

NEW SPECIES SYNDROME IN INDIAN
PTERIDOLOGY
AND THE FERNS OF NEPAL



C.R. FRASER-JENKINS

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BY

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DEDICATION

Professor Tadeus Reichstein, F.R.S., LI, Nob. (1897-1996) - a personal appreciation.

The first I heard about Professor Reichstein was when I was a young post-graduate student of fern-botany and the intricate systematics of the species of *Asplenium* he was publishing on caught and fired my imagination as they were drawn to my attention by Professor (then Dr.) John Lovis, an expert in the same field at Leeds University. Good luck in field-collecting shortly before had led me to discover in Turkey and the Soviet Caucasus, as it then was, what could only be the "missing" diploid ancestor of the common European Male-Fern and, amid a slight atmosphere of scepticism at first, I was delighted to receive an unexpected letter from Prof. Reichstein in 1971. He asked for material to allow him to investigate the chemistry of the new candidate for the "missing diploid," as he had only just previously concluded that the chemistry of a different species could fit the expected pattern. However when he investigated the Caucasian plant he immediately accepted that it must be the correct ancestor, concluding the late Professor Irene Manton's search for it, and went on to show it chemically. Little was I to know that this enquiry was to be the but the tip of a very extensive and gradually revealed iceberg, not only in fern-taxonomy but also in general scientific methodology, and would be the start of a 25 year personal friendship that spanned the generations and continents, as was typical of him.

Professor Tadeus Reichstein (20 July 1897 - 1 Aug. 1996), always known to his friends and colleagues as TadzhiK, was a genius of a man and a "polymath" of extraordinary diversity, energy and great charm of character. When I first went over to meet him at his beautiful home at 22, Weissensteinstrasse, Brüderholz, above Basel, in Switzerland, at the start of 1972, he was already 74, but seemed a much younger, middle-aged man. It was his remarkable, totally alert and enquiring mind in my own subject of ferns that amazed and fascinated me right away. No line of possibilities remained closed in our discussions towards a full understanding of the inner systematic taxonomy of fern-species and their evolution and he was able to draw on an almost encyclopaedic knowledge of the botanical research-literature in a way which virtually no-one can emulate today. This was at a time when he had only ten years previously turned his attention to his second scientific career, the botany of ferns, following on from, as I later discovered, an illustrious research-career in medicinal organic chemistry as the Director of the famous Institut für Organische Chemie of the University of Basel. His work included the discovery, isolation and synthesis of the corticosteroid hormones and working out their functions and medical application, for which, together with the N. American Professors Hensch and Kendall, he was awarded the Nobel Prize for medicine in 1950. These hormones were first obtained in minute quantities from cows' adrenal glands and later, following his work, by synthesis. He had previously worked on the chemistry of digitalis and coffee and then in 1933, in a famous piece of research, discovered the modern, efficient method of synthesising Vitamin C, being awarded the prestigious Marcel Benoist

Prize in 1948. His stories of the accidental discovery of a crucial step in the process from bacterial contamination introduced by a chance invasion of fruit-flies, or of his early lecture-tours in the United States as a scientific sensation, albeit a slightly impecunious one - all told in his superb rolling Swiss accent (for he became an acknowledged, if adopted expert in the Swiss-German language) - were a delight to hear. For his work on Vitamin C he had a life-long financial arrangement with Roche, for whom he worked at the time, which, during his long life, was able to fund all his private research-interests and those of others he helped. Even years after his retirement as Professor of Organic Chemistry at Basel University, he was able to keep a small but high-powered research-team working and publishing actively on the phloroglucide-chemistry of ferns, among other projects.

But there was not only the chemistry (including insect-muscle physiology) and botany (including an intimate knowledge of the Alpine flowers and their up-to-date taxonomy), but also first-hand accounts of what it was like to climb to the top of the Matterhorn and Eiger, or to become electrified during a thunderstorm on a high Alpine ridge, for, to my surprise, Tadzhih also turned out to be a famous member of the unrivalled Swiss Alpine Club. There is a traverse named after him, which he discovered and pioneered, on the Eiger, among other routes he made on the major Alpine peaks. Again it was fascinating to see him unexpectedly, for he had a great humility, on B.B.C. television a few years ago, discussing the philosophy and life of Carl Jung, as he was a close associate of his and a founder-member of the Jungian Society and always used to attend and often speak at their annual meetings at Kusnacht, or at the Eranos conferences for the international exchange of ideas. His philosophical insight on matters, whether at the breakfast-table or late at night in gentle and happy discussion, was a privilege of enlightenment! He seemed to have known everyone, whether Pablo Cassals or Paul Klee, at first hand and in botany (and, of course, in chemistry, too) few of the authorities of the mid and latter part of the century were not either in correspondence with him or acquaintances of his at one time or another, which all added to his remarkable breadth and depth of knowledge. It was also remarkable that he simultaneously turned out to know well so many local amateur botanists and forestry-officers even if they were only peripherally involved with ferns. He seldom left any stones unturned when he was pursuing a subject and was inexhaustible in his quest for detailed knowledge on individual fern-discoveries, as in all his subjects. His cyto-taxonomic publications, which he always wrote himself, mainly on *Asplenium*, *Cheilanthes* and *Cystopteris* (as well as on *Dryopteris* on which we often worked jointly), are fine examples of his exact and detailed research, which revolutionised our knowledge and understanding of the evolution and taxonomy of groups of fern-species, starting in Europe, the Canaries and Azores and going on to the Caucasus, Iran, The Himalaya and China, as the material became available, often from my own collecting-trips, which he funded generously.

At once the quality of his research made him "the authority" in whatever he tackled, always the one person who could come up with the answers and often with the most unexpected, yet totally authoritative facts based on his normally unassailable research. He seldom made mistakes, though he was not at all happy when he did, and would work with renewed energy to correct in detail anything that had turned out to be inadequate or mistaken in one of his previous publications. No-one in his field could work

with such care and in such depth as he did, drawing on every scrap of information available to him. Not unexpectedly, perhaps, for such an active, dedicated and driving research-worker, in his later years he was a mixture of the utterly absorbing and the downright difficult on occasions - but that was his unresented prerogative! We occasionally had some fine rows together, which he would rapidly restore - in addition to sharing many good times. I remember once making a fool of parking his car and being thoroughly told off when I was driving him to Corsica and Sardinia in 1974 for a most enjoyable and worthwhile field-trip, when we climbed the rocks to the top of Mte. Spada and other hills together, finding a new *Dryopteris*, when he was already 77! Later on his patience could frequently wear rather thin and could easily end up with him in a rage at some hair-splittingly annoying name-change imposed on his previous work and resulting from his bugbear, the rules of the "International Code Of Botanical Nomenclature," essential nevertheless. But he would soon calm down and quickly find again his delightful sense of humour, chuckling conspiratorially at the antics of "the wolves" who set the rules and liked to play such games instead of getting on with pure research. Even if seriously annoyed by some problem he remained prepared to work out and understand the cause of the trouble if one discussed it honestly with him - and would accept good intentions once he had thoroughly investigated things. On the other hand, and quite rightly, he had little patience for any traces of laziness or carelessness in people's work. Shoddy research and, particularly, poor documentation of collections annoyed him to the point of withdrawal of his scientific cooperation with a few erstwhile colleagues if he doubted things would improve.

From the time I first knew him, whatever the circumstances, he was always outstandingly generous and knew well the value of helping those who were genuinely dedicated. He helped to fund a number of pteridologists in various parts of the world, and presumably researchers in other fields too, and he was always more than willing to offer help to local botanists when he needed to obtain material from obscure and remote localities around the world. He also helped considerably the British Pteridological Society, of which he was a generous supporter and honorary member, the Swiss group, Farn Freunden, and other societies. He was particularly generous to me, both on a personal level, lending me for my honeymoon his fabulous italianate second house, "Casa alla felci," on the slopes at Agarone overlooking Lake Maggiore in south Switzerland, and, above all, in connection with my collecting and herbarium-research. His financial grants enabled me to continue my field-collecting work year after year, even right up to 1996, and thus allowed me to obtain the material basis for my own research-papers, which he always took a very keen and encouraging interest in. In return he thus obtained much of the plant-material for his work or eagerly-sought references, identifications, information about type-specimens and lists of collections from particular areas which I could provide in an exchange of ideas. As time went on he collaborated in more or less detail with all who were working actively in his field. As he was not a cytologist the cytological findings he needed were made for him first by the late Professor Irene Manton and the late Dr. Stanley Walker, then by Prof. John Lovis, all at Leeds, followed by Prof. Gabor Vida at Budapest and the late Dr. Anne Sleep at Leeds. It was characteristic of him that he took a special interest in Anne Sleep's long and difficult physiological, sclerotic illness which he did much to help with, taking her to a specialist hospital and clinic in Switzerland and even carrying

out some original chemical-medical research into the enzymes involved, which was able to help delay and alleviate some of the symptoms for many years. His cytology was later done by Dr. Jakob Schneller at Zürich, Dr. Mary Gibby at the Natural History Museum, London and finally by Mrs. Helga Rasbach at Glottertal, near Baden. In the meantime Dr. Carl-Johann Widén at Helsinki was able to continue with detailed thin-layer chromatographic and mass-spectrographic work on fern phloroglucides, using the refined methods Prof. Reichstein and his co-workers at Basel had pioneered. His last collaborator was Dr. Ronnie Viane at Gent, who carried out studies of spore-ornamentation and epidermal appendages, which were launched and much helped financially by Prof. Reichstein.

Tadzhik was born at Wloclawek, N.W. of Warsaw, where his father was a technical engineer, but the family - his elder brother and two younger brothers, one of whom, Ignatz, is a Professor of Inorganic Chemistry at Basel - moved to Kiev in the Ukraine every autumn and back again each spring in connection with their father's work. Tadzhik often told me fascinating stories of Kiev at the turn of the century before the bridges across the Dnepr river were built and of walking across on the ice until one heard at night-time the booming-cracking and rumbling of the start of the ice-melt in spring which heralded their return to Poland. In 1905, as a result of an upsurge of violent anti-Jewish sentiment, and fortunately before the great storm of the first world-war swept across Europe, their father wisely moved the family to Jena in east Germany and in 1908 to neutral Switzerland, where they settled at Zürich when Tadzhik was 11. I have had the privilege of sitting and working at the beautiful polished and inlaid, wooden bureau-desk he made himself as a young lad, now nearly an antique itself, in their former home at 14, Forstersteig, on the slopes of Zürichberg, where I stayed with his family-friend, Frau Maya Rauch, who then owned the house in 1991 - and who ultimately came to Basel to look after Tadzhik in his last illness. His academic career nearly foundered at that early stage for he was not at first accepted into the good local school, essential in order to have a chance at University, because his English was too poor. But he was determined to get in, even at that age, and after working hard on his English soon passed into the school. Needless to say he later passed out with distinction and in his later life spoke, wrote and lectured in about eight European languages fluently, including excellent English, though he always continued to claim he was still weak at it! After graduating at the Zürich Technisches Hochschule University in 1920, where he also obtained his Ph. D., his meteoric career in chemistry soon took off, being appointed a Professor of Pharmaceutical Chemistry at Basel University in 1938 and leading up to the highest accolade of all, the acclaimed Nobel Prize, beyond normal scientists' wildest dreams. His many later honours included, as a Fellow of the Royal Society, their Copley Medal in 1968.

Before long Tadzhik married his beloved and devoted Lizzie Quarles van Ufford, from Holland, a person of outstanding grace and spirituality, who devoted her life to him and became much loved for the cooling balm of her counselling guidance to all around her in distress or personal difficulty. Their only child was their daughter, Ruth, married to the concert-cellist, Bruno Straumann, and who sadly died of cancer some ten years ago at the age of 60 - a cross which Tadzhik and Lizzie's longevity had led them to have to bear. Lizzie herself died at home in Basel a few years before Tadzhik, after a long illness, at the ripe age of 90.

In the late 1960's Tadzhib turned his attention from chemistry to his well-known research on ferns and in his last years was determined to finish a huge and exhaustive piece of work on *Asplenium* and *Cheilanthes* for Professor Rechinger's "Flora Iranica," which I was also working on, providing him much information for and editing, along with the late lamented Professor Karl Kramer of Zürich. I particularly remember one night at his home on my return from the Himalaya to Basel in 1992, when he was "a mere 95," when we worked through the list of collections I had brought back for him so he could cite them in the Flora. As midnight approached I simply could not keep my eyes open much longer, though I was less than half his age, but his mind was made up to keep working on into the night until the task was done - and so we did! On another occasion about that time he was determined to single-handedly push my old van, on its way to Nepal, outside his house in the snow to try to get it started, much to my alarm - but such was his tremendous energy! Luckily he was able to finish "Flora Iranica" and also publish many of his then unpublished fern-work projects in a race against failing eye-sight, and it is to be hoped that his remaining papers and the "Flora Iranica" ferns, long since completed in typescript, will soon be handed over to the publishers, the latter as the last volume in the series, containing as it does the results of years of our joint-research and many expeditions. In 1995 Tadzhib's eyesight finally became too bad, due to glaucoma, for him to continue working, or even to distinguish between "a fern and a tree," as he himself put it - yet whenever I telephoned from India or Nepal he would immediately say, "Oh, where *are* you?!" in excitement and go on to ask what new findings had come to light, adding how pleased he was. When asked how he was he would sometimes say, rather quietly now, "I'm getting a little old," but always followed by "Yes, all right!" It seemed, though he was slowing down, as if he could go on forever and it certainly looked as if he might make his century. But sadly this was not quite to be, when a second abdominal operation led to a kidney infection that started to overtake him just before his 99th birthday. It was sad, but also uplifting, to hear from Frau Rauch by telephone that he had succeeded at last in preparing himself fully for his last journey - beyond life into the unknown: and on the 1st. August 1996, eleven days after his 99th birthday he slipped away peacefully at his home in Basel, with his grandsons and family-friend at hand to support him. He was buried at the Cemetery of the Israelitic Community, Basel. He leaves three grandsons, Til, Patrick and Benjamin Straumann, now pursuing their own academic careers.

In all he published nearly 100 high quality, outstandingly thorough and formative research-papers on ferns, including his joint-work with many other European pteridologists, and similarly published some 450 important and fundamental chemical papers. He gave his superb garden-collection of carefully labelled living ferns, grown at Basel and Agarone, containing many famous original collections and type-plants, to Zürich University Botanical Garden, Zollikerstrasse, Zürich, several years ago; his extensive and important herbarium went mainly to Zürich again and also partly to Gent, Belgium, with many duplicates in my own herbarium (at the Natural History Museum, London; National Museum of Wales, Cardiff; and Helsinki University Botanical Museum). His large, comprehensive and valuable private botanical library was given a couple of years before his death to Cracow University, Poland. Species *etc.* named after him are:-

Anogramma reichsteinii Fraser-Jenkins (1997).

Asplenium x reichsteinii Bennert & Rasbach (1987).

Asplenium tadei Fraser-Jenkins & Schneller (1987).

Athyrium x reichsteinii Schneller & Rasbach (1984).

Dryopteris reichsteinii Fraser-Jenkins (1989).

Dryopteris wallichiana (Sprengel in L.) Hylander subsp. *reichsteinii* Fraser-Jenkins (1996).

He discovered and named over 50 new species, subspecies or hybrids of ferns.

Other tributes to him have appeared for his 90th. birthday in (among others):-

The Botanical Journal of the Linnaean Society (London) (1987).

The Fern Gazette (1987).

Farnblatter (1987).

Helvetica Chimica Acta (1987).

The Journal of the Swiss Alpine Club (1987).

and obituaries have appeared (among many others) in:-

Eripainos Kirmiu-Kemi (Helsinki) (1996).

The Independent (London) (1996).

The Bulletin of the British Pteridological Society (1997).

Christopher Fraser-Jenkins, Kathmandu, Feb. 1997.

SYNOPSIS

In this book, comments are made on the approach to "new species" prevalent in India with particular reference to suggestions made in a recent publication by Panigrahi (1995) concerning a work by Singh & Panigrahi, in prep. The increasing abundance of poorly researched, erroneous "new species" in parts of Asia seriously threatens to overwhelm the ability and time available for more authoritative and international specialists to evaluate them and identify them properly as known species, which is the case for the great majority of such names. If this tendency is allowed to continue as a result of the lack of editorial filtering of papers sent for publication a situation similar to that in Chinese pteridology may develop with real species being poorly understood because they are divided under an excess of false names. Authors unfamiliar with variation in the species concerned or with the basic literature for each genus may be tempted to publish new names whenever they cannot identify a specimen rapidly, though it may merely be an individual representing just a part of the range of phenotypic variation in a known species. Similarly they may publish as new any species unfamiliar to them in their area, even though it exists in the literature or is represented in herbaria that they have not consulted. That publishing more papers and "new species" evidently assists careers in India unduly as a major criterion of success is serious cause for concern. The end result, as in China, may be that no-one takes seriously apparent "new species" published from the area, nor will they identify their collections properly, leading to the eventual implosion of taxonomy altogether in a chain-reaction of "new species syndrome." New varieties of uncertain status are also being published apace in Indian pteridology, but are usually of no taxonomic significance and should not have been named.

It is pleaded that local floristic accounts of authors' collections stop aiming to publish spurious new taxa. Instead there is a crying need for detailed and geographically far-reaching

monographic studies of genera, with international collaboration whenever possible and appropriate, and authors should also familiarise themselves with extra-Indian Asiatic species as much as possible, as well as with essential herbarium-collections in both Indian and foreign herbaria which are at present ignored and thus rendered effectively useless.

A partial list of spurious names in Indian pteridology is given with their correct names in 79 genera (and 16 subgenera within *Thelypteris*), containing 41 necessary new combinations (1 at the rank of subfamily, 4 at subgenus, 25 at species, 8 at subspecies and 3 at nothospecies or nothosubspecies), 7 *nomina nova* at species-rank, 1 *nomen novum* for a nothospecies, 1 new subfamily, 8 new species, 4 new subspecies, 7 new hybrids (including a new nothogenus) and 2 new cultivars, where the nomenclature or taxonomy has so far been inadequate. Names that are suspect and require further investigation are also listed without giving corrected names, but with a query as to what they are equivalent to.

INTRODUCTION

In March 1992 I was given the opportunity to look through S.S. Singh's Ph. D. thesis from Calcutta University, under Dr. G. Panigrahi, on ferns of Tirap, Arunachal Pradesh, which was passed on to me by the late Prof. K.U. Kramer, one of the external examiners, for comments. The work was generally of good quality as the author had made the effort to draw on and incorporate work done abroad as well as in India, where few authors normally bother to assimilate even the publications of their contemporaries. Although the thesis was far from complete in its listing of species, being based only on the author's collections, as so often in India, and contained some errors needing correction, it was pleasing to see a work worthy of spending the time on it. It was encouraging, for example, to find that Singh had noticed my own mistake (Fraser-Jenkins (1991)) in calling *Polystichum pseudotsussimense* Ching, a species previously overlooked and unnamed in India, *P. subapiciflorum* Hay. (a synonym of *P. biaristatum* (Bl.) T. Moore), which I had also found to be wrong but had not got around to publishing, rather than blindly accepting the word of a foreign specialist without further investigation. He also found that the name *Onychium contiguum* Hope is superfluous and cannot be used (see Fraser-Jenkins (1993: 145), where I have cited his discovery and found that the correct name for the species is *O. cryptogrammoides* Christ). However it must be said that Kramer was concerned at the number of apparent new species contained in the thesis and, upon examination, so was I. I even had to reject one kindly named after myself that, from the photograph, obviously belonged to another common species and I could see from the other photographs that most or all of the "new" *Polystichum* and *Diplazium* species, at least, were not new species at all. It therefore seemed likely that very few, if any, of Singh's species would really be new and in my report to Kramer and subsequent letter to Singh (referred to by Panigrahi (1995) and therefore received by them despite their failure to either follow the advice or reply) I requested that further study be undertaken before they were published and that the material should be checked by someone familiar with the genera concerned in the area.

It was therefore with a sense of alarm that I later read (Panigrahi (1995: 174)) that no

less than 48 new taxa, which seemed rather boldly trumpeted abroad, were going to be published in this work, under the authorship of Singh & Panigrahi (estimated for late 1997 by the publishers, Bishen Singh and Mahendra Pal Singh of Dehra Dun, not 1993 as stated by Panigrahi (1993*d*), or 1995 as stated by Panigrahi (1995)), though material from the genera I am widely known to have monographed has not been made available for identification and, on checking with other international specialists in particular genera, the same appears to have been the case there also.

By way of attempted justification for this unsatisfactory state of affairs concerning the naming of all these spurious taxa, Panigrahi quoted, slightly inaccurately, Hope's (1899: 321 [7 in the reprinted version], not 1902-1903, as cited by Panigrahi in error for 1899-1904) complaint that his Victorian contemporaries too often reduced good species to varieties - the opposite situation to today's problem! But we must first bear in mind that Hope's species-concepts, ahead of his time due to his careful field-observation, were generally on a par with our modern-day concepts. So what was disturbing him was the old-fashioned Beddomean, Clarkeian and Hookerian tendency of his day to reduce almost all the perfectly good new Himalayan species being discovered in larger genera, such as *Dryopteris*, *Polystichum*, *Athyrium*, *Diplazium* and *Cheilanthes* to varieties of *D. filix-mas* (L.) Schott, *P. setiferum* (Forssk.) Woyнар or *P. aculeatum* (L.) Roth, *A. filix-femina* (L.) Roth, *D. polypodioides* Bl. and *C. farinosa* (Forssk.) Kaulf., respectively - indeed often, it seemed, of whatever species made them feel taxonomically at home while abroad! Thus two pages before, Hope said he made species of the varieties "when distinct enough from the so-called types [*i.e.* "typical" specimens, not type-specimens] to be separately described" and went on to explain his reasons, as summarised here, most of the taxa being very obviously distinct by today's standards. Secondly one needs only look at the species Hope described anew (bearing in mind some earlier names were not known to him or were misapplied) in his book to see how very distinct his now well known species are (*e.g.* *Cheilanthes dubia* Hope, *Athyrium rupicola* (Hope) C. Chr., *Polystichum duthiei* (Hope) C. Chr., *Dryopteris gamblei* (Hope) C. Chr., *Dryopteris acutodentata* Ching (*nom. nov.* for *Nephrodium kingii* Hope), *Thelypteris papilio*

(Hope) Iwats. *etc.*). One can then realise that there is no comparison between such real species and the mainly trifling, insignificant or inconstant entities that have been described by Panigrahi & Singh and defended using Hope's statements. All this was misinterpreted or overlooked by Panigrahi. One wonders what Hope himself would have thought if he had seen his words being misused in this way and had had to deal with the "species" concerned in a treatment of Indian ferns. On page 321, which Panigrahi quoted from, Hope even said that the taxa he made species of had "*only slight or fancied resemblances*" to previously described species and gave examples. Of all Hope's new taxa the only one that was not properly distinguished by him from species previously known to him was *Asplenium tenellum* Hope, his erroneous illustration of which was a specimen of *Athyrium strigillosum* (T. Moore ex E. Lowe) T. Moore ex Salom. showing semi-juvenile, luxuriant frond-morphology. But for nomenclatural reasons the name is actually a synonym of what later came to be called *Athyrium setiferum* C. Chr., a *nomen novum* for it, which does stand as a good species. A second rather debatable species was one of the examples he gave on page 321 and is a lot more critical than his other novelties - the taxon now called *Pseudophegopteris pyrhorhachis* subsp. *laterepens* (Trotter in Hope) Fras.-Jenk., but which nevertheless shows some important differences and is a distinct, if difficult taxon. When Hope separated this from *P. pyrhorhachis* (Kunze) Ching subsp. *distans* (Mett.) Fras.-Jenk. (*sub Polypodium laterepens* Trotter in Hope and *Polypodium distans* D. Don, *non* Kaulf., respectively) he was quite clear from field- and herbarium-studies that he was dealing with a real, distinct entity even if it is somewhat cryptic and he, like I, knew well from being familiar with both subspecies that they are genuinely distinct, both in rhizome-characteristics and in the, normally, more acute and dissect pinnules of subsp. *laterepens* (except when undeveloped due to exposure). They also have a different ecology and range; subsp. *distans*, with its more short-creeping, more compact, thicker rhizome and more clumped fronds, occurring at lower altitudes in the outer Himalaya, or otherwise further east, and subsp. *laterepens*, with a long-creeping, thinner rhizome and distant fronds, occurring at higher altitudes and further into the Himalaya, or further west. Where the former reaches its westernmost extension in Jammu Division.

Kathua, at Kadol, collected by me (Fraser-Jenkins (1992)), it occurs at rather lower mid altitude in the outermost ranges, while subsp. *laterepens* occurs on the way up to the Chatra Gala pass on the next range to the north and higher up. Further east, in Nepal, the latter retreats further inwards and gradually becomes mostly replaced by subsp. *distans*. Holttum (1969) in his study of *Pseudophegopteris* evidently did not know them in the field as he lumped them together unrecognised under what I now treat as a third subspecies, subsp. *pyrrhorhachis*, in contrast to his normal slight tendency to recognise too many species. I have subsequently come to know, after reidentification by me of Indian cytological voucher-specimens, that there is also a cytological difference between the two. Of the two cytotypes of *P. pyrrhorhachis* reported by Khullar and his co-workers (summarised by Khullar & Sharma (1991)), the diploid applies to subsp. *distans* (while Manton & Sledge's (1954) two cytotypes from Sri Lanka belong to subsp. *pyrrhorhachis* and a further and as yet unidentified subspecies) and the tetraploid applies to subsp. *laterepens*. I have now reidentified Khullar, Sharma & Verma's (1988) cytological report for *P. rectangularis* (Zoll.) Holtt., from Kinnaur, as an error for attenuated (due to exposure), undeveloped and partly immature plants of *P. pyrrhorhachis* subsp. *laterepens*. One of their specimens (PAN!) even has a creeping rhizome, though it is more compressed than normal and imitates that of *P. pyrrhorhachis* subsp. *distans*, which is not normally the case, but is probably due to the environment of that particular population so far into the Himalaya in a very desolate region. Confusion with *P. rectangularis* has been a rather widely made error, including in the cover at Kew, as pointed out by Holttum (1969), and I have myself seen how close to it (in lack of pinnule-lobing) attenuated or immature, but fertile *P. pyrrhorhachis* subsp. *distans* can become in Kathua, Nepal and Sikkim, as also are attenuated plants of subsp. *laterepens* in a number of mostly west-Himalayan localities. True *P. rectangularis* is a quite distinct east-Himalayan species with an erect rhizome, not occurring in the west.

Before Hope described new species he took the trouble to work in detail at the BM, Kew, Saharanpur (now Dehra Dun), Calcutta *etc.* and become familiarised with species even outside his immediate area, India, so that when he talked about a new species, after studying it

very carefully in the field on a population level, he really knew that it was not something known already from an adjacent area. He also knew it did not merely represent an individual part of the variation within a previously known species as he carefully studied its range of variation and that of all the affiliated species throughout the whole of India before describing it as a new one. Hope's practice and comments are, of course, completely endorsed by me, as by all serious international taxonomists, even if they may not have been followed properly by Panigrahi's student under his guidance, or indeed, as we can see later in this paper, by Panigrahi himself.

But Panigrahi (1995) made much of claiming and attempting to show otherwise and mistakenly contradicted some comments I had made rejecting the specific rank (Fraser-Jenkins (1988)) in certain cases which actually apply in a completely different context, not comparable with what he was writing about. They were made concerning a highly cryptic and close-knit, apomictic, hybrid-derived species-aggregate from Europe, *Dryopteris affinis* (R. Lowe) Fras.-Jenk. and its subspecies (first discovered and elucidated by Fraser-Jenkins (1980a)), which all contain one set of the same genome, W, probably from *D. wallichiana* (Spreng. in L.) Hyland, subsp. *wallichiana*, admixed with different ratios of other genomes from generally rather similar but distinct species - *i.e.* OW; OOW; O₁O₂ W and probable OCW (see Fraser-Jenkins (1980a) *etc.*). My choice of rank for these intimately related and closely similar taxa as subspecies instead of species was surely appropriate and has been followed by nearly all authors and Floras *etc.* since. It also appears to be the moderate middle-course between two extremes - as, on the one hand, some theoretical North American systematists with little or no first-hand taxonomic knowledge of the (European) group, have made species out of them (Beitel & Buck (1988)), though they have not been followed by others - yet, on the other hand, a British non-specialist (Dyer (1996)) has declared that even the subspecies should not be recognised at all, which has been discussed further by Fraser-Jenkins (1996), in answer. Much of the reason for Dyer's idea must have been the result of confusion arising from his colleague, Page's (1982), mistaken transposition of my subspecific names in his popular illustrated book, due to his not being familiar with the subspecies themselves (despite his later

unsubstantiated and unbelievable claim (Page (1996)) to have been able to recognise the taxa, unpublished and unheard of at the time, some ten years before the publication of my paper describing them!). As I discovered from seeing his identifications in E (and after reidentifying a specimen Dyer had shown me in July 1994 after obtaining a misidentification of it from Page), Page has subsequently made many frequent and obvious misidentifications of specimens as "hybrids" or the wrong subspecies and all this must therefore have contributed markedly to Dyer's forsaking the subspecies. Also contributing to the problem was Jermy's not assigning the proper ranks to the taxa that I had given them, following normal botanical practice as constantly exemplified in the Code, but instead calling them all the less-meaningful "morphotypes," whether they were the important subspecies or the far less important geographical varieties within the subspecies. The situation with *D. affinis* is utterly different from that to which either Hope or Panigrahi were referring and my comments on it should not have been taken out of context and applied to good and readily morphologically separable biological species in general as Panigrahi attempted to do, presumably having failed to understand the context of my paper.

Panigrahi (1995) should also not have invented his own inference that I would not treat a biological species as a species and then attributed it to me in error. Since all genuine species are biological ones, presumably he felt that I am not able to accept any species in any genera, but only subspecies! I myself never said or followed the practice that recognising taxa such as amphidiploids as species on cytological grounds is highly unfortunate, as he stated, which could delete the majority of European *Dryopteris* species, for example. But even though one cannot draw hard and fast rules for the applications of ranks, I have most definitely said that in this particular case of *D. affinis*, it would be highly unfortunate to make species for various reasons. I adhere to this now, as do most others who know the group. Similarly he attributed to me the criticism that those who opt for species-status (for ? cytological or ? any species) are mere combination-seekers - yet I clearly applied my remark only to the taxa within the special case of the *D. affinis* and *D. wallichiana* group and, as it happens, I also had in mind a particular E. European author. But I can imagine from his

lifetime's concentration on seeking out new combinations that can be made by picking up the loose ends in the literature, often with totally insufficient accompanying taxonomic research or knowledge, that Panigrahi might be expected to be over-sensitive to that particular charge! Actually, not only he (as the most outstanding example) but all too many Indian botanists appear to be too keen to be the first to create new combinations with little real knowledge of the genera and species concerned, or to name new species from mere phenotypic variants without understanding that they really belong to the original known species. There are far too many such cases in Indian pteridology.

My own principles, originally formulated in my early days from such well known authorities as Davis & Heywood (1967) *etc.*, but now tempered by long practice, and in keeping with those of the great majority of pteridologists, are that a species should be both biologically separate and practically recognisable, with a clear morphological distinction from other species. Hence my dislike of the widely discredited situations in *Alchemilla*, *Euphrasia*, *Hieraceum* *etc.* (but apparently now advocated by Das, Misra and Panigrahi (1989) for ferns, too) of over-important "microspecies," which in my view have been assigned too high and a less than practical or meaningful rank at the specific level, rather than the more appropriate one of subspecies (or below), since they are in no way equivalent to the rank of species as employed in most other genera, as should be the practice. As there is no normal rank of "microspecies" it is not sanctioned by general usage as implied by Panigrahi, so why seek to introduce it in ferns when we already have the perfectly good rank of subspecies (or below) available? For example, it would hardly be desirable to make highly cryptic species ("microspecies") in *Adiantum philippense* L., *Pteris cretica* L., or of the tetraploid and hexaploid cytotypes within *Cystopteris fragilis* (L.) Bernh. subsp. *fragilis* (or also in subsp. *dickieana* (Sim) Hyland.) *etc.* of mere cytotypes no-one could recognise on gross or hand-lens morphology, even though some might like to do so purely on theoretical grounds, or even just in order to make new names or combinations under their authorship. Such species would in no way be equivalent in rank to other species in the genera concerned. One must ask if Panigrahi was intending to imply, as it looks like he was, that he thought all different

cytotypes should automatically be made different species, thus also giving him the opportunity to create many new names? It needs to be borne in mind that rather many species carefully worked on by top-grade modern specialists contain more than one cryptic cytotype. If there is insufficient practical morphological distinction different cytotypes merely become another characteristic, like any other, to be overridden if necessary; nor should all amphidiploids automatically be made species, or cryptic autopolyploids subspecies as a kind of rule, as some cytologists have argued in *Asplenium etc.* It is each individual situation in nature that counts and should be reflected in our taxonomic and nomenclatural treatment, even if nature is not always consistent and convenient for our minds!

My treatment of the clearly morphologically distinct amphidiploid or segmental allopolyploid *Dryopteris submontana* (Fras.-Jenk. & Jermy) Fras.-Jenk. as a species was obviously appropriate and in keeping with principle, yet Panigrahi (1995) mentioned it as if an anomaly compared to what I had said about *D. affinis* - *i.e.* that I had raised a mere cytotype to be a species, against what I had said. But this was an apparent anomaly that he alone gave rise to by not following properly what I had said. Panigrahi (1965) actually had quite insufficient taxonomic knowledge of this species and appears only to have known it as a cytotacon pointed out to him as a training-exercise by Manton when he studied at Leeds. He was not familiar enough with the group in Europe, from his cytological counting alone, to see how well distinct it is. It was first found to be tetraploid by Manton (1950), though Panigrahi (1993d), in a strange paper which amounts to a catalogue of a lifetime of incompetent errors, full of spurious claims that others' original findings were merely reconfirmation of his own previous work, appears to be suggesting that the taxon and its cytological elucidation were his discovery, but it was already recognised even prior to the advent of cytotaconomy in continental Europe under invalid or illegitimate names. The well known continental diploid, *D. villarii* (Bell.) Woynar *ex* Schinz & Thell., also first found to be diploid by Manton (1950), was suggested by her (and not, as he implied in 1993d by his vague wording, by Panigrahi (1965)) to be part-ancestral to the tetraploid, while the Mediterranean *D. pallida* (Bory) C. Chr. *ex* Maire & Petitmengin was found to be another diploid by Vida

(1969) and was suggested by him to be the other ancestral diploid. Panigrahi's contribution was the synthesis of a hybrid between *D. villarii* and *D. submontana* and the obtaining of a chromosome-count on it, which by itself proved nothing. Another diploid natural hybrid he investigated, *D. x vidae* Fras.-Jenk. & Gibby, was never published by him (see Fraser-Jenkins & Gibby (1980)) as he appears not to have realised or understood its significance in showing *D. submontana* to be allotetraploid and amphidiploid and thus finally proving that *D. villarii* is indeed part-ancestral to *D. submontana*, both of which findings Panigrahi did not demonstrate, despite his (1995: 242) claim that he did. However I must now correct the nomenclature I used previously (Fraser-Jenkins (1977)) as *D. submontana* must now be known as *D. mindshelkensis* Pavl., a name whose identity was previously unclear (Fraser-Jenkins (1977 and 1986: 192)). In 1992 I discovered an unidentified specimen of it from Afghanistan, Darreh Zang gorge. *R. Gibbons* 828, 4 Aug. 1971 at Missouri (MO) and came to the realisation that it is the same species as *D. submontana* and not a Soviet central-Asian endemic, as previously thought, but another Soviet "pseudo-endemic" (see Fraser-Jenkins (1993)), described anew due to the isolation of botanical scientists in the former U.S.S.R. A similar and very bad situation exists with the 100% incorrect, hardly responsible and often missapplied names of new species, subspecies and varieties recently recognised from the Caucasus by Askerov (1979, 1983*a* and *b* and 1988) in a number of spurious new combinations *etc.* Other recent Soviet publications are also similarly unaware of modern work and include grossly outdated or inaccurate generic placements *etc.* The range of *D. mindshelkensis* is actually a fine example of a palaeo-Mediterranean and Tethys-coastal species, with an Atlantic extension from Spain to Britain, as often occurs. Its Asian range extends in a fragmented series of short hops from S.E. Europe to S. Turkey (Fraser-Jenkins & Schneller (1987)), the Caucasus, N.E. Iran, Tadzhikistan and Afghanistan, always occurring on limestone, or a calcareous substrate. The justified distinction of such a species, however, is quite different from the generation of "new species" uncalled for by the taxonomic situation that exists in nature, which is what I was referring to with *D. affinis* (Fraser-Jenkins 1988), or from the prolific generation of mistaken new names which is the problem the present paper

attempts to tackle.

Turning back to principles, let us now face the situation that Singh's 48 "new" taxa may soon be published without being checked; one wonders if any at all will actually be new? Panigrahi is well aware whom to ask internationally who really knows the various genera well enough to recognise them and any genuine new ones could then be usefully published. It is, of course, safe for him to rely on international workers to give their opinions and not poach on new taxa - unlike what can so often happen in India where others' findings, particularly determinations unwisely written in herbaria before publication with the intention to assist others, but even sometimes new taxa (see *sub Phymatosorus malabaricus* in the list, below) may be picked up and published without consultation or permission by certain second-hand "botanists." It seems to me to be a serious failing in the duty of a supervisor to allow or encourage a student (or author) to publish "new species" like Singh's without due advice and caution instead of insisting they be checked properly before thinking of naming them at all, let alone publishing them. Gone, sadly, are the likes of the late, lamented Prof. P.N. Mehra, who almost single-handedly created the high standards required by means of detailed and incisive supervision; in his absence, not only do we see shoals of spurious new taxa, but also piles of undocumented and thus useless specimens in private, University- and national herbaria that are all that remains to verify these all too eagerly produced publications that last forever with their questionable taxa and records and may represent a life-time of someone's study! Gone, too, is the late Dr. R.R. Stewart, of equal stature, and who was equally strict on picking up errors and failures, all in good cause. As an example of his dismay at the apparent slap-dash one need only turn to his (Stewart (1985)) rather severe review of errors in Dhir's (1980) commendable book on west-Himalayan ferns - though in this particular instance I believe he was over-critical of basically minor points in what was actually as good a work as had been published in India at the time. Holttum's (1975) informative and authoritative criticism of Nayar & Kaur's (1974) book, where they published many of his thelypteroid combinations in advance of his work being ready, is also a masterly guide-line to students and, interestingly, shows that he was not adequately consulted or shown the book before it was in press (pg.

320). It is also important to realise (Kaur, pers. comm. 1984) that the two authors did not even see Beddome's types which is surely the only worthwhile basis for such a book. I must also decry the taxonomic and nomenclatural incompetence and careless inaccuracy in their work which has resulted in many of their apparent new combinations being invalid, as can be seen from the list later in this paper.

Mistaken "new species" are undoubtedly one of the main problems in Asian pteridology, but in India there has latterly been a marked tendency for several authors, including Singh, to publish a number of so-called "new varieties" as well and for these subsequently to be added to inaccurate lists of what are thought to be endemic taxa *etc.*, most of which, resulting from lack of extra-Indian knowledge, are not endemics at all. In Europe, at least, varieties are seldom recognised in ferns and their nature must be questioned in India. What are these varieties, why are they placed at that rank and are they really of taxonomic significance? If they really represent consistently and readily recognisably different biological entities with, for example, an independent range (though they may overlap), then they are almost certainly species in their own right, or, if closely related, overlapping morphologically and differing only in minor characteristics, subspecies. A good candidate for genuine varietal status, if it is necessary to separate it, would be a minor ecological form (ecotype) that turns up rather frequently whenever the right conditions apply, but, being fully interfertile, merges into and is not separated properly from the rest of the species, even though it has been genetically selected by the particular environment. Another might be a slight geographical variant of a species, perhaps at one end or in one part of its range, particularly within some apomictic complexes. But almost all the "new varieties" in India are not these at all. Some are species the authors could not recognise properly - *i.e.* they are of temporary status as varieties; but the vast bulk are merely unusual *specimens* of no taxonomic status because they represent growth-stages, poorly or abnormally well-developed plants, or are single representatives of continuous phenotypic variation as a result of exposure, altitude, or just growing-conditions *etc.* These things are just part of the normal variation within species and cannot be separated in the field. There is no sensible dividing line between them and "normal"

individuals within the population, or between populations. So what is the point of recognising them at all? Clearly they should not have been named and the increasing Indian practice of naming varieties just because an author has come across a herbarium-specimen or two that he found atypical and hard to identify should be nipped in the bud as soon as possible. I myself have also been guilty of maintaining pointless varieties when I accepted three varieties which are only growth/environmental/developmental stages, forming a perfectly continuous range, within *Athyrium attenuatum* (Clarke) Tag., some years ago (Fraser-Jenkins & Khullar (1982)). In a forthcoming monographic study of west- and central-Himalayan *Athyrium* and *Diplazium* (Fraser-Jenkins 1997c, in press) I have sunk these without trace within the species, as they should have been in the first place and as should now be done for many other Indian "varieties," depending on the situation in each individual case. It is surprising that despite my explanations and photographs (in Fraser-Jenkins & Khullar (1982)) showing that the above-mentioned *Athyrium* variants are only growth-forms, published in a series edited by Bir, we still find the two being treated as distinct species by Bir, Irudayaraj & Singh (1995), failing to assimilate new work. However this is not to say that the semi-geographical varieties in *Dryopteris affinis* are not worthy of recognition, in case my words should again be misapplied out of context.

The lack of editorial vetting of botanical papers sent for publication in India is a severe problem which urgently needs redress as it allows the whole subject to stagnate, the same old mistakes, practices and omissions being endlessly repeated in publication after publication, as happens in the *Indian Fern Journal*, despite its many good points and the achievement of its very existence, which is probably the major break-through of the post-independence era in Indian pteridology. Furthermore, editors (and supervisors) should insist that voucher-material for all records be placed, fully documented, in a known national herbarium (and not at a temporary University one - even the future of PAN, and certainly of PUN, must be seen as in doubt in a few years' time) at the time of publication in order that the mistakes can be properly corrected by reidentification by later workers. It is the quality of the mistakes being made that causes much concern as they are generally easily avoidable and

should so have been. No-one, even monographers really experienced in a genus, can avoid occasional misidentification of difficult and atypical type-specimens, or such-like mistakes. But mistakes arising from simply not knowing the species and the flora or not seeing the types should be avoided by not publishing prematurely and those resulting from not being aware of well known literature should be weeded out by editors. Yet it has become clear that many or most authors in India do not take the trouble to assimilate or perhaps even read the papers published in their field, which casts doubt on their sense of dedication. Thus important new international papers are widely ignored in India, partly due to a general lack of communication and cooperation. We are all familiar with the one-way letters to India, which one learns years later, when the contents are unauthorisedly published anew, were indeed received! In some other cases, by contrast, international publications may be taken too much as "Gospel Truth" due to the lack of local expertise combined with the ravages of an education which teaches students at all levels to repeat obediently and not question or verify for themselves the opinions of "authorities." Significantly, in the cases where a student does produce original work, we find the supervisor will often have his name added, even as the first author, in the student's publication of his work! Papers in Indian journals are also ignored, the only possible excuse being that authors there are almost obliged by their institutes' system of promotion, based on the number and not quality of their publications, to publish far too hastily and frequently with publications full of repetition of previous work (therefore not normally acceptable for publication in reputable international journals) and so full of errors that most papers are unreliable to the point of not being worth reading. There is also hardly time to assimilate all these mostly useless and misleading papers. But, of course, for any serious worker it must be done despite the difficulty. For example, even in the papers of Bir, who is, of course, a genuinely dedicated researcher, unlike some others, one can weed out three quarters of the information as repetition (often slightly inaccurately repeated, too) and find that they all boil down to a handful of about half-a-dozen genuinely new papers - particularly the formative one, Mehra & Bir (1965), which drew on his own collections in Sikkim and also on those of his fellow workers and joint-collectors there from Panjab University, Verma and

Loyal, and especially of the pioneering collector, S.K. Malhotra, who was strangely not even mentioned in the acknowledgements or in the text, where collections were generally not accredited to their collectors. Fortunately the original specimens still survive in more-or-less good state at PAN and can be drawn on to reevaluate and make full use of this important publication.

It is concerning acceptability for publication that the responsibility of editors is so important. On receiving a paper or book full of errors whose author is obviously unfamiliar with contemporary literature or with the essential standard publications for each genus, an editor - who of all people must be highly familiar with the literature - must send it back pointing out fundamental corrections and revision to be made. In the previous 1995 ("1994") volume of the *Indian Fern Journal*, for example, many obvious mistakes should not have been allowed to slip through the net. For example Bera, Ghorai & Raut's (1995) claim that they were the first to record galls in Indian *Selaginella*, when the basic, standard foundation-work for the genus, which has not been superseded, Alston's (1945) "*An enumeration of the Indian species of Selaginella*," clearly records them for *S. pentagona* Spring and not only identified the family of wasp (which Bera *et al.* rather uninformatively stated they were unable to do) but also gave an earlier reference as well. Furthermore, though I cannot be quite sure, their photograph appears to me to show a *Selaginella* species with isomorphic sporophylls, that looks like *S. pentagona*, whereas *S. monospora* has dimorphic sporophylls, as can easily be seen from Alston's key. Following this, De & Bera (1996) only stated that it is a *Cynpid* wasp (in contrast to Alston's identification as a *Cercynomid*) and have still to be told by a responsible editor of Alston's work (largely copied with added misidentifications and gaps in the key and hardly improved on by a recent Indian book on the genus (Dixit (1992))). Another glaring example is Sankari Ammal & Bhavanandan's (1995) wildly incorrect report of the European-type boreal species, *Dryopteris cristata* (L.) A. Gray, from south India, while its range (the nearest point being some 3,000 miles further north at Lake Baikal in Siberia) is fully recorded in European and North American Floras and a detailed monograph of Indian *Dryopteris* (Fraser-Jenkins (1989)) is well known to the editor. Other such cases are Chandra

& Kaur's (1995) ignorance of the genus *Dryopsis* of Holttum & Edwards when referring to "*Ctenitis clarkei*" (Bak.) Ching and "*Ctenitis nidus*" (Clarke) Ching, and apparently even of *Nothoperanema*, with "*Ctenitis hendersonii*" (Bedd.) Itô in Nakai & Honda, while misidentifying "*Pleopeltis malacodon* Hook." [actually (Hook.) Bedd.], which should be called *Phymatopteris malacodon* (Hook.) Pich. Serm., as the totally different, far-east Asian "*Crypsinus hastatus*," (Thunb.) Copel. This latter does not occur in India and is more normally confused with *Phymatopteris oxyloba* (Wall. ex Kunze) Pich. Serm.; but actually Beddome's t.387 is anyway very obviously *P. quasidivaricata* (Hay.) Pich. Serm. One must ask, too, why they seem not to have heard of the genus *Phymatopteris* in this particular paper while accepting it in the same volume a little further on (Kaur & Chandra (1995)); which the editor obviously failed to point out to them, assuming he actually checked their papers. Other examples are Pande & Bhandari's (1995) use of *Pyrrosia beddomeana* (Gies.) Ching instead of *P. costata* (C. Presl) Tag. & Iwats., as clearly shown in the standard work on the genus (Hovenkamp (1986)); Pande & Bir's (1995) use of *Asplenium viride* Huds. instead of *A. ramosum* L. (see the Code (1994: 23, Ex. 14) re spelling of this name), *Cryptogramma gracilis* (Michx.) Clute instead of *C. stelleri* (Gmel.) Prantl, *Diplazium lobulosum* (Wall. ex Mett.) C. Presl instead of *D. longifolium* T. Moore (see Morton (1973)); Bir, Irudayaraj & Singh's (1995) nomenclatural errors, including "*Athyrium petersenii*" (Kunze) Bir instead of *Deparia petersenii* (Kunze) Kato (which is tetraploid), "*Athyrium japonicum*" (Thunb. ex Murray) Copel. instead of *Deparia japonica* (Thunb. ex Murray) Kato (which is diploid, though misreported as tetraploid due to confusion with *D. petersenii* by Bir *et al.*), or "*Athyrium allantodioides*" Bedd. instead of *Deparia allantodioides* (Bedd.) Kato (at least they might have heard of the synonymous genera *Lunathyrium* and *Athyriopsis*, if not *Deparia*), or the use of both *Athyrium attenuatum* "Tag." [actually (Clarke) Tag.] and *A. dentigerum* (Wall. ex Clarke) Mehra & Bir (mentioned previously), or, again their use of both *A. fimbriatum* "(Wall.) T. Moore" [Wallich names still being attributed as if validly published, as they used to be in the first part of this century], and (misapplied) *A. foliolosum* "Wall. ex Sim" - the first name having been misapplied by Bir for many years to *A. atkinsonii* Bedd.,

which they also list, but both names being intended to refer to what should be called *A. fimbriatum* T. Moore, or their listing of an unidentifiable "*A. sikkimense* [*sikkimensis*]" Wall. ex Ching etc.; Beri & Bir (1996) also listed the family "*Aspidiaceae*," well known to be illegitimate following its rejection by Committee, instead of *Dryopteridaceae* - against the Code and a well publicised case, mentioned in the 1995 volume of the *Indian Fern Journal* - and placed *Lepisorus* and *Drynaria* in the *Loxogrammaceae* instead of the *Polypodiaceae*! It is also quite clear that the *Loxogrammaceae* are far too close to the *Polypodiaceae* to be recognised as a family, as, too, are the *Drynariaceae*. Further examples are Anand & Shrivastava's (1995) use of *Adiantum lunulatum* Burm. fil., well publicised recently to be incorrect and against the Code, instead of *A. philippense* L., an error which has been all too widely perpetuated in India following earlier papers by Verma (1962), Morton (1974) and Sledge (1982), all against the principles of lectotypification and the avoidance of the concept of *nomina dubia*; Pande, Vishwakarma & Pande's (1995) use of the name *Pyrrhosia stictica* ["*sticta*"] (Kunze) Holtt., instead of *P. porosa* (C. Pres!) Hovenk. (*sens. strict.*) and report of the exclusively S.E. Asian *P. stigmosa* (Sw.) Ching. In another amazing example, Pande & Pande (1994) came out with the ridiculous blunders that *Notholaena marantae* (L.) R. Brown, *Lycopodiella cernua* (L.) Pich. Serm. (*sub Palhinhaea*), *Lycopodium annotinum* L., *Cheilanthes duthiei* Bak. and "*Onychium contiguum*" Wall. ex Hope are exclusively epiphytes in Kumaun, when in fact more exclusively terrestrial species, in Kumaun or anywhere else, would be hard to imagine! Perhaps symbolically, even the covers of the recent *Indian Fern Journals* have been illustrated with the superfluous "new species," *Athyrium mehrae* Bir and *Cornopteris birii* Bir, or with wrong names, and it is to be hoped that the correct name will be given to the species illustrated on the 1996 ["1995"] cover, rather than the one Bir originally published it under. Finally I have to say that the various new species and new records given in the *Journal* must all be taken as tentative to unlikely until more carefully checked by those who know the genera and flora in more depth. All such papers containing numbers of "new species" should be thoroughly questioned by editors before publication, in view of the lack of acknowledged authorities in India, and sent back to authors to seek the opinion of

international specialists in the genera concerned, if such exist, or at least of the better workers in India, if not. The need for more thorough editing is all too frequently shown by journals such as the *Indian Fern Journal*, *Bulletin of the Botanical Survey of India*, *Journal of Economic and Taxonomic Botany* etc., whose pages are littered with self-contradictory and uninformed statements as well as of superfluous "new species." I also feel that having as president of the Indian Fern Society from 1993-1994, or even as a member of the council, the "emeritus scientist," Panigrahi, in reality pteridology's foremost protagonist of erroneous and poorly researched new names and of combination-seeking and one who, by his continual and uncorrected errors has done so much damage to Indian pteridology, not to mention the dubious ethics of lifting many of them out of the middle of other people's work (as can be seen from many examples given in the list of names following), sends the wrong type of signal to guide future botanists in India by. His publications should have been more carefully looked into and evaluated as to what they were really worth and as to their originality and depth, or otherwise, of research before considering such a step. The same should also apply to Punetha, though it must be said that his most dubious and unethical paper (Kholia & Punetha (1995), see under *Dryopteris darjeelingensis*) had not been published at the time of his selection for the council.

As is now well known to many specialists, both abroad and in India, and at last perhaps to one or two in China as well, the greatest problem of excessive "new species" exists in China, unfortunately an area adjacent to the Indo-Himalaya and a continuous part of the same floristic region, the Sino-Himalayan region, of which the Indo-Himalaya is merely an attenuated part. Both areas also have a very large wedge of intrusion of various subtypes of south-east Asian elements which form the bulk of the fern-flora in Assam, southern Yunnan and the outer (plainward) edges of the east Indo-Himalaya. Hence India is potentially able to be very badly affected by the extraordinary situation that has happened in China, the legacy of the almost random "splitting" and naming of meaningless species and genera (among which, of course, are hidden occasional good ones) by the late Prof. R.C. Ching and subsequently by his over-influenced followers. This is undoubtedly the greatest explosion of "new species

syndrome" that has ever occurred in the c.250 year history of pteridological taxonomy and it has probably expanded beyond the means of specialists to be able to deal with it in the foreseeable future. The time required to synonymise correctly so many names, often based on single, atypical specimens, frequently without ripe spores, is simply not available, nor are the funds. Although considerably curtailed very recently, it is still happening to a greater degree than elsewhere and is a special-case situation arising from the idiosyncratic practice of Ching who not only could not recognise species in the later part of his long life, particularly subsequent to the Chinese "cultural revolution," as well as previously to a lesser degree, but also thought it desirable practice to put names on any collection he was not sure of, or found even very slightly atypical. As he also wielded unchallenged authority it led to the rise of the disastrous situation on India's doorstep. Unfortunately his attention quite often strayed across the Himalaya and led to superfluous species being described from India too (as can be seen from the list below) and recently some Indian pteridologists have begun to import the Chinese problem through correspondence and through being unable to evaluate the inevitable response obtained from China that collections consist of "new species," which is merely blindly followed. It is therefore doubly important to avoid adding to the problem by publishing narrow-based local work containing erroneous "new species" at this juncture. During my own research I have spent a great deal of time, effort and money comparing species known to me from Pakistan, India, Nepal and Sikkim with types in China, which is a very difficult task due to the richness and complexity of the flora on the Chinese side of the Himalaya. But on top of that we have the problem of the great quantity of defunct names in Chinese herbaria - the actual species all being split up under the names Ching gave, including many unpublished ones in addition to the published ones, so that little idea of distributional range is possible. There is also the occasional loss of even modern types in some cases; the frequent designation of poor quality, unrepresentative types; difficulty due to official blockage of being able to examine species and their ranges of variation in the field *etc.* If at the same time as this slow and painstaking work, which requires far more knowledge of the species than it does to just name collections as if new, the problem is still being added to, both in China and increasingly

in India, it is extremely unlikely that anyone will be able to sort out all this quite mistaken "work" even in a lifetime or two.

It seems that "new species syndrome" arises in rather different ways in different regions of the world, though all leading to the same end-result where often even the authors themselves cannot any longer recognise their own "species" - as I have observed both in China and India! In North America and increasingly in Europe, too, where basic taxonomy, though much needed, is too often considered to be outdated and less "high-powered" or valid than molecular biological studies, systematists with a lack of taxonomic background and insight have concentrated on isozyme- and DNA-studies without really being able to evaluate the taxonomic significance (or lack of it) of their results. As in the school of Prof. W.H. Wagner, this has sometimes led to the description or maintenance of too many "new species," which I think of as "techno-speciation." We even have a few taxa known only from the gametophyte-generation - and therefore, obviously too imperfectly known to be named under our taxonomic and nomenclatural system - which have been "described" and named all the same because of isozyme-differences from other N. American species! Yet nothing is known of what the crucial sporophyte-plant looks like so it could not be compared morphologically with other species of the genus world-wide (many such workers in N. America apparently being unaware in their work of the existence of anywhere other than the U.S.A. and, possibly, Mexico!). I, for one, am fully aware that it is a complete myth that a meaningful taxonomy of a genus can be obtained from the morphology of prothalli, as such workers like to pretend in justification; at the same time there is such difficulty in interpreting isozyme-results without already understanding the taxonomy well that I must reject taxonomy based exclusively on fern-gametophytes. Nor have wide-ranging generic studies of isozyme-patterns in order to get some idea of the variability of species been carried out. We have no idea if the observed isozyme-differences really indicate a separate species or merely represent part of the variability in one species due to the non-functional prothallial form being partially reproductively isolated. Prothalli alone cannot make good taxonomy at species-level and we should instead realise that the real identity and nature of "*Vittaria appalachiana*" Farrar & Mickel (1991)

and "*Trichomanes intricatum*" Farrar (1992) are merely unknown for now and be content that that is the situation at present instead of trying to invent "new species" from a few chemicals contained within them. The naming of *Polystichum kwakiutlii* D. Wagner (1990) from three frond-apices of a single old collection without any other material known and no comment as to the spore-size or morphology (if mature) is also rather poor taxonomic practice, though considerably less so than the other two examples. It was a significant win for common-sense that Werth & Lellinger's (1992*a* and *b*) proposals to allow naming of theoretical species from mere isozyme-samples taken from other species was rejected as it should have been. Reynolds & Taylor's (1991) similar idea concerning DNA-sequences is similarly undesirable. Can one imagine the chaos as incompetent and narrowly based isozyme-studies all over Asia flooded into mass-publication of innumerable such non-species named in the same way as if they were actual species, to the delight of Indian name-seekers?! I confess that I have myself indulged, just once, in naming a theoretical species (Fraser-Jenkins 1997*a*, in press), but this was done in order to save it from virtual misappropriation under a *nomen nudum* already given to it in the U.S.A. and to demonstrate that the Code does not need altering in this respect as it already covers such eventualities, as well as to help in the search for an important missing ancestral diploid. At least this was not based on mere chemical constituents taken from and belonging to other species. Unfortunately another contrasting bad result of the isozyme "techno" approach has been that in some cases, such as the much abused and neglected, yet mostly perfectly good species in the genus *Pteridium*, rather few sensible answers have been provided, apart from quite usefully demonstrating a mistaken "new subspecies" published by Page (1989 and in Page & Golding (1989)) that could also have been sunk by "traditional" taxonomic appraisal. Problems have arisen due to inability to interpret results in the absence of a proper "traditional" taxonomic background. Most of the species have simply been called "*Pteridium*," or "*Pteridium aquilinum*" (L.) Kuhn, or, at best, one of the too many old varietal names treated by Tryon (1941). A perfectly good species, *P. latiusculum* (Desv.) Fries, which I can confirm from long-term morphological study on both sides of "the ditch" (Atlantic) is indeed the same taxonomic species in Norway, Finland, N.

Romania, Siberia *etc.* as in N. America (despite isozyme-results interpreted as suggesting otherwise on some Danish material, which I have not seen, and on the British plant, see below in the list (Rumsey, Sheffield & Haufler (1991)), has thus been relegated to a mere variety due to over-emphasis of isozyme-results. *Dicranopteris linearis* (Burm. fil.) Underw. is in a rather similar taxonomic situation containing "varieties," a few well known ones obviously being good and easily recognisable species, though they have not yet been worked on technically, but other recent "varieties" in it described from India were mistaken. Fortunately most of the self-generated technical confusion can simply be ignored by taxonomists, though the "techno-species" themselves, once published and based on botanical description of plants, cannot, under the rules.

The second strain of the syndrome, in China, has been the more damaging explosion (as mentioned above) of Chingian "random-speciation" or "accidental-speciation" (as, by accident, some are correct), nearly invalid according to the Code's (1994) preamble (1) about the "avoidance of the useless creation of names," but unable to be rejected as things stand at present and therefore having to be carefully identified and treated in the same way as species recognised more carefully in other, more soundly based and normal ways.

The third type of manifestation of the syndrome is that prevalent in India because it is considered desirable there to add "new species" to impressive-sounding *curricula vitae* with maximised numbers of papers published, and indeed how many "new species" one has named is quite wrongly held to be an immediate measure of one's botanical worth. Some "botanists" even appear to spend the bulk of their time creating as many new combinations as possible, usually from others' work and publications, sometimes even more-or-less at random on the chance that the name might become accepted, simply in order to propagate their own name. Publishing preemptive papers deliberately trespassing on others' work, or even outright theft are also practiced all too frequently in India instead of carrying out one's own original research, all just to increase the list of publications and "new taxa." This "career-speciation" is widely practised there, particularly by Government-botanists, among others. Often in India the whole environment tends to gravitate against considered and carefully compiled research

and there is a tendency for students of originality to be suppressed while others are more favoured, either for reason of their political affiliation, or because they merely follow their teacher's instructions and findings as being the easiest way to enhance one's career-promotion prospects, or, worse still, merely to achieve one's mandatory qualification. Many younger students today appear to care little for the subject but just leave it for more lucrative careers once they have their basic degree, M. Sc., or even Ph. D., for show and qualification. Rarely does one find that precious flame to be nurtured and encouraged at all costs, the student (or qualified, or even, as often occurs in the West, unqualified senior researcher) totally dedicated to the subject, perhaps from an early age. The substitute-work being published today relies heavily on "new species syndrome" to give it the appearance of reality even though that is showing every sign of being a terminal disease. The spurious publications produced often cause more trouble (through misidentification *etc.*) than they are worth and only serve to hasten the demise of all funding for taxonomy. They are also made almost irretrievably difficult to check and correct because many workers do not preserve their voucher-specimens of records properly, clearly labelled under the original published names (or numbers in the rare cases where numbers are cited); furthermore University-students are allowed unsupervised access to valuable and important vouchers and in India all too frequently steal specimens to remount as their own collections from spurious localities. All too often, too, a voucher-specimen can only be produced, when sought by another, from an unlabelled collection, retrieved from memory alone and thus frequently incorrectly localised, or not the actual voucher-specimen at all. It is the duty and responsibility of all authors to be able to provide genuine, properly numbered and labelled voucher-specimens and types on request - otherwise they should not bring their studies into the public domain - *i.e.* they should not launch into publication in the first place. We need to look over our shoulders at the situation that has now arisen in the West, where new, ruthlessly self-serving, monetarist and anti-humanitarian policies of big-business-orientated, non socially-concerned governments have caused an almost total cut-back on all academic or even applied research that does not immediately generate a profitable financial return for the backers. One of the first subjects to go has been

taxonomy, although it still hangs on by its teeth in reduced form in a few traditional refugia, though these too are in danger, constantly suffering further large cuts and being pressurised away from pure taxonomy. If Indian pteridologists, presumably representative of all branches of Indian taxonomy, continue to work to such unsatisfactory standards it will only speed up the end of funding for the subject here as well, even if at present the financial situation is perhaps not quite as black as in the West. Now that Western Governments are effectively forcing India to follow their own mistaken ways in so many areas of life, including economically, it is highly desirable that our own subject tightens itself up before the final axe may fall - there are few if any signs of the necessary improvement at present.

Why is it that there are no really painstaking and authoritative Indian specialists in particular genera, who know their genera throughout most of Asia and are of international repute? - people who have such wide and yet detailed knowledge that they are capable of competently evaluating and either rejecting, when necessary, or actively agreeing with identifications made by, for example, Chinese or Japanese botanists whose determinations of specimens sent from India mention "new" taxa? There seem to be no real experts who could stand up to a misidentification made by a well known foreign botanist instead of treating it as if a pronouncement from the gods. That is what I would like to see in India - a home-grown specialist of real international repute and acclaim who becomes known as "*the authority*," of the same stature as a Kramer in *Lindsaea* and *Pteris*, a Price in *Loxogramme*, a Hennipmann in *Bolbitis*, a Hovenkamp in *Pyrrosia* or a Reichstein in parts of *Asplenium*, for example. These reputations are gained purely on the basis of their generally excellent, carefully detailed and geographically far-reaching taxonomical monographic research - the result of total dedication to the subject. How much better it could be if someone who actually lives in the area could have taught himself or herself to reach such a high level, through field-, herbarium- and literature study, as well as international cooperation, that they could constantly apply their superior knowledge in the field here in the Himalaya - and could set an example for others.

What of the rôle or expected lead of the Botanical Survey of India in this regard? They have for years been in the unique position of having assured Government-funds available

specifically for taxonomic research as well as being bequeathed by the British the most important herbarium, full of isotypes and cited material from last century, and have continuing funds to allow it to be built up even further; they also received the best library (where, however, we now find that many books are lost and often not put back properly or even signed out). Yet I see few signs of experts arising there, indeed often less so than in the universities. In fact as soon as some junior or middle-ranking officer begins to become familiar in depth with his subject he is as likely as not to be moved to another position, put onto a different subject and frequently moved to some quite different and unsuitable station in some pointless and damaging career-game decreed by the directorate. Those in charge seem to have no realisation of how they are thereby destroying the abilities and interests of their own people and apparently care little as to what is required for a good research-situation. Nor are local people normally trained to be experts in their area, but career-orientated Bengalis, who do not even know or trouble to learn the natural area around their station, are sent to such fine places as, for example, Assam, Khasia or Sikkim, instead of drawing on and encouraging local expertise. Perhaps most damaging of all, their workers are generally not encouraged to gain from mutual international co-operation, to India's great loss. Despite recent intergovernmental agreements encouraging mutual cooperation in natural scientific research and despite the fact that B.S.I. officers are given full facilities at Kew, largely at British taxpayers' expense, and that any Indian national can visit any herbarium in Britain at will without British Government-permission, while also being totally free to carry out any research they like, or to collect plants wherever they like (apart from in reserves) with no need for permits, the B.S.I. in reciprocation, has often seemed intent to block almost any foreign work being done in India whenever they could - and has a long tradition of doing so, going back at least to Kramer's field-work days in the Andamans and in the south of the country. Even when their own middle-rank officers invite joint-collaborative efforts the B.S.I. leadership's tactic is to delay, refuse permission, fail to even answer applications, though the results would have been published jointly and would have been of significant help and cudos to Indian pteridologists. On top of these internal lapses is the problem that the B.S.I.'s fern-

workers (at least) are not properly guided, and become lost and useless as a result of "new species syndrome," and widespread misidentification leading to a mass of incorrect reports, as mentioned already. Instead of their trying to produce local floristic accounts with insufficient knowledge, which are thus highly incomplete and based only on the author's or Calcutta's *etc.* recent collections, they should be being guided into the far more urgently needed longer-term research into the taxonomy of species-groups and, eventually, the monographic study of genera, with active workers being encouraged to draw on the collections at BM, Kew and in Japan as well as in all the main Indian herbaria and collections. Such work does, of course, require international collaboration, which seems to be what they are afraid of, perhaps with elements of post-colonial xenophobic resentment or some such anachronistic, latter-day nationalism being involved, often under the guise of protection of India's natural "resources" against perceived Western commercial exploitation - at least that is put up as the excuse, though the real reason is more likely fear of the poor quality of their own work being revealed! But, after all, how was it that in the early days Mehra's school of pteridologists was able to make such advances as they did in their cytotaxonomic studies of Sikkimese ferns in the late 1950s and 1960s? It was by sending specimen abroad to Alston, Morton, Holttum, Stewart and Ching (while the latter was still working reasonably well) to ask their opinions and advice, which they freely gave, thus greatly assisting with the taxonomic basis of the Indian work. Given the situation of the present taxonomic problems combined with an apparent intent to remain in isolation, it seems unlikely that many such advances could be made again - or unlikely that international specialists would wish to cooperate very much until things change. A change of thinking and practice in the B.S.I., as in the whole of Indian botany, is urgently required - many Indian pteridologists have also told me the same thing - so let us hope it will come about. If I reach old age I dearly hope it will by that time have come about that I will profitably be asking specialists for identifications and advice, who are Indian botanists, rather than only the other way around! - I shall try to retain my belief that this could one day be so, even if it flies in the teeth of the current evidence.

There is now a crying need for someone to compile a comprehensive list of the

erroneous "new" taxa and especially of the huge number of misidentified new records published for Indian pteridophytes since Independence in 1947 and greatly increased over the last 5 to 10 years. However this must only be done after carefully ensuring they have really seen and properly reidentified the original material on which the false records were based. This would be a most useful service to Indian and international pteridologists to enable them to avoid the spurious records that abound in journals, census-lists and lists of so-called endemic and endangered species in the area. All such lists could then be revised to show the real situation and real numbers of Indian pteridophytes, which are at present quite mistaken. In a few genera I have already investigated and compiled the information and I have been able to put it together partially for several more, though there remain a number of genera I have not yet had the time to check all the types of, which I have therefore not yet been able to tackle properly, but which are packed with unverified "new taxa." These include the "new" *Selaginella* of Dixit; *Isoetes* of Panigrahi, Srivastava *et al.*; *Plagiogyria* of Dixit & Das; one of the *Dicranopteris* "varieties" of Panigrahi & Dixit; *Loxogramme* of Dixit (which should have been checked with Price); *Pteris* of Nair & Ghosh; *Vittaria* of Dixit; *Cyathea* of Dixit; *Microlepia* of Biswas, Nayar & Kaur and Madhusoodanan; *Hypolepis* of Biswas (see Brownsey (1987), for comments on these doubtful "new species," which need checking by him); and *Lindsaea* of Dixit & Ghosh. All these need reinvestigation on a wider geographical scale, which is most important, and with better knowledge of intraspecific variation and it is likely that most of them will have to be reidentified. I am aware of the large amount of investigative work and experience such an exercise will take and that it cannot be done successfully in India alone, nor can such work hope to overtake completely the new errors being published in India at an ever-increasing rate until more active and competent editors put a stop to that. The ideal approach might be for various teams of both Indian and international workers to tackle the problem together, involving maximum mutual cooperation to everyone's benefit.

It is a pity that the recent volumes of *Index Filicum*, from Supplement 4 onwards, do not aim to include any taxonomic judgement as to the real identity of the names listed, unlike

the original works by Christensen. This is probably due to the inability of modern workers to match the enormous taxonomic knowledge Christensen had, but it nevertheless appears to me to be an unfortunate shortcoming that well known specialists could not be consulted as to their opinions, thus losing much of the potential value of the work and implying a lack of competent judgement. Such a policy would be a major step forward towards the elimination of mistaken "new species," but the recent Supplement 6 (Johns (1997)) unfortunately continues in this vein instead of having the courage to alter the previous policy and does not even relate together with the original name later homonyms based on the same basionym or type, often listed in the previous supplements. In general it does little to help tackle the recent explosion of unnecessary names, in fact rather the opposite. As can be seen from the present list, below, it also omits a number of Indian names and contains more mistakes than I had become used to in previous supplements. Much of the basic list was originally compiled by Parris at Kew before her retirement, yet surprisingly her name is nowhere mentioned in the authorship or introductory acknowledgements by Johns, who took it over. Although the present list has not been able to set out to be complete it is hoped that it helps to make up for some of the shortcomings of the latest Supplement of *Index Filicum* as far as the Indian subcontinent is concerned. A rather random selection of examples of spurious, post-independence "new species," varieties, or combinations from selected genera, held up to the light of day in the Indian flora is given below, including species described outside India that also occur there, though not giving all the many recent ones from Ching and his followers except where especially relevant. I take the opportunity, as well, to correct some of my own errors in my previous monographs of *Dryopteris* and *Polystichum* (Fraser-Jenkins (1989 and 1991)), which mostly arose due to the types of a handful of obscure and little-known, mostly Chinese species being very difficult to identify and having undergone re-identification by me since I formed my original opinion. It may be observed that approximately three-quarters of the 23 species named by Indian botanists in the four large genera I have prepared or completed monographic study of, *Athyrium*, *Cheilanthes*, *Dryopteris* and *Polystichum*, which are covered comprehensively in this list, are incorrect, as I previously took pains to point out

(Fraser-Jenkins (1991)) in a plea for caution with "new species" which went entirely unheeded, even though it was first given at a public lecture attended by most of India's pteridologists! Only 2 *Athyrium* (one of them already proposed by Clarke at an infraspecific rank last century), 2 *Dryopteris* (one named by accident by Panigrahi & Basu (1980) as the type turned out to be quite different from all the rest of the authors' concept) and 1 *Polystichum* (*P. mehrae* Fras.-Jenk. & Khullar, which was my own finding) being good species. The statistics in other genera are expected to be similar, or sometimes worse. The present list is not complete, however, and it is advised that all the copious and often rather irresponsible new names given over the last 10 years or more by such as Biswas, Dixit, Ghosh, Panigrahi, Nayar, Pande & Pande (1992 and 1994) and in the various papers of Punetha & Kholia be taken as tentative and requiring further study. We will soon be obliged to add to these the so-called novelties in Singh's new work (Singh & Panigrahi (1995 and in press)), which have unfortunately not been made available to me for final identification in order to avoid forthcoming problems.

While correcting the names in the list it has often been necessary for me to discuss in detail the nature of these mistakes and how they came about, including some explicit pointing out and criticism of some of the bad practices involved. My intention in doing so, apart from to set the scientific record straight and show why the name was wrong, has also been the important need to show by means of examples how badly things have sometimes been done, often even with a complete lack of ethical principle that is sometimes rather astonishing, especially to workers from outside of India. By bringing to attention these embarrassing and discreditable examples of obvious and easily avoidable blunders, bad taxonomic practice or even plain dishonesty, it is hoped that in future research-workers and editors in the region will make more effort to uplift their standards of work and bring about a much-needed improvement. Only then can we achieve a real flowering of taxonomic research in the Indian region which would bring with it respect for Indian pteridologists and for the quality of their work and publications.

LIST OF NAMES

Acystopteris

Cornopteris tenuisecta (Bl.) Tard.-Blot = *Acystopteris tenuisecta* (Bl.) Tag.

Adiantum

Adiantum assamicum (Nayar) Nayar, *comb. inval., basion. nud.* = ? *A. incisum* Forssk. subsp. *indicum* (Ghatak) Fras.-Jenk.

A. capillus-veneris L. var. *dissectum* ["*dissecta*"] Nayar = *A. capillus-veneris* L.

A. caudatum L. var. *assamicum* Nayar, *nom. nud.* = ? *A. incisum* Forssk. subsp. *indicum* (Ghatak) Fras.-Jenk.

A. caudatum L. var. *flabellatum* Nayar, *nom. nud., non A. flabellulatum* L. = ? *A. incisum* Forssk. subsp. *incisum* (see Morton (1974 : 287)).

A. cuneipinnulum Nair & S. Ghosh (*nom. nov.* for *A. cuneatum* Langsd. & Fisch., *non* Forst. *fil.*) = *A. raddianum* C. Presl. Nair & Dixit (1981) added the comment "*non A. raddianum*," but as the name was originally a *nom. nov.* it has the same type as the replaced name, which is now called *A. raddianum*. The sense in which Nair & Ghosh (1974) took the name is also *A. raddianum* and it seems likely that Nair & Dixit were confused by the variation in segment-size present in this species, including around the Darjeeling area, where I, too, have seen it below and N. of Lebong. It also occurs quite widely around that area at Kurseong, Kalimpong and Takdah, as well as in the S. and peninsular India and even at Mussoorie in the W. Himalaya. This species is an alien S. and C. American one which, like several other species of the genus, such as *A. concinnum* Humb. & Bonpl. *ex* Willd. and *A. latifolium* Lam., has become naturalised in India and elsewhere in Asia as an escape from cultivation, particularly in the south. Sledge (1973*b*) clearly treated *A. raddianum*, giving *A. cuneatum* in synonymy. Interestingly Manickam & Irudayaraj (1992: 102-103) have reported it to be a complex; the small plants with very small pinnules (from which many of the well known cultivars in the European and American horticultural trade are probably

derived) they found to be diploid and the larger plants with larger segments tetraploid. They also mentioned intermediates which they did not investigate. All three also occur in the Darjeeling area. If their findings were correct it would appear that these naturalised and cultivated plants do not all belong to *A. raddianum sensu stricto* and we must look at the synonymy of the species and at other related S. American species to find names for the two taxa. However around Darjeeling it appeared to me that only one species with a complete range of frond-morphology seemed to be involved which sounds similar to the reported S. Indian situation, thus reinvestigation is necessary before any conclusions can be drawn. Since writing this comment I have recently noticed Kramer's (1993) note also correcting Nair & Ghosh's *nomen novum* and pointing out that Presl's name was long-established in the literature - the point being that the authors should not have attempted to create new names until they really knew the genus and the flora concerned.

A. edentulum Christ = ? *A. poiretii* Wikstr. Mehra & Bir's (1964: 106) report of this species was correct (voucher-specimens: N. Sikkim, Lachen, 9000'. S.C. Verma 1128, 27 July 1958 (PAN 2886-2890!)), however it appears to be very closely related to or synonymous with *A. poiretii* Wikstr. (*synonyms: A. thalictroides* Willd. ex Schlecht.; *A. aethiopicum sensu auct. Ind., non L.*), from S. India, China, Africa and S. and C. America. Other synonyms are *A. refractum* Christ, *A. delavayi* Christ and *A. muticum* Ching. *A. wattii* Bak. (*synonym: A. levingei* Bak.) was reported by Khullar (1994: 305) as being synonymous on the basis of information supplied by me, though, unlike me, Khullar concluded both were only variants of *A. capillus-veneris* L. and erroneously sank *A. refractum etc.* into that species due to not reporting correctly what I had told him. It may perhaps be correct that *A. wattii* is only a variant of *A. capillus-veneris*, however, and the sterile fronds need to be examined to see if the teeth are obtusely crenate as in the former or acutely serrate as in the latter. From memory I think they were crenate

but I must see the types of both *A. wattii* and *A. levingei* again at Kew. The latter also came from N. Sikkim, near to Lachen (at Chungthang). Hope (1900: 240), who was by far the best pteridologist in India to the present day, clearly separated *A. wattii* and, significantly, included Nilgiri Hills plants (of *A. poiretii*) in it, so was probably correct, in which case these two names may also belong to *A. poiretii*.

A. indicum Ghatak = presumably a good taxon, but almost totally confused with *A. incisum* Forssk. subsp. *incisum*. Morphological differences (in the hairs only) are so minute and the taxa so close that they are certainly not distinct enough to be maintained as species. In fact all the characteristics given for *A. indicum* by Manton, Ghatak & Sinha (1967) were either wrong (e.g. the "erect" fronds, which are actually pendent when full-sized) or common to both. *A. indicum* is accordingly to be known as *Adiantum incisum* Forssk. subsp. *indicum* (Ghatak) Fras.-Jenk., *comb. nov.* (basionym: *Adiantum indicum* Ghatak, *Bull. Bot. Surv. India* 5: 71 (1963)). Thus far it was only known certainly from the original type-collections (holotype at CAL!), though it would seem likely that any *A. incisum* collections from low-altitude, tropical W. Bengal and Bangladesh, at least, could well be the same taxon, but this cannot be ascertained in the absence of cytological verification. However I was able to re-find it in plenty on old walls of houses adjacent to Ariadaha ("Oriodoho") ghats on the E. side of the Hooghly river, at Belgharia, now a northern suburb of Calcutta, shortly N.E. of Dum Dum airport. C.R. Fraser-Jenkins Field no. 1384, 31 May 1997. The plants are identical in pinna-shape to *A. incisum* subsp. *incisum*, though bearing fewer laminar hairs, thus appearing more glabrous, and the hairs being rather long and jointed. Its cytotype has not yet been confirmed. I doubt it is really the same as any of the further W. Himalayan plants. Also at the locality were *Pteris multifida* Poir. in Lam. and *P. vittata* subsp. *bengalensis* Fras.-Jenk. The specimens collected by Nakaike *et al.* (Nakaike & Malik (1992, 1993 and 1995)) in Pakistan (as also by me) have been reidentified by me as *A. incisum* subsp. *incisum*, which I already

brought to his attention. They were not cytologically checked, which is essential in this case, subsp. *incisum* being diploid and subsp. *indicum* tetraploid. This reidentification might explain the fact that Nakaike's "*A. indicum*" and *A. incisum* were the only two species found to be chemically identical by Iwashina, Matsumoto & Nakaike (1995), who did not question their identification of the material as *A. indicum* even though their paper was produced well after I had pointed out the problem while I was identifying Nakaike's *Dryopteris* etc. and, subsequently, his whole Pakistani collection. In the past all these taxa were often included in the clearly distinct *A. caudatum* L., a species I have now found well to the west of its previously known range, in W.C. Nepal, near Golchina, Khaireni to Deorali, Gorkha District, Gandaki Zone. C.R. Fraser-Jenkins Field no. 1129, 16 Feb. 1994, with Rajkumar & Saroshwati K.C. & Ganesh Pariyar (NMW), also at the same locality. C.R. Fraser-Jenkins Field no. 1293, 22 March 1997, with U. Chhetri (K. Pongali) & G. Pariyar and at Chowti Bara Mandir, c.6 km S. of Damauli, between Mugling and Pokhara, E. of Pokhara, Tanahun District, Gandaki Zone, W.C. Nepal. C.R. Fraser-Jenkins Field no. 1301, 31 March 1997, with G., S.M. & N. Pariyar, with *Onychium siliculosum* (Desv.) C. Chr.

- A. lomesam* [Geevarghese in] Nayar & Geevarghese (1993) = ? *A. caudatum* L. Geevarghese's sense of "*A. caudatum*," judging by his illustration (pg. 141) may be *A. zollingeri* Mett. ex Kuhn. He did not illustrate this "new species." No indication was given of the derivation of the non-standard form of the specific epithet, so we are unable to tell if it was a bad attempt at Latin, as in other cases, which needs correcting (as do their often highly erroneous diagnoses), or whether it is another of the unfortunate Nayar-influenced Sanskrit names, against recommendations, to be treated as an indeclinable substantive.
- A. nagnam* [Geevarghese in] Nayar & Geevarghese (1993) = ? *A. incisum* Forssk. subsp. *incisum*. Again neither derivation of the epithet, nor illustration were given. I hope to investigate its true identity when I can next go to S. India.

A. ramyam [Geevarghese in] Nayar & Geevarghese (1988 ["1986"]) = *A. concinnum* Humbl. & Bonpl. ex Willd. The illustrations given by Nayar & Geevarghese (1993: 133) are obviously this species. The authors must have overlooked Sledge's (1973*b*) well known and definitive paper on *Adiantum* which treats and illustrates this species as an adventive in neighbouring Sri Lanka. It is a pity they did not also illustrate their other "new species," so that they can be more easily identified.

A. sinicum Ching = *A. incisum* Forssk. subsp. *incisum*.

A. teestae Verma in Mehra & Khullar (1977), *nom. nud.* = *A. philippense* L. *A. teestae* was first named and separated from *A. philippense* by Verma in his unpublished Ph. D. thesis of 1964 primarily because it is a diploid sexual cytotype and it appeared to have distinctive small pinnae and fronds (see Mehra & Verma (1963) and Verma (1962)). Mehra & Khullar (1977) reorganised their concepts to include two further cytotypes in *A. teestae* on morphological grounds, however after visiting the type-locality and looking at the species throughout the Himalaya, as well as in herbaria and at PAN, I doubt that the small size and other features mentioned by them are of taxonomic significance, despite their conclusions, as the species merely appears to be highly plastic in these respects and this also seems to apply to the individual cytotypes themselves. At present, therefore, I do not think it possible to recognise taxa within *A. philippense* even at the infraspecific rank of subspecies.

Anogramma

Anogramma leptophylla sensu auct. Ind., non (L.) Link = ***Anogramma reichsteini*** Fras.-Jenk., *sp. nov.*, *basionym. Planta ad A. leptophyllum affinis et similis sed multo minora, usque ad 1 cm alto; frons plerumque tantum trilobata. Cytotypus tetraploideus. Holotypus:* India, Uttarkhand (Uttar Pradesh), S. side of Nainital University, S.W. side of and above Nainital Lake, N. of Tollital Bazaar, Nainital; semi-shaded, rocky, steep path-side bank on way up to University campus. *C.R.*

Fraser-Jenkins Field no. 309, with *Prof. Y.P.S. Pangtey* (who indicated locality), 11 Sept. 1996 (BM).

This species is named in honour of the late Professor T. Reichstein (see Dedication). On studying the material labelled *Anogramma leptophylla* at DD, RAW and PAN in 1977 and 1978, I felt convinced from its morphology that the consistently small W. Himalayan plant was most probably a distinct species, with less dissect leaves and wider (more juvenile-type) segments. The European plant is diploid and, in contrast, although the counts did not seem to be very clear and could probably do with confirmation, the present Himalayan plant was found to be tetraploid by Verma in Mehra & Verma (1960), from Mussoorie and again later by Verma & Khullar (1965a) from Dalhousie and Mussoorie and by Khullar & Mehra (1972) from Nainital, none of whom commented on its morphological distinctness. My idea that it was distinct was hinted at, though not properly accredited by Khullar (1994: 307) whom I had told about it very clearly some years before. I have myself also commented (Fraser-Jenkins (1992: 85-86)) that the true *A. leptophylla* was a larger plant, different from the small W. Himalayan plant. In 1990, however, I later discovered perfectly normal large plants in the far-west Himalaya in Pakistan (1 mile N. of the Kandian valley turn off the Karakoram Highway, N. of Dasu on E. side of the Indus valley, Hazara [Indus Kohistan], North-West Frontier Province, c.900 m. CRFJ 16662, 21 Sept. 1990 [= T.R. 7846] and in Chitral, c.1900 m, c.4 km above and S. of Pursad, on W. side of Purit Gol valley, S.E. of Shishi, N.E. of Drosh, S. of Chitral town. C.R. *Fraser-Jenkins* Field no. , 28 Nov. 1991) which I immediately informed Prof. Reichstein most probably belonged to true *A. leptophylla*. I had previously told him that the small plants from further east were probably distinct, in connection with our joint-work for "*Flora Iranica*."

Lovis, Rasbach & Reichstein (1993) stated that the Indian plant (by which they meant the small W. Himalayan plant) "may be another taxon" or "is

obviously another taxon," mistakenly attributing my idea to Rasbach & Reichstein (1990), where, however, no such idea was mentioned or suggested. Nor were any taxonomic comments on the possible existence of two taxa mentioned by Manton, Lovis, Vida & Gibby (1986). Though my collections of large plants were not, as far as I know, chromosome-counted, they are excluded here, regardless of what cytotype they might be, from my concept of the new species. I am assuming that CRFJ 16662 and 28 Nov. 1991 probably (hopefully) belong to the European diploid, true *A. leptophylla*, and would be surprised if they merely represented large plants of *A. reichsteinii*. I should also point out that my concept and recognition of *A. reichsteinii* are independent of the cytology, which, like Lovis, Rasbach & Reichstein (1993), I feel requires confirmation before it is accepted completely, even though I do not doubt Verma's counts and, in a case like this, where the identity of the plant is obvious, it is most probably correct. Lovis *et al.*'s doubts were directed more at the exactness of the number rather than at the tetraploid cytotype.

A. reichsteinii occurs in the W. Himalaya in the higher parts of the more outer ranges as an endemic (presumably of ancient European-element connection), scattered and rather rare, from Chamba east to Nainital and also in Nepal (*e.g.* Chapagaon Town, Kathmandu valley. *R.L. Fleming* 2231, 23 July 1976 (MICH!)). It is replaced in the furthest west Himalaya by *A. leptophylla* (N.E. Afghanistan: Nurestan, Barikot to Kamdesh. *J.E. Carter* 279 (K) and Kabul, Tang-i Gharu gorge, 20 km E. of Kabul, route de Sarobi. *H. Pabot* (G); Pakistan: Chitral. CRFJ, 28 Nov. 1991 (above); Swat [Indus Kohistan] 950 m, road-bend 5 miles S. of Pattan, N. of Besham and Jijjal on W. side of Indus river, North-West Frontier Province. CRFJ 16656, 20 Sept. 1990 [= *T.R.* 7844]; Hazara. CRFJ 16662 (above) and 780 m, rocks by Circuit House at Dasu on E. side of Indus river, North-West Frontier Province. CRFJ 16661, 21 Sept. 1990 [= *T.R.* 7845]). CRFJ 16656 and 16661 are both small collections from very dry

places, but I assume they must also belong to *A. leptophylla*, which can, of course, be small when less developed, though *A. reichsteinii* apparently cannot become large and developed. The large plants from S. India and Sri Lanka remain unidentified as yet, the variation and complexity of this genus in India having been overlooked in Reichstein's two papers apart from (1993: 154) paraphrasing my comments *re CRFJ* 16662, explained to him in my letter, "large like the European diploid," whose significance was not commented upon.

Arachniodes

Arachniodes amabilis "(Bl.) Nayar & P. Chandra" (1968) = *A. amabilis* (Bl.) Tindale (1961). Ching (1964), Iwatsuki (1979), Kuo (1985), Matsumoto & Nakaike (1990) and Nakaike & Yamamoto (1995) have all separated the Himalayan, Sri Lankan and Taiwanese plant (which is tetraploid) as *A. rhomboidea* (Wall. ex C. Presl) Ching on cytological grounds because a Japanese diploid plant is thought to correspond more closely with Blume's Javan plant. However the Javan plant is cytologically unknown and though the separation of the two names may be correct, it requires confirmation. Many of the Himalayan and Sri Lankan plants of "*A. amabilis*" seem to me not significantly different from the Javan, my having examined them in the field in all three areas.

A. assamica "(Kuhn) Nayar & P. Chandra" (1968) = *A. assamica* (Kuhn) Ohwi (1962).

A. conifolia "(T. Moore) Nayar & P. Chandra" (1968) = *A. conifolia* (T. Moore) Ching (1962) (*synonyms: Aspidium conifolium* Wall. ex Kunze, *non* C. Presl). By referring to Wallich, Moore (1857) legitimised Kunze's later homonym as a new species in the genus *Lastrea*. I suspect that *Rumohra adiantiformis* (Forst. fil.) Ching and its near relatives in Madagascar, one of which I collected and have had under observation in cultivation for many years, along with it, are, after all, congeneric with *Arachniodes*. I am now sure *Rumohra* is dryopteroid and not in the *Davalliaceae*, even though Holttum pointed out to me (pers. comm. 1985) rather strongly, as well as in his publications (*e.g.* Holttum (1984)) that it should

be in the *Davalliaceae*, which I had to say at the time that I doubted (see also Fraser-Jenkins (1986: 185)). I do not see any really significant differences that I would count as generically distinct from *Arachniodes* species in general. If this is so and could be confirmed by some substantial, unequivocally interpretable evidence - *i.e.* not just vaguely ambivalent isozyme-twaddle or anything less than conclusive DNA differences involving many species - the species of *Arachniodes* would have to be known again, as they originally were, as *Rumohra*. However at present it is probably impossible to make a decision and *Arachniodes* is still accepted here for the other species. I have not listed Morton's (1960) combinations for them under *Byrsopteris*, a defunct name, unusual in his excellent work, or the combinations from various authors under *Polystichopsis*; these can easily be found in *Index Filicum*.

A. rhomboidea (Wall. ex Mett.) Ching var. *yakusimensis* (Itô) Shieh = *A. amabilis* (Bl.) Tindale. I recently collected what appears to be this taxon behind the National Research Institute of Cold Water Fish at Banlekh, N. of Tanakpur, Almora District, Uttarkhand (Uttar Pradesh). *C.R. Fraser-Jenkins* Field no. 899, 25 Oct. 1996 (along with *Athyrium otophorum* (Miq.) Koidz., Field no. 883-887, previously unknown from the west Himalaya and known only from one unidentified collection at K (reidentified by me) from N.E. India in the Indian subcontinent). But it seems to be linked to normal *A. amabilis* by intermediates, at least when one examines other populations of this species in Nepal *etc.*, and providing the Banlekh population is really the same as this variety, as it looks, I cannot accept the variety as a distinct taxon.

A. yakusimensis (Itô) Nakaike = *A. amabilis* (Bl.) Tindale.

Lithostegia foeniculacea (Hook.) Ching = *Arachniodes superba* Fras.-Jenk., *nom. nov.* (for *Aspidium foeniculaceum* Hook., *Sp. Fil.* 4: 36, t.237 (1862), *non Arachniodes foeniculacea* Ching in Ching & Hsieh (1986), an unfortunately similarly named, congeneric taxon published amid a mass of meaningless new

names). This species clearly belongs in *Arachniodes* and as the genus *Lithostegia* Ching was a monotypic one based on it as the type-species, it now becomes a synonym of *Arachniodes*. The scales, frond-axes and segment-shape, even texture, are typical of *Arachniodes*, as a very finely dissect member of the genus. Analogous species occur also in *Polystichum* in Section *Micropolystichum* (see Fraser-Jenkins (1991)). The hair-like appendages on the laminar upper-surface are hardly exceptional and the sori are also acceptable in the genus.

Peranema foeniculacea (Hook.) Nayar & Kaur (1963), *comb. inval., sin. basion. ref.* and an alternative name not definitely accepted by the authors = *Arachniodes superba* Fras.-Jenk. Nayar & Kaur's (1974) second mention of their strange combination in the wrong subfamily again gives no basionym-reference as well as the wrong original genus for Hooker's name, though the latter mistake is not so important. It is also an alternative name, of equal importance to another which they also accepted as correct, as they explained in the book's introduction, so was not definitely accepted by the authors as well as not being intended to be a new combination.

Araiostegia

Araiostegia delavayi (Bedd. ex Clarke & Bak.) Ching in Chien & Chun = *A. beddomei* (Hope) Ching in Chien & Chun. I have yet to check the types of *A. delavayi*, which is essential, but in the sense the British-Indian botanists of last century took it in, the difference (in scales, which were drawn as slightly toothed in *A. beddomei* by Hope) between the two is very small and not constant and, at least in the Himalaya, I am finding only one species both in herbaria (including in CAL, where Basu has attempted to apply both names to the one species) and in the field. Most specimens are \pm without scale-teeth, though a few have slight toothing in some of the scales but usually the bases of the scales are slightly lacerate while the apices are more or less entire.

A. hopei Panigr. & Basu (1984) (*nom. nov.* [err. for *sp. nov.*] for *A. clarkei* (Bak.)

Copel.) = *A. hookeri* (Moore *ex* Bedd.) Ching. Because Panigrahi & Basu were attempting to take their new name in a sense different from *A. hookeri* it is not a *nom. nov.*, which they soon after realised and corrected in Panigrahi & Basu (1985*b* and *c*). Hope's concept of *A. clarkei*, which they wanted to separate from *A. hookeri*, not only and correctly included (the type of) *A. hookeri*, but his specimens from Chamba, which I have seen (but Panigrahi did not, going by Hope's plate only) are also perfectly normal *A. hookeri*, as is the specimen from Sundukpho [Sandakphoo], Darjeeling collected by *Levinge* and illustrated by Panigrahi & Basu as being their "*A. hopei*." Panigrahi & Basu evidently did not realise that Hope's sense of *A. clarkei* was the same species as *A. hookeri* presumably because they did not properly investigate the identity and taxonomy of the species concerned and on paper it perhaps looks possible (at least if misled by Christensen's (1906) well known misidentification of *A. hookeri* with *A. dareiformis* (Hook.) Copel.) that two different taxa might have been involved, suggesting an opportunity to insert a new name of theirs into the picture on the chance that it might stand. Their name is therefore a synonym of *A. hookeri*. It is of interest that originally Basu's determinations at CAL show that he was also attempting to distinguish two species, *A. clarkei* and *A. hopei* (which he at first called "*A. sikkimensis*," *nom. ined.* in his determinations), with the result that many sheets were "mixed" according to him, but in fact both were exactly the same, which was the situation he had come to understand by the time he published his paper, but this demonstrates a tendency to try to split taxa unnecessarily. As found by Copeland (1931), *A. clarkei* was a superfluous name for *A. hookeri* (*sub Acrophorus hookeri* Moore, *i.e.* Moore *ex* Bedd.), which, as Hope rightly said, was indeed the same as his species. I have not yet had the chance to check out what species Panigrahi & Basu's cited specimens of *A. hookeri* (which they did not illustrate) belong to, but from the description they gave it sounds possible that the bulk of their concept (excluding Beddome's *t.95*, which, along with the type of *A.*

hookeri, is the same as their "*A. hopei*") might even have been *A. beddomei* (Hope) Ching in Chien and Chun. But it appears to have been a name they were not properly conversant with. It is otherwise difficult to imagine how they could have illustrated such typical *A. hookeri* as being their new species, but such a misapplication of a name, which we have had to come to expect from Panigrahi's work, would explain their mistaken renaming of *A. hookeri*. Panigrahi & Basu also mistakenly stated that *A. pseudocystopteris* (Kunze) Copel., the commonest species of the genus throughout the Himalaya to China, Thailand *etc.*, is "restricted to the Western Himalayas," which must inevitably cast doubt on their understanding of any of the species of this genus at all. It is worth mentioning here that I do not accept Kato's (1985) continued separation of *Gymnogrammitis* (*i.e.* its only species, here treated as *Araiostegia dareiformis*) as a genus, based on minor characteristics. I treat it as merely an exindusiate species of *Araiostegia*.

A. hopei Panigr. & Basu (1985c) (later homonym of *A. hopei* Panigr. & Basu (1984)) = *A. hookeri* (Moore *ex* Bedd.) Ching.

A. yunnanensis "(Christ) Tag. & Iwats. *ex* Panigrahi & Basu" (1984) = *A. yunnanensis* (Christ) Copel. (1927). This Chinese species was mistakenly combined again at second hand without any knowledge of the species itself by Panigrahi & Basu, who evidently did not even know of the basic literature for the genus. It was already clearly done by Copeland in his paper in which the genus *Araiostegia* itself was first described and its species listed. It is also clearly listed in *Index Filicum*, which is a work most pteridologists I know of take the trouble to consult, although Panigrahi has frequently ignored it, as can be seen from several other cases listed in this paper. Tagawa & Iwatsuki, whose names he unfortunately dragged into his obvious error, without their permission or knowledge, being perfectly aware of the name, were never intending a new combination as Panigrahi implied. It is clear that without knowing anything about the species or its nomenclature Panigrahi nevertheless deemed it appropriate to attempt to create a

new combination for it, which reveals much of his attitude towards carelessly making new names in his botanical publications which need to be more carefully vetted and curtailed by journal-editors.

Humata yunnanensis (Christ) Ching = *Araiostegia yunnanensis* (Christ) Copel.

Paradavallodes membranulosa (Wall. ex Hook.) Ching = *Araiostegia membranulosa* (Wall. ex Hook.) Holtt. in Sen, Sen & Holttum (1972). Both Holttum (1972) and Kato (1985) have rejected the genus *Paradavallodes* as belonging to *Araiostegia* and have given detailed reasons for doing so; I concur.

P. multidentata (Wall. ex Hook. in Hook. & Grev.) Ching = *Araiostegia multidentata* (Wall. ex Hook.) Copel.

Arthromeris

Arthromeris jarrettiae ["*jarrettii*"] Sastry & S. Chaudhury = ?

A. x purohitii P. & H. Pande, *nom. nud.* = *A. wallichiana* (Spreng.) Ching. The "type"-specimen is in Herb. P.C. Pande, Almora University (!) and has somewhat immature, thus irregular spores.

A. repandula Ching = *A. mairei* (Brause) Ching. My collections of this quite common species from Garhwal, Almora, Pithoragarh and several places around the Kathmandu valley in central Nepal show that it is quite distinct in texture, sori, pinna-margins and especially rhizome-scales (which are similar to those in *A. wallichiana*). My collections from the Kathmandu valley show that when it reaches full size it often has straight and not undulate edges to the pinnae. Ching (1983) reported it from Kumaun as a new species, *A. repandula*. It appears to be the same as the species Satija & Bir (1985) reported as *A. lungtauensis* Ching. However they did not cite any numbers or dates to allow one to be sure that the material which I found to be the present species at PAN(!), with similar, but not exactly the same, because less precise localities, was that cited. It is labelled as *A. lehmanii* (Mett.) Ching, while *A. lehmanii* is labelled there as *A. pinnata* (Hay.) Ching, the latter determined by Alston, but with a comment by Bir that it does not

seem different from *A. lehmanii*. There was no material labelled as *A. lungtauensis*.

Asplenium

Asplenium adiantum-nigrum L. subsp. *yuanum* (Ching) Reichstein, Viane, Rasbach & Schneller (1994) = *A. adiantum-nigrum* L. subsp. *adiantum-nigrum*. This taxon was intended to refer to some of the Asian (including some of the Indo-Himalayan) populations of *A. adiantum-nigrum*, which the authors thought to have been derived from the two ancestral diploids, *A. adiantum-nigrum* L. subsp. *woronowii* (Christ) Fras.-Jenk., **comb. nov.** (basionym: *Asplenium woronowii* Christ, *Vestn. Tiflisskago Bot. Sada [Mon. Jard. Bot. Tiflis]* **6**: 25 (1906); synonyms: *A. cuneifolium* Viv. subsp. *woronowii* (Christ) Reichstein, Viane, Rasbach & Schneller; *A. pseudolanceolatum* Fomin; *A. sajanense* Gudosch. & Krasnob.) and *A. adiantum-nigrum* L. subsp. *onopteris* (L.) Heufler, neither of which occur in the Indian subcontinent. Subsp. *adiantum-nigrum*, which also occurs in the Indo-Himalayan region as well as in Europe and elsewhere, was thought to have been derived from both *A. adiantum-nigrum* subsp. *serpentini* (Tausch.) Heufler (synonyms: *A. cuneifolium* Viv.; *A. adiantum-nigrum* subsp. *cuneifolium* (Viv.) Aschers.) and *A. adiantum-nigrum* subsp. *onopteris*. Reichstein *et al.* (1994) found that subsp. *cuneifolium* and subsp. *woronowii* were genomically similar, thus explaining the fertile intermediates between subsp. *adiantum-nigrum* and "subsp. *yuanum*." However, on morphological grounds, Fraser-Jenkins (1993) provided an alternative explanation, that all subsp. *adiantum-nigrum* (including "subsp. *yuanum*," which I do not accept as a good taxon) was actually derived from subsp. *woronowii* and subsp. *onopteris* and merely varied clinally (and inconstantly) throughout its range. Although the picture is more complex than previously thought Vogel (pers. comm. 1996) has kindly informed me that this latter idea now appears to have been proven by the complex and most thoroughly and impressively carried out DNA-work of Vogel &

Gibby (in prep.), thus it seems that subsp. *serpentini* was not involved as an ancestor of subsp. *adiantum-nigrum*, even though it is genomically compatible with subsp. *woronowii*. Though I do not as yet know what Vogel & Gibby's DNA-work indicates, I also suspect (as suggested by Fraser-Jenkins (1993)) subsp. *serpentini* to have been the ancestor, along with subsp. *onopteris*, of another tetraploid, European and W. Asian (but not Indian-subcontinental) taxon, subsp. *corunnense* (Christ) Rivas-Martinez (which Reichstein preferred to call var. *silesiacum* Milde, for reasons which will, I hope, soon be published by Viane, formerly much confused with subsp. *serpentini* but actually readily distinguishable by its frond-morphology, with experience.

I now treat all these closely related and closely similar, often partly overlapping taxa as subspecies of *A. adiantum-nigrum*, but sink subsp. *yuanum* completely. Subsp. *woronowii* and subsp. *serpentini*, with their markedly different ecology and range are also well distinguished morphologically (rather better than subsp. *corunnense* versus subsp. *serpentini*, for example) despite being genomically similar and stand along with the others as good and \pm equally distinguishable subspecies.

I have not listed the many redundant European *Asplenium* names (including the rather too many subspecies in *A. trichomanes* L., for example) from recent literature concerning species also present in the Himalaya; nor synonyms of the several species in the *A. laciniatum* D. Don (*synonym: A. varians* Wall. ex Hook. & Grev.) complex discovered by Reichstein. Reichstein's posthumous publications, now considerably overdue, are being overseen by Viane and I hope will soon be published. These also include the unnecessarily and badly delayed, joint-work Reichstein, Khullar, Kramer and I did for "*Flora Iranica*," whose fate I cannot now ascertain. Being virtually completed several years ago, it is to be hoped that this authoritative and exhaustively detailed work will be sent to the Rechingers (overall editors) without further delay.

- A. adiantum-nigrum* L. var. *yuanum* (Ching) Ching = *A. adiantum-nigrum* L. subsp. *adiantum-nigrum*.
- A. affine* Sw. forma *majus* Sledge = *A. affine* Sw.
- A. birii* (A. & D. Löve) Bir, Fras.-Jenk. & Lovis = *A. magnificum* (Ching) Bir, Fras.-Jenk. & Lovis. On seeing more Chinese material I now feel pretty sure that *A. magnificum*, *A. latibasis* (Ching & Shing) Nakaike and *A. qiujiangense* (Ching & Fu) Nakaike are all the same species and are the same as *A. birii*, which is now to be known by the earliest name, *A. magnificum*. In Bir, Fraser-Jenkins & Lovis (1985: 61) I had raised the possibility of their close relationship but had not investigated further to come to a conclusion.
- A. crinicaule* Hance var. *sikkimense* Bir = *A. crinicaule* Hance.
- A. dulongjiangense* Viane in Viane & Reichstein (1991), (*nom. nov.* for *Ceterachopsis qiujiangensis* Ching & Fu in Ching & S.H. Wu, *superfl.* for *Asplenium qiujiangense* (Ching & Fu) Nakaike (1986)) = *A. magnificum* (Ching) Bir, Fras.-Jenk. & Lovis. See also under *Asplenium qiujiangense*. It is perhaps fortunate that Viane's rather strange and uncalled for epithet copying the worst of Chingian epithets, with a Pin-Yin misspelling of an "i" before the "u" after "q" and named after an obscure, long place-name against the recommendation of the Code, was anyway unnecessary.
- A. exiguum sensu* Iwatsuki (1988), *non* Bedd. = ? *A. yunnanense* Franch. After I had separated *A. exiguum*, which is a distinct S. Indian species, from the Himalayan plant (see Khullar (1994: 456)) it appeared that the name for the Indo-Himalayan species should be *A. yunnanense*. However Reichstein, who carried out a very thorough and careful cytotaxonomic study of this group, yet to be submitted for publication by Viane, informed me that it was conspecific with the Mexican vicariant, *A. glenniei* Bak. in Hook. & Bak., which name I therefore used (Fraser-Jenkins (1993)) for the west-Himalayan plant. But many of the Mexican plants, including those I collected in Chihuahua State, are spore-sterile hybrids.

reproducing vegetatively (from laminar bulbils) on a wide scale and behaving as a species in their own right. The plants I was finding there also had slightly wider, more foliose fronds and can usually be so distinguished from the Himalayan plants, quite apart from the variability of the frond-apex in the Himalaya, which more frequently bears an extended, whip-like, bulbiferous apex, at least on some fronds, though it can also be \pm absent in some populations. In view of these facts I prefer to go back to the name *A. yunnanense* for the Himalayan plant, pending the appearance of Reichstein's final paper on the group.

A. yunnanense is quite common in west Nepal, e.g. several collections of it from Mugu District (*O. Polunin, W.R. Sykes & L.H.J. Williams* 5171 and 3239 and *H. Tabata, D.P. Joshi et al.* 17061, 17170 and 17193 *pro parte*, identification confirmed by me (BM, KYO)). The last number is mixed with *A. pekinense* Hance, which I have now determined from two Nepalese specimens I reidentified and of which I also informed Khullar (1994) who published this record without saying where it came from. These are: between Hyanglu and Riga, Mugu District, 1350 m. *H. Tabata, D.P. Joshi et al.* 24677, 6 Sept. 1983 and Tihar, Mugu District, 2400 m. *H. Tabata, D.P. Joshi et al.* 17193, 26 July 1983 *pro parte* (both in KYO!). In the drier parts of W. and W.C. Nepal *A. nesii* Christ is also not uncommon and often confused with *A. yunnanense*. I was able to detect and identify a few Nepalese collections (among others) of it which I informed Reichstein about (see Ching & Reichstein (1981)), though not in time for his paper. Khullar's (in Khullar, Sharma & Singh (1984)) claim to have gathered "the first authentic record of [*A. nesii*] from the Himalaya" after merely revisiting a fine collection-locality of Fleming's (at Deoban mountain, Jaunsar, Uttar Pradesh) which I had identified the material of and told Reichstein about and which he had already published in his paper with Ching of 1981 is both incredible and incomprehensible. The more so since it was Reichstein who actually gave him the details and money in order for him to go there to see if he could re-find it and send

it alive for Reichstein's cytological study, none of which was suggested in Khullar's paper! The Nepalese records I found include the very fine specimens collected by Dr. Bob Fleming Sr. at Tukuhe in the Kali Gandaki valley, Mustang District in 1952 (BM, KATH *etc.*). I also found the species myself, both in the Karakorams in Hunza, N. Pakistan (see Fraser-Jenkins (1992)) and in W. Nepal, at Jumla: N.E. side of large rock by path leading to Rara Lake, c.1½ km N. of Jumla Technical College, c.6 km N. of Jumla, S. of and below Dori Lekh, below Patama meadow, Jumla District, Karnali Zone, W. Nepal. C.R. Fraser-Jenkins Field no. 3, with Rajkumar K.C. & K. 'ina Neupane, 7 June 1995, not far above *Dryopteris subimpressa* Loyal (Field no. 1).

A. falcatum Lam. var. *bipinnatum* Sledge = *A. polyodon* Forst.

A. gueinzianum Mett. ex Kuhn var. *acutipinum* ["*acutipinna*"] (Bir) Bir in Vasudeva, Bir & Kachroo, *comb. inval.*, *sin. basionym ref.* = *A. gueinzianum* Mett. ex Kuhn.

A. indicum Sledge (*nom. nov.* for *A. planicaule* Wall. ex Mett., *non* E. Lowe) = *A. yoshinagae* Mak. subsp. *indicum* (Sledge) Fras.-Jenk. (1992). Nakaike (1986) was incorrect in suggesting that *A. indicum* is a superfluous name since there was no other epithet available, as originally accepted by the author, Sledge, at the specific rank and epithets do not have priority outside of their rank. In addition the epithet *abbreviatum* (*A. falcatum* Lam. var. *abbreviatum* Kunze (1851)) of Kunze, as suggested for use by Nakaike, cannot be used at the specific rank in *Asplenium* since the combination is preoccupied by *A. abbreviatum* Mak. My combination of the epithet *indicum* at the different rank of subspecies would be unaffected either way, but correctly has Sledge's *A. indicum* as basionym. Subsp. *yoshinagae* (in Japan) is octaploid and has buds at the lamina-base. Similar plants also occur in Manipur and Sikkim with proliferous buds at the lamina-base, but one such, from near Lachen, Sikkim. S.S. Bir, 27 July 1958 (PAN) is an apparent voucher-specimen, marked "*n* = 72," though a duplicate specimen has no such buds. If the result was correct for this specimen it indicates that the mere presence

or absence of buds is not diagnostic between the two subspecies as was thought so far. But the situation requires reinvestigation in India because of a certain degree of unreliability of both cytological results and purported voucher-specimens from the workers at PAN. Subsp. *indicum* is tetraploid and occurs throughout the Himalaya, from west (Kathua) to east.

- A. indicum* Sledge var. *obtusum* "(Bir) Trivedi, Mehrotra & Aswal" (1977) = *A. yoshinagae* Mak. subsp. *indicum* (Sledge) Fras.-Jenk.
- A. indicum* Sledge var. *obtusum* (Bir) Bir in Kachroo (ed.), *Recent Advances Bot. Res.*: 113 (1976) (misquoted *sub* var. "*obtusa*" as in Bir, Satija, Vasudeva & Goyal by Johns (1997)) = *A. yoshinagae* Mak. subsp. *indicum* (Sledge) Fras.-Jenk. Fraser-Jenkins (1993: 155, note 30) mentioned a taxon similar to, but not, as it now turns out, the same as var. *obtusum*, as the latter is only a developmental or environment-induced form of *A. yoshinagae* subsp. *indicum*, along with a hybrid also present. The type of var. *obtusum* merely represents a less developed plant than usual.
- A. indicum* Sledge var. "*proper*" [err. for var. *indicum*] Trivedi, Mehrotra & Aswal, *nom. inval. et nom. nud.* = *A. yoshinagae* Mak. subsp. *indicum* (Sledge) Fras.-Jenk.
- A. laciniatum* D. Don var. *acutipinum* ["*acutipinna*"] Bir = *A. gueinzianum* Mett. ex Kuhn.
- A. lakshmananii* Viswanathan = ?
- A. latibasis* (Ching & Shing) Nakaike = *A. magnificum* (Ching) Bir, Fras.-Jenk. & Lovis.
- A. latilobum* Viane in Viane & Reichstein (1991), (*nom. nov.* for *Ceterachopsis latibasis* Ching & Shing in Ching & S.H. Wu, *non Asplenium latibasis* (Ching) Viane in Viane & Reichstein (1991)) = *A. magnificum* (Ching) Bir, Fras.-Jenk. & Lovis.
- A. lepidum* C. Presl subsp. *hermani-christii* (Fomin) Askerov [*sub* "*hermani-christii*"] = *A. lepidum* C. Presl subsp. *haussknechtii* (Godet & Reut.) Brownsey.

- A. lepidum* C. Presl subsp. *samarkandense* (Koss.) Brownsey = *A. lepidum* C. Presl subsp. *haussknechtii* (Godet & Reut.) Brownsey. See Fraser-Jenkins (1993), where I misspelt the name as "*samarcandense*," following the Israeli translation of the "*Flora of the U.S.S.R.*"
- A. lovisii* (Rothm.) Rothm., Beitrag zur Kenntniss der Flora von Mecklenburg II. *Wiss. Zeitschr. Ernst-Moritz Arndt Univ. Greifswald* **14** (1/2): 77-78 (1965) = *A. trichomanes* L. subsp. *quadrivalens* D. Meyer. This name, which was published with a latin diagnosis and a type-specimen, was omitted from both *Index Filicum Suppl. V* and Derrick, Jermy & Paul (1987), though *A. trichomanes* L. subsp. *lovisii* Rothm. was mentioned by the latter. It is probably the correct name at the specific rank for this taxon if anyone were to think that rank appropriate, which is unlikely. It appears that there is no name at the specific rank for the much rarer *A. trichomanes* subsp. *inexpectatum* ["*inexpectans*"] Lovis, which has been found by me in Pakistan (see Fraser-Jenkins (1993)). It cannot be named with that epithet at the specific rank anyway because the combination is preoccupied by *A. x inexpectatum* E.L. Braun ex Morton.
- A. x lusaticum* D. Meyer = *A. trichomanes* L. nothosubsp. *x lusaticum* (D. Meyer) Lawalrée (= *A. trichomanes* L. subsp. *trichomanes* x *A. trichomanes* L. subsp. *quadrivalens* D. Meyer).
- A. nidus* L. var. *acutifolium* Bir = *A. nidus* L.
- A. nidus* L. var. *phyllitidis* "(D. Don) Bir" [actually (D. Don) C. Chr.] = *A. phyllitidis* D. Don subsp. *phyllitidis*.
- A. paucivenosum* (Ching) Bir forma *majus* Bir = *A. magnificum* (Ching) Bir. Fras.-Jenk. & Lovis.
- A. paucivenosum* (Ching) Bir forma *minus* Bir = *A. paucivenosum* (Ching) Bir.
- A. planicaule* Wall. ex Mett., non E. Lowe var. *obtusum* ["*obtusa*"] Bir = *A. yoshinagae* Mak. subsp. *indicum* (Sledge) Fras.-Jenk.
- A. planicaule* Wall. ex Mett., non E. Lowe (see below under *A. yoshinagae* var.

- planicaule*) var. *yoshinagae* sensu Bir, non (Mak.) Tag. [= *A. yoshinagae* Mak. subsp. *yoshinagae*] = *A. yoshinagae* Mak. subsp. *indicum* (Sledge) Fras.-Jenk.
- A. polyodon* Forst. fil. var. *bipinnatum* (Sledge) Sledge, *comb. inval.*, *sin. basionym et ref.* = *A. polyodon* Forst. fil.
- A. qiujiangense* (Ching & Fu) Nakaike (1986), *non* Ching ex S.H. Wu (1989) = *A. magnificentum* (Ching) Bir, Fras.-Jenk. & Lovis.
- A. ruta-muraria* L. subsp. *pseudogermanicum* (Heufl.) Askerov = *A. ruta-muraria* L. subsp. *ruta-muraria*. This so-called variety is merely an occasional form of the normal plant and has been fully dealt with previously by the European *Asplenium* specialists, whose detailed work is obviously unknown to the former Soviet botanists due to their isolation. Askerov must have no idea of the normal application of the rank of subspecies, which is misused here as in other cases he treated.
- A. subintegrifolium* (Hook.) Bir in Vasudeva, Bir & Kachroo (1990), *comb. inval.*, *sin. basionym ref.* = *A. gueinzianum* Mett. ex Kuhn.
- A. subintegrifolium* (Hook.) Khullar (1991 and 1992), *comb. inval.*, *sin. basionym* = *A. gueinzianum* Mett. ex Kuhn. Khullar's specimen, identified by him as *A. subintegrifolium* from Didihat Forest, [Pithoragarh,] Kumaun, 1800m. S.P. Khullar 180, Aug. 1967 (PAN) has been reidentified by me as a stunted and very immature *A. yoshinagae* Mak. subsp. *indicum* (Sledge) Fras.-Jenk. Though Khullar (1992) mentioned both a diploid and tetraploid cytotype, without reference, explanation or cited specimens, both *A. gueinzianum* and *A. yoshinagae* subsp. *indicum* are tetraploid. The distinctness of Khullar's specimen from *A. gueinzianum* presumably led Khullar (1991 and 1992), but not in his previous papers, to separate it at the specific rank, though without validating the combination. However in a postscript (1992) he placed it as excluded or doubtful without further explanation, but presumably following discussion with me in which I had told him that it was not a good taxon.

- A. tetraploideum* Panigr. = ? *A. aethiopicum* (Burm. fil.) Becherer (see *sub A. tripinnatum* below).
- A. trichomanes-ramosum* L. (replacing *A. viride* Huds., see Lellinger (1981) and Fraser-Jenkins (1992)) = *A. ramosum* L. See the Code (1994: Art. 23.7, Ex. 14).
- A. tripinnatum* (Bak.) Panigr., *non* Roxb. in Griff. = ? *A. aethiopicum* (Burm. fil.) Becherer, from Africa. Panigrahi (1963) raised this species, but as a later homonym, purely on the basis of a chromosome-count he made of a specimen from Kenya known to him from a single herbarium-frond and found to be tetraploid. However *A. furcatum* Thunb. var. *tripinnatum* Bak. was described from southern Africa, as was *A. aethiopicum* and its synonym, *A. furcatum*. He did not comment on the cytotype of true *A. aethiopicum* or on how his species (if really the same taxon as the Kenyan tetraploid) differs from it. The work was therefore incomplete to the point of his really being quite unable to suggest such a species from the evidence available and it requires further investigation, as does the later name, *A. tetraploideum* Panigr., which was his second attempt at naming it. The S. African taxon concerned has also been recognised as *A. aethiopicum* (Burm. fil.) Becherer subsp. *tripinnatum* (Bak.) Braithwaite (1986) in a much more thorough study.
- A. unilaterale* Lam. var. *birii* [Geevarghese in] Nayar & Geevarghese (1993) = ?
- A. unilaterale* Lam. var. *bivalvatum* [Geevarghese in] Nayar & Geevarghese (1993) = ?
- A. unilaterale* Lam. var. *majus* (C. Chr.) Sledge = *A. unilaterale* Lam. (synonym: *A. trapezifolium* Roxb. in Griff., *non sensu* Bedd. [= *A. inaequilaterale* Willd. in L.]). *A. excisum* C. Presl is very close indeed to a large form of *A. unilaterale* though it tends to have longer pinnae, with more acute pinna-apices and they are probably distinct. They are also fairly consistently separable in the field in Nepal and Sikkim. Iwatsuki (1975) and Kato & Iwatsuki (1986), in their detailed studies, have maintained *A. excisum* as a species distinct from other taxa they investigated in the group (though the specimens they illustrated as *A. unilaterale*

do not seem to match the type-sheet of *A. unilaterale*, illustrated by Nakaike (1992)). Since *A. unilaterale* was described from Mauritius (under its old name, Île de France, as opposed to Île Bourbon, which is La Réunion) it is always a possibility that no true *A. unilaterale* (whose cytology in Mauritius has not been investigated) occurs in India at all and that the Indian plants could represent partly smaller *A. excisum* and perhaps some other closely similar taxon; but further study and comparison of the cytology and frond-morphology of the Mauritian and various Indian plants is required to answer this question. At present I accept Indian plants as being *A. unilaterale* and maintain Indian *A. excisum* as distinct. The similar, but fairly easily distinguished *A. obscurum* Bl., which also occurs in the Himalaya (and which I have recently found as far west as on the S. side of Phewa Tal, Pokhara, W.C. Nepal. C.R. Fraser-Jenkins Field no. 1127. 1 Jan. 1997, and quite commonly around the Kathmandu valley), differs in having a dull blackish-grey (when alive) or grey (when dried), as opposed to glossy-black stipe and rachis. Occasionally both *A. excisum* and *A. obscurum* occur together, as at Pharping, near Dakchin Kali, S. of Kathmandu, C. Nepal. C.R. Fraser-Jenkins Field nos. 109 and 110, with B. Pariyar, J.B. Pariyar, K. Neupane and R. Baruwal, 20 July 1996, but remain perfectly distinct species. The smaller and again different species often named as *A. unilaterale* var. *udum* Atk. ex Bedd. (in which I also include vars. *delicatulum* Parish ex Bedd. and *rivale* Bedd., both being too close to "var. *udum*" to merit specific separation) should be known as *A. filipes* Copel. (synonyms: ? *A. cataractarum* Ros., non Bl.; *A. obliquissimum* (Hay.) Sugim. & Kur., though some of these names, relating to slightly different, or irregular forms, have been separated by some Japanese botanists who use the name *A. obliquissimum* for "var. *udum*." Iwatsuki (1992) now uses the name *A. filipes* for it and separates *A. cataractarum*; but if the latter is really distinct it needs him to make a new combination of Nakaike's remarkable *nom. nov.*, *Hymenasplenium murakami-hatanakae*, in *Asplenium* for it).

A. varians Wall. ex Hook. & Grev. subsp. *fimbriatum* (Kunze) Schelpe = *A. laciniatum* D. Don. Some years ago, when looking into the S. African "*A. varians*" group jointly with Prof. Reichstein, he and I concluded together that subsp. *fimbriatum*, which was known to be tetraploid, merely represented what must now be called *A. laciniatum*. As commented on by Morton (1974) and followed by Kuo (1985) and me (Fraser-Jenkins (1991)) and thence others, Don's *A. laciniatum* was mistaken by later authors and misapplied to *A. gueinzianum* Mett. ex Kuhn. Reichstein's (in Viane & Reichstein (1986)) proposal to reject *A. laciniatum* as dubious and inconvenient was clearly rejected by Committee (see Pichi Sermolli (1987*b*)) and since then the name has become \pm widely accepted instead of *A. varians* in Indian *etc.* literature. I am obliged to add, in order to set the taxonomic record straight, that I have to disagree that the identity of Don's type in BM, which I first informed Reichstein about and told him that I believed it to be the tetraploid "*A. varians*," is dubious, as concluded by Sleep & Reichstein (1984). Not only is the frond-morphology typical of what used to be called *A. varians sensu stricto* and not like the diploid *A. tenuicaule* Hay. (or the tetraploid *A. kukkonenii* Reichst. *et al.* (in prep.)), both first elucidated by Reichstein, but also, in contrast to what Reichstein said, I was able to find \pm plenty of spores, which I measured, found to correspond to his figures for the tetraploid, and informed him of in early 1978. Perhaps Reichstein had been influenced by his usual method of scraping the sheet near the specimen which gives good samples of fully ripe spores only as long as the spores are plentiful in fresh material, but by that stage, he did not want to change the nomenclature he had been using and would not accept that the type had sufficient spores to cast light on its identity. From another approach it is worth pointing out that the tetraploid "*A. varians*" is also the only member of the group found commonly around the Kathmandu valley *etc.*, where Don's type most probably came from, and even grows naturally in the city (where, for example, I have seen it on walls in a Thamel restaurant), which

makes it yet more likely that *A. laciniatum* is that taxon. It is of interest that the annotation that has been taken as referring to a local name for the plant on Hooker's type-specimen of *A. varians*, "*Dawecow*," might well mean the Nepali word for medicinal ("*Dowai-ko*" or दवाईको), which is invariably the response or question one gets when country-people in Nepal see one collecting plants!

As *A. laciniatum* has now come into general usage instead of *A. varians* I see no reason, even though their conspecificity is now as good as certain, to suggest making a further proposal to reject *A. laciniatum* any more in favour of *A. varians*. This was held open as a possible future step by Pichi Sermolli (1987*b*), should it still be desirable to do so, in his report on the Committee's reasoning. It is much to be hoped that Reichstein's final, posthumous publications completing his spectacular elucidation of the whole *A. laciniatum* group and other Himalayan *Asplenium* species will soon be sent for publication by Viane, whatever name he uses.

- A. viride* Huds. subsp. *incisum* (Bern.) Askerov = *A. ramosum* L. This well known occasional form of *A. ramosum*, which occurs throughout its range is obviously not any kind of distinct subspecies and should not be recognised nomenclaturally.
- A. yoshinagae* Mak. var. *indicum* (Sledge) Ching & S.K. Wu in C.Y. Wu = *A. yoshinagae* Mak. subsp. *indicum* (Sledge) Fras.-Jenk.
- A. yoshinagae* Mak. forma *obtusum* (Bir) Bir, *comb. inval., sin. basionym ref.* = *A. yoshinagae* Mak. subsp. *indicum* (Sledge) Fras.-Jenk.
- A. yoshinagae* Mak. var. *planicaule* (Clarke) Morton (intended to be a *nom. nov.* for *A. planicaule* Wall. *ex* Mett., *non* E. Lowe, but Morton apparently overlooked Clarke's legitimisation of the epithet as *A. laciniatum* D. Don var. *planicaule* Clarke, of which his name is thus a homotypic new combination) = *A. yoshinagae* Mak. subsp. *indicum* (Sledge) Fras.-Jenk.
- A. yoshinagae* Mak. var. *planicaule* (Clarke) Morton forma *obtusum* ["*obtusa*"] (Bir) Bir in Vasudeva, Bir & Kachroo = *A. yoshinagae* Mak. subsp. *indicum* (Sledge)

Fras.-Jenk.

A. yuanum Ching = *A. adiantum-nigrum* L. subsp. *adiantum-nigrum*.

Ceterachopsis birii A. & D. Löve (*nom. nov.* for *A. paucivenosum* (Ching) Bir forma *majus* Bir) = *Asplenium magnificum* (Ching) Bir, Fras.-Jenk. & Lovis.

C. latibasis Ching & Fu in Ching & Shing = *A. magnificum* (Ching) Bir, Fras.-Jenk. & Lovis.

C. latiloba Ching & Shing in Ching & S.H. Wu = *A. magnificum* (Ching) Bir, Fras.-Jenk. & Lovis. See also *sub Asplenium latilobum*, above.

C. qiujiangensis Ching & Fu in Ching & S.H. Wu = *A. magnificum* (Ching) Bir, Fras.-Jenk. & Lovis. See also *sub Asplenium dulongjiangense*, above.

Hymenasplenium murakami-hatanakae Nakaike (1992), (*nom. nov.* for *Asplenium cataractarum* Ros., *non* Bl.) = *Asplenium filipes* Copel. (see above under *A. unilaterale*). If *A. filipes* proves to be conspecific, which seems highly likely, this mouthful of an epithet will thankfully pass into synonymy. There was no blockage to simply transferring the quite well known epithet *cataractarum* into *Hymenasplenium* if one wished to recognise such a genus, which is much against the modern revisions of *Asplenium* and its splinter-genera and is not recognised here.

Sinephropteris delavayi (Franch.) Mickel = *Asplenium delavayi* (Franch.) Copel.

Tarachia prolongata (Hook.) Momose = *Asplenium prolongatum* Hook.

T. septentrionalis (L.) Momose = *Asplenium septentrionale* (L.) Hoffm. subsp. *septentrionale*.

Athyrium

Araiostegia yaklaensis (Bedd.) Nayar & Kaur = *Athyrium fimbriatum* T. Moore (= *A. foliolosum sensu* Bir *et auct. plur.*, *non* Wall. *apud* T. Moore *ex* R. Sim).

Athyrium andersonii (Clarke) Panigr. & Basu (1985a and 1987) = *A. atkinsonii* Bedd.

See Fraser-Jenkins (1997b, in press) for detailed discussion of the confusion made by Panigrahi with regard to this name, which he completely misunderstood when

making this spurious combination. It was preceded by his making another mistaken combination without adequate research, *A. yaklaense* (see below under that name), which, when he found it to be nonsense, he replaced by the present misapplied combination.

A. attenuatum (Clarke) Tag. forma *dentigerum* (Clarke) Khullar & Fras.-Jenk. in Fras.-Jenk. & Khullar = *A. attenuatum* (Clarke) Tag.

A. attenuatum (Clarke) Tag. forma *intermedium* Mehra & Khullar ex Fras.-Jenk. & Khullar = *A. attenuatum* (Clarke) Tag.

A. austro-yunnanense Ching = *A. foliolosum* Wall. *apud* T. Moore ex R. Sim (= *A. puncticaule* and *A. macrocarpon* ["*macrocarpum*"] *sensu* Bir *et auct. plur.*, non (Bl.) T. Moore and (Bl.) Bedd., respectively [= *A. puncticaule* (Bl.) T. Moore]). See Fraser-Jenkins (1997*b*, in press) for details of the nomenclatural muddle surrounding *A. macrocarpon*, partly corrected by Bir (1964) and Sledge (1962 and 1982), then copied by Panigrahi & Basu (1986), who claimed Sledge's findings as their own, failing to cite his papers, as well known to them as to others, but then, anyway proceeded to arrive at the wrong conclusion due to muddling up the taxonomy.

A. birii Ching *apud* Bir in Mehra & Bir (1960) and Bir (1973), *nom. nud.*, non (Ching *apud* Bir) Seriz. [= *Cornopteris decurrentialata* (Hook.) Nakai] = *A. himalaicum* Ching ex Mehra & Bir.

A. caudiforme Ching = *A. solenopteris* (Kunze) T. Moore.

A. caudipinnum ["*caudipinna*"] Ching (type = Murree, 298, not "Mussee, 296") = *A. mackinnoniorum* ["*mackinnonii*" of Hope *et auct. plur.*; "*mackinmoi*" of Ching] (Hope) C. Chr.

A. dentigerum (Clarke) Mehra & Bir = *A. attenuatum* (Clarke) Tag.

A. dissitifolium (Bak.) C. Chr. var. *kulhaitense* (Atkins. ex Clarke) Ching in Ching & Hsieh = *A. drepanopterum* (Kunze) A. Br. ex Milde.

A. exindusiatum Ching = *A. drepanopterum* (Kunze) A. Br. ex Milde.

- A. filix-femina* (L.) Roth subsp. *pectinatum* (Wall. ex Mett.) A. & D. Löve = *A. pectinatum* (Wall. ex Mett.) T. Moore.
- A. x heterosporum* Hsieh & Z. Wang = *A. anisopterum* Christ. The type in PE(!) has good, but partly immature spores, which were mistaken for abortive spores.
- A. x keralensis* Manickam & Irudayaraj, *nom. inval.*, *sin.* type-specimen (locality only) = *A. falcatum* Bedd. The sporangia of the original specimen (K!) are too young to see if it had abortive spores and confirm it as a hybrid, which is most unlikely anyway as the frond-morphology is typical of *A. falcatum* (see Fraser-Jenkins (1997b, in press)).
- A. kumaonicum* [Holttum in] Punetha. The description and diagnosis of this species were provided by Holttum who identified it for Punetha as a new species (information from Punetha, pers. comm. 23 Oct. 1996), all of which Punetha (1985) failed to state or acknowledge properly with the result that the taxonomic discovery looked as if it was his own, though he would not have known whether or not it was a new species. It is a good species related to *A. anisopterum* Christ and is morphologically intermediate between *A. anisopterum* and *A. foliolosum* Wall. *apud* T. Moore ex R. Sim. It has large, perispore spores similar to those of *A. anisopterum*, but has a thicker (and when living, pink) stipe than in that species, a more wide-based lamina, but more widely adnate pinnules than in *A. foliolosum*. I have now found it in "Pangtey's Gorge" at Pangote, near Nainital in 1994 and 1996 and it is no doubt a more widespread, if overlooked species.
- A. mehrae* Bir = *A. rupicola* (Edgew. ex Hope) C. Chr. (see Fraser-Jenkins (1997b, in press)).
- A. "mackinnonii"* (Hope) C. Chr. = *A. mackinnoniorum* (Hope) C. Chr. See the Code (1994: Art. 60, Ex. 20); the protologue stated that it was "named after the brothers Mackinnon," so the termination must be corrected to be plural.
- A. micropterum* "(Hay.) Fras.-Jenk." in Khullar (1996), *comb. inval.* = *A. micropterum* Fras.-Jenk., *sp. nov.*, *basionym.* *Planta minuta, delicatula.* *Ab A. anisoptero*

differt stipite tenui, fronde membranacea, angusta, pinnata. Pinnis lobatis, lobis acutis, valde dentatis. Indusiis magnis, fimbriatis. Sporis magnis, perisporis valde contiguis ad sporas, fere absentis. Holotypus: India, Uttarkhand (Uttar Pradesh), below (N. of) road-bridge, lower "Pangtey's Gorge" (stream-gorge just east of Pangote), c.½ km E. of Pangote, 3½ km N.W. of Kilbury ("Kilabari"), N. of Nainital, behind main ridge of China ("Cheena") Peak, Nainital District: narrow, deep stream-gorge between cliffs, below forest. *C.R. Fraser-Jenkins* Field no. 414, 22 Sept. 1996 (BM); also collected with *Polystichum mucronifolium* (Bl.) C. Presl (agg.), *Acystopteris tenuisecta* (Bl.) Tag. and *Dryopteris pulvinulifera* (Bedd.) O. Ktze. (the latter first discovered there by Prof. Y.P.S. Pangtey and identified for him by me) in the same gorge. *Isotypes:* Ditto (H, NMW and KATH).

This is a relative of *A. anisopterum* Christ, but is usually a smaller plant with more toothed pinnae. Larger plants with longer leaves maintain the prominent teeth. Its very tightly perisporiate spores (compared with the loosely perisporiate spores of *A. anisopterum*) are reminiscent of *Cystopteris fragilis* (L.) Bernh. subsp. *dickieana* (R. Sim) Hyland., but do have a separate, if close perispore. It occurs scattered throughout the West Himalaya from the inner Simla Hills eastwards, becoming common in the Kumaun Hills; also present in Nepal, Sikkim and presumably further east to China. It is the "typical," small "*A. anisopterum*" of most Indian authors, *i.e.* it is more extreme than true *A. anisopterum* itself, and corresponds with *Asplenium macrocarpon* Bl., *non* (Fée) T. Moore var. *atkinsonii* Clarke *ex* Bak. in Hook. & Bak., though *A. anisopterum* and *A. micropterum* have so far always been treated as one entity in India. It appears probably to correspond with Mehra & Verma's (1957) and Bir's (1972) tetraploid plant of "*A. anisopterum*," vouchers of which I have seen in PAN, though those counts could perhaps do with confirmation due to the confusion made in Bir's paper on it. It generally occurs at slightly higher altitudes and more

into the Himalayan ranges than *A. anisopterum*, though the two may often occur together. Fuller details are given in my forthcoming monograph (Fraser-Jenkins (1997b)), but the species has now been validated here instead of there as originally planned in order to clear up the unauthorised confusion of it made by Khullar.

The name *A. micropterum* was published erroneously by Khullar due to not obtaining the information properly and accurately from me and including it without my knowledge and in advance of my paper. Other mistakes made in the same way include his use of the name *A. imbricatum* Christ taken from an intermediate stage of my research for my forthcoming *Athyrium* monograph (Fraser-Jenkins (1997b, in press)) and now replaced by the name *A. distans* (D. Don) T. Moore, and also concerning my identification of *Woodsia hancockii* Bak. I had merely had some doubts about the latter at the time and had not rejected it as stated by Khullar in Khullar, Sharma & Chaudhary (1987: 260), but had accepted it as correct some years ago, when I also accepted that Dixit (1982) had acted properly and in good faith when he published my determination, my having looked into the whole matter.

A. multidentatum (Doell) Ching ex Wang *et al.*, *non sensu* Ching [= *A. monomachii* (Kom.) Kom.] = *A. filix-femina* (L.) Roth, described from S.W. Germany, not present in the Indian subcontinent.

A. parasnathense "(Clarke) Ching ex Bir" (1964) = *A. parasnathense* (Clarke) Ching ex Bir in Mehra & Bir (1964).

A. polysporum (Clarke) Ching ex Mehra & Bir = *Athyrium schimperi* Moug. ex Fée subsp. ***biserrulatum*** (Christ) Fras.-Jenk., ***comb. nov.*** (*basionym*: *Athyrium biserrulatum* Christ, *Bull. Acad. Int. Géogr. Bot. Mans* **17**: 135-136 (1907)). This subspecies is the Himalayan plant, the African ones belonging to both this subspecies and subsp. *schimperi* (see Fraser-Jenkins (1997b, in press)).

A. praetermissum Sledge var. *erythrorhachis* (Bedd.) Sledge = *A. wardii* (Hook.) Mak.

Newly reported from Sri Lanka and thus the Indian subcontinent.

A. praetermissum Sledge var. *tripinnatum* Sledge = *A. praetermissum* Sledge. I have found this species several times in Sikkim and the Darjeeling area and in Meghalaya as well as in S. India and Sri Lanka and I have also identified material of it from C. and E. Nepal, Tibet and S.W. China. Its presence in the Himalaya had been overlooked by Sledge (1956), who instead reported what was actually *A. distans* (D. Don) T. Moore as an unnamed species (*sub Allantodia incisa* Wall.) from Sikkim and Assam (see Fraser-Jenkins (1997*b*, in press)). *A. distans* occurs throughout the Himalaya from Kashmir east to Assam, including abundantly in C. and E. Nepal, Sikkim and Darjeeling and in Tibet and S.W. China. It varies somewhat in the fineness or coarseness of its lobing, which can therefore cause confusion, but I have also recently discovered what appears to be *A. silvicola* Tag. on the Changu Narayan ridge, c.1 km S. of Sankhu, N.E. of Kathmandu, Kathmandu District, Bagmati Zone, C. Nepal. C.R. Fraser-Jenkins Field no. 1257, with R. & G. Pariyar & R. Subedi, 15 Feb. 1997. It is rather similar to *A. distans* but has a distinctly coarser and more foliose frond. It is known from Japan, Taiwan and China and has also been reported from Sikkim by Yoshikawa (1990), but requiring confirmation there in case of confusion with some of the other Himalayan species (see comments by Fraser-Jenkins (1997*b*, in press)).

A. pseudofilix-femina ["*pseudo-filix-femina*"] Ching = *A. attenuatum* (Clarke) Tag.

A. sikkimense Ching (1983), *non* (Bir) A. & D. Löve (1977) = *A. distans* (D. Don) T. Moore.

A. subtriangulare (Hook.) Bedd. var. *sikkimense* Bir = *A. sikkimense* (Bir) A. & D. Löve (1977), *non* Ching (1983).

A. tenuifrons "(Wall. ex Hope) Punetha" [actually Wall. *apud* T. Moore ex R. Sim and not "Wall. ex Blanf.," as stated by Johns (1997)] = *A. strigillosum* (T. Moore ex E. Lowe) T. Moore ex Salom. I had for a number of years been using the name *A. tenuifrons* for this species in error until I discovered that it is obviously

predated by *A. strigillosum*, whose date I had mistakenly thought to be later, as I had been using the second edition of Lowe's work without realising it. Punetha (1985), having picked up my use of this name, probably from my determinations, instead of *A. clarkei* Bedd. (a name of an E. Himalayan species hitherto misapplied to *A. strigillosum* by Bir), did not realise *A. tenuifrons* was first published by Sim under *Athyrium* and mistakenly combined it again, not realising, too, that it was the same as *A. strigillosum*.

A. tsaii Ching in Mehra & Bir, *nom. nud.*, non Ching [= *A. attenuatum* (Clarke) Tag.] = *A. attenuatum* (Clarke) Tag.

A. yaklaense (Bedd.) Panigrahi & Basu (1984) = *A. fimbriatum* T. Moore. The true combination-seeking intentions of Panigrahi concerning his muddled combination, *A. andersonii* (Clarke) Panigr. & Basu (see above under that name), are revealed by his previous creation of this mistaken combination, done so carelessly and hastily that it could not have been properly researched at all. Indeed by the time he published the later note he referred to he had found out that this combination was erroneous, but then (without synonymising it and thus correcting his blunder) proceeded to create further confusion with yet another misapplied combination, *A. andersonii*. Since he evidently had no idea of the species of the genus or of what he was doing, it would have been better if the editors concerned had done their homework and rejected his pointless submissions.

Kuniwatsukia cuspidata (Bedd.) Pich. Serm. = *Athyrium cuspidatum* (Bedd.) Kato.

Microchlaena cuspidata (Bedd.) Ching, *gen. illeg.* (non *Microchlaena* Wight & Arnott, *nec* O. Ktze.) = *Athyrium cuspidatum* (Bedd.) Kato.

Pseudocystopteris andersonii (Clarke) Ching = *Athyrium atkinsonii* Bedd.

P. atkinsonii (Bedd.) Ching = *Athyrium atkinsonii* Bedd.

P. davidii (Franch.) Z. Wang = *Athyrium davidii* (Franch.) Christ (*synonym: A. duthiei* Bedd.).

P. schizochlamys Ching = *Athyrium schizochlamys* (Ching) Iwats.

P. sikkimensis (Bir) Ching = *Athyrium sikkimense* (Bir) A. & D. Löve.

P. subtriangularis (Hook. in Hook. & Bak.) Ching = *Athyrium subtriangulare* (Hook. in Hook. & Bak.) Bedd. I have identified material of this species from as far west as Deoli Patan, S.E. of Jumla, 12000'. *O. Polunin, W.R. Sykes & L.H.J. Williams* 3196, 5 Sept. 1952 (and no. 3149 and *H. Tabata, D.P. Joshi et al.* 9250) (BM, KYO), which could mean that it would be worth keeping an eye open for it in the west Himalaya.

Azolla

Azolla filiculoides Lam. In addition to the well known and widespread Indian *A. pinnata* R. Br. (synonym: *A. pinnata* var. *imbricata* (Roxb. in Griff.) Bonap.). I have also found *A. filiculoides* to be common around the Kathmandu valley in C. Nepal (I have not looked elsewhere), e.g. at Sankhu. *C.R. Fraser-Jenkins* Field no. 1277, with *R. & G. Pariyar & R. Subedi*, 15 Feb. 1997; near my home at Chandol, Kathmandu (specimen not collected) and near my son's home at Sanagaon, near Sankhu. *C.R. Fraser-Jenkins* Field no. 1379, with *Rajkumar K.C.*, 23 May 1997; Rana garden behind Nepal Indo-Suez Bank, Durbar Marg, Kathmandu. *CRFJ* 15878, 6 Dec. 1989, with *C.D. Fraser Jenkins*; and pond c. ½ km N. of Pashupatinath temple-complex on back-road to Bouddha, Kathmandu. *C.R. Fraser-Jenkins* Field no. 1032, with *Raghu Raj Onta*, 20 Nov. 1996. It is surprising that it does not seem to have been mentioned in the regional botanical literature, but it is perhaps a recent adventive in connection with rice-cultivation. After I realised that I had found a taxon similar to the European *A. filiculoides* and not *A. pinnata* I sent it to Prof. Everard at Lille, who kindly confirmed that it was really *A. filiculoides* and not one of the other species in that group.

Recent literature (Sweet & Hills (1971), followed by Loyal, Gollen & Ratra (1982)) has treated *A. imbricata* (Roxb. in Griff.) Nakai as a variety of *A. pinnata* R. Br. (though Dixit (1984) merely listed it as if another species, as with many other names be listed) and mentioned intermediates in the Indian

subcontinent *etc.* However I do not think the variation is of taxonomic significance and it appears to be quite continuous. Thus, as in my previous paper (Fraser-Jenkins (1992)), I do not recognise this taxon.

Belvisia

Belvisia henryi "(Hieron. ex C. Chr.) Panigr. & Patnaik" (1965) = *B. henryi* (Hieron. ex C. Chr.) Raymond (1962). The types of this species, described from China, are larger than is usually the case in our region, though specimens occasionally reach a similar size here.

B. henryi "(Hieron. ex C. Chr.) Tag. in Hara" (1966) = *B. henryi* (Hieron. ex C. Chr.) Raymond (1962).

Blechnum

Blechnum orientale L. var. *grande* ["*grandis*"] [Geevarghese in] Nayar & Geevarghese (1993) = *B. orientale* L.

Bolbitis

Bolbitis appendiculata (Willd.) Iwats. var. *asplenifolia* (Bory) Sledge = *B. appendiculata* (Willd.) Iwats.

B. appendiculata (Willd.) Iwats. var. *neglecta* Hennipman = *B. nodiflora* (Bory in Bélang.) Fras.-Jenk.

B. appendiculata (Willd.) Iwats. var. *kummata* [Geevarghese in] Nayar & Geevarghese (1993) = ? No derivation for this strange varietal epithet was indicated.

B. asplenifolia (Bory in Bélang.) Iwats. = *B. appendiculata* (Willd.) Iwats. I have now found this species growing as far west as the S. side of Phewa Tal, Pokhara, W.C. Nepal. C.R. Fraser-Jenkins Field nos. 1148 ("forma *asplenifolia*") and 1149 ("forma *appendiculata*"), 1 Jan. 1997, growing with *B. major* (Bedd.) Hennipman. *B. heteroclita* (C. Presl) Ching in C. Chr. and *Asplenium finlaysonianum* Wall. ex Hook. (Field no. 1126). The developmental forms are of no taxonomic importance, so I do not make a new combination for "forma *asplenifolia*."

B. bipinnatifida (J. Smith) Iwats., *non* (Mett. ex Kuhn) Ching = *B. sinensis* (Bak.)

Iwats.

B. helferiana (Kunze) Iwats. = *B. appendiculata* (Willd.) Iwats.

B. hookeriana Iwats. (*nom. nov.* for *Polybotrya vivipara* Ham. ex Hook., non *Bolbitis vivipara* (Kjellb. in Kjellb. & C. Chr.) C. Chr. [= *B. quoyana* (Gaud.) Ching]) = *B. nodiflora* (Bory in Bélanger.) Fras.-Jenk. I do not know why Hennipman (1977) stated that the correct name at the specific rank in *Bolbitis* should be *B. hookeriana* when he listed several other available synonymous epithets which have priority.

B. kanarensis Nayar & P. Chandra = *B. x lancea* (Copel.) Ching (= *B. angustipinna* (Hay.) H. Itô x *B. subcrenata* (Hook. & Grev.) Ching).

B. nagalandensis Rao & Jamir = ? *B. angustipinna* (Hay.) H. Itô.

B. semicordata (Bak.) Ching var. *incisa* Nayar & P. Chandra = *B. semicordata* (Bak.) Ching.

Egonolfia appendiculata (Willd.) J. Smith var. *major* (Bedd.) Nayar & Kaur = *Bolbitis major* (Bedd.) Hennipman. I have now found this species growing as far west as the S. side of Phewa Tal, Pokhara, W.C. Nepal. C.R. Fraser-Jenkins Field no. 1150, 1 Jan. 1997; also in the next gorge above Chowti Bara Mandir, 6 km S. of Damauli, E. of Pokhara, W. of Mugling, Tanahun District, Gandaki Zone, W.C. Nepal. C.R. Fraser-Jenkins Field no. 1328, 23 March 1997.

E. appendiculata (Willd.) J. Sm. subsp. *vivipara* (Hook.) Hennipman var. *neglecta* (Hennipman) Dixit = ***Bolbitis nodiflora*** (Bory in Bélanger.) Fras.-Jenk., *comb. nov.*, non *B. vivipara* (Kjellb. in Kjellb. & C. Chr.) C. Chr. [= *B. quoyana* (Gaud.) Ching] (*basionym: Polybotrya nodiflora* Bory in Bélanger, *Voy. Ind. Or., Bot.*, 2: 17 (1833)). This species, which is common in the Chittagong Hill Tracts in S. Bangladesh, appears to me to be a distinct species not a mere subspecies of *B. appendiculata* as treated by Hennipman (1977). But unfortunately it is not possible to use the same epithet at both ranks due to the preoccupation of the combination *Bolbitis vivipara*.

E. appendiculata (Willd.) J. Sm. var. *vivipara* (Hook.) Deb = *Bolbitis nodiflora* (Bory in Bélang.) Frasn.-Jenk.

E. keralensis Nayar & Kaur = *Bolbitis appendiculata* (Willd.) Iwats.

E. major (Bedd.) Ching & S.K. Wu in C.Y. Wu = *Bolbitis major* (Bedd.) Hennisman.

Botrychium

Botrychium lanuginosum Wall. ex Hook. & Grev. var. *nepalense* (Nishida) Nair & Dixit = *B. lanuginosum* Wall. ex Hook. & Grev.

Botrypus lanuginosus (Wall. ex Hook. & Grev.) Holub = *Botrychium lanuginosum* Wall. ex Hook. & Grev.

B. lanuginosus (Wall. ex Hook. & Grev.) Holub var. *nepalensis* (Nishida) S. Ghosh = *Botrychium lanuginosum* Wall. ex Hook. & Grev.

Japanobotrychium lanuginosum (Wall. ex Hook. & Grev.) Nishida ex Tag. = *Botrychium lanuginosum* Wall. ex Hook. & Grev.

J. lanuginosum (Wall. ex Hook. & Grev.) Nishida ex Tag. var. *nepalense* Nishida = *Botrychium lanuginosum* Wall. ex Hook. & Grev.

J. virginianum (L.) Nishida ex Tag. = *Botrychium virginianum* (L.) Sw.

Osmundopteris lanuginosa (Wall. ex Hook. & Grev.) Nishida = *Botrychium lanuginosum* Wall. ex Hook. & Grev.

Sceptridium daucifolium (Wall. ex Hook. & Grev.) Lyon var. *intermedium* Sahashi = ?

S. daucifolium (Wall. ex Hook. & Grev.) Lyon var. *kanaii* Sahashi = ?

S. multifidum (Gmel.) Nishida ex Tag. = *Botrychium multifidum* (Gmel.) Rupr.

Cerosora

Idiogramma microphylla (Hook.) S. Ghosh (1983) = *Cerosora microphylla* (Hook.) R. Tryon (1986). The only difference Ghosh mentioned between this species and the rest of *Cerosora* was the absence of farina associated with paraphyses (actually trichomes), but (see Tryon, Tryon & Kramer (1990)) this is not constant even in the other two species of the genus; nor is such a feature constant or considered to be of generic significance in the other pteridaceous genera or subgenera (e.g. in

"*Leptolepidium*," see under *Cheilanthes*). This difference is hardly one of importance when there are considerable similarities between all three species, as here, and one must ask whether Ghosh ever saw the other two, non-Indian and little-known species of *Cerosora*, which he made no comparison with or mention of at all, nor did he cite Holttum's (1959*b*) paper detailing the genus. In the apparent absence of any knowledge of the other species it is obviously not possible to reach a conclusion, as Ghosh did, that a new genus is involved, since most of the necessary research was not carried out. Following Tryon (1962 and 1986) and having seen the similarity between the three species, I agree that the poorly based "genus," *Idiogramma* (which, as with various other insignificant genera, was not considered worth listing in the synonymy by Kramer & Green (1990)), should be sunk into *Cerosora* and now do so. It is worth mentioning that the type (*i.e.* holotype), from Sorareem [Sohrarim, near Cherrapunjee, where I have also seen this species, as well as in Sikkim and Darjeeling], not "Sarureen" as stated by Ghosh from misreading the writing on the label, is not at CAL, as stated by Ghosh, perhaps referring to an isotype, but at Kew; nor did H.F. Blanford ["Blauford"] collect in Sikkim in 1857, his collections mostly being done around about the 1880s.

Cheilanthes

Aleuritopteris albomarginata (Clarke) Panigr., *non sensu* Panigr. [= *Cheilanthes formosana* Hay. and other species] = *Cheilanthes dalhousiae* Hook. See Fraser-Jenkins (1992 and 1993). The use of *Cheilanthes* instead of *Aleuritopteris* and *Leptolepidium* has been discussed by several authors, including myself (Fraser-Jenkins (1993, and 1977*c*, in press.)). I do not feel very strongly about this, however, and suspect that at a later date a proper and more far-reaching study (which has never yet been carried out) may well result in the separation of several cheilanthoid genera, perhaps including *Aleuritopteris*. But as so far defined and discussed, *Aleuritopteris* is still too difficult to separate from *Cheilanthes* as it

overlaps with it in many features. *Leptolepidium*, on the other hand, is a direct synonym of *Aleuritopteris* as its type is *C. dalhousiae* which is the correct name for what used to be called *C. albomarginata*.

A. anceps (Blanf.) Panigr. = *Cheilanthes anceps* Blanf. This species has been widely confused, particularly in China, with the commoner and more widespread *C. formosana* Hay.

A. bicolor (Roxb. in Griff.) Kholia & Punetha (1995), *comb. inval.*, *sin.* basionym = *Cheilanthes bicolor* (Roxb. in Griff.) Griff. ex Fraser-Jenkins (1992 and 1993). *C. bicolor* was found by me to be the name for the Indian species known before as *C. farinosa sensu auct. Ind., non* (Forssk.) Kaulf., once the other Indian species have been separated (as they, too, have often been included in *C. farinosa sens. latiss.*). Manton & Sledge (1954) found true *C. farinosa* from E. Africa, to be a triploid apomict (though Panigrahi (1962) wrongly claimed their finding as his discovery (see Manton, Roy & Jarrett (1966: 553)) when he attempted unsuccessfully to repeat their finding to produce an exact number). This was followed by Verma & Loyal's (1960) and Verma's in Mehra (1961) reports for Indian "*C. farinosa*" (but of which I have seen no voucher-specimens so cannot confirm the identity, which is essential) as diploid with $n = 29$, which was followed by reports by Roy and Pandey (1963) and Roy and Sakya (1963) of $n = 30$ in *C. farinosa* from the Parasnath Hills and Kathmandu. These may well be the first correct reports for *C. bicolor*, but unfortunately Prof. Roy's non-pteridological successor at Patna University, on taking over his room on his retirement, threw out all the very important voucher-specimens virtually representing his lifetime of research-publication, in order to use the cupboards, thus rendering all his publications virtually meaningless at a stroke. This act of irresponsible and anti-scientific vandalism was discovered by myself, Dr. B.M.B. Sinha and Prof. R.P. Roy when I asked to study the vouchers at Patna in March 1990 and in my view should have led to the instant dismissal of his successor by the University

authorities, who took no action. Fortunately at least the Nepalese voucher-specimens of Roy, Sinha & Sakya (1971) are safely preserved in the BM, London (though they are stated to be at Kew and Patna), and include a further count on *C. bicolor* (voucher-specimen confirmed by me). The next count for *C. bicolor*, again with $n = 30$ and a voucher-specimen confirmed by me, was by Verma & Khullar (1965a), who also gave some details of its morphology. Much fuller and more comprehensive details, including correcting Panigrahi's errors as well as pointing out the differences from true *C. farinosa* and confirming the African *C. farinosa* (not the Yemeni plant, as stated by Khullar (1994)), to be triploid (first found by Manton (1959)), were given by Manton, Roy & Jarett (1966). Thus the cytotaxonomic basis for separating *C. bicolor* was fully clear.

When I became fully familiar with the Himalayan species of *Cheilanthes* I found, as had others, that it was immediately obvious *C. bicolor* was also very distinct morphologically and I have no hesitation in saying that it is not even close to *C. farinosa*, which is more closely related to, though distinct from *C. anceps* Blanf. But on investigating other names and types in the genus it became clear that it had been named separately long before and should be called *C. bicolor*; see Fraser-Jenkins (1992 and 1993) for details of the nomenclatural complications that had previously obscured this name.

Concerning further the question of whether or not *Pteris bicolor* is a superfluous name for *C. dealbata* D. Don (see Fraser-Jenkins (1992 and 1993) for detailed discussion), Morton (1974: 367) rightly pointed out that it could not be superfluous because Don's *C. dealbata* was itself a later homonym, so that epithet was not obliged to have been used under the rules and had no priority over *Pteris bicolor* either. I do not quite agree with him that when Griffith added the Wallich name and reference into Roxburgh's (1844) account he was not referring to *C. dealbata* Wallich, Cat. no. 71, as I believe he was, since that was what was written. But I think it is right to say that we cannot assume or take it that

Wallich's *nomen nudum*, *C. dealbata*, was the basis for Don's (1825) name *C. dealbata* - for which Don merely gave as a synonym, but not as an ascription (see Code (1994: Art. 46.3)), *Hemionitis dealbata* Wallich, *in litt.*, a name I can find no information about. Judging from Don's normal practice he did not usually base his names on Wallich's or anyone else's unless the exact binomial was specifically cited as such and his practice was deliberately not to use Wallich's Catalogue names - a practice criticised strongly by Lindley and even more strongly by Wallich himself (in his account of *Peranema cyatheoides* D. Don, *sub Sphaeropteris barbata* Wall., one of the only too few names of ferns he published validly, but as later synonyms, in *Plantae Asiaticae Rariores*: 42 (1830)) (see Smith & Fraser-Jenkins (1982)). Mainly because of the practical difficulties which now arise in identifying Don's names when based on a Wallich collection, as a result, I endorse their criticism! Thus it was not Don's *C. dealbata* that Griffith added in but merely Wallich's, which as a *nom. nud.* could not make Roxburgh's name superfluous. Griffith would undoubtedly have been aware of Don's *C. dealbata*, but probably preferred to mention Wallich's one instead - we must remember that Don's book was shunned by botanical society at the time and apparently his names were avoided mention of whenever possible. There is a third reason, with more far-reaching possible consequences, as to why whatever name Griffith had put into Roxburgh's account in the "synonymy" would have made no difference. This is because, as previously explained by me (Fraser-Jenkins (1993)), Griffith was an editor, not the author, who was Roxburgh alone - Griffith actually stated, "the foot notes are my own, otherwise the matter is verbatim Roxburgh's," though he must have forgotten to add that the Wallich synonyms, being later than Roxburgh's time must also have been added in by him, as Morton concluded. Therefore the names could not be made superfluous by the addition of later synonyms by Griffith: the Code (1994: Art. 52.1) specifically says that the name of a taxon, "*as circumscribed by its author*" [*i.e.* Roxburgh, not Griffith],

must include "the type of a[nother] name which ought to have been adopted, or whose epithet ought to have been adopted, under the rules" to be considered superfluous. So what Griffith wrote in after Roxburgh's death is irrelevant. I do not agree, as Morton wrote (1974: 287) under another such case, that of *Adiantum microphyllum* Roxb. in Griffith., *non* Sw. (a synonym of either *A. venustum* D. Don, or perhaps more likely, the more common, *A. fimbriatum* Christ, but unusable as it is a later homonym), that by adding in the name *A. venustum* D. Don, Griffith made Roxburgh's species-name superfluous. All this also means that *Pteris bicolor* should be typified, as I did (Fraser-Jenkins (1992)), by Roxburgh's type-specimen and not by Wallich's (or Don's), which is why *C. bicolor* applies to what used to be known as *C. farinosa sensu auct. Ind.*, the very common and widespread lower-altitude species with long, reddish-brown stipes, narrow, bicolorous scales at the base only and a markedly pentagonal-deltate, ± finely dissect, ± herbaceous lamina.

An obvious specimen of *C. bicolor* was illustrated by Panigrahi in Panigrahi, Gupta & Swami (1991) under the highly inaccurate identification of "*Leptolepidium dalhousiae*" (Hook.) Hsing & S.K. Wu, from Jammu Division in Indian-occupied Kashmir, by which name the higher-altitude *Cheilanthes leptolepis* Fras.-Jenk. is normally meant. Five further specimens of *C. bicolor* were misreported, but this time as "*Aleuritopteris grisea*" (Blanf.) Panigr., by Panigrahi & Dixit (1966) as erroneous "new records" and illustrated there. The specimens cited were reidentified by me in BSA in Feb. 1994. However most of Panigrahi's identifications of "*C. grisea*" from the Himalaya are actually *C. formosana* Hay.

A. bulbosa (Kunze) Ching = *Cheilanthes bulbosa* Kunze.

A. chrysophylla (Hook.) Ching = *Cheilanthes chrysophylla* Hook.

A. dalhousiae (Hook.) Ching = *Cheilanthes dalhousiae* Hook.

A. doniana S.K. Wu (1983) (*nom. nov.* for *Cheilanthes dealbata* D. Don, *non* Pursh [=

Argyrochosma dealbata (Pursh.) Windham], *superfl.* for *A. dealbata* Fée) = *Cheilanthes doniana* Fras.-Jenk. & Khullar in Khullar (1994: 200-201) [*sub* "*comb. nov.*," actually a *nom. nov.*]. This species was mentioned by me (Fraser-Jenkins (1993: 144)) as having a *nom. nov.* of *C. doniana* (given by Ching and also by Wu, but actually *sub Aleuritopteris*), which I deliberately did not validate as my research was not finalised. However, in keeping with the Code (1994: Rec. 58A. 1), I subsequently intended to make it a new species, with a new and better type in the present paper. But in the meantime it was published with the name *C. doniana* without my knowledge and approval by Khullar, whom I had privately told some time before that as *C. dealbata* was superfluous and thus illegitimate the species needed a new name which I would give it in my monographic revision of Indian *Cheilanthes*, (in prep.), possibly *C. doniana*. The situation should simply have been referred to and a name should not have been created formally by him. Moreover, having not consulted fully with me before taking it over, he erroneously thought that it was a new combination, against the Code (1994: Arts. 58.1 and 58.3 and Ex. 2), and wrongly cited S.K. Wu as a basionym-author whereas the name is to be treated as the name of a new taxon or as a *nom. nov.* I am now obliged to employ this name, but with amended author-citation. *C. doniana* is similar to a very long-fronded *C. anceps* Blanf., but with shorter, wider and less lobed pinnules in the mid-frond (in particular) than in that species, wider, often less obviously bicolorous (but not fully concolorous) scales and more separate indusial lobes. It is a spectacularly long-fronded species when fully developed, with very bright-white farina and pendent fronds up to 3 ft. long. I have identified material of it from as far east as Myanmar (Burma, Taungteik. F.G. Dickason 7553, 1 May. 1937 (E)).

A. doniana S.K. Wu ex Ching (1985 ["1984"]) (*nom. nov.* for *Cheilanthes dealbata* D. Don, *non* Pursh, *superfl.* for *A. dealbata* Fée and later homonym of *A. doniana* S.K. Wu) = *Cheilanthes doniana* Fras.-Jenk. & Khullar in Khullar.

- A. dubia* (Hope) Ching = *Cheilanthes dubia* Hope (synonym: *C. leveillei* Christ, type in E (!)).
- A. duthiei* (Bak.) Ching = *Cheilanthes duthiei* Bak.
- A. flaccida* (Bedd.) Nayar & Kaur, *comb. inval.*, alternative name not definitely accepted by the authors = *Cheilanthes bullosa* Kunze.
- A. formosana* (Hay.) Tag. = *Cheilanthes formosana* Hay. The author was misquoted as S.K. Wu by Johns (1997: 40).
- A. grisea* ["*gresia*" of Ching *et auct. Chin.*] (Blanf.) Panigrahi (1961), *non sensu* Panigr. [= *Cheilanthes krameri* (Franch. & Sav.) Ching; *C. formosana* Hay.; *C. bicolor* (Roxb. in Griff.) Griff. *ex Fras-Jenk.* and other species] = *Cheilanthes grisea* Blanf.
- A. grisea* (Blanf.) Panigrahi (1955), *comb. inval.*, *sin. basionym ref.* = *Cheilanthes grisea* Blanf.
- A. grisea* (Blanf.) Panigr. var. *alpina* (Ching *ex* S.K. Wu) S.K. Wu = *Cheilanthes grisea* Blanf.
- A. humatifolia* Zhang & Shi = *Cheilanthes chrysophylla* Hook.
- A. interrupta* Saiki = *Cheilanthes anceps* Blanf.
- A. javanensis* Saiki = *Cheilanthes anceps* Blanf.
- A. kathmanduensis* Ching & S.K. Wu in S.K. Wu = *Cheilanthes bicolor* (Roxb. in Griff.) Griff. *ex Fras.-Jenk.* The type of *A. kathmanduensis*, like that of Wu's *A. longipes*, appears to be absent from KYO where I searched for it on two visits there, including with the help of Prof. Y. Saiki, and may perhaps have been lost while on loan to PE or KUN. The locality (Sundarijal), which is not far from my home, has been carefully examined in detail by me. In comparing Wu's illustration with the protologue-description, the distance the scales extend up the stipe is actually described slightly differently from what is shown in the illustration (which latter does not fit any species known to me) and more obviously fits *C. bicolor* which is present in the locality along with *C. formosana* Hay., but there is no *C.*

anceps Blanf. there, which I had previously mistakenly thought could be the identity of the name (Fraser-Jenkins (1992)) due to the misleading illustration.

A. krameri (Franch. & Sav.) Ching = *Cheilanthes krameri* Franch. & Sav. Apart from my seeing a number of S. Indian and other Asian herbarium-specimens, this species has also been collected by me in the Shevaroy Hills, Yercaud, Kakasholai, S. India. *CRFJ* 9050 and 9051, 13 Dec. 1978 (NMW, BM) and in Sri Lanka, Kandy, Corbets' Gap. *C.R. Fraser-Jenkins* Field no. 278, 14 Oct. 1993 (BM, K, PDA, US) *etc.* and is similar to a small, short-fronded *C. bullosa* Kunze. It was found by Manton & Sledge (1954) to be diploid, under the name *C. farinosa* (Forssk.) Kaulf. (*sens. lat.*), voucher-specimen reidentified by me at BM. Their record was then taken up and included in Panigrahi's Ph. D. study under Manton, but was misidentified by him (Panigrahi (1955, 1961 and 1962)) as the high-altitude Himalayan, Tibetan and S.W. Chinese "*Aleuritopteris grisea*" (Blanf.) Panigr., *i.e.* *Cheilanthes grisea* Blanf. *C. krameri* was previously known from Japan (very rare), Taiwan and S.E. Asia but not from the Indian subcontinent. I have also identified material of it from the Nilgiri Hills, S. India (see Fraser-Jenkins (1997c) in press), and E. China (see Addenda, below).

A. longipes Ching & S.K. Wu in S.K. Wu, *nom. inval.*, no type, collector or number, only locality (Kurseong ["Kureong"]) and date cited = *Cheilanthes bicolor* (Roxb. in Griff.) Griff. *ex* Fras.-Jenk. The type of *A. longipes*, like that of Wu's *A. kathmanduensis*, appears to be absent from KYO and may perhaps have been lost while on loan to PE or KUN. I have carefully examined the type-locality (below Darjeeling) and its surroundings as well as the other two localities given, Senchal ["Seuchal"], below Darjeeling and Yoksam ["Yokusan"] to Bakkim ["Bakkam"], N. of Geyzing and Pemayangtse in W. Sikkim, and have concluded from the protologue that it must have been *C. bicolor* that was intended, despite the drawing, but not description, of the scales as concolorous. The lamina in the illustration is also more like *C. bicolor* than the concolorous-scaled *C.*

subdimorpha (Clarke & Bak.) Nayar & Kaur, the only two species it could possibly be.

A. pentagona Saiki, non *Cheilanthes pentagona* Schelpe & Anthony = *Cheilanthes subdimorpha* (Clarke & Bak.) Nayar & Kaur. This species is like a very robust, coarsely lobed, thick-stemmed *C. bicolor* with concolorous, reddish stipe-base scales. It occurs from the edge of the Darjeeling foothills (rare) eastwards to Laos, but is very common in Meghalaya, though hardly known to Indian botanists.

A. platyklamys Ching = *Cheilanthes platyklamys* (Ching) Fras.-Jenk., **comb. nov.** (*basionym*: *Aleuritopteris platyklamys* Ching, *Flora Tsinglingensis* 2: 207 (1974)). I have recently found this species at Gini in Pithoragarh. C.R. Fraser-Jenkins Field nos. 443-445, with A.M. Thapa & B. Pariyar, 27 Nov. 1994, following my reidentification of specimens of it collected from there and from Kalamuni by Kholia, one of which had been reported by Punetha & Kholia (1989b) as "*C. mexicana* (Fée) Punetha & Kholia," from Gini. They also included under that name a specimen of *C. anceps* Blanf. (redetermined by me), from Panyapodi. The determinations as *C. mexicana* were made for them by Saiki as were all their *Cheilanthes* and *Lepisorus* etc. determinations, as they did not do their own research on these groups before publishing. The name *A. mexicana* Fée was generally misapplied by Saiki (1984) to *C. anceps*. I had previously discovered *C. platyklamys* at the higher altitudes of Phulchowki mountain, above Godavari, near Kathmandu, C. Nepal. CRFJ 15841, with C.D. Fraser Jenkins, 20 Nov. 1989, and C.R. Fraser-Jenkins Field no. 345, with A.C. Jermy & V.L. Gurung, 12 Jan. 1993, as new to the Indo-Himalaya. Punetha agreed with my request not to publish the species until I had done so in connection with my revision of *Cheilanthes*, as a condition of my telling him the name for his specimens of *C. platyklamys*, but it was then published by Kholia & Punetha (1995), without informing me, as a later addition to the first draft of a paper by them that I had corrected for them in 1994. They did not even say that I had

discovered and identified it for them in their collections! However because they did not reveal their intention to publish it and obviously did not themselves know the species in this genus (as in many others), they did not ascertain that they had obtained the information from me properly, and quite mistakenly stated that they had previously (Punetha & Kholia 1989) reported it as *C. bullosa*, muddling up which specimens I had said were *C. platyklamys*. As their "*C. bullosa*," reidentified by me in 1994, from Baluwakote and Panyapodi, was *C. bicolor* and *C. leptolepis* Fras.-Jenk., respectively, it turns out that their reporting of *C. platyklamys* from India was therefore quite erroneous, being taxonomically incompetent and misidentified (by them) in addition to their lack of honesty and courtesy.

A. platyklamys Ching var. *alpina* Ching ex S.K. Wu = *Cheilanthes grisea* Blanf.

A. pseudoargentea S.K. Wu = *Cheilanthes subdimorpha* (Clarke & Bak.) Nayar & Kaur. The type and other cited material, which I have seen at KYO are typical of this species, which was evidently unknown to Wu. Interestingly he was at first going to give it joint-authorship with Iwatsuki, according to his determinations on the sheets.

A. pseudofarinosa Ching & S.K. Wu ex S.K. Wu = *Cheilanthes anceps* Blanf.; not *C. formosana* Hay. (sub *C. brevifrons* (Khullar) Khullar) or *C. subdimorpha* (Clarke & Bak.) Nayar & Kaur, as simultaneously stated by Khullar (1994), the latter based on an unfinalised and erroneous opinion of mine which I once mentioned to him.

A. rufa (D. Don) Ching = *C. rufa* D. Don.

A. stenochlamys Ching ex S.K. Wu = *Cheilanthes platyklamys* (Ching) Fras.-Jenk. The reports of *A. stenochlamys* from Nepal (Phulchowki) and Bhutan by Wu (1983) are *C. platyklamys* (specimens recently reidentified by me). *A. stenochlamys* is merely *C. platyklamys* from a sheltered locality which is less soriferous than normal so the sori are shorter, narrower and more separate.

A. subrufa (Bak.) Ching = *Cheilanthes dubia* Hope. This name was misidentified by Wu as being a synonym of what is now called *C. dalhousiae*, but the types at K (!) are *C. dubia*.

A. tamburii (Hook.) Ching = *Cheilanthes tamburii* Hook. This superb species, similar to a big *C. argentea* (Gmel.) Kunze (which also occurs, but as a greater rarity, in N. Sikkim and Meghalaya), was illustrated by Gurung (1991: 74) *sub Doryopteris concolor* (Langsd. & Fisch.) Kuhn in v. Deck. It is rare and scattered in C. and E. Nepal and further east and Gurung's specimens came from Langtang- to Syabrubensi, Rasuwa District, C. Nepal (redetermined by me in KATH). I have also found it subsequently between Ramche and Dhunche C.R. Fraser-Jenkins Field no. 28, 28 Sept. 1994 and at Deurali, Dhunche. C.R. Fraser-Jenkins Field no. 67, with Rajkumar K.C., B. Pariyar & R. Karki, 29 Sept. 1994, in the same general area.

A. tenella (Ching & S.K. Wu) Saiki = *Cheilanthes subvillosa* Hook.

A. thwaitesii (Mett. ex Kuhn) Saiki = *Cheilanthes thwaitesii* Mett. ex Kuhn.

Cheilanthes anceps Blanf. var. *brevifrondis* Khullar & Mehra (1972), *nom. nud.* = *C. formosana* Hay. This was an earlier attempt at naming "*C. brevifrons*."

C. anceps Blanf. var. *brevifrons* Khullar = *C. formosana* Hay. Although Hayata's type is a very poor, immature plant it definitely belongs to this species and has a very few scales which are bicolorous and brown, not concolorous and reddish as in *C. krameri* Franch. & Sav. *etc.* It also has glands and minute asperations on the rachis as expected. It is a common species in Taiwan, where I have also collected it. It is unfortunate that Khullar (1994) preferred not to use the correct name which I had discovered (Fraser-Jenkins (1992)) and long since told him about in detail. In China this species has usually been called *A. anceps* (Blanf.) Panigr. by Ching, S.K. Wu *et al.*, which is why true *C. anceps*, which is not common there, was renamed as *A. pseudofarinosa*. *C. formosana* differs from *C. anceps* in its narrower, smaller fronds with a more wrinkled upper surface to the lamina and in

its narrower, slightly smaller (but similarly bicolorous) scales which, diagnostically, run up the rachis as well as the stipe, but are not present on the costae. Khullar's (1994) illustration of *C. anceps*, though correctly numbered (and the specimen, from Rajasthan (PAN!), verified by me), is misleading in showing many scales on the rachis whereas in *C. anceps* there are normally no such, or only one or two very small such scales, confined to the base of the rachis.

Although Khullar in Mehra & Khullar (1970), Khullar & Mehra (1972) and Khullar (1976) first published the correct cytological number ($n = 30$) and the epithet *brevifrons* for this species, Verma in Mehra (1961) was the first to find it diploid (but with the erroneous number of $n = 29$), under the name *C. anceps* (voucher-specimen: "*C. anceps*. Ging, Darjeeling, 1350m. S.C. Verma s. n., July 1956, $n = 29$, PAN 3783," reidentified by me in Aug. 1991 as *C. formosana*). This count led subsequent workers from Chandigarh to think that *C. anceps* is diploid, whereas it is actually tetraploid (Manton & Sledge (1954) *sub C. anceps* (voucher-specimen at BM reidentified by me); and voucher-specimens from S. India and Mt. Abu, Rajasthan of unpublished results by Khullar and Bir (reidentified by me)); see Fraser-Jenkins (1997c, in press). Panigrahi's (1960 and 1962) identification of Manton and Sledge's Sri Lankan tetraploid as *C. anceps* was correct, though perhaps mostly by chance; as it was apparently only based on a comparison of Blanford's description with the plants cultivated at Leeds (see Panigrahi (1962: 58)), without proper comparison with the type in the normal way (even though Panigrahi was at that time studying in Britain where the type was available to him). I have collected *C. anceps* (as well as *C. bullosa*, *C. krameri* etc.) from three places in Sri Lanka (see Fraser-Jenkins (1997c, in press)) and found it to correspond exactly with the Himalayan plant and its type.

Blanford's (1886) protologue of *C. anceps* was partly mixed with *C. formosana*, the existence of two taxa first being suggested by Hope (1900: 98) who mentioned a small and large form. The two were looked into by Prof. S.C.

Verma (pers. comm. Aug. 1991) in connection with the 1965 M. Sc. research of his student, Chand Sharma, and he was the first person to discover that two distinct species were involved in *C. anceps*, naming the smaller species (*C. formosana*) as *C. himaliae* Verma (*ined.*), from the Himalaya and correctly giving the range of the larger, true *C. anceps* as the Himalaya, S. India and Rajasthan. However Verma very prudently and scientifically decided not to include *C. himaliae* in his joint paper with Khullar (Verma & Khullar (1965a)), requesting him to take it out, though he had originally put in details of it, as he had not been able to check Blanford's type and study other materials at Kew and needed to do so first. He finally did so in the 1970s, determining material at K and BM on the sheets as *C. himaliae*, but in the meantime Khullar (1976) published a name of his own for it, finally (Khullar (1985)) realising and making it a species as Verma had done before him, but publishing it mistakenly as new without looking into its range and nomenclature outside India.

C. formosana was illustrated by Panigrahi & Dixit (1996) under the names *C. anceps* and *C. albomarginata* (Clarke) Panigr., all as erroneous "new records," the two specimens cited were reidentified by me in BSA in Feb. 1994. *C. formosana* together with *C. bicolor* are the two commonest and most widespread species in the Indian subcontinent, with *C. dalhousiae* Hook. (*synonym: C. albomarginata*), at higher altitudes, the next most common. A¹¹ these species have been much confused and misidentified by Panigrahi in his various papers.

C. brevifrons (Khullar) Khullar = *C. formosana* Hay.

C. dalhousiae sensu auct. Ind., non Hook. = *C. leptolepis* Fras.-Jenk. (1993). The illustration of this species (*sub C. dalhousiae*) by Khullar (1994) is obviously *C. bicolor*, but with the wider scales of *C. leptolepis* added in up the stipe subsequently instead of realising that the drawings or specimens had been muddled. That of *C. bicolor* is *C. leptolepis*, but with narrow scales drawn in as

being confined to the stipe-base, as in *C. bicolor*; this was due to muddling the drawings as well as citing confused and erroneous PAN numbers for several of his *Cheilanthes* drawings (which, along with the specimens, I have checked out and found to have been wrongly numbered, as they are also for several other genera in his book). The normal international practice, incidentally, is to cite the locality (in brief), the collector's name and the collector's number and/or date. Merely citing PAN herbarium-numbers provides no worthwhile information and cannot be checked by other workers (though I have myself made a copy of the PAN register). I have been obliged to note the PAN or PUN accession-numbers as well as collectors' numbers when working in those herbaria due to the practice of Mehra's school of workers to cite only the former. Indeed only Dhir maintained a proper system of collector's numbers, though Bir did so for some of his collection-years. Khullar has not done so, though he has sometimes created arbitrary, but right-sounding numbers when presenting some specimens to Kew *etc.* In fact almost all of his later collections are unnumbered and unlocalised in disordered piles in his room so that his papers after *c.* 1975 frequently have no verifiable basis at all in terms of voucher-specimens, which can only lead to problems and to the rejection of many of his abundantly published records.

C. "discolor" Griff. = erroneous slip-up for *C. bicolor* (Roxb. in Griff.) Griff. *ex* Fras.-Jenk. and not an independent name as it was taken to be by Saiki (1984).

C. flaccida (Bedd.) Mehra & Bir, *non sensu* Mehra & Bir [= *C. bicolor* (Roxb. in Griff.) Griff. *ex* Fras.-Jenk.] = *C. bullosa* Kunze. S. India and Sri Lanka only.

C. keralensis Nair & S. Ghosh = *C. thwaitesii* Mett. *ex* Kuhn (*synonym: C. laxa* T. Moore, *nom. nud.*). Although there is an isotype of *C. thwaitesii* (C.P. 1321) at CAL, which exactly matches the larger specimens of "*C. keralensis*," it is unnamed and was in the undetermined folder there, which is probably at least partly why the species was not previously known to local workers there, leading to its unnecessary redescription.

C. leptolepidium Fras.-Jenk. (1992), *nom. nud.* = *C. leptolepis* Fras.-Jenk. In my first mention of this species, before I described and validated it, I gave it an incorrect genitive plural termination by mistake, muddling it up with the generic name *Leptolepidium*.

C. longipes (Ching & S.K. Wu in S.K. Wu) Dixit & Bal Krishna [*sub* "Ching *ex* S. K. Wu" and "*stat. nov.*"] (1989) = *C. bicolor* (Roxb. in Griff.) Griff. *ex* Fras.-Jenk.

C. mexicana (Fée) Punetha & Kholia (1989), *non* Davenp., *nec sensu* Punetha & Kholia [= *C. anceps* Blanf. and *C. platyklamys* (Ching) Fras.-Jenk.] = ***Cheilanthes chihuahuaensis*** (Saiki) Fras.-Jenk., ***comb. nov.*** (*basionym*: *Aleuritopteris chihuahuaensis* Saiki, *J. Phytogeog. Taxon.* **32**(2): 85 (1984); *synonym*: *Aleuritopteris peruviana* Saiki). This species comes from C. and S. America and is not present in Asia. Saiki (1984) misapplied the name *A. mexicana* Fée to various Asiatic species, including *C. anceps* Blanf., *C. krameri* Franch. & Sav. and *C. platyklamys* (Ching) Fras.-Jenk., as well as, correctly, to the tropical American plant, but the name cannot be used in *Cheilanthes* for the rather obvious reason that the combination is preoccupied. Punetha & Kholia (1989) simply published Saiki's determinations of their material with inadequate research.

A. mexicana is a *Cheilanthes* of subgenus *Aleuritopteris*, though Tryon (1962) mistakenly applied the name to *Pityrogramma tartarea* (Cav.) Maxon from tropical America. Another name used by Saiki to apply to the same Mexican species as well as, quite erroneously, to the Indian *C. bicolor* (Roxb. in Griff.) Griff. *ex* Fras.-Jenk. was *A. pulveracea* (C. Presl) Fée. But *C. pulveracea* C. Presl (1825), *non* Spreng. in L. (1827), cannot be used for the Mexican plant, despite Presl's having done so, as it was published as a superfluous name, including *Pteris argyrophylla* of Willd. (1810), which latter was actually the same as and based on *Pteris argyrophylla* Sw. (1806) (*synonym*: *Pteris argentea* Bory (1804), *non* Gmel. (1768)). *Cheilanthes argyrophylla* (Sw.) Cordem. is a distinctive, long, narrow-fronded species with a bullulate upper surface to the

lamina, from La Réunion, Ethiopia, Kenya, Tanzania, Uganda, Zaire, Zambia, Burundi and Cameroon (in the first and last of which countries I have also collected it), but not present in the Americas or Asia. Recent synonyms are *Aleuritopteris afra* Pich.-Serm., *A. centro-africana* Saiki, *A. flava* Saiki, ? *A. leptophylla* Saiki, *A. longifrons* Saiki and "Species A" of Faden in Agnew's "Upland Kenya Wild Flowers" (1974), as well as *C. pulveracea* C. Presl. Thus the New-World "*Cheilanthes farinosa*" agg. species, not at all the same as true *C. farinosa* (Forssk.) Kaulf., confined to Africa and S.W. Arabia, has been without a name in *Cheilanthes* until now. Unfortunately, though it should be called *A. mexicana* Fée in *Aleuritopteris*, it must now be called *C. chihuahuaensis* (Saiki) Fras.-Jenk. in *Cheilanthes*. It is one of the concolorous red-scaled species, belonging to the same group as *C. krameri* Franch. & Sav., *C. grisea* Blanf. and *C. bullosa* Kunze and is closest to the latter. I have collected it commonly in Mexico.

- C. pseudoargentea* (S.K. Wu) Iwats. = *C. subdimorpha* (Clarke & Bak.) Nayar & Kaur.
C. pseudofarinosa (Ching & S.K. Wu) Iwats. = *C. anceps* Blanf.
C. wusukungii Miyamoto & Ohba (1997) = *C. dubia* Hope. It is strange that some Japanese botanists imagine they should describe a "new species," *i.e.* merely one not known to them, when they are not even familiar with the basic literature for the area or the genus concerned, so have no basis from which to "regard this as a new species," as they said. This species, which occurs throughout Nepal including at several well known places in the Kathmandu valley (Godavari *etc.*), was beautifully illustrated by Hope (1899), with a detailed description and informative discussion of its intermediate morphology between what are now known as *C. dalhousiae* and *C. rufa*, yet while noticing its resemblance to *C. rufa*, but not its obvious intermediacy towards *C. dalhousiae*, Miyamoto & Ohba completely failed to make any mention of *C. dubia*, which was presumably unknown to them. Fortunately their taxon was well illustrated and it is

immediately obvious that it is this species, common at lower-mid altitudes throughout Nepal. The authors did not think to compare their species with *C. dalhousiae* (which they still called *C. albomarginata*, failing to assimilate my papers' emendment of the name *C. dalhousiae*), to which it is as closely related as it is to *C. rufa*, and they also misapplied the name *C. subrufa*, which is a synonym of *C. dubia* - i.e. Iwatsuki in Tagawa & Iwatsuki (1985) was a good deal more accurate in his identification of the species than they were!

In fact their paper is so full of errors concerning the genus that it is surprising that their supervisor did not ask for it to be checked by someone more closely connected with Himalayan fern-taxonomy, such as Nakaike. For example, there are actually 15 west-Himalayan *Cheilanthes* species, not 5, as they wrongly attributed to me, having misread the geographical area my paper covered (I can only surmise); but anyway, in that particular paper they cited, I actually reported 11 species (7 in Subgenus *Aleuritopteris*) from the far-west Himalaya, including *C. dubia* itself, so one wonders if they could really have read the paper! There are also 15 species in Nepal, not 10 as they thought. Species present in Nepal, verified by me, are *C. tenuifolia* (Burm. fil.) Sw., *C. duthei* Bak., *C. leptolepis* Fras.-Jenk., *C. subvillosa* Hook., *C. rufa* D. Don, *C. dubia* Hope, *C. dalhousiae* Hook., *C. chrysophylla* Hook., *C. formosana* Hay., *C. platyklamys* (Ching) Fras.-Jenk., *C. grisea* Blanf., *C. doniana* Fras.-Jenk. & Khullar in Khullar, *C. anceps* Blanf., *C. bicolor* (Roxb. in Griff.) Griff. ex Fras.-Jenk. and *C. tamburii* T. Moore, while the very rare *C. argentea* (Gmel.) Kunze occurs nearby in N. Sikkim, Songgong, 14000'. *R. Rhomoo* [*Riba Rhomoo* was a collector for *G.H. Cave*] 7634, 4 Oct. 1923 (Herb. Lloyd Bot. Garden, Darjeeling, det. by me 26 Jan. 1993) and *C. subdimorpha* (Clarke & Bak.) Nayar & Kaur also occurs nearby below Darjeeling (Gurung's (1985) reports of the two latter plus *C. kuhni* Milde and *C. hancockii* Bak. from Nepal were just species she thought might be in Nepal combined with unchecked literature-reports, including some from other countries).

They also reported only six species from Thailand, but I have myself identified or confirmed the presence of 14 species there, *C. tenuifolia*, *C. velutina* (Tard. Blot & C. Chr.) Fras.-Jenk., **comb. nov.** (basionym: *Notholaena velutina* Tard. Blot & C. Chr., *Not. Syst. (Paris)* 6: 167 *et t.* (1938)), *C. belangeri* (Bory) C. Chr., *C. rufa*, *C. dubia*, *C. dalhousiae*, *C. formosana*, *C. krameri* Franch. & Sav., *C. anceps*, *C. siamensis* (S.K. Wu) Iwats., *C. subdimorpha*, *C. bicolor*, *C. delicatula* Tag. & Iwats. and *C. fragilis* Hook.

Though this case is a very bad example of new species syndrome, I suppose it is good to see someone with the courage to ignore the "Pin Yin" misspelling of names, with its incorrect pronunciations given to certain European (Roman) letters in a way they have never been pronounced in any known language, which has only led to many Chinese names being even more badly and incurably mispronounced abroad than before. Yet I cannot see the value of naming a species of *Cheilanthes* after an author who has so muddled up this genus, among others!

Cheilosoria belangeri (Bory) Ching & Shing = *Cheilanthes belangeri* (Bory) C. Chr.

C. hancockii (Bak.) Ching & Shing = *Cheilanthes hancockii* Bak. This name was rather widely misapplied by Hara (1966), in the first Japanese *Flora of the Eastern Himalaya* report, to *C. bicolor* (Roxb. in Griff.) Griff. *ex* Fras.-Jenk. (specimens reidentified by me). *C. hancockii* (synonyms: *C. henryi* Christ, *C. taliensis* Christ, *C. wilsonii* Christ) has not been found in the Indian subcontinent but is confined to China. It is related to *C. tenuifolia* (Burm. fil.) Sw. (synonym: *Cheilosoria tenuifolia* (Burm. fil.) Trev.), which Panigrahi (1987) erroneously proposed to be the type of *Cheilanthes*, *nom. cons.*, instead of *C. micropteris* Sw., contradicting Pichi Sermolli's (1953) careful and accurately reasoned work on the subject without good reason. Kholia & Punetha (1995), not having looked into the matter themselves, followed Panigrahi and did not realise that his proposal had been rejected by Committee. They were also apparently unaware of the existence of or

the Chinese application of *Cheilosoria* and concluded that there were only two species of *Cheilanthes* in Asia, *C. hancockii* and *C. tenuifolia*. They omitted to mention even the well known *C. pteridioides* (Reichard) C. Chr. subsp. *acrostica* (Balbis) Bolos, Vigo, Masalles & Ninot and *C. persica* (Bory) Mett. ex Kuhn from the west Himalaya, or the various S.E. Asian *etc.* species related to *C. tenuifolia*, or the S. Indian and Sri Lankan *C. opposita* Kaulf., and how they should be placed, presumably not being aware of the complexity of the problem, or, indeed, of many of the well known species in the genus.

Their report of *C. tenuifolia* from Pithoragarh, though they failed to say so, was based on a determination by me of an unnamed specimen they showed me in 1994, said to have been collected by Kholia, but for which they did not know the locality, though they put in the locality for the other records they published. By 1996 they still did not know the locality and its purported origin from the West Himalaya must therefore be treated as doubtful until I have been shown it in the field. I have found the species as far west as Komale, near Deorali, above Markichowk and Khaireni, Ghorkha District, W.C. Nepal. *C.R. Fraser-Jenkins* Field no. 1138, with *Rajkumar K.C.*, 17 Feb. 1994 (also Field no. 1088, 30 Dec. 1996); and also on the S. side of Phewa Tal, Pokhara, W.C. Nepal. *CRFJ* 18103, 23 Jan. 1991 (growing in the same general locality as *Vittaria sikkimensis* Kuhn (*CRFJ* 18108); *Bolbitis heteroclita* (C. Presl) Ching (*CRFJ* 18138); and *B. appendiculata* (Willd.) Iwats. (*CRFJ* 18139) and several other species traditionally considered to be east-Himalayan). I have also seen herbarium-specimens from Lete, W. of Pokhara, Manang District, W.C. Nepal. *D.P. Joshi & M.M. Amatya* 73/286, 6 July 1973 (KATH), but though possibly therefore extending as far west as Pithoragarh, it must be remembered that rather a lot of "eastern" S.E. Asian elements drop out about the longitude of Jumla in W. Nepal and there is a marked difference in floristic constitution between Pokhara and Pithoragarh.

C. mysurensis (Wall. ex Hook.) Ching & Shing [name misspelt as "*mysuriensis*" and "Hsing" and basionym-author given as Ching, in error by Johns (1997)] = *Cheilanthes opposita* Kaulf. (synonyms: *C. melanocoma* Bory in Bélang., *C. swartzii* Webb. & Berth., *C. mysurensis* Wall. ex Hook.). Although the type-locality of *C. opposita* was published as "Cape of Good Hope" it was actually collected by Röttler in S. India. Indian botanists continue to use the illegitimate later name, *C. mysurensis*, being generally unaware of the rather many nomenclatural publications concerning this exceptionally beautiful, finely dissect and narrow-fronded, tufted species. Alston (1936), Fuchs (1961) and Fraser-Jenkins (1997c, in press) have pointed out that this species should be called *C. opposita*. Panigrahi & Basu (1982), however, being unaware of the earlier synonyms, merely repeated the reasoning given by Webb & Bertholet, Fuchs and others concerning the use of the name *C. swartzii* instead of *C. mysurensis* and erroneously concluded that that should be the correct name.

Leptolepidium dalhousiae (Hook.) Hsing [= Shing] & S.K. Wu = *Cheilanthes dalhousiae* Hook., non sensu auct. Ind. [= *C. leptolepis* Fras.-Jenk.].

L. leptolepis (Fras.-Jenk.) Kholia & Punetha (1995) = *Cheilanthes leptolepis* Fras.-Jenk.

In their hasty attempt to create a new combination, Kholia & Punetha did not understand that as the genus *Leptolepidium* is typified by *C. dalhousiae* it is no longer possible to retain it as a genus to accommodate *C. leptolepis* and *C. subvillosa* Hook, which at present therefore do not have any separate genus to include them in. As explained by Fraser-Jenkins (1992 and 1993), but evidently not read properly by Kholia & Punetha, *Leptolepidium* is a direct synonym of *Aleuritopteris*, where *C. dalhousiae*, as lectotypified by me, belongs. They claim to believe that the characters separating these genera are distinct despite my explaining how every one breaks down, which they did not take account of. Yet while accepting *C. leptolepis* instead of *C. dalhousiae sensu auct. Ind.* they failed to understand that I had shown that *Leptolepidium* cannot be used and the genus

in the old sense of Wu needs a new name if it should be felt necessary now to make a genus out of it, which seems rather inappropriate in the more recent setting of Kramer's (1988), now widely followed plea not to split genera unless they really have to be - a valuable and authoritative guide-line, cited, but evidently not actually followed by Panigrahi (1995). I would suggest that it should be left to S.K. Wu, if anyone, to sort this out as he was one of the joint-authors of the original *Leptolepidium*; but, anyhow, let us hope it is not about to be misappropriated by some interloping gleaner of potential new names extracted at second hand from others' work, from Calcutta or Pithoragarh, for example! In my opinion these particular groups are better and more appropriately treated as infrageneric groups and a new group for *C. leptolepis*, *C. subvillosa* and a few farinose species from Asia and Mexico should merely be a section within the subgenus *Aleuritopteris*, to which it is too closely related when compared to the other groups in *Cheilanthes* to be separated.

L. subvillosum (Hook.) Hsing [= Shing] & S.K. Wu = *C. subvillosa* Hook.

L. tenellum Ching & S.K. Wu = *C. subvillosa* Hook.

Colysis

Colysis decurrens "(Wall. ex Hook. & Grev.) Nakaike" (1992), *comb. inval., sin. basionym ref., non* (Bl.) Panigrahi (1992a) = *C. pothifolia* (D. Don) C. Presl. This is merely a state where the rachis-wings are a little broad (see *sub C. flavescens*) and was so pointed out by Ching (1933), with whom I agree.

C. flavescens (Ching) Nakaike, Matsumoto and Gurung (1990) = *C. pothifolia* (D. Don)

C. Presl. *C. pothifolia*, the Himalayan plant, seems to vary to include plants with virtually no wing of lamina along much of the rachis ("*Polypodium flavescens*" Ching, as pointed out by Ching (1933b), who sank this, his own species, and never recognised it again despite his normal policy of over-splitting) to plants with a wider wing, including some that are virtually indistinguishable from the Japanese and Chinese, *C. elliptica* (Thunb. ex Murray) Ching, which is an earlier name than

C. pothifolia. As I do not know if the Japanese plants also include such an unbroken range of variation, the name *C. pothifolia* is retained here in keeping with the Japanese practice. However *C. flavescens*, which I have seen at Nakaike's locality at Vajrayogini near Sankhu, does not seem to me to be at all distinct and merges fully into *C. pothifolia*, as can be seen from a series showing a full range of intermediates I collected on the N. side of the Changu Narayan ridge, S. of Sankhu, Kathmandu District, Bagmati Zone, C. Nepal. *C.R. Fraser-Jenkins* Field nos. 1211-1214, with *R. & G. Pariyar & R. Subedi*, 15 Feb. 1997.

Kaulinea dilatata (Bedd.) Nayar & Kaur [sub "Wall. ex Hook."] = *Colysis dilatata* (Bedd.) J. Smith. Bosman (1991) in her comprehensive monograph, with which I mostly agree as to genera, included this species and its synonym, *Microsorium hancockii* (Bak.) Ching, within *C. insignis* (Bl.) J. Smith, but I have found the two species to be quite distinct. *C. dilatata* has a third, very distinctive, abaxial (lower surface) wing of laminar tissue all down the 3-cornered lower rachis ("stipe") below the main lamina and also has slightly more widely separated and narrower laminar lobes ("pinnae") when mature, while *C. insignis* has no such third wing and thus has a rounded lower rachis and has more crowded "pinnae." I have examined these features also in the types of the two species (at K and L respectively). Though it seems to bear little resemblance to Holttum's (1954) illustration, I have recently found *C. insignis* near Bushera, S. of and below Gangtok, Sikkim. *C.R. Fraser-Jenkins* Field no. 853, 8 Nov. 1995, misidentified by H. Nooteboom of Leiden in 1996 as *C. pteropus* (Bl.) Bosman, and also as far west as C. Nepal, N. side of Changu Narayan ridge, c.1 km S. of Sankhu, Kathmandu District, Bagmati Zone. *C.R. Fraser-Jenkins* Field no. 1216-1218 with *R. & G. Pariyar & R. Subedi*, 15 Feb. 1997 and on the S. side of Phewa Tal, Pokhara, Kaski District, Gandaki Zone, W.C. Nepal. *C.R. Fraser-Jenkins* Field no. 1112, 1 Jan. 1997 and I have seen *C. dilatata* in several places, including S. of Aghor on the Rajpath road, N. of Hetauda, Makawanpur District, Narayani Zone.

C. Nepal. *CRFJ* 16136, 4 March 1990 and Deban, Namdapha Forest Reserve, Arunachal Pradesh, N.E. India. *C.R. Fraser-Jenkins with the Scientific Exploration Society*, 17 Jan. 1994. The two have not been distinguished in India until now. *C. insignis* is common in S.E. Asia and *C. dilatata* extends more into China.

K. hancockii (Bak.) Nayar = *Colysis dilatata* (Bedd.) J. Smith.

K. pteropus (Bl.) Nayar = *Colysis pteropus* (Bl.) Bosman. I have found this species as far west as Chowti Bara Mandir (Fish-temple), c.6 km S. of Damauli, east of Pokhara, west of Mugling, Tanahun District, Gandaki Zone, W.C. Nepal. *C.R. Fraser-Jenkins* Field no. 1297, with G., S.M. & N. Pariyar, 22 March 1997.

K. pteropus (Bl.) Nayar var. *minor* (Bedd.) Nayar & Kaur, non *Colysis minor* (Fée) M. Price = *Colysis pteropus* (Bl.) Bosman.

K. zosteriformis (Wall. ex Mett.) Nayar & Kaur [*sub* "Wall."], *comb. inval.*, valid basionym ref. not given = *Colysis pteropus* (Bl.) Bosman.

Lepisorus pteropus (Bl.) Dixit (1984) [*sub* "(Bl.) Ching"], *comb. inval.*, alternative name not definitely accepted by the author = *Colysis pteropus* (Bl.) Bosman.

Lepisorus pteropus (Bl.) Dixit, *comb. inval.*, var. *minor* (Bedd.) Dixit = *Colysis pteropus* (Bl.) Bosman.

Microsorium dilatatum (Bedd.) Sledge = *Colysis dilatata* (Bl.) J. Smith.

M. pteropus (Bl.) Copel. var. *minor* (Bedd.) Balakrishnan = *Colysis pteropus* (Bl.) Bosman.

M. pteropus (Bl.) Copel. var. *zosteriformis* (Bedd.) Kaur & S. Chandra = *Colysis pteropus* (Bl.) Bosman.

Coniogramme

Coniogramme caudata (Wall. ex Ettings.) Ching in C. Chr. var. *nepalia* Dixit & Das = *C. pubescens* Hieron. (*synonym: C. spinulosa* (Christ) Hieron., kleptotype seen in PE; *C. caudata sensu auct. Ind.*, non (Wall. ex Ettings.) Ching [= *C. serrulata* (Bl.) Fée]). The termination employed by Dixit was probably a mistaken attempt

at latin in the wrong part of speech rather than a vernacular name as an indeclinable substantive but, being a geographical name, unfortunately does not have to be corrected. The "variety" is quite normal for this species and was recognised in error. As pointed out by me (Fraser-Jenkins (1992)), the species has recently been known in China and India as *C. caudata*, characterised by abruptly caudate segment-apices, toothed lamina-margins and, diagnostically, narrowly cuneate pinna-bases. However no less than three Indian species have caudate segment-apices, *C. fraxinea* (D. Don) Fée *ex* Diels in Engl. & Prantl, without teeth, *C. serrulata* (Bl.) Fée (*synonyms: C. indica* Fée, *C. maxima* Ching & Shing) with teeth but with wide, \pm squarely or rounded-truncate pinna-bases and the present species, *C. pubescens* Hieron. Indian botanists, following Ching (1937: t.167), have evidently failed to consult the original literature, which is not as widely available as, for example, the Indian reprints of Beddome, Clarke and Hope. But as with all taxonomic study, revision of this genus (Dixit & Das (1979)) should not be published until the literature has been thoroughly checked and assimilated and the result of not doing so has been a most inaccurate paper in many respects by them. Even worse was the bewildering array of meaningless and misapplied names published by Ching & Shing (1981), which not even they themselves could recognise again in subsequent determinations! However Hieronymus (1916) correctly stated that Wallich's *Grammitis caudata* is a mixture of mostly *C. fraxinea* (in the synonymy of which both he and Christensen (1905) placed the name), with some of the present species and a third taxon (actually *C. serrulata*, reidentified by me at K). On turning to Ettingshausen (1864: 57, t.1-37, 38), who first validated Wallich's *G. caudata*, we find a detailed description of the nervature and, more helpfully, two very good quality nature-prints of segments showing a widely rounded-truncate segment-base, not the narrowly cuneate ones of "*C. caudata*" *sensu auct. Ind.* One of the segments has an abruptly caudate apex and the other a less abruptly caudate one, but both have similarly prominent

teeth at the tips. They are both the same species as *C. serrulata* and quite obviously not the same as the sense in which modern Indian authors take *C. caudata*, following Ching. Fraser-Jenkins (1992: 95) mentioned this widespread misidentification and the true identity of *C. caudata*, but when attempting to correct the mistake I unfortunately chose the name *C. caudiformis* Ching for it instead, on the basis of the identity of the bulk of specimens under that name in PE. However not only is the identity of the type of *C. caudiformis* rather difficult to be sure of, but also there fortunately exists an earlier name, *C. pubescens* Hieron., specifically and accurately described by Hieronymus to apply to the part of Wallich's *G. caudata* which is not *C. fraxinea* or *C. serrulata* but corresponds to Ching's plate under the name *C. caudata*. I now lectotypify *C. pubescens* by the specimen "*Gymnogramme* β . *serrulata*, *Grammitis caudata* Wall. Cat. no. 4. Ind. Or., 1820. *J.D. Hooker & T. Thomson* 12. Herbarium Hookerianum 1867" (K), cited by Hieronymus, and I exclude the extra locality he gave, "*Ceylona*" (Sri Lanka), where it does not occur.

I also take the opportunity to comment that the *C. rosthornii* Hieron. I tentatively reported with a query (Fraser-Jenkins (1992: 90, 109) on the basis of Ching's determinations of the same taxon at PE, stating that I had still to check the type, is quite common in the further west Himalaya. It is similar to *C. affinis* Wall. ex Hieron. but is less prominently toothed and the vein-endings do not run quite so far up into the teeth, nor are the teeth so narrow. But, like *C. affinis*, it has the sori not approaching the margins at all and often yellowish and has a similar degree of frond-dissection and very herbaceous texture. It could either be a distinct species, or possibly an attenuated, rather toothless *C. affinis*, though the latter perhaps seems less likely. It is not the same as *C. intermedia* Hieron., the mistaken illustration of which by Kung (1988) is a poorly toothed *C. serrulata*. What is purportedly an illustration of a frond ("plant") of *C. affinis* by Khullar (1994: 312) is presumably only one lower pinna from a large plant, with an

imaginary stipe attached, since *C. affinis* is always bipinnate below, with several pinnules; the original specimen (Mussoorie. S.S. Bir 1360, PAN 3498) is correct *C. affinis*. Khullar's "*C. caudata*" is *C. pubescens*, from the picture, as would be expected, but his "*C. denticuloserrata*" (Hieron.) Dixit & Das (both from the picture and the original specimen: Narkanda, Simla. S.S. Bir, 29 Aug. 1960. PAN 4911) is *C. serrulata*, while his illustration of *C. indica* Fée (a synonym of *C. serrulata*, see Fraser-Jenkins (1992: 95), type seen in BM) is actually *C. affinis*, and the specimen drawn was so labelled at PAN by its collector (Kalatop, Dalhousie. M. Golaknath, Aug. 1964, *n* = 30, PAN 5235). I also noted that it has typical *C. affinis* teeth with the veins running up them, unlike in the drawing. Khullar's "*C. intermedia*" illustration and specimen (Lakkar Mandi, Dalhousie. S.P. Khullar, Aug. 1962, *n* = 30, PAN 4725) are typical *C. affinis*, though a poor left-hand specimen on the same sheet is too young to be certain of its identity, but his *C. fraxinea* illustration and specimen (Jabbarkhet Khud, Mussoorie. S.K. Malhotra, Sept 1952, PAN 522) are correct, as expected.

C. caudiformis Ching & Shing, *non sensu* Fraser-Jenkins (1992) [= *C. pubescens* Hieron] = *C. sp.* near to or perhaps the same as *C. serrulata* (Bl.) Fée. I have seen the type and other material in PE (see also Shing (1990: 263, t.72), which is correct) and it appears similar to a rather extreme *C. serrulata* with shorter, very abruptly caudate, wide-based segments. It could also represent a distinct Chinese species not at present known to me, but I suspect it is a merely a synonym of *C. serrulata*.

C. denticuloserrata ["*denticulato-serrata*"] (Hieron) Dixit & Das = *C. serrulata* (Bl.) Fée.

C. purpurea Dixit & Das = *C. serrulata* (Bl.) Fée. The illustration of Dixit & Das (1969) is typical of *C. serrulata*, which name and species was not otherwise treated by them and now I have seen the type in CAL I can confirm it is just rather poor, but easily recognisable material of that species.

Cornopteris

Athyrium birii (Ching *apud* Bir) Seriz. = *Cornopteris decurrentialata* (Hook.) Nakai.
See Fraser-Jenkins (1997*b*, in press).

A. quadripinnatifidum (Kato) Seriz. = ? *Cornopteris banajaoensis* (C. Chr.) Iwats. & Price, or otherwise *C. quadripinnatifida* if a good species.

Cornopteris birii Ching *apud* Bir = *C. decurrentialata* (Hook.) Nakai. A quite large population of "*C. birii*" I found c.3 km N. of Lachung on the E. side of the river in N. Sikkim. *C.R. Fraser-Jenkins* Field nos. 1123-1125, 16 Nov. 1995, shows clearly that the rectangular pinna-lobes and thin, creeping rhizome emphasised by Bir (and exactly matching Bir's types (K! PAN!)) are merely features of immature, precociously fertile plants, which, as they grow older, develop thick ascendent-apexed rhizomes and rounded-pointed pinnules and are typical *C. decurrentialata*. I have also found this species at Tinjure, near Gangtok; c.9 km W. of Ghoom on the road to Sukhia Pokhari and N. of Mongpo, behind Tiger Hill, all in the Darjeeling-Sikkim region. It seems to have been completely overlooked by the British-Indian and Indian botanists (except as a "new species" by Bir), though recently reported by Nakaike in Nakaike, Matsumoto & Gurung (1990) from Gokarna, near Kathmandu, C. Nepal (where I did not notice it though I assume it must have been correct). It is a good warning-example of how too local an approach and over-readiness to invoke "new species" leads to more mistaken new names that have to be corrected.

C. quadripinnatifida Kato = ? *C. banajaoensis* (C. Chr.) Iwats. & Price, or otherwise a good species.

Cyathea

Alsophila hookeri (Thwaites) R. Tryon = *Cyathea hookeri* Thwaites.

A. nilgirensis "(Holtt.) Nayar & Kaur" (1974) = *Cyathea nilgirensis* Holtt.

A. nilgirensis (Holtt.) R. Tryon (1970) = *Cyathea nilgirensis* Holtt.

A. sinuata (Hook. & Grev.) R. Tryon = *Cyathea sinuata* Hook. & Grev.

A. spinulosa (Hook.) R. Tryon = *Cyathea spinulosa* Hook.

A. walkerae (Hook.) J. Smith var. *tripinnata* (Hook. & Bak.) Panigr. = *Cyathea walkerae* Hook.

Cyathea balakrishnanii Dixit & Tripathi (1986 ["1984"]) = *C. gigantea* (Wall. ex Hook.) Holtt. The types and other material at CAL and BSA (!) appear to be merely small specimens of *C. gigantea*, as might be expected from the drier regions in C. India, and such plants appear to be connected by intermediates to larger *C. gigantea*. The difference in venation is not constant even in the types, nor is the number of sori, both of which can be larger than stated.

C. holttumiana R. Rao & Jamir = ? *C. brunoniana* (Wall. ex Hook.) Clarke & Bak. The forked pinnule-apices are obviously merely an abnormality and do not have anything to do with specific differences. The authors were presumably unaware of the huge body of literature concerning such irregularities in hundreds of species in many genera in Europe, N. America, Japan *etc.*

C. nilgirensis Holtt. var. *lobata* Manikam & Irudayaraj (1992) = *C. nilgirensis* Holtt.

C. schmidiana (Kunze) Nair = *C. nilgirensis* Holtt.

C. sikkimensis (Clarke & Bak.) Cretz. = *C. khasyana* (T. Moore ex Kuhn) Domin.

Gymnosphaera andersonii (Scott ex Bedd.) Ching & S.K. Wu in C.Y. Wu = *Cyathea andersonii* (Scott ex Bedd.) Copel.

G. khasyana (T. Moore ex Kuhn) Ching = *Cyathea khasyana* (T. Moore ex Kuhn) Domin.

Cyrtomium

Cyrtomium beddomei S. Ghosh (*nom. nov.* for *Aspidium caryotideum* Wall. ex Hook. & Grev. var. *macropterum* Kunze) = *C. nervosum* Ching & Shing in Shing (see Fraser-Jenkins (1993)). The specimens at CAL so identified by Ghosh, as well as syntype material of Kunze's name I have seen at K. B, JE *etc.*, are *C. nervosum*, often slightly exposed plants, and this also matches Kunze's description of his variety. Var. *macropterum* was distinguished by Kunze from his var.

micropterum, which is a much better known species, *C. micropterum* (Kunze) Ching, occurring in S. India and S. Africa and distinguished by its small pinnae.

Dixit (1997) reported *C. aequibasis* (C. Chr.) Ching from Orissa, but the description he gave, mentioning small pinnae with caudate apices, does not sound like that species, which is not known or expected in peninsular India, but perhaps refers to something more like *C. nervosum*, at a guess, though I have yet to see the specimens. Dixit gave its range as including Nepal and Bhutan and even S. Africa (presumably referring to *C. micropterum*); also Sri Lanka, from where I have seen no verifiable specimens of *Cyrtomium*. As yet I have seen nothing from India quite like Ching's (1937) illustration of *C. aequibasis* and it is possible that he was correct to describe it as endemic to China. Dixit (1984) omitted it altogether, but presumably only because he did not know of it or of Christensen's report from "Assam." Plants so identified at BM, K *etc.* appear to be a taxon very close to or merely variation in *C. caryotideum* (Wall. ex Hook. & Grev.) C. Presl, with wider-based, elongated rectangular pinnae.

C. macrophyllum (Mak.) Tag. var. *tukusicola* (Tag.) Tag. = *C. macrophyllum* (Mak.) Tag. *C. tukusicola* Tag. seems to have been a redescription of a more exposed plant of *C. macrophyllum* with a more leathery frond. Most reports of *C. macrophyllum* from the Indo-Himalaya, as checked by me, are actually of *C. nervosum* Ching & Shing in Shing, distinguishable by its partly toothed laminar edges. Further cyto-taxonomic study of *C. macrophyllum* would be desirable, however, as it appears to be a cytological complex in Japan.

Cystopteris

Cystopteris almaatensis Kotuch. = ?

C. altajensis Gureeva = ?

C. dequinensis Z. Wang (1994) = *C. moupinensis* Franch. The type in PE (!) is merely a larger specimen of *C. moupinensis*, which is a quite common higher-altitude species in Nepal, Sikkim *etc.*

C. fragilis (L.) Bernh. var. *contorta* Khullar in Mehra & Khullar, *nom. nud.* = *C. fragilis* (L.) Bernh. subsp. *fragilis*. So far only the tetraploid cytotype of subsp. *fragilis* has been detected in the Himalaya; as in Europe, it is generally less dissect and has more obtuse and rounded segments than the common European hexaploid (see Vida (1974)) and has been reported to have shorter spinules on the spores than in the hexaploid (see Manton (1950)). It is quite likely that the hexaploid may also exist in the Himalaya. Fraser-Jenkins (1992: 112 and in other papers) has treated *C. fragilis sensu stricto* and *C. dickieana* (R. Sim (unranked)) Newm., *Phytologist* **1851**: Append. 26 (1851) as subspecies because of their morphological closeness and overlap and partly shared genomes, even though they have been proven to be partly genomically different by \pm one genome. They form only 54 out of the 84 bivalents possible in the tetraploid x tetraploid hybrid (see Vida (1970 and 1974) and Lovis (1977)) and form natural sterile hybrids with abortive spores. Recent N. American isozyme-studies by Haufler & Windham (1991) and Parks (1995) (see also Haufler, Moran & Windham (1993)) sinking subsp. *dickieana* (*sub C. dickieana*) have evidently missed the point and have been "over-interpreted" as showing that the two subspecies (or species) are the same taxon and merely spore-forms of each other, which is not likely in view of Vida's findings. His formative and important work was apparently not known to the rather insular N. American botanists, until, for example, I raised their existence to Prof. Parks at the Edinburgh conference in 1994, which he then included a brief reference to in his paper (Parks (1995)). In my opinion no taxonomic interpretations of Park's results are possible and one cannot from that basis alone draw any significant taxonomic conclusions at all, as was done in error. We merely do not yet know of an allozyme-phenotype that is actually associated with spore-type (the diagnostic difference between subsp. *fragilis* and subsp. *dickieana*) or with the demonstrated genomic difference between the two. It is worth noting however that the only genuinely mixed population Parks investigated (his population "C") also contained

more allozyme-phenotypes than any other. Jermy & Harper's (1971) suggestion that there were intermediate spore-types was also mistaken (see Vida (1974: 187)) and was based on an immature echinate spore (queried by me and confirmed to me by A.C. Jermy, pers. comm., Jan. 1989). As is surely well known whenever one carries out extensive spore-checking under the light-microscope (which is perfectly sufficient), immature (yet dark) spores of both types appear smooth at first, but then in the echinate spore-type when the spinules begin to form they first appear as a few small papillae within wider smooth areas. The so-called "intermediate spore-type" also reported by Parks (1975) as a third spore-type is not a real, distinct spore-morphology, but merely a semi-mature spore.

Actually spore-morphology in these subspecies is not all variable in respect of rugosity versus echination (the "warty" and "spiny" spore-types) as was incorrectly stated by Blasdell (1963), who did not understand this group well. Harper & Jermy (1971), Haufler & Windham (1991) and Parks (1995). Their suggestion that the existence of populations with both spore-types implies variation in one taxon is again not in any way suggested by the evidence and I would simply conclude that they found some mixed populations of the two subspecies, as often occurs. Perhaps if they had looked more carefully in N. America they would have stumbled upon the sterile hybrid between the two, quite common in Europe and Asia, which might have led them to favour a quite opposite conclusion, with or without isozymes! As far as separating *C. fragilis* subsp. *fragilis*, *C. fragilis* subsp. *dickieana* (R. Sim) Hyland. and the slightly more difficult European and African, *C. fragilis* subsp. *diaphana* (Bory) Litard. (*synonyms*: *C. diaphana* (Bory) Blasdell, *C. viridula* (Desv.) Desv.) is concerned, it is my experience after checking thousands of my own and others' collections from all over the world, that the morphology of mature spores is 100% reliable and no intermediate types occur. Nor is this circular logic as I have seen that it also agrees to quite some degree with slightly recognisable frond-morphology

(Prof. Gabor Vida being rather better at recognising the frond-morphology than I am). This also agrees with Vida's (1974: 187) similar observation.

C. fragilis (L.) Bernh. subsp. *dickieana* "(R. Sim) Fras.-Jenk." (1992) = *C. fragilis* (L.) Bernh. subsp. *dickieana* (R. Sim (unranked)) Hyland. (1945). I had overlooked this combination by Hylander, which is often given in the literature as "(R. Sim) Hook." or "(R. Sim) T. Moore" in error. Both Hooker (1870: 464) and Moore (1860) *etc.* used the rank of variety.

C. fragilis (L.) Bernh. forma *granulosa* Bir & Trikha = *C. fragilis* (L.) Bernh. subsp. *dickieana* (R. Sim (unranked)) Hyland. It is emphasised that the spores must be checked in order to confirm the general idea obtained from the frond-morphology which is often too difficult to interpret, especially because the tetraploid subsp. *fragilis* is close in frond-morphology to subsp. *dickieana* except that it has spiny spores, while subsp. *dickieana* has rugose and darker ones. So far only the hexaploid subsp. *dickieana* has been detected in the Himalaya, though this does not mean that the European tetraploid may not also be there. Though, as in Europe, the Himalayan hexaploid subsp. *dickieana* tends to have more obtuse segments or lobes than the European hexaploid subsp. *fragilis*, it is, nevertheless, generally rather more finely dissect than is the bulk of European tetraploid subsp. *dickieana* (see Vida (1974)). It is well known and indeed rather obvious that the tetraploid subsp. *dickieana*, as at the type-locality, represents an unusually foliose and more rounded-lobed population with larger lobes, which is an abnormality, now widespread in garden-cultivation as a "sport." As this is now widely maintained in gardens it is named here as a new cultivar, *C. fragilis* (L.) Bernh. subsp. *dickieana* (R. Sim (unranked)) Hyland. '**Dickie**' Fras.-Jenk. (protologue: *Cystopteris dickieana* R. Sim (unranked), *Gard. Farm. J.* 2(20): 308 (1848)). It has been given a new cultivar-name under Art. 25.2 and 17.3, note 1, of the Cultivated Plant Code (1995); a similar and well known case is that of the European *Polypodium cambricum* L. the abnormal form of which, with lobed

pinnae (which is also represented by Linnaeus' type-specimen of the species) must be given a new cultivar-name. This is duly named here as *Polypodium cambricum* L. 'Cambrian' Fras.-Jenk. (protologue: *Polypodium cambricum* L., *Spec. Plant.* 2: 1086 (1753)), which it is hoped will finally resolve the long controversy surrounding the use of this correct botanical name for this species, which I have long advocated in compliance with the Code (1994). Even the normal populations of *C. fragilis* subsp. *dickieana* (e.g. as growing abundantly in the Sierras of central Spain, but common in all mountain-districts of Europe - though very rare in the rather impoverished British flora) can often be recognised from the obtuse, if smaller segments. However detecting the two subspecies from the frond-morphology alone is even more difficult in the Himalaya than in Europe as one is normally comparing the rather undissect, obtusely lobed tetraploid subsp. *fragilis* with the still obtusely lobed, but more dissect hexaploid subsp. *dickieana*. In Europe, by contrast, it is most commonly the other way around, with the commonest cytological races being the less dissect, usually very obtusely segmented tetraploid subsp. *dickieana* in contrast to the more dissect, usually acutely segmented hexaploid subsp. *fragilis*. The two latter are considerably easier to tell apart from frond-morphology, though all must subsequently be confirmed from a spore-check, which can quickly be done dry, under a compound light-microscope.

C. fragilis (L.) Bernh. forma *himalayensis* Bir & Trikha = *C. fragilis* (L.) Bernh. subsp. *fragilis*. Bir renamed Khullar's specimen of "var. *contorta*" as forma *himalayensis*, despite its being clearly labelled as var. *contorta*, without permission or consultation, unnecessarily introducing a new name and failing to credit its discovery to Khullar. However, this taxon is not different from the European tetraploid subsp. *fragilis* which has been given numerous names at different ranks there, as also have the tetraploid and hexaploid subsp. *dickieana*.

C. x montserratii Prado & Salvo = *Cystopteris fragilis* (L.) Bernh. *nothosubsp. x*

montserratii (Prado & Salvo) Fras.-Jenk., *comb. et stat. nov.* (basionym: *Cystopteris* x *montserratii* Prado & Salvo, *Anal. Jard. Bot. Madrid* **41**(2): 466 (1985 ["1984"])). This is the name for *C. fragilis* subsp. *fragilis* x *C. fragilis* subsp. *dickieana* of whatever cytotype; tetraploid, pentaploid (common, presumably of two sorts and origins) and hexaploid are all possible.

C. nivalis (Pirotta) Pich. Serm. (from Africa) = *C. fragilis* (L.) Bernh. subsp. *fragilis*.

C. sikkimensis Ching *apud* Bir = *C. fragilis* (L.) Bernh. subsp. *dickieana* (R. Sim (unranked)) Hyland. The cytotype of this taxon requires further investigation as the spores are the same size as normal (hexaploid) subsp. *dickieana* and the frond-morphology is also typical. Bir reported it as octaploid but this requires confirmation.

C. tangutica Grubov = ?

C. thermalis Khokhr. = *C. fragilis* (L.) Bernh. subsp. *fragilis*.

C. tibetica Z. Wang (1994) = *C. moupinensis* Franch. The type in PE (!) is merely a small specimen of *C. moupinensis*.

Rhizomatopteris montana (Lam.) Khokhr. = *C. montana* (Lam.) Desv.

Davallia

Pachypleuria repens (L. fil.) Kato (1985) = *Davallia repens* (L. fil.) Kuhn. The hairy scale-margin emphasised by Kato appears to me to be of no generic significance and I recognise neither *Pachypleuria*, nor *Humata*, which are both far too close and interconnected with *Davallia* to constitute distinct genera.

Dennstaedtia

Emodiopteris appendiculata "(Wall. ex Hook.) Ching & S.K. Wu," *comb. inval., sin.* basionym = *Dennstaedtia appendiculata* (Wall. ex Hook.) J. Smith. In keeping with most modern authorities I see no worthwhile reason to separate *Emodiopteris* (synonym: *Dennstaedtia* subgen. *Mehraea* Kachroo). Doubtless this unestablished name is a good opportunity for combination-seekers in India, but I feel it should be left to the surviving original author to redo it as the "genus"

is still being treated separately in China (if it is really felt desirable to do so).

Emodiopteris appendiculata "(Wall. ex Hook.) Ching & S.K. Wu" [*comb. inval.*] var. *elwesii* (Bedd.) Dixit = *Dennstaedtia appendiculata* (Wall. ex Hook.) J. Smith. Material of Bir's from Simdong, N. Sikkim. S.S. Bir 1058 (PAN) is the same ± glabrous form as the type of "var. *elwesii*:" both have a few remnant hairs at the sides of the rachis and belong simply to *D. appendiculata*, not being worthy of taxonomic recognition. Hair-loss in this case may be partly due to age, or exposure.

Emodiopteris elwesii (Bedd.) Ching & S.K. Wu in C.Y. Wu = *Dennstaedtia appendiculata* (Wall. ex Hook.) J. Smith.

Deparia

Athyriopsis japonica (Thunb. ex Murray) Ching = *Deparia japonica* (Thunb. ex Murray) Kato.

A. lasiopteris (Kunze) Ching = *Deparia petersenii* (Kunze) Kato.

A. petersenii (Kunze) Ching = *Deparia petersenii* (Kunze) Kato.

A. polyrhizon (Bak. in Hook. & Bak.) Chu & Z. Wang = *Deparia polyrhizon* (Bak. in Hook. & Bak.) Seriz.

Athyrium dubium (D. Don) Ching = ***Deparia lancea*** (Thunb. ex Murray) Fras.-Jenk., ***comb. nov.*** (basionym: *Asplenium lanceum* Thunb. ex Murray in L., *Syst. Veg.*, ed. 14: 933 (1784), non *Diplazium lanceum* Bory). I now confirm Nakaike's tentative opinion in Matsumoto & Naikaike (1990) that this species must be a *Deparia* and not a *Diplazium* for the convincing reasons he gave; its general frond-morphology also seems to me more like a *Deparia* than a *Diplazium*. I feel it is now necessary to recognise this formally in its nomenclature, though when I told Nakaike of my opinion and invited him to join with me in making the combination he did not do so and was presumably not as decided about its placement as I am. As there is no blockage to using the epithet *lancea* in *Deparia*, unlike in *Diplazium* (where the species must be called *D. subsinuatum*

(Wall. ex Hook. & Grev.) Tag.; the combination *Diplazium dubium* Link also being preoccupied), it is now restored to its original epithet.

A. petersenii (Kunze) Bir = *Deparia petersenii* (Kunze) Kato.

Cornopteris boryana (Willd.) Tard. Blot = *Deparia boryana* (Willd.) Kato. Some authors prefer to separate this species into the genus *Dryoathyrium* as *Dryoathyrium boryanum* (Willd.) Ching, however there is a range of species intermediate between the tripinnate *Deparia boryana* and the various bipinnatifid species and it is unrealistic to separate *D. boryana* from the rest of the genus.

C. macdonellii (Bedd.) Tard. Blot = *Deparia macdonellii* (Bedd.) Kato [*sub "mcdonellii"*]. Although the collector was *J.C. McDonell*, the Code (1994: Rec. 60C.4(a)) shows that the latin epithet should be spelt *macdonellii*.

Deparia lasiopteris (Kunze) Nakaike (1992) = *D. petersenii* (Kunze) Kato. From my experience of these taxa, I believe Sledge (1975 and 1977) and Kato (1984), were correct to sink *Diplazium lasiopteris* Kunze into *Deparia petersenii* rather than to separate them as Nakaike has apparently done, but without explanation.

D. polyrhizon "(Bak. in Hook. & Bak.) Sledge" (1982) = *D. polyrhizon* (Bak. in Hook. & Bak.) Seriz.

D. sikkimensis ["*shikkimensis*"] (Ching) Nakaike & Malik, *non sensu* Nakaike & Malik (1992) [= *Deparia acuta* (Ching) Fras.-Jenk.] = *D. allantodioides* (Bedd.) Kato.

x *Depazium tomitaroanum* (Masamune) Nakaike (1992) = *Deparia tomitaroana* (Masamune) Nakaike & Malik. The hybrid-genus x *Depazium* Nakaike (1992), with the type x *D. tomitaroanum*, thus passes into the synonymy of *Deparia*. Since the closely similar Japanese *Deparia lobatocrenata* (Tag.) Kato also appears not to be a hybrid between *Deparia* and *Diplazium*, where Nakaike had placed it (*sub* x *Depazium*), it appears that no intergeneric hybrid of this nature has yet been found. See below under *Diplazium* x *tomitaroanum*.

x *D. zeylanicum* (Hook.) Nakaike (1992) = *Deparia zeylanica* (Hook.) Kato.

Diplazium subsinuatatum (Wall. ex Hook. & Grev.) Tag. = *Deparia lancea* (Thunb. ex

Murray) Fras.-Jenk.

- D. subsinuatatum* (Wall. ex Hook. & Grev.) Tag. x *Lunathyrium petersenii* (Kunze) Ohba, reported by Matsumoto & Nakaike (1990) = ? *Deparia zeylanica* (Hook.) Kato. I have now found this species, just like Sri Lankan specimens, growing fairly plentifully in three separate populations in a stream gully (Mahadev Khola) below Khatripakhar, due N. of Sanagaon village, S.W. of Sankhu, N.E. of Kathmandu, C. Nepal. C.R. Fraser-Jenkins Field no. 226, with R. Lama, L.B. Tamang & J.B. Pariyar, 11 Aug. 1996, just above my adopted son's house, growing with both the supposed parental species mentioned by Nakaike. Although its papillate spores are slightly irregular I am not yet convinced that they are really "abortive" (as in a sterile hybrid) and am not at present sure the plant is a hybrid, which requires further investigation - perhaps by trying to grow the spores. The unusual cytology reported by Matsumoto & Nakaike (which appears to me from their photograph to show 79 bivalents and 2 univalents, not the quadrivalent *etc.* they reported) might only reflect it being a somewhat meiotically disturbed sexual tetraploid species, the same ploidy as the other two, though their conclusion that it is a hybrid may still be correct. The interpretation of spores as indicating a hybrid can often be difficult, particularly if not quite fully mature. In the past rather many Japanese reports of hybrids *etc.* have not given clear enough information or reasons for interpretation to assess the status of the plants. *D. zeylanica* was so far thought to be endemic to Sri Lanka where it has not been collected for about a century and like rather many species there must be very rare; its spores need to be compared with those of the present plant, as does its cytotype, but the frond-morphology appears identical.
- D. x tomitaroanum* Masamune ["(Masamune) Nakaike" in Nakaike & Gurung] = *Deparia tomitaroana* (Masamune) Nakaike & Malik. Nakaike in Nakaike & Gurung (1995) gave this as the probable name for the above plant (see next above and *sub x Depazium*), but Kato (1984) mentioned differences between *D.*

tomitaroana and *D. zeylanica* and maintained the former as distinct and as being a *Diplazium* (which latter placement I feel is probably not correct). The roots in the Nepal plant are fine as in *D. zeylanica* and the lower pinnae are definitely slightly unequal. See detailed comments given by Kato (1984). *D. tomitaroana* occurs in China and Japan but probably not in the Indian subcontinent.

Dryoathyrium macdonellii (Bedd.) Morton = *Deparia macdonellii* (Bedd.) Kato.

Lunathyrium acutum Ching = *Deparia acuta* (Ching) Fras.-Jenk., **comb. nov.**

(*basionym*: *Lunathyrium acutum* Ching, *Acta Phytotax. Sinica* 9: 73 (1964)).

For details of this small tetraploid species with prominent basal acroscopic pinna-auricles in the lower part of the frond see Fraser-Jenkins (1997*b*, in press). It occurs from Pakistan eastwards and was reported by Nakaike & Malik (1992) sub *Deparia sikkimensis* (Ching) Nakaike & Malik, in error.

L. allantodioides (Bedd.) Ching = *Deparia allantodioides* (Bedd.) Kato. This species has long been known to be distinct from the east N. American and far north-east Asian *D. acrostichoides* (Sw.) Kato (*synonym*: *Athyrium thelypteroides* (Michx.) Desv.), which has a less fully tapered lamina-base; but it is still reported under these names occasionally in India. Various segregates have been named from China recently, but require more study.

"*L. x allantodioides*" *sensu* Khullar in Khullar, Sharma & Verma (1988) and Khullar (1991), *non L. allantodioides* (Bedd.) Ching [= *Deparia allantodioides* (Bedd.) Kato] = *Deparia acuta* (Ching) Fras.-Jenk. x *D. allantodioides* (Bedd.) Kato. This hybrid was incorrectly cited with an x in front of one of the parental species' names, following Bir's also having done the same thing in several of his publications when he wanted to indicate a hybrid of partly unknown percentage. It should have been listed as "*L. allantodioides* hybrid." I have reidentified the material at PAN (Kumaon, Ghangaria, 3000 m. S.S. Sharma 5612, 21 Aug. 1983 (PAN 8759 (cited as 8245))) as being this hybrid, partly by reference to the photograph showing the important lower lamina in Sharma's (1986, *ined.*) Ph. D.

thesis. The mounter at PAN herbarium unfortunately discarded that part due to not being properly instructed and supervised. The specimen is too young to observe abortive spores and my identification was based largely on knowing of Sharma's cytological report. His photograph of meiosis was interpreted by him as showing $2n = 160$ (tetraploid ? The PAN workers' reports cite a $2n$ number in error whenever a hybrid is thought to be involved following this mistaken method of citation employed by Bir in his various papers, but did not carry out mitotic (root-tip) counts); with 1 hexavalent, 2 pentavalents, 5 quadrivalents, 9 trivalents, 39 bivalents and 19 univalents. However his photograph appears to me to show very approximately 3 trivalents, 50 bivalents and 17 univalents ($n = c. 126$, which is nearer an expected triploid) and not the remarkable interpretation they gave it. If it is really triploid, it would fit for the hybrid-parentage I suggest above. However as the original material is so poor, without even spores to check, no lower frond and a doubtful cytological result, even though it is probably the above hybrid I have come to the conclusion and told Khullar that it is not good enough to name until better material can be collected.

L. japonicum (Thunb. ex Murray) Kurata = *Deparia japonica* (Thunb. ex Murray) Kato.

Although this species, which is diploid, does occur quite widely at rather low altitudes in the Himalaya it is widely confused with the closely similar and much more common *D. petersenii* (Kunze) Kato there, which is tetraploid. See Kato (1984) for the differences. Nakaike & Malik's (1993: 335, t.20) specimen from Pakistan (seen in CBM on loan from TNS) looks correct and suggests that my (Fraser-Jenkins (1992)) reports under *D. petersenii* probably include both species. I have myself collected plants rather similar to their *D. japonica* near Karora, W. of Besham on road to Shangla Pass, eastern Swat, N. Pakistan. CRFJ 16541, 16 Sept. 1990 or 16647, 19 Sept. 1990 and had not realised they could perhaps be *D. japonica* and not just *D. petersenii*.

L. lasiopteris (Kunze) Nakaike = *Deparia petersenii* (Kunze) Kato.

L. macdonellii "(Bedd.) Khullar" (1985 ["1984"]) = *Deparia macdonellii* (Bedd.) Kato.
L. macdonellii (Bedd.) Ching (1983) = *Deparia macdonellii* (Bedd.) Kato.
L. mackinnonii Ching = *Deparia allantodioides* (Bedd.) Kato.
L. petersenii (Kunze) Ohba = *Deparia petersenii* (Kunze) Kato.
L. sikkimense Ching = *Deparia allantodioides* (Bedd.) Kato.
L. zeylanicum (Hook.) Edie = *Deparia zeylanica* (Hook.) Kato.
Parathyrium boryanum (Willd.) Holtt. = *Deparia boryana* (Willd.) Kato.
P. macdonelli (Bedd.) Holtt. = *Deparia macdonellii* (Bedd.) Kato.
Triblemma lancea (Thunb. ex Murray) Ching (1978 *a* and *b*) = *Deparia lancea* (Thunb. ex Murray) Fras.-Jenk.
T. zeylanica (Hook.) Ching = *Deparia zeylanica* (Hook.) Kato.

Diacalpe

Diacalpe aspidioides Bl. var. *hookeriana* (Wall. ex T. Moore) Ching & S.K. Wu in C.Y. Wu = *D. aspidioides* Bl.

Dicranopteris

Dicranopteris linearis (Burm. fil.) Underw. var. *altissima* Holtt., *sensu* Panigrahi & Dixit (1969*b*) = *D. taiwanensis* Ching & Chiu in Chien & Chun (see Kuo (1985: 54)). There are certainly three, perhaps also a fourth, very clear, good species of *Dicranopteris* present in the Indo-Himalayan region and I agree with Kuo (1985) that they must be treated as species, but it also seems likely that earlier names may exist at specific rank than some of the names used rather tentatively here. Unfortunately Panigrahi & Dixit (1969*b*) appear to have tried to report as many of Holttum's varieties as they could, as "new records" *etc.*, without either knowing them properly or being able to re-assess their identity and rank (which has yet to be done for most of them - Holttum himself pointing out that some were doubtful). From their determinations at CAL (!), I have found that most of their records were misidentifications, while one of their two "new taxa" is merely a single example of insignificant variation in *D. linearis sensu stricto* and the other I

have not been able to see. Holttum (1957 and 1959a) stated that the type is from Sri Lanka (Ceylon) at G and is hairy, but this did not constitute a lectotypification. Pichi Sermolli (1962b), however, reasoned and commented in detail, effectively designating as type, which we must accept, a specimen from Java at G. Unfortunately this old specimen appears to be glabrous (at least above) and should be investigated underneath and remounted if necessary. Though Pichi Sermolli felt it was probably the same taxon as the Sri Lankan plants in the sense of Holttum there does remain a slight possibility that the name is not now being applied in the right sense if the specimen belongs to one of the glabrous species. But from Pichi Sermolli's account I doubt this and it is more than probable, as he suggests, that it may only have lost its hairs with the passage of time. I have briefly seen but not properly studied the specimen at G.

D. linearis (Burm. fil.) Underw. var. *brevis* Manickam & Irudayaraj (1992) = *D. linearis* (Burm. fil.) Underw.

D. linearis (Burm. fil.) Underw. var. *demota* Holtt., *sensu* Panigrahi & Dixit (1969b) = *D. taiwanensis* Ching & Chiu in Chien & Chun.

D. linearis (Burm. fil.) Underw. var. *hirta* Kaur & Punetha, *non* *Gleichenia hirta* Bl. = *D. linearis* (Burm. fil.) Underw. I have seen this taxon growing at its type-locality as well as having seen its type.

D. linearis (Burm. fil.) Underw. var. *inaequiloba* [Geevarghese in] Nayar & Geevarghese (1993) = ? *D. subpectinata* (Christ) Kuo. I have not yet seen the type of this "variety," though from the description it sounds rather similar to *D. subpectinata*; however the presence of that species in India (S. India) must be considered very doubtful.

D. linearis (Burm. fil.) Underw. var. *latiloba* Holtt., *sensu* Panigrahi & Dixit (1969b) = *D. linearis* (Burm. fil.) Underw.

D. linearis (Burm. fil.) Underw. var. *montana* Holtt. = *D. taiwanensis* Ching & Chiu in Chien & Chun (see Kuo (1985: 54)). This species, which I believe also includes

D. tetraphylla (Ros.) Kuo, has also been confused with the distinct species, *D. splendida* (Hand.-Mazz.) Tag. (synonym: *D. ampla* Ching & Chiu in Ching & Wang), which is the very large and long-segmented, glabrous species occurring in the far N.E. of India and common in Assam, lower altitudes of Meghalaya, the peripheral parts of Bangladesh *etc.*, in all of which places I have seen it (see Ching (1937: t.153)), though the name was not mentioned by Panigrahi & Dixit (1969b) or Dixit (1984). I am not yet sure of the identity of *D. warburgii* (Christ) Nakai, which Dixit put as a name for *D. splendida* shown him in my collections. If it is conspecific with the latter, it would be the earlier and correct name. *D. warburgii* was described from Indonesia and *D. splendida* from S. China and Vietnam, but Holttum (1959a) gave the former as a synonym of "var. *rigida*" (Bl.) Holtt., so it probably does not belong here. Itô in Hara (1966) and Iwatsuki (1988), neither of whom were very critical, referred *D. taiwanensis* to this name, presumably in error. The Japanese plant has been referred by Japanese botanists to *D. pedata* (Houtte) Nakaike (synonym: *D. dichotoma* (Thunb. ex Murray) Bernh.), but it is very close to *D. linearis*.

I have recently found *D. taiwanensis* (along with *D. linearis* (Field nos. 1106 and 1162) and the presumed hybrid between the two, all growing separately), as far west as the S. side of Phewa Tal, Pokhara, Kaski District, Gandaki Zone, W.C. Nepal. C.R. Fraser-Jenkins' Field no. 1105, 1 Jan. 1997. The hybrid is described here as *Dicranopteris x nepalensis* Fras.-Jenk., *hybr. nov.*, basionym (*D. linearis* x *D. taiwanensis*). *Planta hybrida praesumptiva, morphologia intermedia inter parentes. Axes frondium glabri praeter ad partem infimum axium ubi aliquot fibrillae parvae dispersae interdum adsunt. Rami accessorii ad bifurcam ultimum absenti vel parvi adsunt. Axes frondium juveniliu purpurascensium. Plantae ad 2 metrum altae, sporae juveniles, sed valde irregulares. Holotypus: W.C. Nepal, Gandaki Zone, Kaski District, c. ½ km W. of "Fishtail Lodge" Hotel in Raniban Forest, on S. side of E. end of Phewa Tal*

Lake, S. of and across lake from Pokhara "Lake-side" town; slightly degraded forested steep slope above lake. *C.R. Fraser-Jenkins* Field no. 1428, 17 Aug. 1997 (BM). *Isotypi*: Ditto (KATH, NMW, K, H). *Paratypes*: Ditto no. 1161, 1 Jan. 1997 (BM).

The plant occurs over a large area of c.100 m across, as a pure stand and though the sori are young its spores are more irregular than expected when young and its obviously distinct and clearly intermediate morphology have convinced me that it must be the above hybrid. *D. linearis* (Field no. 1162) also occurred adjacent to the large stand and both *D. linearis* (Field no. 1106) and *D. taiwanensis* (Field no. 1105) occurred c.1-1½ km further east in the less degraded part of this supposedly preserved forest (abounding with wood-cutters on all three occasions I have visited it), the latter being a much taller plant.

D. linearis (Burm. fil.) Underw. var. *sebastiana* Panigr. & Dixit = ? *D. subpectinata* (Christ) Kuo. I have not yet seen the type of "var. *sebastiana*," though from the description it might perhaps apply to *D. subpectinata*, providing it is not merely a mistake for *D. taiwanensis*.

D. linearis (Burm. fil.) Underw. var. *subferruginea* (Hieron. ex Brause) Nakai, sensu Panigrahi & Dixit (1969b) etc. = *D. linearis* (Burm. fil.) Underw. Khullar (1994: 48-50) reported this from Kumaun as the common "variety" in the W. Himalaya; I have seen mainly *D. linearis* in the W. Himalaya, including some of the collections and localities cited by him. His illustration also refers to *D. linearis*, however the specimen-number given (Kumaun, Thal, 1400 m. S.P. Khullar A6. Oct. 1984 (PAN 8568)) is actually *D. taiwanensis* and was labelled by Khullar as *D. linearis* var. *demota*, which is one of the names commonly misapplied to that species in India. By contrast PAN 8569 (Kumaun, Thal, 1400 m. S.P. Khullar A7. Oct. 1984), of which Khullar's illustration is obviously *D. taiwanensis*, is actually *D. linearis* and was labelled by Khullar as *D. linearis* var. *subferruginea*; thus the numbers of the illustrations have been confused, as has often occurred in his book.

Khullar also cited Hope (1900: 25) under "var. *demota*," but Hope merely referred to "*Gleichenia dichotoma* Willd." (*i.e.* (Thunb. *ex* Murray) Hook.), by which was meant *D. linearis sens. lat.*, and did not distinguish any taxa within it, nor were his localities the same as those cited for "var. *demota*" by Khullar, however they were cited by Khullar under "var. *subferruginea* "

D. linearis (Burm. fil.) Underw. var. *subpectinata* (Christ) Holtt., *sensu* Panigrahi & Dixit (1969b) = *D. linearis* (Burm. fil.) Underw. True *D. subpectinata* (Christ) Kuo does not occur in the Himalaya, though it may, but very doubtfully, occur in S. India. Material at CAL identified as it by Panigrahi is merely *D. linearis*. Panigrahi & Dixit (1969b) rather ambiguously reported *D. subpectinata* from the Himalaya, stating that this taxon, which was entirely their own erroneous determination, was what was meant by Itô's report in Hara (1966) of *D. warburgii*. But Itô's sense of *D. warburgii* in that paper was actually *D. taiwanensis* (specimens seen and redetermined by me, also corrected by Iwatsuki (1988), though he placed *D. warburgii* in the synonymy of "var. *montana*," presumably in error, and used the latter name to refer to *D. taiwanensis*). Panigrahi & Dixit's report of *D. subpectinata* in India was thus completely in error, despite its incorrect partial attribution to Itô by them.

D. linearis (Burm. fil.) Underw. var. *tenuis* Manickam & Irudayaraj (1992) = ? *D. taiwanensis* Ching & Chiu in Chien & Chun.

D. linearis (Burm. fil.) Underw. var. *wattii* Panigr. & Dixit = *D. linearis* (Burm. fil.) Underw. The type at CAL (!) is a fairly large specimen of *D. linearis sens. strict.* The rather prominent notches at the apices of the segments in this particular specimen are merely a slight abnormality which occurs quite frequently in this species (*sens. strict.*) throughout its range.

D. tetraphylla (Ros.) Kuo = *D. taiwanensis* Ching & Chiu in Chien & Chun.

Diplazium

Dictyodroma heterophlebia (Mett. *ex* Hook. & Bak.) Ching = *Diplazium*

heterophlebium (Mett. ex Hook. & Bak.) Diels.

Diplaziopsis heterophlebia (Mett. ex Hook. & Bak.) M. Price = *Diplazium heterophlebium* (Mett. ex Hook. & Bak.) Diels. I do not recognise *Diplaziopsis* as being sufficiently distinct from *Diplazium* to be a separate genus, rather than a group of species within *Diplazium*. Price (1990b) mentioned pale roots as well as the anastomosing veins as distinguishing features of *Diplaziopsis*, but neither is diagnostic, pale roots also occurring, for example, in *Diplazium longifolium* T. Moore (July 1859) (synonym: *D. lobulosum* (Mett. (Sept. 1859)) C. Presl ex C. Chr., see Morton (1973: 226)). Anastomosing veins, though not like the areole-forming veins of *D. heterophlebium*, also occur in *Diplazium esculentum* (Retz.) Sw., which is again, clearly a true *Diplazium*. Scales on the rachis and costae also occur in *D. himalayense* (Ching) Panigr. or in *D. crinitum* (Bak.) C. Chr., as in *D. heterophlebium*, though both the former have free veins. I have recently discovered *D. crinitum* in the forest behind the Forest Inspection Bungalow, Digboi, N.E. Assam and between Silaunijan and Koilamati, Rengma Hills, C. Assam. C.R. Fraser-Jenkins Field nos. , Dec. 1995, where it seems to have been completely overlooked in the Indian subcontinent despite its being so very distinct from all the other Indian species. It occurs otherwise in Borneo.

I accept that it is very difficult to define *Diplazium* as distinct from *Athyrium* except by its chromosome base-number of 41 and larger, less tooth-lobed, more rectangular or rounded-rectangular segments, but nevertheless I am sure that they are two separate genera. *Allantodia*, by contrast, recognised by Ching and his followers in China, but probably by no-one else, is in my view inseparable from *Diplazium*. Its main diagnostic feature of an imparipinnate lamina-apex is no more important here than it is in *Dryopteris*, where the imparipinnate *Pycnopteris* was sunk into *Dryopteris* by me (Fraser-Jenkins (1986)) as a subgenus, though I now (Widén, Fraser-Jenkins, Reichstein & Sarvela (1997)) recognise it only as a section within subgenus *Dryopteris*. There

are even some species intermediate between *Allantodia* and *Diplazium* (see Fraser-Jenkins 1977b, in press). I have not listed here the many recent combinations of *Diplazium* species under *Allantodia* by Ching *et al.*

Diplazium allantoideum M. Price (*nom. nov.* for *Allantodia sylvatica* Bl., *non Diplazium silvaticum* (Bory) Sw.) = *D. mixtum* (Roxb. in Griff.) Morton.

D. australe "(R. Br.) Bir," *non sensu* Bir (1964) and Bir in Mehra & Bir (1964) [= *D. spectabile* (Wall. ex Mett.) Ching] = *D. australe* (R. Br.) Wakef. From Australasia, not present in the Indian subcontinent.

D. bellum "(Clarke) Tag. in Hara " (1966) = *D. bellum* (Clarke) Bir in Mehra & Bir (1964).

D. bellum "(Clarke) Bir " (1964) = *D. bellum* (Clarke) Bir in Mehra & Bir (1964).

D. fieldingianum Panigr., *non Allantodia fieldingiana* Kunze [= *Diplazium polypodioides* Bl.] = *D. maximum* (D. Don) C. Chr. (*lectotype* of *D. maximum*: "Wall. Cat. 230.1. *Asplenium polymorphum* Wall. Napalia 1820 [sheet 1]" (K-W), also determined as *lectotype* by Morton in 1970).

Under the Code (1994: Art. 48.1), because Panigrahi explicitly excluded Kunze's type of *Allantodia fieldingiana* (Schmid 7) by stating, "it is, therefore, reasonable to refer Schmid 7 to *Diplazium polypodioides* Bl." [instead of *D. maximum*, which is the sense he mistakenly took *A. fieldingiana* in], he must be considered to have published a new name of his own, having mistypified and misidentified *Allantodia fieldingiana*. The Fielding specimen (he did not say which one of the two Fielding specimens present at G he selected) chosen by Panigrahi as *lectotype* is now rejected as being seriously in disagreement with Kunze's protologue which mentions a firm, coriaceous frond, the sori near to the segment-midribs and asperous costae, all features of *D. polypodioides* and not shown by Fielding's specimens, nor by *D. maximum*, to which latter species both of Fielding's Himalayan specimens belong. Furthermore *D. maximum* does not occur in the Nilgiris from where Kunze described his plant. I now select as

lectotype of *Allantodia fieldingiana* Kunze the following specimen which I saw during my last visit to the erstwhile East Germany in 1987 and which is either a duplicate of, or the actual "single specimen" ["unica frons"] cited and described in full by Kunze and intended to be the basis of his name: "*Allantodia fieldingiana* Kze. Prope Utacamund. Dr. B. Schmid 7, Plantae Nilagiricae" (JE!). This is a specimen of *D. polypodioides*, as expected, and though it has no stipe the asperous costae and small segments bearing small, central sori are typical of this species. Jena, along with Kew, is where the Reverend Dr. L.B.E. Schmid's main herbarium went, with other of his Nilgiri specimens at Berlin, Leiden, Tübingen (as I have found), Wien, Geneva *etc.*; though all the Schmid specimens Kunze mentioned in his paper were cited as being in the herbarium of K.H.E. ["Carolus"] Koch (Berlin), at least at that time, perhaps before their final distribution. Fielding's collection was only mentioned briefly by Kunze, without description, as being the first specimen of his new species that he saw and which he at first thought to be *Gymnogramma opaca* (D. Don) Spreng. in L., *i.e.* *Cornopteris opaca* (D. Don) Tag., a rather uncommon species occurring in C. and E. Nepal (and east to S.E. Asia) and which I have found above the Vajra Cinema Hall on the N.E. outskirts of Gangtok in Sikkim. C.R. Fraser-Jenkins Field no. 548, 19 Dec. 1993. Detailed comments concerning the great confusion made by Panigrahi are given by Fraser-Jenkins (1997*b*, in press). Ironically, Panigrahi (1993*d*: 246) now claims to have "sorted out" this and other *Diplazium* species, instead of the true situation that he has mostly succeeded only in confusing them beyond measure and certainly left them in a much worse muddle than they were in before he began to meddle with them!

D. frondosum (Clarke) J. Smith ex Christ [*nom. superfl.* for *D. flaccidum* Christ] var. *sublatifolium* (Clarke) Bir & Irudayaraj (1993) = *D. maximum* (D. Don) C. Chr.

D. himalayense (Ching) Panigr. var. *effusior* (Clarke) Panigr. = *D. bellum* (Clarke) Bir. Panigrahi (1975*c*) mistakenly selected as lectotype the specimen cited that does

not belong to *D. himalayense*, where, however, he placed the name as a variety. The other specimen cited by Clarke belongs to *D. himalayense*, but as both fit the protologue well enough I must, under the rules, accept the unfortunate lectotype he chose, which is *D. bellum*, and must thus accept the alienation of this growth-form from *D. himalayense*. I have found *D. himalayense* as far west as C. Nepal, Mahaveer, N. of Lamidanda, Hetauda to Naubise, Makawanpur District, Narayani Zone. CRFJ 16148, 4 March 1990; it is common in east Nepal, Sikkim, Darjeeling etc.

D. hirsutipes (Bedd.) Nayar & Kaur, *comb. inval.*, alternative name not definitely accepted by the authors = *D. stoliczkae* Bedd. The type of *D. stoliczkae* merely has the stipe broken and all the scales rubbed off; it is not a separate form from *D. stoliczkae* var. *hirsutipes* Bedd., as this taxon was formerly known.

D. indicum Nair (*nom. nov.* for *Asplenium latifolium* D. Don, *non* Bory, *nec* Cav., *superfl.* for *Diplazium latifolium* T. Moore) = *D. latifolium* T. Moore. I have recently found this species as far west as the S. side of Phewa Tal, Pokhara, Kaski District, Gandaki Zone, W.C. Nepal. C.R. Fraser-Jenkins Field no. 1143, 1 Jan. 1997; and C. Nepal; N. side of Changu Narayan ridge, 1 km S. of Sankhu, Kathmandu District, Bagmati Zone. C.R. Fraser-Jenkins Field no. 1262, with R. & G. Pariyar & R. Subedi, 15 Feb. 1997. It is often confused with the E. Himalayan and S.E. Asian *D. dilatatum* Bl., which is a distinct species with a tuft of many very narrow, exserted, brown scales at the non-muricated stipe-base and a matt lamina, not markedly succulent and smooth as in *D. latifolium*. *D. latifolium* also has much longer sori and a knobbly-muricate, not smooth very base of the stipe.

D. maximum (D. Don) C. Chr. var. *vestitum* (Clarke) Morton = *D. himalayense* (Ching) Panigr.

D. multicaudatum (Wall. ex Clarke) Mehra (1939) = *D. spectabile* (Wall. ex Mett.) Ching.

- D. polypodioides* Bl. var. *brachylobum* Sledge = *D. brachylobum* (Sledge) Manickam & Irudayaraj.
- D. polypodioides* Bl. var. *vestitum* (Clarke) Iwats. in Ohba & Malla [sub "*vestita*"] = *D. himalayense* (Ching) Panigr. This obviously distinct species, like a large *D. maximum* with, amongst other differences, many small, brown scales on all the axes, cannot be considered a mere variety of any other species.
- D. procerum* (Hook. & Bak.) Nayar & Kaur [sub "(Wall.)"], *comb. inval.*, alternative name not definitely accepted by the authors = *D. muricatum* (Mett.) v. A. v. R. I have found this species as far west as the small valley on the S.W. side of Phulchowki mountain, S.E. of Kathmandu, Lalitpur District, C. Nepal, but it is commoner further east, especially around Darjeeling and in Sikkim.
- D. pseudosylvaticum* Panigr. (*nom. nov.* for *Allantodia sylvatica* Bl., non *Diplazium sylvaticum* (Bory) Sw.) = *D. mixtum* (Roxb. in Griff.) Morton.
- D. sibiricum* "(Kunze) Jermy" (1964) = *D. sibiricum* (Turcz. ex Kunze) Kurata in Namegata (1961).
- D. sikkimense* (Clarke) C. Chr. = *D. polypodioides* Bl.
- D. sommerfeldtii* A. & D. Löve (*nom. nov.* for *Aspidium crenatum* Sommerf.) = ? *D. sibiricum* (Turcz. ex Kunze) Kurata in Namegata (*synonyms: Athyrium mite* Christ (1909); *A. idoneum* Kom. (1916)). Japanese and Himalayan plants are tetraploid (see Löve, Löve & Pichi Sermolli (1977)), therefore Löve & Löve (1977) automatically gave a new specific name to the European diploid plant, though without explanation or any comment as to their morphological differences, if any (which were presumably not studied by them). In fact the two are extremely close and should perhaps only be separated as subspecies. They should be certainly not have been made species without a proper study of how to distinguish them, furthermore the Siberian plant (the type is from Baikal) has not been investigated cytologically nor studied in detail to see if it corresponds with the European or Japanese and Himalayan plant. As I can see little difference, apart

from possibly in segment-size, between my Norwegian collections and west-Himalayan ones I shall refrain from creating a new combination at the subspecific rank for Löve's name until the two apparent taxa have been more fully studied. In the absence of more detailed research into the two taxa a new combination would only be premature. It might also be desirable to reconfirm at least the European cytological result.

D. spectabile "(Wall. ex Mett.) Bir" (1961) = *D. spectabile* (Wall. ex Mett.) Ching (1936).

Doryopteris

Cheilanthes concolor "(Langsd. & Fisch.) Schelpe & Anthony in Anthony & Schelpe" (1982) = *Doryopteris concolor* (Langsd. & Fisch.) Kuhn in von Deck. Like *Aleuritopteris*, *Doryopteris* is, again difficult to define satisfactorily so as to separate it properly from *Cheilanthes*, but it seems a sufficiently distinct group to keep separate without such an overlap as *Aleuritopteris* has. The relationship of *D. concolor* to the rest of the genus, such as *D. ludens* (Wall. ex Hook.) J. Smith probably requires further confirmation, and it was separated by Tryon, who placed it under *Cheilanthes*. However in morphology it fits better into *Doryopteris* and is so treated here. *Cheilanthes tamburii* T. Moore has been mistaken for *D. concolor* by Gurung (1991) in Nepal (specimens in KATH!), the latter not occurring in the north of India or the Himalaya.

C. concolor (Langsd. & Fisch.) R. & A. Tryon (1981) = *Doryopteris concolor* (Langsd. & Fisch.) Kuhn in von Deck.

Drynaria

Drynaria prolifera P. & H. Pande, *nom. nud.* = *D. propinqua* (Wall. ex Mett.) J. Smith *apud* Bedd. The "type"-specimen is in Herb. P.C. Pande, Almora University (!).

D. tibetica Ching & S.K. Wu in C.Y. Wu = *D. mollis* Bedd.

Dryopteris

Acrorumohra hasseltii (Bl.) Ching = *Dryopteris hasseltii* (Bl.) C. Chr.

A. obtusissima (Mett. ex Kuhn) Ching = *Dryopteris macrochlamys* (Fée) Fras.-Jenk.

See below *sub Dryopteris sri-lankensis* Fras.-Jenk.

A. undulata (Bedd.) Ching = *Dryopteris undulata* (Bedd.) O. Ktze. See below *sub Dryopteris sri-lankensis* Fras.-Jenk.

A. yoroii (Seriz.) Shieh = *Dryopteris yoroii* Seriz. [*sub "yoroii"*].

Arachniodes hasseltii (Bl.) Ching = *Dryopteris hasseltii* (Bl.) C. Chr.

A. obtusissima (Mett. ex Kuhn) Ching = *Dryopteris macrochlamys* (Fée) Fras.-Jenk.

A. zeylanica (Ching) Ching = *Dryopteris undulata* (Bedd.) O. Ktze.

Dryopteris acutodentata [*sub "acuto-dentata"*] Ching. Newly recorded (det. CRFJ) from the far-west Himalaya, not given by Fraser-Jenkins (1992 and 1993), from Indian-occupied Kashmir, Tragbal Pass, 12000'. R.R. & I.D. Stewart 4893, 7 Aug. 1919 (US) [*sub D. serrato-dentata*, det. R.C. Ching, 1938]. The rather similar *D. x liddarensis* Fras.-Jenk. (*D. barbiger*a (T. Moore ex Hook.) O. Ktze. x *D. serratodentata* (Bedd.) Hay.) has fully abortive spores, all pale-brown scales and more lobed segments. It is not an aberrant plant of *D. acutodentata*, as I had began to wonder at one time.

D. affinis (R. Lowe) Fras.-Jenk. subsp. *coriacea* Fras.-Jenk. = *D. wallichiana* (Spreng. in L.) Hyland. subsp. *coriacea* (Fras.-Jenk.) Fraser-Jenkins (1994). Turkey, Iran and the Caucasus only, not present in the Indian subcontinent.

D. alpestris "Tag. ex Ching & S.K. Wu in C.Y. Wu" = *D. alpestris* Tag. The authorship of this name was listed erroneously by Johns (1997) as Ching & Wu clearly did not intend a new species. They did not put "*sp. nov.*" after it as with their new species, nor did they cite a type. The mere supplying of a description in latin did not indicate that a new species was intended and Ching was well aware of Tagawa's species, citing its author properly.

D. alpicola Ching & Z. Wang in Z. Wang (1985) (*nom. nov.* for *D. chrysocoma* var. *alpina* Ching, non *D. alpina* Ros.) = *D. chrysocoma* (Christ) C. Chr. See Fraser-Jenkins (1989: 374).

- D. ambigua* Sledge = *D. deparioides* (T. Moore) O. Ktze. subsp. *ambigua* (Sledge) Fras.-Jenk.
- D. barbiger*a (T. Moore ex Hook.) O. Ktze. var. *falconeri* (Hook.) R. Stewart = *D. barbiger*a (T. Moore ex Hook.) O. Ktze.
- D. barbiger*a (T. Moore ex Hook.) O. Ktze. subsp. *komarovii* (Koss.) Fras.-Jenk. = *D. komarovii* Koss. In a previous paper (Fraser-Jenkins (1992)) I restored this distinct taxon to the specific rank and I have no doubt now that it is a good, clear species.
- D. blanfordii* (Hope) C. Chr. subsp. *gongboensis* (Ching) Fraser-Jenkins (1992: 86) = *D. blanfordii* (Hope) C. Chr. subsp. *nigrosquamosa* (Ching) Fraser-Jenkins (1989). The very poor quality, highly immature type-specimen of *D. nigrosquamosa* Ching has caused considerable problems by being very difficult to identify and should never have been used as a type. My first impression was that it appeared to belong to the Tibetan and S.W. Chinese vicariant subspecies of *D. blanfordii*, which I therefore called subsp. *nigrosquamosa*, as the earliest name, and as it happened also one which could apply at both the specific and subspecific rank. However I later (Fraser-Jenkins (1992)) thought *D. nigrosquamosa* might belong to a distinct species and I therefore decided instead to use the next available synonymous epithet for the subspecies of *D. blanfordii*, namely *D. blanfordii* subsp. *gongboensis*. But recently Widén in Widén, Fraser-Jenkins, Reichstein & Sarvela (1997) found that the phloroglucide-chemistry of *D. nigrosquamosa* and "*D. gongboensis*" Ching in C.Y. Wu is virtually identical. It therefore seems that they are indeed synonymous as I had originally thought, so the correct, earliest name at subspecific rank reverts to subsp. *nigrosquamosa*, as in my monograph. It is unfortunate, though, that we must use a name based on such a highly inadequate type.
- D. bonatiana* (Brause) Fras.-Jenk. = *D. panda* (Clarke) Christ. Mehra & Loyal's (1965) tetraploid cytotype requires confirmation and further comparison with *D.*

panda, but it appears to be very rare and I was unable to refind it so far, despite visiting the stated locality and the general area several times. *D. bonatiana*, which I (Fraser-Jenkins (1989)) had thought might be the same, is evidently just normal *D. panda*. I am not sure now whether a distinct (and tetraploid) taxon really exists in the east Himalaya, or not and, if so, whether or not it is the same as *D. costalisora* Tag., which looks a little similar to Loyal's specimen in PAN, providing that both of them are not just small *D. panda*. Some answers may hopefully materialise if I can refind it and examine it in the field some day - the locality is easy enough to visit.

D. chingii Nair (*nom. nov.* for *Nephrodium filix-mas* (L.) Rich. in Marthe var. *fibrillosum* Clarke, *superfl.* for *D. sinofibrillosa* Ching) = *D. xanthomelas* (Christ) C. Chr. *D. xanthomelas* is the correct name for *D. sinofibrillosa* Ching (*synonym: D. pulcherrima* Ching). See Fraser-Jenkins (1992: 91).

D. chrysocoma (Christ) C. Chr. var. *costalisora* (Tag.) Shieh = *D. costalisora* Tag. This is apparently a good species, probably confined to Taiwan, though close to *D. panda*. Reports from the Himalaya have so far been in error for *D. chrysocoma*, *D. woodsii* Hay. and *D. panda* (Clarke) Christ, but see my comment under *D. bonatiana*, above.

D. x daliensis Z. Wang = *D. daliensis* Z. Wang, *pro hybr.* Wang (1985) gave cytological figures of approximately 14 univalents, 14 bivalents and 27 trivalents at meiosis in the type-plant (no. 00097 = C. 327) of this supposed hybrid, which he originally wrote on the sheet to be a probable triploid apomict, but his photograph does not appear to me to show so many trivalents, but more bivalents, with some univalents. In Oct. 1982 he told me that only one sporangium gave results and he stated in his paper that the results were not sure and a definite count could not be obtained. The interpretation given by Wang appears to me to be doubtful. When I checked the spores in June 1991 I found that they were, as expected, mostly young, but I found some groups of mature ones which were

normal, good spores with clean, brown perispores and were definitely not the abortive spores of a hybrid. The type of *D. x daliensis* therefore appears to me to represent an apomictic species, most probably an apomictic triploid, and would therefore be a distinct cytotype. It is generally similar to *D. woodsii* Hay. (as is Wang's tetraploid, *D. zinongii* Z. Wang & Fras.-Jenk. in Z. Wang). It is unfortunate that the type was only a young specimen with unripe spores and merely a cytological voucher-specimen for an uncertain count. On checking the other specimens cited I found that all had good, if partly young, or in one case (1549) mould-infected, so partly unformed spores. Nos. 1549, 02589 and 53106 are *D. chrysocoma* (Christ) C. Chr., while 1145 and 122 are *D. woodsii*.

D. darjeelingensis Fras.-Jenk. = *D. gamblei* (Hope) C. Chr. This is the widespread W. to E. Himalayan species in the *D. hirtipes* (Bl.) O. Ktze. group and is also represented by Wällich's collection of *Aspidium atratum* Wall., non Kunze. Although I originally recognised this species and name, following Hope (in my notes and determinations at K (in 1979), CAL (in Oct. 1980) and in other Indian herbaria etc.; see Widén, Åyräs & Reichstein (1992: 42)), during the course of my ongoing research I felt it necessary to change the nomenclature in various stages, but not that part of my concept of the species. Thus, later on, I temporarily put together *D. gamblei* and *D. cycadina* (Franch. & Savat.) C. Chr. (but did not publish this) - the latter being a very closely related but distinct Japanese species - and then decided, by c.Jan. 1981 (in my notes from BM and K, though I noted that it was more scaly than usual) that *D. gamblei* should be placed within *D. stenolepis* (Bak.) C. Chr. (see Fraser-Jenkins (1989)). Subsequent to that I came to realise that *D. stenolepis* is actually another distinct and much rarer species occurring in the W. and C. Himalaya, C. Nepal (Langtang), Bhutan (Mishichen), S.W. China etc. and having distinctive pale-brown stipe-base scales and narrower, less lobed pinnae. In the meantime, realising from both its distinct morphology and triploid cytotype (Mehra & Loyal (1965) and Gibby (1985)) that what was

actually *D. gamblei* from near Darjeeling (where it is common) was not the same as *D. stenolepis*, I mistakenly described it again as a new species, *D. darjeelingensis* Fras.-Jenk. (1989) - a synonym, therefore, of *D. gamblei*. *D. gamblei* was also treated by Panigrahi & Basu (1982), but without knowledge of the various species and considerable complexity of Section *Hirtipedes* Fras.-Jenk. in the Indian region and thus merely by following Hope, who had given an excellent illustration and description of it, as is well known.

A specimen from Shillong, cited and illustrated by Fraser-Jenkins (1989) under *D. stenolepis*, and material from Sohrarim, Umtyngar, Khasi Hills, have turned out to represent a further new species, now known from several populations in Meghalaya, and about to be described as *D. meghalaica* Fras.-Jenk. & Gibby in a chemical-taxonomic investigation by Widén, Fraser-Jenkins, Reichstein & Sarvela (1997, in press), where I also sink *D. darjeelingensis*, though this aspect of our work has now been dishonestly preempted by Kholia & Punetha (1995), see below. *D. meghalaica* was found by Gibby (1985) to be diploid apomict, like *D. stenolepis*, and thus distinct from the triploid *D. gamblei*. When I first recognised it and gave it its name (in prep.) in summer 1991, I found that it also has distinctive, narrow, but more lobed pinnae (see the illustration of it by Fraser-Jenkins (1989: 336)) compared with those of *D. stenolepis*, but not as deeply and rectangularly lobed as in *D. gamblei* (illustrated *sub D. darjeelingensis* by Fraser-Jenkins (1989: 335)). Its sori are more central in the pinnae, but the stipe-base scales are dark as in *D. gamblei*. Widén, Åyräs & Reichstein (1992), who based their nomenclature and taxonomy on the results of my research into the group, also found *D. meghalaica* to be chemically distinct from true *D. stenolepis*, but this was somewhat obscured by Reichstein's unqualified use of the name *D. stenolepis* there, even though I had previously found out, that my earlier (1989) use of the name *D. stenolepis* actually applied to a complex of *D. gamblei* and *D. stenolepis*. It should have been made clear that I already knew my Chinese plant

being reported on was not the same as the bulk of the material I had previously misreported as *D. stenolepis* from India. Hence it was impossible to address the question, as they briefly did, as to whether Chinese and Indian *D. stenolepis* were conspecific as they had not seen or investigated Indian *D. stenolepis*, nor could they make sense of the various different names I had used during different steps of my investigation, two of which I had deliberately not put in print as they were not finalised. These were unfortunately mentioned by Reichstein, suggesting what looked like random confusion, but was actually an organised progression of nomenclatural research similar to other cases he had dealt with himself in *Asplenium etc.* under temporarily misapplied names. Their paper was prepared without my knowledge when I was abroad, though I had provided all the nomenclatural and taxonomic background-research to Reichstein previously. I was therefore not provided the opportunity to bring it up to date and clarify it as should have been done and without which it was not possible to interpret their results. Fortunately this has now been done (Widén, Fraser-Jenkins, Reichstein & Sarvela (1997, in press)) and we can now see that all three species, *D. gamblei*, *D. stenolepis* and *D. meghalaica* have a distinct chemistry as well as frond-morphology and that though Indian and Chinese *D. stenolepis* are chemically different, it is in a different way and not relevant to the conclusion that appeared to be drawn in the previous paper due to misnaming.

In the meantime, however, I have been dismayed and astonished to discover that our ongoing joint-work and detailed research-programme has been seriously interfered with and partly preempted by the most dishonest case of theft of information I have yet come across by two Indian acquaintances I had tried to assist by privately providing them with certain details. In a new paper by Kholia & Punetha (1996), publishing my findings, the authors have also falsely claimed that it was actually they who informed me about *D. gamblei* and the identity of *D. darjeelingensis* in 1991. However not only had they no knowledge of these

species and of the application of the names until after I showed them, but in fact the situation was exactly the opposite way around. It was I who told them of the existence of *D. stenolepis* and *D. darjeelingensis*, which I showed them in the field at Dhaj, Pithoragarh, on 14 Jan. 1990; they did not previously know that there were two taxa or know their identity beyond being aware they were seeing the *D. atrata* (Kunze) Ching aggregate and Dr. Punetha actually asked me subsequently to confirm to him by letter which species were present (I had previously identified his unidentified material of *D. stenolepis* for him, which he had collected from Dhaj and sent by post), which I duly did. In Jan. 1990 I was collecting the rhizomes of these species for the programme of chemical analysis by Dr. C.-J. Widén at Helsinki. I did not visit them again in 1991, as they stated (I keep a detailed list each year of where I went), but next visited them in November 1994, my second visit. They then showed me the first draft of a paper they had prepared in which they intended, among other things, to report the presence of the *D. darjeelingensis* which I had shown them, as a new record for the west Himalaya, collected by us together in 1990. However I had in the meantime, of course, discovered from my further research in Britain in late 1990 and in the E. Himalaya that *D. darjeelingensis* was the same species as *D. gamblei* and that it does not belong to *D. stenolepis*; so I informed them of this confidentially and told them that I intended to publish this correction to my previous work at some stage fairly soon. While making corrections to the other species mentioned in their draft for them, I added the comment concerning their report of *D. darjeelingensis* (which they had listed under that name without any mention of *D. gamblei* as I did not tell them about that until I saw them again in 1994), "Fraser-Jenkins (in prep.) now sinks his *D. darjeelingensis* into *D. gamblei* (Hope) C. Chr., which he separates from *D. stenolepis*; both are present at Dhaj (Fraser-Jenkins, pers. comm. 11/1994)" and I agreed for them to publish that comment. I also corrected their reports of *Diplazium*, *Asplenium* and *Cyrtomium* in the draft.

which were based partly on the determinations and comments I had made on their material in early 1990, and I fortunately kept a copy of the ammended draft. This draft subsequently became their published paper (Kholia & Punetha (1995)) after the addition of other identifications and comments made by me and of further genera (such as "*Aleuritopteris*") they had not told me they would include, but incorporating new information about them from me (see, for example, under *Cheilanthes platychlamys*, above; a species I had confidentially identified for them in advance of my unpublished revision of the genus, which I had told them some important details of where it was relevant to their geographical area, in a spirit of scientific co-operation and friendship, but had asked them not to publish in advance of me, which they agreed to).

However, in the final published version of their paper they had not quoted my comment, as agreed, but had altered the entry for *D. darjeelingensis*, now under *D. gamblei*, claiming to have made their own research-findings on it and, amazingly and quite wrongly, to have been the ones who informed and corrected me about it instead of the other way around! They also failed to show which of the many identifications of species they cited were made by me, thus giving rise to many of their reports, and made it appear that they were themselves doing active taxonomic research. In fact they have not only published (and thus stolen) other people's confidential information after failing to carry out their own research, which gives them no proper basis for publication, but have also dishonestly claimed it as their own work, saying that I had failed to understand it, despite my having taught it all to them. In addition, due to their having to keeping parts of the work they stole from me secret from me until publication, they did not get their facts right in a number of places where they made serious and easily avoidable errors (see under *Cheilanthes* and *Diplazium*, above), thus misleading others. Although this is an extreme example, it shows how truly unfortunate it is that a handful of over-published pteridological authors in India are

determined to publish anything they can get hold of at second-hand, even dishonestly if necessary, without doing their own research, essential if they are really to know what they are publishing about.

D. deparioides (T. Moore) O. Ktze. subsp. *gracillima* (Ching) Fras.-Jenk. = *D. undulata* (Bedd.) O. Ktze. I have recently collected a range of immature plants of *D. undulata* in its normal, non-undulate form in Sri Lanka on the Knuckles Range near its type-locality (Wattakelly Hill) along with adult and intermediate plants, all ± fertile. I am now clear that *D. gracillima* Ching belongs here along with *D. sri-lankensis* Fras.-Jenk. *D. undulata* is confusingly variable, quite apart from whether it occurs in its abnormal, dissect and flexuose form or not.

D. diffracta (Bak.) C. Chr. = ? *Dryopteris diffracta* (Bak.) C. Chr., or ? *Acrorumohra diffracta* (Bak.) Ching. Although all the other species placed in *Acrorumohra* by Ching (1964) belong to *Dryopteris* Section *Nephrocystis*, *A. diffracta* (the type-species) and the very closely related, or perhaps synonymous, *Dryopteris subreflexipinna* Ogata, do not seem to fit as well as the other species do in section *Nephrocystis*. It is therefore difficult to come to any conclusion as to whether *Acrorumohra* belongs to *Dryopteris* (in that section), or is a good genus in its own right. Fraser-Jenkins (1986 and 1989) sank *Acrorumohra* into *Dryopteris* but further evidence is needed, perhaps from molecular-biological sources, before a final decision can be made.

D. x flemingii Fras.-Jenk. = *D. flemingii* Fras.-Jenk. (*pro hybr.*). This relative of *D. sublacera* Christ is a fertile apomictic tetraploid and from having seen more of it in the field it appears that it behaves as a species, as would be expected, forming populations and with a definite range. It has dark stipe- and rachis-scales and more lobed pinnules than in *D. sublacera*. The Chinese names, *D. minjiangensis* Kung and *D. nyingchiensis* Ching, both earlier than *D. flemingii*, could perhaps represent the same species and require further cytotaxonomic and field-study to ascertain whether or not they are just variants of *D. sublacera* or could replace the

name *D. flemingii*, which would be a pity. *D. flemingii* was named after the late and much loved "Dr. Bob," Robert L. Fleming, Sr., of Kathmandu, medical specialist (founder of the United Mission Hospital), ornithologist and pteridologist (see Fleming, R.L., Sr., Fleming, R.L., Jr. and Bangdel, L.S. 1976. *Birds of Nepal, with reference to Kashmir and Sikkim* (2nd ed. 1979): 1-358. Kathmandu (a collection of the original paintings for this book now being in the "coffee-shop" of the Soaltee Hotel, Bafal, Kathmandu); Fleming, R.L. [Sr.] 1985. Ferns in general, in Majupuria, T.C. (ed.), *Nepal - Nature's Paradise*: 192-193. Bangkok; and Fletcher, G.N. 1964. *The fabulous Flemings of Kathmandu, the story of two doctors in Nepal*: 1-219. Dutton, New York; and see in Rajbhandari (1994: 39)), whom I am proud to have known as a friend and many of whose fern-collections in K, BM, MICH and KATH I have identified at his request and have continued to do so after his death in Phoenix, Arizona, in 1987, at the age of 82.

I have found this species in quantity on the west side of the river, shortly below the second bridge, c.2 km N. of and above Janki-Bhai Chatti on path to Jamnotri, 10 km N. of and above Hanuman Chatti, N.E. of Barkot, N. of Mussoorie, Uttarkashi, Uttarkhand (Uttar Pradesh), India; mossy rocks facing N.E., c.2600 m. CRFJ 16015-16018, 26 Jan. 1990; also N.E. side of Khurpudanda, E. of and above Somdang, W. of and above Syabrubensi and Gatlang, N. of Dhunche, Rasuwa District, Bagmati Zone, N.C. Nepal. CRFJ 15736, 10 Nov. 1989. It is confusable with *D. sublacera* Christ and *D. basisora* Christ, but has darker, denser scales and more lobed pinnules. *D. basisora* is now reported anew from the Indian subcontinent from the path to Moghu (Mongu) from Triyugi (Trijugi) Narayan, 3-6 km above and W. of Triyugi Narayan, above and W. of Sonprayag, W. side of Mandakini valley, N. of Rudraprayag and N.E. of Srinagar, Chamoli Garhwal, Uttarkhand (Uttar Pradesh), unspoilt forest with *Quercus* and *Cedrus deodara*, c.2800-3000 m. C.R. Fraser-Jenkins Field no. 633. 29 Sept. 1996. It is otherwise very common in S.W. China (e.g. near Kunming in

Yunnan, where I was first shown it by Dr. W.M. Chu). I have also identified material of it from Bhutan, *sub D. lepidopoda* Hay., Tinlegang - Gon Chungnang (above Phunakha). *H. Kanai et al.* 4222, 5567 (KYO). It is morphologically close to *D. sublacera*, but has a slightly stiffer lamina, more acute pinnule-teeth, a more deltate frond and the sori confined to the characteristically rather narrowed bases of the upper pinnules. The stipe-base scales are slightly glossy, russet-brown but they may become rather darker on the rachis. In general it is rather intermediate towards *D. fructuosa* (Christ) C. Chr.

D. x ghatakii Fras.-Jenk. On morphological grounds the parentage of this sterile hybrid is probably *D. cochleata* (D. Don) C. Chr. x *D. sparsa* (D. Don) O. Ktze., rather than *D. austro-indica* Fras.-Jenk. x *D. cochleata*, as I originally thought.

D. gracillima Ching var. *prolongata* Sledge = *D. undulata* (Bedd.) O. Ktze.

D. gracillima Ching var. *triangularis* Sledge = *D. undulata* (Bedd.) O. Ktze.

D. gracilifrons Ching, *nom. nud.* = *D. fangii* Ching, Fras.-Jenk. & Z. Wang in Z. Wang (*nom. nov.* for *D. chrysocoma* (Christ) C. Chr. var. *gracilis* Ching, *non D. gracilis* (T. Moore *ex* Bedd.) Ching [= *Polystichum thomsonii* (Hook. *fil.*) Bedd.]). I have no idea why Wang decided to change the name Ching had given to this species in the herbarium, which he and I had previously agreed to use. However *D. fangii* is now the correct name.

D. harae H. Itô in Hara = *D. pulvinulifera* (Bedd.) O. Ktze.

D. hatusimae H. Itô = *D. hasseltii* (Bl.) C. Chr.

D. hirtipes (Bl.) O. Ktze. subsp. *atrata* (Kunze) Fras.-Jenk. = *D. atrata* (Kunze) Ching.

This taxon, described from S. India (not to be confused with the bulk of Himalayan "*D. atrata*" *sensu* Wallich, which is the common *D. gamblei* (Hope) C. Chr.), is probably better treated as a species in its own right, though it is very close morphologically to *D. hirtipes*. But in view of its different cytotype combined with broader, more square pinna-lobes and some narrower rachis-scales it is treated as a species here. It is also fairly common in the E. Himalaya around

Darjeeling *etc.* and I have found it as far west as C. Nepal, N. side of Changu Narayan ridge, 1 km S. of Sankhu, Kathmandu District, Bagmati Zone. *C.R. Fraser-Jenkins* Field no.1264, with *R. & G. Pariyar & R. Subedi*, 15 Feb. 1997.

D. hirtipes (Bl.) O. Ktze. [sub "(Bl.) Hook.," given by Panigrahi & Basu] var. *exinvoluta* (Clarke) Sledge *ex* Panigr. & Basu (1982*b*) = *D. scottii* (Bedd.) Ching. This combination was first put forward but not actually made by Sledge (1973*a*), whose work was well known to and followed by Panigrahi, though he failed to cite it.

D. incislobata Ching & S.K. Wu in C.Y. Wu = *D. zayuensis* Ching & S.K. Wu in C.Y. Wu. See Fraser-Jenkins (1992: 90) where I accept two taxa within what I had previously treated (Fraser-Jenkins (1989)) as only the one species, now called *D. xanthomelas* (Christ) C. Chr.; some more details were given by Widén. Fraser-Jenkins, Reichstein, Gibby & Sarvela (1996). I have now identified *D. zayuensis* from W. and E. Nepal, Jumla District, Chandanbise Khola. *P.R. Shakya & B. Roy* 5790, 18 June 1980 and Dolakha District, Rolwaling. *N.P. Manandhar & M.K. Adhikari* 1583, 18 May 1979 (both in KATH).

D. kuratae Nakaike = ? *D. pseudolunanensis* Tag. Nakaike's new species was intended to provide a name for the Japanese species formerly known there as *D. pycnopteroides* auct., but which I had found to be a different species from the true, S.W. Chinese *D. pycnopteroides*. It is very similar to and I suspect could be the same as *D. pseudolunanensis*, a species I did not accept previously (Fraser-Jenkins (1986)).

D. lachoogensis (Bedd.) Nayar & Kaur = *D. fructuosa* (Christ) C. Chr. This is not a separate species from *D. fructuosa* as I (and others) had previously treated it (Fraser-Jenkins (1989)). I have now made collections of it showing a complete range of variation from the less to the more lobed-pinnuled from shortly above Lachung in N.E. Sikkim, from where it was first described.

D. macrocarpa R. Stewart ("nom. nov." [err. for *sp. nov.*, see Code (1994: Art. 33 note

2 and Ex. 9)] for *Nephrodium filix-mas* (L.) Rich. in Marthe var. *schimperianum sensu* Clarke, *non* (Hochst. ex A. Br.) Clarke [= *Dryopteris schimperiana* (Hochst. ex A. Br.) C. Chr., from Africa and Yemen only]) = *D. chrysocoma* (Christ) C. Chr. Though Stewart (1945) also cited Beddome's *Lastrea filix-mas* (L.) C. Presl var. *elongata* (Sw.) Bedd. [*sub* "(Hook. & Grev.) Bedd." [= *Dryopteris aitoniana* Pich. Serm., from Madeira only], *non sensu* Bedd. [= *Dryopteris approximata* Sledge, from Sri Lanka and S. India only], that was not the earliest reference he gave and was not the same as Stewart's own concept of *D. macrocarpa* as can be seen from the Trotter specimen he cited and from his other papers. Clarke's description, excluding the basionym (as Stewart showed that he did) must therefore be taken as the protologue of *D. macrocarpa* as was done by Fraser-Jenkins (1986 and 1989).

D. madrasensis Fraser-Jenkins (1989) = *D. wallichiana* (Spreng. in L.) Hyland. subsp. *madrasensis* (Fras.-Jenk.) Fraser-Jenkins (1994: 22). For the reasoning behind the change of rank see Fraser-Jenkins (1988).

D. mehrae Khullar in Mehra & Khullar, *nom. nud.* = *D. blanfordii* (Hope) C. Chr. subsp. *blanfordii*.

D. odontoloma (Bedd.) C. Chr. forma *brevifolia* Mehra & Khullar, *nom. nud.* = *D. stewartii* Fras.-Jenk.

D. palikuensis Herat ex Fraser-Jenkins (1994) = *D. subbipinnata* W. Wagner. Details concerning the independent discovery of *D. palikuensis* by Herat and the rejection of the paper intending to publish it, leading to its replacement by Wagner's name, were given by Fraser-Jenkins (1994). Hawai'i only, not present in the Indian subcontinent, though *D. khullarii* Fras.-Jenk. is a generally similar but distinct species.

D. pallida (Bory) C. Chr. *apud* Maire & Petitm. [*sub* "(Bory) Fomin." according to authors prior to Fraser-Jenkins (1992)] subsp. *nigropaleacea* Fras.-Jenk. = *D. nigropaleacea* (Fras.-Jenk.) Fras.-Jenk.

D. parachrysocoma ["*para-chrysocoma*"] Ching & Z. Wang in Z. Wang = *D. chrysocoma* (Christ) C. Chr. Although I (Fraser-Jenkins (1989)) thought it possible, tentatively, that this could be a distinct species, I now believe it merely belongs within a slight range of variation in *D. chrysocoma*.

D. parallelogramma (Kunze) Alston = *D. wallichiana* (Spreng. in L.) Hyland. subsp. *wallichiana*.

D. patentissima "(Wall. ex Kunze.) Panigr. & Basu" [*sub* "(Franch.)"] (1980*a* and *b*), *non sensu* Panigr. & Basu [= *D. lepidopoda* Hay.] = *D. wallichiana* (Spreng. in L.) Hyland. subsp. *wallichiana*. Panigrahi & Basu yet again completely misinterpreted the species concerned and muddled up the nomenclature of this name which they sought to separate from *D. wallichiana*, of which it had long and correctly been placed in the synonymy by almost all authors. They then attempted to create a new combination for it though, as clearly shown by *Index Filicum*, it had been so combined some twelve years before by a well known Indian pteridologist from their sister-organisation. Not one of the three species they treated was understood in the correct sense by them! Later, having discovered part of their error (since I investigated and redetermined their cited specimens at CAL in Oct. 1980), and citing Smith & Fraser-Jenkins' (1982), justification of the use of the name *D. wallichiana*, Panigrahi & Basu (1983) altered their nomenclature to use the name *D. nigra* Ching instead of *D. patentissima*, but this again was mistaken as that species had been named *D. lepidopoda* Hay. long before Ching's renaming of it. They also mistakenly cited the basionym-author of the epithet *patentissima* as Hooker, but the name was not accepted by Hooker and was thus invalid (in the wrong genus). Fraser-Jenkins (1989) showed that the basionym was validated long before as *Aspidium patentissimum* Wall. ex Kunze. *Linnaea* 13: 146 (1839), based on Wallich's plant under Cat. no. 340. For some reason the editor of my monograph at the BM inserted that this was a "*nom. illeg.* (Art. 63.1)" of the old Code (or Code (1994: Art. 52.1)) meaning that it was a

nomen superfluum, but I doubt this is so. In any case since later authors citing Wallich as the authority for this epithet did not exclude his specimen, which is *D. wallichiana* subsp. *wallichiana*, from their concepts it remains the type of the name, e.g. J. Smith in 1842 (not mentioned by Panigrahi & Basu), Clarke in 1876 and Franchet in 1887. I must also point out that Franchet's specimen at P is not *D. lepidopoda* at all, as stated by Panigrahi, who may not even have seen it, but *D. wallichiana* subsp. *wallichiana* (see Fraser-Jenkins (1989: 357)). Thus even when attempting to correct his previous mistakes it seems that Panigrahi did not know enough about the subject to get it right in any single respect. Yet, without so much as a mention of his confusion and subsequent correction paper, we now find Panigrahi (1993d) actually commending his disastrous paper!

D. patentissima (Wall. ex Kunze) Nair [*sub* "(Franch.)"] (1968), *non sensu* Nair [= *D. lepidopoda* Hay.] = *D. wallichiana* (Spreng. in L.) Hyland. subsp. *wallichiana*.

D. pteridiiformis Christ, *non sensu auct. Chin. et* Fraser-Jenkins (1989) [= *D. camusiae* Fras.-Jenk.] = *D. x pteridiiformis* Christ (*pro spec.*). The spores of the type-specimens (lectotype, Fraser-Jenkins (1989) and isolectotypes) are abortive, det. CRFJ, and the frond-morphology is rather different from normal, being a wider, slightly more dissect frond. It must therefore be a hybrid, which I suspect to be *D. caroli-hopei* Fras.-Jenk. x *D. kunmingensis* Fras.-Jenk. As the type of the name is a hybrid and the name thus belongs to the hybrid, the species long known as *D. pteridiiformis* is without a name. It is therefore described as a new species, as follows :-

Dryopteris camusiae Fras.-Jenk., *sp. nov.*, *basionym.* *Species similis ad D. marginatam sed rhizoma longiora, reptantia, lamina angustiora ad basem. Segmenta ultima non profunde lobata ad apices eorum. Sori magni. Cytotypus tetraploideus* (M. Gibby 1981, for CRFJ 10028, see Gibby (1985)). *Holotypus:* China, Yunnan, steep valley below Chung-Chu-Sze temple, north Zhi Shan (West Hill), N.W. of Kunming. C.R. Fraser-Jenkins 10024, with W.M. Chu and S.K. Wu

(the former indicated the locality), 17 April 1980 (BM). *Paratypes*: Ditto, nos. 10025-10028 (NMW, BM, PE, KATH). This species is named after my friend and colleague, Miss Josephine Camus, of The Natural History Museum, London, who has worked on the marattialean ferns among many other pteridological projects and has always been a most kind and sharing help to me when in London.

D. pulcherrima Ching = *D. xanthomelas* (Christ) C. Chr. See Fraser-Jenkins (1992) for the replacement of this name by *D. xanthomelas*.

D. redactopinnata sensu Panigrahi & Basu (all material except type), *non* Basu & Panigr. in Panigr. & Basu [= *D. redactopinnata* Basu & Panigr.] = *D. wallichiana* (Spreng. in L.) Hyland. subsp. *wallichiana*. The type of *D. redactopinnata* inadvertently belongs to a separate species unrecognised by Panigrahi, but previously unnamed (see Fraser-Jenkins (1989: 348, 357)), and the name therefore stands but in a quite different sense from what Panigrahi had in mind. When later commending his confused paper, Panigrahi (1993d: 245) made no mention of his gross errors that I pointed out in the paper he cited as if in support of his accidental species, but merely presented it as if an achievement, "confirmed by Fraser-Jenkins (1989)" - rather than having had to be totally emended by me!

D. reholtumii M. Price, *nom. nud.* = *D. pulvinulifera* (Bedd.) O. Ktze.

D. reichsteinii Fraser-Jenkins (1986), from Madagascar only = *D. wallichiana* (Spreng. in L.) Hyland. subsp. ? *wallichiana*. Apart from the change of rank for the close relatives of *D. wallichiana* (see Fraser-Jenkins (1988)), I also (Fraser-Jenkins (1994)) named a new subspecies, *D. wallichiana* subsp. *reichsteinii* Fras.-Jenk., from Africa only, independent of *D. reichsteinii*, because of some unresolved doubt about the identity of the obscure and little-known Madagascarian plant, which, from its frond-morphology, quite probably belongs not to subsp. *reichsteinii*, as I had originally thought, but to subsp. *wallichiana*, requiring cytological investigation. The Madagascarian plant is very rare and occurs only on Mt. Tsaratanana in the north of the island, which is not only very hard to reach.

but also hard to get permission to visit; it is known only from a very few herbarium-specimens and I was unable to find it myself when in Madagascar, so its taxonomy remains uncertain.

D. sinofibrillosa Ching = *D. xanthomelus* (Christ) C. Chr. See Fraser-Jenkins (1989 and 1992) concerning the nomenclature of this species.

D. squamifera [partly spelt "*squamigera*," *non* (Hook. & Arn.) O. Ktze.] Ching & S.K. Wu in C.Y. Wu = *D. zayuensis* Ching & S.K. Wu in C.Y. Wu (see Fraser-Jenkins (1992: 90)).

D. sri-lankensis Fras.-Jenk. (*nom. nov.* for *Lastrea deltoidea* Bedd.) = *D. undulata* (Bedd.) O. Ktze. The abnormally developed, highly dissect and flexuose fronds described as *D. undulata* are difficult to identify and have been much confused by all authors in the past. In addition no-one has collected this form recently, though I found a few plants with slightly flexuose rachides, but normal segments, when I searched around the S.W. side of the type locality (Wattakelly Hill, Knuckles Range, Sri Lanka) in 1994, which all belonged to the same species as *D. sri-lankensis*. From studying the range of variation of *D. sri-lankensis* in the field and herbarium it appears that *D. undulata* and *D. sri-lankensis* must be conspecific, rather than *D. undulata* and *D. macrochlamys* (*sub D. obtusissima* (Mett. ex Kuhn) Christ) as was always thought before, including by me (Fraser-Jenkins (1989)). *D. undulata* therefore replaces *D. sri-lankensis*, but *D. obtusissima* remains a synonym of *D. macrochlamys*, as found by me (Fraser-Jenkins (1989: 453)).

D. stenolepis (Bak.) C. Chr. - I have identified this species from N.C. Nepal, Langtang, Ghoda Tabela - Thulosityapru, 2120 m. Mrs. V.L. Guring & party 77/734, 7 Oct. 1977 (KATH). It is similar to *D. gamblei* but has pale-brown scales at the very base of the stipe and narrower, less-lobed pinnae.

D. subbarbigera Ching in C.Y. Wu = *D. komarovii* Koss.

D. submarginata Loyal in Mehra & Loyal, *non* Ros. = *D. subimpresca* Loyal.

D. submontana (Fras.-Jenk. & Jermy) Fras.-Jenk. = *D. mindshelkensis* Pavl.

D. subodontoloma Ching ex Loyal in Mehra & Loyal, *nom. nud.* = *D. subimpressa* Loyal.

D. uropinna M. Price = *D. subtriangularis* (Hope) C. Chr.

D. villarii (Bell.) Woynar ex Schinz & Thell. subsp. *mindshelkensis* (Pavl.) Fraser-Jenkins (1977) = *D. mindshelkensis* Pavl. See the Introduction to this paper; I have also mentioned this previously (Fraser-Jenkins (1996)) but put Pavlov's name as Pavlovski in error. This species reaches as far east as N.E. Afghanistan and Tadzhikistan, so is one of the rather few European elements that just crosses the desert-gap to reach the Indo-Himalayan region in Afghanistan.

D. villarii (Bell.) Woynar ex Schinz & Thell. subsp. *submontana* Fras.-Jenk. & Jermy in Fras.-Jenk. = *D. mindshelkensis* Pavl.

D. wallichiana "(Spreng. in L.) Alston & Bonner" (1956) = *D. wallichiana* (Spreng. in L.) Hylander (1953) subsp. *wallichiana*.

D. wallichiana (Spreng. in L.) Hyland. "Darjeeling variety" (see Fraser-Jenkins (1989: 358-359) and Widén, Fraser-Jenkins, Reichstein, Gibby & Sarvela (1996: 75, 76, 85, 86)) = *D. wallichiana* (Spreng. in L.) Hyland. subsp. *himalaica* Fras.-Jenk., **subsp. nov.**, *basionym.* *Planta similis D. wallichianam subsp. wallichianam sed ab ea differt basi laminae aliquanto latiora, stipite longiore et paleis dispersis basibus nitidis et striis obscuris altioribus attingentibus, apicibus stramineis instructo. Pinnulae aliquanto longae nervulis impressis. Cytotypus diploideus* (Gibby (1985)). *Holotypus*: India, West Bengal, Gairibas to Tonglo, on road to Sandakphoo, Singalilla ridge, W. of Darjeeling, dense mixed forest, 2700 m. *C.R. Fraser-Jenkins* 8535, 16 Nov. 1978 (BM). *Isotype*: Ditto. (NMW). *Paratypes*: Ditto. 8537 (BM); 8536 (H); 8538 (H). Cytological voucher-specimen: West Bengal, between Kalpokhri and Gairibas on road to Sandakphoo, Singalilla ridge, W. of Darjeeling, dense mixed forest, 3000 m. *C.R. Fraser-Jenkins* 10364, 22 Oct. 1980 (BM); $2n = c.82$ at mitosis in root-tips (Gibby (1985)).

Its main features of difference from *D. wallichiana* subsp. *wallichiana* (with which it shares long, narrow rachis-scales and large, glossy segments) are a longer stipe, bearing rather short, narrow scales mixed with highly characteristic, scattered, wider ones with black bases and dark streaks running up into the pale-yellowish scale-apex. There are also some scattered, all-dark scales with slightly paler edges. The lower lamina ends rather abruptly (*i.e.* the lowest pinnae are a little longer) and tapers less than in subsp. *wallichiana* and the pinnules are rather longer, narrower, often more rounded-truncate and less squarely truncate at their apices, and often have more deeply impressed veinlets on the upper surface. This taxon was discovered by me in 1978 and I thought it sufficiently different to be given a "code-name," but it was deliberately not given a formal name in print until now that it has been thoroughly investigated and I accept it as really distinct and new, some 18 years later. This is perhaps rather too much the opposite extreme from the almost unresearched slapping of new names onto unfamiliar specimens that happens in India and China, but the taxon is a critical one and part of a large complex which required more time for consideration. It has now been carefully researched from the taxonomic, cytological and chemical point of view, including field-study in many different localities. Chemically (see Widén *et al.* (1996)) it is very similar to subsp. *wallichiana*, as should be expected, but has more Flavaspidic acids AB and BB than are present in that subspecies; Widén (in our paper) separated it as a different chemotype. On first mentioning it (Fraser-Jenkins (1989 *etc.*)) I stated that I had found intermediate plants with narrower, more tapering lamina-bases and shorter stipes and pinnules, which, in the light of the scale-colour variation in *D. wallichiana* subsp. *wallichiana* decided me against recognising it nomenclaturally as it could have been merely part of the variation shown by that subspecies. However I have observed this taxon (subsp. *himalaica*) in Darjeeling, Sikkim, Nepal (I have recently identified material of it from E. Nepal, Maipokhari - Ilam, 3300-2400 m. V.L. Gurung 1290, 11 Sept. 1980 and

ditto *R.L. Fleming* 2497, 17 Sept. 1978 (both in KATH)) and, recently, Chamoli (Uttar Pradesh) a good number of times since and have also seen material in PE from Yunnan, S.W. China and even when it has a less characteristic lamina-base, stipe and pinnules I still find it to be recognisably distinct. Furthermore I have not yet found a population of it where at least some of the better-developed plants are not \pm typical in these respects.

The furthest west I have seen it (though I shall have to recheck some of the BM collections of "*D. wallichiana*" at some stage) is in the eastern part of the west Himalaya: Uttarkhand (Uttar Pradesh), Chamoli Garhwal, on path to Moghu (Mongu) from Triyugi (Trijugi) Narayan, c.3-6 km above and N. of Triyugi Narayan, above and N.W. of Sonprayag, W. side of Mandakini valley, N. of Rudraprayag, N.W. of Karnaprayag and N.E. of Srinagar, unspoilt mixed forest with *Quercus* and *Cedrus deodara*, c.2800-3000 m. *C.R. Fraser-Jenkins* Field nos. 628 and 629, 29 Sept. 1996. I have also found it, among other places, in N. Sikkim, 1½ km N. of Lachung on E. side of river, c.7700 ft. *C.R. Fraser-Jenkins* Field no. 1100, 16 Nov. 1995 and have seen and reidentified specimens collected from Ilam District, Mechi Zone, E. Nepal by the Japanese E. Himalayan expeditions.

A further taxon which must constitute another subspecies (like the last, most probably having diverged from subsp. *wallichiana* in the Sino-Himalayan region, rather than having had an independent hybrid-origin, though either origin is possible) has been recognised by me for many years (but only mentioned in print as a "further intermediate" by me in Widén *et al.* (1996: 71)) as a segregate of *D. wallichiana* intermediate towards *D. lepidopoda* Hay., though that is rather a misnomer. It is not to be confused with occasional brown-scaled *D. lepidopoda* (e.g. *CRFJ* 8832, 8835 *etc.*, also cited by Fraser-Jenkins (1989)) and bears little, if any resemblance to *D. lepidopoda*. The first time I recognised it as an entity was on Phulchowki mountain, nr. Kathmandu, in C. Nepal in 1989, among a mixed

population of *D. wallichiana* subsp. *wallichiana* and *D. lepidopoda*. But it is actually intermediate between *D. wallichiana* subsp. *wallichiana* and *D. neorosthornii* Ching, though clearly closer to the former. It is now described as *D. wallichiana* subsp. *nepalensis* Fras.-Jenk., *subsp. nov.*, *basionym. Morphologia frondium intermedia inter D. wallichianam subsp. wallichianam et D. neorosthornii. Paleae stipitis rhachidisque dispersae, aliquae paleae maiorae nigrae apicibus brunneis; lamina angusta praesertim in dimidio inferiore in quo latera parallela sunt. Pinnae remotae, par oppositum infimum pinnularum valde longiori quam ceteras, pinnulae longae angustae, pinnulae basiscopica (et interdum ea acroscopica) infima in quoque pinna auricula rotundata basalis basiscopica praedita, apices pinnularum rotundati dentibus parvis flabellatis praeditis. Holotypus: C. Nepal, Bagmati Zone, Kathmandu District, shortly below Bagdwar temple, on E.N.E. side of peak of Sheopuri mountain, above and N. of Budhanilkantha, N. of Kathmandu, dense mixed forest, c.2500 m. C.R. Fraser-Jenkins 15793, 16 Nov. 1989 (BM). Paratype: Ditto. 15794 (NMW). Other specimens I have collected are: Phulchowki mountain, Kathmandu, c.8000 ft. CRFJ 15849-15850, 20 Nov. 1989 and 15892-15893, 19 Dec. 1989; India, banks of path to Janki-Bhai Chatti and Jamnotri, 2 km N. of and above Hanuman Chatti, N.E. of Barkot, Uttarkashi, Uttarkhand (Uttar Pradesh), c.7000 ft. CRFJ 15985. 21 Jan. 1990 and India, path to Moghu (Mongu) from Triyugi (Trijugi) Narayan, c.3-6 km above and W. of Triyugi Narayan, above and N.W. of Sonprayag, W. side of Mandakini valley, N. of Rudraprayag, N.W. of Kailashprayag and N.E. of Srinagar, Chamoli Garhwal, Uttarkhand (Uttar Pradesh), unspoilt mixed forest with *Quercus* and *Cedrus deodara*, c.2800-3000 m. C.R. Fraser-Jenkins Field no. 524, 29 Sept. 1996. I have also identified specimens of it in PE from Yunnan, S.W. China; and from C. Nepal from Phulchowki; Langtang; and Sankhuwasabha (Norbu Gaon), all in KATH. It is quite common at the right altitude in Nepal and probably also occurs in Sikkim and may thence be recorded somewhere in my*

herbarium notes.

It remains constant in its morphology (long stipe; scattered, dark, rather wide scales with brown apices; narrow lamina, especially the long, parallel-sided lower half; distant pinnae; pinnules long and narrow with rounded apices bearing small, flabellate teeth, the lowest opposite-pair of pinnules on each pinna noticeably longer than the rest and bearing a rounded auricle at their basiscopic base, particularly on the basiscopic pinnule) and can be quite easily recognised from place to place. Unfortunately its cytotype is not known, but its spores are not unduly large and do not suggest a triploid apomict.

D. yigongensis Ching in C.Y. Wu. "Hattu 1 species" (see Fraser-Jenkins (1989)) and Widén, Fraser-Jenkins, Reichstein, Gibby & Sarvela (1996)) = *Dryopteris edwardsii* Fras.-Jenk., *sp. nov.*, *basionym. Planta similis D. lepidopodam sed differt paleis latioribus ad basem stipitis et ad rhachidem, pinnulae basiscopicae inferae pinnarum inferarum longiorae. Pinnulae inferae quoque pinnuae longiorae quam alias. Sporae magnae. Cytotypus triploideus apomicticus* (Gibby (1985)). *Holotype*: India, Uttarkhand (Uttar Pradesh), Chamoli Garhwal, path to Moghu (Mongu) from Triyugi (Trijugi) Narayan, c.3-6 km above and W. of Triyugi Narayan, above and W. of Sonprayag, W. side of Mandakini valley, N. of Rudraprayag, N.W. of Karnaprayag and N.E. of Srinagar, unspoilt mixed forest with *Quercus* and *Cedrus deodara*, 2800-3000 m. *C.R. Fraser-Jenkins* Field no. 622, 29 Sept. 1996 (BM). *Isotype*: Ditto (K). *Paratype*: Ditto. 623 (NMW).

When I first discovered this species (on Mt. Hattu - an area which is in need of strict conservation) in 1977 it was a new, undescribed species which I planned to name after Prof. Reichstein. However the obvious place to describe it was in my *Dryopteris* monograph (Fraser-Jenkins (1989)), which took a number of years to complete. In the meantime I visited Beijing (for the first time) in 1980 and found that the name, *D. yigongensis*, which Ching planned to publish in Ching and Wu (1983), *Flora Xizangica*, apparently applied to the same species. Though

poor and difficult material (see Fraser-Jenkins (1989)), his type looked very similar to smaller plants of my Indo-Himalayan species. I therefore did not name the Himalayan plant anew but used the name *D. yigongensis* for it. I subsequently used the name *D. reichsteinii* Fras.-Jenk. for what is now known as *D. wallichiana* subsp. *reichsteinii* Fras.-Jenk. However, on my third visit to Beijing in 1991, because of some doubts about the identity of the type, I inspected it carefully again. To my annoyance I found that I had previously misidentified it and it actually represented a small, poor specimen of *D. lepidopoda* Hay. The rachis was not fibrillose enough, what was left of the scales were too few and too narrow, the lower pinnae too symmetrical and, diagnostically, the spores were too small (their fortunately being ripe in this particular type-specimen) for the Himalayan and Chinese species I had treated in my monograph. Such problems of identification are hard to avoid with some of the very critical and often very poor quality, unrepresentative types of the random "new species" from China.

The Himalayan species, now called *D. edwardsii*, occurs from Pakistan (see Fraser-Jenkins (1992)) east to S. China and I have found it rather frequently and more widely than before since the publication of my monograph of 1989, including in several places in Uttarkashi; Chamoli Garhwal; Pithoragarh (Narayan Ashram); and Nepal (path to Gossainkund, between Deorali (river-bridge) and Chandanbari (top of ridge), c.8 km N.E. of and above Dhunche, N. of Trisuli Bazaar and Kathmandu, Rasuwa District, Bagmati Zone, N.C. Nepal, dense forest, c.2900 m. C.R. Fraser-Jenkins Field no. 1496, 13 June 1994, with S. Gotami & B. Pariyar; another two specimens I have reidentified are from Rara National Park, Mugu District. H. Tabata, D.P. Joshi et al. 3003, 25 Aug. 1976 (PE!) and 19722, 20 Oct. 1984 (KYO!)). It is named after Mr. Peter J. Edwards, of the Fern Section, Royal Botanic Gardens, Kew, who has done a great deal of careful work both in the herbarium and field on many pteridological projects and, while humbly and unpretentiously contributing a very great deal to all of our work,

is actually one of the real experts in almost any aspect of fern research I can think of. He has also been a great help to me personally in various projects.

D. yigongensis Ching in C.Y. Wu. "Hattu 2 species" (see Fraser-Jenkins (1989) and Widén, Fraser-Jenkins, Reichstein, Gibby & Sarvela (1996)) = *Dryopteris pauliae* Fras.-Jenk., Widén & Gibby in Fras.-Jenk., *sp. nov.*, *basionym.* *Planta similis D. lepido-podam sed valde differt lamina deltatiore et latiore ad basem, stipite pauco paleas nigras ferrente in dimidio superiore. Pinnulae rotundatiore vel acutiore ad apices earum et pinnulae inferiorae stipitatae. Cytotypus triploideus apomicticus* (Gibby (1985)). *Holotypus*: India, Himachal Pradesh, N.E. side of Mt. Hattu, above Narkanda, N.E. of Simla, 3000 m. *C.R. Fraser-Jenkins* 7647, with *C.D. Fraser Jenkins*, 26 Aug. 1978 (BM). *Paratypes*: Ditto 7652 (H), 7654 (H), 7655 (PE, H), 7656 (H), 7658 (H).

I have also found this species on the W. side of the river, shortly below the second bridge, c.2 km N. of and above Janki-Bhai Chatti, on path to Jamnotri, 10 km N. of and above Hanuman Chatti, N.E. of Barkot, N. of Mussoorie, Uttarkashi, Uttarkhand (Uttar Pradesh), India, mossy rocks facing N.E., c.2600 m. *C.R. Fraser-Jenkins* 16008-16013, 26 Jan. 1990 and on the path to Gossainkhund, between Deorali (river bridge) and Chandanbari (top of the bridge), c.5-8 km N.E. of and above Dhunche, N. of Trisuli Bazaar and Kathmandu, Rasuwa District, Bagmati Zone, N.C., Nepal, forest, c.2800 m. *C.R. Fraser-Jenkins* Field no. 1497, 13 June 1994, with *S. Gotami* & *B. Pariyar*. It probably also occurs in S.W. China, though my earlier notes from PE are not specific enough concerning this taxon as opposed to "*D. yigongensis*," to be sure and I did not look into it on my last visit there.

This species was first found by me (1989) to be distinct based on its morphology and since then has been confirmed as chemically distinct by Widén *et al.* (1996). In view of its consistently different morphology, corresponding with chemical differences I am now sure that it is really a distinct, new species. It is

named after Miss. Alison M. Paul of the Fern Section, Botany Dept., The Natural History Museum, London, whose careful work has been the back-bone of much of the pteridological research by many workers in Britain, not to mention the invaluable help she has given me over the years.

D. yui Ching = *D. panda* (Clarke) Christ.

Polystichopsis hasseltii (Bl.) Holtt. = *Dryopteris hasseltii* (Bl.) C. Chr.

Thelypteris sikkimensis (Bedd.) Reed [sub "(Bak.)"] = *Dryopteris sikkimensis* (Bedd.) O. Ktze.

T. thibetica (Franch.) Nayar & Kaur = *Dryopteris dickinsii* (Franch. & Sav.) C. Chr.

This is merely a more deeply lobed growth-form of the species (see Fraser-Jenkins (1989)).

Elaphoglossum

Elaphoglossum ballardianum A. Biswas = *E. stigmatolepis* (Fée) T. Moore.

E. cherrapunjii S. Ghosh & A. Biswas (termination contrary to Code (1994: Rec. 60D)) = *E. marginatum* (Wall. ex Fée) T. Moore. Ghosh & Biswas' many "new species," the types of which I have studied at CAL, were largely based on single old specimens, often without explanation as to why they were considered distinct species, and merely represent varying individuals within the well known species, which should not have been described as new taxa. It is unfortunate that they thereby obscured Sledge's (1967) much more accurate account of *Elaphoglossum*.

E. fasciculatum Biswas & S. Ghosh = *E. marginatum* (Wall. ex Fée) T. Moore.

E. himalayicum ["*himalayicum*"] K. Biswas ex A. Biswas & S. Ghosh = *E. marginatum* (Wall. ex Fée) T. Moore.

E. indicum A. Biswas & S. Ghosh = *E. marginatum* (Wall. ex Fée) T. Moore.

E. jowaiense A. Biswas & S. Ghosh = *E. marginatum* (Wall. ex Fée) T. Moore.

E. khasianum A. Biswas & S. Ghosh = *E. stelligerum* (Wall. ex Bak. in Hook. & Bak.) T. Moore in Saloman.

E. krajinae ["*krajina*"] A. Biswas = *E. angulatum* (Bl.) T. Moore.

E. meeboldii A. Biswas & S. Ghosh = *E. marginatum* (Wall. ex Fée) T. Moore.

E. pangteyi ["*pangteyii*"] Khullar, Samant & Chaudhury = *E. marginatum* (Wall. ex Fée) T. Moore.

E. prainii S. Ghosh & A. Biswas = *E. marginatum* (Wall. ex Fée) T. Moore.

E. sikkimense A. Biswas & S. Ghosh = *E. marginatum* (Wall. ex Fée) T. Moore.

E. simonsianum S. Ghosh & A. Biswas = *E. marginatum* (Wall. ex Fée) T. Moore.

E. stelligerum "(Wall. ex Bak.) T. Moore ex Alston & Bonner," given as authorities by Sledge (1967) and thence by Nayar & Kaur (1974) and Punetha & Kholia (1989) = *E. stelligerum* (Wall. ex Bak. in Hook. & Bak.) T. Moore ex Saloman; the latter authority was clearly cited by Alston & Bonner (1956). Having mistakenly separated "*E. khasianum*" from this species, whose distribution in Nepal and the W. Himalaya was omitted, Biswas & Ghosh (1984) erroneously treated *E. stelligerum* as a S. Indian endemic.

E. stelligerum "(Wall. ex Bak.) A. Biswas & S. Ghosh" = *E. stelligerum* (Wall. ex Bak.) T. Moore ex Saloman. Biswas & Ghosh (1984) erroneously stated that Sledge (1967) attempted to make this combination but failed, despite the fact that even if Saloman had not previously done so, Alston & Bonner, whom Sledge cited as authorities, would have done so, as Sledge said, and it was never stated or intended to be a new combination by Sledge.

E. thomsonii S. Ghosh & A. Biswas = *E. marginatum* (Wall. ex Fée) T. Moore.

Equisetum

Equisetum diffusum D. Don var. *paucidentatum* Page (1975) = *E. diffusum* D. Don.

This variety is merely an inconstant condition in the species and has also been sunk by Hauke (1978) in part of his authoritative work on *Equisetum*. *E. diffusum* is closely related to *E. arvense* L., rather than to *E. palustre* L., which Page (*sub* "var. *szechuanense*") thought it related to and mainly compared it with, presumably as a result of not knowing the Himalayan species in the field.

E. mekongense Page = *E. arvense* L. This name, described only from a single old

herbarium-specimen, has been sunk by Hauke and appears to represent part of the slight overlap that occurs between *E. diffusum* D. Don and *E. arvense*. Himalayan *E. arvense* often shows shallow double-ridges, itself, in the mid-part of the sheath, but they are not as prominent as in *E. diffusum*. Although I have no reason to think it is a hybrid, no evidence of any substance was presented by Page to exclude the specimen's being a hybrid between the two, despite his statement strongly suggesting otherwise. Merely because it is a difficult specimen, for all intents and purposes effectively unidentified by him, does not indicate that it stands "as a good separate species" as he said.

E. palustre L. var. *szechuanense* Page = *E. palustre* L. This taxon has again been sunk by Hauke and belongs to *E. palustre sensu stricto*.

E. ramosissimum Desf. var. *altissimum* (A. Br.) Bir = *E. ramosissimum* Desf. This is merely the well-developed stage of the normal species.

E. ramosissimum Desf. subsp. *debile* (Roxb. ex Vauch.) Hauke (1963) = *E. ramosissimum* Desf. The overlap between "*E. debile*" Roxb. ex Vauch. and *E. ramosissimum*, pointed out by Hauke, is so large and on such a wide scale that I feel it is meaningless to maintain *E. debile* even as a subspecies. Some S. European material of *E. ramosissimum* that I have seen also approaches *E. debile* in its stem-ridge micromorphology, so that it is not even geographically constant. It is therefore no longer recognised here.

E. ramosissimum Desf. subsp. *incanum* (Vauch.) Pignatti = *E. ramosissimum* Desf.

E. x wallichianum Page = *E. arvense* L. This so-called "hybrid," thought by Page to be between *E. arvense* and *E. diffusum* D. Don has been sunk by Hauke as well as here, despite Page's "little doubt that --[it] -- is the hybrid between them." Indeed no evidence really suggesting hybridity was presented and it was also described from vegetative material only. In view of the existence of some overlap between the two species, which was not realised or understood by Page, who appears not to have studied the taxa in the field in the area, it was quite unwarranted to

suggest that this poor material is a hybrid and describe it from such a specimen. Page's phytogeographical and phylogenetic conclusions were also entirely untenable in view of his misinterpretations of the taxa. Indeed it is obvious to me that *E. diffusum* must have diverged from *E. arvense* in the Sino-Himalayan region, which he did not even mention, having failed to realise it. In view of the poor evidence for hybridity which he nevertheless acted upon here it seems possible that some of Page's European "hybrids" may also need further confirmation and study to ensure they really are hybrids, particularly if they are no more soundly based than "*E. x wallichianum*" and are also without spores.

Hippochaete debilis "(Roxb. ex Vauch.) Ching in C.Y. Wu" (1983) = *Equisetum ramosissimum* Desf. The separation of *Hippochaete* as a genus seems to me to be a pointless piece of splitting, based on characteristics that are of insufficient significance and ignoring the evident similarities.

H. debilis (Roxb. ex Vauch.) Holub (1972b) = *Equisetum ramosissimum* Desf.

H. ramosissima (Desf.) Börner subsp. *debilis* (Roxb. ex Vauch.) A. & D. Löve = *Equisetum ramosissimum* Desf.

Goniophlebium

Goniophlebium integrum Copel. = *G. subauriculatum* (Bl.) C. Presl. I partly disagree with Rödl-Linder's (1990) circumscription of *Goniophlebium*. Perhaps due to the Leiden school's reliance on cladistics, which interferes with and suppresses the extremely important natural intuitive taxonomic process, she attached equal importance to venation (which seems to be of no significance here) and pinnation and was unable to accept what I recognise here as two natural genera. I prefer to separate the species with articulate, non-adnate (lower) pinnae, i.e. *Goniophlebium*, including *Schellolepis* and *Polypodiastrum*, from those with adnate pinnae, i.e. *Polypodiodes*, including *Metapolypodium*, as did Copeland (1947). Ching's (1933) contention that intermediate species (listed under confusing, cladistically fashionable code-names, outside the system of

nomenclature, by Rödl-Linder (1990: 298)) destroyed the distinction does not hold true since the "intermediate" species he mentioned fall clearly into *Goniophlebium* in the present sense, as typified by Rödl-Linder (which I agree with) and the adnation of some of the upper pinnae is obviously of no importance.

G. tomellum (C. Chr.) Copel. = *G. subauriculatum* (Bl.) C. Presl.

Polypodiastrium argutum (Wall. ex Hook.) Ching = *Goniophlebium argutum* (Wall. ex Hook.) J. Sm.

P. mengtzeense (Christ) Ching = *Goniophlebium mengtzeense* (Christ) Rödl-Linder.

P. molle (Bedd.) Ching = *Goniophlebium subauriculatum* (Bl.) C. Presl.

P. taiwanianum (Hay.) Ching = *Goniophlebium mengtzeense* (Christ) Rödl-Linder.

Schellolepis tomentella (C. Chr.) Pich. Serm. = *Goniophlebium subauriculatum* (Bl.) C. Presl.

Grammitis

Grammitis pilifera Ravi & Joseph (1980 ["1979"]) = ?

Huperzia

Huperzia dixitii Mandal & S. Ghosh = *H. selago* (L.) Bernh. ex Schrank. & Mart. When the original typescript was sent to me to referee for publishing and then to edit, the authors stated that *H. selago* did not occur in Asia and were unaware of the previous records from both N.W. and N.E. India and Nepal in well known publications, even from their own B.S.I. staff themselves, and also by Chowdhury (1937) and Mehra & Bir (1964). This doubtless contributed markedly to their idea that their species must be a new one, even though, apparently unknown to them, *H. selago* had already been reported from Sikkim at similarly at high altitudes. The very small size indeed of their rather poor type-specimen is merely a result of very high altitude and exposure and the size of *H. selago* is more variable in the Himalayan region than they were aware of. Although I made the necessary additions and corrections to their paper for them and told them that the choice was, of course, theirs. I recommended further study of *H. selago* and its variants in Asia and told them that

the taxon concerned appeared to me to be that species and that there was sufficient variation in the slightly undulate leaf-apices in much E. Himalayan *H. selago* and other possibly conspecific names from Tibet to doubt the wisdom of describing a new species from their specimens. In the type of *H. dixitii*, which I have examined at CAL, the leaf-apices are not toothed as they have drawn them, but only very slightly undulate, if that, and even if this entity were to be recognised as a species, rather than as one of the many local variants in *H. selago*, which I told them about, in my opinion it should have been compared with "*H. tibetica*" (Ching) Ching (published twice), which is the same thing, and with other Chinese and Tibetan names before going ahead and publishing. It is probably true that some of the local variants could be significant, but I think *H. dixitii* requires further study and is unlikely to be a species distinct from *H. selago*. It is even less likely to be new. Surprisingly, I have recently found that the Eumtso La, Sikkim, specimens of *W.W. Smith & J.H. Cave* 1275 (x 2) and *J.H. Cave* 188 at CAL (!), which they originally cited as being the same species before I added in several other collections of real "*H. dixitii*" for them, are obviously very different, resembling "*H. dixitii*" only in their rather small size. The leaves are much less acute, stiffer and patently exserted and the specimens are actually *H. herteriana* (Kümm.) T. & U. Sen (the spelling of which was mistakenly altered to "*herterana*" by Johns (1997), against the Code (1994: Rec. 60 C (d) and Art. 60.H)). I have also collected *H. herterianu* in various different sizes, including very small, on mossy rocks in forest below Yumthang, Lachung valley, N.E. Sikkim. *C.R. Fraser-Jenkins* Field no. 1019, 15 Nov. 1995, with *C. Carle, B.J. Seaton, S. Ruger & C. Barrett*. The type of "*H. dixitii*" was also from "Youngthum," which they placed in the Lachen valley, but from higher up above the forest than I went, which was all snow when I went there. Following such a mistake in identification one can only wonder at the validity and competence of the authors' opinions concerning the separability of "*H. dixitii*." A plant similar to *H. dixitii*, which I identify as *H. selago*, was collected in E. Nepal, Selap - Lamo

- Pokhari - Gupha Pokhari, 2800 m. *H. Kanai*, *H. Ohashi*, *K. Iwatsuki*, *H. Ohba*, *Z. Iwatsuki* & *P.R. Shakya* 725178, 10 June 1972 (TI, KATH *etc.*) and is c. 3" tall.
- H. fordii* "(Bak.) Mandal & U. Sen" (1979 ["1978"]), *comb. inval.*, *sin. basionym ref.* = *H. fordii* (Bak.) Dixit (1984).
- H. fordii* "(Bak.) Holub" (1985) = *H. fordii* (Bak.) Dixit (1984).
- H. fordii* "(Bak.) Dixit" (1988) = *H. fordii* (Bak.) Dixit (1984).
- H. hamiltonii* "(Spring *ex* Hook. & Grev.) T. & U. Sen" (1978) = *H. hamiltonii* (Spring) Trevis.
- H. laxa* "(C. Presl) T. & U. Sen" (1978) = *H. laxa* (C. Presl) Trevis.
- H. phlegmaria* "(L.) Panigr." (1993) = *H. phlegmaria* (L.) Rothm. I have found this species as far west as the S. side of Phewa Tal, Pokhara, Kaski District, Gandaki Zone, W.C. Nepal. *C.R. Fraser-Jenkins* Field no. 1048, 1 Jan. 1977, with *Nephrolepis delicatula* (Decne. in Jacq.) Pich. Serm. (no. 1174).
- H. phyllantha* "(Hook. & Arn.) Panigr." [partly *sub* "(Hook & Grev.)"] (1993c) = *H. phyllantha* (Hook. & Arn.) Holub (1985). After scanning through Øllgaard's (1990) account of *Huperzia* in Kramer & Green's book, Panigrahi presumably thought there was further opportunity to create combinations extracted from other people's work, but was not familiar enough with the subject, or even with the well known literature on the genus as he did not notice that the relevant combinations were listed by Øllgaard (1987) in his comprehensive work.
- H. pulcherrima* "(Wall. *ex* Hook. & Grev.) T. & U. Sen" (1978) = *H. pulcherrima* (Wall. *ex* Hook. & Grev.) Pich. Serm. (1970).
- H. subulifolia* "(Wall. *ex* Hook. & Grev.) T. & U. Sen" (1978), *comb. inval.*, *sin. basionym ref.* = *H. subulifolia* (Wall. *ex* Hook. & Grev.) Trevis.
- H. subulifolia* "(Wall. *ex* Hook. & Grev.) Mandal & U. Sen" (1979 ["1978"]) = *H. subulifolia* (Wall. *ex* Hook. & Grev.) Trevis.
- H. subulifolia* "(Wall. *ex* Hook. & Grev.) T. & U. Sen" (1985) = *H. subulifolia* (Wall.

- ex* Hook. & Grev.) Trevis.
- H. subulifolia* "(Wall. *ex* Hook. & Grev.) Trevis [*sub* "(Wall. *ex* Hook. & Grev.) Mandal & U. Sen," according to Mandal & U. Sen] var. *assamica* Mandal & U. Sen (1979 ["1978"]) = ? This name was not even mentioned by Dixit (1987) in his purported account of Indian *Lycopodiaceae*.
- Phlegmariurus cancellatus* (Spring) Ching (1982c) = *Huperzia cancellata* (Spring) Trevis.
- P. cancellatus* (Spring) Ching in C.Y. Wu (1983) = *Huperzia cancellata* (Spring) Trevis.
- P. carinatus* (Desv.) Ching (1982b) = *Huperzia carinata* (Desv.) Trevis.
- P. carinatus* (Desv.) Ching (1982c) = *Huperzia carinata* (Desv.) Trevis.
- P. fordii* (Bak.) Ching (1982b and c) = *Huperzia fordii* (Bak.) Dixit.
- P. hamiltonii* (Spreng. in L.) A. & D. Löve = *Huperzia hamiltonii* (Spring) Trevis.
- P. hamiltonii* (Spreng. in L.) A. & D. Löve var. *petiolatus* (Clarke) Ching = *Huperzia petiolata* (Clarke) Dixit (1981 ["1980"]).
- P. macrostachys* (Hook. *ex* Spring) Nair & S. Ghosh = *Huperzia macrostachys* (Hook. *ex* Spring) Holub.
- P. phlegmaria* (L.) T. & U. Sen (1978) = *Huperzia phlegmaria* (L.) Rothm.
- P. phyllanthus* (Hook. & Arn.) Dixit [*sub* "*phyllanthum*"] = *Huperzia phyllantha* (Hook. & Arn.) Holub.
- P. pulcherrimus* (Wall. *ex* Hook. & Grev.) A. & D. Löve = *Huperzia pulcherrima* (Wall. *ex* Hook. & Grev.) Pich. Serm.
- P. squarrosus* (Forst. *fil.*) A. & D. Löve = *Huperzia squarrosa* (Forst. *fil.*) Trevis. I have found this species as far west as the S. side of Phewa Tal, Pokhara, Kaski District, Gandaki Zone, W.C. Nepal. C.R. Fraser-Jenkins Field no. 1097, 1 Jan. 1997.
- P. vernicosus* (Hook. & Grev.) A. & D. Löve = *Huperzia vernicosa* (Hook. & Grev.) Trevis.

Hymenophyllum

Mecodium blumeanum (Spreng. in L.) Nayar & Kaur = *M. polyanthos* (Sw.) Copel. =
Hymenophyllum polyanthos Sw.

M. minor (Bedd.) Kaur & S. Chandra = *M. polyanthos* (Sw.) Copel. = *Hymenophyllum*
polyanthos Sw.

M. polyanthos (Sw.) Copel. var. *blumeanum* (Spreng. in L.) Nair [sub "(Bedd.)"] = *M.*
polyanthos (Bl.) Copel. = *Hymenophyllum polyanthos* Sw. See Sledge (1968)
concerning the inseparability of the name *H. blumeanum* Spreng. in L.
Beddome cited and definitely included Sprengel's *H. blumeanum* under this name.
so did not create an independent name as Nair thought.

M. polyanthos (Sw.) Copel. var. *microglossum* (Bedd.) Nair = *Hymenophyllum*
polyanthos Sw.

Meringium flaccidum (van den Bosch) Nair, non *Hymenophyllum flaccidum* van den
Bosch = *Hymenophyllum khasianum* Bak in Hook. & Bak.

Hypodematium

Hypodematium crenatum (Forssk.) Kuhn subsp. *hirsutum* (D. Don), *comb. ined.*,
tentatively suggested by me to apply to subsp. *loyalii*, but with a query and the
combination deliberately not made (Fraser-Jenkins (1992)), indicating that it was
not definite. I later (Fraser-Jenkins (1993)) found that the type of *Nephrodium*
hirsutum D. Don actually belongs to subsp. *crenatum* and I described a new
subspecies, *H. crenatum* subsp. *loyalii* Fras.-Jenk. & Khullar in Fras.-Jenk., to
apply to Loyal's tetraploid taxon which is slightly morphologically distinct from
subsp. *crenatum*. I think there are probably only the two taxa present in the
Indian subcontinent, but further investigation would be desirable, particularly in
the far north-east. For those who automatically like to make new species of any
published cytotypes under their own authorship it is pleaded that no new name is
necessary, but only a new combination (as long as no earlier specific name turns
up), in order to preserve the late lamented Professor D.S. Loyal's association with

the fern he discovered, which I have named in his much respected memory. A fine plant of subsp. *loyalii* grows into prominence every monsoon-season on the wall of the Telegraph Office, above Rangasala, in the middle of Kathmandu.

H. crenatum triploid hybrid, of Loyal, Paik & Tiwana (1977) = *Hypodematium crenatum* (Forssk.) Kuhn nothosubsp. x *tiwanae* Fras.-Jenk., *hybr. nov.*, *basionym* (= *H. crenatum* subsp. *crenatum* x *H. crenatum* subsp. *loyalii* Fras.-Jenk.). *Planta hybrida, morphologia intermedia inter parentes sui, segmenta ultima laminae parva sed indumentum manifestum. Sporae abortivae. Cytotypus triploideus. Holotypus*: India: "*Hypodematium crenatum* 3x, n = 123. Kempty Fall, Mussoorie, Gunwant Tiwana no. C., 7 Sept. 1964 [CRFJ 16196]" (BM). *Paratypus*: Ditto. G. Tiwana s.n., 3 Sept. 1964 [CRFJ 16195]" (BM). These specimens were given to me from a remnant pile of unmounted specimens left over from Prof. Loyal's herbarium, which he passed on to Prof. S.P. Khullar and thence to me (on 11 Feb. 1990) to sort and preserve where important. This is a highly cryptic sterile hybrid confirmable from its abortive spores (when fully ripe), see Loyal, Patnaik & Tiwana (1977: t.1c). Plants that seem intermediate between the two subspecies should be checked with a microscope in order to detect abortive spores. It was reported to show 5 trivalents, 47 bivalents and 14 univalents at meiosis, suggesting that the two different genomes present in subsp. *loyalii* (each in duplicate) are only partially compatible (to the extent of 11 chromosome-pairs) and thus that subsp. *loyalii* is a segmental allotetraploid.

H. eriocarpum (Wall. ex Mett.) Ching = *H. crenatum* (Forssk.) Kuhn subsp. *crenatum*.

H. hirsutum (D. Don) Ching (1985 ["1984"]) = *H. crenatum* (Forssk.) Kuhn subsp. *crenatum*.

Hypolepis

Hypolepis beddomei Nair & S. Ghosh (*nom. nov.* for *H. punctata sensu* Bedd. (1892), *pro parte, non* (1883), *nec* (Thunb.) Mett. ex Kuhn) = *H. pallida* (Bl.) Hook. from Taiwan and S.E. Asia only. See Brownsey (1987).

H. coerulescens A. Biswas = ? *H. punctata* (Thunb.) Mett. ex Kuhn or ? *H. polypodioides* (Bl.) Hook. Biswas has not made her types of *Hypolepis* or *Microlepidia* available for scientific study, despite having published these names some ten years previously as being at CAL. They were said by her (pers. comm., May 1997) to be at Kalyani University, but to be "unavailable," when I sought to study them at CAL, or there, recently. I can only assume they are kept out of sight for fear of their being exposed as nothing more than specimens of previously known species, which they almost certainly are. Brownsey (1987) also doubts if her "new" *Hypolepis* are good species.

H. polypodioides is the commonest of the two Himalayan species, as stated by Brownsey, but has been completely overlooked by all Indian botanists. It is abundant throughout Nepal, including around the Kathmandu valley (e.g. at Sankhu; Jamachok; Phulchowki; Chapagaon; Swayambunath; and in waste-places in the city etc.); in Pithoragarh; Chamoli; Himachal Pradesh; Darjeeling; Sikkim; and, though I must check my specimens again, is probably the plant I collected at Patnitop, Jammu Division, Indian-occupied Kashmir (see Fraser-Jenkins (1992)). It has hairs but no capitate glands, unlike in the other Himalayan species, *H. punctata*, which has both; these features are easier to see by examining sterile areas of lamina, free of shed spores etc. Biswas did not emphasise or understand the important diagnostic characteristics when describing her "new species" from frond-shape etc., which is not of importance.

H. gamblei A. Biswas = ? *H. punctata* (Thunb.) Mett. ex Kuhn or ? *H. polypodioides* (Bl.) Hook.

H. glandulifera Brownsey & Chinnock = ? *H. longa* A. Biswas. See Brownsey (1987: 248), also concerning the name *Cheilanthes resistens* Kunze.

H. indica A. Biswas = ? *H. punctata* (Thunb.) Mett. ex Kuhn or ? *H. polypodioides* (Bl.) Hook.

H. sikkimensis A. Biswas = ? *H. punctata* (Thunb.) Mett. ex Kuhn or ? *H. polypodioides*

(Bl.) Hook.

H. viridula A. Biswas = ? *H. punctata* (Thunb.) Mett. ex Kuhn or ? *H. polypodioides*

(Bl.) Hook.

Isoetes

Isoetes bilaspurensis Panigr. = *I. coromandelina* L. fil.

I. coromandelina L. fil. subsp. *brachyglossa* (A. Br.) Panigr. = *I. coromandelina* L. fil.

I. dixitii ["dixitei"] Shende = *I. coromandelina* L. fil.

I. indica Pant & Srivastava, non Koenig = *I. unilocularis* Smith = *I. coromandelina* L.

fil. The name *I. unilocularis*, which appears to be a synonym of *I. coromandelina*, was not mentioned by Pant & Srivastava (1962) or Srivastava, Pant & Shukla (1993) in their two papers purporting to cover "The genus *Isoetes* in India." In describing many "new species," Srivastava *et al.*, as well as other Indian authors, did not attempt to examine or discuss the significance in taxonomic terms of the slight variation in megaspore-surface patterns they noted, but simply made any detectable difference a "new species," even though in some cases there are intermediate types. The presence of intermediates strongly suggests that the variants merely represent intraspecific variation, since they are not hybrids. Several of them even grow together in the same mat. Most appear to represent variation in *I. coromandelina*, though those with reticulate spore-surfaces may perhaps represent a second Indian species, requiring further investigation to see if it is really distinct. As long as it is not a species known from outside the Indian subcontinent, the oldest name for this would probably be *I. panchananii* Pant & Srivastava, if it is not merely a further part of the variation in *I. coromandelina*. Part of Srivastava *et al.*'s reasoning was that since many species exist (or, at least, have been described) in other parts of the world it should not be surprising to find many new species in India! Yet this irrelevant argument bears no relation whatever to the local situation that is actually indicated by what has been found in nature in India.

- I. mahadevensis* Srivastava, Pant & Shukla = ? *I. coromandelina* L. fil.
- I. mirzapurensis* Panigr. & Dixit = *I. indica* Pant & Srivastava = *I. unilocularis* Smith =
I. coromandelina L. fil.
- I. panchanatii* Pant & Srivastava = ? *I. coromandelina* L. fil.
- I. panchganiensis* Srivastava, Pant & Shukla = ? *I. coromandelina* L. fil.
- I. panchganiensis* Srivastava, Pant & Shukla var. *kermangundiensis* Srivastava, Pant &
Shukla = ? *I. coromandelina* L. fil.
- I. pantii* Goswami & Arya = *I. coromandelina* L. fil.
- I. rajasthanensis* Gena & Bhardwaja = ? *I. coromandelina* L. fil. Gena & Bhardwaja's
three "new species" from virtually the same tank in Rajasthan (an area where
Isoetes had not previously been found) stretch the limits of credibility!
- I. reticulata* Gena & Bhardwaja = ? *I. coromandelina* L. fil.
- I. sahyadriensis* Mahabale = *I. coromandelina* L. fil.
- I. sampathkumaranii* ["*sampathkumarani*"] L. Rao = *I. coromandelina* L. fil. Despite
Pant & Srivastava's (1962) placing it in a different section, the megaspores of this
"species" appear not significantly different, indeed hardly different at all, from
those of *I. coromandelina*.
- I. tuberculata* Gena & Bhardwaja = *I. coromandelina* L. fil.

Lepidogrammitis

- Lemmaphyllum rostratum* (Bedd.) Tag. in Hara = *Lepidogrammitis rostrata* (Bedd.)
Ching.
- Lepisorus rostratus* (Bedd.) Nayar & Kaur, *comb. inval.*, alternative name not definitely
accepted by the authors = *Lepidogrammitis rostrata* (Bedd.) Ching.

Lepisorus

- Lepisorus albertii* (Regel) Ching = *L. clathratus* (Clarke) Ching.
- L. amaurolepidus* "(Sledge) Nayar & Kaur" (1974), *comb. inval.*, alternative name not
definitely accepted by the authors = *L. amaurolepidus* (Sledge) Bir & Triikka in
Bir & Vasudeva [*sub "L. amaurolepida"*] (1971). This species is very close to *L.*

contortus (Christ) Ching but is tetraploid, with $n = 74$ (Manton & Sledge (1954)). A cytological report said to have been for *L. contortus* gave $n = 23$ (see Löve, Löve & Pichi Sermolli (1977: 71), however this was by Patnaik & Panigrahi (1963) and in view of the remarkable taxonomic inaccuracy of the second author, particularly in complex genera such as this, the record cannot be accepted as correct until the voucher-specimen has been checked. The actual number is also anomalous compared to other reports for the genus so perhaps also cannot be relied upon. So far I have not seen any tetraploid voucher-specimens of *Lepisorus* from the Himalaya apart from *L. morrisonensis* (Hay.) H. Itô and its synonym, *L. reichsteinii* Khullar, but I have also not seen any voucher-specimens of genuine *L. contortus* at PAN etc. giving a cytological result. If *L. contortus* does turn out to be diploid, not tetraploid as in *L. amaurolepidus*, it would confirm *L. amaurolepidus* as a distinct species as it also tends to have larger, less scaly and more crowded fronds than in *L. contortus*. Bir's several records of Himalayan *L. amaurolepidus*, so labelled by him at PAN (e.g. Lebung Forest. S.S. Bir 904, 25 Aug. 1957 (PAN 3576)), are *L. contortus* and differ rather little from some of his S. Indian specimens, but his later material at PUN is mostly *L. nudus*.

L. amaurolepidus (Sledge) Bir & Trikha var. *longifolius* Bir & Trikha, non *L. longifolius* (Bl.) Holtt. [= *Phymatosorus longifolius* (Bl.) Bosman & Fras.-Jenk.], nec Ching ex Ching & Wang [= *L. longus* Ching] = *L. nudus* (Hook.) Ching. I have reidentified the type of var. *longifolius*, "Nainital. C.K. Trikha 1911" at PUN (!) as typical *L. nudus*; it has the normal concolorous grey-brown scales of that species. Unfortunately Bir in Bir & Trikha (1974) gave almost no useful information whatsoever as to the identity of this taxon as the crucial rhizome-scales were not even mentioned except in a key to the group containing "*L. subconfluens*," *sensu* Bir and the two varieties of "*L. amaurolepidus*," *sensu* Bir (where they were erroneously said to be bicolorous, though the presence or absence of a solid central band was not mentioned), nor the closeness of the point

of origin of the fronds. Of the relevant group only *L. nudus*, *L. contortus* and *L. thunbergianus* occur in the area where this taxon was described from and the name could have applied to any of them from the inadequate description given, though the large fronds comply with *L. nudus* better than other species. The laminar scales (present of course on immature fronds of all *Lepisorus*) seem to be drawn as possibly bicolorous, though this was not stated and they are actually merely concolorous *L. nudus* scales. Even the locality given covered an enormous area! Bir's over-emphasis of the diagnostically useless characteristic of the paraphyses, sometimes at the expense of information about the rhizome-scales has led to many of his *Lepisorus* taxa being badly misidentified by him. I assume his report of $n = 35$ for this variety must have applied to the type and only specimen cited. This count was ignored by Khullar (1991), but it is important as Japanese *L. thunbergianus*, to which this varietal name might have been expected to apply, is based on $n = 25$ and 50 (diploid and tetraploid). However *L. nudus* has been found to have $n = 35$ by several reliable workers.

L. asterolepis (Bak.) Ching, *comb. inval., sin. basionym ref.* = *L. macrosphaerus* (Bak.) Ching.

L. birii Khullar in Khullar, Pangtey, Samant, Rawal & Singh (1991), *nom. nud.* = ? *L. nudus* (Hook.) Ching. Ching, quoted by Khullar (1994: 114)), thought that no *L. thunbergianus* occurs in the Indian subcontinent and that the many Indian records of it were in error for a distinct and unnamed species - which Khullar attempted to give a name to as both *L. birii* and *L. tenuipes* Ching & Khullar. But the populations of *L. thunbergianus* I looked at in Japan (around Kyoto) and have seen in herbaria there look not significantly different from the Himalayan plants and have similar long, narrow, toothed rhizome-scales with a solid dark-red central band and very narrow pale edges. I accept the Indian plants to be *L. thunbergianus*, once all the mistaken specimens of *L. nudus*, which is so often misidentified as it by Indian workers, have been separated, and excluding also *L.*

contortus. However I have not seen Khullar's "type" of *L. birii*, cited as "Do Gaon [below and S. of Nainital], 1600m. S.P. Khullar 2227, Oct. 1979," in herb. Khullar (now mostly irretrievable and lying unlabelled and unnumbered, or mostly lost, in a pile in his room in the Botany Dept., Panjab University), though I have myself collected only *L. nudus* from around Do Gaon. It has turned out, though, that instead of being *L. thunbergianus* as expected, the type of *L. tenuipes* is actually *L. nudus*, due to misidentification of the species of *Lepisorus*; and the types of most of his other names of *Lepisorus* are also not the species they were supposed to be. "*L. birii*" is thus quite likely to have been *L. nudus* and not *L. thunbergianus*. The number given must have been invented at random as Khullar has no proper numbering system or index to his collections except the earlier ones incorporated in PAN, in compliance with the requirement for his Ph. D.

L. chingii Khullar, *nom. nud.* = *L. thunbergianus* (Kaulf.) Ching. The "type" was cited by Khullar (1988) as PAN 5274, but as that is *Athyrium setiferum* C. Chr. from Manali (also written in the PAN register), it must have been in error for PAN 4572 (from Narkanda, Simla, S.S. Bir, 29 Aug. 1961, *sub L. ussuriensis* (Regel & Maack) Ching, redetermined on the sheet as *L. chingii* by S.P. Khullar). This specimen has been reidentified by me as *L. thunbergianus*. The name *L. chingii* was intended to be a replacement for *L. ussuriensis sensu auct. Ind.*, following comments made to Khullar by Ching that *L. ussuriensis* does not occur in the Himalaya and is replaced by an unnamed species there. I agree that Ching was correct in saying there is no *L. ussuriensis* in the Himalaya and Khullar (1994: 116) misunderstood and misquoted me as thinking it did occur there as I had already independently come to the same conclusion as Ching. I also never collected in Manchuria as he stated and have never collected *L. ussuriensis*. However I found that the Himalayan records of "*L. ussuriensis*" actually refer mainly to *L. thunbergianus*, among other species, and not to some unnamed species as Ching thought.

- L. excavatus* sensu Ching, non (Bory ex Willd.) Ching = *L. sesquipedalis* (J. Sm.) Fras.-Jenk. (1992: 91-92). True *L. excavatus* from La Réunion does not occur in Asia and is different from Asian plants.
- L. excavatus* (Bory ex Willd.) Ching var. *himalayensis* Bir & Trikha = *L. sesquipedalis* (J. Sm.) Fras.-Jenk.
- L. excavatus* (Bory ex Willd.) Ching var. *mortonianus* Bir & Trikha = *L. sesquipedalis* (J. Sm.) Fras.-Jenk.
- L. excavatus* (Bory ex Willd.) Ching var. *scolopendrius* Bir & Trikha = *L. sesquipedalis* (J. Sm.) Fras.-Jenk.
- L. gyirongensis* Ching & S.K. Wu in C.Y. Wu = *L. nudus* (Hook.) Ching.
- L. himalayensis* "(Bir & Trikha) Khullar & Pangtey in Khullar, Pangtey, Samant, Rawal & Singh" (1991) = *L. sesquipedalis* (J. Sm.) Fras.-Jenk. See my comment *sub L. mortonianus*, below.
- L. himalayensis* (Bir & Trikha) Khullar (1988) = *L. sesquipedalis* (J. Sm.) Fras.-Jenk.
- L. intermedius* Ching & Khullar in Khullar (1984) = *L. nudus* (Hook.) Ching. According to Khullar (1994), this name was apparently intended to replace reports of *L. amaurolepidus* from the west Himalaya and Ching had identified Khullar's specimen as a new species. It might therefore be expected to be *L. contortus* (Christ) Ching. However Khullar in Khullar, Pangtey, Samant, Rawal and Singh (1991), where it is a *nomen nudum*, put *L. amaurolepidus* var. *longifolius* Bir & Trikha (which is actually *L. nudus*) in its synonymy and made it clear that it was intended to replace that name rather than, as he later said in 1994, *L. amaurolepidus*. In 1994 he made no mention of var. *longifolius* under *L. intermedius* at all, but (pg. 116) stated it had been merged [by him and incorrectly] into *L. amaurolepidus*, even though he did not list *L. amaurolepidus* from the west Himalaya. I think that *L. amaurolepidus* is probably not present in the Himalaya at all.

All of this careless, contradictory writing is difficult to interpret, but I

suggest that the earlier account was probably correct and at that time Khullar's concept of the name was the same as either *L. thunbergianus* or *L. contortus*, probably the latter, hence his description of long, bicolorous, toothed scales with opaque (central) luminae. However by the time of its validation in 1994, which is the concept, type and account that must be followed, it had been partially changed without any explanation, but probably due to confusion and misidentification of a specimen of his own that he preferred to make the type and erroneously thought could be the same thing. But, surprisingly, the type of *L. intermedius* (labelled "*L. intermedius* Ching & Khullar. 118. Sat Tal" [det.] R.C. Ching, [1983]), which I reidentified in PE in May 1991 is *L. nudus*! Although the formal description (Khullar (1994: 93)), like the 1988 account, says "luminae opaque" [*i.e.* in the central cells] and "scales bicolorous with a broad band of light coloured marginal cells," in complete contradiction he also commented in the protologue (pg. 95) that the luminae are *not* opaque [*i.e.* the scales are not bicolorous] - in contrast to the bicolorous scales of *L. amaurolepidus*. In fact, like all *L. nudus* the type at PE does not have bicolorous scales and the cell-luminae are not opaque, thus agreeing with the latter comment rather than the formal description.

These damaging confusions by Khullar (1994 and in other publications of his) may be due to the lack of proper scientific documentation of his collections and notes and the lack of numbered voucher-specimens for virtually all his later records, which are thus unverifiable and quite often incomprehensible. Fortunately, under the type-method, the present name can be identified unequivocally according to the cited holotype which I have been lucky enough to find carefully preserved by Ching, though unincorporated and unmounted at PE. This specimen was not identified by either Khullar or Ching as being anything to do with *L. amaurolepidus* or var. *longifolius* and its connection with the previous published explanations by Khullar in 1988 is unexplained apart from that it later (1994) became cited as the type and corresponds with the additional note in the

protologue.

L. jakonensis (Blanf.) Ching = *L. pseudonudus* Ching. I would like to confirm this, preferably in the field, but the type of *L. pseudonudus* appears to be a collection of the same species as the Indo-Himalayan one from a dryish or exposed place, with rather thicker fronds than usual and less attenuated apices than when it is growing in luxuriant and sheltered forest. It is normally an epiphyte, unlike the similar, but smaller and normally lithophytic species, *L. clathratus* (Clarke) Ching, which also has less attenuated and more obtuse frond-apices and a thinner lamina. The rhizome-scales are identical in both, when mature, and are concolorous with black cell-walls, large, clear cells (unlike in *L. loriformis* (Wall. ex Mett.) Ching) and long, jagged-looking teeth. *L. pseudonudus*, both the type and the Himalayan plants, is not a hybrid as reported by Panigrahi & Patnaik (1961) and Panigrahi (1963) and as commended as a scientific advancement of his, by Panigrahi (1993*d*). This must have been due to a misidentification, as might be expected, and/or also due to cytological misinterpretation. The specimen they referred to, which I have not seen, requires further study to see if it is really a hybrid and as to its proper identity.

L. kashyapii (Mehra, *nom. nud.*) Mehra in Bir, *comb. inval.* = ***Lepisorus mehrae*** Fras.-Jenk., *sp. nov.*, *basionym.* *Species valde similis ad L. sesquipedalem sed apices paelearum laminae longissimi et contorti in plano uno disposito.* *Holotypus:* India, Uttarkhand (Uttar Pradesh), Nainital District: forested stream-gorge with cliffs above (S. of) road-bridge, upper "Pangtey's Gorge," c.1½ km S.E. of Pangote, c.3 km N.W. of Kilbury ("Kilabari"), N. of Nainital, behind main ridge of China ("Cheena") Peak, c.2000 m. *C.R. Fraser-Jenkins* Field no. 368. 21 Sept. 1996 (BM). *Isotypus:* Ditto (PAN).

Polypodium kashyapii was a *nomen nudum* when Mehra (1939) published it with a long, but English, not Latin description. It was not subsequently validated by Stewart (1942), Alston & Bonner (1956), Bir (1962).

nor by any later worker, nor were their transfers to other genera valid. But as I believe it to be a good species (although I formerly thought it to be mere variation in *L. sesquipedalis*) it needs a valid name, now supplied. I prefer to name and describe it anew in honour of its finder and the first person to recognise and describe it, the late Professor P.N. Mehra, of Panjab University, Chandigarh whose work and approach I have a high regard for. Were it to be given the same epithet as he gave it, it would be difficult to know how to cite it while still mentioning his name in connection with it, as he originally named it in the genus *Polypodium*, so his name could not be written as "Mehra *ex* ..." I have also chosen a new type-specimen as unfortunately I did not make a note about his original specimen, though I probably saw it at LAH when I looked briefly through Mehra's old Mussoorie collections there a few years ago. Many of the characteristics described by Mehra are rather variable from plant to plant and habitat to habitat, including the length of laminar scale-apices, whether or not the fronds dry a brown colour when (not rapidly enough) dried, the closeness of the rhizome to the substrate and the prominence or otherwise of the veins. However there is a frequent tendency for the characteristics he mentioned to occur in combination which makes this taxon generally appear distinct from the very closely related *L. sesquipedalis* and fortunately there seems to be one very distinct and constant feature - the scales on the lamina (especially away from the midrib) have markedly long, contorted, toothed apices twisted in one plane. Those further away from the midrib have almost no widened basal part and are highly diagnostic. I believe this, along with the tendency to be different in the other respects mentioned, show that it must really be a distinct species, though not as easily characterisable and identifiable as Mehra originally thought.

L. kashyapii (Mehra, *nom. nud.*) Mehra in Bir, *comb. inval.* var. *major* Bir & Satija = *L. mehrae* Fras.-Jenk.

L. kashyapii (Mehra, *nom. nud.*) Mehra in Bir, *comb. inval.* var. *minor* Bir & Satija = *L.*

mehrae Fras.-Jenk.

L. khullarii P. Pande & Shing in Pande & Pande (1994), *nom. nud.* = *L. contortus* (Christ) Ching. The original "type"-specimen was far too arbitrarily and readily determined by K.H. Shing as a "new species" close to *L. angustus* Ching, which latter is merely a narrow form of *L. thunbergianus* (Kaulf.) Ching. But the "type" of *L. khullarii* has the typical, very pale and (compared with *L. thunbergianus*) rather wide scales of *L. contortus*, some with a characteristically narrow, dark-reddish band of opaque cells in the lower centre of the scale, and the fronds are typical of *L. contortus*. It was collected from Almora, Malghar (Nachani), 915 m. P.C. Pande 17919, 19 Sept. 1985, redetermined by me at Almora University in 1996.

L. krameri ["*kramerii*"] P. & H. Pande in Pande, Pande & Bhandari (1995), *nom. nud.* = *L. sesquipedalis* (J. Sm.) Fras.-Jenk. I have seen the original "type"-specimen, from Munsiyari: Khatiya top, 3000 m. P.C. Pande 17923 (Field no. 107), 10 Sept. 1985, redetermined by me at Almora University in 1996. It is a poor but normal *L. sesquipedalis* with \pm pale-brown and slightly paler-edged rhizome-scales, a thick rhizome and the leaves drying \pm green. It has been named purely because the few sori are abnormally developed and elongated, as sometimes happens in disturbed individuals in this species. Pande's policy of giving names to taxonomically insignificant abnormalities, which he makes publications about, is the equivalent of the Victorian naming of "sports" (monstrosities), though at least they they were later referable to valuable and desirable horticultural cultivars. Pande's monstrosities are of little interest or value and could potentially interfere with the naming of an important overlooked, semi-cryptic cytotype resulting from normal taxonomic study, so their naming should be discouraged - by the editor of the *Indian Fern Journal etc.*, if necessary. They belong to previously described species, subspecies, varieties, or even forms and describing them as new is not in the practice of modern taxonomy, or intended by the system of the Code *etc.* A

further practice which should be discouraged is the rash of *nomina nuda* Pande and Khullar have given rise to, a practice which is outside of the Code (unless it is really important to do so under Rec. 50 B) and has been generally avoided, as such taxa remain vague and lead to confusion of typification *etc.* It seems to have become the practice among some Indian pteridologists to give a formal sounding name to any unusual specimen and even publish it (as a *nomen nudum*), usually to abandon it later when it becomes clear that it was just a mistake. This is fast becoming a kind of ghost new species syndrome and should be abandoned. If the taxon is really worth naming, after proper and conclusive, far-reaching study, it should then be named, otherwise not at all. Creating *nomina nuda* in this sort of way seems to me to be a sign of incompetent taxonomy and has even been done long before the actual paper validating them has been prepared, indicating that there may have been no decided and real intention to publish properly before slapping a new name onto the specimen.

L. leiopteris (Kunze) Bir & Trikha = *L. sesquipedalis* (J. Sm.) Fras.-Jenk.

L. loriformis (Wall. ex Mett.) Ching var. *stenistis* [sub "*steniste*"] (Clarke) Ching = *L. loriformis* (Wall. ex Mett.) Ching.

L. macrosphaerus (Bak.) Ching var. *asterolepis* (Bak.) Dixit = *L. macrosphaerus* (Bak.) Ching.

L. mediocris Ching & Khullar, *nom. nud.* = *L. morrisonensis* (Hay.) H. Itô. (*synonym: L. bicolor* (Takeda) Ching). The original "type"-specimen of *L. mediocris* ("*L. mediocris* Ching & Verma n. sp. Type. N.W. Himalaya leg. S.C. Verma 5304" [det.] R.C. Ching, 5 Sept. 1983) was reidentified by me in PE in May 1991.

L. mortonianus (Bir & Trikha) Khullar (1988) = *L. sesquipedalis* (J. Sm.) Fras.-Jenk. I find the published aneuploid chromosome-difference unconvincing, let alone whether the morphology of the specimen is specifically distinct.

L. mortonianus "(Bir & Trikha) Khullar in Khullar, Pangtey, Samant, Rawal & Singh" (1991) = *L. sesquipedalis* (J. Sm.) Fras.-Jenk.

L. mussooriensis Khullar (1988), *nom. nud.* = *L. thunbergianus* (Kaulf.) Ching. The original "type"-specimen ("*L. mussooriensis* Khullar, n. sp. Khullar no. 8, near *L. thunbergianus* but differs by rhizomatic scales rufo-brown, and narrower with attenuate apical part, very near *L. contortus*" [det.] R.C. Ching, 27 May 1981) was reidentified by me in PE in May 1991. The name was intended to replace *L. contortus* as suggested by Ching, who mistakenly did not think *L. contortus* occurred in the Indo-Himalaya. Khullar (1994), following my telling him something of the scales of a kleptotype of *L. contortus* in PE, said the rhizome-scales of the type of *L. contortus* "are not very clear," which is erroneous as I have seen part of the syntype-material and the scales are very obviously mostly clear, or very pale, some with a narrow, solid central band, as in the Himalayan populations of this common and widespread species. However the original "type"-specimen of *L. mussooriensis* has very narrow, bicolorous scales and belongs to *L. thunbergianus*, suggesting some confusion or a lack of understanding of the species of this genus.

L. nepalensis Iwats. in Ohashi = *L. clathratus* (Clarke) Ching.

L. parvus Khullar (1988 and 1991) and in Khullar, Pangtey, Samant, Rawal & Singh (1991), *nom. nud.* = *L. nudus* (Hook.) Ching. The original "type"-specimen was reidentified by me in PE in May 1991. This was thought to refer to a small plant of *L. thunbergianus* (*sub L. tenuipes* Ching & Khullar) according to Khullar (1994) but the "type" is merely a small *L. nudus*. It was first identified and named for Khullar by Ching, as can be seen from his determination on Khullar's specimen at PE. Khullar in Khullar, Pangtey, Samant, Rawal & Singh (1991) cited a further specimen, as "Laria Kanta, Nainital, 2400 m. S.P. Khullar 7092, Sept. 1979." I have reidentified this as best possible in PAN and I am pretty sure it is again *L. nudus*; it is not *L. thunbergianus*. The specimen is a single small frond with no rhizome or essential rhizome-scales, but I was able to find a single, small, ovate, entire, concolorous brown scale on the lamina near the midrib. It is actually

labelled, "*L. parvus* Khullar, Chakrata, Deoban, 1800 m. *S.P. Khullar H.K.* 8. Sept. 1980 (PAN (Acc. no. 7092))" and is so registered in the PAN herbarium-index, with the collector given as *Harbijan Kaur*, Khullar's former student. A number of collections cited by Khullar in a similar way may indicate that there was some confusion over who was the actual collector, which I have not looked further into. This is presumably the correct locality and the specimen must have been published with the wrong locality due to muddling of specimens, Khullar not having any such numbering system or even labels or localities written on each flimsy folder for his much confused surviving specimens. The original specimen in PE is determined and labelled: "*Lepisorus parvus* Khullar sp. nov. [named by Ching], differs from all other known species of the genus by small size and ovate, acute concolored scales. N.W. India, Mussoorie, alt. 2000 m. *S.P. Khullar* 12 [det.] *R.C. Ching*, 27 May 1981," in other words not from either of the localities given for the PAN specimen. This also gives some insight as to how Ching would just name almost any collection he received as new, especially in his later years, since the scales on this specimen (and as he described them) are typical for *L. nudus* and this almost meaningless determination was thus founded only on the small size - *i.e.* it was just a small specimen! It is unfortunate that on receipt of the many pointless determinations Khullar, like most of his compatriots, had insufficient knowledge to reject them as he should have done, thus giving rise to his many erroneous names in *Lepisorus*, which he has not properly reappraised and sunk even now. But they have now to be dealt with for the sake of realistic botanical study in the west Himalaya, which has only been impeded by such confusions.

L. pseudoclathratus ["pseudo-clathratus"] Ching & S.K. Wu = *L. clathratus* (Clarke)

Ching. At one stage I thought this taxon was perhaps *L. pseudonudus* as the fronds seemed rather narrow at their apices, but it is probably only *L. clathratus*. My earlier opinion was unfortunately published without further checking by

Khullar (1994: 118), who did not know of my change of opinion.

L. pseudolinearis ["*pseudo-linearis*"] Ching & Khullar in Khullar (1988 and 1994), *nom. nud.* = *L. nudus* (Hook.) Ching. The original "type"-specimen ("*L. pseudolinearis* Ching & Khullar. SPK 122 (Dhobi Khud. 7000)") [det.] R.C. Ching), along with two other specimens (nos. 110 and no. 1), was reidentified by me in PE. This name was intended to refer to what is actually *L. thunbergianus* (sub *L. tenuipes* Ching & Khullar) according to Khullar (1994), but the "type" is *L. nudus*, as are the other two specimens.

L. reichsteinii Khullar (1988 and 1994), *nom. nud.* = ? *L. morrisonensis* (Hay.) H. Itô. I have not seen the original "type"-specimen of this name, but Khullar (1994: 119) has sunk it into *L. morrisonensis*, which may be so. I hardly think Reichstein would have been impressed by this inadequately researched naming of a "new" taxon which was merely not properly identified.

L. scolopendrius (Ching) Mehra & Bir (1965) [sub "(D. Don) Mehra & Bir"] = *L. sesquipedalis* (J. Sm.) Fras.-Jenk. Don's name, *Polypodium scolopendrium*, was a later homonym of *Polypodium scolopendria* Burm. fil. [= *Phymatosorus scolopendria* (Burm. fil.) Pich. Serm.]. The next author to use the epithet was Ching who therefore provided the basionym for Mehra & Bir's combination, based on Don's description but as a new species, long predated by Smith's name.

L. scolopendrius (Ching) "Tag. in Hara" (1966) [sub "*scolopendrium* (D. Don) Tag."] = *L. sesquipedalis* (J. Sm.) Fras.-Jenk.

L. scolopendrius (Ching) Mehra & Bir [sub "(D. Don) Mehra & Bir"] var. *himalayensis* (Bir & Trikha) Pangtey & Punetha (1987) [sub "*scolopendria*"] = *L. sesquipedalis* (J. Sm.) Fras.-Jenk.

L. scolopendrius (Ching) Mehra & Bir [sub "(D. Don) Mehra & Bir"] var. *mortonianus* (Bir & Trikha) Pangtey & Punetha (1987) [sub "*scolopendria*"] = *L. sesquipedalis* (J. Sm.) Fras.-Jenk.

L. stewartii Ching = *L. thunbergianus* (Kaulf.) Ching. I have examined the type at

RAW and found it to be typical of this species, with narrow, bicolorous scales.

L. tenuicaudatus ["*tenuicauda*"] Ching = *L. loriformis* (Wall. ex Mett.) Ching.

L. tenuipes Ching & Khullar in Khullar (1985 ["1984"]) = *L. nudus* (Hook.) Ching.

Although Khullar was intending to follow Ching's idea to give a new name to west-Himalayan *L. thunbergianus*, which Ching erroneously told him was not a species that occurred in the Himalaya, Khullar's description and drawing are of *L. nudus* and both the type at PAN and the original material he sent to PE are *L. nudus*, reidentified by me. It appears that *L. thunbergianus* was not properly known to Khullar.

L. thunbergianus (Kaulf.) Ching var. *angustus* (Ching) Kurata = *L. thunbergianus* (Kaulf.) Ching. This taxon is identical to *L. thunbergianus* and is treated here as synonymous. It was first described as a species, *L. angustus* (type: Szechuan. Opien. T.F. Lu 170 [not 107 as published], 21 Sept. 1929 (PE!); *synonyms*: *Polypodium lineare* Thunb. (*non* Burm. fil., *nec* Hout.) var. *thunbergianum* (Kaulf.) Takeda forma *caudatoattenuatum* Takeda; *Polypodium caudatoattenuatum* (Takeda) C. Chr.), and has typical *L. thunbergianus*-type, narrow, bicolorous and toothed scales and long, narrow fronds, though there is a full range of intermediates between narrower (longer) and wider (shorter) fronds, both in Japan and China and in India. As can be seen from Löve, Löve and Pichi Sermolli (1977), *L. thunbergianus* in Japan contains both diploids and tetraploids, but I understand from Nakaike (pers. comm. 1994) that the cytotypes do not seem to him to correspond with any recognisable and discrete morphology. Further study of this situation might reveal some small differences, however, and if so it would be desirable to recombine the earlier name at specific rank (*L. angustus*) as a subspecies, provided its cytology was known by study of new material from the type-locality.

L. tibeticus Ching & S.K. Wu in C.Y. Wu = *L. contortus* (Christ) Ching.

L. variabilis Ching & S.K. Wu in C.Y. Wu, *nom. inval.*, no type cited, *non* *Platygyria*

variabilis Ching & S.K. Wu = *L. clathratus* (Clarke) Ching.

Platygyria variabilis Ching & S.K. Wu ["*sub comb. nov.*," error for *sp. nov.* (with latin diagnosis and type), basionym not given], *non Lepisorus variabilis* Ching & S.K. Wu in C.Y. Wu [= *Lepisorus clathratus* (Clarke) Ching] = *Lepisorus clathratus* (Clarke) Ching. See Fraser-Jenkins (1992). *Platygyria's* key-feature of a complete annulus cannot be of any generic or even specific significance at all, but is merely a surprisingly primitive, more-or-less irregular microscopic feature of certain polypodiaceous species. I was surprised when Ching & Wu in Ching, Ling & Wu (1983) cited some of my collections that are quite definitely *L. clathratus* as belonging to their "new genus" as they are not even specifically distinct, but presumably would have had to have been separated specifically by them once they recognised their "genus" as one cannot have a specimen belonging to two different genera at once! The rest of *Platygyria* (see Ching (1980)) appears to belong to *Phymatopteris* because the type-species, *P. waltonii* (Ching) Ching & S.K. Wu, is a *Phymatopteris*, *P. waltonii* (Ching) Fras.-Jenk. (see under that genus).

Plæopeltis amaurolepida Sledge = *Lepisorus amaurolepidus* (Sledge) Bir & Trikha in Bir & Vasudeva.

P. bicolor (Takeda) Sledge = *Lepisorus morrisonensis* (Hay.) H. Itô.

P. caudatoattenuata (Takeda) Panigr. & Patnaik = *Lepisorus thunbergianus* (Kaulf.) Ching.

P. contorta (Christ) Alston & Bonner = *Lepisorus contortus* (Christ) Ching.

P. excavata (Bory ex Willd.) Sledge ["(Bory ex Willd.) T. Moore," *auct., comb. inval.*], *non sensu* Sledge (1960) [= *Lepisorus sesquipetalis* (J. Sm.) Fras.-Jenk.] = *Lepisorus excavatus* (Bory ex Willd.) Ching. Mascarenes, Madagascar and Africa only, not present in Asia.

P. excavata (Bory ex Willd.) Sledge var. *himalayensis* (Bir & Trikha) Benl = *Lepisorus sesquipetalis* (J. Sm.) Fras.-Jenk.

P. excavata (Bory ex Willd.) Sledge var. *mortoniana* (Bir & Trikha) Benl [*sub*

- "mortonianus"] = *Lepisorus sesquipedalis* (J. Sm.) Fras.-Jenk.
- P. himalayensis* (Bir & Trikha) A. & D. Löve = *Lepisorus sesquipedalis* (J. Sm.) Fras.-Jenk.
- P. jakonensis* (Blanf.) Singh & Panigr., *comb. inval.* = *Lepisorus pseudonudus* Ching. Singh & Panigrahi (1990) failed to indicate which synonym is the basionym for any of their combinations as absolutely required by the Code (1994: Art. 33.2); this is important when there is more than one synonym listed, as here, thus it appears that their combination must be invalid.
- P. kashyapii* (Mehra, *nom. nud.*) Alston & Bonner, *comb. inval.* = *Lepisorus mehrae* Fras.-Jenk.
- P. kuchenensis* (Y.C. Wu) A. & D. Löve (1977) = *Lepisorus kuchenensis* (Y.C. Wu) Ching.
- P. kuchenensis* "(Y.C. Wu) Panigr. & Singh in Singh & Panigr." (1990), *comb. inval.*, basionym not clearly indicated = *Lepisorus kuchenensis* (Wu) Ching. This species has been mistakenly reported by Bir in Satija & Bir (1985) *etc.* in error for *L. sesquipedalis* or *L. mehrae*.
- P. leiopteris* (Kunze) Singh & Panigr., *comb. inval.*, basionym not clearly indicated = *Lepisorus sesquipedalis* (J. Sm.) Fras.-Jenk.
- P. loriformis* "(Wall. *ex* Mett.) Alston & Bonner" (given by Nayar & Kaur (1974) in error; Alston & Bonner clearly cited Moore as the combining author) = *Lepisorus loriformis* (Wall. *ex* Mett.) Ching.
- P. loriformis* (Wall. *ex* Mett. (1857)) T. Moore (1862) var. *stenistis* [*sub* "*steniste*"] (Clarke) Panigr. & Patnaik = *Lepisorus loriformis* (Wall. *ex* Mett.) Ching.
- P. macrosphaera* (Bak.) Panigr. & Patnaik = *Lepisorus macrosphaerus* (Bak.) Ching. Panigrahi and others have placed this species in *Pleopeltis* in its true sense.
- P. macrosphaera* (Bak.) Panigr. & Patnaik var. *asterolepis* (Bak.) Panigr. & Patnaik = *Lepisorus macrosphaerus* (Bak.) Ching.
- P. mortoniana* (Bir & Trikha) A. & D. Löve [*sub* "*mortonianus*"] = *Lepisorus*

- sesquipedalis* (J. Sm.) Fras.-Jenk.
- P. oligolepida* (Bak.) A. & D. Löve (1977) = *Lepisorus oligolepidus* (Bak.) Ching.
Probably not present in India *etc.*; reported in error by Bir & Trikha (1974).
- P. oligolepida* "(Bak.) Panigr. & Singh in Singh & Panigr." (1990). *comb. inval.*
basionym not clearly indicated = *Lepisorus oligolepidus* (Bak.) Ching.
- P. oosphuera* (C. Chr.) Panigr. & Patnaik = *Lepisorus oosphuerus* (C. Chr.) Ching. The
presence of this species in India (Fischer (1938), from Tripura and Mizoram)
requires confirmation.
- P. pseudonuda* (Ching) Panigr. & Patnaik, *non sensu* Panigr. & Patnaik (1965) [=
Lepisorus sublinearis (Bak. ex Takeda) Ching, from the illustration] = *Lepisorus*
pseudonudus Ching.
- P. scolopendria* (Ching) Alston & Bonner = *Lepisorus sesquipedalis* (J. Sm.) Fras.-
Jenk.
- P. sordida* (C. Chr.) Panigr. & Patnaik = *Lepisorus sordidus* (C. Chr.) Ching. Its
presence in India (Panigrahi & Patnaik (1965), from Arunachal Pradesh) is
doubtful and requires confirmation.
- P. subconfluens* (Ching) Panigr. & Patnaik (1965) = *Lepisorus subconfluens* Ching. Its
presence in India (Panigrahi & Patnaik (1965), from Arunachal Pradesh and
Meghalaya) is doubtful and requires confirmation.
- P. subconfluens* "(Ching) Pich. Serm." (1973) = *Lepisorus subconfluens* Ching.
- P. sublinearis* (Bak. ex Takeda) Tag. & Iwats. = *Lepisorus sublinearis* (Bak. ex
Takeda) Ching. Discovered (unidentified) by Prof. Y.P.S. Pangtey at Bajoon,
Nainital, det. by me (also C.R. Fraser-Jenkins Field no. 526, 3 Dec. 1994).
- P. suboligolepida* (Ching) Tag. & Iwats. (1975) = *Lepisorus suboligolepidus* Ching = ?
Lepisorus oligolepidus (Bak.) Ching. *L. suboligolepidus* is very close to and
may be conspecific with *L. oligolepidus*. Reports from India are doubtful and
require confirmation. West Himalayan reports (Bir & Trikha (1974) *etc.*) are
clearly wrong and the specimen they reported (from 10,500ft [not "1050 m."].

Sonamarg, Indian-occupied Kashmir. *R.R. Stewart* 6598, 9 Aug. 1921 (US)) has been reidentified by me as *L. morrisonensis* (Hay.) H. Itô.

P. suboligolepida "(Ching) Panigr. & Singh in Singh & Panigr." (1990) = ? *Lepisorus oligolepidus* (Bak.) Ching.

P. variabilis (Ching & S.K. Wu) Singh & Panigr., *comb. inval.*, basionym not clearly cited = *Lepisorus clathratus* (Clarke) Ching. Singh & Panigrahi (1990) failed to state which of the two independent names they cited, *Lepisorus variabilis* Ching & S.K. Wu, or *Platygyria variabilis* Ching & S.K. Wu, both published in 1983, is the basionym for their combination as required by the Code (1994: Art. 33.2). Panigrahi's two papers (Panigrahi & Patnaik (1965) and Singh & Panigrahi (1990)) merging *Pleopeltis* and *Lepisorus* and thence creating new combinations, several already made by previous authors up to 15 years before, were already out of date in generic terms when published and it is strange that Panigrahi (1993*d*) seemed surprised to have been shown to be wide of the mark subsequently. The different origins of the two genera were correctly pointed out by Ching (1933 and 1978) and Sledge (1982), among others, and Pichi Sermolli's (1977) inability to distinguish them can only be taken as inadequate or erroneous. Copeland (1947), who also combined the two, was generally (though not always) a quite uncritical author. Zink (1989) has clearly shown the morphological differences between them. Perhaps due to a common mistake in not properly separating *Lepisorus macrosphaerus* (Bak.) Ching and *L. nudus* (Hook.) Ching some of Panigrahi's concept of the genera could have been intermediate, *i.e.* mixed. Indeed, Satija & Bir's (1985: 34) report of intermediates between *Pleopeltis* and *Lepisorus* was in error for *L. nudus* from C. India (specimens at PUN! reidentified by me).

Lepisorus in general has been particularly badly affected by misidentification by Ching, Panigrahi, Bir, Khullar and others. Both Zink and I are independently of the opinion that less than half the species listed from India are really correctly reported.

Polypodium kashyapii Mehra, *nom. nud.* (not in latin) = *Lepisorus mehrae* Fras.-Jenk.

Leptochilus

Colysis decurrens (Bl.) Panigr. (1992a), *non* (Wall. ex Hook. & Grev.) Nakaike (1992) = *Leptochilus decurrens* Bl. I do not accept Hennipman's (in Hennipman, Veldhoen & Kramer (1990) in Kramer & Green) synonymisation of *Paraleptochilus* (of which *L. decurrens* is the type) into *Colysis*, which, as he explained, was only tentative, requiring further research. Despite this, and with hardly any evidence of further research other than opening the pages in Kramer & Green's (1990) well known book, Panigrahi (1992a) uncritically seized on Hennipman's idea to take over his work and create the new combination resulting from Hennipman's generic treatment. This kind of approach can hardly be thought to be of any scientific worth. I also think it not of value to recognise *Paraleptochilus* Copel., which Copeland himself also sank later (see Sledge (1982: 28)).

Dendroglossa metallica (Bedd.) Nayar & Kaur, *comb. inval.*, alternative name not definitely accepted by the authors = *Leptochilus metallicus* (Bedd.) C. Chr.

Leptochilus decurrens Bl. forma *lanceolatus* (Fée) Sledge = *L. decurrens* Bl.

Nistarika bahupunctika [not in latin] Nayar, Madhusoodanan & Molly = *Leptochilus thwaitesianus* Fée or *Leptochilus decurrens* Bl. Sledge (1956 and 1960) in his detailed and well reasoned papers on *Leptochilus* showed that *L. lanceolatus* Fée, which is similar to "*Nistarika*" cannot at present be convincingly separated from *L. decurrens*, but that *L. thwaitesianus* has been much confused with it. The authors of "*Nistarika*" seem not to have been aware of his conclusions. Having the leaves in four rows in the unnecessary "new genus," *Nistarika*, appears to be only the result of the plant climbing up trees. As shown by the material at BM and K, the presence or absence of lamina in fertile fronds is also a variable and unimportant characteristic. It is also unfortunate that Nayar and his school deliberately tend to use a vernacular language instead of latin, as recommended by the Code and as in

almost the whole of botanical practice. These little-known and extinct (thus even more unnecessary and uncalled for) words in Sanskrit are indeclinable substantives but it is sometimes not clear whether the words have been given mistaken latin terminations (to be corrected), or not. It is to be hoped that the workers concerned will be able to break out of their local isolation in this respect and follow normal practice.

Paraleptochilus decurrens (Bl.) Copel. var. *lanceolatus* (Fée) Dixit [*sub "lanceolata"*] =
Leptochilus decurrens Bl.

Paraleptochilus metallicus (Bedd.) A. & D. Löve = *Leptochilus metallicus* (Bedd.) C.
Chr.

Lindsaea

Lindsaea andamanica Dixit & B. Ghosh = ?

L. beddomei ["*beddomea*"] Dixit & B. Ghosh = ?

L. ensifolia Sw. var. *gigantea* Geevarghese in Nayar & Geevarghese (1993) = ? *L. ensifolia* Sw.

L. odorata Roxb. var. *darjeelingensis* T. & U. Sen = *L. odorata* Roxb. The types in CAL (!) are merely small plants of *L. odorata*, as often occurs throughout its range due to ecological conditions, not worthy of nomenclatural recognition.

L. rutlandia Dixit & B. Ghosh = ? From Rutland Island, S. Andamans. This species is clearly distinct from *L. ensifolia*, but needs to be checked against S.E. Asian species. As it is named after Rutland Island, the original termination of the epithet is contrary to the Code (1994: Rec. 60 D), but being derived from a geographical name it is unfortunately not forbidden by Arts. 60.11 or 23.1 so must remain in its strange, incorrect form.

Schizolegnia ensifolia (Sw.) Alston = *Lindsaea ensifolia* Sw.

S. heterophylla (Dryand.) Alston = *Lindsaea heterophylla* Dryand.

S. indica Almeida = *Lindsaea heterophylla* Dryand.

S. javanensis (Bl.) Alston = *Lindsaea javanensis* Bl.

- S. orbiculata* (Lam.) Alston = *Lindsaea orbiculata* Lam.
S. savantwadiensis Almeida = *Lindsaea heterophylla* Dryand.
S. tenera (Dryand.) Alston = *Lindsaea tenera* Dryand.
S. walkerae (Hook.) Alston = *Lindsaea walkerae* Hook.
Schizoloma javanensis (Bl.) Holtt. = *Lindsaea javanensis* Bl.
S. tenera (Dryand.) Holtt. = *Lindsaea tenera* Dryand.

Loxogramme

- Loxogramme avalanchia* Dixit & Das, *nom. nud.* = ? *L. chinensis* Ching. This epithet, being derived from a geographical name, is unfortunately able to stand as originally spelt, despite its being an obvious mistake, being named after Avalanchi.
- L. mussooriensis* Dixit & Das = *L. involuta* (D. Don) C. Presl. Price (1990*a*) clearly showed the differences between *L. involuta* (with broad rhizome-scales and a ± flat upper surface to the costa, or slightly rounded when living) and *L. porcata* Price (with narrow rhizome-scales and a ridged costa). Dixit & Das (1995) strangely ignored this and provided a key-description of *L. involuta* mistakenly stating that the costa is raised, while their description of *L. mussooriensis*, which "species" was not, as perhaps implied in their acknowledgements, checked with Price, corresponds exactly to *L. involuta*. I had also collected *L. involuta* previously at their type-locality and have now found it commonly in the west Himalaya, whereas *L. porcata* is less common there (though abundant in C. Nepal) and occurs more in the inner Himalaya in Kumaun, though extending west to Himachal Pradesh. *L. involuta* just reaches Kathua in S.E. Jammu, from where I correctly reported it (Fraser-Jenkins (1992)) from Kadol, N. of Bhund, though at that time I did not know how to recognise *L. porcata*, which I do now. However Fraser-Jenkins (1993) erroneously revised the Kathua material as being *L. porcata*, but it has the ± flat costa (above) of *L. involuta* (type in BM!).

Lycopodiella

- Lycopodium cernuum* L. var. *sikkimense* (Müll.) Kung = *Lycopodiella cernua* (L.) Pich.

Serm. I do not know why Johns (1997) cited the authority for *L. cernuum* as L. fil., whereas he gave the basionym-author for the epithet in *Lycopodiella* and *Palhinhaea* as L.

Palhinhaea cernua (L.) Franco & Vasc. in Vasc. & Franco = *Lycopodiella cernua* (L.) Pich. Serm.

P. cernua (L.) Franco & Vasc. var. *curvata* (Sw.) Nair & S. Ghosh = *Lycopodiella cernua* (L.) Pich. Serm.

P. cernua (L.) Franco & Vasc. var. *pendula* (Hook.) Nair & S. Ghosh = *Lycopodiella cernua* (L.) Pich. Serm.

P. cernua (L.) Franco & Vasc. forma *sikkimensis* (Müll.) Kung = *Lycopodiella cernua* (L.) Pich. Serm. This varietal epithet was not mentioned in Dixit's (1981) purported account of the *Lycopodiaceae* of India.

P. cernua (L.) Franco & Vasc. var. *sikkimensis* (Müll.) Ching (1981) = *Lycopodiella cernua* (L.) Pich. Serm.

P. cernua (L.) Franco & Vasc. var. *sikkimensis* (Müll.) Ching (1983) = *Lycopodiella cernua* (L.) Pich. Serm.

Lycopodium

Diphasiastrum alpinum (L.) Holub = *Lycopodium alpinum* L.

D. complanatum (L.) Holub = *Lycopodium complanatum* L.

D. complanatum (L.) Holub subsp. *alpinum* (L.) Jermy = *Lycopodium alpinum* L.

D. veitchii (Christ) Holub = *Lycopodium veitchii* Christ.

D. wightianum (Wall. ex Hook. & Grev.) Holub = *Lycopodium wightianum* Wall. ex Hook. & Grev.

Diphasium casuarinoides (Spring) Mandal & U. Sen (1979 ["1978"]), *comb. inval., sin.* basionym ref. = *Lycopodium casuarinoides* Spring.

D. wightianum (Wall. ex Hook. & Grev.) Pich. Serm. = *Lycopodium wightianum* Wall. ex Hook. & Grev.

Lycopodiastrum casuarinoides (Spring) Holub ex Dixit (1981) = *Lycopodium*

casuarinoides Spring.

Lycopodiastrum casuarinoides "(Spring) Holub" (1983) = *Lycopodium casuarinoides* Spring. Dixit published and thus preempted Holub's combination and also his now defunct genus.

Lycopodium arunachalense ["*arunachalensis*"] Pandey & V. Singh (1990), *nom. nud.* = ?

Lycopodium centrochinense Ching = ?

Lycopodium complanatum var. *epigeicum* ["*epigeica*"] Pandey & V. Singh (1990), *nom. nud.* = ?

Lycopodium lohitense ["*lohitensis*"] Pandey & V. Singh (1990), *nom. nud.* = ?

Lycopodium pseudoclavatum Ching (1982) = *L. japonicum* Thunb. ex Murray. This species is being collected from the wild in Nepal at an obviously unsustainable rate, particularly within reach of Kathmandu, Pokhara *etc.*, to wrap around gateposts leading into army-encampments. It is also increasingly used for the same purpose at weddings. A few years ago I saw a villager on the old "Rajpath Road" from Kathmandu to Hetauda carrying a huge bundle of about 60 kg of it to Kathmandu to sell for this purpose and came to realise why it is now rather uncommon in places where I remember it as being abundant previously. The name *L. pseudoclavatum* and Ching's paper on it in India *etc.*, mistaken though it may have been, was not even mentioned by Dixit (1987) in his purported account of the *Lycopodiaceae* of India, even though his earlier paper (Dixit 1984*b*) merely took its information from Ching in repeating that the Indo-Himalayan species is *L. japonicum* instead of *L. clavatum*, which was not a new finding.

Lycopodium pseudoclavatum Ching in C.Y. Wu (1983) = *L. japonicum* Thunb. ex Murray.

Macrothelypteris

Thelypteris ornata (Wall. ex Bedd.) Iwats. = *Macrothelypteris ornata* (Wall. ex Bedd.) Ching.

T. torresiana (Gaud. in Freyc.) Alston = *Macrothelypteris torresiana* (Gaud. in Freyc.)

Ching.

Marsilea

Marsilea ballardii Gupta = *M. condensata* Bak.

M. ballardii Gupta var. *rajasthanensis* (Gupta) S. & M. Almeida = *M. conaensata* Bak.

M. diffusa Lepr. ex A. Br. "var. *Madagascar*" Bhardwaja & Gena (1989), *nom. nud.* =
M. diffusa Lepr. ex A. Br. Although this name (and "var. *Jullundur*") presumably
referred to collection-localities, they were published as if taxonomic names.

M. kedarmalii Bhardwaja, Gena & D'Souza = ? *M. coromandelica* Burm. fil.

M. maheshwarii Gopal = *M. minuta* L. The type at CAL (!) has normal *M. minuta*-
type sorocarps.

M. major (Haines) Chowdhury = *M. minuta* L.

M. minuta L. var. *indica* Gupta = ? *M. minuta* L.

M. minuta L. "var. *Jullundur*" Bhardwaja & Gena (1989), *nom. nud.* = *M. minuta* L.

M. poonensis Kolhatkar = ?

M. rajasthanensis Gupta = *M. condensata* Bak.

M. rajasthanensis Gupta var. *ballardii* (Gupta) Gupta = *M. condensata* Bak.

Microlepia

Microlepia brevistrigosa A. Biswas (1991) = ? Despite the nearly ten years that have
passed since she published most of her new names, Biswas' types of both
Microlepia and *Hypolepis* remain unavailable at CAL and, according to her (pers.
comm. May 1997), are at Kalyani University where they are also "unavailable." It
is regrettable that apparent fear of their being reidentified properly should be
allowed to interfere badly with the progress of scientific advancement. In such a
case they should clearly never have been published at all if they are not to be held
up to the light of day instead of being obfuscated by excuses.

M. firma Mett. ex Kuhn var. *hirta* "(Clarke) Sledge" *non sensu* Sledge [= *M. dubia*
(Roxb.) Morton (1974)] = *M. setosa* (J.E. Smith in Rees) Alston (*synonym: M.*

- hirta* (Kaulf.) C. Presl; *misapplied name: M. strigosa sensu* W.H. Wagner (1981 and 1993), *non* (Thunb.) C. Presl). From Hawai'i, not present in India.
- M. firma* (Mett. ex Kuhn) var. *hirta* (Roxb.) Morton = *M. setosa* (J.E. Smith in Rees) Alston.
- M. haflangensis* Nayar & Kaur = ? *M. proxima* (Bl.) C. Presl. See appendix, below.
- M. macrosora* A. Biswas (1989 ["1988"]) = ?
- M. manohara* Nayar & Madhusoodanan = ? *M. speluncae* (L.) T. Moore. The small spores may be young, but I have yet to see the type-specimen.
- M. marginata* (Panzer in Houtt.) C. Chr. var. *calvescens* (Wall. ex Hook.) Nair = *M. calvescens* (Wall. ex Hook.) C. Presl. See under *M. uropinnata*, below.
- M. neostrigosa* Ching = ?
- M. oblongifolia* A. Biswas (1989 ["1988"]) = ?
- M. sikkimensis* A. Biswas (1989 ["1988"]) = ?
- M. tamenlongensis* A. Biswas (1989 ["1988"]) = ?
- M. uropinnata* Panigrahi & Das (1982), (*nom. nov.* for *Davallia urophylla* Hook. (1859), *non* *Microlepia urophylla* T. Moore (1861: 290), *superfl.* for *M. caudigera* T. Moore (1861: 303)) = *M. caudigera* T. Moore. *M. caudigera* is a bipinnate-tripinnatifid east-Himalayan and Chinese species similar to a hairy *M. platyphylla* (D. Don) J. Smith. Panigrahi in Panigrahi & Das (1982) mistakenly thought *M. caudigera* (a *nom. nov.* for *Davallia urophylla* Hook.) was a superfluous name, presumably thinking that Moore should have transferred the epithet *urophylla* Hook. to *Microlepia*. Moore did not do so because he treated *Davallia urophylla* Wall., which applies to a simply pinnate species, as a valid name, as was the mistaken practice of his day, and so had apparently attempted to make a combination (on pg. 303) for that as *Microlepia urophylla* "(Wall.) T. Moore" - but actually as Wall. ex T. Moore, *nom. nud.* He therefore gave the new name *M. caudigera* to Hooker's quite different sense and first validation of the epithet *urophylla*. Panigrahi must therefore have thought there was an

opportunity to create a new name due to the apparent invalidity of Moore's Wallich-based name. However what Panigrahi either failed to notice, or perhaps did not understand, was that in the same genus only a few pages before, Moore (1861: 290) made a valid *nom. nov.*, *Microlepidia urophylla* T. Moore, *non Davallia urophylla* Hook. (which on pg. 303 he had specifically excluded from his own independent *M. urophylla*). It is possible that Panigrahi may have noticed this but had thought it, too, to be a *nom. nud.* due to his unfamiliarity with nomenclatural procedures and his evidently having a poor grasp of how to apply the articles of the Code in practice, but he did not mention it. However *M. urophylla* T. Moore was validated on Moore's pg. 290 by reference to a previously published valid description (Code (1994: Art. 32.1.(c))), that of the simply pinnate *Davallia calvescens* Wall. *ex* Hook. (1846), conspecific, as Moore thought, with *Davallia urophylla* Wall. *Microlepidia urophylla* T. Moore is obviously a superfluous name for *Davallia calvescens* which should have been called *Microlepidia calvescens* (Wall. *ex* Hook.) C. Presl, but that merely makes *M. urophylla* illegitimate. It still exists as a valid name, so could not have been used, under the rules, for *Davallia urophylla* Hook., therefore *M. caudigera* is not superfluous, but Panigrahi's mistaken *M. uropinnata* is instead. Panigrahi's citation of an apparently independent name, *M. urophylla* T. Moore *ex* Bedd. (1866) was also erroneous. The correct name, *M. calvescens*, has, of course, long been in use for the simply pinnate species and was not a new finding resulting from Panigrahi's "critical studies on certain of *Microlepidia*," as he tried to lead us to believe.

A similar, but distinct and much better-known Himalayan and E. Asian species (see Hooker (1846: 172-173, t.48)) is the commoner and more widespread *M. marginata* (Panzer in Houtt.) C. Chr. (*synonyms: M. marginalis* (Thunb.) Bedd.; *M. scabra* (D. Don) J. Smith, *non Dennstaedtia scabra* (Wall. *ex* Hook.) T. Moore; *Davallia villosa* Wall. *ex* Hook., *non Microlepidia villosa* (D. Don)

Ching), which differs in being much more hairy below, including on all the veinlets and indusia, whereas *M. calvescens* is virtually glabrous except on the costae. Iwatsuki (1988) treated some of its synonyms as belonging to *M. calvescens*. Although *M. calvescens* was reported (*sub Davallia*) by Hooker from Kumaun it was not mentioned by Khullar (1994).

M. viridula A. Biswas (1989 ["1988"]), *nom. inval., sin. num. tip. et herb. = ?*

Neocheiropteris

Leptochilus subhemionitideus (Christ) Bosman, *comb. inval.*, full basionym ref. not given = *Neocheiropteris subhemionitidea* (Christ) Fras.-Jenk., *comb. nov.* (basionym: *Polypodium subhemionitideum* Christ, *Bull. Herb. Boissier* 7: 5 (1899); *misapplied name: Microsorium hymenodes sensu auct. Ind., non* (Kunze) Ching [= *M. membranaceum* (D. Don) Ching]). I agree with Bosman that this species is not a *Microsorium*, but I cannot accept her wide definition of *Leptochilus* to include this and *Neocheiropteris buergeriana* (Miq.) Nakaike in Kurata & Nakaike (*synonyms: Leptochilus buergerianus* (Miq.) Bosman; *Lepidomicrosorium subhastatum* (Bak.) Ching in Ching & Shing; *Neocheiropteris subhastata* (Bak.) Tag.). The latter is not present in the Indian subcontinent despite reports in error for *Neocheiropteris superficialis* (Bl.) Bosman, both of which were effectively placed by Ching in *Lepidomicrosorium*, though he only placed synonyms of *N. subhemionitidea* in that genus. From its venation and soral arrangement *etc.*, I treat *Lepidomicrosorium* as a synonym of *Neocheiropteris*, not partly in *Leptochilus* as Bosman treated it, and I thus agree with Hennipman, Veldhoen & Kramer (1990) concerning at least some of the present species I place in *Neocheiropteris*. Following, but modifying, Bosman's ground-breaking findings, what has been known so far in India as *Microsorium hymenodes* should now be called *Neocheiropteris subhemionitidea*.

Microsorium brachylepis (Bak.) Nakaike = *Neocheiropteris superficialis* (Bl.) Bosman.

M. henryi (Christ) Kuo [*sub "Microsorium"*] = *Neocheiropteris henryi* (Christ) Fras.-

Jenk. **comb. nov.** (basionym: *Polypodium henryi* Christ, *Bull. Herb. Boiss.* **6**: 873 (1898)).

M. ["*Microsorium*"] *indicum* Ching = *Neocheiropteris zippelii* (Bl.) Bosman.

M. ovatum (Fée) Nair & Bennet = ***Neocheiropteris ovata*** (Fée) Fras.-Jenk., **comb. nov.** (basionym: *Drynaria ovata* Fée, *Mém. Fam. Foug.* **5 Gen. Fil.**: 270 (1852); synonyms: *Phymatodes ovata* C. Presl, *Tent. Pterid.*: 197 (1836), *nom. nud.*; *Polypodium ovatum* Wall. *ex* Hook. & Grev., *non* Burm. *fil.*; *Microsorium phyllomanes* (Christ) Koidz., *Act. Phytotax. Geobot.* **5**: 50 (1936) [*teste* Dixit (1984)]; *Neocheiropteris phyllomanes* (Christ) Ching; *Neolepisorus phyllomanes* (Christ) Ching; *misapplied name*: *Neocheiropteris ensata* (Thunb.) Ching - a slightly narrower-fronded species from Japan, Korea, China, Taiwan *etc.*). Unfortunately Nayar & Kaur failed to establish a valid combination and later authors following them, such as Dixit (1984) *etc.*, while citing the synonymy, were not intending or making a new combination and did not indicate which synonym is the basionym. The combination is duly established here.

Neocheiropteris ovata "(Fée) Nayar & Kaur" [*sub* "*ovatus* (Bedd.)"], **comb. inval.**, alternative name not definitely accepted by the authors = *Neocheiropteris ovata* (Fée) Fras.-Jenk.

Neolepisorus ovatus (Fée) Ching [*sub* "(Bedd.)"] = *Neocheiropteris ovata* (Fée) Fras.-Jenk.

Tricholepidium normale (D. Don) Ching = *Neocheiropteris normalis* (D. Don) Tag. (*synonym*: *Neolepisorus normalis* (D. Don) Ching).

Notholaena

Cheilanthes catanensis (Cosent.) H.P. Fuchs = *Notholaena lanuginosa* (Desf.) Desv. *ex* Poir. in Lam. *subsp. lanuginosa*.

C. catanensis (Cosent.) H.P. Fuchs *subsp. bivalens* (Reichst.) Hansen & Sunding = *Notholaena lanuginosa* (Desf.) Desv. *ex* Poir. in Lam. *subsp. bivalens* Reichst. in Badré & Reichst. This is the subspecies present in the Indian subcontinent (see

Reichstein's determination quoted by Fraser-Jenkins (1993)).

C. vellea (Aiton) F. Müll. subsp. *bivalens* (Reichst. in Badré & Reichst.) Greuter & Jermy = *Notholaena lanuginosa* (Desf.) Desv. ex Poir. in Lam. subsp. *bivalens* Reichst. in Badré & Reichst. The epithet *vellea* cannot be used in *Notholaena* for this species because the combination is preoccupied by *N. vellea* R. Br., a synonym of *Cheilanthes brownii* (Desv.) Domin, from Australia, which latter name Khullar (1994) mistakenly gave as a synonym of *N. lanuginosa*. Similarly, *N. vellea* R. Br. cannot be transferred to *Cheilanthes* because of the prior existence of *C. vellea* (Aiton) F. Müll., so both names blocked each other and necessitated name-changes for both the Australian and the Eurasian species.

Cosentinia vellea (Aiton) Tod. subsp. *bivalens* (Reichst. in Badré & Reichst.) Rivas Martinez & Salvo = *Notholaena lanuginosa* (Desf.) Desv. ex Poir. in Lam. subsp. *bivalens* Reichst. in Badré & Reichst. Although Pichi Sermolli (1985) revived the genus *Cosentinia*, I do not think it is sufficiently distinct from *Notholaena* to warrant recognition.

Gymnopteris marantae (L.) Ching = *Notholaena marantae* (L.) Desv. I agree with Pichi Sermolli's (1983 and 1989) well reasoned papers that J. Smith's apparent lectotypification of *Notholaena*, based on *N. trichomanoides* (L.) R. Br., is not sound and must be superceded, particularly also as Tryon & Tryon's (1980) proposal to conserve *Notholaena* with the type of *N. trichomanoides* was rejected by Committee (Pichi Sermolli (1981a)). *N. marantae* (L.) Desv. is now the type of *Notholaena* and has long been taken to be so in Europe. The N. American species treated by Tryon in his various papers, even long after the rejection of his proposal, in *Notholaena* mostly belong to *Chrysochosma*, or otherwise to *Argyrochosma* and *Cheilanthes*.

Gymnopteris marantae (L.) Ching var. *intermedia* Ching = *Notholaena delavayi* (Bak.) C. Chr. My collections of *N. delavayi* from between Buddhi and Garbyang in Pithoragarh, just west of the west Nepal border (where it was first discovered in

the Indo-Himalaya by Duthie and later by Ghosh & Ghosh (1986)), consist of both "var. *delavayi*" and "var. *intermedia*", the former having been missed out by Khullar (1994) for some reason. There are also intermediates between the two and it seems most likely that "var. *intermedia*" with its larger fronds and once lobed pinna-bases is merely the largest growth-form attainable by *N. delavayi* and therefore not of taxonomic significance or to be recognised nomenclaturally, nor belonging to *N. marantae* as thought by Ching. My suggestion to Khullar that it was worth investigating to see if "var. *intermedia*" might not be an allotetraploid species between *N. delavayi* and *N. marantae* was not intended to be a judgement between the two possibilities, as he then published and attributed to me, and I do not really think two such species are involved in *N. delavayi* although that cannot be excluded without further study. Ching (1982) had suggested that "var. *intermedia*" was a hybrid between the two species, but it has perfectly good spores of roughly the same size as "var. *delavayi*" so is not a hybrid. *N. delavayi*, determined or confirmed by me, also occurs in N.W. Nepal (Jumla District, Kabre to Choutha, 2900 m. *H. Tabata*, *D.P. Joshi*, *K. Tsuchiya*, *N. Fujita*, *E. Suzuki*, *Y. Shimizu*, *F. Koike*, *K. Matsui* & *T. Yumoto* 14715, 24 June 1983 (KYO); Rohgaon, Suli Gad, 10,000 ft. *O. Polunin*, *W.R. Sykes* and *L.H.J. Williams* 3432, 15 Sept. 1952 (BM, KYO) and Rohgaon, Dolpo. *R.L. Fleming* 2014 (MICH) as well as in Tibet and S.W. China.

Notholaena delavayi (Bak.) C. Chr. var. *intermedia* (Ching) Khullar (1994: 217). *comb. inval.* = *N. delavayi* (Bak.) C. Chr. This apparent combination was accidentally written due to not troubling to check the literature, as Khullar evidently thought Ching had published the name under *Notholaena delavayi*. Khullar obviously did not intend to make a new combination and neither cited his name, nor "*comb. nov.*," nor the word "basionym," though citing the basionym with an error of citation under the wrong genus and species, but as the only mention of that epithet. Even though the resulting "combination" was definitely accepted by the

author it cannot be accepted as valid as it did not actually indicate a basionym as such. There also appears to be no need to recognise such growth-forms nomenclaturally, pending further studies.

N. marantae (L.) Desv. var. *delavayi* (Bak.) Tag. = *N. delavayi* (Bak.) C. Chr.

Paraceterach delavayi (Bak.) R. Tryon = *Notholaena delavayi* (Bak.) C. Chr. Quite apart from Tryon's misapplication of *Notholaena* (see above) it is not sure that *Paraceterach* is a congeneric later name. It may only be superficially similar and requires further study.

P. marantae (L.) R. Tryon = *Notholaena marantae* (L.) Desv.

P. vestita (Hook.) R. Tryon = *Notholaena himalaica* Fras.-Jenk., *nom. nov.* (for *Gymnogramme vestita* Hook., *Icon. Plant.* 2: t.115 (1837); synonym: *Gymnopteris vestita* (Hook.) Underw., non *Notholaena vestita* (Spreng. in L.) Desv.). It is unfortunately necessary to provide a new name for this species as there appear to be no other synonyms available to use for it from India or China (see, for example, Ching & Wu in Wu (1983), Kung (1989), Ching & Shing (1990 and 1994)). *N. himalaica* and its allies were shown by Ranker (1987 *ined.*, 1989 *etc.*) to belong to a very distinct group from *Hemionitis* where they had been tentatively placed, along with *Gymnopteris*, by Mickel (1974), but following Tryon's misapplication of *Notholaena* and placement of these species in *Paraceterach*, N. American authors had overlooked the correct genus, for them, which is *Notholaena*.

Paragymnopteris bipinnata (Christ) Shing = *Notholaena borealisinensis* (Kitag.) Fras.-Jenk., *comb. nov.* (basionym: *Gymnopteris boreali-sinensis* Kitag., *Rep. Ist. Sci. Exped. Manchuria* 4(2): 83, t.12 (1935); synonyms: *Hemionitis bipinnata* (Christ) Mickel; *Paraceterach bipinnata* (Christ) R. Tryon; *Paragymnopteris bipinnata* (Christ) Shing var. *auriculata* (Franch.) Shing, non *Notholaena bipinnata* Liebm., nec T. Sim). Not present in the Indian subcontinent.

P. delavayi (Bak.) Shing = *Notholaena delavayi* (Bak.) C. Chr. Shing (1994) was evidently not aware of the well known arguments concerning the application of

Notholaena and unfortunately created an unnecessary new genus, hardly mentioning *Notholaena* even though the type-species, *N. marantae*, was treated under that genus in all the European literature and much Indo-Himalayan literature, too. He was presumably over-influenced by Ching's placement of the species in *Gymnopteris* and the subsequent N. American finding that putting them in that genus was not correct.

P. marantae (L.) Shing = *Notholaena marantae* (L.) Desv. The Himalayan subspecies is the diploid subsp. *marantae*, despite an erroneous report of a tetraploid from Jamnotri, Chamoli, Uttarkhand (Uttar Pradesh), where I have also collected this species, by Sharma in Khullar, Sharma & Verma (1988), repeated by Khullar (1991). This was reinvestigated by Reichstein (pers. comm., c.1990) and found to be mistaken (see also Khullar (1994: 222)). The other subspecies is subsp. *subcordata* (Cav.) Benl & Poelt, which occurs mainly in Macaronesia as a geographical segregate and is also diploid, but the distinctness of the two is rather doubtful - many species vary slightly and have Atlantic "maritime forms" of no real significance in Macaronesia.

P. marantae (L.) Shing var. *intermedia* (Ching) Shing = *Notholaena delavayi* (Bak.) C. Chr.

P. sargentii (Christ) = *Notholaena sargentii* (Christ) Fras.-Jenk., *comb. nov.* (basionym: *Gymnopteris sargentii* Christ, *Bot. Gaz., Chicago* **51**: 355 (1911); synonym: *Paraceterach sargentii* (Christ) R. Tryon). From China, not present in the Indian subcontinent.

P. vestita (Hook.) Shing [*sub* "(Wall. ex C. Presl)"] = *Notholaena himalaica* Fras.-Jenk.

Nothoperanema

Nothoperanema hendersonii "(Bedd.) Nakaike" (1975) = *N. hendersonii* (Bedd.) Ching (1966). This genus is close to *Dryopteris* and could also be recognised as a subgenus of it if desired, as it was originally described. Despite the presence of jointed hairs, I place it in Subfamily *Dryopteridoideae*, not *Peranematoideae*.

Oleandra

Oleandra malasiana [sub "*malasianum*"] S. Ghosh = ? *O. pistillaris* (Sw.) C. Chr. Holttum's (1954 and 1968) comments on the taxonomic insignificance of the variation in this species seem more reflective of the true situation than just creating new names without first-hand knowledge of the ferns of the area. Although the spelling of the epithet is very obviously an unfortunate mistake due to lack of knowledge, it appears to be impossible to put it right under the actual Articles of the Code (1994), to "*malaysiana*" or, better, "*malesiana*," as it clearly should have been.

Ophioglossum

Ophioglossum eliminatum Khandelwal & Goswami = ? The protologue-description of this taxon is woefully inadequate in making no comparison at all with any other species and failing to say what it is similar to and how it differs. We are left to guess that it was probably made a species on some obscure cytological grounds, which are not actually stated. I have not yet seen the type at CAL, but it is conceivable that the description could be referring to *O. nudicaule* L. fil.

O. indicum Khandelwal, ? *ined.* = *O. gramineum* Willd. I have seen the type at CAL, which is typical of this distinctive species, but I have not found out where/if it was actually published, though it would seem it was, from the information on the sheet at CAL.

O. oleosum Khandelwal in Bir (1987) = *O. nudicaule* L. fil. I have seen the type at CAL and found it to be normal *O. nudicaule*.

O. oleosum Khandelwal (31 Oct. 1987) = *O. nudicaule* L. fil.

Osmunda

Osmunda asiatica (Fernald) Ohwi = *Osmunda cinnamomea* L. subsp. *asiatica* (Fernald) Fras.-Jenk., **comb. nov.** (basionym: *Osmunda cinnamomea* L. var. *asiatica* Fernald, *Rhodora* **32**: 75 (1930)). This is the Asiatic and Himalayan taxon, differing slightly but consistently from the vicariant N. American plant.

O. claytoniana L. subsp. *pilosa* (Wall. ex Hook. & Grev.) Fras.-Jenk. (1992) = *O. claytoniana* L. subsp. *vestita* (Wall. ex Milde) A. & D. Löve (1977). Unfortunately I had overlooked Löve and Löve's earlier combination of a name for this taxon at subspecific rank. This is not a hybrid, or intermediate taxon as they suggested, but is the diploid sexual geographical subspecies of *O. claytoniana* that represents the species in the Himalayan region.

O. regalis L. subsp. *japonica* (Thunb. ex Murray) A. & D. Löve = *O. japonica* Thunb. ex Murray. *O. regalis* and *O. japonica* are obviously closely related and apart from *O. regalis* being larger and its segments slightly longer, differ only in having fertile pinnae towards the apices of the sterile fronds in the former, but fully separate all-fertile or all-sterile fronds in the latter. But such differences seem to be of considerable importance in this particular genus (e.g. the major difference between *O. claytoniana* L. and *O. cinnamomea* L. is the position of the sori) and I accept the two as species. Both occur in the Himalayan region but many records of "*Osmunda regalis*" are either for sterile material (which could also be *O. japonica*) or are in error for *O. japonica*. I have seen only *O. japonica* (including my own fertile collection from Kadol, Kathua in Indian-occupied Kashmir and several from further east) or sterile material suspected to be *O. japonica* from the west and far-west Himalaya, though Panigrahi & Dixit (1969a) reported a specimen of *O. regalis* from Kumaun (Rao 1171l in BSD) but without saying if it is fertile or merely sterile. But I have seen fertile true *O. regalis* from the far north-east in the Himalayan region and the similar, but distinct, *O. huegeliana* C. Presl from C. and S. India, the latter not even being mentioned by Panigrahi & Dixit in their purported account of *Osmunda* in India.

O. regalis L. var. *panigrahiana* Dixit = *O. huegeliana* C. Presl. The unwanted and unnecessary name, var. *panigrahiana*, was given without realising that the species, for such it is, had already been named. I have seen isotypes of var. *panigrahiana* at BSA. Dixit (pers. comm. June 1997) had not heard of *O. huegeliana* when I

told him about it.

O. regalis L. var. *spectabilis* "(Willd.) Banerji" (actually (Willd.) A. Gray) = *O. spectabilis* Willd. From N. America only, mistakenly reported from India.

Osmundastrum cinnamomeum (L.) C. Presl var. *asiaticum* (Fernald) Kitag. = *Osmunda cinnamomea* L. subsp. *asiatica* (Fernald) Fras.-Jenk.

Parahemionitis

Parahemionitis arifolia (Burm. fil.) Panigr. (1993a ["1992"]) = ***Parahemionitis cordata*** (Roxb. ex Hook. & Grev.) Fras.-Jenk. **comb. nov.** (basonym: *Hemionitis cordata* Roxb. ex Hook & Grev., *Icon. Fil. 1: t.64* (1828)). Morton (1974: 316) pointed out Alston's determination of what must be the type-specimen of *Asplenium arifolium* Burm. fil. as *Acrostichum aureum* L. As there is no doubt about the determination and that it must have been what Burmann intended, a new combination is necessary to provide the correct name for the present species under the rules of priority. *Parahemionitis* Panigr. was erected successfully by Panigrahi (1993a) only by his third of four attempts (see also Panigrahi (1991, 1992b and 1993e; he admitted the failure of only one such previous hasty attempt due to invalidity and not following the Code). The fourth attempt, redescribing it as a later homonym, was perhaps just to make sure of it, after all, it was not every day that he was lucky enough to be able to seize on a whole new genus taken from others' work! The need for a new genus became known to him though Mickel's (1974) and Ranker's (1989) original and authoritative research as summarised in the account by Tryon, Tryon & Kramer (1990) in Kramer and Green's book, the pages of which have spawned all too many of the combinations and new names he has been able to glean from it. Although Mickel (1974) had suggested the possibility of raising a new genus for this species, he rejected it as too impractical to be a tenable hypothesis when considering the morphology of the species of *Gymnopteris* now to be added to *Hemionitis*. But Ranker (1989) had then shown that the Indian fern definitely does not belong in true *Hemionitis* where it

had long been placed. However if he and his co-workers had had plans to formalise their valuable findings by publishing a new genus, as would probably be expected as an outcome of their research, they would have found that their work had been hijacked by an interloper from Calcutta. We are not told in any of the four papers dealing with this single topic whether or not they gave their approval to this, assuming it was requested in the proper and expected way in order to be sure to avoid impinging on what was clearly their research-area. In such a case, communication of a request to take up their research, rather than just publishing oneself based entirely on other's findings, has long been the accepted norm in our subject and must be ensured to remain so in the future.

P. arifolia Panigrahi (1991 and 1992*b*), *nom. inval.*, *nom. gen. nud.* = *P. cordata* (Roxb. ex Hook. & Grev.) Fras.-Jenk. The first of Panigrahi's four publications was probably also not effectively published, being in such a spurious and ephemeral publication.

P. arifolia Panigrahi (1993*c*) = *P. cordata* (Roxb. ex Hook. & Grev.) Fras.-Jenk.

Pellaea

Aleuritopteris delavayi (Bak.) Nayar & Kaur, *comb. inval.*, alternative name not definitely accepted by the authors = *Pellaea trichophylla* (Bak.) Ching (*synonyms: Cheilanthes trichophylla* Bak.); *Cheilanthes delavayi* Bak., *non Gymmogramme delavayi* Bak. [= *Notholaena delavayi* (Bak.) C. Chr.]). Bir in Mehra & Bir (1964: 110) reported a specimen of this species, the only report from the Indian subcontinent, from Sikkim, without locality, collected by Prof. S.C. Verma. Verma (pers. comm. Sept. 1996) has told me that it came from further up the route E. from Karponang on the way to the pass leading to Chhangu Lake in E. Sikkim, but that he was not at all sure of its identity, but thought it looked similar to *P. trichophylla*. There is no voucher-specimen in PAN (which is also the case with quite a few of the other cytological records of Verma in Mehra (1961)). Apart from its being invalid, Nayar & Kaur placed this name in completely the

wrong "genus."

Mildella nitidula (Hook.) Hall & Lellinger = *Pellaea nitidula* (Hook.) Bak. in Hook. & Bak. *Mildella* may represent a minor natural group within *Pellaea* and Hall & Lellinger's inclusion of this particular species within the group was correct, in contrast to Ching's (1965) suggestion that they had misinterpreted the nature and point of origin of the pseudoindusium in this species. As quoted by Khullar (1994: 227-228) I was able to examine Ching's original drawings of the pseudoindusium and the specimens he looked at, as well as looking in detail at living plants in Pakistan *etc.* and I believe Ching to have been mistaken and Hall & Lellinger's interpretation correct. However I cannot accept this group, differing from *Pellaea* only in minor characteristics, to be a genus in its own right. This species also occurs in W. Nepal, Mugu, Gumgadi - Dhauleya and Jumla, Kudari - Nagma, where it was collected by *Tabata et al.* 16886, 22 July 1983 and 14161, 6 Nov. 1982, respectively (KYO!); like my own collection from Pithoragarh, Lakhimpur to Malpa, N. of Jipti, c. 41 km N. of Tawaghat, N. of Darchula. C.R. Fraser-Jenkins Field no. 243, 19 Nov. 1994, with G. Tamang, A.M. Thapa & B. Pariyar. The specimens are rather small and delicate and reminiscent of *P. henryi* Christ.

P. hastata (Thunb.) Prantl in Engl. (synonym: *P. calomelanos* (C. Presl) Link. non *Pityrogramma calomelanos* (L.) Link) - Khullar (1994) omitted its occurrence further east than the west Himalaya, but I have seen specimens from west Nepal at BM and KYO and have recently identified a photograph of it from W. Nepal, shown me for naming by one of the non-pteridological workers at Godavari, Kathmandu (KATH).

Pellaea malabarica Geevarghese ex Madhusoodanan & Jyothi (31 Jan. 1993 ["1992"]) = ? It is surprising that as with *Microsorium malabaricum* Nayar & Geevarghese (see under *Phymatosorus*), the authors published Geevarghese's taxon and name independently, obviously with insufficient consultation as it preempted his own publication of it later in the same year. Once again the same taxon was named

twice. I have not yet discovered quite how these unfortunate happenings arose, though it hardly looks to have been honest, but it is to be hoped that such actions will not be allowed to slip through the editorial net again.

P. malabarica Nayar & Geevarghese (1993) = ?

P. seticaulis (Hook.) S. Ghosh = *P. falcata* (R. Br.) Fée. This species was described from S. India but later included by Hooker in *P. falcata* as a variety. It is widely and generally known in India and Sri Lanka as *P. falcata*, but Ghosh must have thought that if the Indian and Australasian plants were separate taxa his new combination, *P. seticaulis*, might be able to replace the name *P. falcata* as applied to the S. Indian and Sri Lankan plants. However on comparing the Australasian and Indian/Sri Lankan plants I find that they match exactly, including in size (with small, large and intermediate plants in both regions), width of pinnae and their spacing and in scales. There are several "varieties" named from Australia but they are connected together continuously and do not appear to be more than environmental growth and developmental forms, which need not be named. Similar variation in form also occurs in our region and is part of the morphological make-up of the species.

Phanerophlebiopsis

Phanerophlebiopsis hookeriana (C. Presl) Fras.-Jenk. (1992), *comb. inval.*, "basionym" a *nom. nud.* and not cited = ***Phanerophlebiopsis caduca*** (T. Moore) Fras.-Jenk., ***comb. nov.*** (*basionym*: *Cyrtomium caducum* T. Moore, *Ind. Fil.*: 276 (1861); *synonyms*: *Lastrea hookeriana* C. Presl, *nom. nud.*; *Polystichum hookerianum* C. Chr. *nom. nud.*; *Polystichum caducum* (T. Moore) Diels; *Cyrtomium hookerianum* C. Chr., *nom. nud.*). The combination using the epithet *hookeriana* was not properly made by me (Fraser-Jenkins (1992a: 279)) due to a line being missed out after the word "*hookeriana*" during the printing of the book so that the authority for the combination and genus of the basionym were omitted. That name would anyway have been a *nom. nud.* as Presl gave no description, a fact

that was often overlooked by Christensen in *Index Filicum*. The first validation of a name for this species was by Moore, based on Hooker & Greville's description of *Aspidium caducum* Wall., non Kunth in Bonpl. The genus *Phanerophlebiopsis* is intermediate between *Cyrtomium* and *Polystichum* and its species have narrow pinnae with partially anastomosing veins. It seems both discrete and distinct from the other two and in my view merits generic separation, even though it is hard to define.

Phegopteris

Phegopteris tibetica Ching in C.Y. Wu = *Thelypteris phegopteris* (L.) Slosson in Rydb.
= *P. connectilis* (Michx.) Watt.

Thelypteris hexagonoptera "(Michx.) Nayar & Kaur," *comb. inval.*, alternative name not definitely accepted by the authors = *T. hexagonoptera* "(Michx.) Weath." = *T. hexagonoptera* (Michx.) Nieuwland = *Phegopteris hexagonoptera* (Michx.) Fée. Confined to N. America. Beddome's and Stewart's reports of this from the far-west Himalaya referred to *Phegopteris connectilis* (Michx.) Watt.; original specimen (BM) reidentified by me.

Phymatopteris

Crypsinus cartilagineoserratus [*sub "cartilagineo-serratus"*] (Ching & S.K. Wu in C.Y. Wu) Nakaïke = *Phymatopteris malacodon* (Hook.) Pich. Serm. Small but precociously fertile plants like this occur quite often in populations of *P. malacodon* and their teeth are often as long.

I do not agree with Hennipman, Veldhoen & Kramer (1990) in Kramer & Green, or Rödl-Linder (1990), that the species of *Phymatopteris* belong in *Selliguea*, which is a natural and discrete genus itself (and also differs by having the base-number of $x = 37$, not 36). The relationship of *Phymatopteris* to *Crypsinus* looks closer and the Japanese botanists, in particular, combine them under *Crypsinus*, but Ching (1964b), though he made much confusion over typification and thus application of generic names, clearly formalised the generic

concepts; he was followed by Pichi Sermolli (1973). Holttum (1968, 1973 and 1975), who evidently knew these genera well, was clear that neither *Crypsinus* nor *Selliguea* occur in India but are purely S.E. Asian genera which do not include the species of *Phymatopteris*. Holttum (1973a) also pointed out Nayar & Kaur's (1971) misuse of *Selliguea* in two different senses in the same paragraph. I am not familiar enough with the type of *Crypsinus*, *C. pyrolifolius* (Goldm.) Copel., from the Philippines, and its relatives to make a decision myself, though I also doubt the two are really congeneric. I now follow Pichi Sermolli (1973) who has given well documented details of their separation, and accept *Phymatopteris* as a good genus. It is likely that too many species have been described and it is certain that too many species have been recorded from the Indo-Himalaya by Indian botanists due to misidentification, but they are listed here mostly without judgement, pending reidentification of voucher-specimens for the doubtful records. A recent account of the genus in Nepal, but under *Crypsinus*, has been given by Nakaike (1987).

C. chrysotrichus (C. Chr.) Tag. = *Phymatopteris chryso-tricha* (C. Chr.) Pich. Serm.

C. crenatopinnatus (Clarke) Copel. = *Phymatopteris crenatopinnata* (Clarke) Pich. Serm.

C. ebenipes (Hook.) Copel. = *Phymatopteris ebenipes* (Hook.) Pich. Serm.

C. ebenipes (Hook.) Copel. var. *subebenipes* (Ching) Iwats., S.K. Wu, Mitsuta & Cheng = ? *Phymatopteris subebenipes* (Ching.) Pich. Serm., or ? *P. ebenipes* (Hook.) Pich. Serm.

C. echinosporus (Tag.) Tag. = *Phymatopteris echinospora* (Tag.) Pich. Serm.

C. engleri (Lueress.) Copel. = *Phymatopteris engleri* (Lueress.) Pich. Serm.

C. erythrocarpus (Mett. ex Kuhn) Tag. in Hara = *Phymatopteris erythrocarpa* (Mett. ex Kuhn) Pich. Serm.

C. integerrimus (Ching) Nakaike (1987) = ? *Phymatopteris griffithiana* (Hook.) Pich. Serm., or ? *P. integerrima* (Ching) Bir in Satija & Bir. I would prefer to take a

good species.

the ranges of variation in the species before fully accepting *P. integrum* as a further look at this group (including *P. rhyndophylla* (Hook.) Pich. Serm.) and

C. malacodon (Hook.) Copel. = *Phymatopteris malacodon* (Hook.) Pich. Serm.

C. montanus Sledge = *Phymatopteris montana* (Sledge) Pich. Serm.

C. nepalensis Nakaike (1987) = ? *Phymatopteris subebenipes* (Ching) Pich. Serm. or ?

P. ebenipes (Hook.) Pich. Serm. Although Nakaike stated that the scales of his *C. nepalensis* are mid-brown, not glossy-black, the majority of the specimens he cited (e.g. 725085, 725342, 725483, 725120, 725731 and 725617) have glossy-black rhizome-scales, sometimes with paler margins, but usually becoming fully glossy-black near the point of insertion of the stipe. He also mentioned as diagnostic the very densely fimbriate scales and it is certainly true that in most of the specimens there is a dense fringe of russet-brown hairs at the scale-margins, sometimes obscuring the scales sufficiently to impart a reddish colour to the whole rhizome. However the more ovate, black scales at the stipe-base insertion-points are frequently far less fimbriate, if at all and are not different from those in *P. ebenipes*. In some examples, e.g. 725617 they bear only scattered, pale fimbriations further back along the rhizome where the black colour becomes more obvious, but are densely russet-brown fimbriate at the rhizome-apex. The pinnatipartite lamina is just the same as in *P. ebenipes* and the only possibly significant difference I can find is that the specimens ("*C. nepalensis*") with the brownest scales and most russet fimbriations do not seem to have more than a very few, very small scales beside the rachis and often have none, even when the fronds are young (as in one of my collections from Phulchowki mountain, S.E. of Kathmandu, C. Nepal, C.R. *Fraser-Jenkins* Field no. 34, with K. *Neupant*, J.B. G. & R. *Parryar* & R. *Bornwal*, 30 June 1996), whereas those (*P. ebenipes*) with the blackest scales and more scattered fimbriations mostly have scattered, darkish, partly deciduous scales beside the rachis, but even this is not always so and I have

seen a few specimens of the all dark-scaled, less-fimbriate type without such scales. I think further study of variation in "*C. nepalensis*" and *P. ebenipes* is necessary in the field in order to investigate whether there is really a good dividing-line between them as it is obviously nothing like as clear as Nakaike published. If the two really constitute distinct species and are not just the extreme ends of the range of variation in *P. ebenipes*, it is worth noting that Ching's description of "*Phymatopsis subebenipes*" Ching is almost identical to Nakaike's description of "*C. nepalensis*" and although Nakaike made a new combination of this name, too, in *Crypsinus*, he did not tell us the important information as to whether or not he saw type-material of the Chinese and Tibetan names he recombined. This probably means that he did not and in any case he made no comparison with that taxon, which would seem to be the obvious study needed. Although I saw it briefly, I have not studied the type of *P. subebenipes* carefully. However "*C. nepalensis*" is not accepted here, pending further study.

C. nigrovenius (Christ) Iwats. in Ohashi (1975) = *Phymatopteris nigrovenia* (Christ) Pich. Serm.

C. nigrovenius "(Christ) Tu" (1979) = *Phymatopteris nigrovenia* (Christ) Pich. Serm.

C. oxylobus (Wall. ex Kunze) Sledge = *Phymatopteris oxyloba* (Wall. ex Kunze) Pich. Serm.

C. quasidivariatus (Hay.) Copel. = *Phymatopteris quasidivariata* (Hay.) Pich. Serm.

C. rhynchophyllus (Hook.) Copel. = *Phymatopteris rhynchophylla* (Hook.) Pich. Serm.

C. stewartii (Bedd.) Copel. = *Phymatopteris stewartii* (Bedd.) Pich. Serm.

C. stracheyi (Ching) Panigr. & Patnaik = *Phymatopteris quasidivariata* (Hay.) Pich. Serm. Tagawa (1950 *etc.*) and Kuo (1985) have found *C. stracheyi* to be a synonym of *P. quasidivariata*. From my own collections in Nantou, Taiwan and in the Himalaya they are certainly very close indeed and I can find no differences between them. I accept that they must be conspecific.

C. subebenipes (Ching) Nakaike = ? *Phymatopteris subebenipes* (Ching) Pich. Serm., or

- ? *P. ebenipes* (Hook.) Pich. Serm.
- C. trisectus* (Bak.) Tag. = ? *Phymatopteris oxyloba* (Wall. ex Kunze) Pich. Serm.
- C. yakushimensis* (Mak.) Tag. = *Phymatopteris yakushimensis* (Mak.) Pich. Serm.
- Phymatodes montana* (Sledge) Bir & Devi = *Phymatopteris montana* (Sledge) Pich. Serm.
- P. yakushimensis* (Mak.) Tag. = *Phymatopteris yakushimensis* (Mak.) Pich. Serm.
- Phymatopsis cartilagineoserrata* [sub "*cartilagineo-serrata*"] Ching & S.K.Wu in C.Y. Wu = *Phymatopteris malacodon* (Hook.) Pich. Serm. Ching's (1979) insistence on using *Phymatopsis* for this genus was against several articles of the Code, as were his very generalised remarks on its typification, "we all know that the type is, " made in an effort to preserve the name he had been using. However, as shown by Pichi Sermolli, the name cannot be used as it is a synonym of *Dipteris*.
- P. chrysotricha* (C. Chr.) Ching = *Phymatopteris chrysotricha* (C. Chr.) Pich. Serm.
- P. crenatopinnata* (Clarke) Ching = *Phymatopteris crenatopinnata* (Clarke) Pich. Serm.
- P. erythrocarpa* (Mett. ex Kuhn) Ching = *Phymatopteris erythrocarpa* (Mett. ex Kuhn) Pich. Serm.
- P. integerrima* Ching = ? *Phymatopteris griffithiana* (Hook.) Pich. Serm. or ? *P. integerrima* (Ching) Bir.
- P. malacodon* (Hook.) Ching = *Phymatopteris malacodon* (Hook.) Pich. Serm.
- P. montana* (Sledge) Ching = *Phymatopteris montana* (Sledge) Pich. Serm.
- P. nigrovenia* (Christ) Ching = *Phymatopteris nigrovenia* (Christ) Pich. Serm.
- P. oxyloba* (Wall. ex Kunze) Ching = *Phymatopteris oxyloba* (Wall. ex Kunze) Pich. Serm.
- P. stewartii* (Bedd.) Ching = *Phymatopteris stewartii* (Bedd.) Pich. Serm.
- P. stracheyi* (Ching) Ching = *Phymatopteris quasidivariata* (Hay.) Pich. Serm.
- P. subebenipes* Ching = ? *Phymatopteris subebenipes* (Ching) Pich. Serm. or ? *P. ebenipes* (Hook.) Pich. Serm.
- Phymatopteris ebenipes* (Hook.) Pich. Serm. var. *oakesii* (Clarke) Bir & Satija in Satija

& Bir = *P. ebenipes* (Hook.) Pich. Serm.

P. integerrima (Ching) Bir in Satija & Bir (1985) = ? *P. griffithiana* (Hook.) Pich Serm.
or ? *P. integerrima* (Ching) Bir.

P. integerrima "(Ching) Bir" (1989) = ? *P. griffithiana* (Hook.) Pich. Serm. or ? *P. integerrima* (Ching) Bir.

P. nakaikei [sub "*nakaikeium*"] P. & H. Pande = *P. ebenipes* (Hook.) Pich. Serm. The "type"-specimen is from Munsiyari, [Pithoragarh District, Uttarkhand (Uttar Pradesh)]. *P.C. Pande* 69, 9 Sept. 1983 (Herb. P.C. Pande, Almora University !).

P. nigrovenia "(Christ) Bir in Satija & Bir" (1985) = *P. nigrovenia* (Christ) Pich. Serm. (1973).

P. pangteyi [sub "*pangteyii*"] P. & H. Pande, *nom. nud.* = *P. malacodon* (Hook.) Pich. Serm. The "type"-specimen is in Herb. P.C. Pande, Almora University (!).

P. quasidivariata "(Hay.) Bir in Satija & Bir" (1985) = *P. quasidivariata* (Hay.) Pich. Serm. (1973).

P. stracheyi (Ching) Pich. Serm. = *P. quasidivariata* (Hay.) Pich. Serm.

Platygyria waltonii (Ching) Ching & S.K. Wu = ***Phymatopteris waltonii*** (Ching) Fras.-Jenk., **comb. nov.** (*basionym*: *Neocheiropteris waltonii* Ching in Hook., *Icon. Plant.*: 107, t.3158 (1832), with taxonomic query as to generic placement). Although Ching, when describing this genus, separated it mainly on the basis of a complete annulus, he also mentioned clathrate scales as being diagnostic, but the scales in this species are not very strongly clathrate and several other species of *Phymatopteris* have slightly clathrate scales. Its frond-morphology seems to fit best in *Phymatopteris*, where I now place it.

Phymatosorus

Lepisorus longifolius (Bl.) Holtt. = ***Phymatosorus longifolius*** (Bl.) Bosman & Fras.-Jenk., **comb. nov.** (*basionym*: *Grammitis longifolia* Bl., *Enum. Plant. Javae*: 119 (1828); *synonyms*: *Grammitis decurrens* Bl., *Polypodium revolutum* C. Chr. (*nom. nov.* for *Grammitis longifolia* Bl., non *Polypodium* Cav., nec C. Presl).

Microsorium longifolium (Bl.) Copel.). I had realised that this species is not a *Lepisorus* but considering the thick rhizome and sunken sori I am sure Bosman (1991) must be correct in placing it as a *Phymatosorus*. Beddome's (1883) report of it from Kumaun was presumably in error for *Lepisorus loriformis* (Wall. ex Mett.) Ching, which looks superficially similar.

Microsorium cuspidatum (D. Don) Tag. in Hara = *Phymatosorus cuspidatus* (D. Don) Pich. Serm. (1977). See Morton (1974: 350-351).

M. malabaricum Nayar & Geevarghese = ? *Phymatosorus scolopendria* (Burm. fil.) Pich. Serm. Apparently no attempt was made to check whether this taxon is known from S.E. Asia, which, if it is not just a poorly developed *P. scolopendria* (if indeed it is a *Phymatosorus* at all), should have been done. I have yet to see the type. See under *Phymatosorus malabaricus*, below.

M. rubidum (Kunze) Copel. = *Phymatosorus longissimus* (Bl.) Pich. Serm. This is one of the dozen or so species treated twice under different genera by Dixit (1984) without realising that they were the same taxon. Surprisingly, Satija & Bir (1985) described it, presumably without first-hand knowledge, as growing on trees or rocks. In fact, as stated by Beddome and Clarke, it is confined to the wet substrate of deep marshes and when I have seen it (e.g. at Noguurre, S.E. of Golaghat in the Nambor Forest region of Assam, C.R. Fraser-Jenkins Field no. 14 Dec. 1995) it always has its rhizome submerged under water, growing on the floating islands of vegetation, with its erect fronds sticking up more than my own height (6 ft.) among reeds and bushes etc.

M. variabile (Ching) Tag. = ? *Phymatosorus nigrescens* (Bl.) Pich. Serm.

Phymatodes banerjiana S. & N. Pal = ? *Phymatosorus scolopendria* (Burm. fil.) Pich. Serm. This species was described from plants of unknown origin cultivated at Calcutta Botanical Gardens (Sibpur) and should obviously have been compared with exotic collections before publishing as a "new species," which was not properly done. However the type-collection at CAL (!) matches the well known

P. scolopendria, as grown in many European and N. American gardens. I have noticed that some other collections from the wild in S. India under the name *P. scolopendria* at CAL etc. look rather distinct and slightly similar to, or reminiscent of the Australasian *P. diversifolius* (Willd.) Pich. Serm., though this may only be a result of variation in *P. scolopendria*. If Pal & Pal had based their concept of *P. scolopendria* on such plants, this may be why they described *P. banerjiana* as new. I intend to check the type of *P. scolopendria* before long to ascertain that it is really the same as the plant widely cultivated under that name in Europe etc. in order to reach a more definite conclusion about *P. banerjiana*. Either way it is clear that insufficient research was carried out into the species of this genus before the publication of a "new species."

Phymatosorus banerjiana (S. & N. Pal) Pich. Serm. = ? *P. scolopendria* (Burm. fil.) Pich. Serm. Pichi Sermolli did not comment on the identity of this taxon, so probably just accepted it for transfer without further research at the specific level.

P. beddomei S. Ghosh = *P. cuspidatus* (D. Don) Pich. Serm. The type and only collection at CAL (!) is the apical half only of an old, large frond of perfectly normal *P. cuspidatus* and was previously so identified. Ghosh may have been confused by its large size and thus rather narrow pinnae.

P. lucidus (Roxb. in Griff.) Pich. Serm. (1973) = *P. cuspidatus* (D. Don.) Pich. Serm. Pichi Sermolli corrected the name for this species a few years after his 1973 publication.

P. malabaricus Geevarghese ex Nampy & Madhusoodanan (1994), non *Microsorium* Nayar & Geevarghese = ? *Phymatosorus scolopendria* (Burm. fil.) Pich. Serm. The authors published Geevarghese's taxon and name independently and evidently without sufficient consultation, claiming that he had not published it, though we are not told why they thought it would therefore be ethical for them to step in and take it over as theirs. The same taxon was therefore named twice. Its identity is anyway dubious and from their poor drawing it might refer to an immature but

fertile *Phymatosorus scolopendria* (Burm. fil.) Pich. Serm. with simple fronds, a common condition in (for example) the plants of it my father and I have grown for some 35 years under glass, but unheated, in his garden at Bridgend in Wales, when spreading onto the rather dry wall. Geevarghese's (in Nayar & Geevarghese (1993)) description is detailed but not clear enough about the important features of scales *etc.* and for some reason did not illustrate the plant, though illustrating other well known species. Whatever it turns out to be on proper investigation it is unfortunate that it was evidently piratized by Nampy & Madhusoodanan (see also another case *sub Pellaea malabarica* Geevarghese).

P. variabilis (Ching) Pich. Serm. = ? *P. nigrescens* (Bl.) Pich. Serm.

Plagiogyria

Plagiogyria distanta Dixit & Das, *nom. nov.* (for *P. glaucescens* Ching var. *arguta* Ching) = ? *P. glauca* (Bl.) Mett. I am not yet convinced that Ching was right in separating his *P. glaucescens* Ching, the Indian plant, from *P. glauca* from Java. I am still less convinced that var. *arguta* Ching is distinct from *P. glaucescens*, as Dixit & Das thought, and I think further research is much required in this whole genus throughout Asia before informed conclusions can be arrived at.

P. elongata Dixit & Das = ? *P. triquetra* Wall. ex Mett. The "new species" and apparent new records of Dixit & Das (1981), as is too often the case, had no explanation as to why such examples of rather insignificant variation were accorded specific importance. They were mostly merely described as new without discussing or showing an essential understanding of the ranges of variation within and discontinuity from the previously known species - which I rather doubt were properly looked into. Those that were based inadequately on only single collections would have allowed no such concepts to be developed so that no valid judgement could have been made as to whether they were really distinct species or not. In fact they generally do not appear to be so and are not accepted here, pending further study.

P. malayensis Dixit & Das = *P. tuberculata* Copel. From Malaya, not present in the Indian subcontinent. *P. tuberculata* was clearly described by Holttum (1954) and has recently been well illustrated by Piggott & Piggott (1988). Though Dixit & Das (1981) stated that their plant differs from it in having an imparipinnate frond-apex, rather than a pinnatifid one, this condition is also shown by *P. tuberculata* (synonym: *P. sumatrana* Ros., *P. subrigida* v. A. v. R. and *P. rotundipinnata* Bonap.) and I see no difference between them.

P. meghalayensis Dixit & Das = ? *P. adnata* (Bl.) Bedd. Although Nakaike (1971) separated the Japanese and Indian plant as *P. rankanensis* Hay., I feel this could do with further study to ensure the Javan *P. adnata* really is distinct, in which case it is not present in India and *P. meghalayensis* would be a synonym of *P. rankanensis*.

P. minguingensis Dixit & Das = ? *P. scandens* Mett. This appears to be no more than a single collection of a large plant of *P. scandens*.

Pleopeltis

Lepisorus macrocarpus (Bory ex Willd.) Dixit [*sub* "(Willd.) Ching"], *comb. inval.* = *Pleopeltis macrocarpa* (Bory ex Willd.) Kaulf. No such combination was made by Ching on the page Dixit cited, nor on any other page in the reference concerned - as Ching wanted to ensure other workers properly understood the differences between *Lepisorus* and *Pleopeltis*, which he clearly separated, so he would not have placed this species in *Lepisorus* in this work. It must have been one of the many mere slip-ups by Dixit in his nevertheless useful book - one of the few I always carry with me to assist when my memory fails me, despite the abundant errors in it! Although listed by Johns (1997) as if valid, Dixit did not intend a new combination, did not cite his name as author of it and did not put the word basionym, as strictly required by the Code.

Marginaria macrocarpa (Bory ex Willd.) Nayar & Kaur, *comb. inval.*, alternative name not definitely accepted by the authors = *Pleopeltis macrocarpa* (Bory ex Willd.)

Kaulf. See Pichi Sermolli (1965).

Polypodiodes

Goniophlebium amamianum (Takeda) Nakaike (1992) = *Polypodiodes niponica* (Mett.) Ching.

G. dielseanum (C. Chr.) Rödl-Linder = ***Polypodiodes dielseana*** (C. Chr.) Fras.-Jenk., **comb. nov.** (basionym: *Polypodium dielseanum* C. Chr., *Ind. Fil.* 2: 522 (1906)). This species, overlooked by Satija and Bir (1985) and other modern Indian authors, approaches the genus *Goniophlebium* in having no connecting lamina wing between the bases of most of the pinnae, except the upper ones. However its widely adnate pinnae show it to be a *Polypodiodes* species.

Metapolypodium kingpingense Ching & Chu = ***Polypodiodes manmeiensis*** (Christ) Fras.-Jenk., **comb. nov.** (basionym: *Polypodium manmeiense* Christ, *Bull. Herb. Boiss.* 6: 870-871 (1898)). I accept the genus *Polypodiodes* (sometimes erroneously spelt "*Polypodioides*," including by me (Fraser-Jenkins (1992))) for the species with adnate (lower) pinnae which Rödl-Linder had placed in *Goniophlebium* (see under that genus).

M. manmeiense (Christ) Ching = *Polypodiodes manmeiensis* (Christ) Fras.-Jenk.

Polypodiastrum dielseanum (C. Chr.) Ching = *Polypodiodes dielseana* (C. Chr.) Fras.-Jenk.

P. prainii (Bl.) Ching (1978 and 1979) = ***Polypodiodes prainii*** (Bedd.) Fras.-Jenk., **comb. nov.** (basionym: *Goniophlebium prainii* Bedd., *J. Bot. (London)* 31: 226 (1893)). From Malaya and Sumatra; Satija & Bir (1985) mistakenly reported this species from India (in general) having misinterpreted Ching's (1979: 30-31) comment that *Polypodiastrum* contained "16 species mostly Himalayan, with 2 species ranging eastwards" to mean that all the species listed were in the Indo-Himalaya, whereas *P. prainii* had never been reported from there and is one of the two more eastern species. It is slightly anomalous in often having the lowest pair of pinnae with a narrow base, but nevertheless does not fit into *Goniophlebium* as

the lamina on the acroscopic side of the pinna-costa is attached adnately to the rachis.

Polypodiodes amamiana (Tag.) Saiki [sub "*Polypodioides*"] = *P. niponica* (Mett.) Ching.

P. amoena (Wall. ex Mett.) Ching forma *pilosa* (Ros.) Ching = *P. amoena* (Wall. ex Mett.) Ching.

P. amoena (Wall. ex Mett.) Ching var. *pinnatifida* (Dhir, nom. nud.) P. Pande, comb. inval. = *P. amoena* (Wall. ex Mett.) Ching.

P. atkinsonii (C. Chr.) Ching = ***Polypodiodes hendersonii*** (Bedd.) Fras.-Jenk. **comb. nov.** (basionym: *Goniophlebium hendersonii* Bedd., *Ferns Brit. Ind. Suppl.*: 21, t.383 (1876); synonym: *Polypodium hendersonii* Atkins. ex Bak. in Hook. & Bak., non E. Lowe).

P. transpianensis (Yamam.) Saiki [sub "*Polypodioides*"] = *P. niponica* (Mett.) Ching.

Polypodium amoenum Wall. ex Mett. var. *pinnatifidum* [sub "*pinnatifida*"] Dhir, nom. nud. = *Polypodiodes amoena* (Wall. ex Mett.) Ching.

P. amoenum Wall. ex Mett. var. *xerophyticum* Mehra & Bir (type, sub "var. *sikkimense*," Bir 1050 (PAN), seen Aug. 1996) = *Polypodiodes amoena* (Wall. ex Mett.) Ching.

P. lachnopus Wall. ex Hook. var. *xerophyticum* [sub "*xerophytica*"] Mehra, nom. nud. = *Polypodiodes lachnopus* (Wall. ex Hook.) Ching.

P. microrrhizoma Clarke ex Bak. in Hook. & Bak. var. *xerophyticum* ["*xerophytica*"] Mehra, nom. nud. = *Polypodiodes microrrhizoma* (Clarke ex Bak.) Ching.

P. wattii (Bedd.) Tag. = *Polypodiodes wattii* (Bedd.) Ching. This species has been united by Rödl-Linder with *P. niponica* (Mett.) Ching as a variety, but appears distinct. In their descriptions the Leiden-school monographers unfortunately tend to use mathematical ratios and indices instead of the normal and far more immediately meaningful tradition of botanical descriptive words as universally used, so that it is not so easy to make comparisons when reading the book unless

one knows the plants.

Polystichum

Arachniodes bipinnata (Bedd.) Nayar & Kaur [*sub* "(Wall.)"], *comb. inval.*, full basionym ref. not given (see Code (1994: Art. 33.2)) = *Polystichum walkerae* (Hook.) Sledge.

A. macrocarpa (Bedd.) Nayar & Kaur [*sub* "(Wall.)"], *comb. inval.*, full basionym ref. not given = *Polystichum walkerae* (Hook.) Sledge. See Sledge (1973) and Fraser-Jenkins (1991).

A. pinnatifida (Bedd.) Nayar & Kaur [*sub* "(Wall.)"] = *Polystichum walkerae* (Hook.) Sledge.

A. walkerae (Hook.) Ching = *Polystichum walkerae* (Hook.) Sledge.

Lastreopsis wattii (Bedd.) Tag = *Polystichum wattii* (Bedd.) C. Chr.

Polystichum anomalum (Hook. & Arn.) J. Smith var. *travancoricum* (Bedd.) Sledge = *P. anomalum* (Hook. & Arn.) J. Smith.

P. anomalum (Hook. & Arn.) J. Smith forma *travancoricum* (Bedd.) Fras.-Jenk. = *P. anomalum* (Hook. & Arn.) J. Smith.

P. bicolor Ching & S.K. Wu in C.Y. Wu. (1983), *non* Reid Smith (1975) = *P. piceopaleaceum* [*sub* "*piceo-paleaceum*"] Tag. The type-number in PE is 6352, not 6552 as published. *P. bicolor* is not *P. makinoi* (Tag.) Tag., as I mistakenly said previously (Fraser-Jenkins (1991)) before I had fully worked out the taxonomy of the erstwhile "*P. nigropaleaceum*" *sensu auct. Ind.* in the indo-Himalaya.

P. birii Jamir & R. Rao = *P. scariosum* (Roxb. in Griff.) Morton.

P. brachypterum (Kunze) Ching in C.Y. Wu = *P. squarrosum* (D. Don) Fée. Ching had long been misapplying the name *P. squarrosum* to more obtuse-pinnuled plants of *P. neolobatum* Nakai, which partly explains his recognition of the name *P. brachypterum*, though it must be said that he would have been likely to have recognised almost any and every name by the time he and Wu produced the

disastrous "*Flora Xizangica*." *P. squarrosus* has so far been found to be diploid sexual whenever it has been investigated and I assume Matsumoto & Nakaïke's (1988) report of it being tetraploid from Jamachok mountain, Kathmandu must be in error as the population there is perfectly normal *P. squarrosus* and I do not suspect the existence of a cytological complex in this species. I have not checked their voucher-specimen but I doubt they would have confused the identity of this distinctive species; the only tetraploid I know of there is *P. yunnanense* Christ, which is presumably the identity of their tetraploid "*P. piceo-paleaceum*" from the same locality.

P. castaneum (Clarke) Nayar & Kaur, *comb. inval., sin. basionym ref.* = *P. prescottianum* (Wall. ex Mett.) T. Moore.

P. conaense Ching & S.K. Wu in C.Y. Wu = *P. atkinsonii* Bedd., not *P. stenophyllum* Christ, as I mistakenly said previously (Fraser-Jenkins (1991)).

P. ellipticum Ching & S.K. Wu in C.Y. Wu = *P. wilsonii* Christ, not *P. shensiense* Christ, as I mistakenly said previously (Fraser-Jenkins (1991)).

P. fugongense Ching & Chu ex Kung & Zhang = *P. longipaleatum* Christ, not a hybrid as Kung & Zhang reported due to the mere failure of the sporangia to mature. I had already corrected this on their specimen in PE in 1991.

P. garhwalicum Nair & Nag = *P. neolobatum* Nakai.

P. heteropaleaceum Nair & Nag = ? *P. mucronifolium* (Bl.) C. Presl (*synonyms: P. tenggerense* Ros., *P. kodamae* Tag). See Fraser-Jenkins (1991). Though the frond-morphology of the Himalayan and S. Indian plants of what used to be called *P. tacticopterum sensu auct. Ind., non* (Kunze) T. Moore is very similar indeed to the Javan *P. mucronifolium*, except in having more of the wide, dark-centred rachis-scales. I have found that the spores suggest the Javan plant with small, dark papillate spores (Gunung Gede, Java. C.R. Fraser-Jenkins Field no. 728. 7 Feb. 1995, NMW) could be a diploid and the Himalayan plant with large, dark, verrucose spores (Mt. Phulchowki, Godavari, Kathmandu, C. Nepal. CRFJ

15858, NMW) could be either tetraploid, or perhaps diploid apomict. I have not seen the type of *P. tacticopterum*, perhaps destroyed at LZ in 1944 by the British "blanket-bombing" during the second world war, but isotypes could well exist at JE, TUB *etc.* But I have not used that name for the Indian-subcontinental species because the protologue description does not fit the present species. Its indusium was said by Kunze to be coriaceous, whereas it is vestigial or absent in the Indian-subcontinental plant. I am not at present able to identify which species *P. tacticopterum* refers to until I have found some authentic material. Further cytological study of S.E. Asian and Indian-subcontinental plants is necessary before the name for the Indian-subcontinental plant, which appears to correspond closely with *P. kodamae* Tag., can be finalised. For now I have placed it under *P. mucronifolium*. *P. heteropaleaceum* was described by Nair & Nag without any reference to *P. tacticopterum* and they evidently did not realise that the species was already well known, including at their type-locality, under that name. It had appeared to them to be completely new simply because they did not know the species in India and therefore should not have been named in the first place and then published without proper research.

My discovery of this species at "Pangtey's Gorge," near Kilbury, behind Nainital, Uttarkhand (Uttar Pradesh), was surprising, but I have also identified a specimen of it from W. Nepal, Raniban, Dailekh District, 2620 m. *H. Tabata. D.P. Joshi et al.* 21702, 29 Nov. 1983 (also nos. 21666, 21774, 21541 and 21592) (KYO!), which is a linking area with the C. and E. Nepal populations.

P. indicum Khullar & Gupta, *nom. nud.* = *P. discretum* (D. Don.) J. Smith.

P. kathmanduense Nakaike in Otani = *P. discretum* (D. Don) J. Smith. Nakaike in Matsumoto & Nakaike (1988) stated that although I had placed this species & Khullar's *P. indicum* under *P. discretum*, the illustration of *P. indicum* by Khullar & Gupta (1978) (actually 1980) looked different, but this was merely because of a poor drawing. My identifications were based on the original specimens and were

correct.

P. lentum (D. Don) T. Moore var. *bifurcatum* M. Biswas & Basu = *P. lentum* (D. Don) T. Moore. This is merely perfectly ordinary *P. lentum*, but with an abnormally irregular, forked frond. Such irregularities, often much more developed, can occur in any species and do not warrant separate botanical names. It should have been rejected for publication by both the B.S.I. and the journal-editor.

P. levingei Nair, non Hope ex Christ = *P. stenophyllum* Christ.

P. longidens Ching & S.K. Wu in C.Y. Wu = *P. thomsonii* (Hook. fil.) Bedd., not *P. martinii* Christ, as I mistakenly said previously (Fraser-Jenkins (1991)) due to the specimen being rather large.

P. longipinnulum Nair = *P. semifertile* (Hook.) Ching. This is merely \pm sterile-frond type morphology of *P. semifertile*, though the frond (photo in CAL!) is actually fertile in the lower half to two thirds in the normal way for this species.

P. makinoi sensu Fras.-Jenk (1991), non (Tag.) Tag. = *P. sp.*, ?? *P. microphyllum* (Bl.) C. Presl or ?? *P. tangmaiense* Kung & Tateishi. Further research is intended to be carried out by me into the identity of this brown-scaled species from Ukhrul, Manipur, which is similar to the two brown-scaled species mentioned. Although in the same section, it is obviously distinct from *P. makinoi* and is almost surely one of the S.E. Asian species. My collections of *P. microphyllum* from Gunung Gede in Java are quite like it.

P. makinoi sensu Fras.-Jenk. in Fraser-Jenkins & Khullar (1986), non (Tag.) Tag. = *P. yunnanense* Christ (synonym: *P. jizhushanense* Ching in Ching & S.K. Wu in C.Y. Wu, confirmed here as a synonym). When I was becoming clear about the morphological distinction between the diploid *Polystichum piccopaleaceum* Tag. and the tetraploid *P. yunnanense*, which had until then always been thought of as a single species under a misapplied name, *P. nigropaleaceum* (Christ) Diels in Engl. & Prantl [= *P. discretum* (D. Don.) J. Smith], I was looking for a name for *P. yunnanense*, the commoner species of the two. For some time I thought it could

be, at least partly (the more extreme plants), *P. makinoi*, which was actually rather wide of the mark. But I therefore reported both *P. yunnanense* from Nepal and "*P. makinoi*" from Nepal and Bhutan, later finding it at Dhaj in Pithoragarh, from which places I had seen really typical material of the tetraploid, which I could be sure of. I later (Fraser-Jenkins (1991: 272-274)) corrected this error and confirmed the single name, *P. yunnanense* for it, virtually unknown in India, as well as finding that it was the common species in the group throughout the Himalaya.

However in a recent paper by Kholia & Punetha (1995), they mentioned my use of *P. makinoi* but falsely implied that they had attempted to research its identity and nomenclature, saying, "when it became very difficult for us to fit this species either in *P. discretum* (D. Don) J. Smith or in *P. piceopaleaceum* we sent many specimens to Mr. C.R. Fraser-Jenkins (BM), who thought it to be *P. makinoi* (Tag.) Tag. but in January 1991, he identified it as *P. yunnanense*." Not only is *P. yunnanense* so very unlike the all-narrow scaled *P. discretum* that it can hardly be confused with it in any way (apart from being in the same section), but also the correct application of *P. discretum* and even of *P. piceopaleaceum* were quite unknown to those authors at the time. Nor, when they sent me material of it, were they in any quandary about it; but, like every other botanist in India at the time, it was simply known to them as *P. nigropaleaceum*, without further question. They had merely sent me some specimens among material of various genera they asked me to determine *via* Dr. S.P. Khullar. When I mistakenly determined them as *P. makinoi* (as explained above) and told them the known range of that species they rapidly produced a short note reporting it as new to India, without informing me in advance, and reproducing what I had told them (Punetha & Kholia (1989a)), which also demonstrates that they were not doing their own research, as they now claim. It is as well that at least in this case they did not also try to claim, as they did with

Dryopteris gamblei (Hope) C. Chr. (see under *D. darjeelingensis*, above), to have taught me all about it, even if they thought fit to pretend they were attempting to research into the problem, which was one they were not even aware of!

In a series of three recent papers on Section *Metapolystichum*, Zhang & Kung (1995 and 1996*a* and *b*) have unfortunately confused *P. yunnanense* and appear not to have seen my later paper (Fraser-Jenkins (1991)). Due to previous confusion of the name and its misapplication to *P. discretum* by Ching, which later Chinese authors would automatically be inclined to follow, Kung (in Zhang & Kung (1995)) claimed that the lectotype of *P. yunnanense* I selected in Fraser-Jenkins & Khullar (1985) "can not be taken as the lectotype," though not giving any reason for this incorrect statement. They then mistakenly selected another lectotype which is *P. discretum*. However, as I already wrote to Kung some years ago from the BM in an official reply, which he evidently ignored, to a query of his on this subject, the type I selected is definitely the sense in which Christ took the name of his new species, *P. yunnanense*. I had explained to him that *P. yunnanense* is independent of *Aspidium aculeatum* (L.) Sw. var. *yunnanense* Christ (which is indeed *P. discretum*); see Fraser-Jenkins (1991: 272-273)). My lectotype cannot be said to be in any way against the protologue (indeed Kung did not attempt to show this) and therefore cannot be superceded under the Code (1994: Art. 9.13) and replaced by the lectotype suggested by Kung, or by any other specimen. Thus *P. yunnanense* stands, as Christ intended it, as the name for the common tetraploid "*P. nigropaleaceum*" *sensu auct. Ind.* and does not become a synonym of *P. discretum*, which, though he did not realise it, would have been the outcome of Kung's idea.

P. makinoi (Tag.) Tag. var. *chuanzangense* Ching & S.K. Wu in C.Y. Wu = *P. yunnanense* Christ, not *P. makinoi*, as I tentatively suggested (Fraser-Jenkins (1991)) in the temporary absence of the type, which I have now seen.

P. mehrae Fras.-Jenk. & Khullar (1985), *nom. inval.*, type omitted by Khullar, whom I

had requested to select one when inviting him to be joint-author = *P. mehrae* Fras.-Jenk. & Khullar (1986). This species is often confused with the far-east Himalayan *P. cyclolobum* C. Chr., particularly in China where *P. cyclolobum* is much commoner, but the two are distinct. *P. mehrae* was long known in Indian fern-literature as *P. acanthophyllum* (Franch.) Christ (e.g. see Khullar & Gupta (1980)), but I discovered that the Indo-Himalayan plant had been misidentified and was completely different from *P. acanthophyllum* when I checked the types of the latter at P in 1978. They belonged to a very attractive, small, long-toothed species more similar to a small *P. neolobatum* Nakai, though distinct from it; thus the common Indo-Himalayan species was without a name at the specific rank.

P. moluccense sensu Fras.-Jenk. (1991), non (Bl.) T. Moore = *P. kunthianum* [Geevarghese in] Nayar & Geevarghese. I had prevaricated for some time as to the identity of the then unnamed *P. kunthianum* which both I (in 1979) and Geevarghese independently discovered in S. India, as I realised it was not known in the Indian literature. However, having at first thought it a new species, I then quite erroneously thought it must be *P. moluccense*, so did not publish it as new (in Fraser-Jenkins (1991)). When Geevarghese rediscovered it in 1981 he named it anew, but without having carried out the necessary research among Himalayan and S.E. Asian *etc.* species, though I was later able to confirm to him, when he asked me, that it was indeed new. Some of my comments were cited by him in Nayar & Geevarghese (1993: 216), though omitting that I had told him it was new and that I had found it some three years before. Although related to *P. moluccense* it has broader lobes and rather wider rachis- and costal scales. My (Fraser-Jenkins (1991)) report of *P. moluccense* from Sri Lanka was in error for a rather abnormal *P. biaristatum* (Bl.) T. Moore (Horton Plains. *K. Larsen* AAU 70. 29539, 2-4 Dec. 1970 (MO)) with unlobed pinnules, now reidentified by me.

P. mucronifolium "(Bl.) Nayar & Kaur" = *P. mucronifolium* (Bl.) C. Presl.

P. nudisorum Ching = *P. longipaleatum* Christ. This species was long known as *P.*

discretum (D. Don) J. Smith or *P. setosum* (Wall ex Christ) Schott. ex Diels in error. It has distinctive, long hair-fibrils on the lamina which are partly deciduous.

P. orientalitibeticum [sub "*orientali-tibeticum*"] Ching in C.Y. Wu = *P. piceopaleaceum* Tag., not *P. makinoi* (Tag.) Tag., as I mistakenly said previously (Fraser-Jenkins (1991)).

P. paramoupinense Ching in C.Y. Wu = *P. woodseoides* Christ. I would like to revisit Paris (P) to confirm that the best candidate for the type of *P. moupinense* (Franch.) Bedd. is really the specimen Mons. F. Badré kindly sent me a photocopy of, which is unfortunately a small specimen of *P. prescottianum* (Wall. ex Mett.) T. Moore. If there were other sheets of type-material (and my previous Paris herbarium-notes do not say so) that belonged to *P. woodseoides* and fitted the protologue I would lectotypify it in that sense, in which it has long been taken. But if not, we must use the name *P. woodseoides* as I did (Fraser-Jenkins (1991)) instead of *P. moupinense*.

P. x pseudosemifertile [sub "*pseudo-semifertile*"] Nakaike & Gurung = *P. chunnii* Ching (see Fraser-Jenkins (1991) for more detailed discussion).

P. setosum "(Wall.) Bedd." *apud* Khullar & Gupta (1980), *comb. inval.* = *P. setosum* (Wall. ex Clarke) Schott ex Diels, *non* (Thunb.) Copel. = *P. longipaleatum* Christ.

P. setiferum (Forssk.) Woyнар var. *crenatum* Nair = ? *P. scariosum* (Roxb. in Griff.) Morton, or ? *P. manmeiense* (Christ) Nakaike. Although I at first thought, from the poor quality illustration in Nair's paper and the locality given, that this must be *P. discretum* (D. Don) J. Sm. (see Fraser-Jenkins in Fraser & Khullar (1986)). I have now examined a better photograph in CAL. Though still very hard to identify without seeing the original frond in LE, I think it must be *P. scariosum* from its non-toothy, rather obtuse-tipped and large pinnules, fusing at the pinna-apices. The scales, which, as far as I can see, are probably not all narrow and hair-like as they are in *P. discretum*, and the frond-apex being rather abruptly caudate.

are also more like *P. scariosum*, though the very apex is not shown in the photograph, so one cannot see if a diagnostic bulbil is present or not. The only other possible choice could be *P. manmeimense* (Christ) Nakaike, but the frond looks perhaps rather too big and wide for that. The locality of "The Panjab" printed on the old label on the sheet would be wrong for *P. scariosum*, however, but it may just have been the collector, King's, printed label attached to the sheet in error. Until I have seen the sheet itself in LE I cannot be sure what it is. It is obvious that Nair did not know either and it is a classic example of the unreliability of naming "new taxa" from single old sheets merely because the author concerned could not identify it. It is worth repeating, as I found, that neither *P. setiferum* nor *P. aculeatum* (L.) Roth occur in the Indian subcontinent, the only species in common with Europe being *P. lonchitis* (L.) Roth.

P. setiferum (Forssk.) Woynar var. *nigropaleaceum* (Christ) Sledge, *non sensu auct. Ind., nec* Sledge [= *P. yunnanense* Christ and *P. piceopaleaceum* Tag.] = *P. discretum* (D. Don) J. Smith.

P. stimulans (Kunze ex Mett.) Bedd. var. *delavayi* (Christ) Kung = *P. cyclolobum* C. Chr. (*synonym: P. rhomboideum* Ching).

P. subapiciflorum sensu Fraser-Jenkins in Fraser-Jenkins & Khullar (1986) and Fraser-Jenkins (1991), *non* Hay. [= *P. biaristatum* (Bl.) T. Moore] = *P. pseudotsussimense* Ching. When I visited Tokyo (Tl) in April 1991 I especially reexamined the type-specimen of *P. subapiciflorum*, which now consists of only one, immature frond, because I had never seen any material of the E. Himalayan species I had revived the name for (as it had previously had no name and had been unrecognised in Indian literature) from Taiwan. From its scales it was obvious that the type did not belong to that species but to *P. biaristatum*; see my comment, in the Introduction, above, concerning Singh's also having noticed my error, which I had not published a correction for until now.

P. x tare-bhirense Nakaike & Gurung = ? *P. yunnanense* Christ or ? correct hybrid (*P.*

squarrosus (D. Don) Fée x *P. yunnanense* Christ). The type-collection (both at TNS (temporarily at CBM) and KATH) has no spores to enable it to be confirmed as a hybrid as the sporangia are partly young but have not developed fully. This is commonly the result of the environment or perhaps some simple genetic disturbance, rather than hybridity, the diagnostic feature of which is spore-abortion of a characteristic, hybrid-type. The morphology of the fronds of both collections cited by Nakaike & Gurung (1988) could be correct for the hybrid and certainly appears rather intermediate between the two presumptive parental species, but I cannot be sure as some plants of *P. yunnanense* can also look very similar. A rather similar specimen I reported under this name from Kadol, Kathua, Jammu Division. CRFJ 17949 (NMW), in Fraser-Jenkins (1991: 285), turned out, on visiting the locality again at a later stage of the year, to have good spores and slightly darker scales and to be merely a "coarse-segmented" *P. yunnanense*. Hence the importance of having ripe spores or an unequivocal cytological result before reporting or describing most "hybrids."

P. travancoricum (Bedd.) Nayar & Kaur, *comb. inval.*, *sin. basionym ref.* = *P. anomalum* (Hook. & Arn.) J. Smith.

P. walkerae (Hook.) Sledge var. *bipinnatum* (Bedd.) Nayar & Kaur [*sub* "(Wall.)"] = *P. walkerae* (Hook.) Sledge.

Pseudophegopteris

Macrothelypteris aurita (Hook.) Pich. Serm. = *Pseudophegopteris aurita* (Hook.) Ching. I accept *Pseudophegopteris* as a good, independent genus and follow Holttum (1969) in also keeping *Macrothelypteris* separate.

M. hirtirachis (C. Chr.) Pich. Serm. = *Pseudophegopteris hirtirachis* (C. Chr.) Holtt. This large Sikkimese, Darjeeling and doubtless E. Nepalese species has been much overlooked by Indian botanists, including Dixit (1984). I have seen it near Karponang, E. of Gangtok, and in other places in Sikkim.

M. levingei (Clarke) Pich. Serm. = *Pseudophegopteris levingei* (Clarke) Ching.

- M. pallida* (Ching) Pich. Serm. = *Pseudophegopteris pyrrhorhachis* (Kunze) Ching subsp. *distans* (Mett.) Fras.-Jenk.
- M. pyrrhorhachis* (Kunze) Pich. Serm. = *Pseudophegopteris pyrrhorhachis* (Kunze) Ching subsp. *pyrrhorhachis*. This subspecies, which is tetraploid (from both Sri Lanka and S. India), is so far known with certainty only from the south of our region, where it replaces subsp. *distans* (Mett.) Fras.-Jenk. and is morphologically closer to it than to the other tetraploid, subsp. *laterepens*. The identity of Manton & Sledge's hexaploid cytotype, which is also morphologically distinguishable, is uncertain, though either that or possibly even subsp. *pyrrhorhachis* itself may well correspond with *Pseudophegopteris paludosa* (Bl.) Ching, from S.E. Asia. If so, which I hope to investigate further at some stage, I will most probably treat it as a further subspecies and transfer the two subspecies I have raised so far to being subspecies of *P. paludosa* (it being an earlier name). But this needs further careful comparison, including in the field in both regions, as well as cytological study, before a proper decision can be made. Holttum's (1969) treatment of *P. paludosa* and *P. pyrrhorhachis* as separate species could still end up being vindicated, even though his concept of the latter was not of a single entity, so did not allow a proper comparison to be made at that time. I must emphasise, however, that hasty, one-sided, Calcuttan-style combinations without proper research would be most uncalled for in this difficult group. A few previous reports of *P. paludosa* from S. India and especially the Japanese reports from the Himalaya merely refer to the species-complex in general, presumably mostly subsp. *pyrrhorhachis* and subsp. *distans*, rather than applying the name in a critical sense.
- M. pyrrhorhachis* (Kunze) Pich. Serm. var. *glabrata* (Clarke) Pich. Serm. = *Pseudophegopteris pyrrhorhachis* (Kunze) Ching subsp. ? *laterepens* (Trotter in Hope) Fras.-Jenk.
- M. rectangularis* (Zoll.) Pich. Serm. = *Pseudophegopteris rectangularis* (Zoll.) Holtt.
- Pseudophegopteris microstegia* (Hook.) Ching = *P. pyrrhorhachis* (Kunze) Ching

subsp. *distans* (Mett.) Fras.-Jenk., **comb. nov.** (basionym: *Phegopteris distans* Mett., *Ueber Einig. Farngatt.* [*Abhandl. Senckenb. Naturf. Ges.* 2] iv, *Phegopt. u. Aspid.*: 16 (1858)). Don's *Polypodium distans* was a later homonym of Kaulfuss', but the epithet was legitimised in *Phegopteris* by Mettenius. I have chosen the rank of subspecies for the closely related members of this complex, as explained in the Introduction, above, as they are too closely similar to be sensibly treated as species, even though they can usually be distinguished - with experience. Those who actually know this group will undoubtedly agree that the specific rank would be impractical and undesirable, even if some N. American-style, non-taxonomic cytologists, or worse, Calcuttan combination-seekers, may like to throw their spoke into the works with a new combination at specific rank, which I would only have to sink in my next publication!

P. oppositipinna (v. A. v. R.) Ching = *P. rectangularis* (Zoll.) Holtt.

P. pallida (Ching) Ching = *P. pyrhorhachis* (Kunze) Ching subsp. *distans* (Mett.) Fras.-Jenk.

P. pyrhorhachis (Kunze) Ching var. *glabrata* (Clarke) Holtt. = *P. pyrhorhachis* (Kunze) Ching subsp. ? *laterepens* (Trotter in Hope) Fras.-Jenk.

Thelypteris brunnea Ching, *nom. superfl.* (for *Thelypteris paludosa* (Bl.) Iwats.), *non sensu* Ching [= *Pseudophegopteris pyrhorhachis* (Kunze) Ching subsp. *distans* (Mett.) Fras.-Jenk.] = *Pseudophegopteris paludosa* (Bl.) Ching. In contrast to what Holttum (1969) said, *Dryopteris brunnea* C. Chr. is not an invalid name as Christensen complied with the conditions to validate it by reference to previous valid names he included within it, the earliest of which (definitely included within his mixed concept) was *Polypodium distans* D. Don, an illegitimate later homonym. However since he also included within his concept the valid and legitimate *Polypodium paludosum* Bl., a much earlier name than the legitimisation of Don's epithet as *Phegopteris distans* Mett., he ought to have transferred *paludosum* to *Dryopteris* under the rules. *Dryopteris brunnea* was therefore an

illegitimate *nomen superfluum* for *Polypodium paludosum*, which at that time had no blockage to the transferal of its epithet to *Dryopteris*: as such it must also have the same type as *P. paludosum*, of which it is a synonym, regardless of Christensen's also including *P. distans* in it. *Thelypteris brunea* Ching also has the same type as Christensen's name but like it remains a superfluous name for *T. paludosa*.

T. laterepens ["late-repens"] (Trotter in Hope) R. Stewart in Nasir & Ali = *Pseudophegopteris pyrrhorhachis* (Kunze) Ching subsp. *laterepens* (Trotter in Hope) Fras.-Jenk., *comb. nov.* (basionym: *Polypodium laterepens* Trotter in Hope, *J. Bombay Nat. Hist. Soc.* **12**: 628 (1899)). Subsequent to understanding that this taxon is distinct from the related *P. pyrrhorhachis* subsp. *pyrrhorhachis* and subsp. *distans* I looked into the cytological reports by Khullar & Kaur (1975) and Khullar, Sharma & Verma (1988) (repeated by Khullar (1991)) at PAN in Sept. 1996. When I checked on and reidentified their voucher-specimens I found that their diploid vouchers belong to subsp. *distans* and their tetraploids belong to subsp. *laterepens*. Though the two were previously united (e.g. by Holttum (1969)) they are definitely distinct and the difference in their cytotype combined with the different morphology and ranges confirms this nicely. The Sri Lankan plants (a tetraploid and a hexaploid) are not the same subspecies as the Himalayan ones as the Sri Lankan tetraploid is not subsp. *laterepens*, but is much closer to subsp. *distans*, and is identical, both morphologically and cytologically, with the S. Indian subsp. *pyrrhorhachis*; see comments in the Introduction to this paper, above. In due course I hope to carry out further taxonomic and nomenclatural research into the identity and separability of the Sri Lankan hexaploid, as well as into the ranges of all four taxa and whether or not subsp. *distans* also occurs in the south or subsp. *pyrrhorhachis* in the C. and E. Himalaya, with a view to further revision at the subspecific rank.

T. paludosa (Bl.) Iwats. var. *glabrata* (Clarke) Iwats. = *Pseudophegopteris*

pyrrhorhachis (Kunze) Ching subsp. ? *laterepens* (Trotter in Hope) Fras.-Jenk.

T. pyrrhorhachis "(Kunze) Nayar & Kaur" (1974), *comb. inval.*, alternative name not definitely accepted by the authors = *Pseudophegopteris pyrrhorhachis* (Kunze) Ching subsp. *pyrrhorhachis*.

T. pyrrhorhachis (Kunze) Kuo = *Pseudophegopteris pyrrhorhachis* (Kunze) Ching subsp. *pyrrhorhachis*.

T. rectangularis "(Zoll.) Nayar & Kaur" (1974), *comb. inval.*, alternative name not definitely accepted by the authors = *Pseudophegopteris rectangularis* (Zoll.) Holtt.

T. rectangularis (Zoll.) Iwats. (1975) = *Pseudophegopteris rectangularis* (Zoll.) Holtt.

Psilotum

Psilotum nudum (L.) Pal. Beauv. var. *molesworthii* Iranzo, Prado & Salvo = *P. nudum* (L.) Pal. Beauv. This "variety" is merely a growth-form from drier localities and should not have been given a separate name, though it is sad to have to sink something named after the late Mrs. Betty Molesworth-Allen. She carried out remarkable fern-work in S.W. Spain and showed me her exciting discoveries of Macaronesian elements there on the occasions when my parents used to visit her and her husband, the late Mr. Geoffrey Allen, to go bird-watching. Although an amateur, who had started her interest in ferns in Malaya (see, for example, Holttum (1968)), she evidently understood the taxonomy of many of the Spanish species rather better than some of the professional botanists in her local vicinity.

Pteridium

Pteridium aquilinum (L.) Kuhn in von Deck. subsp. *latiusculum* (Desv.) Shieh (1973) = *P. latiusculum* (Desv.) Fries subsp. *latiusculum* (synonym: *P. aquilinum* (L.) Kuhn in von Deck. subsp. *japonicum* (Nakai) A. & D. Löve). Not present in the Indian subcontinent. A second Indian-subcontinental taxon was discovered in Pakistan and Indian-occupied Kashmir by me some years ago and reported (Fraser-Jenkins (1992)) as *P. latiusculum*. It is nearer to that species than to the

common Himalayan *P. revolutum* (Bl.) Nakai but is not the same as it is intermediate in morphology between *P. aquilinum* and *P. latiusculum* subsp. *latiusculum*. It has the near-glabrosity of *P. latiusculum* subsp. *latiusculum* but the segments are only slightly wider than in *P. aquilinum*, whereas in *P. latiusculum* subsp. *latiusculum* they are markedly wider. *P. latiusculum* subsp. *latiusculum* occurs as a boreal species in N. America, Scandinavia (not Britain), N.E. Germany, N.E. Europe (including Poland and Romania: Scarisoara, S.E. of Oradea. CRFJ 965, with Prof. G. Vida & J.D. Seed, 1 Sept. 1969 (LTR, BM, NMW); and 10 km S. of Cluj on Turda road, Ardeal, Transylvania, Romania. CRFJ 14473, 14 Nov. 1987) and throughout the northern part of the former USSR, Siberia and N. Japan. It is replaced further south in the USA, Europe (including Britain and Denmark), N.W. Africa, Macaronesia, the Caucasus, Turkey and Iran etc. by *P. aquilinum*. A very similar taxon occurs through Africa and has been called *P. capense* (Thunb.) Krasser, but is possibly synonymous, and another species, *P. centraliafricanum* (Hieron.) Alston occurs in E. Central Africa. Other species occur in C. and S. America, C. and S. China (including the edible *P. esculentum* (Forst. fil.) Cock., which I have eaten pickled there (as also a *Dicranopteris* species), whereas *P. aquilinum*, at least, is dangerously toxic). S.E. Asia (the main stronghold of *P. esculentum*, which, along with *P. semihastatum* (Wall. ex Agardh) Andrews (sub *Pteris lorigera* Wall., Num. List: no. 103 (1828), synonym: *Pteridium yarrabense* (Domin) Wakef.) was mistakenly reported by Nair (1972) from Kumaun on the basis of an erroneous locality of Wallich's: such mistakes being quite frequent in Wallich's List and on his specimens) and Australasia. The common Indian-subcontinental species is the distinctively stiff-crispaceous fronded *P. revolutum* (Bl.) Nakai, quite different from either *P. aquilinum*, which latter does not occur in the Indian subcontinent or S. Asia, or the far-west Himalayan species. *P. revolutum* extends throughout S. and much of S.E. Asia and across China (where it has been named more than once by Ching

and co-workers) to Taiwan. It is quite clear to me that these taxa are good species. True *P. aquilinum* has various synonyms, including *Polypodium austriacum* Jacq. (see Fraser-Jenkins (1980b)); *Pteridium tauricum* C. Presl ex Krecz. apud Grossheim; *P. aquilinum* subsp. *herediae* (Clemente ex Colmeiro) Jermy in Derrick, Jermy & Paul [sub "(Colmeiro ex Clemente)"]; *P. herediae* (Clemente ex Colmeiro) Barnola [or ? Joaquin; also "Löve & Kjellquist"] (once thought to be cytologically distinct in error (see Löve, Löve & Pichi Sermolli (1977)) and originally separated merely because it occurs on limestone, which happens commonly in *P. aquilinum*); *P. ceheginense* Barn. ex Joaq.; *P. aquilinum* subsp. *brevipes* (Tausch) Wulf.; and *Pteris brevipes* Tausch.

Pteridium, as treated in the literature so far, presents a non-standard nomenclatural situation, not because the taxonomic situation is different from that in other genera, which it is not, but because most taxonomists have shied away from it as it has become the domain of applied biologists and agronomists who have published reams of papers on its economic importance, including its chemistry and toxicity *etc.* usually without even being aware of which species they were reporting the details of! Indeed many such economic reports, often quoted from European or N. American literature, are obviously misapplied, especially in India, to the wrong species and are often completely erroneous as a result. Many papers, including in the "bracken-conferences," where authors should have known better, just talk about "bracken" or "*Pteridium*" as if it was all the one thing: yet it is clear that the morphology, ecology, range and chemistry are quite distinct between the species. An attempt was made by Tryon (1941) to bring the genus back into the reach of taxonomists, but that was very preliminary and unfinalised and treated most of the species only as varieties, which is not suitable. It is to be hoped that for once and for all the genus will now have its good and clear species recognised throughout Asia as they should have been long ago.

As the far-west Himalayan species has been almost totally overlooked

(apart from a brief comment by Nair (1972) that I have recently come across, mentioning the glabrous far-west Himalayan plants, which he wrongly concluded were of no taxonomic significance, and thought were linked to "var. *wightianum*" by intermediates), it appears not to have been named before and is described here as a new species:-

Pteridium brownseyi Fras.-Jenk., *sp. nov.*, *basionym.* *Morphologia frondis intermedia inter P. aquilinum et P. latiusculum subsp. latiusculum. Segmenta laminae fere glabra subtus ut in P. latiusculo sed aliquot anguste ut in P. aquilino, lobatiora ad lateras quam in P. latiusculo. Holotypus:* Pakistan, Azad Kashmir, c.¼ km N. of and below Sarbala, above and S. of Suden Gali village, c.4 miles N. of and below Suden Gali top, 6½ miles S. of and above Chikhar, S. side of Jhelum valley, S.E. of Muzaffarabad, Muzaffarabad District, below *Pinus* trees on grassy slope, 1720 m, with *P. revolutum*. *C.R. Fraser-Jenkins* 17193, 6 Nov. 1990 (BM). *Paratypes:* Ditto. 17194 (NMW) and 17195 (RAW). The species is named after Dr. Patrick J. Brownsey of the National Museum of New Zealand, Wellington, New Zealand, whose carefully researched work on *Hypolepis* (e.g. Brownsey (1987)) and *Pteridium* (Brownsey (1989)) needs to be brought more to the attention of Asian botanists.

Interestingly Rumsey, Sheffield & Haufler (1991) have found *P. aquilinum* and *P. latiusculum* subsp. *latiusculum* to be isozymically distinct and have also investigated a plant rather similar to *P. brownseyi* but from Scotland, Britain, found by Page (1989), who at first thought it to be *P. latiusculum* but later (Page (1995)) thought it to be a subspecies of *P. aquilinum*, before finally (?) describing it as a species, *P. pinetorum* Page in Page & Mill (1995), containing two subspecies. Actually I believe the subspecies to be synonymous in the sense he took them in, though the second one, subsp. *osmundaceum* (Christ) Page, is actually a misapplied name as the type of Christ's var. *osmundaceum*, which I have seen, is merely a large, sterile-frond type morphology example of *P. aquilinum*.

which is probably the only taxon present in Switzerland. The isozyme-results on *P. pinetorum* showed a pattern intermediate between *P. aquilinum* and *P. latiusculum* subsp. *latiusculum* and Rumsey, Sheffield and Haufler suggested it could be of hybrid-origin, showing that *P. latiusculum* and *P. aquilinum* are not fully distinct, forming such intermediates wherever they overlap. However the intermediate plants, which, like *P. brownseyi* have good spores, are behaving as a species (or rather, subspecies) now and should not be called hybrids *per se* and I cannot accept, either, that such distinct taxa as *P. latiusculum* and *P. aquilinum* are not distinct species. The Scottish plant, which I would suspect was very probably introduced into the small area of disturbed and quite possibly secondary or artificial roadside-pine-wood (hardly an ancient, undisturbed, primaeval forest-stand, as described) it occurs in, as shown to me and others by Page in 1994, is again intermediate in morphology between the two species, but is not very similar to *P. brownseyi*, having wider and less lobed, stiffer segments and being considerably closer to *P. latiusculum*, where it appears to me to belong (as I said to Page, Sheffield and others at the conference in 1994). I now recombine it as ***Pteridium latiusculum*** (Desv.) Fries subsp. ***pinetorum*** (Page) Fras.-Jenk., **comb. nov.** (basionym: *Pteridium pinetorum* Page in Page & Mill, *Bot. J. Scotland* **47**: 139 (1995)). Page & Mill (1995) also divided *P. aquilinum* into three subspecies, which, having been shown them in the herbarium at E by Page, I now synonymise in their entirety into *P. aquilinum sensu stricto* as being not worthy of nomenclatural recognition and just mistakes on Page's part. It is also clear from their isozymes (see Sheffield (1995)) that these subspecies are merely spurious. The two new names are *P. aquilinum* subsp. *atlanticum* Page and subsp. *fulvum* Page & Mill.

Concerning typification, when I investigated the name *Pteridium tauricum* (based on Ruprecht's *Pteris aquilina* L. var. *transcaucasica*) in 1983 I found that it must apply to *P. aquilinum sensu stricto*, common in Transcaucasia.

because Ruprecht's concept of *P. aquilinum* was based on the northern bracken, *P. latiusculum* subsp. *latiusculum*, that he knew from around St. Petersburg (erstwhile Leningrad), Ki'ev (in both of which places I have seen it), Moscow *etc.* When he visited the Caucasus he realised that he was seeing a different taxon and so named it anew. The obvious question arises as to which species Linnaeus' *P. aquilinum* belongs, the northern or southern bracken. Tryon (1941) took it to be the southern bracken and in so far as botanists have separated the two (more successfully in N. America and the far-east than in Europe) that is the sense in which *P. aquilinum* has normally been taken, both before and after Tryon. The bulk of (European) economic literature has also referred to the southern bracken under the name *P. aquilinum* and that is the sense in which one would like to take the name if possible. I have not yet looked into this as most Linnaean fern-names are in the process of being very carefully and expertly typified by Jarvis *et al.* of the BM's Linnaean names project (see, for example, Jonsell & Jarvis (1994)), who are typifying Linnaean names according to proper procedures in accordance with widespread and current usage, as long as this is not in conflict with the protologue (or earlier information) or with the references cited by Linnaeus. They will presumably also deal with this well known and economically important name. Page's (1995) far too hasty and unthought-out comment that Linnaeus' specimen was from Sweden was made without any reference to the above-mentioned and important Linnaean project and without commenting on the references Linnaeus cited for *Pteris aquilina*, but was presumably simply based on the fact that Linnaeus lived in Sweden, where only *P. latiusculum* subsp. *latiusculum* occurs (except possibly in the far south?), which may not actually be relevant.

P. aquilinum (L.) Kuhn in von Deck. subsp. *latiusculum* "(Desv.) Page" (1989) (and *sub* "(Und.) Desv." in Page & Golding (1989), which must have been a confusion with *P. aquilinum* var. *latiusculum* (Desv.) Underw. *ex* Heller) = *P. latiusculum* (Desv.) Fries subsp. *latiusculum*. Page must presumably have been unaware of

- Shieh's combination in his important work on Taiwanese ferns. Nakaike's (1975) well known book listing the full nomenclature of Japanese ferns shows that the combination was published twice by Shieh in 1973 and again in the *Flora of Taiwan* in 1975, two of these works being ones that one would expect most competent pteridologists dealing with a species present in Asia to be familiar with.
- P. aquilinum* (L.) Kuhn in von Deck. subsp. *pinetorum* Page (1995), *nom. nud.* = *P. latiusculum* (Desv.) Fries subsp. *pinetorum* (Page) Fras.-Jenk. Britain *etc.*, not present in the Indian subcontinent.
- P. aquilinum* (L.) Kuhn in von Deck. subsp. *wightianum* "(Agardh) A. & D. Löve" (1977) = *P. revolutum* (Bl.) Nakai. Although the Löves' combination is an illegitimate later homonym it was made valid by the reference to Tryon's (1941) combination where a valid basionym was cited. In 1977 they otherwise only cited Wallich's name as a basionym which, of course, was a *nomen nudum*.
- P. aquilinum* (L.) Kuhn in von Deck. subsp. *wightianum* (Agardh) Shieh (1973) = *P. revolutum* (Bl.) Nakai. *P. aquilinum* var. *lanuginosum* (Bory ex Willd.) Hay. is another name that has often been misapplied to *P. revolutum* in India, but applies to a distinct Mascarene taxon.
- P. aquilinum* (L.) Kuhn in von Deck. var. *wightianum* (Agardh) Tryon (1941) = *P. revolutum* (Bl.) Nakai.
- P. capense* (Thunb.) Krasser var. *densum* Nakai = *P. revolutum* (Bl.) Nakai. This name was reported from India in error by Dixit (1984) and with the erroneous authority of Tagawa (1949).
- P. pinetorum* Page in Page & Mill subsp. *pinetorum* = *P. latiusculum* (Desv.) Fries subsp. *pinetorum* (Page) Fras.-Jenk. Europe only.
- P. pinetorum* Page in Page & Mill subsp. *osmundaceum* (Christ) Page in Page & Mill. *non sensu* Page & Mill [= *P. latiusculum* (Desv.) Fries subsp. *pinetorum* (Page) Fras.-Jenk.] = *P. aquilinum* (L.) Kuhn in von Deck. Europe *etc.*, not present in the Indian subcontinent.

Pteris

Idiopteris hookeriana (Agardh) T. Walker = ? *Pteris hookeriana* Agardh. Although Walker (pers. comm. 1993) has suggested this species may be more closely related to the *Lindsaeaceae* than the *Pteridaceae*, Kramer (pers. comm. 1993) informed me that he felt sure it was a *Pteris* and not an independent genus. I have no personal opinion on the matter.

Pteris almeidiana Bole & Almeida (1977) = *P. otaria* Bedd. Walker (1958), in a most elegant and thorough study, produced a classical paper demonstrating that the diploid sexual taxon, *P. otaria*, represents or originated as a fertile hybrid between *P. multiaurita* Agardh and *P. quadriaurita* Retz.; all three have long been known from southern peninsular India. The plants he illustrated included exactly the form illustrated by Bole & Almeida as a "new species," on the strength of a tentative identification as a hybrid by Jarrett. Although the parental species are very different and are ecologically separated there is apparently no sterility-barrier between them and their chromosomes form bivalents in the "hybrids;" the "hybrids" being more abundant in Sri Lanka than the parental species. Walker also showed that the spores of self-fertilised *P. otaria* give rise to a range of form nearly approximating to both parents as well as to every possible permutation of intermediates. He therefore suggested that specific names should only be retained for the two parental species. However since *P. otaria* occurs widely and independently, reproduces itself and has a different, "mixed" ecology, it behaves as a species in its own right and, as with any other hybrid-derived, fertile species. I prefer to treat it as a species instead of using an x-sign and calling it a hybrid (an option Walker did not discuss). I see no reason, therefore, why it should not continue to be called *P. otaria*, regardless of the remarkable and surprising story of its origin.

Bole & Almeida's paper did not even cite any previous literature and since every one of their "new species" was obviously not new and could easily

have been identified properly if they had carried out proper background-research, this paper is a typical example of what is wrong in Indian botany and should not have been allowed to be published had the editor of the journal had it properly referred.

P. aspericaulis Wall. ex Agardh var. *subindivisa* (Clarke) Ching [*sub* "Wall. ex Hieron."] = *P. subindivisa* Clarke. This is a distinct species, which I have seen by the entrance to the Teesta gorge near Siliguri, below Darjeeling, and at Namdapha in Arunachal Pradesh; it would presumably also occur in E. Nepal. It does not belong to *P. aspericaulis*, as is sometimes thought.

P. cretica L. var. *nervosa* (Thunb.) Ching & S.H. Wu = *P. cretica* L.

P. excelsa Gaud. in Freyc. var. *rotunda* ["*rotundus*"] P. & H. Pande in Pande, Pande & Bhandari (1995), *nom. nud.* = *P. excelsa* Gaud. in Freyc. The original "type"-specimen from Nainital, 2000 m. H.C. Pande 570, 25 Aug. 1990, which I have seen in Herb. P.C. Pande at Almora University, is merely a sterile, baby plant of *P. excelsa* with undeveloped, rounded pinna-apices and should never have been considered for any sort of new name.

P. furunculata Nair & Ghosh = ? *P. gongalensis* T. Walker. The types at CAL (!) look no different from *P. gongalensis* and have the characteristic raised veins, a marked cartilaginous edge to the non-apiculate pinna-lobes and typical pinna-shape. They differ only in having strange raised microdots all over the lower surface of the lamina, visible with a lens. But the actual holotype itself only has a few of these dots, mostly nearer the pinna-costae. I cannot but assume that they are probably more of an abnormality, present to a rather variable degree in the populations concerned, rather than a feature of specific significance. The situation certainly needs more looking into and I do not accept this species at present.

P. hekouensis Ching in Ching & S.H. Wu = *P. barbiger*a Ching. It is strange that this very distinctive species, *P. barbiger*a, described from near Darjeeling, has been completely overlooked by modern Indian botanists, including by Dixit (1984a).

The type (Nallah near Rongbee, 4000', Darjeeling. *J.S. Gamble* 5217A. Oct. 1872. K (!)) shows it to be unique in the area in having densely scaly axes and costae. Rungbi is in the Teesta valley, below and east of Darjeeling and Mongpo. an area where many S.E. Asian elements occur that are more commonly met with further east.

P. x khullari Pangtey, Samant & Verma = *P. wallichiana* Agardh. The spores in the type-specimen are mostly young, but in an isotype ex herb. *Y.P.S. Pangtey*, kindly given to me on 3 Dec. 1994 (*C.R. Fraser-Jenkins* Field no. 523. NMW) I was able to find almost fully ripe sporangia near the base of the pinna, which contained normal good spores. From its frond-morphology, too, it does not appear to be a hybrid as originally thought due to confusion between semi-mature spores and hybrid-type abortive spores. It was a single aberrant plant within a population of normal *P. wallichiana* and merely represents an abnormal specimen of that species. The "plant" illustrated by Khullar (1994) is actually the apical half of a single radiating "pinna." The whole leaf had the tall, thick stipe normally found in *P. wallichiana* (Pangtey, pers. comm. 1994).

In point of fact it appears that *Pteris* could be an exception to the situation that occurs in most fern-genera in that, though genuine abortive spores, if present, must indicate hybridity, the converse is not necessarily true, as discovered by Walker (see above, *sub P. almeidiana*). Such a situation could well occur in certain other, but not necessarily all, *Pteris* hybrids and it would be of much interest to survey all known hybrids in the genus (once properly re-examined) to see where it does occur and where hybrid-type abortive spores occur.

P. nepalensis H. Itô in Hara (1966) = *P. puberula* Ching. Iwatsuki, Wu, Mitsuta & Chang (1984) have put *P. nepalensis* into the synonymy of *P. puberula* Ching without comment, as has Iwatsuki (1988). I have not yet been able to examine the type of *P. puberula*, though I know *P. nepalensis* well, but in my notes from PE on 8 May 1991, I noted that the material (which was all from

Yunnan) in the *P. puberula* folder in the general, non-type collection was typical *P. nepalensis*. I therefore feel pretty sure, pending seeing the type, that this species should be called *P. puberula*. It may therefore be anomalous that the illustration of *P. puberula* by Ching & Wu in Wu (1983) shows a species with anastomosing opposite-basal veinlets and perhaps rather more apiculate segments, which does not, therefore, match *P. nepalensis*. In other respects the illustration, if accurate, is generally similar, but I doubt it could really be the same species.

Punetha (1983) misreported *P. nepalensis* and *P. subindivisa* Clarke from Pithoragarh in error for *P. subquinata* Wall. ex Agardh (specimens reidentified by me) and not for "*P. pseudoquadriaurita*" Khullar, as stated by Khullar (1994: 285). I have seen *P. nepalensis* as far west as near the top of Sheopuri mountain, N. of Kathmandu, Kathmandu District, Bagmati Zone, C. Nepal. C.R. Fraser-Jenkins Field no. 1360, with R. & G. Pariyar, 19 April 1997, and it is abundant at higher altitudes in E. Nepal and around Darjeeling (also near Lachung, N. Sikkim. C.R. Fraser-Jenkins Field no. 1062, 15 Nov. 1995), with its widely deltate, thin lamina with few pinnae dying back at the first approach of winter. I have not checked if it is also present in Tibet, as would be expected.

P. prainii S. Ghosh = *P. cretica* L. This is merely a single old collection of an abnormal, ± undimorphic plant of *P. cretica*. The holotype and isotype at CAL (!) show the normal dimorphism between the sterile and fertile parts of the frond, but not the clear dimorphism between sterile and fertile fronds one usually sees. But such plants occur occasionally among normal ones. One frond in the isotype is actually a normal, fully dimorphic fertile frond, while another has the wider pinnae with marked teeth of a sterile frond throughout the lower part of the frond, but some narrower fertile areas in the upper pinnae. The specimen should not have been named as if a new taxon.

P. pseudoquadriaurita [sub "*pseudo-quadriaurita*"] Khullar = ? *P. aspericaulis* Wall. ex J.G. Agardh. This species was described in order to put a name to the

common west-Himalayan sexual diploid species previously included within *P. aspericaulis*. This was widely known to Indian authors (but not in the west) as *P. quadriaurita* Retz., in error, though Walker (1960) and others had long since shown that that species is confined to S. India and Sri Lanka in the Indian subcontinent. Drawing on this Khullar named and finally (Khullar (1994)) validly described the west-Himalayan plant as a new species, *P. pseudoquadriaurita*, though I had previously warned him that it was actually in the group of *P. aspericaulis* which needed full study before describing any new taxa therein. Khullar, thinking of its distinctness from *P. quadriaurita*, had not originally associated it with *P. aspericaulis* because Verma (in Mehra (1961)) had reported *P. aspericaulis* from the Darjeeling area as an apomictic diploid. Verma's specimen (Birch Hill, Darjeeling. S.C. Verma, Sept. 1957. PAN 3818 and 3321) is a distinct member of the *P. aspericaulis* group with rather few pinnae, wider segments, a stiff lamina and an all-rough stipe and rachis. Khullar's (1994) illustration of his type of *P. pseudoquadriaurita* (from Nainital, 1500 m. S.P. Khullar J. 43 (tag on specimen) or J. 46 (given on label), Oct. 1980 (PAN 8033) [locality, collector's number and date not even given in protologue]), showing only 5 pairs of pinnae, non-apiculate pinnules and the pinnae not lobed to the costae (i.e. looking like *P. biaurita* L.), is completely erroneous in all three parameters as the type actually has 17 pairs of pinnae, the pinnae fully dissect to the costa and apiculate at their apices! His illustration might even have been confused with *P. linearis* Poir. in Lam. (or, the main picture only, with *P. biaurita*) as it seems impossible that any pteridological author could have illustrated it so completely inaccurately in all its key diagnostic features unless they were actually quite unaware how to distinguish it.

The identity of *P. aspericaulis* itself has not yet been clarified. It was described from the Kathmandu valley or its surrounding hills (possibly also either on the old "Rajpath" route up to Kathmandu via Hetauda, or on the way to

Gossainkund via Dhunche in Rasuwa District) by Agardh, based on *Wallich* Cat. no. 107. Agardh's herbarium and the specimens he worked on are at Lund (LD), so a lectotype should be selected from there, which I have not yet done. But duplicates of *Wall. Cat.* 107 are at Kew (K and K-W) and, not surprisingly, contain collections showing more than one type of morphology, one with wider, coarser segments and up to c.8 pairs of pinnae, more similar to Verma's specimen, and one with narrow segments and more pinnae, closer to *P. pseudoquadriaurita*. The latter morphology probably corresponds more closely to Agardh's *P. aspericaulis* and is well represented by a specimen in K labelled "*Pteris aspericaulis*. Nepalia. *Wallich*, 1829. H.1.107, Herbarium Hookerianum 1867," with 11 pairs of pinnae. But it remains to be seen what, if any, specimens are at LD. The situation is also rather more complex because in the hills around the Kathmandu valley I have collected at least four different species with recognisably distinct frond-morphology, all belonging to "*P. aspericaulis*" *sens. lat.* Dr. T.G. Walker has been studying these for a forthcoming detailed cyto-taxonomic survey of the group and has informed me (pers. comm. April 1996) that he has found a sexual diploid, two different diploid apomicts and a triploid apomict among my collections from Jamachok, Sheopuri and Phulchowki mountains and near Sankhu, surrounding the Kathmandu valley, alone. *P. tricolor* Lindl., described from Sikkim, possibly corresponds with a further species in the group, though specimens from Sikkim so labelled at Kew are all *P. subquinata* Wall. *ex* Agardh in its white-variegated form, which is quite common, as I have seen, around Chungthang in N. Sikkim. *P. asperula* J. Smith is evidently another closely related species in the group and there are several others. Although, then more by good luck than anything else, *P. pseudoquadriaurita* might in the end stand, it can be seen that the description of a purported new taxon in this group without the necessary study of the rest of the group concerned, or even of the type of *P. aspericaulis*, the species most likely to be the same, was hardly sound and was

less than desirable at this stage. The whole group, including its various types and including in China and S.E. Asia, needs to be studied properly first. For now I assume the common west-Himalayan plant is quite probably *P. aspericaulis*.

P. raghavendrae ["*raghavendrei*"] Chowdhery & S. Singh = *P. wallichiana* Agardh.

I have seen the type at BSD.

P. silent-valliensis S. & R. Ghosh = *P. multiaurita* Agardh. The types at CAL (!) are stunted, small and exposed plants with very short, "erect" rhizomes; but other, more luxuriant material of it there shows a short, horizontal rhizome. The greater number of simple veins, with less forked veins is also an effect of exposure and is not shown so much in the rest of the material. The often toothed pinna-apices (at the very tip) and all other laminar features of this fern are typical of *P. multiaurita*. It is hardly sad that such an excruciatingly awful "latin" specific epithet (whose spelling, being an attempt at semi-latinisation as well as a geographical name, need not be altered under the Code recommendations) is now relegated to the silence it merits.

P. vittata L. forma *brevipinna* S.C. Verma in Mehra (1961), *nom. nud.* = *Pteris vittata* L. subsp. *vermae* Fras.-Jenk., *subsp. nov.*, *basionym.* *Plantae valde similis ad P. vittatam subsp. vittatam sed pinnis angustioris, soris et indusiis latioris et planta plerumque non magna ut in P. vittata subsp. vittata differt. Cellulae palearum ad basem stipitis magnae, sporae parvae. Cytotypus diploideus, n = 29* (Verma in Mehra (1961)). *Holotypus*: India, Uttarkhand (Uttar Pradesh): "*Pteris vittata* (forma '*brevipinna*'). Bhujia Ghat, Nainital, 700m. S.C. Verma [s.n., sin. date]. Pinnae narrow, broad, wide sorus, *n = 29* (PAN 3828)." *Isotypus*: Ditto. (PAN 3827).

This subspecies is named in honour of its discoverer, Prof. S.C. Verma, who has continued to produce important and carefully researched, original work at Panjab University, Chandigarh, for many years, following in the tradition of the late Prof. P.N. Mehra. The PAN register shows that the specimens were

collected in Sept. 1959 and incorporated in the herbarium on 3 Feb. 1962. Prof. Verma (pers. comm. c.1990) states that he and his small party stopped at the picnic spot just below Bhujia Ghat on the way up to Nainital from Haldwani and he climbed down a little below the road and made the field-fixation and collection, but could never refind the plant or other diploids later, though he has seen other similar material in BM, K *etc.* His comments have also been mentioned by Khullar (1994: 282), to whom I passed them on.

I have seen rather many similar plants from throughout the Himalaya, but it is too difficult to decide whether or not they could be just variation in subsp. *vittata*, rather than subsp. *vermae*, without detailed work on stomatal size (which is smaller in subsp. *vermae*) *etc.* The commonly occurring type of *P. vittata* in the Indo-Himalaya is a sexual tetraploid; there is also a larger, more tropical sexual hexaploid, occurring at least in S. India *etc.* and sterile hybrids also occur. In Bangladesh, around Calcutta, Assam *etc.* there is another taxon which is characteristic of tropical N.E. India at low altitude and replaces subsp. *vittata* there. It is smaller and has narrower pinnae which are often rather blunt at their apices. It appears generally similar to the W. Indies' and tropical C. and S. American, *P. longifolia* L., described from Haiti, which is both tetraploid and, rarely, diploid (see Proctor (1985: 268-269)), of which my Jamaican and St. Vincentian collections are sometimes difficult to distinguish from it. As far as I am aware the Bengali *etc.* plant has not previously been mentioned as a separate taxon in the Indian subcontinent, at least. It is also a more widespread S.E. Asian taxon and is named below as *P. vittata* subsp. *bengalensis* Fras.-Jenk.

In addition to Verma's work, Wang (1989), in a very interesting research-publication, has done detailed work and discovered the diploid and tetraploid (the latter at the type-locality for the species) along with two new sterile hybrids with abortive spores in various places in China. I have studied his numerous voucher-specimens at PE, which he kindly showed me, and believe his

diploid and tetraploid to be the same as the Indo-Himalayan ones, the diploid being of similar morphology to Verma's one. Wang also did some mapping of the cytotypes in China and gave good descriptions of them. He did not name them. However, but, along with Reichstein, expressed the hope that some new type of nomenclature could be adopted for cytotypes in species-complexes in the future. I myself am strongly of the opinion that no new system is required or would be desirable; cytology alone cannot be a good basis for naming taxa unless it is combined with some morphological distinction. Furthermore we already have a highly appropriate and practical rank available for such closely related and semi-cryptic taxa - that of subspecies, which is used here. The rank of species would in my opinion be both impractical and inappropriate and it is only to be hoped that this subspecies will not automatically be given the "Calcutta-treatment" (also done too readily and with too little taxonomic knowledge of the taxa concerned by Löve and a few other N. American botanists) of being picked up out of this publication and recombined at specific rank, in accordance with the long-term practice and dubious intentions of Panigrahi. However if future workers should decide, *after proper and full research of their own*, that it is, after all, to be distinguished as a species, I must remind them of the practical value of keeping a specific epithet the same as the subspecific one, where possible and appropriate, as here (Code (1994: Rec. 24b.2)), especially in cases where there will obviously be disagreement as to its ranking as a species. Thus a new combination, rather than a new species or *nomen novum*, would be the less confusing course; but I doubt future research into its features of distinction would be likely to indicate that the specific rank would be practically desirable.

The N.E. Indian taxon is described here as *Pteris vittata* L. subsp. *bengalensis* Fras.-Jenk., *subsp. nov.*, *basionym. Planta minora quam in subspp. vittata et vermae. Pinnae angustae, segmentum terminalis longissimum, apices pinnarum non valde acuti. Holotypus: India, W. Bengal, Calcutta, Ariadaha*

village on E. side of Hooghly river at Belgharia, N.E. of Dum Dum airport, N. 24 Parganas, N. Calcutta, at bases of old walls. *C.R. Fraser-Jenkins* Field no. 1382, 31 May 1997 (BM). *Isotypus*: Ditto. (NMW); growing with *P. multifida* Poir. in Lam. (Field no. 1383) and *Adiantum incisum* Forssk. subsp. *indicum* (Ghatak) Fras.-Jenk. (Field no. 1384) - see also Appendix, below.

The late Prof. Karl Kramer informed me in Zürich about 4 years ago, when we were jointly editing the ferns for *Flora Iranica*, that *P. vittata* is a quite exceptional species in the genus in many respects and that he was planning to look into it further to see if it really belonged in the same genus (which, however, I am satisfied must be the case), research which, sadly, was not to be forthcoming due to his being so unfortunately struck down at the height of his career by a brain-tumour. It would seem likely that this species belongs at least to a distinct section in the genus.

Pyrrisia

Pyrrisia birii P. & H. Pande, *nom. nud.* = *P. mannii* (Giesenh.) Ching. The "type"-specimen is in Herb. P.C. Pande, Almora University (!).

P. fissa (Bl.) Mehra [*sub "fissus"*], *non sensu* Mehra [= *P. porosa* (C. Presl) Hovenkamp] = *P. longifolia* (Burm. fil.) Morton. Not present in the Indian subcontinent.

P. jaintensis (Clarke) Ching in C.Y. Wu = *P. laevis* (J. Sm. ex Bedd.) Ching.

P. nayariana Ching & P. Chandra in P. Chandra = *P. porosa* (C. Presl) Hovenkamp. Khullar's record of "*P. nayariana*" from below Nainital was in error for *P. porosa*, which I have also collected, along with *P. mannii*, from the same locality.

P. stictica (Kunze) Holtt. = *P. porosa* (C. Presl) Hovenkamp.

Selaginella

Lycopodioides chrysocaulos (Hook. & Grev.) Kung = *Selaginella chrysocaulos* (Hook. & Grev.) Spring. I do not propose to recognise the genus *Lycopodioides* just because there are some groups within *Selaginella* which could be split if one

wanted to. *Selaginella* is a universally known, practical and useful genus, not needing to be split and *Lycopodioides* is in my opinion a good subgenus. Let us only hope we shall be spared a rash of Panigrahi new combinations in *Lycopodioides*.

L. delicatula (Desv. ex Poir.) Kung = *Selaginella delicatula* (Desv. ex Poir.) Alston.

L. pulvinata (Hook. & Grev.) Kung = *Selaginella pulvinata* (Hook. & Grev.) Maxim. = ? *Selaginella tamariscina* (Pal. Beauv.) Spring. The more extended growth-habit of *S. tamariscina* is inconstant and it can also have the compact rosettes of *S. pulvinata*. It remains to be studied whether the toothed leaves of *S. tamariscina* and entire ones of *S. pulvinata* are constant differences. "*S. pulvinata*" also occurs in S.E. Tibet, Kongbo. F. Ludlow, G. Sherriff & H.H. Elliot 12409 (BM) and in W. and W.C. Nepal: between Husta and Narhu, Bheri river. O. Polunin, W.R. Sykes & L.H.J. Williams 3240, in 1952 (BM); and Ranmugaon, 8000ft. J.D.A. Stainton, W.R. Sykes & L.H.J. Williams 3316, in 1954 (BM). I have also found it in quantity on the west side of the Kali river, at Pangola, N. of Tintola, c.25 km N. of Tawaghat, N. Pithoragarh District, Uttarkhand (Uttar Pradesh). C.R. Fraser-Jenkins Field no. 390, 23 Nov. 1994, somewhat further up the valley from the locality, nearer Tawaghat, discovered by Punetha, Sen & Kholia (1991), but published without locality. Their specimen was later confirmed by me for them and I then informed Dixit about it (in Jan. 1991) and gave him the specimen from Pithoragarh given me in 1990 by Punetha and I later also gave him some specimens of my 1991 collection from near Beijing (Peking), N. China, to show him how similar *S. tamariscina* and *S. pulvinata* are. Because Alston (1945) had had some doubt about its occurrence in India and Dixit had not seen it, he at first rejected it as an Indian species (Dixit (1983)) in error, but afterwards (Dixit (1992: 52)) published its occurrence in Pithoragarh on the basis of the material I brought to him from Punetha, though using the name *S. pulvinata* and omitting the collector and locality.

L. tamariscina (Pal. Beauv.) Kung = *Selaginella tamariscina* (Pal. Beauv.) Spring.

Selaginella blatteri Bole & Almeida = ?

S. blepharostachya Alston ex Knox = *S. pennata* (D. Don) Spring.

S. coonoriana Dixit (1985a ["1983"]) = ? Dixit compared this single collection with *S. cataractarum* Alston, to which, in my view, it is not closely related, then, not surprisingly, found considerable differences. The type at CAL (!) is probably closer to the *S. reticulata* (Hook. & Grev.) Spring group, though not that species itself. I doubt that Dixit's various "new species" in this group are really new and nearly all are based on inadequate single-locality collections. Scraps of them were sent for confirmation to Mr. A.C. Jermy at the BM through me, though he had not worked on Indian *Selaginella* in particular and had no interest to study and identify them. Indeed they were lost for some time until repeated requests through me stimulated their probably rather hasty examination. It seems more than likely that they all require further study, requiring a more detailed knowledge of the ranges of variation in S. and C. Indian species before thinking of them as "new species."

S. ganguliana Dixit (1985b ["1984"]) = ? *S. repanda* (Desv.) Spring. Dixit compared his "new species" only with the rather different *S. pallida* (Hook. & Grev.) Spring (*sub S. nepalensis* Spring), but it is not unlike a luxuriant specimen of *S. repanda*. Nakaïke's report in Nakaïke & Gurung (1995) of *S. repanda* from Nagarkot on the high northern rim of the Kathmandu valley is obviously anomalous and, though I have not been shown his specimen, I assume it is most unlikely for this rather low-altitude, Indian-peninsular and Nepal terai-foothills species. It is more likely to be a specimen of *S. pallida*, which somewhat resembles it in general.

S. indica (Milde) R. Tryon = *S. vardei* Lévl. or *S. longipila* Hieron.

S. jainii Dixit (1985a ["1983"]) = ?

S. kashmiriana Dixit [*sub* "(Milde) Dixit"] (*nom. nov.* for *S. borealis* (Kaulf.) Spring forma *indica* Milde, *non S. indica* (Milde) R. Tryon) = *S. jacquemontii* Spring.

Although I informed Dixit of the existence and application of the name *S. jacquemontii* in time, he preferred not to acknowledge it in his book (Dixit (1992)) and to continue to use his mistaken name, *S. kashmiriana*. The related species, *S. aitchisonii* Hieron. in Engl. & Prantl. has until now been mistakenly recorded from Nepal in error for *S. jacquemontii*, which is quite common in the west of the country, but I have seen and reidentified genuine *S. aitchisonii* (*sub S. sanguinolenta sens. lat.*) from N.W. Nepal, Mugu District, between Chuteko Lekh and Dolphu, 3200 m, rocks. *H. Tabata, D.P. Joshi et al.* 22090, 4 Aug. 1983 (KYO). Fraser-Jenkins (1992) has commented on and separated the two species which had been united as varieties of *S. sanguinolenta* (L.) Spring by Alston (1945).

S. keralensis Dixit (1987 ["1985"]) = ?

S. nairii Dixit (1985*b* ["1984"]) = ? *S. reticulata* (Hook. & Grev.) Spring. Dixit compared this "new species" with *S. minutifolia* Spring, which it is not close to. Its non-aristate median leaves and wide, ciliate strobili are much more similar to *S. reticulata* and the types in CAL (!) look more like a series of slightly attenuated small specimens of that species. Some of the more compact specimens look more normal.

S. nayarii Dixit (1987 [" 1985 "]) = ?

S. nepalensis Spring = *S. pallida* (Hook. & Grev.) Spring. Panigrahi (1978 and 1993*d*: 245) mistakenly advocated the wrong name, *S. nepalensis*, for this species, correctly called *S. pallida* by Alston (1945), who synonymised the other name. Panigrahi (1978) did not realise that by transferring the later homonym, *Lycopodium pallidum* Hook. & Grev., *non* Beyr. *ex* Gaud., to *Sellaginella*, Spring thereby created a new species or *nom. nov.* (see Code (1994: Art. 58.3, Ex. 2 and 3)). However this was published simultaneously with *Sellaginella nepalensis* Spring. Therefore under the Code (1994: Art. 11.5) we must follow the choice of name of the first author who combined them. Spring did not do so, also keeping

them separate in his later monograph (*Mém. Acad. Sci. Belg.* **24**(2): 116 (1850) - a reference omitted by Panigrahi for *S. pallida*, though put in (on pg. 261) for *S. nepalensis*). However Alston (1945: 218) did so under the name *S. pallida* and must be followed, but with the corrected author-citation of Spring only (the Code has changed since 1945, but not since 1978 in this respect). Panigrahi's note attempting to "straighten out this nomenclatural situation" as usual did nothing of the kind and was evidently written without knowledge of even the Code's better known rules. It has since been followed, despite my pointing it out to him in advance, by Dixit (1984 and 1992), who should better have trusted Alston's judgement if he could not check the situation out for himself.

S. panchganiana Dixit (1985a ["1983"]) = ?

S. panigrahi Dixit (1985a ["1983"]) = ? I am unconvinced of the good standing of this name. Dixit compared it with *S. proniflora* (Lam.) Bak., but it looks closer to *S. reticulata* (Hook. & Grev.) Spring and its allies.

S. rajasthanensis Gena, Bhardwaja & Yadav = ? *S. reticulata* (Hook. & Grev.) Spring. This was compared by its authors to *S. cataractarum* Alston (misspelt as "*catractrum*" by Dixit (1984 and 1992)), to which it bears little resemblance; but it is more similar to *S. reticulata*.

S. sanguinolenta (L.) Spring forma *aitchisonii* (Hieron. in Engl. & Prantl) Alston = *S. aitchisonii* Hieron. in Engl. & Prantl; see Fraser-Jenkins (1992: 88). This species, which I am one of the few living botanists to have seen growing and alive, has a consistently distinct habit, whether in its normal homophyllous form (which links *Selaginella sens. strict.* and *Lycopodioides*) or in its occasionally occurring delicate, heterophyllous form, which is usually confined to a few sheltered, usually sterile branches only, as observed by me in northern Pakistan (Jalband Valley, S.W. of and above Kalam, N. Swat, 3100 m. CRFJ 16990-16993, 16 Oct. 1990 (NMW, herb. Dixit (? in BSA), BM)), where it is pendent from rounded clumps hanging on rock-cliffs, but where, even on cliffs, *S. jacquemontii* never assumes

the same habit. In neither form does it equate to *S. jacquemontii* Spring or the boreal Asian *S. sanguinolenta* (L.) Spring. Alston (1945) was misled by the similar existence of two forms in *S. sanguinolenta*, reported by previous authors, into thinking that *S. jacquemontii* must be one form and *S. aitchisonii* the other, but all three are distinct species in my opinion. R.R. Stewart 7464 (NY!) from Baltal, N. Indian-occupied Kashmir, mentioned by Alston as showing both "forms" together is all the normal homophyllous form of *S. aitchisonii*, though doubted by Dixit (1992: 36), who neither knew this species or saw the specimen. When I discovered that *S. aitchisonii* and *S. jacquemontii* are actually genuinely distinct species, I demonstrated them and the two, previously unknown forms of *S. aitchisonii* to Dr. Dixit at Allahabad in Jan. 1991 and gave him material from my collection, since he had previously separated them more or less automatically without seeing the range of variation in *S. aitchisonii*.

S. sanguinolenta (L.) Spring forma *indica* (Milde) Alston = *S. jacquemontii* Spring.

S. tamariscina (Pal. Beauv.) Spring var. *pulvinata* (Hook. & Grev.) Alston = *S. pulvinata* (Hook. & Grev.) Maxim. = ? *S. tamariscina* (Pal. Beauv.) Spring.

Sphaeropteris

Alsophila albosetacea Bedd. = *Sphaeropteris albosetacea* (Bedd.) R. Tryon.

A. brunoniana Wall. ex Hook. = *Sphaeropteris brunoniana* (Hook.) R. Tryon.

A. contaminans Wall. ex Hook. = *Sphaeropteris glauca* (Bl.) R. Tryon.

Cyathea contaminans (Wall. ex Hook.) Copel. = *Sphaeropteris glauca* (Bl.) R. Tryon.

C. crinita (Hook.) Copel. = *Sphaeropteris crinita* (Hook.) R. Tryon.

C. nicobarica Balakrishanan & Dixit = ?? *Sphaeropteris albosetacea* (Bedd.) R. Tryon.

Stegnogramma

Lastrea mollissima (Kunze) Akasawa = ***Stegnogramma mollissima*** (Kunze) Fras.-Jenk., *comb. nov.* (basionym: *Gymnogramma totta* Schecht. var. *mollissima* Kunze, *Linnaea* **24**: 249 (1851)). I do not agree with Iwatsuki (1963) and Sledge (1981) that this group of Indian taxa within *Stegnogramma* should be

merely varieties, which seems rather an uncritical and outdated treatment, subspecies might have been more realistic, but I believe they are really quite distinct species with distinct ranges, partly distinct cytotypes and a sufficiently distinct morphology. Still less can I accept Irudayaraj, Manickam & Dominic Rajkumar's (1995) comment that even infraspecific divisions are of no value, which they were not in a position to state since they appear not to have examined or been properly familiar with material from any area other than S. India, where only *S. mollissima* occurs (reported as *S. pozoi* by them). The mere finding that the S. Indian plant is tetraploid, which is not a new report, having been known some 20 years previously, does not suggest that it is necessarily the same as the Madeiran tetraploid. To make proper conclusions, morphological comparisons of a number of specimens obviously have to be made. My own collections from Madeira and N. Spain on the one hand and S. India and the Himalaya on the other are clearly not of the same thing and they maintain themselves as distinct in cultivation (in the superb fern-garden of Mr. and Mrs. Martin Rickard at Kyre Park, Tenbury Wells, Worcestershire, England, where I have sent my plants from various regions of the world). Although Irudayaraj *et al.* report a spore-size difference from the west-Himalayan plants (which remain cytologically unknown) based on the figures given by Khullar in Khullar, Sharma & Singh (1983). Khullar's figures need to be reinvestigated from fully mature (ripe) samples from several localities in the W. Himalaya. There is no frond-morphological difference between the Himalayan plants (including Khullar's specimen mistakenly reported as *S. pozoi* var. *petiolata*, and his "normal" plants) and S. Indian plants that I have been able to observe and the spore-size in several of my own west-Himalayan collections from various localities is consistently rather large, of the same order as the figures of Irudayaraj *et al.* and clearly larger than the figures given by Khullar *et al.* (1983), whose spore-size figures I have often found reason to doubt. In addition I have no reason to state that the type or isotypes of *S. mollissima* are

lost and have never said so, as Irudayaraj *et al.* attributed erroneously to me. It should be remembered that many isotypes of Kunze's *S. Indian* (*etc.*) names exist in other herbaria, such as B, L, JE, TUB, K, G, despite the loss of his main herbarium at LZ. I have not searched for the types of *S. mollissima* so made no note about it and I cannot recall whether or not I have seen any.

The Japanese plant appears to be distinct from the N. and S. Indian *S. mollissima*, as pointed out by Sledge, and the Sri Lankan diploid appears to correspond to the Javan *S. aspidioides*, according to Sledge, though he did not use these names. *S. pozoi* seems to be confined to Europe, Macaronesia and Africa and though (Fraser-Jenkins (1992)), like others, I formerly treated the Himalayan plants (including *S. himalaica* Ching) as belonging to *S. pozoi* (*i.e.* in a wide sense), this was inadequate and was before I had looked into the genus in more detail.

Leptogramma pozoi (Lag.) Heyw. subsp. *mollissima* (Kunze) Nakaike =
Stegnogramma mollissima (Kunze) Fras.-Jenk.

L. scallanii (Christ) Ching = ? *Stegnogramma mollissima* (Kunze) Fras.-Jenk.
Iwatsuki (1963a) reported this name from Meghalaya referring to plants of *S. mollissima*, though I do not know if he had a correct concept of *L. scallanii*, or whether these plants really correspond with it. Petiolate lower pinnae is a variable characteristic in *S. mollissima*.

Stegnogramma himalaica (Ching) Iwats. = *S. mollissima* (Kunze) Fras.-Jenk.
Occasional anastomosis of the veins, which was pointed out by Ching as distinguishing his species, appears to be a variable feature of *S. mollissima* and not one of taxonomic significance. I have seen it happening occasionally in normal free-veined populations. The hairs on the frond-axes in "*S. himalaica*" are also no different from those in other *S. mollissima*.

S. leptogrammoides Iwats. (*synonym: Thelypteris kingii* Reed, *non T. leptogrammoides* (Ros.) Reed) = A good species with much longer and denser axial hairs than in *S.*

mollissima and many anastomosing veins. Bir's specimens of "*Stegogramma pozoi*" from Lachen in PAN (!) have been reidentified by me as this species.

S. petiolata Ching = *S. aspidioides* Bl. Khullar (1985 and 1991) reported a specimen of *S. pozoi* (Lag.) Iwats. var. *petiolata* (Ching) Holtt. from Gaurikund, Chamoli in the W. Himalaya, on the basis of Holttum's determination of his collection, as being distinct from the rest of his W. Himalayan collections. However having examined his specimens (*S. petiolata*. Gaurikund, 2400 m. *S.P. Khullar* 35, Oct. 1983 (PAN 7034) and Gaurikund, 2000 m. *S.P. Khullar* 5321 (K)) I have found them to be perfectly normal, rather exposed specimens of *S. mollissima* and not *S. petiolata* and I have also found only *S. mollissima* in the vicinity of Gaurikund. Holttum (*in litt.* 18 Jan 1983) wrote to Khullar with an identification of no. 5321 as *S. pozoi* var. *petiolata*, but added that the specimen "is more like Ceylon specimens than any in Kew herbarium from N.W. India. Its basal pinnae are short-stalked, and several others are free; most Indian specimens have all pinnae but the basal ones more or less adnate to the rachis, also longer hairs on the costae, lower surface." Yet I have to disagree slightly as many W. Himalayan (and S. Indian) specimens of *S. mollissima* have similarly shortly stalked pinnae and do not usually have longer hairs. But it is perhaps significant that Holttum said it was more like Ceylon specimens than the (four) other west-Himalayan specimens at Kew are - but not exactly that it was the same, indicating some uncertainty, despite his determination, which I believe to have been mistaken.

S. pozoi (Lag.) Iwats. subsp. *mollissima* (Kunze) Iwats. = *S. mollissima* (Kunze) Fras.-Jenk.

S. pozoi (Lag.) Iwats. var. *mollissima* (Kunze) Sledge = *S. mollissima* (Kunze) Fras.-Jenk.

S. pozoi (Lag.) Iwats. var. *petiolata* (Ching) Sledge (26 Feb. 1981) = *S. aspidioides* Bl.

S. pozoi (Lag.) Iwats. var. *petiolata* "(Ching) Holtt." (1981) = *S. aspidioides* Bl.

S. scallanii (Christ) Iwats. [*sub "scallani"*] = ? *S. mollissima* (Kunze) Fras.-Jenk.

S. totta (Schlecht.) Dhir [sub "(J. Smith)"] in Dhir & Sood (1981), *comb. inval., sin.*
basionym, *non sensu* Dhir [= *S. mollissima* (Kunze) Fras.-Jenk.] = *S. pozoi* (Lag.)
Iwats. Not present in the Indian subcontinent.

Thelypteris griffithii (T. Moore) Reed (1968) = *Dictyocline griffithii* T. Moore =
Stegnogramma griffithii (T. Moore) Iwats. I agree with Iwatsuki and others that
Dictyocline belongs in *Stegnogramma*.

T. griffithii "(T. Moore) Kuo" (1985) = *Stegnogramma griffithii* (T. Moore) Iwats.

T. totta (Schlecht.) Nayar & Kaur (1974), *comb. inval.*, alternative name not definitely
accepted by the authors, *non* (Thunb.) Schelpe (1963) [*synonym: Cyclosorus*
tottus (Thunb.) Pich. Serm.], *nec sensu* Nayar & Kaur [= *S. mollissima* (Kunze)
Fras.-Jenk.] = *Stegnogramma pozoi* (Lag.) Iwats.

Tectaria

Ctenitis parishii (Hook.) Jamir & Rao (1988: 368-369) = *Tectaria* (Sect. *Sagenia*)
manilensis (C. Presl) Holtt. (1985). A glance at Holttum's paper in the well
known *Indian Fern Journal* would have avoided Jamir & Rao's mistaken
combination. It also seems much more likely from their description, including a
"short-creeping, rather stout" rhizome, that instead of being *T. manilensis*
(*synonym: Lastreopsis manilensis* (C. Presl) Price), which has a long-creeping, ±
thin rhizome and is not yet known from India (see Holttum (1988)), their plant was
probably *Ctenitis subglandulosa* (Hance) Ching (*synonym: Ctenitis rhodolepis*
(Clarke) Ching), which has a superficially similar frond and is common in Nagaland
etc. They did not otherwise mention this species, though it has to be said that
their book is so highly incomplete and often inaccurate that that omission may not
be of significance.

Tectaria apiifolia "(J. Sm. ex Kunze) S. Chandra" = *T. apiifolia* (J. Sm. ex Kunze)
Copel. This name is listed in *Index Filicum suppl.* 1, but was overlooked by
Chandra. Holttum (1984*b* and 1986) has also pointed out the close relationship of
the monotypic genus *Psomiocarpa* to *Tectaria* Sect. *Sagenia*, though keeping it

distinct as *P. apiifolia* (J. Sm. ex Kunze) C. Presl. Its chromosome base-number also agrees with *Tectaria*. It occurs in the Philippines and is not present in the Indian subcontinent. Chandra's preoccupied combination was mistakenly listed by Johns (1997) under *Thelypteris*. Chandra's other Philippine combination, *Tectaria aurita* (Sw.) S. Chandra, *Kalikasan, Philippine J. Biol.*, **12**(1-2): 157 (1983), apparently accepted by Holttum (1986: 157-158), though subsequently mentioned under *Stenosemia* by Holttum (1988), is one of the names omitted altogether from *Index Filicum suppl.* 6, along with Price's *Ctenitis pallens* (Brack.) Price and *Lastreopsis manilensis* (C. Presl) Price, published in the same volume in this well known journal.

T. coadunata "(Wall. ex J. Sm.) Raizada & Chowdhury in Chowdhury" [*sub* "(Wall. ex Haines)"] = *T. coadunata* (Wall. ex J. Sm.) C. Chr. *Aspidium coadunatum* Wall. ex Hook. & Grev. is a later homonym of *A. coadunatum* Kaulf., so the basionym is *Sagenia coadunata* J. Sm. Following Sledge's (1972) and Holttum's work, it is now well known that *T. macrodonta* (Fée) C. Chr. is a superfluous *nom. nov.* and a synonym of *T. coadunata*. It is surprising that Dixit (1984) still listed them as separate species, while Gurung (1991 *etc.*) still listed the species under *T. macrodonta*.

T. decurrens (C. Presl) Copel. var. *minor* (Bedd.) Nayar & Kaur = ***Tectaria x pteropus-minor*** (Bedd.) Fras.-Jenk., **comb. nov.** (*pro sp.*) (*basionym: Sagenia pteropus-minor* Bedd., *Ferns S. India*: 82, t.245 (1864)). This hybrid, with abortive spores, that I have collected at Lady Horton's Walk, in the forest behind the Temple-of-the-Tooth on the north side of Kandy, Sri Lanka, in the same locality as Sledge (1972) did, has the parentage *T. decurrens* (C. Presl) Copel. x *T. zeilanica* (Houtt.) Sledge (see Sledge (1972)) and has been cytologically investigated by Manton & Sledge (1954). Beddome indicated in his protologue that he preferred the specific rank and named it in the form of a valid species, not in the same way as he treated varieties.

T. macrocarpa (Bedd.) Nayar & Geevarghese (1988 ["1986"]) = *T. wightii* (Clarke) Ching. Nayar & Geevarghese's combination was erroneously based on Beddome's (1863) *t.117*, which was labelled "*Aspidium polymorphum* [Wall. ex Hook. var.] β . *macrocarpum* Beddome." However in the text on pg. 40. Beddome provided the description for his plate and named it as *A. polymorphum* [var.] β . *contractum*, this being the name he accepted for the taxon concerned. Although the Code (1994: Art. 42.3) allows an illustration with analysis (such as *t.117*) to be acceptable *in place of* a written description or diagnosis, it is obvious that the written description and plate both apply to the one taxon and that as there is a written diagnosis, this and the name used there, rather than the plate, should be taken as the validating description. In it Beddome said, "it is, I believe, only a variety of *A. polymorphum*, and I have called it *polymorphum* β . *contractum*," mentioning the contracted fertile fronds and large, exindusiate sori. Thus var. *macrocarpum* must be considered an unaccepted *nomen nudum*. Beddome (1870: Index iv) listed *Aspidium polymorphum* var. β . *macrocarpum* with a reference to *t.117*, but this must be considered an illegitimate later synonym of var. *contractum*, while Beddome (1883: 218) incorrectly stated, "I do not consider the contracted form even a constant variety" and mentioned Clarke's (1880) *Nephrodium wightii* as referring to it. Similarly Beddome (1892: 45-46) mentioned under *Aspidium polymorphum*, "there is a specimen of the form with contracted fertile fronds and large sori collected in Northern India by Hook. f. et Thom. (i.e. the fern Mr. Clarke calls *Asp. wightii*)."

Turning to Clarke (1880: 538-539, *t.76*) we find that he provided a name at the specific rank for Beddome's "contracted variety" as *Nephrodium wightii* Clarke, based mainly on Wight's S. Indian (Courtallum) plant, which Beddome (1883) had mistakenly identified as *Sagenia siifolia* (Willd.) T. Moore, i.e. *Tectaria siifolia* (Willd.) Copel., a S.E. Asian species which Clarke separated from the S. Indian plant. Clarke also mentioned a specimen said to be from

Bhotan [Bhutan], coll. *Griffith*, as very doubtfully localised and said that *N. wightii* was considered as a var. of *A. polymorphum* by Beddome. Thus the earliest name at specific rank for this species, which is completely distinct from *T. polymorpha* (Wall. ex Hook.) Copel., is *Tectaria wightii* (Clarke) Ching (see also Holttum (1988)), and *T. macrocarpa* (Bedd.) Nayar & Geevarghese, based on Beddome (1870), is a synonym of it dating only from 1988 at the specific rank. It is surprising that Nayar & Geevarghese did not identify their specimens as the well known *T. wightii*, which had been listed with var. *macrocarpum* as a synonym by Nayar & Kaur (1974) and Dixit (1984), among their own compatriots, but they may have been misled into thinking that *T. wightii* applied only to a N.E. Indian species, particularly because Clarke's plate is rather poor; or they may have been confused by Chandra & Kaur's (1985) unnecessary new combination of *T. polymorpha* var. *macrocarpa*, also cited with the wrong, invalid basionym and a misprinted name and plate-number.

I designate as lectotype of *T. wightii* the specimen labelled "*Nephrodium wightii* [det.] C.B.C. Pen. Ind. Or., Courtallum. Herb. *Wight*" (K!). The species has been very well illustrated by Beddome and also, recently, by Manickam & Irudayaraj (1992: 569, t.199), though the latter expressed inexplicable confusion as to its clear distinctness from *T. polymorpha*. It also occurs in Bangladesh, from where I have seen specimens from Cox's Bazaar in DACU (e.g. *Begum & Akhtar* 4, 9 April 1973 and *Khanam, Begum, Rauf & Nahaz* 35, 9 April 1973), previously misidentified as *T. heterocarpa* (Bedd.) Morton, a species I have found commonly in Assam and also in Arunachal Pradesh (Namdapha, with the *Scientific Exploration Society* in Jan. 1994).

T. periya Nayar & Geevarghese (1988 ["1986"]) = ? *T. coadunata* (Wall. ex Hook. & Grev.) C. Chr. The dimensions and degree of frond-dissection are no greater than in *T. coadunata*, in contrast to Nayar & Geevarghese's statements, nor is the absence of bulbils on the lamina any different from *T. coadunata*, which normally

does not have them, but may in some populations. The sori, too, are as in *T. coadunata*. It is therefore doubtful if this "new species" represents more than part of the range of variation in *T. coadunata* and it obviously requires looking into.

I assume that the name *periya*, named after the place of the same name, was an abortive attempt at Latin with an incorrect termination, but since it is a geographical name the recommendations of the Code (1994) are unfortunately not mandatory and it does not have to be corrected properly to *periyana* as it should have been.

T. polymorpha (Wall. ex Hook.) Copel. var. *macrocarpa* (Bedd.) Chandra & Kaur [*sub "macrocarpa"*] (1985 ["1984"]), basionym incorrect = *T. wightii* (Clarke) Ching.

Thelypteris

Although Holttum has stated that the only alternatives in his view were to recognise all his "genera" or place all under *Thelypteris*, I believe it is more sensible to treat the great majority under that genus, but to recognise a few of the more distinctive groups as genera. I have adopted this course here, as have many recent authors, though the genera recognised by different authors not unnaturally vary slightly with their different viewpoints. I have had to make certain new combinations where names were apparently not available for Holttum's genera at the subspecific rank, hence authorities have been put in for all the thelypteroid subgenera, as well as the correct name at the generic rank as a synonym.

Subgenus *Abacopteris* (C. Chr.) Iwats. (*synonym*: Genus *Pronephrium* C. Presl).

x *Chrinephrium insulare* (Iwats.) Nakaike = *Abacopteris insularis* Iwats. = *Pronephrium insulare* (Iwats.) Holtt. = *Thelypteris* x *insularis* (Iwats.) Iwats. I agree with Holttum (and Iwatsuki) that on morphological grounds this "intergeneric" hybrid fits better in Subgenus *Abacopteris* (or *Pronephrium*) than in Subgenus *Cyclosoriopsis* (or *Christella*), but Nakaike (1992) was undoubtedly correct in creating a hybrid-genus for it as long as one prefers to separate Holttum's splinter-genera, which I do not. This taxon is obviously a hybrid from

its frond-morphology and Iwatsuki reported its meiosis to be irregular and its spores abortive. However neither Holttum, nor Nakaike commented further on its possible parentage, which Iwatsuki had thought to be *Thelypteris parasitica* (L.) Fosb. x *T. triphylla* (Sw.) Iwats. Holttum (1972b) commented that it is close to the Sri Lankan *Pronephrium thwaitesii* (Hook.) Holtt. and its fronds are indeed very similar. However Sledge (1981) commented that the species now known as *T. thwaitesii* (Hook.) Reed has good spores, having looked into it to see if it could be a hybrid, so it seems more likely that that could be an allopolyploid species which arose from a sterile hybrid, though no information as to its cytology is available as it has not been refound in Sri Lanka (or anywhere else) since more than a century ago. As is common and useful practice, allowed by the Code and widely followed by, among others, Lovis, Reichstein, Sleep, Vida, myself *etc.* (in *Asplenium*, *Dryopteris*, *Polystichum* *etc.*), the sterile hybrids giving rise to fertile allopolyploid species by chromosome-doubling (or apomixis) are most usefully given different binomials despite rather unnecessary and idiosyncratic objections from W.H. Wagner in N. America. Thus the existence of the name *T. thwaitesii* would not preclude the use of *T. x insularis*, *pro sp.*, if they were thought or found to have the same ancestry or parentage. Indeed, from examination of the type-collection at K, I would think it very likely that *T. thwaitesii* must originally have formed from a hybrid between *T. parasitica* and *T. triphylla* and must therefore represent a species derived from *T. x insularis*. However I did not check the spores to confirm Sledge's finding, but as he mentioned details of them I doubt he would have been mistaken. Most interestingly, Geevarghese in Nayar & Geevarghese (1985 and 1993) refound a taxon they reported as *T. thwaitesii* in roughly the same-locality in S. India as Beddome (1883: 399) reported it from and furthermore found that their plant has abortive spores which they could not germinate and is therefore a hybrid. They discussed its origin in some detail and concluded, I believe correctly, from their good illustrations and other local

evidence, that their plant was *T. parasitica* x *T. triphylla*. Thus their plant must be *T. x insularis* and not *T. thwaitesii* as they thought, though *T. thwaitesii* and the Japanese and S. Indian *T. x insularis* all look ± identical in frond-morphology alone.

A postscript to this story is that Holttum (1972) also reported a collection of a similar plant under the name *Pronephrium thwaitesii* from Assam, Jhansi river. *J. Day*, 1880 (K, P), which he said was a little larger with up to 5 pairs of pinnae (though this and more can also occur in *T. thwaitesii* and *T. x insularis*) and suggested it was "doubtless another local hybrid of *P. triphyllum*." I have not seen that specimen but I was lucky enough, to my surprise, to stumble upon a quite large population of a similar plant when taking a walk in order to have a peaceful break, while staying briefly near the noisy bazaar at Golaghat, Assam recently. The plants had formed a dense colony some 25 meters across by vegetative reproduction, beside a small village-pond on the N. side of the road at Kosarihat village, some 3 or 4 km N.E. of Golaghat (discovered on 21 Dec. 1995) and grew in company with *T. triphylla* and *T. appendiculoides* Fras.-Jenk., but not *T. parasitica* (which was nowhere in the vicinity (or area ?), though *T. arida* also occurred there). It differed from *T. x insularis* and *T. thwaitesii* only in having a slightly less widely deltate lamina and very slightly more deeply lobed, shorter pinnae with less long-acuminate pinna-apices. Like *T. x insularis*, it also had fully abortive spores, though in many, but not all, of the rather scarce fertile fronds the sporangia failed to complete their development. It also had a markedly long, thin, creeping rhizome by which it must have vegetated for many years. I gave a piece for cultivation to Dr. P. Gogoi, of the Botany Dept., Debraj Roy College, Golaghat, who is working on the mosses and ferns of Karbi-Anglong District and Nambor Forest, and it seems certain that it must indeed be a new hybrid between *T. triphylla* and *T. appendiculoides*, the latter species apparently not occurring in S. India, Sri Lanka or Japan. I now describe it as follows: -

Thelypteris x *gogoi* Fras.-Jenk., *hybr. nov.*, *basionym* (= *T. appendiculoides* x *T. triphylla*). *Planta hybrida morphologia valde similis idem T. thwaitesii sed differt pinnis aliquanto brevioribus et apicibus earum non longe acuminatis, pinnis aliquanto profundioribus lobatis. Rhizoma exilis longe repens, lamina lanceolati-deltata. Frondes fertiles elatiorae quam eas steriles. Sporae abortivae. Cytotypus ignotus. Holotypus*: India, Assam, among bushes by pond in fields behind and on N.W. side of Kosarihat village, c.3½ km N.E. of Golaghat, Jorhat District. C.R. Fraser-Jenkins Field no. 3001, 21 Dec. 1995 (BM). *Isotypes*: Ditto (NMW, KATH, PAN, CAL, herb. P. Gogoi (Golaghat)). It is named after Dr. P. Gogoi, of Golaghat, whose enthusiasm has led him to find a number of rare ferns in his area, including *Schizaea digitata* (L.) Sw. (see Gogoi, P. and Sarma, J. 1986. *Schizaea digitata* (L.) Sw., a less known fern of India from Assam, *Geobios New Reports* 5: 81-82 (1986)), *Parahemionitis cordata* (Roxb. ex Hook. & Grev.) Fras.-Jenk. and, together with me, *Doryopteris ludens* (Wall. ex Hook.) J. Smith and *Trichomanes saxifragoides* C. Presl, both near Nilip, Koilamati, Karbi-Anglong District, Assam, on 15 Dec. 1995. The latter species I have also found, growing with *Vittaria sikkimensis* Kuhn (CRFJ 18108) as far west as the S. side of Phewa Tal, Pokhara, W.C. Nepal. CRFJ 18089, 23 Jan. 1991, rather to my surprise - and indicating how little we yet know of the westernmost distribution of species in Nepal due to the lack of an active modern fern-specialist there until just recently (with the induction into this field of Mr. Naresh Thapa at Godavari, KATH).

Cyclosorus articulatus (Houlst. & T. Moore) Panigrahi (1993b) = *Pronephrum articulatum* (Houlst. & T. Moore) Holtt. = *Thelypteris articulata* (Houlst. & T. Moore) Panigr. In yet another second-hand paper gleaned with little or no taxonomic research of his own from the pages of Kramer & Green (1990) Panigrahi (1993b) has attempted to make as many new combinations from India as he could, several already made long before and listed in *Index Filicum*, without

adding any more to our actual knowledge of the thelypteroid ferns and without, as he claimed "establishing the artificiality of several of Holttum's genera" at all. Indeed the genera concerned (*Pronephrium*, *Pseudocyclosorus*, *Christella* and *Trigonospora*) stand very well and clearly as real and natural subgenera, as I see it, or genera as some others do, and are not in doubt as groups at all.

- C. asperus* (C. Presl.) Nayar & Kaur, *comb. inval.*, alternative name not definitely accepted by the authors = *Pronephrium asperum* (C. Presl) Holtt. = *Thelypteris aspera* (C. Presl) Iwats. Malesia only.
- C. gardneri* (Holtt.) Nayar & Kaur, *comb. inval.*, no full basionym ref. and an alternative name not definitely accepted by the authors = *Pronephrium gardneri* Holtt. = *Thelypteris gardneri* (Holtt.) Panigr.
- C. lakhimpurensis* (Ros.) Nayar & Kaur [*sub "lakhimpurensis"*], *comb. inval.*, alternative name not definitely accepted by the authors. Combination also made twice (pg. 65 and pg. 95) in same book = *Pronephrium lakhimpurensis* (Ros.) Holtt. = *Thelypteris lakhimpurensis* (Ros.) Iwats. I have found this species as far west as the S.E. side of Phewa Tal, Pokhara, W.C. Nepal. CRFJ 18110 and 18111, 28 Jan. 1991 (NMW), growing with *Thelypteris ornatipes* (Holtt.) Fraser-Jenk. CRFJ 18114 and 18115 (NMW). I also found *T. lakhimpurensis* near Deorali, Komale, above Khaireni, Gorkha District, W.C. Nepal. C.R. Fraser-Jenkins Field no. 1142, with Rajkumar K.C., 17 Feb. 1994 and (the same locality), Chisapani Darrah Khola, Komale, above Khaireni, Gorkha District. C.R. Fraser-Jenkins Field nos. 1055-1056, 30 Dec. 1996, and Nakaïke has found it in the Kathmandu valley. See also in the appendix, below.
- C. menisciicarpos* "(Bl.) Panigr." (1993b) [*sub "menisciicarpon"*] = *Pronephrium menisciicarpon* (Bl.) Holtt. = *Thelypteris menisciicarpa* (Bl.) Iwats. Panigrahi evidently did not trouble to check even *Index Filicum* before unnecessarily creating this combination for the second time.
- C. menisciicarpos* (Bl.) Holtt. = *Pronephrium menisciicarpon* (Bl.) Holtt. = *Thelypteris*

menisciicarpa (Bl.) Iwats.

C. nudatus (Roxb. in Griff.) Nayar & Kaur, *comb. inval.*, alternative name not definitely accepted by the authors = *Pronephrium nudatum* (Roxb. in Griff.) Holtt. = *Thelypteris nudata* (Roxb. in Griff.) Morton.

C. penangianus "(Hook.) Panigrahi" (1993b) = *Pronephrium penangianum* (Hook.) Holtt. = *Thelypteris penangiana* (Hook.) Reed. This was another unnecessary combination already made by Copeland nearly 50 years before and clearly listed in *Index Filicum*, which can hardly be missed.

C. penangianus (Hook.) Copel. = *Pronephrium penangianum* (Hook.) Holtt. = *Thelypteris penangiana* (Hook.) Reed.

C. repandus (Fée) Nayar & Kaur [*sub "repanda"*], *comb. inval.*, alternative name not definitely accepted by the authors = *Pronephrium repandum* (Fée) Holtt. = *Thelypteris repanda* (Fée) Morton. S.E. Asia only.

Pneumatopteris nudata (Roxb. in Griff.) Punetha & Kholia (1990) = *Pronephrium nudatum* (Roxb. in Griff.) Holtt. = *Thelypteris nudata* (Roxb. in Griff.) Morton. Its placement in *Pneumatopteris* by Punetha & Kholia followed comments by Holttum to Punetha (*in litt.* 25 May 1988) in which he identified one of Punetha's specimens (whose identity I have not checked on at K) as being *P. nudatum*, but added, "but I think this should belong to the genus *Pneumatopteris*. There are small swollen aerophores at the bases of the pinnae. Your specimen also has the two lowest pinnae very much reduced [but is] sterile. I hope you will make a field-study and consider making the transfer from *Pronephrium* yourself. I cannot continue to publish on fern-taxonomy much longer and my memory is also beginning to fail." From his comments it seems likely that Holttum may have either misidentified Punetha's specimen or at least been confused. On 23 June 1988 Punetha wrote to Holttum to suggest making the transfer and Holttum merely replied, on 14 July 1988, "if you publish a transfer to *Pneumatopteris* you must write *Pneumatopteris nudata* (Roxb.) Punetha to indicate quite clearly that you

are proposing a new name based on Roxburgh's type. Some specimens at Kew show rhizome-scales which are very thin, and lack superficial hairs; in this they resemble *Pneumatopteris*, which I believe to be the right genus." It is thus not clear that Holttum really advocated that *P. nudatum* (rather than some of the Kew specimens and perhaps Punetha's specimen) should belong to *Pneumatopteris*, which was evidently too rapidly seized on by Punetha & Kholia without the proper study advised and too readily published as if definite. It also seems likely that Holttum was merely getting confused, as he sometimes was (and admitted so) in his last couple of years. In 1990 I asked him specifically about it because Holttum (1972b: 105-106) had stated that *T. nudata* or another species would have made a good generic type. He confirmed to me in conversation that *P. nudatum* was definitely a *Pronephrium* and that Punetha & Kholia must have been incorrect to consider it a *Pneumatopteris*. I suspect that this situation was the inevitable outcome of Punetha & Kholia's publishing too much at second hand without doing their own proper research, which indicates that there was no proper basis for publishing and only led to confusion.

P. nudata (Roxb. in Griff.) var. *minor* Punetha & Kholia = *Pronephrium nudatum* (Roxb. in Griff.) Holtt. = *Thelypteris nudata* (Roxb. in Griff.) Morton.

Pronephrium articulatum (Houlst. & T. Moore) Holtt. = *Thelypteris articulata* (Houlst. & T. Moore) Panigr.

P. birii Dixit & Balkrishnan = ?

P. gardneri Holtt. in Holtt. & P. Chandra = *Thelypteris gardneri* (Holtt. in Holtt. & P. Chandra) Panigr.

P. insulare (Iwats.) Holtt. [*sub "insularis"*] = *Thelypteris* x *insularis* (Iwats.) Iwats.
See under x *Chrinephrium insulare*, above.

P. kumaonicum P. & H. Pande in Pande, Pande & Bhandari, *nom. nud.* = *P. penangianum* (Hook.) Holtt. = *Thelypteris penangiana* (Hook.) Reed. I have collected material from the small roadside "type"-population at Petsal, shortly east

of Almora, indicated to me by P.C. Pande, and it is normal *T. penangiana*, as is the "type" (Petsal, Barechhena. *H.C. Pande* 335, 25 May 1991, herb. P.C. Pande, Almora University (!)).

P. lakhimpurens (Ros.) Holtt. (1972b) = *Thelypteris lakhimpurens* (Ros.) Iwats.

P. lakhimpurens "(Ros.) Holtt. in Holtt. & P. Chandra" (1974 ["1971"]) = *Thelypteris lakhimpurens* (Ros.) Iwats.

P. nakaikei [sub "*nakaikeium*"] Dixit = ?

P. nudatum (Roxb. in Griff.) Holtt. (1972b) = *Thelypteris nudata* (Roxb. in Griff.) Morton.

P. nudatum "(Roxb. in Griff.) P. Chandra" (1974 ["1971"]) = *Thelypteris nudata* (Roxb. in Griff.) Morton.

P. parishii (Bedd.) Holtt. = *Thelypteris parishii* (Bedd.) Panigr.

P. penangianum (Hook.) Holtt. (1972b) = *Thelypteris penangiana* (Hook.) Reed.

P. penangianum "(Hook.) P. Chandra" (1974 ["1971"]) = *Thelypteris penangiana* (Hook.) Reed. It is as well that Chandra's paper preempting Holttum's work, kindly made available to several Indian authors in advance, failed to appear before Holttum's paper due to the inefficiency of publication of several of these Indian journals.

P. simplex (Hook.) Holtt. = *Thelypteris simplex* (Hook.) Iwats.

P. stenopodium P. Chandra in Holtt. & P. Chandra = ?

P. thwaitesii (Hook.) Holtt. = *Thelypteris thwaitesii* (Hook.) Reed. See under x *Chrinephrium insulare*, above.

P. triphyllum (Sw.) Holtt. (1972b) = *Thelypteris triphylla* (Sw.) Iwats.

P. triphyllum "(Sw.) P. Chandra" (1974 ["1971"]) = *Thelypteris triphylla* (Sw.) Iwats.

P. triphyllum (Sw.) Iwats. var. *parishii* (Bedd.) Kuo = *Thelypteris parishii* (Bedd.) Panigr.

P. triphyllum (Sw.) Iwats. var. *parishii* "(Bedd.) Nakaïke" = *Thelypteris parishii* (Bedd.) Panigr.

Thelypteris articulata "(Houlst. & T. Moore) Tag. & Iwats." (? Nov. 1975) =
Pronephrium articulatum (Houlst. & T. Moore) Holtt. = *Thelypteris articulata*
(Houlst. & T. Moore) Panigr. (Aug. 1975). The relative dates need checking.

T. laetestrigosa [sub "*laete-strigosa*"] (Clarke) Iwats. in Hara = *Pronephrium*
articulatum (Houlst. & T. Moore) Holtt. = *Thelypteris articulata* (Houlst. & T.
Moore) Panigr.

T. multilineata (Wall. ex Hook.) Morton = *Pronephrium nudatum* (Roxb. in Griff.)
Holtt. = *Thelypteris nudata* (Roxb. in Griff.) Morton.

T. multilineata (Wall. ex Hook.) Morton var. *bhutanica* Nair = ?

T. stenopoda (P. Chandra) Panigr. [sub "*stenopodum*"] = *Pronephrium stenopodum* P.
Chandra = ?

Subgenus *Amauropelta* (Kunze) Reid Smith (synonym: Genus *Amauropelta* Kunze).

Amauropelta hakgalensis Holtt. in Sledge = ? *Thelypteris bergiana* (Schlecht.) Tard.

Blot. I found in 1993 that this species has now become abundant on roadsides, walls and banks in a good number of places all around Nuwara Eliya in central Sri Lanka. Sledge's report of it as a rarity was undoubtedly correct at the time and I interpret the discrepancy as a case of its having spread rapidly in secondary habitats - the typical pattern of a successfully adventive species. Although Holttum had not been able to identify it with the known African (*sens. lat.*) species and Smith found that it was not an American species, I have compared my Sri Lankan material, which is often quite a bit larger than Sledge's original material, with the African species *T. bergiana* and found them to be almost identical. My material came from Nuwara Eliya. C.R. Fraser-Jenkins Field nos. 368-369, 26 Oct. 1993; Ohiya, Horton Plains. C.R. Fraser-Jenkins Field no. 481, 27 Oct. 1993; and Pedrotalagala. C.R. Fraser-Jenkins Field no. 371, 26 Oct. 1993. I also saw it at Hakgala (type-locality); Ramboda Pass; and Little World's End, Horton Plains. The frond-morphology of *A. hakgalensis* and *T. bergiana* matches exactly in every respect, including the similarly tapering lower pinnae, lobe-shape, number of veins,

the presence of both straight and hooked hairs beneath and, usually, minute indusia; they also look recognisably similar. The only difference I could find, as pointed out previously by Holttum and Sledge, is that there are scattered, pale glands (or "capitate hairs") on the lower frond-surface and indusia in the Sri Lankan plant - a feature which is rather seldom of major specific significance in most fern-genera. However among the large amount of material at my disposal from my collections, which I also examined in this respect when living, I found that the glands are sometimes so scattered as to be almost absent, approaching the condition in *T. bergiana*. It is also of interest that an apparent second species, very closely related indeed to and sympatric with *T. bergiana*, was described from S. Africa as *T. knysnaensis* Anthony & Schelpe, a year later than Sledge's publication and therefore not considered by him or Holttum. Though I have not seen this, it is said to differ only in having no hooked hairs beneath and in having a larger and glandular indusium. Turning back to my Sri Lankan collections, I found that the indusium also varies from (normally) being very small, to some specimens with quite obvious, rather large indusia, though it seems always to have some hooked hairs below. If, as seems possible or quite likely, from its closeness, *T. knysnaensis* is merely a local variant of *T. bergiana* and not a fully separate species in its own right, it would indicate that polymorphicity within *T. bergiana* can include glandularity (at least of the indusium) which is the only remaining feature of difference of the Sri Lankan plant.

Thus, rather than creating a new combination in *Thelypteris* for *A. hakgalensis*, which would have been necessary had it been a convincing new species, I think it very likely that it actually belongs to *T. bergiana*, which must have arrived adventively in Sri Lanka, perhaps from Madagascar or La Réunion. Further cytological information is necessary, however, as Löve, Löve & Pichi Sermolli (1977) only mention a number of " $2n = 168-194$ " and I have not been able to check the original paper on Tristan Da Cunha ferns - necessary when

consulting this work because of numerous misquotations and the unnecessary and often inaccurate standardisation to a $2n$ number. This was interpreted as a hexaploid by Lovis (1977: 274) - *i.e.* as a real figure of $n = 87$, but this is probably not relevant to mainland African *T. bergiana* as the Tristan Da Cunha plant (as also the W. African island one) is a distinct "variety." The Sri Lankan plant is diploid with $n = c.58$ (Sledge (1981), amending Manton & Sledge's (1954) original estimate of $n = 62$). *T. bergiana* is so far known to occur in E. and S. Africa, Madagascar and La Réunion (see Jacobsen (1983) and Burrows (1990)).

Subgenus *Amphineuron* (Holt.) Fras.-Jenk., *comb. nov.* (basonym: Genus *Amphineuron* Holt., *Blumea* **19**(1): 45-46 (1971)).

Amphineuron immersum (Bl.) Holt. in Nayar & Kaur = *Thelypteris immersa* (Bl.) Ching.

A. opulentum (Kaulf.) Holt. = *Thelypteris opulenta* (Kaulf.) Fosb. in Fosb. & Sachet.

A. terminans (J. Sm. ex Hook.) Holt. = *Thelypteris terminans* (J. Sm. ex Hook.) Tag. & Iwats.

Parathelypteris immersa (Bl.) Ching = *Thelypteris immersa* (Bl.) Ching.

P. subimmersa (Ching) Ching = *Thelypteris immersa* (Bl.) Ching.

Thelypteris decora (Domin) Reed = *T. terminans* (J. Sm. ex Hook.) Tag. & Iwats.

T. extensa (Bl.) Morton = *T. opulenta* (Kaulf.) Fosb. in Fosb. & Sachet.

T. terminans "(J. Sm. ex Hook.) Panigrahi" (1975b) = *T. terminans* (J. Sm. ex Hook.) Tag. & Iwats. (1975). I have not yet checked the exact dates of publication of these two combinations so as to ascertain which one has priority.

T. wagneri Fosb. & Sachet = *T. terminans* (J. Sm. ex Hook.) Tag. & Iwatsuki.

Subgenus *Coryphopteris* (Holt.) Fras.-Jenk., *comb. nov.* (basonym: Genus *Coryphopteris* Holt., *Blumea* **19**(1): 33 (1971)).

Coryphopteris didymochlaenoides (Clarke) Holt. in Nayar & Kaur = *Thelypteris didymochlaenoides* (Clarke) Ching. See also Grimes & Parris (1986: 11).

C. hirsutipes (Clarke) Holt. in Nayar & Kaur = *Thelypteris hirsutipes* (Clarke) Ching.

Lastrea angulariloba (Ching) Tag. = *Thelypteris hirsutipes* (Clarke) Ching.

L. indochinensis (C. Chr.) Tag. = *Thelypteris hirsutipes* (Clarke) Ching.

L. simozawae (Tag.) Tag. = *Thelypteris hirsutipes* (Clarke) Ching.

Parathelypteris angulariloba (Ching) Ching = *Thelypteris hirsutipes* (Clarke) Ching.

P. hirsutipes (Clarke) Ching = *Thelypteris hirsutipes* (Clarke) Ching.

P. indochinensis (C. Chr.) Ching = *Thelypteris hirsutipes* (Clarke) Ching.

P. simozawae (Tag.) Ching = *Thelypteris hirsutipes* (Clarke) Ching.

Subgenus *Cyclogramma* (Tag.) Iwats. (synonym: Genus *Cyclogramma* Tag.).

Cyclogramma auriculata (J. Sm.) Ching = *Thelypteris auriculata* (J. Sm.) Iwatsuki (synonym: *Cyclogramma himalayensis* (C. Chr.) Tag.; see Grimes & Parris (1986: 18)). Another apparent species, *T. khasiensis* Ching, from Meghalaya and Sheoporee (Sheopuri) range, near Sanko (Sankhu), [Kathmandu District,] Nepal. J.E. Winterbottom, Feb. 1848 (K!), det. R.E. Holttum, is very close to *T. squamaestipes* (Clarke) Ching. It was omitted by Dixit (1984), who presumably did not know of it. I have found it abundantly on Sheopuri on several occasions and collected it to show a range of variation in frond-morphology. I had assumed it was *T. squamaestipes*, as did Nakaike & Gurung (1988), so I rather doubt *T. khasiensis* is any more than another Chingian mistake, but further comparison should be carried out before deciding; I have not yet found *T. squamaestipes* in its original localities around Darjeeling in order to compare it properly.

C. tibetica Ching & S.K. Wu = ? *C. squamaestipes* (Clarke) Tag. = *Thelypteris squamaestipes* (Clarke) Ching.

Subgenus *Cyclosoriopsis* Iwats. (synonym: Genus *Christella* Lév.).

Christella appendiculata (Bl.) Holtt. = ***Thelypteris appendiculoides*** Fras.-Jenk., *nom. nov.* (for *Nephrodium appendiculatum* C. Presl, *Epim. Bot.*: 47 (1849), *non Thelypteris appendiculata* (Bl.) Reed). *Thelypteris molliuscula* (Bedd.) *comb. ined.*, cited as "(Bedd.) Iwats." by Iwatsuki (1988), was actually based (Iwatsuki in Hara (1986)) on the independent name, *Aspidium molliusculum* Kuhn and

applies to "*Pseudocyclosorus canus*" (Bak.) Holtt. & Grimes (see below under that subgenus), as does *Thelypteris hopei* (Bak.) Holtt., though Holttum (1976) had erroneously applied both names to the present species. Similarly *T. appendiculata* (C. Presl) comb. ined., erroneously cited by Iwatsuki (1988) as "(C. Presl) Reed," was actually based (Reed (1968)) on the independent name, *Gymnogramme appendiculata* Bl. and applies to "*Sphaerostephanos appendiculata*" (Bl.) Holtt. The epithet *microsorium* (*Nephrodium microsorium* (Clarke) Bedd.) also cannot be used for the present species since the combination is preoccupied in *Thelypteris* by *T. microsora* Reed. Thus this species needed a new name in *Thelypteris*, which I have now given it. This slightly aromatic-leaved, balsam-scented (when living) species, which is much confused with *T. parasitica* (L.) Fosberg by Indian botanists, is used in the Nambor Forest region (near Golaghat) in Assam as an insecticidal repellent and is placed under the paper in chests-of-drawers to stop insect-damage, including that from termites, according to Dr. P. Gogoi (pers. comm. 1995, specimens in use identified by me). As it is an abundant and widespread, weedy species it should be tried on a wider scale in the tropics.

The genus I accept for "*Christella*" is *Thelypteris* and I treat the species of *Christella* as constituting a subgenus, Subgen. *Cyclosoriopsis*, for reasons of priority (as with Subgen. *Abacopteris* instead of *Pronephrium*), though the choice of rank is rather arbitrary, but I take *Christella* as not being different enough, though a natural group, to merit generic recognition. These groups were thoroughly researched by Holttum and are highly meaningful and, I believe, natural; I only disagree with the rank he placed most of them at, though not in all cases. My reduction of some of his genera to subgenera, as has been done even more widely in the New World, does not, of course, negate Holttum's work, as wrongly implied in connection with my work by Panigrahi (1995). This can be seen from what I actually wrote (Fraser-Jenkins (1992: 110-111), as opposed to

Panigrahi's quite mistaken idea that I preferred to ignore Holttum's work, as one might be led to think, which was purely his own invention. Yet ironically, in contrast to his misplaced criticism, we actually find that Panigrahi (1993b) himself, having read through Reid-Smith's (1990), in Kramer & Green, generic rearrangement of Holttum's groups (which Panigrahi implied there are not very meaningful), took upon himself to claim that Holttum's genera are artificial, which they are not. He then proceeded to indulge in his main "taxonomic" activity of extracting information from papers by real specialists (particularly from that book), and making whatever combinations he could before others who were actually doing the real study and work. He thus combined several species of *Christella* (*Cyclosoriopsis*) and other subgenera into *Cyclosorus*, treated as a genus, while, as so often, not adding anything of substance to our knowledge and understanding of fern-taxonomy, or giving us any insight into the generic separability of *Cyclosorus*. Earlier, too, it must be pointed out that Panigrahi (1975a), when discussing these groups, misunderstood that though not all sporangia in a plant may bear glands, their presence (in some sporangia) is, as Holttum said, highly significant and diagnostic. He also belittled the importance of anastomosing veins, which are again highly significant in certain groups, and, copying but misapplying a comment by Holttum himself, claimed that the genera were artificial in these respects. The rest of his paper was, as usual, dedicated to creating combinations, several in error, having been made already *etc.*, while much other information published by him without proper source-acknowledgement, was right in the middle of being prepared by Holttum or Sledge when Panigrahi thought fit to interpose his partly preemptive paper into the scene. It can be seen that quite apart from these examples of dubious ethics, his mistaken implication that I did not properly take account of Holttum's genera was as fine an example of double standards as one could imagine!

C. arida (D. Don) Holtt. in Nayar & Kaur = *Thelypteris arida* (D. Don) Morton.

- C. assamica* (Bedd.) Holtt. in Nayar & Kaur = *C. subelata* (Bak.) Holtt. = *Thelypteris subelata* (Bak.) Iwats.
- C. clarkei* (Bedd.) Holtt. in Nayar & Kaur = *Thelypteris clarkei* (Bedd.) Reed.
- C. crinipes* (Hook.) Holtt. in Nayar & Kaur = *Thelypteris crinipes* (Hook.) Iwats.
- C. cylindothrix* (Ros.) Holtt. in Nayar & Kaur = *C. clarkei* (Bedd.) Holtt. in Nayar & Kaur = *Thelypteris clarkei* (Bedd.) Reed. I have found that the type of *C. clarkei* (K!) has good spores and is not a hybrid as suggested tentatively by Holttum (1976), but is merely an irregularly developed frond of what used to be called *C. cylindothrix* (*T. cylindothrix* (Ros.) Iwats. in Hara), which I therefore now call *T. clarkei*. I have recently collected this species as far west as the S. side of Phewa Tal, Pokhara, W.C. Nepal. C.R. Fraser-Jenkins Field no. 1138. 1 Jan. 1997; and below Komale, near Deorali, above Markichowk and Khaireni, Gorkha District, W.C. Nepal. C.R. Fraser-Jenkins Field no. 1093, 30 Dec. 1996; and in the next gorge above Chowti Bara temple, 6 km S. of Damauli, E. of Pokhara, Tanahun District, Gandaki Zone, W.C. Nepal. C.R. Fraser-Jenkins Field no. 1319. 23 March 1997. Another specimen of it I have reidentified from C. Nepal is from Makawanpur District, Garhi - Dunge. H. Kanai 674982. 16 Nov. 1990 (*sub T. dentata*) (KATH).
- C. dentata* "(Forssk.) Holtt." (1974 ["1973"]) = *C. dentata* (Forssk.) Brownsey & Jermy (1973) = *Thelypteris dentata* (Forssk.) E. St. John.
- C. dentata* "(Forssk.) Holttum in Nayar & Kaur" (1974) = *C. dentata* (Forssk.) Brownsey & Jermy (1973) = *Thelypteris dentata* (Forssk.) E. St. John. Nayar & Kaur were evidently not aware of the earlier combinations when they continued to publish Holttum's unfinished combination. Indeed Holttum (1976: 297) said that unfortunately some of the new combinations "published with my name in Nayar & Kaur's *Handbook*" were incorrect because he had not completed a full study of all the species at that time, and as we have seen (in the Introduction, above) he was not told of the existence of the book until it was in press, which only tends to

cast doubt on the advisability of over-cooperation unless ethical standards are raised in India.

C. dentata (Forssk.) Brownsey & Jermy = *Thelypteris dentata* (Forssk.) E. St. John.

C. dentata (Forssk.) Brownsey & Jermy var. *glabra* Punetha & Kholia (1990) = *C. papilio* (Hope) Holtt. in Nayar & Kaur = *Thelypteris papilio* (Hope) Iwats. The type in Pithoragarh (!) is a perfectly normal specimen of this species with the typical upright rhizome, "butterfly-like" auricles on the lower stipe, more glabrous lamina *etc.*, and has now been reidentified by me.

C. dentata (Forssk.) Brownsey & Jermy var. *himalayensis* Punetha & Kholia (1990) = *C. dentata* (Forssk.) Brownsey & Jermy = *Thelypteris dentata* (Forssk.) E. St. John. The type in Pithoragarh (!) has been reidentified by me and is perfectly normal *T. dentata*.

C. evoluta (Clarke & Bak.) Holtt. in Nayar & Kaur = *Thelypteris evoluta* (Clarke & Bak.) Tag. & Iwats.

C. gustavii (Bedd.) Holtt. in Nayar & Kaur = *Thelypteris gustavii* (Bedd.) Reed.

C. hilsenburgii (C. Presl) Holtt. = *C. hispidula* (Decne.) Holtt. = *Thelypteris hispidula* (Decne.) Reed. See Sledge (1981).

C. hispidula (Decne.) Holtt. = *Thelypteris hispidula* (Decne.) Reed. A single plant I found in W.C. Nepal which appeared to be very similar to *T. hispidula* has turned out to be a hybrid with abortive spores. It is named here as *Thelypteris x linii* Fras.-Jenk., **hybr. nov.**, *basionym* (= *T. clarkei* x *T. dentata*), named in honour of my kindly and esteemed friend, Professor Lin, You-Shin, of the Botanical Institute, Beijing, who has carried out valuable and realistic research on Chinese pteridophytes and was Dr. Anne Sleep's last student of pteridophyte-cytotaxonomy at Leeds University. *Planta hybrida, morphologia intermedia inter eum parentium. Rhizoma elongatum, adscendentum, plus minusve crassum. Frondes fasciculatae, stipites elongati, basis laminae lata, sed angustiora quam ad medium; pinnae profunde pinatifidae, lobi angusti (ut in T. clarkei), sed par*

unus et dimidium venularum infimarum oppositarum anastomosans infra sinum ad basem pinnularum, pili laminae breves et dispersi. Sporae abortivae. Holotypus: W.C. Nepal, Gandaki Zone, Gorkha District, Chisopani Darrah Khola, c.½ km above Komale, near Deorali, above and N.E. of Markichowk and Gopling, N.W. of Majhuwa Khaireni; deep, rocky, forested stream-gorge. C.R. Fraser-Jenkins Field no. 1060, 30 Dec. 1996 (BM). Isotypi: Ditto (NMW, KATH)

The exactly intermediate rhizome and lamina-base do not agree with the hypotheses that a creeping rhizome is dominant to an erect one and a non-decrescent lamina-base is dominant to a decrescent one in hybrids in this subgenus. These ideas were formulated by Panigrahi in his Ph. D. thesis at Leeds and were unfortunately included in his joint-paper partly under Manton's name (Panigrahi & Manton (1958)), there not at that time being enough evidence available to question them. However, while Holttum (1976) found them surprising, Sledge (1981) was the first to state outright that he found them dubious as regards the lamina-base (even after allowing for his probably misidentified specimens); his doubts are amplified here. Panigrahi's theories were probably no more than an attractive idea for a student to put into his Ph. D. thesis, but unrealistic due to insufficient different cases having been studied and perhaps also as a result of not having seen plants growing naturally. Panigrahi's (1993*d*) enthusiastic review of his previous publications, and their apparent support by various workers, curiously failed to refer to Sledge's important and well known work and appears to be misplaced compared to what we actually find in nature.

Khullar in Khullar, Sharma & Singh (1983: 627) stated that no wild hybrids of *C. dentata* had yet been found, but must have been unaware of the well known literature on this subject, including the reports of Manton & Sledge (1954) and Sledge (1979 and 1981). Sledge's reports included *C. dentata* x *C. parasitica*, but the first specimen he cited (*Alston* 11745), with good spores, was therefore not a hybrid (since "*Christella*" hybrids have abortive spores), but an

error for a probable variant of *T. dentata*, or some closely related taxon. But the other two specimens he cited (*Sledge* 509 and 1357, BM (!)) are this hybrid in my opinion. A hybrid said to be of this nature, as well as another *T. dentata* hybrid, has also been reported by Wagner (1988) from Hawai'i, but without seeing the specimen I am not sure that his report would be reliable, both in terms of the identification of its presumptive parents and as to whether it is genuinely a hybrid. However this hybrid has recently been named and described from Taiwan as *Cyclosorus x intermedius* Shieh & Tsai and is now given a new name (unfortunately necessary for nomenclatural reasons), in *Thelypteris* as ***Thelypteris x paradentata*** Fras.-Jenk., *nom. nov.* (for *Cyclosorus x intermedius* Shieh & Tsai, *J. Sci. Engin. (Nat. Chung-Hsing Univ.)* **24**: 8 (1987), *non Thelypteris intermedia* (Mühl. ex Willd.) House [= *Dryopteris intermedia* (Mühl. ex Willd.) A. Gray] (= *Thelypteris dentata x T. parasitica*). The epithet means "near to *dentata*" and is not a hybrid-formula, *i.e.* does not have a hyphen and does not combine "parts of the epithets of the names of the parents" in the sense of the Code (1994: Rec. H.10A), but it is convenient in coincidentally reminding us of the presumptive parentage of the hybrid and thus avoids the problem raised by Rec. H.10A, mentioned in Rec. H.10B, that formulae for hybrids are more informative than epithets. The main problem of having many hybrid-epithets, as far as I am concerned, is that I can never remember which hybrid they are - even with some of my own namings; but when it comes to the multitude of Japanese hybrid-epithets, consistently and most annoyingly listed in Japanese Floras *etc.* without putting in the presumed parentage, I have little hope of knowing what they are supposed to be! I generally ignore them unless the parentage is written in the same work: I also suspect that quite a lot of them may not even be hybrids at all, let alone whether their parentage has been correctly speculated, which is always a problem.

Sledge also reported *Christella hispidula x C. parasitica*, surely correctly, and this is named and described here as ***Thelypteris x parahispidula*** Fras.-Jenk..

hybr. nov., basionym (= *Thelypteris hispidula* x *T. parasitica*). *Planta hybrida, morphologia frondium intermedia inter eum parentium. Stipes elongatus, basis laminae lata sed par infimum pinnae parum abbreviatum, par unus venularum anastomosans ad basem pinnularum; lamina disperse hispidula. Sporangia abortiva. Holotypus: Sri Lanka, Lady Horton's Walk, Kandy, 600 m. J. Manton P93 (43), Dec. 1950; ex hort. Tropical Fern House, Kew. Coll. A.H.G. Alston 11742, BM (!). Triploid with *n* pairs and *n* singles (Sledge (1981)). Although the sporangia have aborted so that the spores cannot be checked, the cytological result clearly indicates that it is really a hybrid and, as pointed out by Sledge, also strongly suggests its parentage when considered along with its frond-morphology.*

The third hybrid Sledge reported was *Christella meeboldii* x *C. parasitica*, though it is not clear from his description whether it has good spores or not and unfortunately I have not examined the specimen (BM). However, the photograph of a meiotic count of it given by Manton & Sledge (1954: 183, t.10, f.99) looks more like normal meiosis in a tetraploid and would seem to have far too many bivalents for what might be expected in such a hybrid. Their own interpretation also indicated serious doubt, which Sledge (1981) did not comment on. This "hybrid" may therefore have been a mistake and is not described here. This and the other doubtful records may explain why Sledge thought that spore-sterility in this subgenus was not strictly associated with hybridity, which I believe it to be.

C. hokouensis (Ching) Holtt. = *Thelypteris hokouensis* (Ching) Reed.

C. jaculosa (Christ) Holtt. = *Thelypteris jaculosa* (Christ) Panigr. I have found this species as far west as the next gorge above Chowti Bara temple, 6 km S. of Damauli, E. of Pokhara, Tanahun District, Gandaki Zone, W.C. Nepal. C.R. Fraser-Jenkins Field no. 1318, 23 March 1997. This species has long been misnamed by Japanese botanists as *T. subpubescens* (Bl.) Iwats. in error.

C. kumaunica Holtt. = *C. x kumaunica* Holtt. (*pro sp.*) = ***Thelypteris x kumaunica*** (Holtt.) Fras.-Jenk., **comb. nov.** (*pro sp.*) (*basionym: Christella kumaunica* Holtt.,

Kew Bull. 31(2): 318 (1976)). The spores in the type-specimen at K were found by me to be abortive and were so determined on the sheet in May 1990. They were probably not just young spores, which can easily be mistaken as abortive, but were irregular, with thick, granular perispores and occasional irregular clear folds or "wings." Considering also its distinctive frond-morphology, I think it must therefore be a hybrid, though I would like to recheck. I have seen no other material of it. If it is a hybrid, *T. arida* (D. Don) Morton would appear to be quite likely for one parent, the other being unknown, but just possibly being something like *T. jaculosa* (Christ) Panigr. The lamina-base gradually tapers down to very small pinnae, which occurs in both those species. The rhizome is a thin, long-creeping one, again similar to that in *T. arida* and *T. jaculosa*. I do not think either *T. dentata* or *T. papilio* (Hope) Iwats. could be part-parental, as I once thought possible choices. The frond-morphology of this taxon is very similar indeed to *T. jaculosa* but it has slightly deeper and narrower pinna-lobes. However it is not likely to be that species in view of its abortive spores, unless it represents an individual with disturbed cell-division, furthermore I have not seen that species further west than W.C. Nepal, so its involvement, also as a parent, must remain highly conjectural.

C. lebeufii (Bak.) Holtt. in Nayar & Kaur = *Thelypteris lebeufii* (Bak.) Panigrahi (1975a). This combination, like Panigrahi's note on *T. jaculosa*, was based on the revision of these species at Kew by Holttum, whose monograph on the subgenus was thus partly preempted.

C. malabariensis (Fée) Holtt. = *C. dentata* (Forssk.) Brownsey & Jermy = *Thelypteris dentata* (Forssk.) E. St. John. See Sledge (1978), but Sledge (pers. comm. c.1980 and Sledge (1982) later found that *C. meeboldii* (Ros.) Holtt. in Nayar & Kaur (i.e. *T. meeboldii* (Ros.) Reed) is a good species which should be excluded from the synonymy of *C. malabariensis* where Holttum had placed it in error due to misapplication of the latter name.

C. meboldii (Ros.) Holtt. in Nayar & Kaur (1974) = *Thelypteris meboldii* (Ros.) Recd.
C. meboldii ("Ros.) Holttum, Saldanha & Nicolson" (1976) = *Thelypteris meboldii* (Ros.) Recd. Holttum's combination of 1976 had been pre-empted by Nayar & Kaur (see Holttum (1975) for his comment about their book not being shown to him until very shortly before its publication).
C. multiauriculata Punetha, non *Thelypteris multiauriculata* (Copel.) Recd. = *C. dentata* (Forssk.) Brownsey & Jermy = *Thelypteris dentata* (Forssk.) E. St. John. The type at Kew and duplicate at Pithoragarh, together with similar material Punetha and I collected together adjacent to the type-locality (now built over) on the site of Government Post-Graduate College, Pithoragarh, next to his office there, are normal *T. dentata*. Holttum (*in litt.* 2 Nov. 1985) actually told Punetha his specimen was nearest to *T. dentata*, but that the capitate hairs on it are not normal in that species and the specimen did not correspond to any species known to him [in that respect]. He went on to describe it to him as otherwise showing what are the normal characteristics for *T. dentata*: auricled pinnae with a few reduced basal pinnae. Punetha (1990) mistakenly thought these latter features were special to his collection and emphasised the auricles in his description and new name even though they are exactly the same as in any *T. dentata*. Holttum then obliged him when he required a latin diagnosis, but did not appear to imply, as Punetha thought, that he accepted the "new species" (as also with Punetha's "new varieties" of *T. dentata*). Punetha & Sen (1988) have also found that it is tetraploid and thus the same ploidy as *T. dentata* (which is not partly diploid as they said). The glands (? spores, dust or mould) on the type are clearly not significant and I have now reidentified this species as *T. dentata*. Had Punetha troubled to carry out his own proper research which is the real justification for publishing - in order to teach others after really becoming knowledgeable about the subject - such errors could perhaps have been avoided, instead of rushing into

print, without developing any in-depth knowledge of the subject, whenever he receives information from others. It seems that this "species" was basically the result of a misunderstanding of Holttum's words. Punetha also stated erroneously that natural hybrids of *T. dentata* do not occur (see above, under *C. hispidula* and see Sledge (1981), who mentioned several and stated that Manton & Sledge (1954) first found such wild hybrids).

C. namburensis (Bedd.) Holtt. in Nayar & Kaur = *Thelypteris namburensis* (Bedd.) Reed. I have recently collected this species in the forest behind the Forest Rest House at Digboi, Lakhimpur District, Assam. It is close to *T. jaculosa*, but more hairy and the fronds on smaller, more juvenile plants have an abruptly ending, ± wide lamina-base, though those of larger plants have a tapering lamina-base, which was not described by Beddome.

C. papilio (Hope) Holtt. in Nayar & Kaur = *Thelypteris papilio* (Hope) Iwats.

C. papilio (Hope) Holtt. in Nayar & Kaur var. *repens* Sledge = *C. sledgei* (Fras.-Jenk.) Khullar, in prep. = *Thelypteris sledgei* Fras.-Jenk., *nom et stat. nov.* (for *Christella papilio* var. *repens* Sledge, *Bull. Brit. Mus. Nat. Hist., Bot.*, **8**(1): 37-39 (1981)). That this is a good species, in contrast to what Sledge thought, has been accepted already by Holttum (1976: 335), but unfortunately under the wrong name of *Christella taprobanica* (Panigr.) Holtt. (see below under that name), as pointed out by Sledge. Sledge did not create a superfluous name, as might be thought, when he placed *T. taprobanica* Panigr. in the synonymy because he put "*p. p.*" after it and showed in the text that he excluded the holotype, it was also a name at a different rank. Johns (1997) mistakenly gave its range as throughout the Himalaya *etc.*, having misunderstood that this was the range for the whole species given in Sledge's paper. It is known so far only from Sri Lanka.

C. papyracea (Bedd.) Holtt. in Nayar & Kaur = *Thelypteris papyracea* (Bedd.) Reed.

C. parasitica (L.) Lév. = *Thelypteris parasitica* (L.) Tard. Blot. The many reports of this species from the W. and C. Himalaya (at least) are in error for *T.*

- appendiculoides*, whose lamina-base is often wider than expected, particularly in sterile fronds; it is also reported in error for *T. dentata* and sometimes *T. clarkei*.
- C. quadrangularis* (Fée) Holtt. in Nayar & Kaur = *C. hispidula* (Decne.) Holtt. = *T. hispidula* (Decne.) Reed. Ghatak, Manton & Holttum (1971) showed that the name *Nephrodium quadrangulare* Fée corresponded with their diploid ancestral species with an upright rhizome, which Holttum (1976) finalised the nomenclature for as *Christella hispidula*, but in the meantime Nayar & Kaur published Holttum's unfinalised nomenclatural findings prematurely and so created this unnecessary combination.
- C. semisagittata* (Roxb. in Griff.) Holtt. = *Thelypteris semisagittata* (Roxb. in Griff.) Morton.
- C. siamensis* (Tag. & Iwats.) Holtt. = *Thelypteris siamensis* Tag. & Iwats. = ? *Thelypteris hispidula* (Decne.) Reed.
- C. sledgei* (Fras.-Jenk.) Khullar (1997, in press) = *Thelypteris sledgei* Fras.-Jenk.
- C. subelata* (Bak.) Holtt. = *Thelypteris subelata* (Bak.) Iwats.
- C. subpubescens* (Bl.) Holtt. = *Thelypteris subpubescens* (Bl.) Iwats.
- C. sumatrana* (v. A. v. R.) Mitsuta = *Thelypteris subpubescens* (Bl.) Iwats.
- C. taprobanica* (Panigr.) Holtt., *non sensu* Panigr. (as to type), *nec* Holtt. [= *Thelypteris sledgei* Fras.-Jenk.] = *C. dentata* (Forssk.) Brownsey & Jermy = *Thelypteris dentata* (Forssk.) E. St. John. Panigrahi's (1976a) bungled attempt to make his own new species out of Manton & Sledge's (1954), at that time, ongoing work on the cytotaxonomy of Sri Lankan ferns was forthrightly exposed by Sledge (1981: 37-39), who (pers. comm.) remained most upset by the unwarranted and, worse, incompetently erroneous interference into his research. The species concerned has now been "rescued" and named after its discoverer. Although Holttum (1976) took the name *C. taprobanica* to mean the present taxon he did not notice (and such an error would indeed be unexpected) that Panigrahi selected the wrong specimen as holotype and thus *C. taprobanica* is only a synonym of *T. dentata*.

In fact only one of the three specimens Panigrahi cited belonged to the correct species and he clearly did not know how to recognise the species he was attempting to name. As Sledge said, having learnt from the literature (Manton & Sledge (1954)) that certain Sri Lankan plants were tetraploid members of the *T. papilio* (Hope) Iwats. aggregate and had creeping rhizomes (whereas *T. papilio* is diploid and has an erect rhizome), Panigrahi just selected as a new species (perhaps revealing thereby that his "principle" to name all cytotypes may be based more on the desire to create new names under his own authorship than on real taxonomic reasons!) the three specimens that he found placed in the *T. papilio* folder at Kew which had creeping rhizomes - despite the fact that two of them, including the type he chose, were *T. dentata*, which also, of course, usually has a \pm short-creeping rhizome! This misappropriation can hardly be called respectable taxonomic research. Yet Panigrahi (1993d: 245), though obviously well aware of Sledge's important paper (which he has cited elsewhere), pretends to be blissfully unaware of his incompetent *faux pas*, though this cannot really be so. Instead of abjectly retracting his error he even trumpets it abroad, self-importantly, as an achievement, and then ignorantly proceeds to make another pointless new combination for it in *Cyclosorus*!

C. zeylanica (Fée) Holtt. in Nayar & Kaur, *non Thelypteris zeylanica* Ching = *Thelypteris srilankensis* Panigr.

Cyclosorus appendiculatus (C. Presl) Panigrahi (1993b), *non* (Bl.) Ching = *Christella appendiculata* (C. Presl) Holtt. = *Thelypteris appendiculoides* Fras.-Jenk. One wonders why Panigrahi was apparently in such a careless hurry that he did not even trouble to check in *Index Filicum* to see that the combination he made was preoccupied.

C. benguetensis Copel. = *Christella hispidula* (Decne.) Holtt. = *Thelypteris hispidula* (Decne.) Reed.

C. didymosorus (Parish ex Bedd.) Nayar & Kaur = *Christella parasitica* (L.) Lév. =

Thelypteris parasitica (L.) Tard. Blot.

C. falcatus (Christ) Copel. = *Christella hispidula* (Decne.) Holtt. = *Thelypteris hispidula* (Decne.) Reed.

C. griffithianus (Fée) Panigr. = ? See below *sub Thelypteris griffithiana*.

C. hokouensis Ching = *Christella hokouensis* (Ching) Holtt. = *Thelypteris hokouensis* (Ching) Reed.

C. oblancifolius (Tag.) Tag. = *Christella dentata* (Forssk.) Brownsey & Jermy = *Thelypteris dentata* (Forssk.) E. St. John.

C. papyraceus (Bedd.) Ching = *Christella papyracea* (Bedd.) Holtt. in Nayar & Kaur = *Thelypteris papyracea* (Bedd.) Reed.

C. procurrens (Mett.) Copel. = *Christella parasitica* (L.) Lév. = *Thelypteris parasitica* (L.) Tard. Blot.

C. quadrangularis (Fée) Tard. Blot. = *Christella hispidula* (Decne.) Holtt. = *Thelypteris hispidula* (Decne.) Reed.

C. siamensis (Tag. & Iwats.) Panigr. = *Christella siamensis* (Tag. & Iwats.) Holtt. = *Thelypteris siamensis* Tag. & Iwats. = ? *Thelypteris hispidula* (Decne.) Reed.

C. taprobanicus (Panigr.) Panigrahi (1993b) = *Christella taprobanica* (Panigr.) Holtt. = *Thelypteris dentata* (Forssk.) E. St. John. See above *sub Christella taprobanica*.

Dryopteris maxima (Haines) Raizada & N. Chowdhury [*sub "maximum"*] = *Christella arida* (D. Don) Holtt. in Nayar & Kaur = *Thelypteris arida* (D. Don) Morton.

Thelypteris albociliata (Copel.) Reed = *Christella parasitica* (L.) Lév. = *T. parasitica* (L.) Tard. Blot.

T. assamica (Bedd.) Reed = *Christella subelata* (Bak.) Holtt. = *Thelypteris subelata* (Bak.) Iwats.

T. biaurita (Bedd.) Reed = *Christella lebeufii* (Bak.) Holtt. in Nayar & Kaur = *T. lebeufii* (Bak.) Panigr.

T. blumei Panigr. (*nom. nov.* for *Dryopteris acuminata* Ros., non *Thelypteris acuminata* (Panzer in Houtt.) Morton) = *Christella subpubescens* (Bl.) Holtt. = *T.*

subpubescens (Bl.) Iwats.

T. contigua (Ros.) Reed = *Christella hispidula* (Decne.) Holtt. = *T. hispidula* (Decne.)
Reed.

T. cylindothrix (Ros.) Iwats. in Hara = *Christella cylindothrix* (Ros.) Holtt. in Nayar &
Kaur = *Christella clarkei* (Bedd.) Holtt. in Nayar & Kaur = *T. clarkei* (Bedd.)
Reed.

T. fadenii Fosberg & Sachet = *Christella parasitica* (L.) Lév. = *T. parasitica* (L.) Tard.
Blot.

T. falcatula (Copel.) Reed = *Christella hispidula* (Decne.) Holtt. = *T. hispidula*
(Decne.) Reed.

T. griffithiana (Fée) Panigr. [*sub "griffithianus"*] = ? This name is at present quite
unable to be used or understood, including by Panigrahi, as the description could
apply to many different genera of ferns, not necessarily all thelypteroid, and no-one
has seen the type which probably also had a confused locality or collector as cited
("Ceylon. Griffith") by Fée. Fée's main herbarium is at Rio de Janeiro (RB), see
Windisch (1982), which was not mentioned by Panigrahi (1975*d*), while I have
seen other types of his at MPU (again not mentioned), P and STR. It is not
clear, though I very much doubt it, whether or not Panigrahi actually searched
himself at the last two, but all require investigation as, though not listed by
Windisch, the name was not properly listed by Fée himself, or by Christensen
(1906). What is clear is that Panigrahi had no idea what the species was, but
nevertheless made a combination, presumably on the chance the name might stand
one day, which is a reprehensible procedure and shows much of his attitude in
seeking to make combinations without real research or taxonomic knowledge.
The name is of course quite likely to be a synonym of some other species.
Holtum (1976) merely listed it in his index as dubious, which is what should have
been done if it cannot be properly lectotypified or reasonably neotypified.

However Panigrahi (1993*d*: 246) later claimed to have "unearthed an

overlooked name" as if it were a commendable achievement instead of a pointless nuisance, while not revealing at all that he does not have a clue what it refers to and that the "type" he selected (but never saw) may well not exist (see also Holttum (1976), whom he cites as if supporting him concerning some of his other lectotypifications, which we are merely obliged by the Code to follow) and of course has no herbarium stated after it (see the Code (1994: Art. 9.14)), so does not constitute valid lectotypification at all. Yet with amazing purposelessness in the face of his previous quite meaningless publication he actually goes so far, now, as to create a new combination for it in *Cyclosorus*. In my opinion, given the very general and vague description and probable wrong locality and/or collector, I think there could be just as much (or rather, as little) justification in claiming that it was an earlier name for the accidentally named *Dryopteris redactopinnata* Panigr. & Basu, which has a similarly bipinnatifid frond! The name should obviously have been merely listed and left in obscurity as unidentified.

T. hilsenbergii (C. Presl) Panigráhi (1975d) = *Christella hispidula* (Decne.) Holtt. = *T. hispidula* (Decne.) Reed. See Sledge (1981).

T. hilsenbergii "(C. Presl) Schelpe" (1976) = *Christella hispidula* (Decne.) Holtt. = *T. hispidula* (Decne.) Reed.

T. hirtopilosa (Ros.) Reed = *Christella hispidula* (Decne.) Holtt. = *T. hispidula* (Decne.) Reed.

T. latipinna (Benth.) Iwats. = *Christella latipinna* (Benth.) Lév. = *C. subpubescens* (Bl.) Holtt. = *T. subpubescens* (Bl.) Iwats.

T. malabariensis (Fée) Panigr. = *Christella malabariensis* (Fée) Holtt. (see above under that name) = *C. dentata* (Forssk.) Brownsey & Jermy = *T. dentata* (Forssk.) E. St. John.

T. mindanensis (C. Chr.) Reed = *Christella dentata* (Forssk.) Brownsey & Jermy = *T. dentata* (Forssk.) E. St. John.

T. nymphalis (Forst. fil.) Reed = *Christella dentata* (Forssk.) Brownsey & Jermy = *T.*

dentata (Forssk.) E. St. John.

T. procurrens (Mett.) Reed = *Christella parasitica* (L.) Lév. = *T. parasitica* (L.) Tard.
Blot.

T. pseudoamboinensis (Ros.) Panigr. = *Christella subpubescens* (Bl.) Holtt. = *T. subpubescens* (Bl.) Iwats. See Holttum (1976: 325) concerning Panigrahi's inaccurate description of *T. subpubescens*.

T. quadrangularis (Fée) Schelpe = *Christella hispidula* (Decne.) Holtt. = *T. hispidula* (Decne.) Reed.

T. repandula (v. A. v. R.) Reed = *Christella hispidula* (Decne.) Holtt = *T. hispidula* (Decne.) Holtt.

T. semisagittata "(Roxb. in Griff.) Panigrahi" (1975a) = *Christella semisagittata* (Roxb. in Griff.) Holtt. = *T. semisagittata* (Roxb. in Griff.) Morton (1974).

T. siamensis Tag. & Iwats. = *Christella siamensis* (Tag. & Iwats.) Holtt. = ? *T. hispidula* (Decne.) Reed.

T. srilankensis Panigr. (*nom. nov.* for *Nephodium zeylanicum* Fée, *non Thelypteris zeylanica* Ching) = *Christella zeylanica* (Fée) Holtt. = *Thelypteris srilankensis* Panigr.

T. subelata "(Bak.) Reed" (1968) = *Christella subelata* (Bak.) Holtt. = *T. subelata* (Bak.) Iwats. (1963b).

T. sumatrana (v. A. v. R.) Tag. & Iwats. = *Christella sumatrana* (v. A. v. R.) Mitsuta = *C. subpubescens* (Bl.) Holtt. = *T. subpubescens* (Bl.) Iwats.

T. taprobatica Panigr., *non sensu* Panigr. [= *T. sledgei* Fras.-Jenk.] = *Christella dentata* (Forssk.) Brownsey & Jermy = *T. dentata* (Forssk.) E. St. John. See above under *Christella taprobatica* and see also Fraser-Jenkins (1997b), concerning the confusion made by Panigrahi.

Subgenus *Cyclosorus* (Link) Morton (*synonym: Genus Cyclosorus* Link).

Cyclosorus interruptus (Willd.) Itô = *Thelypteris interrupta* (Willd.) Iwats.

Subgenus *Glaphyopteridopsis* (Ching) Iwats. (*synonym: Genus Glaphyopteridopsis* Ching).

Glaphyopteridopsis erubescens (Wall. ex Hook.) Ching = *Thelypteris erubescens*
(Wall. ex Hook.) Ching.

Subgenus *Lastrea* (Bory) Alston (synonym: Genus *Oreopteris* Holub).

Oreopteris elwesii (Bak. in Hook. & Bak.) Holtt. in Nayar & Kaur = *Thelypteris elwesii*

Bak. in Hook. & Bak. This attractive species is of local occurrence but is abundant around Lachung in N.E. Sikkim (C.R. Fraser-Jenkins Field nos. 1038, 1049 and 1089), where, among other places, including in the town itself. I have found it growing all along beside the main road towards Yumthang, c.3 or 4 km N. of Lachung and on the E. side of the Lachung river (growing with *Matteuccia intermedia* C. Chr. (C.R. Fraser-Jenkins Field no. 1106, 16 Nov. 1995), a rather little-known but distinctive species similar to *M. orientalis* (Hook.) Trev., but with a tapering lamina-base, not mentioned by Dixit (1984)). *T. elwesii* has markedly upright fronds arising separately from a thin, long-creeping rhizome, turning yellow, then brown at the first approach of winter. Mehra & Bir (1964) reported it correctly from Lachen, 8000 ft, N. Sikkim. S.S. Bir 1031, 22 July 1958. $n = 34$, diploid (PAN 2065-2071!) and also reported it from Chhangu Lake, E. Sikkim, though there are no specimens from the latter locality in PAN and that record could possibly have been a mistake for *Athyrium rupicola* (Hope) C. Chr., whose fronds can be similar if poorly fertile, or *A. davidii* (Franch) Christ, which has a similar creeping rhizome. I did not see *T. elwesii* at Chhangu when I was there (twice), but it could well be there. I have no idea why Dixit & Ghosh (1986) announced this "poorly-known" species as "rediscovered" since it was never lost and was well known even to their compatriots, Mehra & Bir, whose valid records they rather glossed over, presumably not having taken the trouble to go to the important herbarium at PAN - India's erstwhile most important fern-research school. Perhaps it was only little-known to them personally, and to their B.S.I. parties whom they say were unable to find it in the past, probably due to being unable to recognise much of what they were seeing while in the field which is a

great draw-back to collecting.

Subgenus *Metathelypteris* (Itô) Reid Smith *ex* Fras.-Jenk., **comb. nov.** (*basionym*: *Thelypteris* Sect. *Metathelypteris* Itô in Nakai & Honda, *Nov. Flora Jap.* **4**: 137 (1939); *synonym*: Genus *Metathelypteris* (Itô) Ching). Reid Smith (1990) first suggested this subgeneric combination, which is needed here, but did not actually make it.

Metathelypteris decipiens (Clarke) Ching = *Thelypteris decipiens* (Clarke) Ching.

M. flaccida (Bl.) Ching = *Thelypteris flaccida* (Bl.) Ching.

M. flaccida (Bl.) Ching var. *repens* Sledge = ***Thelypteris dassanayakei*** Fras.-Jenk., **nom. nov.** (for *Metathelypteris flaccida* (Bl.) Ching var. *repens* Sledge, *Bull. Brit. Mus. Nat. Hist., Bot.*, **8**(1): 8-9 (1981)). I do not agree with Sledge (1981) that any of the three creeping-rhizomed ferns he mentioned are mere varieties or are inseparable; he had broader species-concepts than I do in general, but nevertheless recognised and described this taxon, which appears to me to be a good species. It is named after Professor M.D. Dassanayake of the National Botanic Gardens, Peradeniya, Kandy, Sri Lanka, the leading light behind the *Flora of Sri Lanka*, which he has run most ably, and one of the most personable, friendly and helpful botanists I have had the good fortune to meet.

M. gracilescens (Bl.) Ching = *Thelypteris gracilescens* (Bl.) Ching.

Subgenus *Parathelypteris* (Itô) R. & A. Tryon (*synonym*: Genus *Parathelypteris* (Itô) Ching)

Parathelypteris beddomei (Bak. in Hook. & Bak.) Ching = *Thelypteris beddomei* (Bak. in Hook. & Bak.) Ching.

P. glanduligera (Kunze) Ching = *Thelypteris glanduligera* (Kunze) Ching.

Wagneriopsis beddomei (Bak. in Hook. & Bak.) A. & D. Löve = *Thelypteris beddomei* (Bak. in Hook. & Bak.) Ching. "*Wagneriopsis*" was separated with virtually no explanation by Löve & Löve (1977), but actually on the grounds of its different chromosome base-number from *Parathelypteris*, which is rather typical of the Wagnerian, "techno-approach," with its unfortunate lack of solid grounding in

actual taxonomy. However Löve, Löve & Pichi Sermolli's (1977) statement that *Parathelypteris* has a base-number of 9, arrived at by mathematical deduction from putting together different numbers, one of which has not been properly established, is plainly wrong when the lowest number recorded (for several species) is actually 27 (see Lovis' (1977: 274-275) more sensible comments and approach), which must be the real base-number. The abortive *Wagneriopsis* was obviously not properly established as circumscribed and it turns out that *T. beddomei* was not properly placed there just because it fitted in in terms of its having a similar base-number of 31. Some of the species Löve & Löve included, such as *T. ogasawarensis* (Nakai) Itô ex Honda and *T. japonica* (Bak.) Ching and its var. *formosa* (C. Chr.) Nakaike also do not look related to the other species and significantly the type-species, *T. simulata* (Davenp.) Nieuwland, from N. America, which was cited as $2n = 124$ by Löve, Löve & Pichi Sermolli, actually has $2n = 128$ (see Smith (1993)), which completely invalidates a genus supposed to be based on $n = 31$! Smith, who is not only a highly experienced expert on the New-World *Thelypteridaceae*, but also one of N. America's few true pteridological taxonomists, accepts Subgen. *Parathelypteris* (with base-numbers 27 and 32) for *T. simulata*, with no mention of the mistaken *Wagneriopsis* - as presumably not worth listing in the synonymy.

Subgenus *Pneumatopteris* (Nakai) Iwats. (synonym: Genus *Pneumatopteris* Nakai).

Pneumatopteris truncata (Poir. in Lam.) Holtt. = *Thelypteris truncata* (Poir. in Lam.) Iwats.

P. truncata (Poir. in Lam.) Holtt. var. *loyalii* Holtt. = *Thelypteris loyalii* (Holtt.) Fras. Jenk. See in Appendix, below. I have now found this species in Nepal (W.C. Nepal, Chisopane Darrah Khola, c.1 km above and E. of Komale village, W. of Deorali, above Markichowk and Khairene, Gorkha District, Gandaki Zone. C.R. Fraser-Jenkins Field no. 1067, 30 Dec. 1996, with J.B. & G. Pariyar, K. Neupane, R. Kharki, D. Lama & B. Tamang. It has fairly prominent teeth and

the pinnae only 1.8 cm wide. It was growing with *Cyathea gigantea* (Wall. ex Hook.) Holtt., *Thelypteris ornatipes* (Holtt. & Grimes) Fras.-Jenk., *T. clarkei* (Bedd.) Reed and *Microlepia rhomboidea* (Wall. ex Kunze) Prantl (see Morton (1974: 315), whose conclusions, though not cited, were followed by Biswas (1989)), which latter I also found on the S. side of Phewa Tal, Pokhara, W.C. Nepal, on 1 Jan. 1997.

Subgenus *Pseudocyclosorus* (Ching) Fras.-Jenk., *comb. nov.* (*basionym*: Genus *Pseudocyclosorus* Ching, *Act. Phytotax. Sinica* 8: 322 (1963)).

Christella molliuscula (Kuhn) Holtt. in Nayar & Kaur = *Thelypteris molliuscula* (Kuhn) Iwats., see below under that name.

Cyclosorus falcilobus (Hook.) Panigr. = *Pseudocyclosorus falcilobus* (Hook.) Ching = *Thelypteris falciloba* (Hook.) Ching.

C. ornatipes (Holtt. & Grimes) Panigr. = *Pseudocyclosorus ornatipes* Holtt. & Grimes = *Thelypteris ornatipes* (Holtt. & Grimes) Fras.-Jenk., *comb. nov.* (*basionym*: *Pseudocyclosorus ornatipes* Holtt. & Grimes, *Kew Bull.* 34(3): 505 (1979)). This species is common in the hills around the Kathmandu valley, C. Nepal and also occurs at Chisopane Darrah Khola, Komale, Deorali, above Khaireni, Gorkha District and on the S. side of Phewa Tal, Pokhara, both in W.C. Nepal (see above under *Abacopteris*, sub *Cyclosorus lakhimpurensis* (Ros.) Nayar & Kaur), as well as the range given by Holttum & Grimes (1980). It often has far less auricled, smaller and more spaced out reduced lower pinnae than depicted by Holttum, but can be distinguished easily from the otherwise similar *T. ochthodes* (Kunze) Ching and *T. esquirolii* (Christ) Ching by its markedly erect, not short-creeping rhizome, in those cases where the lower pinnae are not so characteristically basally-acroscopically auricled. However I have found some specimens on the ridge S. of Sankhu, N. Kathmandu valley, C. Nepal, with a thick, but distinctly short-creeping rhizome. *C.R. Fraser-Jenkins* Field no. 1251, with *G. & R. Pariyar & R. Subedi*, 15 Feb. 1997, and again on the N.W. side of Jamachok, near Kathmandu, and also

Kalche, Pokhara (Field no. 1685), which require further investigation: they are similar to *T. ornatipes* in degree of hairiness and glandularity of the under-surface of the costae, but have more spaced-out and less auriculate reduced lower pinnae.

See comments *re* Panigrahi's (1993b) generic placement under Subgenus *Abacopteris* (*Cyclosorus articulatus*).

C. tuberculifer (C. Chr.) Panigr. = *Pseudocyclosorus tuberculifer* (C. Chr.) Ching = *Thelypteris tuberculifera* (C. Chr.) Ching = *Thelypteris tylodes* (Kunze) Ching.

C. tylodes [sub "xylodes"] (Kunze) Panigr. = *Pseudocyclosorus tylodes* (Kunze) Ching = *Thelypteris tylodes* (Kunze) Ching.

Pseudocyclosorus canus (Bak.) Holtt. & Grimes = *Thelypteris molliuscula* (Kuhn) Iwats. (see below under this name).

P. esquirolii (Christ) Ching = *Thelypteris esquirolii* (Christ) Ching. This species is confined to China, Japan *etc.* and is apparently not present, or has not so far been noticed, in the Indian subcontinent, despite several reports from there, mostly in error for *T. ornatipes* (Christ) Ching, or occasionally (*e.g.* Gurung (1985)) even for *T. molliuscula* (Kuhn) Iwats., as I have seen when redetermining the specimens at KATH.

P. falcilobus (Hook.) Ching = *Thelypteris falciloba* (Hook.) Ching.

P. falcilobus (Hook.) Ching var. *latior* (Ching) Kaur & S. Chandra = ? *Thelypteris falciloba* (Hook.) Ching.

P. gamblei Holtt. & Grimes = *Thelypteris gamblei* (Holtt. & Grimes) Fras.-Jenk., *comb. nov.* (*basionym*: *Pseudocyclosorus gamblei* Holtt. & Grimes, *Kew Bull.* 34(3): 511-513 (1980)). Although I do not know this species in the field, the Kew specimens look distinct and I have taken Holttum's finding that this is a separate species on trust.

P. griseus (Bak. in Hook. & Bak.) Holtt. & Grimes = *Thelypteris grisea* (Bak. in Hook. & Bak.) Ching.

P. ochthodes (Kunze) Holtt. in Nayar & Kaur (1974) = *Thelypteris ochthodes* (Kunze)

Ching.

P. ochthodes "(Kunze) Holttum, Saldanha & Nicolson" (1976) = *Thelypteris ochthodes* (Kunze) Ching. Nayar & Kaur preempted Holttum's publication of this combination, which he had kindly given them information about.

P. ochthodes (Kunze) Holtt. in Nayar & Kaur var. *annamalayensis* Manickam & Irudayaraj = ?

P. ochthodes (Kunze) Holtt. in Nayar & Kaur var. *palniensis* Manickam & Irudayaraj = ?

P. ornatipes Holtt. & Grimes = *Thelypteris ornatipes* (Holtt. & Grimes) Fras.-Jenk.

P. repens (Hope) Ching = *Thelypteris molliuscula* (Kuhn) Iwats. (see below under this name).

P. subochthodes (Ching) Ching = *Thelypteris subochthodes* Ching = *Pseudocyclosorus esquirolii* (Christ) Ching = *Thelypteris esquirolii* (Christ) Ching. From China etc., not present in the Indian subcontinent, from where it has been reported in error for *T. ornatipes* (Holtt. & Grimes) Fras.-Jenk. among other species.

P. tuberculifer (C. Chr.) Ching = *Thelypteris tuberculifera* (C. Chr.) Ching = *Pseudocyclosorus tylodes* (Kunze) Ching = *Thelypteris tylodes* (Kunze) Ching.

P. tylodes (Kunze) Ching = *Thelypteris tylodes* (Kunze) Ching, *Bull. Fan Mem. Inst. Biol., Bot.*, 6(5): 286 (1936); this combination was omitted from *Index Filicum Suppl. 4* etc., but listed by Holttum & Grimes (1980).

Thelypteris molliuscula (Kuhn) Iwats. = *Pseudocyclosorus canus* (Bak.) Holtt. & Grimes = *Thelypteris molliuscula* (Kuhn) Iwats. I accept *Thelypteris molliuscula* as the correct specific name and genus for this species instead of *T. cana* (Bak.) ined., non (J. Sm.) Ching [Smith's name being a descriptionless *nom. nov.* for *Nephrodium pubescens* D. Don, non *Lastrea pubescens* (L.) C. Presl (see Holttum & Grimes (1980: 510)), nec *Thelypteris pubescens* (L.) Proctor, and not a mere *nom. nud.* as thought by Sledge (1981)], or *T. repens* (Hope) Ching, both of which epithets I had used previously (Fraser-Jenkins (1992)) and both of which

are well known and widely used names. Holttum showed that Baker's epithet, *canus*, was independent of Smith's. Not only did Baker deliberately exclude some of the Wallich specimens of *Thelypteris caudipinna* Ching that he thought Smith's name was based on, and cast strong doubt on the others, but he also defined the name in a way that definitely had nothing to do with *N. pubescens* D. Don (unknown to him the actual type of Smith's name, and a name he deliberately ignored to the point of exclusion) and in a way that applies to the present species only. However Baker's epithet cannot be used in *Thelypteris* as the combination is preoccupied by *T. cana* (J. Sm.) Ching. What this *T. cana* is is unknown to me, as to Holttum, though it is my hope before too long to complete a detailed study I have made of Don's fern-names and types, including the lectotypification of as many of them as possible. Christensen (1906) had thought *N. pubescens* Don a synonym of what is now known as *T. proluxa* (Willd.) Ching in Subgenus *Cyclosoriopsis*, but as that is confined to New Caledonia it cannot be that. If it should turn out most probably to be the same species as the present one, which is a possibility, it would once again replace the name *T. molliuscula*, which would be a satisfactory situation in terms of nomenclatural stability, and I intend to study the feasibility of its lectotypification with this in mind when I next visit London.

T. tuberculifera (Kunze) Panigrahi = *Pseudocyclosorus tylodes* (Kunze) Ching = *Thelypteris tylodes* (Kunze) Ching. It seems that when there is more than one genus commonly in use for a species Panigrahi often makes his combinations first in the one genus then soon after in the others to try to ensure his name sticks, but without developing a firm concept as to what genus is appropriate, unlike the gradually developing concepts of Ching, or other authors.

Subgenus *Sphaerostephanos* (J. Sm. ex Hook.) Iwats. (*synonym: Genus *Sphaerostephanos* J. Sm. ex Hook.*).

Sphaerostephanos arbuscula (Willd.) Holtt. = *Thelypteris arbuscula* (Willd.) Iwats.

The epithet *arbuscula* is a noun in apposition so should not have its ending

changed.

S. hirtisorus (C. Chr.) Holtt. = *Thelypteris hirtisora* (C. Chr.) Iwats.

S. kurzii Holtt. = *Thelypteris kurzii* (Holtt.) Fras.-Jenk., **comb. nov.** (basionym: *Sphaerostephanos kurzii* Holtt., *Kew Bull.* **34**(2): 231 (1979)). I do not know this species in the field, but the photograph at Kew looks distinct and I have relied on Holttum's judgement as to its being a good species.

S. latebrosus (Kunze ex Mett.) Holtt. in Nayar & Kaur = *Thelypteris latebrosa* (Kunze ex Mett.) Reed.

S. subtruncatus (Bory) Holtt. = *Thelypteris subtruncata* (Bory) Panigr.

S. unites (L.) Holtt. = *Thelypteris unites* (L.) Morton.

S. wynadensis Nayar & Geevarghese (1988 ["1986"]) = *Thelypteris* ? *subtruncata* (Bory) Panigr.

Thelypteris haenkeana (C. Presl) Reed = *T. unites* (L.) Morton.

Subgenus *Thelypteris*.

Thelypteris thelypteroides (Michx.) Holub (1972a), *non sensu* Holub [= *T. palustris* Schott] = *T. novoeboracensis* (L.) Nieuwland. N. America only. Tryon, Tryon & Badré (1980) have shown that Holub took the name *T. thelypteroides* in the wrong sense when he attempted to substitute his new combination for the well known *T. palustris*.

T. thelypteroides (Michx.) Holub subsp. *glabra* Holub = *T. palustris* Schott subsp. *palustris*. From Europe and Asia, including the far-west Himalaya and east to Kinnaur in Himachal Pradesh. The N. American populations of *T. palustris* have been separated as "var. *pubescens*" (Lawson) Fernald and differ slightly from the European and west Himalayan populations in being more hairy. As they are consistently and recognisably different, the rank of subspecies is surely more appropriate for this geographical vicariant and I now make the necessary combination:-

***Thelypteris palustris* Schott subsp. *pubescens* (Lawson) Fras.-Jenk.,**

comb. nov. (basionym: *Lastrea thelypteris* (L.) Bory var. *pubescens* Lawson, *Edinburgh New Philos. J., n.s.*, **19**: 277 (1864)).

Pande & Kandpal's (1986) report of this species from Pithoragarh in Uttarkhand (Uttar Pradesh) was based on a misidentification of their specimens of typical *T. appendiculoides* Fras.-Jenk. by Khullar. Pande has kindly made his main specimen available to me for reidentification after my requests via Prof. Pangtey; Khullar did not know the species *T. appendiculoides* and surprisingly confused it with *T. palustris*. *T. palustris* also does not occur in S. India, as listed by Dixit (1984), such records being based on confusion with the superficially similar *T. confluens* (Thunb.) Morton, a species in the same subgenus, occurring in tropical Africa and New Zealand as well.

T. thelypteroides (Michx.) Holub subsp. *squamigera* (Schlechtend.) Sáo [basionym given as "*Asplenium thelypteris*" Michx., teste Johns (1977)] = *T. squamigera* (Schlechtend.) Ching [sub "*T. squamulosa*"] = *T. confluens* (Thunb.) Morton.

Subgenus *Trigonospora* (Holtt.) Fras.-Jenk., **comb. nov.** (basionym: Genus *Trigonospora* Holtt., *Blumea* **19**(1): 29 (1971)).

Cyclosorus caudipinna (Ching) Panigr. = *Trigonospora caudipinna* (Ching) Sledge = *Thelypteris caudipinna* Ching. See comments re Panigrahi's (1993b) generic placement under subgenus *Abacopteris* (*Cyclosorus articulata*).

C. ciliatus (Benth.) Panigr. = *Trigonospora ciliata* (Benth.) Holtt. = *Thelypteris ciliata* (Benth.) Ching.

C. sericeus (Scott ex Bedd.) Panigr. [sub "(Schott)"] = *Trigonospora sericea* (Scott ex Bedd.) Holtt. = *Thelypteris sericea* (Scott ex Bedd.) Reed.

C. zeylanicus (Ching) Panigr. = *Trigonospora zeylanica* (Ching) Sledge = *Thelypteris zeylanica* Ching.

Trigonospora angustifrons Sledge = ***Thelypteris arthurii*** Fras.-Jenk., **nom. nov.** (for *Trigonospora angustifrons* Sledge, *Bull. Brit. Mus. Nat. Hist., Bot.*, **8**(1): 23 (1981), non *Thelypteris angustifrons* (Miq.) Ching). Named after the late Dr.

Arthur Sledge, of Leeds University, the most important and formative modern pteridologist to work on Indian-subcontinental, especially Sri Lankan ferns, whom I was privileged to know as a friend and colleague.

T. calcarata (Bl.) Holtt. in Nayar & Kaur = *Thelypteris calcarata* (Bl.) Ching.

T. caudipinna (Ching) Sledge = *Thelypteris caudipinna* Ching.

T. ciliata (Wall. ex Benth.) Holtt. = *Thelypteris ciliata* (Wall. ex Benth.) Ching.

T. ciliata (Wall. ex Benth.) Holtt. var. *angustiloba* Holttum, Saldanha & Nicolson = *Thelypteris caudipinna* Ching.

T. glandulosa Sledge = *Thelypteris ratnapuræ* Fras.-Jenk., *nom. nov.* (for *Trigonospora glandulosa* Sledge, *Bull. Brit. Mus. Nat. Hist., Bot.*, **8**(1): 23-24 (1981), *non Thelypteris glandulosa* (Desv.) Proctor, *nec* (Bl.) Tag. & Iwats.).

T. obtusiloba Sledge = *Thelypteris obtusiloba* (Sledge) Fras.-Jenk., *comb. nov.* (*basionym: Trigonospora obtusiloba* Sledge, *Bull. Brit. Mus. Nat. Hist., Bot.*, **8**(1): 18-20 (1981)).

T. sericea (Scott ex Bedd.) Holtt. in Nayar & Kaur = *Thelypteris sericea* (Scott ex Bedd.) Reed.

T. zeylanica (Ching) Sledge = *Thelypteris zeylanica* Ching.

Trichomanes

Crepidomanes auriculatum (Bl.) Iwats. = *Vandenboschia auriculata* (Bl.) Copel. = *Trichomanes auriculatum* Bl.

C. birmanicum (Bedd.) Iwats. = *Vandenboschia birmanica* (Bedd.) Ching in Ching & Wang = *Trichomanes birmanicum* Bedd.

C. euphlebiium (van den Bosch) Dixit & S. Ghosh in Dixit = *Trichomanes euphlebiium* (van den Bosch) Alston in Panigrahi (1975c). Panigrahi did not mention which of the splinter-genera (subgenera) this species belonged to, perhaps being unaware of them. He also claimed the combination to have been the result of his own study, whereas in fact it was proposed by Alston, as Panigrahi briefly admitted but failed to attribute to him in the proper way.

- C. griffithii* (van den Bosch) Dixit & S. Ghosh in Dixit = *Trichomanes griffithii* (van den Bosch) Alston in Panigrahi. See comment under *C. euphlebioides*.
- C. insigne* (van den Bosch) Fu = *Trichomanes insigne* (van den Bosch) Bedd. (= ? *Crepidomanes latealatum* (van den Bosch) Copel. = *Trichomanes latealatum* (van den Bosch) Christ. See Iwatsuki (1988).
- C. kurzii* (Bedd.) Tag. & Iwats. = *Trichomanes kurzii* Bedd.
- C. maximum* (Bl.) Iwats. = *Vandenboschia maxima* (Bl.) Copel. = *Trichomanes maximum* Bl.
- C. minutum* (Bl.) Iwats. = *Trichomanes proliferum* Bl. See Sledge (1968).
- C. pallidum* (Bl.) Iwats. = *Trichomanes pallidum* Bl.
- C. racemulosum* (van den Bosch) Ching in Chien & Chun = *Trichomanes racemulosum* van den Bosch.
- C. radicans* (Sw.) Iwats. = *Vandenboschia radicans* (Sw.) Copel. = *Trichomanes radicans* Sw.
- C. radicans* (Sw.) Iwats. var. *naseanum* (Christ) Iwats. = *Vandenboschia naseana* (Christ) Ching = *Trichomanes naseanum* Christ = ? *Trichomanes striatum* D. Don. See Kung (1988).
- C. schmidianum* (Zenker ex Taschner) Iwats. [sub "*schmidtiana*"] = *Vandenboschia schmidiana* (Zenker ex Taschner) Copel. = *Trichomanes schmidianum* Zenker ex Taschner.
- C. schmidianum* (Zenker ex Taschner) Iwats. var. *latifrons* (van den Bosch) Iwats. = *Vandenboschia latifrons* (van den Bosch) Copel. = *Trichomanes latifrons* van den Bosch.
- Gonocormus siamensis* Tag. & Iwats. = *Trichomanes proliferum* Bl. See Sledge (1968); not to be confused with the rather similar *T. saxifragoides* (C. Presl) van den Bosch (synonym: *T. parvulum* Bl., non Poir. in Lam.), as often happens in herbaria etc.
- Lacosteopsis auriculata* "(Bl.) Panigr & S. Singh" (1990) = *Vandenboschia auriculata*

(Bl.) Copel. = *Trichomanes auriculatum* Bl. Pichi Sermolli (1955, 1973 and 1981a and d) has clearly reasoned and shown in detail that Smith's apparent lectotypification of *Trichomanes* by *T. scandens* L. (now to be called *Mortoniopteris scandens* (L.) Pich. Serm. if one recognises the splinter-genera, which I do not; this being a "genus" close to but probably distinct from *Vandenboschia*) goes against the protologue and the earlier publications of Linnaeus, which should be considered according to the Code (1994: Rec 9A). The type of *Trichomanes* must therefore be *T. crispum* L., as also ruled by Committee (see Pichi Sermolli (1981a) and Jarvis (1992)). He has also shown elsewhere (e.g. under *Notholaena*) that many others of Smith's lectotypifications, made \pm at random, are so unsound, confused and incorrect that it is effectively hardly possible to consider any of them as true lectotypification in the sense of the Code. Unfortunately Panigrahi & Singh (1990) attempted to overturn his careful judgement, which was not only very sound but has clearly involved more careful and convincing research than any other author on the subject - original research which is noticeably absent from Panigrahi & Singh's paper. Their comment that they did not "feel competent [*sic*] to comment further" on the generic limitations should indeed have been applied to the whole paper, which does not show any actual grounds at all to negate Pichi Sermolli's arguments and incorrectly and simplistically says that under the Code Smith's lectotypification cannot be set aside. The result and quite probably the main intention of their misguided paper reverting to *T. scandens* L. as the lectotype is that they were thereby able to create a number of combinations, but several of which had very obviously been made before, including in literature cited by Panigrahi & Singh as if consulted by them. They created combinations in two virtually unknown genera, *Lacosteopsis*, raised by Nakaike (1975) and too close to *Vandenboschia* even to be separated from that in my opinion, and *Ragatelus*, and incorrectly presented *Vandenboschia* as a *nomen superfluum* because it contained *T. scandens*. Their premise and pointless

combinations are rejected here and the correct names are given in both *Trichomanes*, the genus I accept, and, where relevant, for the splinter-genus, *Vandenboschia*, which latter is not accepted here, being insufficiently distinct to be recognised.

L. auriculata (Bl.) Nakaike (1975) = *Vandenboschia auriculata* (Bl.) Copel. = *Trichomanes auriculatum* Bl.

L. birmanica "(Bedd.) Panigr. & S. Singh" (1990) = *Vandenboschia birmanica* (Bedd.) Ching in Ching & Wang = *Trichomanes birmanicum* Bedd.

L. birmanica (Bedd.) Nakaike & Gurung (1988) = *Vandenboschia birmanica* (Bedd.) Ching in Ching & Wang = *Trichomanes birmanicum* Bedd.

L. gigantea (Bory ex Willd.) Panigr. & S. Singh = *Vandenboschia gigantea* (Bory ex Willd.) Pich. Serm. = *Trichomanes giganteum* Bory ex Willd.

L. latifrons (van den Bosch) Panigr. & S. Singh = *Vandenboschia latifrons* (van den Bosch) Copel. = *Trichomanes latifrons* van den Bosch.

L. luschnatiana (C. Presl) Panigr. & S. Singh [*sub "luschnatianum"*], *comb. inval., sin. basionym ref.* = *Trichomanes luschnatianum* C. Presl.

L. maxima "(Bl.) Panigr. & S. Singh" (1990) = *Vandenboschia maxima* (Bl.) Copel. = *Trichomanes maximum* Bl.

L. maxima (Bl.) Nakaike (1975) = *Vandenboschia maxima* (Bl.) Copel. = *Trichomames maximum* Bl.

L. naseana (Christ) Nakaike (1992) = *Vandenboschia naseana* (Christ) Ching = *Trichomanes naseanum* Christ = ? *Trichomanes striatum* D. Don. See Kung (1988).

L. orientalis "(C. Chr.) Panigr. & S. Singh" (1990) [*sub "orientale"*] = *Vandenboschia orientalis* (C. Chr.) Ching in Chien & Chun = *Trichomanes orientale* C. Chr.

L. orientalis (C. Chr.) Nakaike (1975) = *Vandenboschia orientalis* (C. Chr.) Ching in Chien & Chun = *Trichomanes orientale* C. Chr.

L. orientalis (C. Chr.) Nakaike var. *naseana* (Christ) Nakaike = *L. naseana* (Christ)

Nakaike = *Vandenboschia naseana* (Christ) Ching = *Trichomanes naseanum*
Christ = ? *Trichomanes striatum* D. Don. See Kung (1988).

L. radicans (Sw.) Panigr. & S. Singh [*sub* "(Bl.)"], *comb. inval.*, basionym of "Bl." not indicated = *Vandenboschia radicans* (Sw.) Copel. = *Trichomanes radicans* Sw. Not to be confused with the European *T. speciosum* Willd. (*synonym: Vandenboschia speciosa* (Willd.) Kunkel), to which the name *T. radicans* was long misapplied.

L. schmidiana (Zenker ex Taschner) Panigr. & S. Singh = *Vandenboschia schmidiana* (Zenker ex Taschner) Copel. = *Trichomanes schmidianum* Zenker ex Taschner.

L. titibuensis "(H. Itô) Panigr. & S. Singh" (1990) = *Vandenboschia titibuensis* H. Itô = *Trichomanes titibuense* (H. Itô) Morton.

L. titibuensis (H. Itô) Nakaike (1975) = *Vandenboschia titibuensis* H. Itô = *Trichomanes titibuense* (H. Itô) Morton.

Ragatelus crispus (L.) Panigr. & S. Singh = *Trichomanes crispum* L. See comment *sub Lucosteopsis auriculata*, above. This species is the type of *Trichomanes*.

Trichomanes radicans Sw. var. *orientale* (C. Chr.) Lellinger = *T. orientale* C. Chr.

T. titibuense "(Itô) S.K. Wu in Ching & S.K. Wu in C.Y. Wu" = *T. titibuense* (Itô) Morton.

Vandenboschia anceps (Clarke) S. Chandra & Kaur (1985 ["1984"]) [*sub* "(Wall.)"] = ?
V. birmanica (Bedd.) Ching = *Trichomanes birmanicum* Bedd.

Other *Vandenboschia* names are listed within the various entries under *Trichomanes*.

Vittaria

Vittaria arunachalensis Dixit (1983 ["1982"]) = ? *V. ophiopogonoides* Ching. Dixit's "new species" was described from a single collection with mostly rolled up leaves and merely represents an unidentified specimen, which should not have been described as new.

V. elongata Sw. var. *angustifolia* "Holtt. apud Balakrishnan" (1982 ["1980"]) = *V. elongata* Sw. Johns (1997) listed this taxon as validated by Balakrishnan, but it

had been described long before by Holttum (1954: 614), where it appears to be a probable synonym of *V. elongata*. It was also listed by other Indian authors prior to Balakrishnan.

V. garhwalensis Dixit = *V. himalayensis* Ching. The type at BSD (!) represents no more than a single poor collection of a small plant of *V. himalayensis*, which is common in Garhwal *etc.*

V. montana Manickam = ? *V. zosterifolia* Willd. Surprisingly Manickam compared his species with the quite distinct Mascarene *V. ensiformis* Sw. instead of with Himalayan *etc.* species, but the raised midrib below and thick fronds suggest it is similar to *V. zosterifolia*, a species well known from the area concerned, but not mentioned by Manickam & Irudayaraj (1992).

V. wattii Dixit & Nair = ? *V. forrestiana* Ching. The type of *V. wattii* in CAL (!) looks very similar to this species and the midrib is not significantly different from that in *V. forrestiana*, where it is frequently also prominent.

Woodsia

Woodsia himalaica Ching & S.K. Wu in C.Y. Wu = *W. alpina* (Bolt.) S.F. Gray. The type in PE (!) is normal *W. alpina*.

W. hancockii Bak. - see comment under *Athyrium micropterum*, above. I have reidentified material of this species from Muktinath, Mustang District, 3700-4000 m. H. Tabata, D.P. Joshi *et al.* 18965, 27 July 1983 (KYO), which was formerly identified as *W. andersonii* (Bedd.) Christ by Iwatsuki (1988).

Woodwardia

Woodwardia himalaica Ching & S.K. Wu in C.Y. Wu = *W. biserrata* C. Presl. *W. unigemmata* (Mak.) Nakai is a little distinct from the widespread Himalayan plant, but *W. biserrata* from the Philippines, which has been overlooked due to confusion with the European *W. radicans* (L.) Smith, long antedates *W. unigemmata* and appears to be the same as the Himalayan specimens. Synonyms are *W. maxima* Ching & Chiu, *W. latiloba* Ching & Chiu and *W. yunnanensis* Ching & Chiu.

OMISSIONS

Alsophila balakrishnanii (Dixit & Tripathi) Dixit in Saxena & Brahman = *Cyathea gigantea* (Wall. ex Hook.) Holtt.

Helminthostachys zeylanica (L.) Hook. var. *brachyspiccae* Nampy in Nampy & Madhusoodanan = *H. zeylanica* (L.) Hook. This taxon merely represents a few abnormal plants, which are not worth nomenclatural recognition.

Isoetes coromandelina L. fil. var. *raipurensis* Unni = *I. coromandelina* L. fil.

Pteris pellucida C. Presl - this was reported by Pande & Pande (1990) from "Shukidhak" (Sukidhank, above Chalti), Pithoragarh, Uttarkhand (Uttar Pradesh), on the basis of their specimen, *P.C. Pande* 532, Sept. 1989. I have not yet seen this specimen, but on 2 Dec. 1994 I identified another of theirs as a small specimen of this species, Pithoragarh, Chalti. *P.C. Pande* 521, 20 Sept. 1989 (Herb. P.C. Pande, Almora University Botany Dept.). H.C. Pande, the joint-, or perhaps actual collector, was able to give me instructions and a precise sketch-map of their (single) locality for this species, the main river-gulley above Chalti, where he also said *Microlepia ? speluncae* (L.) T. Moore occurred, but when I searched the place, which had not been disturbed, and all nearby gulleys, in Oct. 1996, there was no trace of either species, though the locality would be suitable and is too low for *P. cretica* L. I have also searched in detail, for a number of days on three separate occasions, the whole area around and below Sukidhank (on both sides of the ridge), without success, and, following further discussion with the senior author, I now feel some doubt about the provenance of the original specimen as coming from the west Himalaya, pending further confirmation.

Tectaria polymorpha (Wall. ex Hook.) Copel. - I found this species in the west Himalaya in Pithoragarh, 1½ km S. of Suwalek, 14 km N. of Pithoragarh, on road to Thal. *C.R. Fraser-Jenkins* Field no. 409, 27 Nov. 1994, with *A.M. Thapa* & *B. Pariyar*, with *Arachniodes aristata* (Forst. fil.) Ching (Field no. 407).

"AFTERWORD"

I can only apologise for any mistakes I have made in this list due to oversight or to not having been able to see some of the types or literature I needed to. I hope to see more Indian types later, particularly S. Indian ones and those of A. Biswas.

It is now desirable to answer a few problematical questions raised by Panigrahi (1995), where they are familiar to me, in order to avoid more mistaken confusion, spurious names and unnecessary, misguided and ever-failing proposals in *Taxon* (see Panigrahi (1993*d*: 244), where these embarrassments are mentioned as if successes!). In general I am not anxious at present to enter into questions concerning the higher ranks of families *etc.* in pteridophytes as these have mostly been very adequately dealt with by Pichi Sermolli (1970, 1977, 1981*a* and *b*, 1982, 1987, 1993 *etc.*) and it remains each individual's prerogative to choose whatever parts of whatever scheme he likes, according to what his own research-findings and knowledge indicate. Almost by definition there can never be a state of full agreement on these questions between different specialists and certainly less than exists with the more solid units of taxonomy, genera and species. However I feel obliged to make some comments on some of the more inappropriate suggestions made by Panigrahi concerning families and generic placement within them. This follows after some comments on species which he raised questions about; comments on genera in answer to some of his questions can be found in the list above.

Firstly Panigrahi (1995: 175) asks the question whether the west-Himalayan "*Diplazium polypodioides*" *sensu auct. Ind., non Bl.*, should be called *D. fieldingianum* (Kunze) Panigr. or *D. frondosum* (Clarke) J. Smith *apud* Christ, concluding that it should be *D. fieldingianum*, though because he identified the real type of the latter as belonging to another species, the name in his sense has to be cited as *D. fieldingianum* Panigr., *non Allantodia fieldingiana* Kunze. The answer is neither! It is true, as he says, that the two names are distinct species, but not in the way he was thinking, as *A. fieldingiana* is actually *D. polypodioides* Bl. In Fraser-Jenkins (1993 and 1997*b*, in press) I have shown that Panigrahi completely mistypified *A. fieldingiana* on the basis of a comment he failed to cite, written on a



Himalayan specimen of Fielding's at Geneva by Alston, that it might be a type, but showing doubt as to whether it was really the type. Panigrahi lectotypified it accordingly in the sense of the Himalayan "*D. polypodioides*" *auct.*, which is seriously in conflict with the protologue. The lectotype I have selected (cited also by Moore 1859: 130), "Prope Utacamund. *Dr. B. Schmid 7*, Plantae Nilagiricae" (JE!), belongs to true *D. polypodioides*, as should be expected from Kunze's formal description from S. India, mentioning a coriaceous frond and asperous costae with sori nearer to the segment-midribs. In fact the Himalayan "*D. polypodioides*" does not even occur in the Nilgiris from where Kunze described his species. Panigrahi himself admitted that *Schmid 7* (which could be considered a holotype, though I have lectotypified a specimen here) must belong to a different species. So why did he persist in lectotypifying the wrong thing - which then enabled him to create a spurious new combination? The name *D. frondosum*, though synonymous with the west Himalayan plant, cannot be used for it as it is a *nomen superfluum* for *D. flaccidum* Christ, in contrast to what Panigrahi (1975c) said. In fact I have shown in detail (Fraser-Jenkins (1997b, in press)) that in keeping with the opinions of previous authors (Clarke (1880), Christensen (1931) and Morton (1974)) the west-Himalayan "*D. polypodioides*" should be called *D. maximum* D. Don, which I now lectotypify in this sense by the specimen Morton also selected (*ined.*), namely "Wall. cat. 230.1. *Asplenium polymorphum* Wall. *etc.*1. Napalia 1820" (sheet 1, in K-W!), which must in all likelihood have been part of the original material Don saw. The description and the local situation in the Kathmandu-area show that *D. maximum* must be this species, while Don's other species, *D. latifolium* T. Moore, is a good species in the *D. dilatatum* Bl. aggregate. The name *D. maximum* has often been misapplied to the *D. dilatatum* aggregate, but Panigrahi (1975c), in order to make his combination using the later epithet, *fieldingianum*, preferred to ignore Morton's case for the use of *D. maximum*, saying it was "unreasonable," which is hardly an article of the Code, and did not mention the reasoned opinions of Clarke and Christensen, nor did he discuss Morton's clear argument. Perhaps he only discovered it later and did not like to abandon the combination he was planning to make.

Secondly Panigrahi (1995: 175) makes out that he (Panigrahi (1976)), first showed

that *Pityrogramma austroamericana* Domin is the correct name for the world-wide *P. chrysophylla sensu auct., non* (Sw.) Link, an adventive, yellow powered species present in S. India and Sri Lanka; not to be confused with the white-powered, probably adventive but much more widespread species, *P. calomelanos* (L.) Link. But in fact, *P. austroamericana* was named and characterised by Domin some nearly 50 years before and was also treated by Tryon (1962). Though the name did not always seep through into many publications on a world-wide scale, the Asian material at Kew, which Panigrahi must have picked up on when he was in Britain, was so determined there. Although I have not taken the trouble to check out all his numerous dubious claims in the paper concerned, another such case that he misleadingly makes out to sound as if he should claim the credit for (Panigrahi (1993d: 243)) is that of *Aglaomorpha coronans* (Wall. ex Mett.) Copel. He stated that *his* finding (in Panigrahi & Patnaik (1962)) on morphological and cytological grounds that *Pseudodrynaria* should be merged into *Aglaomorpha* was supported by Hennipman, Veldhoen & Kramer (1990). Yet when we check on this we actually find, not surprisingly, that they made no mention whatsoever of Panigrahi and his paper which in reality was quite irrelevant as it added nothing of any great import to our knowledge and his cytological report did not allow any generic conclusions to be drawn since the majority of polypodiaceous genera are also based on $x = 36$. Furthermore we actually find, unmentioned by Panigrahi, that there may even be some doubt that his report was correct, since Abraham, Ninan & Matthew (1962), in the same year, found $n = 37$! Checking in Lovis' (1977) classical paper on the cytology of fern-genera we find once again that there is no mention of Panigrahi's paper and that the precise number still remained unresolved. In fact Hennipman *et al.* naturally followed Roos' (1985) well known and authoritative monograph of the *Drynarioideae*, not cited by Panigrahi, and, again, when we turn to that, among the many references given, there is no mention at all of Panigrahi and his (according to him) ground-breaking achievements, yet this was evidently not due to any oversight on Roos' part. Rather it was because, as can be seen from the history of our understanding of the genus that Roos outlined in detail, it had long been known (including by Copeland himself) that the relationship between *Pseudodrynaria* and *Aglaomorpha* is a very

close one, such that it has effectively been a matter of arbitrary choice for many years as to whether or not to recognise *Pseudodrynaria*. The balance of opinion has been not to do so, e.g. Tagawa (1939 *etc.*), Holttum (1954: 185) and most modern authors, none of whom were following Panigrahi and his spurious claims! Looking through the list of "successes" claimed by Panigrahi (1993*d*), apart from the preponderance of totally mistaken names and conclusions, or the names later found to be correct only by accident, it is actually rather hard to pick out many cases where he has genuinely contributed important and reliable new findings - and far too many of those names that do stand were actually extracted in essence from others' research with little worthwhile research-contribution from Panigrahi himself. This glowing paper of self-emulation actually turns out in large part to be a travesty of the true situation! It may be of interest to note that I have seen *Aglaomorpha* only as far west as W.C. Nepal, forest on S. side of Phewa Tal, near Pokhara, Kaski District. *CRFJ* 18097, 23 Jan. 1991, though it would be worthwhile checking to see how much further west it goes.

Thirdly Panigrahi (1995: 176), referring to a paper on grasses by Clayton & Panigrahi (1974), talks rather confusingly about the distribution of the pteridophyte-species present in Tirap, Arunachal Pradesh (as far as he could make it out, given the mistaken identifications and names) mentioning holarctic and tropical species, as is common and very generalised knowledge. But he nowhere mentions the well known and central fact, followed and clearly categorised by me (Fraser-Jenkins (1984)) as far as Indian subcontinental ferns are concerned, that we have three major floristic categories to which almost, but not quite, all the Himalayan species belong: 1. European elements, often of the Mediterranean subtype, spreading to the West Himalaya from the west and present in a rather high proportion in the flora in the far-west Himalaya, but not relevant to Arunachal Pradesh. 2. Sino-Himalayan elements of various subtypes, spreading throughout the Himalaya from China in the north-east (see also Ching & Wu (1980 and 1981)). In the case of E. Arunachal Pradesh the generally rather higher-altitude Sino-Himalayan elements have spread down from the north-east (in China) and not at all from the north-west Himalaya *via* Sikkim, in the reverse direction, as Panigrahi's too local and mistaken viewpoint had led him to suggest, out of step with both floristic literature and

common-sense. 3. South-east Asian elements of various subtypes (see also Ching (1979)), spreading, often a long time ago, into the Assamese (in a wide sense) region from the south-east and then along the outer Himalaya at lower altitudes (also having spread from S.E. Asia to Sri Lanka and, as part of its flora, S. India). As the lower-altitude flora of E. Arunachal Pradesh, which was virtually all that Panigrahi & Singh (in prep.) were able to take a preliminary look at, is almost entirely composed of S.E. Asian elements, this category should have been brought into prominence by Panigrahi (1995) but he seemed not to be aware of these floristic types at all in his vague musings, which calls into question the value of his attempting to comment on phytogeographical considerations at all. But the most serious flaw in his conclusions about Tirap, which probably invalidates his ideas in their entirety, is that virtually none of the "Khasi-Nagaland" endemic "new-species" of ferns he talked about is really an endemic at all, their not actually being new species either! We have to get the taxonomy right first and not be led up the garden-path of new species syndrome before we can make meaningful phytogeographical conclusions, as Panigrahi thought he could do.

Fourthly, Panigrahi (1995: 186) asks what is the correct genus for "*Gymnopteris*" species. As explained in the list above, under *Notholaena*, and as is well known following the papers of Pichi Sermolli and rejection by Committee of Tryon's mistypification of *Notholaena*, the species concerned should be placed in *Notholaena*, as done here and as has long been done in Europe, at least. A full list can be found above, including a necessary new name, *N. himalaica* Fras.-Jenk., for the erstwhile *Gymnopteris vestita* (Hook.) Underw.

Fifthly, it is good, if surprising, or in some cases, amazing, to see (Panigrahi (1995: 180-185)) that in his list of genera Panigrahi fortunately rejects many of his more inappropriate, combination-seeking confusions of genera from his previous papers, many of which I have dealt with here - even if totally without explanation or even the statement that he was doing so. Perhaps he has realised the disastrous idiosyncratic errors of his many years of attempting to turn genera upside-down in order to make pointless new names, or perhaps not. We are not told. Yet among other previous conclusions of his that he ignores and thus presumably rejects, he now goes back to sinking *Lacosteopsis* into *Crepidomanes* (why not

the next logical step - to put both into *Trichomanes* now its typification is clear?); *Rugatelus* into *Trichomanes*; and *Aleuritopteris* and *Leptolepidium* into *Cheilanthes*; the separation again of *Pleopeltis* and *Lepisorus*; and the recognition of seven of Holttum's genera in his earlier "*Thelypteris*" (but why not go the logical step and place "*Cyclosorus*," *sens. lat.*, into *Thelypteris*?). Yet there are some continuing and obvious glitches - he recognises *Ceterach* and *Asplenium*, instead of only *Asplenium* (see Bir, Fraser-Jenkins & Lovis (1985) for detailed discussion); *Alsophila* instead of *Cyathea* (see Holttum (1965)) and too few of the species in *Sphaeropteris*; *Gymnogrammitis* and *Araiostegia*, instead of only *Araiostegia*; *Diplopterygium* instead of *Gleichenia* (see Holttum's (1974) very clear comment on this error); surprisingly lumps *Goniophlebium*, *Polypodiodes* and *Pleopeltis* into the circumboreal genus *Polypodium* (absent from the Indian subcontinent); still thinks to place *Phymatopteris*, but not *Colysis*, into *Selliguea* (in my opinion all three good, separate genera); places *Mildella* into *Cheilanthes* instead of *Pellaea*, where I am convinced it belongs; forgets to mention *Idiopteris* at all and recognises *Anisocampium*, *Cheilanthopsis*, *Dictyodroma* and *Diplaziopsis*, all unnecessary genera in my opinion. Previously (Panigrahi (1995: 180)) he claimed, too, that Pichi Sermolli's (1977) classification, which actually he largely follows, except that, like virtually all modern pteridologists, he does not split genera and families so much, was "largely discarded" and that Kramer in Kramer & Green (1990) - from whose book, as we have seen, he has managed to extract the bulk of his then usually mistaken publications for the last 6 years - was "oblivious of the ICBN [Code]," both of which remarks are grossly inaccurate belittlings of the outstandingly fine work done by those authors. He makes much, too, of claiming that only five of Pichi Sermolli's new families had been accepted by Brummitt (1992), yet this is only due to Pichi Sermolli's well known splitting tendency (the opposite of Kramer's well known lumping), which can easily be avoided and worked around. There is no doubt among any of the real researchers that Pichi Sermolli's work on families was the most outstanding, detailed and informative contribution to the higher classification of pteridophytes ever made and one on which, whether we advocate its acceptance in each case or not, we all lean our subsequent work on.

Turning to Panigrahi's views on families, I feel obliged to make the following observations, partly to set the record straight and partly to try to help clear up confusion:-

First I must emphasize that there is no actual need to think of questions of delimitation of pteridophyte-families as a problem which requires standardisation between all authors, which forces too simplistic answers upon complicated questions, as sought by Panigrahi (1995: 176-177). The choice is and should remain that of each individual author, though they must ensure that they really know the families and their genera on a wide scale before publishing their decisions. Study of the delimitation of the genera themselves is far more important and directly meaningful and, because of our binomial nomenclatural system, does require some standardisation if possible. But the constantly fluctuating interplay of ideas between the currently perceived systematic relationships and the practical side of family-delimitation as well as family-nomenclatural problems, though fascinating, is hardly as obvious and essential (and therefore meaningful) in pteridophytes as it is in most angiosperms and gymnosperms. This is not to say that a choice can be avoided by abdicating responsibility altogether as Greuter (1994) did in recognising only the *Polypodiaceae*, which should be instantly repudiated by actual pteridologists, but it means that in ferns there is room for disagreement and it does not matter so much.

Secondly Panigrahi (1995: 178) was apparently unable to understand why his unnecessary and now unrecognised name, *Tectariaceae* (Panigrahi (1986 and 1987)), was sunk by Pichi Sermolli into the *Dryopteridaceae* and he attempted to show him up as being inconsistent on the grounds that he (Pichi Sermolli (1981)) had previously unsuccessfully proposed the conservation of the *Aspidiaceae* (a synonym of *Tectariaceae*). One objection to Panigrahi's *Tectariaceae* could well concern the fact that Panigrahi unwarrantedly interfered directly into Pichi Sermolli's ongoing work, discourteously, or indeed unethically lifting the idea straight out of his proposal the moment he knew about its rejection (see also Pichi Sermolli's (1986: 689) report on the rejection; even the name itself was used in the objections to the proposal, "in fact the name *Tectariaceae* has not yet been established"), but without accrediting him for setting the scene for Panigrahi to take advantage of. Inexplicably

Panigrahi (1995) claimed that Pichi Sermolli "felt offended" and "lamented" the Committee's decision to reject his proposal, but there is no trace of this whatsoever in his report, which is the sort of correctly reasoned and reported and directly laid out account as to why it was rejected that we have come to expect from all his excellent and constructively explained publications. Certainly, too, Pichi Sermolli did not publish any suggestion whatsoever, as invented by Panigrahi (in almost incomprehensively bad English), that he "wished it very much the family *Tectariaceae* should have been there to take care of the *Aspidiaceae*," but it was exactly and diametrically the opposite, he had *not* wanted a new name to replace the *Aspidiaceae* as it could not successfully do so, as explained below! Indeed in the very paper Panigrahi quoted an adjacent sentence of, Pichi Sermolli (1986) questioned "whether it is convenient to create a new name," for very good reason. Apart from his not troubling to get these simple facts right, I am surprised that Panigrahi could not understand that it is rather obvious (and was even clearly stated) that Pichi Sermolli's proposal for conservation, intended in the best interests of nomenclatural stability (even though I did not agree with it for legal reasons), would have conserved a name that could be and was being used both in a wide sense and a narrow sense, being older than any of the other family names in the group of related families. Hence creating a new and unacceptably narrow *Tectariaceae* (much narrower than the modern, fairly narrow sense of the *Dryopteridaceae* or *Woodsiaceae*) was hardly of any use or relevance as it cannot be used as a substitute for the old *Aspidiaceae*, nor for the *Dryopteridaceae* itself (to which it belongs), because of the priority of earlier names. Apparently blissfully unaware of this, Panigrahi (1986d) titled his paper, "*Tectariaceae* Panigr. *fam. nov.* to replace *Aspidiaceae* Frank., *nom. illeg.*," though it could only replace it in the very narrowest sense, which nobody uses!

As I also now do, Pichi Sermolli used a name for this group in a wider sense. *i.e.* on a different level from Panigrahi's *Tectariaceae*, and so do most other pteridologists, including now, I am glad, if dumbfounded, to see, Panigrahi (1995: 182) himself. In the very same paper as he commended his *Tectariaceae* we now see that in the list of families and genera Panigrahi sinks it, without any comment or explanation at all, into the *Dryopteridaceae*, where

it undoubtedly belongs! So why bother to raise it, so unnecessarily, instead of avoiding it by restraint on his publishing it in the first place? Panigrahi (1995) even tried to add to his praise for naming the *Tectariaceae* by citing my own mistaken use of the name (in Fraser-Jenkins (1988)), but I did so only because at that time I uncritically listed all nine commonly used "aspidioid" family-names, the *Peranemataceae*, *Dryopteridaceae*, *Tectariaceae*, *Woodsiaceae*, *Athyriaceae*, *Hypodematiaceae*, *Onocleaceae*, *Lomariopsidaceae* and *Elaphoglossaceae*, belonging to the erstwhile *Aspidiaceae*, in far too narrow senses. However I now agree, and have done so for some time, that this is much too over-splitting in a Chingian way and I currently accept only the *Dryopteridaceae*, *Woodsiaceae* and *Onocleaceae*, with the *Lomariopsidaceae* (including the *Bolbitidaceae* and *Elaphoglossaceae*) perhaps being too much on the edge of this group of families to be included together with them. I do not therefore see any inconsistency at all in Pichi Sermolli's publications, as Panigrahi complained, and his *Tectariaceae* was not sunk by Pichi Sermolli into the *Dryopteridaceae* taken in a broad sense, as Panigrahi tried to make out, but taken in a fairly narrow sense.

I depart from Pichi Sermolli only slightly in that I accept one extra subfamily in the *Dryopteridaceae*, the *Polystichoideae*, described below. The four subfamilies I accept are: -

1. Subfamily ***Peranematoideae*** (C. Presl) Fras.-Jenk., ***comb. nov.*** (*basionym*: *Filicineae* Tribus *Peranemateae* ["*Peranemaceae*"] C. Presl, *Tent. Pterid.*: 64 (1836)).
2. Subfamily *Dryopteridoideae* Holtt.
3. Subfamily ***Polystichoideae*** Fras.-Jenk., ***subfam. nov.***, *basionym*. *Segmentibus laminae plerumque acutibus plerumque dentis uniter terminantibus et acute auriculatis ad basem acroscopicam. Holotypus: Polystichum* Roth.

Subfamily *Tectarioideae* Nayar.

Pichi Sermolli (pers. comm. 1996) believes the *Polystichoideae* to be very obviously a part of the *Dryopteridoideae* and it is true that it has not been recognised by previous authors, but I believe this particular group is more fundamentally different than has previously been given credit to, even though it is based on segment-shape and toothing. Also associated with

it is a tendency for a stiffer, more crispaceous lamina, though of course this cannot be used as any sort of definition.

Thirdly Panigrahi (1986c, 1994a and 1995: 178-179) questioned the authorship of the *Adiantaceae*, *nom. cons.* (Pichi Sermolli (1986)), though, as clearly explained already in good detail by Pichi Sermolli (1970 and 1993), whom Panigrahi did not cite at all (is he aware of this standard, basic work on families?), the *Adiantaceae* of Newman, which Panigrahi sought to revive, only corresponds to a group below the rank of family, so the correct authorship must remain, as is well known, "(C. Presl) Ching." Personally I prefer to recognise the *Adiantaceae* as a separate family from the *Pteridaceae* (which, if combined, must be called the *Adiantaceae*), containing only *Adiantum*, which is quite a widespread treatment nowadays and, by chance, also happens to be the way Panigrahi treated it. But I do not in any way see it as "the most annoying problem" (Panigrahi (1995)) that some authors draw the line between it and the *Pteridaceae* in a different way, sometimes placing the erstwhile *Sinopteridaceae*, at least, into the *Adiantaceae*, which I merely think does not allow for the close relationship between *Cheilanthes*, *Pellaea* and the rest of the *Pteridaceae*. Yet finally Panigrahi (1994a) still continued to plug on with trying to gain some recognition for himself as an authority for a name by tentatively recombining (*i.e.* invalidly) a subfamily *Adiantoideae* (Newm.) Panigr., even though he admitted that Tryon (1990) already made the combination correctly based on Presl. Panigrahi stated that Tryon cited many synonyms and did not actually state which one was the basionym (though it is quite clear), exactly the failing, ironically, that Panigrahi has repeatedly made on numerous occasions in his many spurious combinations of species (*e.g.* in *Pleopeltis*, see *sub Lepisorus*, the *Thelypteridaceae* etc.) as can be seen in the list above!

Fourthly Panigrahi (1995: 179) asked how one can differentiate a family from a subfamily or a genus from a subgenus, as if there were an overall answer - but this is, of course, arbitrary, and it is up to each individual author to decide in each particular case. There is no such rule as he simplistically stated, partly following what was only a general guideline by Kramer in Kramer & Green (1990), but partly inventing an erroneous "rule" of his own. that if intergeneric hybrids occur and the base chromosome-number of the two genera

(assuming it does not vary!) is the same, we must combine them. In fact Kramer & Tryon actually said something very different which was, as so often in his work, misinterpreted by Panigrahi who seems to have some difficulty in grasping the meaning of the written word, or in understanding factual concepts. They said, concerning intergeneric hybridisation, "hybridisation often reflects similarities and may occur without regard for "generic" boundaries. In such cases (e.g. in *Asplenium*) it is evident that characters used to separate genera do not rest on profound genomic differences and therefore should not be given particular systematic weight." In other words, if the genera are both closely related and can hybridise they should be considered for merging, but there was no rule based on similar base-numbers as Panigrahi made up under Kramer's name. The other paper Panigrahi cited as the authority for this was by Kramer (1989), where again there is no mention of base-numbers, but he commented, when speaking of "single-character genera," "the essential similarities in the structure of these ferns are obscured if we place them in different genera, and karyological data as well as - often - naturally occurring or artificially induced hybridisation demonstrate their closeness." There is not a word of Kramer's excellent paper of 1989 that I disagree with, apart from his polite support of Ching (bearing in mind the occasion), whereas, in my opinion, it should have been stated quite clearly that Ching became, or perhaps always was the worst unnecessary splitter of families, genera and species, all three, in modern pteridology and was a dangerous example, not to be followed - a message which was so very much needed in China that it was a pity many foreign botanists and their organisations shirked their responsibilities in this regard. Turning back to Panigrahi's interpretations, an unrealistic rule such as his would oblige *Dryopteris* and *Polystichum*, for example, to be combined just because of the existence of the rare N. American sterile hybrid between *Dryopteris goldiana* (Hook. ex Goldie) A. Gray subsp. *goldiana* and *Polystichum lonchitis* (L.) Roth (x *Dryostichum singulare* W. Wagner). Worse still, and doubtless there are many other examples between other genera, *Diacalpe* and *Polystichum* would have to be combined because I was surprised to discover an unexpected new hybrid in Nepal between *Diacalpe aspidioides* Bl. (I do not accept the view that *Diacalpe* is congeneric with *Peranema*, see

Fraser-Jenkins (1997c, in press)) and *Polystichum squarrosum* (D. Don) Fée.

This hybrid is now described as :-

x *Polysticalpe mirabilis* Fras.-Jenk., **hybr. (nothogen. et nothosubsp.) nov.**, basionym (= *Diacalpe aspidioides* x *Polystichum squarrosum*). *Planta hybrida, morphologia frondis intermedia inter parentes. Stipes dense paleaceus in dimidio inferiore. Pinnae omnes angustae, pinnulae inferiorae basiscopicae non valde elongatae ut in D. aspidioide. Pinnulae ultimae aliquot minore lobatae quam in D. aspidioide. Sporae abortivae.* *Holotypus*: C. Nepal, Bagmati zone, forest where road climbs up in zig-zags from 1-2 km inside the south-eastern gate (no. 1) into Nagarjun forest towards Jamachok, S.E. slope of Jamachok mountain, W. of Balaju, N.W. side of Kathmandu, Kathmandu District, c.1650 m. *C.R. Fraser-Jenkins* 15834, 17 Nov. 1989 (BM), growing with both presumptive parents.

As a result of his need for external rules to say when genera or subgenera should be used, Panigrahi found the existence of various different treatments for the *Cyatheaceae*, too, to be an intractable problem, but (see Panigrahi (1993d)) followed Tryon (1970) and said that true *Cyathea* does not occur in Asia, recognising *Alsophila* instead. I personally find Holttum's (1965) treatment more satisfactory (though I have not got strong opinions here) in sinking *Alsophila* into *Cyathea*, but I prefer to treat his subgenus *Sphaeropteris* as a genus, following other authors, as Panigrahi also did (but without saying so). Either way, I find Tryon's (1970) splitting of *Cyathea* into many genera to be too extreme as well as impractical.

Fifthly Panigrahi has made a large number (10 or more) of mainly unnecessary and rejected proposals and comments in *Taxon* etc. concerning family-authorship and conservation of names (not to mention all his rejected proposals and comments in *Taxon* concerning species), which have needlessly consumed much of others' time; see Panigrahi (1993d) for a list of these presented as if a commendable achievement and without mention of their constant rejection. Within these proposals, quite apart from their mistaken conclusions and often incompleteness (with part of the argument left unresearched "for the committee to decide," because he did not find the literature), he frequently tried to show Pichi Sermolli as having made various mistakes against the articles of the Code. However he failed to mention (or

perhaps realise?) that, unlike himself, Pichi Sermolli was generally not mistaken at the time of publication at all, since the previous Codes were different but had been changed by the time Panigrahi attempted to make a proposal and denigrate Pichi Sermolli's work, as if he knew better. He has even wrongly claimed (Panigrahi (1993*d*)) that the introduction to his rejected proposal (Panigrahi (1986*a*) to conserve the *Athyriaceae* Alston, following comments made by Pichi Sermolli in earlier papers (and see Pichi Sermolli (1993: 133)), was responsible for producing the idea, basic throughout much of botanical nomenclature, that the basionym of families *etc.* (he for some reason said "infra-familial" ranks, perhaps not knowing what that means) should be cited in brackets as well as the combining author, as is done with genera and species - but this was already being widely done long before by authors of import (see for example Pichi Sermolli (1970: 23 *etc.*) and much previous literature) and has nothing to do with the inconsequential dabbings of Panigrahi! Pichi Sermolli (1993: 135, 138) summed up the situation concerning this matter by saying that the citation of a parenthetical author is tolerated for families of pteridophytes, though not done by all authors, whereas in practice it is not done for spermatophytes. The Code (1994: Art. 49.1) obliges it for genera and below but has never prevented it for higher ranks. None of this had any connection with Panigrahi's stream of unacceptable and misguided proposals.

Among his proposals was one (Panigrahi (1994*a* and 1995)) to alter the author-citation for the *Pteridaceae*, even though the family had already been the subject of several detailed notes by Pichi Sermolli (1970, 1981*b*, 1982, 1986 and 1993) as well as of rejected proposals to conserve the name by Tryon (1980) and Panigrahi (1986). The rejection of the latter, the name "not being in need of conservation," Panigrahi (1994*a*) agreed was a correct decision, but said that the Committee did not adjudicate on what he now unrealistically called "a more serious question" concerning the correct citation of its authorship - which he had only subsequently come to question due to his lack of understanding; but, of course no such adjudication was made, since they were not asked to as Panigrahi had not brought up that subject! Panigrahi (1993*d*: 244) stated that he intended to propose the rejection of the *Pteridaceae* (S.F. Gray) Gaudich. against the *Adiantaceae*, which was again obviously

unnecessary because Gaudichaud's name was clearly invalid as he neither referred to Gray or any other valid description, nor provided a description himself, as later admitted by Panigrahi (1994b). I do not understand why Panigrahi persists in all these pointless, badly worded, incompletely researched and usually just plain wrong proposals instead of getting the obvious message from their constant rejection and ceasing to trouble us with them - the same could really be said about most of his outstandingly, perhaps record-breakingly erroneous publications. But shortly after his 1993d comment Panigrahi (1994b) attempted instead to alter the authorship of the *Pteridaceae* to "(S.F. Gray) Reichenb.," as he said himself "despite the decision of the Committee" (in 1993 to reject his 1986 proposal), on the grounds that both Gray's and Reichenbach's names were based on the stem of the genus *Pteris*. But this, of course, has nothing to do with it and is nowhere ruled to be taken as "indirect reference" by the Code. Reichenbach did not refer to Gray nor to any other authors who referred to Gray so Gray cannot be taken to be a basionym-author as Panigrahi made out. Finally (one hopes), Panigrahi (1995: 184) has at last accepted the *Pteridaceae* Reichenb. as the correct name and authority in his list, ultimately falling into line with Pichi Sermolli and everyone else, but without even making any mention of, nor making the required and necessary withdrawals and corrections to the previous brouhaha he made over its authorship - a silence which can only be taken as a failure to admit the total waste of time his inaccurate previous papers amounted to and that they should never have been allowed to be published in the first place had astute editorship and referees been available in India.

My final comments concern the misleading figure of c. 1,100 species of pteridophytes stated by Panigrahi (1995) to occur in India, a local mirror-image on a smaller scale of the ridiculous numbers of species that were claimed by Ching and his successors to exist in China. But in India's case the overestimation of species-numbers has arisen in large part from inaccuracy in identification of "new records for India" as well as from "new species syndrome," which, as we have seen in the list above, has brought about so much misunderstanding. As our knowledge stands at present it is obvious that this number is far too high and the number of false records published in India urgently needs redress through

proper reidentification, particularly by international specialists. I have not yet set about listing the wrongly reported, previously known species and the number of records which should be rejected, or which must be held to be doubtful and not accepted until the original specimens have been rechecked and verified - this is the second essential step towards the compilation of a genuine and accurate Pteridophyte-Flora of the Indian subcontinent, effectively impossible at present because of the mass of wrong records (though I have taken steps to clear up many of them in the west Himalaya in conjunction with Khullar - see Khullar, Pangtey & Fraser-Jenkins (1997), in press and Khullar (1994 and 1997, in press)). I would suggest that a revised list should be compiled from present sources rejecting taxa already known to be wrong and where all taxa reported only recently and from only one or a few records in difficult, complex genera are listed with a query. Only those without queries should be accepted as definitely present in the area concerned and the rest should have their voucher-specimens rechecked by competent international specialists. In this regard it would help if priority were given at CAL *etc.* to completing the label-data and incorporating at once the large unlabelled piles of recent collections their staff have made and often hold separately. It is hoped, however that this present work and a necessary follow-up paper, when more types and corrections have been investigated, will complete a major first step in clearing up mistakes that have for too long stood in the way of an accurate Pteridophyte-Flora.

This is not to say that a good number of genuine new records have not turned up and will continue to do so, especially if knowledgeable international specialists, familiar with Chinese and S.E. Asian species in particular, are able to go into the field in the newly opening-up north-eastern states of the erstwhile Assam (in a wide sense) if they become or remain stable enough. I was just recently shown for identification, which I was able to do, an interesting, hitherto only Chinese *Polystichum* (along with a probable new *Pteris* hybrid), collected in Arunachal Pradesh by the staff at CAL, for example. Needless to say it was being thought of as a probable "new species," but it strongly suggests that more Chinese species would turn up if people who know the genera well visit the area. If one knows immediately in the field the detailed identity of nearly every plant one sees, and is aware of the related

taxonomic problems and complexes involved, novelties and rarities stand out like a beacon and are relatively easily detectable, whereas they will usually be overlooked by those without such knowledge. Hence experienced specialists can find interesting records on virtually every excursion they make. My own totally unexpected findings of *Diplazium crinitum* (Bak.) C. Chr. in Assam (see in the list above under *Diplazium*, *Diplaziopsis heterophlebia*) and of ? *Deparia zeylanica* (Hook.) Kato near where I live in C. Nepal (see under *Deparia*, *Diplazium subsinuatum* x *Lunathyrium petersenii*) considerably surprised me, especially the first, which is so distinctive that it is almost unimaginable how it could ever have been overlooked by both European and Indian pteridologists, the latter having constant access to the area. But such findings are only very few compared to the number of mistaken records published and it is to be hoped that following on from the present work a more serious effort must at last be made to avoid so much spurious publication as has gone on recently, which has only served to obscure our scientific knowledge.

APPENDIX - NOTES ON SOME FERNS OF NEPAL

On a recent visit to Pokhara and Damauli in W.C. Nepal some interesting records turned up, some of which are surprisingly westerly for the species concerned, showing how little we yet know of the true distribution-patterns of pteridophytes in Nepal. This is in large part due to the inability of the British-Indian botanists of former times to visit Nepal, but has been compounded latterly by the unfortunate lack of a dedicated and experienced local pteridologist, able to work actively in Nepal, until now. It is also unfortunate that no workers on Nepalese pteridophytes have worked fully on all three major areas of holdings in the world's herbaria instead of just working locally, which has led to very incomplete data being published. The local Nepalese holdings are at KATH (with a few Indian-made collections also at CAL), where the collections have been very poorly identified so far and are often under completely the wrong names apart from in certain groups reidentified by me (a process I hope to continue with in time). There are far fewer species represented at KATH, despite their encouragingly active efforts to collect, than are written on the sheets by Gurung *etc.* and less than half the known Nepalese species are represented there due to collectors not knowing the species when collecting. The second lot of holdings are in Japan, in TI, KYO and TNS (temporarily at CBM) and are much more comprehensive, though again often not as well identified by Itô, Iwatsuki *etc.* as one might hope for, though the work of Nakaike is the most successful so far, but did not draw enough on the British collections from Nepal and the Indian subcontinent. The third and most comprehensive lot of holdings, which have hardly been worked on by anyone in recent times, are in Britain, at K (mostly older), BM and E. and urgently require inclusion in a comprehensive study, especially as they include material that is the correct nomenclatural basis for all Indian-subcontinental ferns. A further problem that has recently become rather obvious to me is that collectors have over-concentrated on central Nepal, particularly the Kathmandu valley, at the expense of west and especially east Nepal. Thus more species of pteridophytes are known from C. Nepal than other regions, whereas in fact E. Nepal is certainly the richest area, gradually tailing off to the west - for example, many of my own new records are of eastern species, usually S.E. Asian elements, which must be

present in E. Nepal, but have so far only been noticed in C. Nepal, because, like too many others, that is where I happened to go! The problem is compounded by the fact that most workers automatically go up to the perhaps rather duller and certainly floristically better known, higher-altitude regions and the Himalayan ranges, instead of the richer, lower-altitude forests, where all the S.E. Asian elements occur, whose western limits are of considerable interest.

Recently I also visited Surkhet and Dailekh in west Nepal and was able to take a brief, if fairly detailed look at the ferns there. It is immediately striking that by the time one gets as far west as Chinchu - Surkhet - Dailekh and, more expectedly, Jumla, which I have also visited (c.81° 30' - 82° 00' E), the fern-communities I was seeing appeared to be exclusively west-Himalayan and all the more easterly elements, so obvious at Pokhara and all down the road to Butwal (to c.83° 30' E), seem to be completely missing. These include such species, among many others, as *Selaginella pennata* (D. Don) Spring (e.g. CRFJ 18060, 20 Jan. 1991, from Ambot, near Bhakundi, 55 km N. of Butwal, which I have also found at Kalche Khola and Phewa Tal, Pokhara), *Aglaomorpha coronans* (Wall. ex Mett.) Copel., *Pteris pellucida* C. Presl (e.g. CRFJ 18015, 20 Jan. 1991, from Dobhan Bridge, near Butwal), *Cheilanthes tenuifolia* (Burm. fil.) Sw., *Thelypteris clarkei* (Bedd.) Reed (e.g. CRFJ 18016, 20 Jan. 1991, from Dobhan Bridge, near Butwal) and *T. jaculosa* (Christ) Panigr., the first five all common down to Butwal.

Investigation of the westernmost ranges of these and other lower-mid altitude, S.E. Asian elements in relation to the species present in Pithoragarh and Kumaun is of considerable interest and requires much more collecting in mid- and further-western Nepal at lower-mid altitudes, not too far into the Himalayan ranges. From such a study a true picture of the Himalayan pteridophyte distribution-patterns could be obtained for the first time, instead of Nepal being a gap in the map, as at present. Indeed the best line of demarcation between E. and W. Himalayan regions (there being no C. Himalayan elements) could probably be derived from a study of pteridophytes in Nepal, their being \pm short-distance, wind-dispersed species which can easily spread to any area that is suitable for them. I have in mind over the coming

years that it would be good to carry out a thorough phytogeographical study involving the mapping of Nepalese pteridophytes from the world's herbarium-holdings and my own collections and to connect these findings up with newly verified distribution-records of the species concerned from outside Nepal. At present I already hold full lists of virtually all the world's holdings of Afghan, Pakistani and Kashmiri (*i.e.* far-west Himalayan) collections, all reidentified by me, as well as fairly comprehensive coverage of the collections from the rest of the west Himalaya, including my own large collections. If the same could be done for all Nepalese holdings, then combined with the others and with what we know about east Himalayan distributions of ferns (including the complete reidentification of the highly confused and misunderstood "*Flora Xizangica*" holdings in PE), a very clear, detailed and complete view of Sino-Himalayan pteridophyte-phytogeography would ensue.

An updated and comprehensive list of Nepalese pteridophytes, District by District, drawn from all three major areas of Nepalese holdings, would also be a highly informative and ground-breaking study. Both studies would allow previous false records in the Japanese, and especially Gurung's various lists, to be corrected, which is clearly necessary. Such studies should also aim to include more west and east Nepalese collecting-trips to look for "missing" S.E. Asian elements or for the ferns recorded from Sikkim/Darjeeling but not yet noticed in adjacent parts of E. Nepal (such as *Dryopteris sikkimensis* (Bedd.) O. Ktze., which I have seen in quantity in W. Sikkim, not far from the Nepalese border, and which must surely be findable on the routes to the S.W. base of Kanchenjunga on the Nepalese side). It is worth my pointing out that over the last nearly ten years I don't think I have made a single major fern-collecting excursion-trek without coming across something new to Nepal, simply because, from experience, I could target some of the best localities from a distance and knew everything I was seeing in detail in the way of species. This shows how little known the Nepalese ferns are and suggests that a very much fuller picture will readily be obtained within only a few years if such specialist-collecting is carried out. Now that Mr. Naresh Thapa (see below, *sub Thelypteris x nareshii* Fras.-Jenk.) has begun active and original work at the National Herbarium, Godavari, Kathmandu, it is likely that a great deal more of much interest

will emerge from the whole area of Nepal, rather than just the relatively well known Kathmandu valley, as always. We should soon be able to reach the position where the artificial picture of a much richer central Nepal will be properly disposed of, as well as, for the first time, properly connecting up species-ranges in continuation with the better known pteridophyte-floras to the west and east of the country.

It would be good, too, to try to rediscover the very few species "lost" since Wallich *et al.*'s time, such as the elusive *Dryopteris angustifrons* (Hook.) O. Ktze., about which very little is known (see Fraser-Jenkins (1989)). It is unlikely that there have actually been any extinctions (the public's popular "eco-disaster" view arising from a lack of scientific field-knowledge); my guess is that the latter species could have come from the Hetauda to Kathmandu route and could be worth looking for there and in similar places further east. Most of the other ferns described last century are also known from modern collections and thus from proper localities, rather than just from "Nepal" or "Nepalia." It is even possible, with a good local knowledge and knowledge of the size and state of the type-specimens at K *etc.* to guess where the place of collection of some of the original Wallichian *etc.* types must, most likely have been. Thus material exactly matching the type of *Aspidium cornucurvi* D. Don, which is an abnormal, depauperate-segmented form of *Arachniodes speciosa* (D. Don) Ching, and which I now place in its synonymy (and not that of *A. aristata* (Forst. *fil.*) Tind., where it has normally been placed) can still be found today (C.R. Fraser-Jenkins Field no. 1020, 18 Nov. 1996, with D. & R. Lama) in the ancient, part-preserved forest at Bajrabarahi Temple, Chapagaon, S. of Kathmandu, which could well be its original locality, since Hamilton's "Suembu," like his "Narainhetty" (the Royal Palace, Kathmandu), seems only to have been where he stayed at the time. Similarly *Cheilanthes doniana* Fras.-Jenk. & Khullar in Khullar, rare in the Kathmandu valley, occurs at Raniban, Jamachok, where it has long-leaved plants with rather neatly (small-) lobed pinnules, exactly as in Don's type at the BM. I suspect that the types of both this and *Asplenium laciniatum* D. Don, also prominent there, were likely to have been collected at that locality. It is clear that more comprehensive study of Nepal's pteridophytes should cast much interesting, new light on different aspects of Asian pteridology.

Some of the more interesting records from my new collections, along with some additional comments and records relevant to Nepal, are:-

Actiniopteris radiata (Sw.) Link - I have confirmed the identity or reidentified the Nepalese material of this genus (from E. Nepal, in the Terai and Bhabar-forest foothills near Dharan and Dhankuta) at KATH as belonging to both *A. radiata* and *A. semiflabellata* Pich. Serm. Pichi Sermolli (1962a), in his monograph of the genus, had thought only the former might occur in the Indian subcontinent (but did not mention any specimen from Nepal), the single Nepalese specimen of the latter he cited as being a possibly doubtful locality.

Adiantum fimbriatum Christ - from c.2 km N. of Dumling, N. of Darchula, Darchula District, Mahakali Zone, W. Nepal. C.R. Fraser-Jenkins Field no. 357, 22 Nov. 1994, with A.M. Thapa & B. Pariyar.

Angiopteris evecta (Forst. fil.) Hoffm. - from above Chowti Bara Mandir (temple), c.6 km S. of Damauli, Tanahun District. C.R. Fraser-Jenkins Field no. 1307, 23 March 1997 and 1466, 18 Aug. 1997.

Asplenium khullarii Reichst. in Reichstein & Viane, in press - from c.8,000', limestone rocks below forest on N.W. side of Phulchowki mountain, above Godavari, S.E. of Kathmandu, Lalitpur District, C. Nepal. CRFJ 15845, 20 Nov. 1989, with C.D. Fraser Jenkins. I have also found this at "Pangtey's Gorge," Nainital, with *Athyrium mackinnoniorum* (Hope) C. Chr.

A. obscurum Bl. - from the forested gorge c.1.5 km S.E. of Jamune village, c.7 km W. of Damauli off Pokhara road, Tanahun District. C.R. Fraser-Jenkins Field no. 1509, 19 Aug. 1997.

A. tenuicaule Hay. - from Dorpatta, c.12 km N. of Dumling, N. of Darchula, Darchula district, Mahakali Zone, W. Nepal. C.R. Fraser-Jenkins Field no. 311, 21 Nov. 1994, with A.M. Thapa & B. Pariyar. This species retreats further into the Himalaya as one goes further east in Nepal and is largely replaced by *A. laciniatum* D. Don by the time one reaches C. Nepal, entirely so in the Kathmandu valley.

A. yunnanense Franch. - from Dorpatta, c.12 km N. of Dumlung, N. of Darchula, Darchula District, Mahakali Zone, W. Nepal. *C.R. Fraser-Jenkins* Field no. 314, 21 Nov. 1994, with *A.M. Thapa* & *B. Pariyar*. This species was not mentioned by Dixit (1984a) under any name.

Athyrium falcatum Bedd. - I have now found this species in Nepal (having seen no other Nepalese material of it in the world's herbaria, including at K, BM, E, G, US, MICH, CAL, DD, TI, TNS (including temporarily at CBM), KYO, or KATH), on a river-bank in Sal-forested foothills, c.1 km below and S. of Khare Khola village, c.3 km N. of Surkhet, Birendranagar District, Bheri Zone, W. Nepal. *C.R. Fraser-Jenkins* Field no. 1572, 27 Sept. 1997, with *Kodananda Pongali* ("Umesh Chhetri") & *K. Neupane*, near to colonies of *Ceratopteris thalictroides* (L.) Brogn., a little further up the river towards the village. A report of *A. falcatum* by Alston & Bonner (1956), from Ringmo is obviously anomalous and both too high and too far into the Himalaya; the specimen (*A. Zimmermann* 826B, in G) has now been reidentified by me as a juvenile frond of *A. foliolosum* Wall. *apud* T. Moore *ex* R. Sim. Gurung's (1988) report of it as a threatened Nepalese fern was meaningless and neither the "threatened status" nor the identifications of species can be considered in any way reliable in that paper (or her others), containing, as it does, some 125 species erroneously said to have become extinct! Iwatsuki's (1975 and 1988) records of this species are also from an obviously anomalously high altitude and the specimens he cited (TI!) have now been reidentified by me as *A. rupicola* (Edgew. *ex* Hope) C. Chr. *A. falcatum* is a low-altitude C. and S. Indian species extending E. to Burma (Myanmar). It is also locally common in the eastern part of the W. Himalaya in the outermost hills, at Mussoorie, Nainital and Pithoragarh (c.2 km S. of Sukhidhank, N. of Tanakpur. *C.R. Fraser-Jenkins* Field no. 911, 26 Oct. 1996) and I appear to have discovered a new hybrid between it and *A. pectinatum* (Wall. *ex* Mett.) T. Moore, looking very similar to *A. parasnathense* (Clarke) Ching *ex* Bir in Mehra & Bir, at Jeolikote, below Nainital. *C.R. Fraser-Jenkins* Field no. 352, 20 Sept. 1996, an offset now being cultivated by Prof. Y.P.S. Pangtey at

Nainital University in order to investigate its spores in a better sample. This is named and described by me in my forthcoming monographic study of *Athyrium* and *Diplazium* (Fraser-Jenkins (1977b, in press)). *A. falcatum* is diploid and not tetraploid as stated by Khullar in Mehra & Khullar (1974), whose voucher-specimen at PAN(!), from Tal. Pithoragarh, has been reidentified by me as *Deparia petersenii* (Kunze) Kato.

A. micropterum Fras.-Jenk. - from a moss-covered cliff at Dorpatta, c. 12 km N. of Dumling, N. of Darchula, Darchula District, Mahakali Zone, W. Nepal. C.R. Fraser-Jenkins Field no. 317, 21 Nov. 1994, with A.M. Thapa & B. Pariyar.

Bolbitis virens (Wall. ex Hook. & Grev.) Schott - from rocks in forested stream-khola above Liot village, Basmari, c. 5 km W. of Hetauda on Narayanghat road, Makawanpur District, Narayani Zone, C. Nepal. C.R. Fraser-Jenkins Field nos. 1754-1755, 24 Oct. 1997, with Chonche Bahadur Sinchuri, J.B. Pariyar, L.B. Tamang, R. Boruwal & U. Chhetri. Strangely, while following Hennipman's (1977) listing of this species from the Nicobar Islands sub "var. *compacta*" Hennipman, Dixit (1984a) listed the species again under its synonym, *B. deltigera* (Wall. ex Clarke) C. Chr., as if a separate species, which is certainly unjustified, and omitted its type-locality, Nepal, also erroneously giving *Gymnopteris flagellifera* (Wall. ex Hook. & Grev.) Bedd. (a synonym of *B. heteroclita* (C. Presl) Ching, which well known species he did not even mention) in the synonymy of it, all of which names had been clearly elucidated by Hennipman before.

Botrychium multifidum (Gmel.) Rupr. - from Dorpatta, c. 12 km N. of Dumling, N. of Darchula, Darchula District, Mahakali Zone, W. Nepal. C.R. Fraser-Jenkins Field no. 290, 21 Nov. 1994, with A.M. Thapa & B. Pariyar.

Cheilanthes doniana Fras.-Jenk. & Khullar in Khullar - from slopes above Darchula village, Darchula District, Mahakali Zone, W. Nepal. C.R. Fraser-Jenkins Field no. 150, 16 Nov. 1994, with A.M. Thapa & B. Pariyar.

C. dubia Hope - from slopes above Darchula village, Darchula District, Mahakali Zone, W. Nepal. C.R. Fraser-Jenkins Field no. 151, 16 Nov. 1994, with A.M. Thapa & B. Pariyar.

- Cyathea gigantea* (Wall. ex Hook.) Holtt. - from Raniban Forest, S. side of Phewa Tal, Pokhara, Kaski District. C.R. Fraser-Jenkins Field no. 1427, 17 Aug. 1997. I found one small plant only, growing with *Microlepia khasiyana* (Hook.) C. Presl (*M. strigosa sensu auct. Ind., non* (Thunb.) C. Presl).
- Diplazium bellum* (Clarke) Bir in Mehra & Bir - from c.2 km N. of Dumling, N. of Darchula, Darchula District, Mahakali Zone, W. Nepal. C.R. Fraser-Jenkins Field no. 378, 22 Nov. 1994, with A.M. Thapa & B. Pariyar. I have also found it at Gaurikund, Chamoli; "Pangtey's Gorge," Kilbury, Nainital; Phulchowki, Godavari, Kathmandu etc.
- D. polypodioides* Bl. - from stream in forest just west of Anadu village, on S. side of Phewa Tal, Pokhara, Kaski District, Gandaki Zone, W.C. Nepal. C.R. Fraser-Jenkins Field nos. 1546-1548, 24 Sept. 1997; also at Kalche Khola, in Phusre Khola valley, c.15 km S. of Pokhara, off Syangja road, Kaski District. C.R. Fraser-Jenkins Field no. 1690, 19 Oct. 1997, with *D. bellum* (Field no. 1689).
- Dryopteris nigropaleacea* (Fras.-Jenk.) Fras.-Jenk. - from remnant *Quercus* and *Rhododendron* forest, between Ranimatta and Rattanangla, c.40 km N. of and above Surkhet, on road to Dailekh, Dailekh District, Bheri Zone, W. Nepal. C.R. Fraser-Jenkins Field no. 1614, 26 Sept. 1997, with K. Neupane & U. Chhetri.
- D. woodsii* Hay. - from c.2 km N. of Dumling, N. of Darchula, Darchula District, Mahakali Zone, W. Nepal. C.R. Fraser-Jenkins Field no. 379, 22 Nov. 1994, with A.M. Thapa & B. Pariyar.
- D. yoroii* Seriz. - from a moss-covered cliff, at Dorpatta, c.12 km N. of Dumling, N. of Darchula, Darchula District, Mahakali Zone, W. Nepal. C.R. Fraser-Jenkins Field no. 325, 21 Nov. 1994, with A.M. Thapa & B. Pariyar.
- Huperzia squarrosa* (Forst. fil.) Trevis. - abundant on trees at Kalche Khola, in Phusre Khola valley, c.15 km S. of Pokhara, off Syangja road, Kaski district, Gandaki Zone, W.C. Nepal. C.R. Fraser-Jenkins Field no. 1646, 19 Oct. 1997.
- Lepisorus mehrae* Fras.-Jenk. - from trees in remnant *Quercus* and *Rhododendron* forest, between Ranimatta and Rattanangla, c.40 km N. of and above Surkhet, on road to

Dailekh, Dailekh District, Bheri Zone, W. Nepal. *C.R. Fraser-Jenkins* Field no. 1588, 26 Sept. 1997, with *K. Neupane & U. Chhetri*. This collection has the characteristic attenuated and twisted (in one plane) scale-apices on the lamina. It is presumably common throughout Nepal, but has not been separated properly from *L. sesquipedalis* (J. Sm.) Fras.-Jenk. It occurred there with the common epiphyte-assemblage of *Huperzia hamiltonii* (Spring) Trev., *H. pulcherrima* (Wall. ex Hook. & Grev.) Pich. Serm., *Lepisorus sesquipedalis*, *Phymatopteris quasidivariata* (Hay.) Pich. Serm., *P. oxyloba* (Wall. ex Kunze) Pich. Serm., *P. stewartii* (Bedd.) Pich. Serm., *P. ebenipes* (Hook.) Pich. Serm. (varying from scaly to non-scaly lamina and russet-fringed to more black scales), *Goniophlebium argutum* (Wall. ex Hook.) J. Sm., *Drynaria mollis* Bedd., *Loxogramme involuta* (D. Don) C. Presl, *Vittaria himalayensis* Ching, *Oleandra wallichii* (Hook.) C. Presl, *Leucostegia immersa* (Wall. ex Hook.) C. Presl and *Araiostegia pseudocystopteris* (Kunze) Copel.

Leptochilus decurrens Bl. - from Chowti Bara Mandir, c.6 km S of Damauli, Tanahun District. *C.R. Fraser-Jenkins* Field no. 1298, 23 March 1997, with *G., S.M. & N. Pariyar* and 1460, 18 Aug. 1997 (fertile material).

Microlepia "haflangensis" Nayar & Kaur - from the forested gorge c.1.5 km S.E. of Jamune village, c.7 km W. of Damauli off Pokhara road, Tanahun District. *C.R. Fraser-Jenkins* Field nos. 1503-1505, 19 Aug. 1997, with *M. rhomboidea* (Wall. ex Kunze) Prantl, *Pteris linearis* Poir. in Lam., *Thelypteris clarkei* (Bedd.) Reed, *T. jaculosa* (Christ) Panigr., *T. papilio* (Hope) Iwats., *T. ornatipes* (Holtt.) Fras.-Jenk., *Diplazium bellum* (Clarke) Bir, *D. latifolium* T. Moore, *D. spectabile* (Wall. ex Mett.) Ching, *Polystichum obliquum* (D. Don) T. Moore and *Bolbitis heteroclita* (C. Presl) Ching ex C. Chr.: also Raniban forest, c.½ km W. of "Fishtail Lodge" Hotel, on S. side of Phewa Tal. Pokhara. Kaski District. *C.R. Fraser-Jenkins* Field nos. 1551-1553, 24 Sept. 1997; and, as less finely dissected, more exposed plants, with down-curved acroscopic pinnules, more like "typical" *M. todayensis*, from a forested, N.-facing stream-khola (gully), Kalche Khola, above Chisapani and Kalche villages, S.E. of Chorepatan in Phusre Khola valley, c.15

km S. of Pokhara off Syangja road, Kaski District, Gandaki Zone, W.C. Nepal. *C.R. Fraser-Jenkins* Field no. 1670, 19 Oct. 1997, with *M. rhomboidea* and some specimens (Field no. 1669) of apparent "*M. todayensis*," somewhat intermediate towards *M. speluncae* (also present, Field no. 1668) in having wide lamina-bases. This species, which I have also seen at Namdapha, Arunachal Pradesh, with the *Scientific Exploration Society*, is related to or may only be a more finely dissect form of the S.E. Asian *M. todayensis* Christ, though this was not mentioned by Nayar & Kaur, who were presumably unaware of its relationships as they only compared it with the very different *M. speluncae* (L.) T. Moore. The present species has a ± narrowly lanceolate lamina (almost impossible to see in the scrunpled up type-specimen) which narrows to the base much more than in *M. speluncae*, and is up to 2.5 m long; it also has nearly symmetrical pinnules as well as being far less hairy. It has almost certainly been named before Nayar & Kaur's name, given without knowledge of the S.E. Asian and Chinese species, but I have not yet been able to carry out further research into its identity and hope to do so when next in Britain. If *M. todayensis* is not the correct, earliest name, it is possible from the description that it might correspond with *M. proxima* (Bl.) C. Presl, but obviously I need to see the type of that before making any decision.

Nephrolepis delicatula (Decne. in Jacq.) Pich. Serm. (*synonym: N. paucifrons* d'Almeida) - from Raniban Forest, S. side of Phewa Tal, Pokhara, Kaski District. *C.R. Fraser-Jenkins* Field nos. 1449-1450, 17 Aug. 1997 and 1174, 1 Jan. 1997, with *Davallia bullata* Wall. ex Hook., *Vittaria sikkimensis* Kuhn and *Loxogramme porcata* Prick. Number 1174 is dead fronds only, but the plant I brought back to my home in Kathmandu for confirmation turned out to be correct when it grew in spring and I was able to find it on about half a dozen trees when I returned to the locality, though most of the trees there are colonised with the common *N. auriculata* (L.) Trimen (*synonym: N. cordifolia* (L.) C. Presl; see Sledge (1982)). Subsequently, I also found it is common on trees at Anadu village, S. side of Phewa Tal. *C.R. Fraser-Jenkins* Field no. 1549, 24 Sept. 1997; at Kalche Khola, c. 15 km S. of Pokhara, in Phusre Khola valley, off road to

Syangja, Kaski District, Gandaki Zone, W.C. Nepal. *C.R. Fraser-Jenkins* Field no. 1693, 19 Oct. 1997; and on rocks in forested khola above Liot village, Basmati, c. 5 km W. of Hetauda, off Narayanghat road, Makawanpur District, Narayani Zone, C. Nepal. *C.R. Fraser-Jenkins* Field no. 1756, 24 Oct. 1997, with *Chonche Bahadur Sinchuri, J.B. Pariyar, L.B. Tamang, R. Boruwal & U. Chhetri*. *N. delicatula* is a smaller species (my largest collection is 70 cm long, but most are c.15-25 cm long, but fully fertile) with thinner fronds, no scales on the rachis and small, elongated tubers and is quite different in aspect from *N. auriculata* (see Pichi Sermolli (1969)). The report of *N. delicatula* from Nepal by Gurung (1985) was erroneous as it was based on a specimen at KATH which I have reidentified as typical *N. auriculata*.

Onychium fragile Verma & Khullar = *O. tenuifrons* Ching. I have now found this species in Nepal, on rocky roadside banks in remnant, half-cleared *Quercus* and *Rhododendron* forest, between Ranimatta and Rattanangla, c.40 km N. of and above Surkhet, on road to Dailekh, Dailekh District, Bheri Zone, W. Nepal. *C.R. Fraser-Jenkins* Field nos. 1592-1594, 26 Sept. 1997, with *K. Neupane & U. Chhetri*. Except for its much larger spores this species is very difficult to separate conclusively from small *O. cryptogrammoides* Christ (*O. contiguum sensu auct. Ind., non Wall. ex Hope, nom. superfl.* for *O. lucidum* (D. Don) Spreng. in L. [= *O. japonicum* (Thunb.) O. Ktze.]); see Fraser-Jenkins (1993), who has already shown that Khullar's (1994 *etc.*) continued and erroneous use of the names *O. lucidum* and *O. contiguum* is untenable. This error followed from a rather inaccurate study of the genus by Khullar in Verma & Khullar (1965*b* and *c*) and Khullar & Sharma (1980). But this taxon appears, nevertheless, to be most probably a good species, even though the characteristics given by Khullar all break down. Although some specimens are very obviously and characteristically this species (including my own collections from Barlowganj, below and S. of Mussoorie, Uttarkhand (Uttar Pradesh). *C.R. Fraser-Jenkins* Field nos. - , 1 Oct. 1991 and some of my Dailekh collections here cited), others (including others of the Dailekh ones here cited) become larger and approach small *O. cryptogrammoides*. The indusial margins

turn out to be hardly of any diagnostic value as they vary from erose to entire (indeed Khullar (1994: 220) no longer draws them as erose), nor is their smaller degree of overlap diagnostic. It seems likely that "*O. fragile*" can become larger and has then been overlooked within *O. cryptogrammoides*. Moreover on 17 Dec. 1994 I found that Verma's E. Himalayan triploid voucher-specimens (Tonglu. S.C. Verma 780 and 1126 (PAN!)), though rather larger, were otherwise just like "*O. fragile*." But this species seems to be consistently distinct from *O. cryptogrammoides* in having a more deltate, less ovate lamina and shorter, perhaps more acute fertile segments. I assume at least Verma's and probably also Khullar's cytological counts of it as being triploid will have been correct, which, combined with its large, rather irregular spores and apparently recognisable frond-morphology, provide convincing evidence of its distinctness.

As stated by Khullar (1994: 241), I have pointed out that *O. tenuifrons* Ching, from China, appears to be the same species and thus an earlier name. A new illustration of it by Kung (1980: 284) certainly matches the W. Himalayan plants very well, as does Ching's original (1937: t.163) illustration in which erose-denticulate indusia were well illustrated. When I reexamined the material of *O. tenuifrons* in PE on 9 May 1991 (and the type in E) I was quite clearly convinced it must be exactly the same species as the W. Himalayan material and I now refer the W. Nepalese plant, too, to *O. tenuifrons*. It occurs from at least Dharmsala (Himachal Pradesh) eastwards, but though I found a similar thing on the way up Vaishnodevi, Below Adhkumari, Jammu district. CRFJ 17359, 20 Nov. 1990, I think that was more probably just an immature, nearly sterile *O. cryptogrammoides*. Khullar's report in Khullar, Sharma, Singh & Verma (1988) from Patnitop, Jammu, was investigated by me and is not accepted here as there is no voucher-specimen and it was based purely on a single, rather dubious cytological count. I also could not find the species during detailed study of the Patnitop area in 1990. As stated by Khullar (1994: 245), his previous reports of the Chinese *O. plumosum* Ching from Manali, Kulu (Himachal Pradesh), were in error. However he failed to attribute this finding to me, though I had long since brought it to his attention after reidentifying

the specimens concerned at PAN, finding that they were a confused mixture of juvenile leaves of *O. japonicum* and *O. cryptogrammoides*.

O. siliculosum (Desv.) C. Chr. - from an open roadside bank, c.15 km N. of and above Surkhet, on road to Ranimatta and Dailekh, Birendranagar District, Bheri Zone, W. Nepal, 26 Sept. 1997. Specimens seen from bus, but not collected, thus not to be taken as a proper record.

Polystichum mehrae Fras.-Jenk. & Khullar - from Dorpatta, c.12 km N. of Dumling, N. of Darchula, Darchula District, Mahakali Zone, W. Nepal. C.R. Fraser-Jenkins Field no. 327, 21 Nov. 1994, with A.M. Thapa & B. Pariyar; also c.2 km N. of Dumling etc. C.R. Fraser-Jenkins Field no. 381, 22 Nov. 1994, with A.M. Thapa & B. Pariyar.

Pteris aspericaulis Wall. ex Agardh - from Dorpatta, c.12 km N. of Dumling, N. of Darchula, Darchula District, Mahakali Zone, W. Nepal. C.R. Fraser-Jenkins Field nos. 305 and 306, 21 Nov. 1994, with A.M. Thapa & B. Pariyar; also in remnant *Quercus* and *Rhododendron* forest, between Rattanangla and Ranimatta, c.40 km N. of and above Surkhet, on road to Dailekh, Dailekh District, Bheri Zone, W. Nepal. C.R. Fraser-Jenkins Field nos. 1600-1601, 26 Sept. 1997, with K. Neupane & U. Chhetri, with another, wider-pinnuled member of the *P. aspericaulis* aggregate. These populations appear to represent the W. Himalayan diploid, with its long, narrowish fronds with many pinnae and may well also be the same taxon as the type of *P. aspericaulis*.

P. longipinnula Wall. ex Agardh - from shortly S.E. of Jamune village, c.7 km W. of Damauli off Pokhara road, Tanahun District. C.R. Fraser-Jenkins Field no. 1487, 19 Aug. 1997, with G. Pariyar, with *Thelypteris lakhimpurensis* (Ros.) Iwats.

P. semipinnata L. - from shortly S.E. of Jamune village, c.7 km W. of Damauli off Pokhara road, Tanahun District. C.R. Fraser-Jenkins Field no. 1486, 19 Aug. 1997, with G. Pariyar.

P. vittata L. subsp. *bengalensis* Fras.-Jenk. - from a shaded, N.-facing old wall of a wet field behind a building just east of the Hotel Everest, off Beyarak Road, east part of Birganj, Parsa District, Narayani Zone, C. Nepal. C.R. Fraser-Jenkins Field no. 1762, 4 Nov.

1997, with *Satish Kumar Singh*. This occurrence of this subspecies in a very typical secondary habitat in the Nepalese terai suggests that it might well occur further west, though I did not notice it, or think to search for it in Nepalganj, for example, on several visits there, or in the more westerly Gangetic plains' cities in India, where it should be looked out for. Travelling north from Birganj towards Hetauda, it is absent, as far as I saw, from the Churia Ghats (Siwaliks) and first range of foothills, where it is very obviously replaced by subsp. *vittata*.

Pyrrhosia nuda (Giesenh.) Ching - although Hovenkamp (1986) was certainly correct to sink *P. adnascens* (Sw.) Ching under *P. lanceolata* (L.) Farwell, in contrast to Bir's inexplicable treatment in *Satija & Bir (1985) etc.*, I am convinced it could not have been correct to sink *P. nuda* into *P. lanceolata*. Whenever I have seen *P. nuda* in the field, as well as in herbaria, it always appears to me to be a quite distinct entity. It has consistently thicker, usually larger fronds, usually with noticeably less indument than in *P. lanceolata*, thus often appearing to be almost without indument to the naked eye. Apart from in the Teesta valley in Sikkim and in Darjeeling District, where I first came to realise it must be a distinct species, some 7 years ago, I have also found it in W.C. Nepal, on the S. side of Phewa Tal (lake), Pokhara, Kaski District. *CRFJ* 18092, 23 Jan. 1991 (with *P. lanceolata* (*CRFJ* 18093) *etc.*); c.40 km S. of Pokhara on Syangja road, Syangja District. *CRFJ* 18065, 20 Jan. 1991; hill above Golleng village, S. of Wallung and Syangja, Syangja District. *Bala Ram Thapa Chhetri s.n.*, c.18 Oct. 1997 (*C.R. Fraser-Jenkins* Field no. 1758), given to me 25 Oct. 1997; and it is also common on the rocky slopes W. of Mugling on the way to Abo Khaireni, Gorkha District, though I do not appear to have made an actual collection from this last locality, to reconfirm it. Further nomenclatural research would, however, be advisable, including checking the types, to see for sure which of the synonyms listed by Hovenkamp apply to this species and thus whether it is correctly called *P. nuda*.

Selaginella fulcrata (Ham. ex D. Don) Spring - this splendid, apparently very local species (though also reported from China) is abundant down the road from Pokhara to Butwal;

e.g. 10½ miles N. of Butwal. Palpa District, Lumbini Zone, W.C. Nepal. *CRFJ* 18026. 20 Jan. 1991; 4 miles S. of Ramdi, Syangja District, Gandaki Zone, W.C. Nepal. *CRFJ* 18054, 20 Jan. 1991; at Golleng village, Syangja District. *C.R. Fraser-Jenkins* Field no. 1556, 25 Sept. 1997, with *Balaram Thapa Chhetri, K. Neupane, J.B. Pariyar, D. Lama, U. Chhetri & R. Boruwal*; also N. of Bagmati Bridge on path to Bagar, on W. side of Bagmati river, E. of Chandranigarapur and Hetauda, Makawanpur District, Narayani Zone, E.C. Nepal. *C.R. Fraser-Jenkins* Field no. 1702, 21 Oct. 1997, with *J.B. Pariyar, R. Boruwal, U. Chhetri & C.B. Sinchuri*; S.E. of Duarde village, on path down to Bagmati Bridge, on E. side of Bagmati river, N.E. of Chandranigarapur, E. of Hetauda, Sindhuli District, Janakpur Zone, E.C. Nepal. *C.R. Fraser-Jenkins* Field no. 1728. 23 Oct. 1997, with *Lok Bahadur Tamang, J.B. Pariyar, R. Boruwal, U. Chhetri, C.B. Sinchuri & Dawa Lama*; and in forested khola above Liot village, Basmari. c.5 km W. of Hetauda, off Narayanghat road, Makawanpur District, Narayani Zone, C. Nepal. *C.R. Fraser-Jenkins* Field no. 1738, 24 Oct. 1997, with *Chonche Bahadur Sinchuri, J.B. Pariyar, L.B. Tamang, R. Boruwal & U. Chhetri*. It was also reported from further east in the foothills of lowland Nepal by Alston & Bonner (1956).

S. pallidissima Spring - from Dorpatta, c.12 km N. of Dumling, N. of Darchula, Darchula District, Mahakali Zone, W. Nepal. *C.R. Fraser-Jenkins* Field no. 289. 21 Nov. 1994. with *A.M. Thapa & B. Pariyar*. High-altitude populations (e.g. 3350 m. Shyalek Pass, S. of Buddhi and Garbyang, just W. of Kali river, Pithoragarh, Uttarkhand (Uttar Pradesh). *C.R. Fraser-Jenkins* Field no. 279, 21 Nov. 1994; and W. Nepal. *O. Polunin, W.R. Sykes & L.H.J. Williams* (BM)), where plants become small and compressed, have been confused in herbaria with the European *S. helvetica* (L.) Spring, which they imitate.

S. vardei Lévl./*S. longipila* Hieron. - from c.2 km N. of Dumling, N. of Darchula, Darchula District, Mahakali Zone, W. Nepal. *C.R. Fraser-Jenkins* Field no. 348. 22 Nov. 1994. with *A.M. Thapa & B. Pariyar*. I have not yet looked into why Dixit (1984*a* and 1992) stated that the sense in which Alston (1945) took the name *S. longipila* was incorrect.

even though Alston cited Himalayan type-material which he had seen, and there is no other similar Indo-Himalayan species. If Alston was correct, *S. longipila* is an earlier name than *S. vardei*, which I found to refer to the same species; but if Dixit really uncovered an error, rather than creating a new one, it should be noted that *S. vardei* is a much earlier name at the specific rank than *S. indica* (Milde) Tryon (not "Trayon," as Dixit often misspelt his name), which was first raised to the specific rank by Tryon - a name not having priority outside of the rank it was published at.

Tectaria fuscipes (Wall. ex Bedd.) C. Chr. - from Chowti Bara Mandir, c.6 km S. of Damauli, Tanahun District. C.R. Fraser-Jenkins Field no. 1303, 23 March 1997, with G., S.M. & N. Pariyar and 1462, 18 Aug. 1997 and shortly S.E. of Jamune village, c.7 km W. of Damauli off Pokhara road, Tanahun District. C.R. Fraser-Jenkins Field no. 1495, 19 Aug. 1997, with G. Pariyar.

T. heterocarpa (Bedd.) Morton (1973: 270) (*synonym: T. heterosora* (Bak. in Hook. & Bak.) Ching) - from steep bank of large, deep stream-khola below village-school on W. side of Raigaon, c.10 km N. of Bagmati Bridge, on W. side of Bagmati river, N.E. of Chandranigarapur, E. of Hetauda, Makawanpur District, Narayani Zone, E.C. Nepal. C.R. Fraser-Jenkins Field no. 1727, 22 Oct. 1997, with J.B. Pariyar, R. Boruwal, U. Chhetri & C.B. Sinchuri. This find, presumably new to Nepal and so far west, was rather unexpected; unfortunately I had not enough time to investigate properly the rest of the gorge there to see if other eastern elements were present. Although Gurung (1976 and 1984) listed this species (*sub T. heterosora*) as from Nepal, I have not been able to find any previous records of it from Nepal (or from anywhere west of "Assam," apart from Dixit's (1984a) unlocalised mention of Sikkim) from which she could have gleaned the name and I assume it must have been one of the many imaginary records of ferns she happened to see listed from various regions of the Indian subcontinent (or indeed the world, in some cases), which she included without basis in her lists. There is no material of it at KATH, nor material there of other species so identified by her. It may be noted that Gurung (1991: t.89) actually illustrated in her lower picture purported

to be *T. polymorpha* (Wall. ex Hook.) Copel. part of a fertile frond of *T. wightii* (Clarke) Ching, taken from Clarke's (1880) t.78B of that species.

The plants I found were not mature enough to be fertile and only had up to three pairs of pinnae with a large apical segment. Because the rhizome was ascendent, the pinnae have narrow bases, and some are wide in the middle, I thought at first I had found the even less expected *T. wightii*, but the pinna-bases bear minute but characteristic proliferous bulbils, unlike in that species, and on reexamining my Assamese and Darjeeling (below Mackaybari) collections of *T. heterocarpa* I find that immature plants are often \pm similarly shaped and do not develop the typical, long, \pm parallel-sided pinnae and narrow (nearly imparipinnate) laminar apex until the plants are larger. The bulbils, in particular, make it sure that this is *T. heterocarpa*.

Thelypteris ciliata (Wall. ex Benth.) Ching - from steep bank of large, deep stream-khola below village-school on W. side of Raigaon, c.10 km N. of Bagmati Bridge, on W. side of Bagmati river, N.E. of Chandranigarapur, E. of Hetauda, Makawanpur District, Narayani Zone, E.C. Nepal. C.R. Fraser-Jenkins Field no. 1726, 22 Oct. 1997, with J.B. Pariyar, R. Boruwal, U. Chhetri & C.B. Sinchuri. This species has a much narrower frond and less deeply lobed pinnae than the only other species of Subgenus *Trigonospora* I have collected in Nepal, which is *T. caudipinna* Ching. The latter grows in the deep, narrow gorge of the small stream, Mahadev Khola, above and N. of Sanagaon, W. of Sankhu, Kathmandu District, Bagmati Zone, C. Nepal. C.R. Fraser-Jenkins Field nos. 280, 29 July 1995 and 1420, 3 Aug. 1997, with B.R.T. Chhetri, L.B. Tamang & U. Chhetri.

T. clarkei (Bedd.) Reed - from a forested khola above Liot village, Basmary, c.5 km W. of Hetauda, off Narayanghat road, Makawanpur District, Narayani Zone, C. Nepal. C.R. Fraser-Jenkins Field no. 1750, 24 Oct. 1997, with Chonche Bahadur Sinchuri, J.B. Pariyar, L.B. Tamang, R. Boruwal & U. Chhetri; and from Bagar to Raigaon, N. of Bagmati Pul (bridge), N.E. of Chandranigarapur, W. side of Bagmati river, Makawanpur District, Narayani Zone, E.C. Nepal. C.R. Fraser-Jenkins Field no. 1720, 22 Oct. 1997.

with *J.B. Pariyar, R. Baruwal, U. Chhetri & C.B. Sinchuri*, growing with *T. jaculosa* (Christ) Panigr. and *Pteris pellucida* C. Presl. For those who, like me, value abnormal monstrosities of ferns when they are strikingly decorative, as with the many splendid, named cultivars of a great many Asian *etc.* and especially European species, it is worth mentioning that I found a fine plumose clone of this species on a slope below the road c. 3 km N. of and below the pass between Dharan and Dhankuta, above Shimshua village, Dharan District, Koshi Zone, E. Nepal. *C.R. Fraser-Jenkins* Field no. 1107, 1 July 1994. I gave an offset for cultivation to my good friend, Mr. Martin Rickard, for his fern-garden at Kyre Park, Britain, though I assume it would have to be grown under glass there in a frost-free environment.

Thelypteris x nareshii Fras.-Jenk., *hybr. nov.*, *basionym* (= *T. appendiculoides* Fras.-Jenk. x *T. dentata* (Forssk.) Brownsey & Jermy). *Planta hybrida, morphologia intermedia inter eum parentium. Rhizoma longe repentum, subterraneum, sed aliquantum crassiorum quam in T. appendiculoides. Frondes distantae, stipes elongatus, latitudo basis laminae ut in T. dentata. Lobi pinnarum minore profunde separati quam in T. appendiculoides. Par unus venularum anastomosans ad basem pinnularum. Pili laminae longi et dispersi. Dimidium sporarum abortivarum, ceterae similes normalibus. Holotypus: W.C. Nepal, Kaski District, Pokhara, near lake-shore on S. side of Phewa Tal, just below back of "Fishtail Lodge" Hotel, among a large bed of *T. appendiculoides*, with *T. dentata* nearby. *C.R. Fraser-Jenkins* Field no. 1447, 17 Aug. 1997 (BM). *Isotype*: Ditto (KATH). This splendidly intermediate hybrid is named after Mr. Naresh Thapa, of the National Herbarium, Godavari, near Kathmandu, who has recently begun much-needed active work on Nepal's pteridophytes, along with Mrs. Diltara Yami Tuladhar, and whose enthusiasm and independent research is exactly what is needed in this area.*

It stood out immediately from the surrounding *T. appendiculoides* in having less deeply lobed pinnae, but with narrower lobes and longer hairs than in *T. dentata*; furthermore the rhizome was subterranean, thinner and longer-creeping than in *T.*

dentata, though thicker than the *T. appendiculoides* there. The rather many apparently good spores among the abortive ones are not necessarily viable even though they look normal; it would be of interest to attempt growing them to see.

Thelypteris loyalii (Holtt.) Fras.-Jenk., **comb. nov.** (basionym: *Pneumatopteris truncata* var. *loyalii* Holtt., *Blumea* **21**: 314 (1974 ["1973"])) - from the forested gorge c. 1.5 km S.E. of Jamune village, c. 7 km W. of Damauli off Pokhara road, Tanahun District, W.C. Nepal. C.R. Fraser-Jenkins Field no. 1511, 19 Aug. 1997. A fairly large population exists here, unlike at Deorali (see above in the main text *sub Pneumatopteris truncata* var. *loyalii*) and the plants varied from mostly having narrower pinnae (up to c. 2 cm wide) to a few having pinnae up to nearly 2.5 cm wide, with small teeth. They match well Loyal's cytological voucher- and other specimens, which I have studied at PAN (Manjitar - Teesta road, Darjeeling, 2,000'. D.S. Loyal 33, Aug. 1956 (PAN 3172 (type) and 3173); Darjeeling. D.S. Loyal s.n., sin. date (PAN 2207); and Dikchu, 2,000'. N. Sikkim. D.S. Loyal s.n., July 1958 (PAN 2468 and 2569)); the old Manjitar to Teesta road along the south bank of the Rangeet river, below and N.E. of Lebung and Darjeeling, has now fallen into disuse because of a large landslide, but I was able to walk along about half of the route in Nov. 1995 and one could easily go further in this most interesting area. Unfortunately I did not notice the species there on that particular excursion.

As far as I can see, this species appears to have been completely overlooked in Nepal until now, including under the name, *T. truncata* (e.g. see Holttum (1974)). It appears to be consistently distinct from *T. truncata*, which I have seen in Sri Lanka. As commented on by Holttum (1974: 294, 314), Loyal (1961) has found that it is diploid, whereas the Sri Lankan *T. truncata* was found to be tetraploid by Manton in Manton & Sledge (1954). This, combined with the morphological distinction, demonstrates that the two are distinct species. It is pleasing that the species could be named after its discoverer, the late Professor D.S. Loyal, my first friend at Panjab University, Chandigarh (see also under *Hypodematium crenatum* subsp. *loyalii*, above).

Vittaria sikkimensis Kuhn - from forested stream-khola, Kalche Khola, above Chisopani and Kalche villages, in Phusre Khola valley, c.15 km S. of Pokhara, off Syangja road, Kaski District, Gandaki Zone, W.C. Nepal. C.R. Fraser-Jenkins Field no. 1697, 19 Oct. 1997, with other common, or less common epiphytes, including those I collected: *Huperzia squarrosa* (Forst. fil.) Trevis., *Aglaomorpha coronans* (Wall. ex Mett.) Copel., *Lepisorus contortus* (Christ) Ching, *Pyrrhosia lanceolata* (L.) Farwell, *P. porosa* (C. Presl) Hovenkamp, *P. mannii* (Giesenh.) Ching, *Microsorium membranaceum* (D. Don) Ching, *Loxogramme porcata* Price, *Asplenium yoshinagae* Mak. subsp. *indicum* (Sledge) Fras.-Jenk., *Nephrolepis delicatula* (Decne. in Jacq.) Pich. Serm., *N. auriculata* (L.) Trimen, *Davallia bullata* Wall. ex Hook. and *Araiostegia pulchra* (D. Don) Copel.

ADDENDA

Aleuritopteris wuyishanensis Ching = *Cheilanthes krameri* Franch. & Sav. I have seen the type at PE in both 1991 and 1995.

Athyrium austro-yunnanense Ching - two photographs by Zhang of meiosis in this taxon in the herbarium at PE were interpreted to show that it is tetraploid, whereas *A. foliolosum* Wall. *apud* T. Moore *ex* R. Sim, which "*A. austro-yunnanense*" represents typical material of, is diploid. However one of the photographs is clearly two cells adjoining, with two groups of chromosomes coming together and two adjoining areas of cytoplasm, and the other shows several more than the expected 80 bivalents and must also represent more than one cell (or more than 2 cells). Thus this result does not actually show a cytological complex in *A. foliolosum*, even though this is not precluded by various studies in the Himalayan region; further and more critical cytotaxonomic study is evidently needed.

Dryopteris gonggaensis Kung, Zhang & Guo = *D. blanfordii* (Hope) C. Chr. subsp. *nigrosquamosa* (Ching) Fras.-Jenk.

D. rubripes Ching & Chu *ex* Fraser-Jenkins (1986 and 1989), *nom. nud.* = *D. rubrobrunnea* Chu. It is a pity that one of the few genuinely new species' names about to have been published recently from China with the joint-authorship of Ching (as can be seen from the sheets at PE), but first recognised by Prof. W.M. Chu, who is probably China's most competent pteridologist, in the end never got published, for reasons that are not clear. Chu (1992) decided to change the name, which had been accepted by me, mentioning another name, *D. rubristipes* Ching & Liu, which, however is not a homonym, nor would be confused with it. Furthermore *D. rubristipes* is merely another of Ching's countless synonyms, this time of *D. purpurella* Tag. Thus I unfortunately admitted a *nomen nudum* in my publications; in the meantime Chu has published his species as *D. rubrobrunnea*.

REFERENCES

- Abraham, A., Ninan, C.A. & Matthew, P.M. 1962. Studies on the cytology and phylogeny of the pteridophytes, VII. Observations on one hundred species of south Indian ferns, *J. Indian Bot. Soc.* **41**: 339-421.
- Agnew, A.D.Q. 1974. *Upland Kenya Wild Flowers*. Oxford. [ed. 2. Agnew, A.D.Q. & Agnew, S. (eds.): 9-39. Nairobi].
- Alston, A.H.G. 1936. Fern Notes-1, *J. Bot.* **74**(812): 172-174.
- _____ 1945. An enumeration of the Indian species of Selaginella, *Proc. Nat. Inst. Sci. India* **11**(3): 211-235.
- _____ & Bonner, C.E.B. 1956. Résultats des expéditions scientifiques Gênévoises au Népal en 1952 et 1954 (partie botanique) 5. Pteridophyta, *Candollea* **15**: 193-220.
- Anand, R.K & Shrivastava, R.D. 1995 ["1994"]. Ethnopharmacological Study of *Adiantum lunulatum* Burm. F., *Indian Fern J.* **11**(1-2): 137-141.
- Anthony, N.C. & Schelpe, E.A.C.L.E. 1982. New species and new combinations in African Pteridophyta and Orchidaceae, *Contrib. Bolus Herb.* **10**: 143-164.
- Askerov, A.M. 1979 ["1978"]. *Izv. Akad. Nauk Azerbaidzhansk. S.S.R., ser. Biol. Med. Nauk* **1978**(4): 4.
- _____ 1982. Dva novykh vida paporotnika dlya flory S.S.S.R. s Kavkaza, *Dokl. Akad. Nauk Azerbaidzhansk. S.S.R.* **39**(1): 57-61.
- _____ 1983. *Polystichum x dimitrievae* A. Asker.: novi gibridnyi vid paporotnika s Kavkaza, *Dokl. Akad. Nauk Azerbaidzhansk. S.S.R.* **39**(3): 61-62.
- _____ 1986. *Zametki Sist. Geogr. Rast.* **39**: 4-7.
- _____ 1989 ["1988"]. Taxonomy and geography of the Caucasus ferns, in Shing. K.H. & Kramer, K.U. (eds.), *Proceedings of the International Symposium on Systematic Pteridology*: 147. Beijing.
- Balakrishnan, N.P. 1982 ["1980"]. Notes on some little known ferns of Andaman & Nicobar Islands, *Bull. Bot. Surv. India* **22**(1-4): 137.
- _____ & Chowdhury, S. 1967. *Crypsinus chrysotrichus* (C. Chr.) Tagawa. A

new fern record from India, *Sci. Cult.* **33**: 62-63.

Beddome, R. H. 1863. *The Ferns of Southern India [etc.]*: [I-XV, 1-] 40, t.117 [-88, t.1-271 and index]. Madras.

_____ 1866-1870. *The ferns of British India* **1**: t.103 (1866), **2**: t.256-300 (1868) and index (1870). Madras. Reprinted 1976. New Delhi.

_____ 1883. *Handbook to the Ferns of British India, Ceylon and the Malay Peninsula*: [I-XIV, 1-] 218 [-501]. Calcutta.

_____ 1892. *Supplement to the Ferns of British India, Ceylon and the Malay Peninsula [etc.]*: [1-] 45-46 [-110]. Calcutta.

Beitel, J. & Buck, W.R. 1988. The use of subspecies in the *Dryopteris affinis* complex. *Fiddlehead Forum, Bull. Amer. Fern Soc.* **15**(2): 15-16.

Bera, S., Ghorai, N. and Raut, C.K. 1995 ["1994"]. Cypnid gall in *Selaginella monospora* Spring, *Indian Fern J.* **11** (1- 2): 146-149.

Beri, A. & Bir, S.S. 1996 ["1995"]. Chemical Analysis of Some Fern Spores from North West Himalaya, *Indian Fern J.* **12**(1-2): 188-194.

Bhardwaja, T.N. & Gena, C.B. 1989. Pteridological Researches in Rajasthan, in Bhardwaja, T.N., *International Symposium on Present and Future Perspectives in Pteridology (August 8-10, 1989). Souvenir*: 29-41. Jaipur.

Bir, S.S. 1961. Cytological observations on *Diplazium japonicum* (Thbg.) Bedd., *Res. Bull. Panjab Univ., ser. 2, sci.* **12**(1-2): 119-133 *et tt.*

_____ 1962. Taxonomic account of the Indian species of the genus *Vittaria*. *Res. Bull. Panjab Univ., ser. 2, sci.* **13**(1-2): [15-] 23 [-24 *et tt.*].

_____ 1964. Taxonomic notes on some Himalayan ferns, *J. Indian Bot. Soc.* **43**(4): 556-572.

_____ 1972. A note on the cytology of *Athyrium anisopterum* Christ, *Amer. Fern J.* **62**(1): 27-29.

_____ 1973. Cytology of Indian Pteridophytes, in Nair, P.K.K. (ed.), *Glimpses in Plant Research* **1**: [28-] 62 [-119].

- _____ 1976. Taxonomy of Indian pteridophytes, in Kachroo, P. (ed.), *Recent Advances in Botany*: 70-115. Dehra Dun.
- _____ Fraser-Jenkins, C.R. & Lovis, J.D. 1985. *Asplenium punjabense*, sp. nov. and its significance for the status of *Ceterach* and *Ceterachopsis*, *Fern Gaz.* **13**(1): 53-63.
- _____ & Irudayaraj, V. 1993 ["1992"]. Taxonomy of Diplazium Polypodioides Complex in India, *Indian Fern J.* **9**(1-2): 188-203.
- _____ & Singh, S. 1995 ["1994"]. Biosystematic studies on the Asplenioid and Athyrioid Genera from the Himalayas: Results of Chromosomal Analysis on Population Basis, *Indian Fern J.* **11**(1-2): 82-88.
- _____ & Trikha, C.K. 1974. Taxonomic revision of Polypodiaceous genera of India. VI. *Lepisorus excavatus* group, *Amer. Fern J.* **64**: 45-63.
- _____ & Vasudeva, S.M. 1971. Pteridophytic flora of Kodaikanal (South India), *J. Bombay Nat. Hist. Soc.* **68**: 169-195.
- _____ & Kachroo, P. 1989. Pteridophytic Flora of North-Eastern India-I (Families Huperziaceae-Sinopteridaceae), *Indian Fern J.* **6**: 30-55.
- Biswas, A. 1985. The genus *Hypolepis* Bernh. in India, *J. Econ. Tax. Bot.* **7**(1): 111-124.
- _____ 1989 ["1988"]. The study on the genus *Microlepia* Presl in India - II. *Microlepia trapeziformis* (Roxb.) Kuhn complex, *J. Econ. Tax. Bot.* **12**(2): 313-327.
- _____ 1991. The study on the genus *Microlepia* Presl in India - I, *Microlepia strigosa* (Thunb.) Pr. complex, *J. Econ. Tax. Bot.* **15**(1): 31-39.
- _____ & Ghosh, S.R. 1984. The fern family *Elaphoglossaceae* Pichi Sermolli in India, Nepal & Bhutan, *Proc. Indian Acad. Sci. (Plant Sci.)* **93**(6): 581-608.
- Blanford, H.F. 1886. The Silver Ferns of Simla and their allies, *J. Simla Nat. Soc.* **2**: 13-22.
- Blasdell, R.F. 1963. A monographic study of the fern genus *Cystopteris*, *Mem. Torrey Bot. Club* **21**(4): 1-102 et ff.
- Bole, P.V. & Almeida, M.R. 1977. Four new species of pteridophytes from Bombay Presidency, *J. Bombay Nat. Hist. Soc.* **74**: 320-325.
- Bosman, M.T.M. 1991. *A monograph of the fern genus Microsorium (Polypodiaceae)*

including an attempt towards a reconstruction of the phylogenetic history of the microsorioids: I-IX, 1-161. Leiden.

Braithwaite, A.F. 1986. The *Asplenium aethiopicum* complex in South Africa. *Bot. J. Linn. Soc. (Lond.)* **93**(4): 343-378.

Brownsey, P.J. 1987. A review of the fern genus *Hypolepis* (Dennstaedtiaceae) in the Malesian and Pacific regions, *Blumea* **32**: 227-276.

_____ 1989. The taxonomy of bracken (Pteridium: Dennstaedtiaceae) in Australia. *Australian Syst. Bot.* **2**: 113-128.

_____ & Jermy, A.C. 1973 [15 Sept. 1973]. A fern collecting expedition to Crete. *Brit. Fern Gaz.* **10**(6): 331-348.

Burrows, J.E. 1990. *South African Ferns and Fern Allies*: i-xii, 2-363. Sandton.

Chandra, P. 1974 ["1971"]. Genus *Pronephrium* Presl in India, *Bull. Bot. Surv. India* **13**(3-4): 274-281.

Chandra, S. & Kaur, S. 1985 ["1984"]. Additions to the ferns endemic to India, *Indian Fern J.* **1**(1-2): 83-87.

_____ 1995 ["1994"]. Nomenclature of Indian Ferns, *Indian Fern J.* **11**(1-2): 7-11.

Ching, R.C. 1933a. The studies of Chinese ferns IX [*Lepisorus* etc.], *Bull. Fan Mem. Inst. Biol.* **4**: 47-116.

_____ 1933b. The studies of Chinese ferns X. *Microsorium*, *Colysis*, *Leptochilus*, *Selliguea*, *Bull. Fan Mem. Inst. Biol.* **4**: 293-352.

_____ 1936. New and little known ferns from China and Neighbouring Regions, *Lingnan Sci. J.* **15**(3): 391-399.

_____ 1937. *Icones filicum sinicarum* **4**: t.151-200. Peiping [Beijing].

_____ 1962. On the Nomenclature of the compound-leaved *Polysticha*, *Act. Bot. Sinica* **10**(3): 253-263.

_____ 1964a. Notes on some confused species of *Arachniodes* Bl., *Act. Phytotax. Sinica* **8**(4): 383-385.

- _____ 1964b. On the genera *Phymatopsis* J. Sm.. & *Crypsinus* Presl, *Acta. Phytotax. Sinica* **9**(2): 179-197.
- _____ 1978a and b. The Chinese Fern Families and Genera; Systematic Arrangement and Historical Origin, *Act. Phytotax. Sinica* **16**(3): 1-19; **16**(4): 16-37.
- _____ 1979. The Himalaya as a Centre of Concentration for the Southeastern Asiatic Polypodiaceous Ferns, *Act. Bot. Yunnanica* **1**(1): 23-31.
- _____ 1980. *Platygyria* Ching et S.K. Wu, An Unique New Genus of the Polypodiaceae from China, *Act. Bot. Yunnanica* **2**(1): 67-74.
- _____ 1982a. Notes on some Chinese Ferns, *Act. Phytotax. Sinica* **20**(2): 233-235.
- _____ 1982b. In Yang, C.Y., The taxonomy, distribution and medicinal value of the medicinal plants of the family Huperziaceae and Lycopodiaceae in China, *Act. Phytotax. Sinica* **20**(4): 445-452.
- _____ 1982c. The Taxonomy of Chinese *Lycopodiaceae* (sensu lat.) III, *Act. Bot. Yunnanica* **4**(2): 119-128.
- _____ 1983. Taxonomic Notes on some N.W. Himalayans [*sic*] Ferns, *Act. Bot. Austro-Sinica* **1**: 17-25.
- _____ 1985 ["1984"]. Problems in Indian Ferns, *Indian Fern J.* **1**(1-2): 47-50.
- _____ Ling, Y.X. & Wu, S.K. 1983. A Taxonomic Revision on *Lepisorus clathratus* (Clarke) Ching Complex in the Sino-Himalayan Region, *Act. Bot. Yunnanica* **5**(1): 1-23.
- _____ & Reichstein, T. 1981. *Asplenium nesii* Christ (Aspleniaceae Pteridophyta). Studies in *Asplenium* for "Flora Iranica" 2, *Candollea* **36**(1): 195-201.
- _____ & Wu, S.K. 1980. The Floristic Characteristics of the Xizang (Tibet) Pteridophyte Flora in Relation to the Upheaval of the Himalayas. *Act. Bot. Yunnanica* **2**(4): 382-389.
- _____ 1981. *The Floristic Characteristics of the Xizang Pteridophyte Flora in Relation to the Upheaval of the Himalayas*: 1209-1214. Beijing.
- _____ 1983. *Pteridophyta*, in C.Y. Wu (ed.), *Flora Xizangica* **1**: 1-355. Beijing.

- Chowdhury, N.P. 1937. Notes on the anatomy of some Indian species of *Lycopodium* with remarks on the distribution of the genus in India, Burma and Ceylon. *Trans. Nat. Inst. Sci. India* **1**: 187-227.
- Christensen, C. 1905-1906. *Index Filicum [etc.]*: I-LX, 1-744. Hafnia [Copenhagen].
- _____ 1931. Asiatic Pteridophyta collected by Joseph F. Rock 1920-1924, *Contrib. U.S. Nat. Herb.* **26**: 259-337 *et tt.*
- Clarke, C.B. 1880. A Review of the Ferns of Northern India [etc.], *Trans. Linn. Soc. (Lond.)*, *II Bot.*, **1**: 425-619 *et tt.*
- Code 1994: Greuter, W., Barrie, F.R., Burdet, H.M., Chaloner, W.G., Demoulin, V., Hawksworth, D.L., Jørgensen, P.M., Nicholson, D.H., Silva, P.C., Trehane, P. & McNeill, J. (eds.) 1994. International Code of Botanical Nomenclature (Tokyo Code) [etc.], *Regnum Vegetabile* **131**: I-XVIII, 1-389. Königstein.
- Clayton, W.D. & Panigrahi, G. 1974. Computer-aided chorology of Indian grasses. *Kew Bull.* **29** (4): 669-686.
- Copeland, E.B. 1927. Davalodes and related genera, *Philippine J. Sci.* **34**: 239-256.
- _____ 1931. Miscellaneous oriental Pteridophytes, *Univ. California Publ. Bot.* **12**: 383-418.
- _____ 1947. Genera Filicum The Genera of Ferns, in Verdoorn, F. (ed.), *Annal. Cryptogam. Phytopath.* **5**: I-XVI, 1-247 *et tt.* Waltham, Mass.
- Cultivated Plant Code 1995: Trehane, P., Brickell, C.D., Baum, B.R., Hettterscheid, W.L.A., Leslie, A.C., McNeill, J., Spongberg, S.A. & Vrugtman, F. (eds.) 1995. International Code of Nomenclature for Cultivated Plants - 1995 [etc.], *Regnum Vegetabile* **133**: I-XVI, 1-175. Wimbourne.
- Das, P.K. Misra, M.K. & Panigrahi, G. 1989. Fern Flora of Koraput District, Orissa, *Plant Sci. Res.* **11**(1): 7-44.
- Davis, P.H. & Heywood, V.H. 1967. *Principles of Angiosperm Taxonomy*. Edinburgh & London.
- De, S. & Bera, S. 1996 ["1995"]. Anatomical and Biochemical Investigations of Cypnid Gall

- in *Selaginella Monospora* Spring from Darjeeling, West Bengal, *Indian Fern J.* **12**(1-2): 164-167.
- Dhir, K.K. 1980. Ferns of North-Western Himalayas, in Cramer, J. (ed.) *Biblio. Pterid.* **1**: 1-158. Vaduz.
- Dixit, R.D. 1982. *Woodsia hancockii* Baker. A fern new to India, *J. Econ. Tax. Bot.* **3**: 963-964.
- _____ 1983. On the occurrence of *Selaginella tamariscina* (P. Beauv.) Spring var. *pulvinata* (Wall. ex Hook. et Grev.) Alston in India and Burma, *J. Bombay Nat. Hist. Soc.* **79**(3): 717-718.
- _____ 1984a. A census of the Indian Pteridophytes, *Flora of India, ser. IV*: 1-177. New Delhi.
- _____ 1984b. On the occurrence of *Lycopodium clavatum* L. and *L. japonicum* Thunb. in India, *Indian J. Forestry* **7**(1): 72-74.
- _____ 1985a ["1983"]. Four new species of *Selaginella* P. Beauv. from India, *Bull. Bot. Surv. India* **25**(1-4): 223-227.
- _____ 1985b ["1984"]. Two new species of *Selaginella* from India, *Bull. Bot. Surv. India* **26**(122): 104-107 *et tt.*
- _____ 1987 ["1985"]. Two new species of *Selaginella* P. Beauv. from Kerala, India, *Bull. Bot. Surv. India* **27**(1-4): 123-125 *et tt.*
- _____ 1992. *Selaginellaceae of India*: I-X, 1-196. Dehra Dun.
- _____ 1997. Pteridophyta, in Saxena, H.O. & Brahman, M. (eds.), *The Flora of Orissa* **4**: 2009-2918.
- _____ & Das, A. 1979. The genus *Coniogramme* Fée in India, *Proc. Indian Acad. Sci.* **88** B(II, 4): 253-268.
- _____ 1981. A new species of *Plagiogyria* from Malaya, *Fern Gaz.* **12**(3): 182-183.
- _____ & Das, S. 1995 ["1994"]. *Loxogramme Mussooriana* Dixit & Das - a New Species of Ferns [sic] from India, *Indian Fern J.* **11**(1-2): 60-62.

- Dyer, A. 1996. What should we do about *Dryopteris affinis*, *Pteridologist* **3**(1): 25-27.
- Ettingshausen, C. von 1865. *Die Farnkräuter der Jetztwelt [etc.]*: 57, t.37, 38. Wien.
- Farrar, D.R. 1992. *Trichomanes intricatum*: The independent *Trichomanes gametophyte* in the eastern United States, *Amer. Fern J.* **82**: 68-74.
- _____ & Mickel, J.T. 1991. *Vittaria appalachiana*: A Name for the "Appalachian Gametophyte", *Amer. Fern J.* **81**(3): 69-75.
- Fischer, C.E.C. 1938. The Flora of Lushai hills, *Rec. Bot. Surv. India* **56**: 75-161.
- Fraser-Jenkins, C.R. 1977. Three species in the *Dryopteris villarii* aggregate (Pteridophyta, Aspidiaceae), *Candollea* **32**(3): 305-319.
- _____ 1980a. *Dryopteris affinis*: a new treatment for a complex species in the European Pteridophyta Flora, *Willdenowia* **10**(1): 107-115.
- _____ 1980b. Nomenclatural Notes on *Dryopteris*: 4, *Taxon* **29**: 607-612.
- _____ 1982. *Dryopteris* in Spain, Portugal and Macaronesia, *Bolm. Soc. Broteriana, ser. 2*, **55**: 175-336.
- _____ 1984. An introduction to fern genera of the Indian subcontinent, *Bull. Brit. Mus. Nat. Hist., Bot.*, **12**(2): 37-76 et tt.
- _____ 1986. A classification of the genus *Dryopteris* (Pteridophyta, Dryopteridaceae), *Bull. Brit. Mus. Nat. Hist., Bot.*, **14**(3): 183-218.
- _____ 1987. Taxonomic and Nomenclatural Notes 5. *Dryopteris*, in Derrick, L.N., Jermy, A.C. & Paul, A.M., Checklist of European Pteridophytes, *Sommerfeltia* **6**: X-XIII.
- _____ 1988. Some Comments on the Nomenclature of *Dryopteris*, *Indian Fern J.* **5**(1-2): 69-77.
- _____ 1989. A monograph of *Dryopteris* (Pteridophyta: Dryopteridaceae) in the Indian Sub continent, *Bull. Brit. Mus. Nat. Hist., Bot.*, **18**(5): 323-477.
- _____ 1991. An outline monographic study of the genus *Polystichum* in the Indian subcontinent, in Bhardwaja, T.N. & Gena, C.B. (eds.), *Aspects Plant Sci.* **13**: 249-287. New Delhi.

- _____ 1992 ["1991"]. The ferns and allies of the far west Himalaya. *Pakistan System.* **5**(1-2): 85-120.
- _____ 1993 ["1992"]. The ferns and allies of the far west Himalaya - Some Additions and Corrections, *Bot. Helvetica* **102**(2): 143-157.
- _____ 1994. *Dryopteris* (Pteridophyta) of Hawaii - a monographic study, *Thaiszia - J. Bot. Kosice* **4**: 15-47.
- _____ 1996. A reaffirmation of the taxonomic treatment of *Dryopteris affinis* (Dryopteridaceae: Pteridophyta), *Fern Gaz.* **15**(3): 77-81.
- _____ 1997a. *Dryopteris stanley-walkeri* Fraser-Jenkins, the diploid common-ancestor of *D. carthusiana* and *D. cristata* (Pteridophyta: Dryopteridaceae), in Pande, P.C. *et al.* (eds.). Almora.
- _____ 1997b.(in press). A revision of west-Himalayan *Athyrium* Roth and *Diplazium* Sw., with comments on some *Deparia* Hook. & Grev. and *Cornopteris* Nakai (*Woodsiaceae*): 1-111. Dehra Dun.
- _____ 1997c.(in press). Dryopteridaceae (part) and Pteridaceae (part) in Dassanayake, M.D. & Fosberg, F.R. (eds.), *Flora of Sri Lanka: Pteridophyta*.
- _____ & Gibby, M. 1980. Two new hybrids in the *Dryopteris villarii* aggregate (Pteridophyta, Dryopteridaceae), and the origin of *D. submontana*, *Candollea* **35**(1): 306-310.
- _____ & Khullar, S.P. 1982. *Athyrium attenuatum* - a confused Sino-Himalayan Fern, in Bir, S.S. (ed.), *Aspects Plant Sci.* **6**: 94-102. New Delhi.
- _____ 1986 ["1985"]. The nomenclature of some confused Himalayan Species of *Polystichum* Roth., *Indian Fern J.* **2**(1-2): 1-16 *et tt.*
- _____ & Schneller, J.J. 1987. *Asplenium tadei* (Aspleniaceae: Pteridophyta), a new species from Turkey, *Fern Gaz.* **13**(3): 163-168.
- Fuchs, H.P. 1961. The genus *Cheilanthes* Swartz and its European species. *Brit. Fern Gaz.* **9**(2): 38-48.
- Ghatak, J. Manton, I. & Holttum, R.E. 1971. Further cytological and taxonomic observations

- on some members of the *Cyclosorus parasticus* complex, *Brit. Fern Gaz.* **10**(4): 183-192.
- Ghosh, S.R. 1983. A new fern genus *Idiogramma* from India, *J. Econ. Tax. Bot.* **4**(3): 981-982.
- _____ & Ghosh, R.K. 1986 ["1985"]. *Gymnopteris delavuyi* (Bak.) Und. A new fern record for India, *J. Bombay Nat. Hist. Soc.* **82**(1): 243.
- Gibby, M. 1985. Cytological observations on Indian subcontinent and Chinese *Dryopteris* and *Polystichum* (Pteridophyta: Dryopteridaceae), *Bull. Brit. Mus. Nat. Hist., Bot.* **18**(5): 323-477.
- Greuter, W. (ed.) 1994. Names in current use, *Taxon* **43**: 677-678.
- Gurung, V.L. 1976. Pteridophyta, in Malla, S.B., Shrestha, A.B., Rajbhandari, S.B., Shrestha, T.B., Adhikari, P.M. & Adhikari, S.R. (eds.), Catalogue of Nepalese vascular plants. *Bull. Dept. Med. Plants Nepal* **7**: 1-27. Kathmandu.
- _____ 1984. Ferns, in Majupuria, T.C. (ed.), Nepal. Nature's Paradise: 194-211. Bangkok.
- _____ 1988. Threatened ferns of Nepal Himalaya, *Proc. Nat. Conf. Sci. Technol., Apr. 24-29, 1988 etc., Kathmandu, Nepal*: 253-258. Kathmandu.
- _____ 1991. Ferns - the beauty of Nepalese flora: [1-] 74-75 [-234]. Kathmandu.
- Hara, H. 1996 (ed.). *The flora of Eastern Himalaya. Results of the botanical expedition to Eastern Himalaya organised by the University of Tokyo 1960 and 1963*: 453-500. Tokyo.
- Haufler, C.H., Moran, R.C. & Windham, M.D. 1993. *Cystopteris*, in Morin, N.R. et al. (eds.). *Flora of North America North of Mexico* **2**: 263-270. New York, Oxford.
- _____ & Windham, M.D. 1991. New Species of North American *Cystopteris* and *Polypodium* with comments on their Reticulate Relationships, *Amer. Fern J.* **81**(1): 7-23.
- Hauke, R.L. 1963. A taxonomic monograph of the genus *Equisetum* subgen. *Hippochaete*. *Beih. Nov. Hedwigia* **8**: 1-123.

- _____ 1978. A taxonomic monograph of *Equisetum* subgen. *Equisetum*, *Nov. Hedwigia* **30**: 385-455.
- Hennipman, E., Veldhoen, P. & Kramer, K.U. 1990. Polypodiaceae, in Kramer, K.U. & Green P.S. (eds.), *Pteridophyta and Gymnosperms*, in Kubitzki, K. (ed.), *Families and Genera of Vascular Plants* **1**: 203-240. Berlin, Heidelberg, New York.
- Herter, W.G. 1940. *Plantae uruguayenses novae vel criticae*, *Rev. Sudamer. Bot.* **6**(5-6): 129-155 *et tt.*
- _____ 1949. Flora del Uruguay, 1. Pteridophyta, *Rev. Sudamer. Bot.* **9**: 1-28.
- Hieronymus, G. 1916. Über die Gattung Coniogramme und ihre Arten, *Hedwigia* **57**: 265-328.
- Holttum, R.E. 1954. *A revised Flora of Malaya [etc.] 2 Ferns of Malaya*: [I-IV, 1-] 173 [-643]. Singapore.
- _____ 1957. Florae Malesianae Praecursores XVI. On the taxonomic subdivision of the Glecheniaceae, with descriptions of new Malaysian species and varieties, *Reinwardtia* **4**(2): 257-280.
- _____ 1959a. Glecheniaceae, *Flora Malesiana, ser. 2 (Pterid.)* **1**(1): 1-36.
- _____ 1959b. ["1958"]. Notes on Malaysian Ferns, with descriptions of a new genus and new species, *Kew Bull.* **1958**: 447-455 *et t.*
- _____ 1965. Tree-ferns of the genus *Cyathea* Sm. in Asia (excluding Malaysia), *Kew Bull.* **19**(3): 463-487.
- _____ 1968 ["1966"]. *Flora of Malaya (ed. 2) 2 Ferns of Malaya*. Singapore.
- _____ 1969. Studies in the Family Thelypteridaceae. The genera *Phegopteris*, *Pseudophegopteris* and *Macrothelypteris*, *Blumea* **17**(1): 5-32.
- _____ 1972a. The genus *Davallodes*, *Kew Bull.* **27**: 245-249.
- _____ 1972b. Studies in the family Thelypteridaceae IV. The genus *Pronephrium* Presl. *Blumea* **20**(1): 105-126.
- _____ 1973. Posing the problems, in Jermy, A.C., Crabbe, J.A. & Thomas, B.A. (eds.), *The phylogeny and classification of the ferns*, *Bot J. Linn Soc. (Lond.)* **67**, suppl. 1: 1-

10.

- _____ 1974 [28 Jan 1974] ["1973"]. Studies in the family Thelypteridaceae V. The genus *Pneumatopteris* Nakai, *Blumea* **21**(2): [293-] 306 [-325].
- _____ 1975 ["1974"]. The taxonomy of Indian Ferns, *Phytomorphology* **24**(3-4): 314-321.
- _____ 1976. The genus *Christella* Lévillé, sect. *Christella*. Studies in the family *Thelypteridaceae*, XI, *Kew Bull.* **31**(2): 293-339.
- _____ 1982 ["1981"]. *Stegnogramma*, *Flora Malesiana*, Ser. 2, **1**(5): 542.
- _____ 1984a. Studies in the fern-genera allied to *Tectaria*, 1. A commentary on recent schemes of classification, *Fern Gaz.* **12**(6): 313-319.
- _____ 1984b. Studies in the fern genera allied to *Tectaria*: 3, *Aenigmopteris* and *Ataxipteris*, two new genera allied to *Tectaria* Cav., with comments on *Psomiocarpa* Presl, *Blumea* **30**(1): 1-12.
- _____ 1985 ["1984"]. Four limestone ferns assigned to the genus *Tectaria*, *Indian Fern J.* **1**(1-2): 31-39.
- _____ 1986. Studies in the fern-genera allied to *Tectaria* Cav. VI A conspectus of genera in the Old World regarded as related to *Tectaria*, with descriptions of two genera, *Gardens' Bull. (Singapore)* **39**(2): 153-167.
- _____ 1988. Studies in the fern genera allied to *Tectaria* Cav. VII. Species of *Tectaria* Sect. *Sagenia* (Presl) Holttum in Asia excluding Malesia, *Kew Bull.* **43**(3): 475-489.
- _____ & Grimes, J.W. 1980. The genus *Pseudocyclosorus* Ching (Thelypteridaceae). *Kew Bull.* **34**(3): 499-516.
- _____ Saldanha, C.J. & Nicholson, D.H. 1976. *Flora of the Hassan District, Karnataka, India, App. 1. Thelypteridaceae*: 856-867. New Delhi.
- Holub, J. 1972a. On the taxonomy and nomenclature of the European marsh fern, *Taxon* **21**(2-3): 331-332.
- _____ 1972b. Poznámky k československým taxónům celedi Equisetaceae. *Preslia* **44**(2): 112-130.

- _____ 1985. Transfers of *Lycopodium* species to *Huperzia*: with a Note on Generic Classification in Huperziaceae, *Fol. Geobot. Phytotax. (Praha)* **20**: 67-80.
- Hooker, J.D. 1870. *Student's Flora of the British Isles* [ed. 1]: 464. London.
- Hooker, W.J. 1846. *Species Filicum* [etc.]: 172-173, t.48. London.
- _____ 1859. *Filices exoticae* [etc.]: t.19 note. London.
- Hope, C.W. 1899-1904. The ferns of north-western India [etc.], *J. Bombay Nat. Hist. Soc.* **12**(2): 315-325 (March 1899); **12**(3): 527-538 (July 1899); **12**(4): 621-633 (Nov. 1899); **13**(1): 25-26 (Apr. 1900); **13**(2): 236-251 (July 1900); **13**(3): 443-461 (Jan. 1901); **13**(4): 657-671 (May 1901); **14**(1): 118-127 (Jan. 1902); **14**(2): 252-260 (May 1902); **14**(3): 458-480 (Oct. 1902); **14**(4): 720-749 (Feb. 1903); **15**(1): 78-111 (June 1903); **15**(3): 415-419 (Feb. 1904).
- Hovenkamp, P. 1986. A monograph of the fern genus *Pyrrosia* (Polypodiaceae), *Leiden Bot. Ser.* **9**: 1-310. Leiden.
- Hylander, N 1945. *Uppsala Univ. Arsskr.* **1945**(7): 59.
- Irudayaraj, V., Manickam, V.S. & Dominic Rajkumar, S. 1995. Studies on intraspecific variation in South Indian ferns III. Cytomorphology of *Stegnogramma pozoi* (Lag.) K. Iwats., *Thaiszia - J. Bot. (Kosice)* **5**(2): 111-119.
- Itô, H. 1966. Pteridophyta, in Hara, H. (ed.), *The Flora of Eastern Himalaya. Results of the botanical expedition to Eastern Himalaya organised by the University of Tokyo 1960 and 1963*: 453-500. Tokyo.
- Iwashina, T., Matsumoto, S. & Nakaike, T. 1995. Flavonoid Characters of Five *Adiantum* Species in Pakistan, in Watanabe, M. & Hagiwara, H. (eds.), *Cryptogams of the Himalayas 3. Nepal and Pakistan*: 179-191. Tsukuba.
- Iwatsuki, K. 1963a. Taxonomic Studies of Pteridophyta VII, 9. A Revision of the Genus *Stegnogramma* Emend., *Act. Phytotax. Geobot.* **19**(4-6): 112-126.
- _____ 1963b. Thelypteroid ferns of Thailand and Laos collected by Dr. T. Tuyama in 1957-58, *J. Jap. Bot.* **38**(10): 313-315.
- _____ 1975a. Taxonomic Studies of Pteridophyta X, *Act. Phytotax. Geobot.* **27**(1-2): 39-

- _____ 1975b. Pteridophyta, in Ohashi, H. (*ed.*), Flora of Eastern Himalaya. Third Report, *Univ. Mus. Univ. Tokyo Bull.* **8**: 166-205. Tokyo.
- _____ 1979. Notes on Asiatic Pteridophytes 2, *Act. Phytotax. Geobot.* **27**(1-2): 39-54 *et ff.*
- _____ 1988. An enumeration of the Pteridophytes of Nepal, in Ohba, H. & Malla, S.B. (*eds.*), *The Himalayan Plants* **1**: 231-339.
- _____ 1992. Ferns and fern allies of Japan: [I-VII, 1-] 151-152 [-311], *t.* [1-] 85-86 [-196]. Tokyo.
- _____ Wu, S.K., Mitsuta, S. & Chang, X. 1986. The Pteridophytes of Diancangshan, Yunnan - An Enumeration of the collections made in August, 1984, *J. Fac. Sci. Univ. Tokyo, III*, **14**(1): 11-36.
- Jacobsen, W.B.G. 1983. *The Ferns and Fern Allies of Southern Africa*: i-xv, 1-542. Durban/Pretoria.
- Jamir, N.S. & Rao, R.R. 1988. *The ferns of Nagaland*: 1-462. Dehra Dun.
- Jarvis, C.E. 1992. Seventy two proposals for the conservation of types of selected Linnaean generic names, in Nicholson, D.H. (*ed.*), The report of subcommittee 3C on the lectotypification of Linnaean generic names, *Taxon* **41**: 552-583.
- Jermey, A.C. 1964. Two species of *Diplazium* in Europe, *Brit. Fern Gaz.* **9**(5): 160-162.
- _____ & Harper, L. 1971. Spore morphology of the *Cystopteris fragilis* complex, *Brit. Fern Gaz.* **9**: 168-177.
- Johns, R.J. 1997 ["1996"]. *Index Filicum Supplementum sextum pro annis 1976-1990*: I-IX, 1-414. Kew.
- Jonsell, B. & Jarvis, C.E. 1994. Lectotypifications of Linnaean names for Flora Nordica Vol. 1 (Lycopodiaceae-Papaveraceae), *Nordic J. Bot., holarct. gen. tax.* **14**(2): 145-164.
- Kato, M. 1984. A Taxonomic Study of the Athyroid Fern Genus *Deparia* with Main Reference to the Pacific species, *J. Fac. Sci. Univ. Tokyo, III*, **13**(4): 375-429.
- _____ 1985. A Systematic study of the Genera of the Fern Family Davalliaceae, *J. Fac. Sci.*

Univ. Tokyo, III, 13 (5): 553-573.

_____ & Iwatsuki, K. 1986. Variation in Ecology, Morphology and Reproduction of *Asplenium* Sect. *Hymenasplenium* (Aspleniaceae) in Seram, Indonesia. *J. Fac. Sci. Univ. Tokyo, III, 14*(1): 37-48.

Kholia, B.S. & Punetha, N. 1995. Notes on taxonomy and distribution of some pteridophytes in Kumaon (west Himalaya), *J. Indian Bot. Soc.* **74**: 183-187.

Khullar, S.P. 1976. Some lesser known ferns from the W. Himalayas 1. *Cheilanthes anceps* var. *brevifrons*, *Amer. Fern J.* **66**: 21-24.

_____ 1985 ["1984"]. The Ferns of Western Himalaya: a Few Additions, Corrections and Annotations, *Indian Fern J.* **1**(1-2): 89-96.

_____ 1988. The ferns of W. Himalaya: An enumeration (as in "The Illustrated Fern Flora of W. Himalaya"), *J. Himalayan Res. Develop.* **7**: 59-67.

_____ 1991. Chromosome Numbers of West Himalayan Ferns, in Khullar, S.P. & Sharma, M.P. (eds.), *Himalayan Botanical Researches*: 373-398. New Delhi.

_____ 1992. The fern genus *Asplenium* in the W. Himalaya, in Bhardwaja, T.N. & Gena, C.B. (eds.), *Aspects Plant Sci.* **14**: 513-520. New Delhi.

_____ 1994. *An Illustrated Fern Flora of West Himalaya 1*: I-XL ["XXXX"], 1-506. Dehra Dun.

_____ 1996 ["1995"]. List of the ferns of Himachal Pradesh, N.W. Himalaya, *Indian Fern J.* **12**(1-2): 177-187.

_____ 1997 (in press). *An Illustrated Fern Flora of the West Himalaya 2*. Dehra Dun.

_____ & Gupta, S.C. 1978. Cytotaxonomy of the Genus *Polystichum* in the Western Himalayas, *Plant. Syst. Evol.* **129**: 269-275.

_____ 1980. Systematics of the genus *Polystichum* from the Himalayas, *Nova Hedwigia* **32**: 415-444.

_____ & Kaur, S. 1975. In Löve, A. (ed.), I.O.P.B. Chromosome Number Reports, *Taxon* **24**: 507.

_____ & Mehra P.N. 1972. Cytotaxonomy of W. Himalayan ferns 1: Schizaeaceus

series, *Res. Bull. Panjab Univ., n.s.*, **23**(3-4): 189-204.

_____ Pangtey, Y.P.S. & Fraser-Jenkins, C.R. 1997 (in press). *Fern Flora of Garhwal and Kumaun Himalaya (Uttarakhand)*: 1-440. Nainital.

_____ Pangtey, Y.P.S., Samant, S.S., Rawal, R.S. & Singh, P. (1991). *Ferns of Nainital*: I-V, 1-234. Dehra Dun.

_____ & Sharma, S.S. 1980. Systematics of of the Himalayan species of the genus *Onychium*, in Bir, S.S. (ed.), *Aspects of Plant Sci.* **3**: 63-88. New Delhi.

_____ _____ 1987. The Ferns of Western Himalaya (Excluding Uttarakhand), in Pangtey, Y.P.S., Joshi, S.C., Joshi, D.R., Pande, D.C., Dani, D.D. & Rawat, G.S. (eds.), *Western Himalaya 1 Environment*: 347-388. Nainital.

_____ Sharma, S.S. & Chaudhary, V. 1987. The Ferns of Garhwal Himalaya - A Check List, in Pangtey, Y.P.S., Joshi, S.C., Joshi, D.R., Pande, D.C., Dani, D.D. & Rawat, G.S. (eds.), *Western Himalaya 1 Environment*: 347-388. Nainital.

_____ _____ & Singh, P. 1983. The Thelypteridaceae of W. Himalaya, *Nova Hedwigia* **38**: 617-667.

_____ _____ 1984 ["1983"]. A little known fern from the Himalaya - *Asplenium nesii* Christ and the nomenclature of *A. exiguum* Bedd. (Aspleniaceae), *J. Bombay Nat. Hist. Soc.* **80**(1): 262-265.

_____ _____ & Verma, S. 1988. The ferns of Jammu Division - A check list, *Indian J. Applied Pure Biol.* **3**:45-51.

_____ _____ & Verma, S.C. 1988. In Bir, S.S. (ed.), SOCGI Plant Chromosome Number Reports - VI, *J. Cytol. Genet.* **23**: 38-52.

_____ Singh Kochar, A. & Singh Kochar, G. 1989. High Altitude West Himalayan Ferns, in Shah, N.K. et al. (eds.), *Western Himalaya 2*: 310-352. Nainital.

Kramer, K.U. 1989 ["1988"]. Suggestions for criteria to be employed in distinguishing or merging fern genera, in Shing, K.H. & Kramer, K.U. (eds.), *Proceedings of the International Symposium on Systematic Pteridology*: 9-11. Beijing.

_____ 1993 ["1992"]. In Bir, S.S. (ed.) Addendum, *Indian Fern J.* **9**(1-2): 287.

- _____ & Green, P.S. (eds.), Pteridophyta and Gymnosperms, in Kubitzki, K. (ed.), *Families and Genera of Vascular Plants 1: I-XIII*, 1-404. Berlin, Heidelberg, New York.
- _____ & Tryon, A. 1990. Introduction to the Treatment of Pteridophytes, in Kramer, K.U. & Green, P.S. (eds.), Pteridophyta and Gymnosperms, in Kubitzki, K. (ed.), *Families and Genera of Vascular Plants 1: 12-13*. Berlin, Heidelberg, New York.
- Kung, H.S. 1988. Pteridophyta [part], in *Flora Sichuanica* **6**: 1-410. Beijing or ? Chengdu.
- Kunze, G. 1851. Filices Nilagiricae, *Linnaea* **24**: 239-299.
- Kuo, C.M. 1985. Taxonomy and phytogeography of Taiwanese Pteridophytes, *Taiwania* **30**: 5-99.
- Lellinger, D.B. 1981. Notes on North American Ferns, *Amer. Fern. J.* **71**(3): 90-92.
- Löve, A. & Löve, D. 1977. New Combinations in Ferns, *Taxon* **26**: 324-326.
- _____ & Pichi Sermolli, R.E.G. 1977. Cytotaxonomical Atlas of the Pteridophyta: I-XVIII, 1-398. Vaduz.
- Lovis, J.D. 1977. Evolutionary Patterns and Processes in Ferns, in R.W. Preston & H.W. Woolhouse (eds.), *Advances Bot. Res.* **4**: 229-415. London, New York, San Francisco.
- _____ Rasbach, H. & Reichstein, T. 1993. The chromosome number of *Anogramma leptophylla* (Adiantaceae; Pteridophyta) from New Zealand & South Africa, *Fern Gaz.* **14**(5): 149-154.
- Loyal, D.S. 1961. Cytological studies in Himalayan Thelypteridaceae - II. Cytology of *Cyclosorus* Link, *Abacopteris* Fée and *Ampelopteris* Kunze, *Proc. 48th. Indian Sci. Congr., part III (Abstracts)*: 266-267.
- _____ Gollen, A.K. & Ratra R. 1982. Morphological and cytotaxonomic observations on *Azolla pinnata*, *Fern Gaz.* **12**(4): 230-232.
- _____ Paik, P. & Tiwana, G. 1977. Gametophytic abnormalities in a triploid fern *Hypodematium crenatum* (Forssk.) Kuhn, *Proc. Indian Acad. Sci.* **86 B**(2): 107-116.
- Mandal, J.P. & Sen, U. 1979 ["1978"]. Morpho-taxonomy of *Lycopodium* L. from India. *Biol.*

Mem. 3(2): 192-268.

Manickam, V.S. & Irudayaraj, V. 1992. *Pteridophyte Flora of the Western Ghats - South India*: [I-VI, 1-] 158-259, 569 [-653]. New Delhi.

Manton, I. 1950. *Problems of cytology and evolution in the Pteridophyta*: 1-316. Cambridge.

_____ 1959. Cytological information on the ferns of west tropical Africa, in Alston, A.H.G., *The ferns and fern-allies of West Tropical Africa, being a Supplement to the Second Edition of the Flora of West Tropical Africa*: 75-81. London.

_____ Ghatak, J. & Sinha, B.M.B. 1967. Cytotaxonomic studies in the *Adiantum caudatum* complex of Africa and Asia. I. Parentage of *A. indicum* Ghatak. *J. Linn. Soc. (Lond.), Bot.*, **60**(382): 223-235.

_____ Lovis, J.D., Vida, G. & Gibby, M. 1986. Cytology of the fern flora of Madeira. *Bull. Brit. Mus. Nat. Hist., Bot.*, **15**(2): 123-161.

_____ Roy, S.K. & Jarrett, F.M. 1966. The cytotaxonomy of some members of the *Cheilanthes farinosa* complex in Africa and India, *Kew. Bull.* **18**(3): 553-565.

_____ & Sledge, W.A. 1954. Observations on the cytology and taxonomy of the pteridophyte flora of Ceylon, *Phil. Trans. Roy. Soc. London, Biol.*, **238**: 127-185.

Matsumoto, S. & Nakaike, T. 1988. Chromosome Numbers in some ferns in Kathmandu, Nepal, in Watanabe, M. & Malla, S.B. (eds.), *Cryptogams of the Himalayas 1 The Kathmandu Valley*: 1-227. Tsukuba.

_____ _____ 1990. Cytological Observations of Some Ferns in Nepal (1) on the Related Taxa in Japan, in Watanabe, M. & Malla, S.B. (eds.), *Cryptogams of the Himalayas 2 Central and Eastern Nepal*: 163-178. Tsukuba.

Mehra, P.N. 1939. *Ferns of Mussoorie*, in Chaudhuri, H. (ed.), *Punjab Univ. Bot. Publ.*: 1-29. Lahore.

_____ 1961. Chromosome numbers in Himalayan ferns, *Res. Bull. Panjab Univ., n.s.*, **12**(1-2): 139-164.

_____ & Bir, S.S. 1960. Cytological observations on the Himalayan species of *Athyrium*

and comments on the evolutionary status of the genus. *Amer. Fern J.* **50**: 276-295.

_____ 1964. Pteridophytic flora of Darjeeling and Sikkim Himalayas, *Res. Bull. Panjab Univ., n.s.*, **15**(1-2): 69-181.

_____ & Khullar, S.P. 1970. In Löve A. (ed.), IOPB Chromosome Number Reports, *Taxon* **19**: 802.

_____ 1974. Cytotaxonomy of W. Himalayan Ferns - 2. Gleicheniaceae series, *Res. Bull. Panjab Univ., n.s.*, **25**: 133-178.

_____ 1977. Biosystematics of *Adiantum lunulatum* Burm. Complex in India with Special Reference to W. Himalayan Taxa, *Cytologia* **42**: 501-511.

_____ & Loyal, D.S. 1965. Cytological investigations in the Himalayan *Dryopteris Adanson*, *Caryologia* **18**: 461-498.

_____ & Verma, S.C. 1957. The cytology of some *Athyrium* species from Northern India, *Ann. Bot., n.s.*, **21**: 455-459.

_____ 1960. Cytotaxonomic observations on some W. Himalayan Pteridaceae, *Caryologia* **13**: 619-650.

_____ 1963. Polymorphicity and cytogenetics of *Adiantum lunulatum* complex, *J. Indian Bot. Soc.* **42 A** (Maheshwari comm. vol.): 110-121.

Mettenius, G. 1857. Ueber Einige Farngattungen I, Polyopodium, *Abhandl. Senckenberg. Naturf. Ges.* **2**.

_____ 1859. Ueber Einige Farngattungen VI, Asplenium, *Abhandl. Senckenberg. Naturf. Ges.* **3**.

Mickel, J.T. 1974. A Redefinition of the Genus *Hemionitis*, *Amer. Fern J.* **64**(1): 3-12.

Miyamoto, F & Ohba, H. 1997. *Cheilanthes wusukungii*, a New Species Resembling *C. rufa* in Himalaya and Thailand, *J. Jap. Bot.* **72**: 168-171.

Moore, T. 1857-1862. *Index Filicum [etc.]*: I-CLXII (1857), 1-72 (1857), 73-108 (1858), 109-156 (1859), 157-216 (1860), 217-336 (1861), 337-396 (1862). London.

_____ 1860. *The nature-printed British Ferns [etc.]*, octavo edition **2**: 256. London.

Morton, C.V. 1960. Observations on cultivated ferns VI. The Ferns currently known as

Rumohra, *Amer. Fern J.* **50**(1): 145-155 *et t.*

- _____ 1973. Studies of Fern Types II, *Contrib. U.S. Nat. Herb.* **38**(6): 215-281.
- _____ 1974. William Roxburgh's Fern Types, *Contrib. U.S. Nat. Herb.* **38**(7): 283-396.
- Nair, N.C. 1968. Nomenclature of some Indian Ferns, *Indian Forester* **94**: 169-170.
- _____ 1972. The genus *Pteridium* Gleditsch ex Scopoli in the Indian subcontinent. *Bull. Bot. Surv. India* **14**: 13-16.
- _____ & Dixit, R.D. 1981. A list of taxa of Indian ferns not included in Beddome's Handbook to the ferns of British India and a Supplement to the handbook to the ferns of British India, *J. Bombay Nat. Hist. Soc.* **78**: 443-462.
- _____ & Ghosh, S.R. 1974. The nomenclature of *Adiantum cuneatum* Langsd. et Fisch. and the distribution of the taxon in India, *Act. Bot. Indica* **2**: 77-78.
- Nakai, T. 1925. Critical Notes on Japanese Ferns, with special reference to allied species. *Bot. Mag. Tokyo* **39**: 176-203.
- Nakaike, T. 1971. Notes on *Plagiogyria* from Japan and adjacent regions, *Bull. Nat. Sci. Mus. Tokyo* **14**: 257-268 *et tt.*
- _____ 1975. *Enumeratio Pteridophytarum Japonicarum Filicales*: I-XIII. 1-375. Tokyo.
- _____ 1986. An Enumeration of the Ferns of Nepal II. *Asplenium* L., *Bull. Nat. Sci. Mus. [Tokyo], B (Botany)*, **12**(2): 37-54.
- _____ 1987. An Enumeration of the Ferns of Nepal III. *Crypsinus* Presl, *Bull. Nat. Sci. Mus. [Tokyo], B (Botany)*, **13**(3): 89-105.
- _____ 1992. New Flora of Japan Pteridophyta revised & enlarged: [I- VII.1-] 628.-839 [-868]. Tokyo.
- _____ & Gurung, V.L. 1988. Distribution Maps of Pteridophytes in Kathmandu, Nepal (2), *Bull. Nat. Sci. Mus. [Tokyo], B (Botany)*, **14**(3): 77-85.
- _____ _____ 1990. Distribution Maps of Pteridophytes in Kathmandu, Nepal (3), in Watanabe, M. & Malla, S.B. (eds.), *Cryptogams of the Himalayas 2 Central and Eastern Nepal*: 187-212. Tsukuba.

- _____ 1995. Distribution Maps of Pteridophytes in Kathmandu, Nepal (4), in Watanabe, M. & Hagiwara, H. (eds.), *Cryptogams of the Himalayas 3 Nepal and Pakistan*: 151-164. Tsukuba.
- _____ & Malik, S. 1992. A List of Pteridophytes collected from Pakistan in 1990, in Nakaike, T. & Malik, S. (eds.), *Cryptogamic Flora of Pakistan 1*: 261-316. Tokyo.
- _____ 1993. A List of Pteridophytes collected from Pakistan in 1991, in Nakaike, T. & Malik, S. (eds.), *Cryptogamic Flora of Pakistan 2*: 317-359. Tokyo.
- _____ 1995. A List of Pteridophytes collected from Pakistan in 1992, in Watanabe, M. & Hagiwara, H. (eds.), *Cryptogams of the Himalayas 3*: 165-177. Tsukuba.
- _____ & Yamamoto, A. 1995. Nomenclatural Study in the Pteridophytes from Japan and the Adjacent Regions II, *J. Nat. Hist. Mus. Inst., Chiba* 3(2): 143-146.
- Nampy, S. & Madhusoodanan, P.V. 1994. *Phymatosorus malabaricus* (Polypodiaceae: Pteridophyta), a new fern species from south India, *Fern Gaz.* 14(7): 233-234.
- Nayar, B.K. & Chandra, P. 1968. The fern genus *Arachniodes* Blume in India, *Bull. Bot. Surv. India* 10(2): 234-236.
- _____ & Geevarghese, K.K. 1985. Rediscovery of *Pronephrium thwaitesii* (Thelypteridaceae), a little known and long lost fern, *Blumea* 31: 322-328.
- _____ 1988 ["1986"]. Four new taxa of ferns from Wynad, South India, *Bull. Bot. Surv. India* 28(1-4): 133-145.
- _____ 1993. *Fern Flora of Malabar*: 1-424. New Delhi.
- _____ & Kaur, S. 1963. Ferns of India - IX *Peranema* and *Acrophorus*, *Bull. Nat. Bot. Gard. (Lucknow)* 81: 1-40.
- _____ 1971. Gametophytes of homosporous ferns, *Bot. Rev.* 37: 295-396.
- _____ 1974. *Companion to R.H. Beddome's Handbook to the Ferns of British India, Ceylon and the Malay Peninsula*: I-XIII, 1-244 and errata I-IV. Koenigstein and New Delhi.
- Ohashi, H. (ed.) 1975. Flora of Eastern Himalaya. Third Report, *Univ. Mus. Univ. Tokyo*

Bull. **8**: 166-205. Tokyo.

Ohwi, J. 1962. On *Arachnoides* Bl., *J. Jap. Bot.* **37**(3): 75-76.

Øllgaard, B. 1987. A revised classification of the Lycopodiaceae *s. lat.*, *Opera Botanica* **92**: 153-178.

_____ 1990. Lycopodiaceae, in Kramer, K.U. & Green, P.S. (eds.), *Pteridophyta and Gymnosperms*, in Kubitzki, K. (ed.), *Families and Genera of Vascular Plants 1*: 31-39. Berlin, Heidelberg, New York.

Page, C.N. 1975 ["1974"]. *Equisetum* Subgenus *Equisetum* in the Sino-Himalayan region - a preliminary taxonomic and evolutionary appraisal, *Fern Gaz.* **11**(1): 25-47.

_____ 1982. *The Ferns of Britain and Ireland* [I-XII, 1-] 167-173 [-447]. Cambridge, New York and Melbourne.

_____ 1989. Three subspecies of bracken, *Pteridium aquilinum* (L.) Kuhn, in Britain. *Watsonia* **17**(4): 429-434.

_____ 1995. Two approaches to the taxonomy of Scottish bracken I. Morphological and phenological characters, in Dyer A. & Lindsay, S. (eds.), *The ecology and conservation of Scotland's rare ferns*, *Pteridologist* **2**(6): 294-297.

_____ 1996. A reply to C.R. Fraser-Jenkins, *Fern Gazette* **15**(3): 82.

_____ & Golding, Y.C. 1989. Three subspecies of bracken in Britain, *Pteridologist* **1**(6): 265-266.

_____ & Mill, R.R. 1995. *Bot. J. Scotland* **47**: 139-140.

Pande, H.C., Vishwakarma, M.L. & Pande, P.C. 1995 ["1994"]. Pteridophytic Flora of Kheti. Dania and Chamtola Hills of Kumaun Himalaya, *Indian Fern J.* **11**(1- 2): 157-161.

Pande, P.C. & Bhandari, K. 1995 ["1994"]. Pteridophytic Flora of Roopkhund (Garhwal Himalaya), *Indian Fern J.* **11**(1- 2): 20-26.

_____ & Bir, S.S. 1995 ["1994"]. Present assessment of rare and threatened vascular cryptogams (Pteridophytes) of Kumaun Himalaya and their conservation strategies, *Indian Fern J.* **11**(1- 2): 31-48.

_____ & Kandpal, M.M. 1986. *Thelypteris palustris* (Salisb.) Schott - new record for

U.P. Hills, *J. Bombay Nat. Hist. Soc.* **82**(2): 474.

_____ & Pande, H.C. 1990. An enumeration of pteridophytes of Shyamtal Hills of Kumaon Himalaya, *Vegetos* **3**(2): 132-134.

_____ 1994 ["1993"]. Systematics and distribution of epiphytic pteridophytic flora of Kumaun Himalaya, *Indian Fern J.* **10**(1-2): 17-29.

_____ & Bhandari 1995 ["1994"]. Further additions to the fern [sic] flora of Kumaun Himalaya, *Indian Fern J.* **11**(1-2): 97-101.

Pandey, P.S. & Singh, V.P. 1990. Interesting Ferns and Fern Allies of Arunachal Pradesh - A Preliminary Taxonomic Survey, Abstract 161, *Proc. 77th. Ind. Sci. Congr., part III (Abstracts)*: 80.

Panigrahi, G. 1955. The gametophyte of *Aleuritopteris grisea* (Blanford), comb. nov., *Proc. Nat. Inst. Sci. India* **21**: 143-146.

_____ 1961 ["1960"]. A note of *Aleuritopteris grisea* (Blanford) Panigrahi comb. nov. and *A. anceps* (Blanford) Panigrahi comb. nov., *Bull. Bot. Surv. India* **2**: 321-322.

_____ 1962. Cytogenetics of apogamy in *Aleuritopteris farinosa* (Forsk.) Fée complex, *The Nucleus* **5**(1): 53-64.

_____ 1963. Cytotaxonomic studies in *Asplenium aethiopicum* (Burm.) Becherer complex, *Proc. Nat. Inst. Sci. India* **29 B**(4): 383-395.

_____ 1965. Preliminary studies in the cytotaxonomy of the *Dryopteris villarsii* (Bell.) Woyнар complex in Europe, *Amer. Fern J.* **55**: 1-8.

_____ 1975a. Five Asiatic Thelypteris species re-interpreted, *Notes Roy. Bot. Gard. Edinburgh* **33**(3): 495-501.

_____ 1975b. Notes on certain taxa of Thelypteris Schmidel (Thelypteridaceae) of Asia, *Phytologia* **30**(6): 407-414 *et tt.*

_____ 1975c. Taxonomic notes on certain taxa of Asiatic ferns, *Phytologia* **31**(3): 251-258.

_____ 1975d. Notes on certain taxa of Thelypteris (Thelypteridaceae) of Asia - II, *Phytologia* **31**(5): 369-372.

- _____ 1976a. A new species of *Thelypteris* (Thelypteridaceae) from Sri Lanka, *Kew Bull.* **31**(1): 187-188.
- _____ 1976b. The genus *Pityrogramma* (Hemionitidaceae) in Asia, *Kew Bull.* **30**(4): 657-667.
- _____ 1978 ["1975"]. Nomenclatural notes on *Selaginella pallida* (Selaginellaceae) from India, *Bull. Bot. Surv. India* **17**(1-4): 170.
- _____ 1986a. Proposal to conserve *Athyriaceae* Alston (Pteridophyta), *Taxon* **35**: 384-385.
- _____ 1986b. Proposal to conserve *Pteridaceae* Reichenbach (Pteridophyta), *Taxon* **35**: 385-386.
- _____ 1986c. Proposal to conserve four family names of Pteridophyta, *Taxon* **35**: 600-603.
- _____ 1986d. *Tectariaceae* Panigr. fam. nov. to replace *Aspidiaceae* Mettenius ex Frank nom. illeg. (Pteridophyta), *J. Orissa Bot. Soc.* **8**: 41-42.
- _____ 1987a. Proposal to delete *Allosorus Bernhardtii* nom. rej. and to amend typification of *Cheilanthes Sw.* nom. cons. (Pteridophyta), *Taxon* **36**: 167-168.
- _____ 1987b. *Tectariaceae* Fam. Nov. To Replace *Aspidiaceae* Mett. ex Frank. Nom. Illeg. (Pteridophyta), *Proc. 74th. Ind. Sci. Congr., part III (Abstracts)*: 98.
- _____ 1991. Pteridophytic Flora of Orissa, in *Abstracts & Souvenir National Symposium on Current Trends in Pteridology, 4-6th October 1991*: 12-13. Palayamkottai.
- _____ 1992a. Colysis *C. Presl* vis-a-vis *Paraleptochylus [sic]* Copeland. *Proc. 79th. Ind. Sci. Congr., Part III (Abstracts)*: 48-49.
- _____ 1992b. Nomenclatural Notes on "Hemionitis" *Arifolia* (N. Burm.) Moore (Pteriaceae [sic]), *Proc. 79th. Ind. Sci. Congr., Part III (Abstracts)*: 49.
- _____ 1993a ["1992"]. *Parahemionitis*, a New Genus of Pteridaceae, *Amer. Fern J.* **83**(3): 90-92.
- _____ 1993b. Generic delimitation in the Family Thelypteridaceae Pichi Serm., *Res.*

- _____ 1993c. Conspectus of the Pteridophytic flora of Orissa - Part I - the fern allies, *Higher Plants Indian Subcont.(Addit. Ser. Indian J. Forestry 7)* **4**: 103-117.
- _____ 1993d ["1992"]. Biosystematics, Taxonomy and Nomenclature of Pteridophytes, *Indian Fern J.* **9** (1-2): 240-252.
- _____ 1993e. *Parahemionitis* Panigr. nom nud validation of (Pteridaceae), *Proc. 80th. Ind. Sci. Congr., part III (Abstracts)*.
- _____ 1994a. Pteridaceae Reichenbach Subfam. *Adiantoideae* (C. Presl) Tryon. - A Correctable Bibliographic Error?, *Proc. 81st. Ind. Sci. Congr., Part III (Abstracts)*: 73-74.
- _____ 1994b. Nomenclatural Notes: Family Name *Pteridaceae* (S.F. Gray) Reichenb. - Correct?, *Proc. 81st. Ind. Sci. Congr., Part III (Abstracts)*: 74-75.
- _____ 1995 ["1994"]. Taxonomy, Phytogeography and Problems of Nomenclature of Indian Pteridophytes, *Indian Fern J.* **11**(1-2): 173-188.
- _____ & Basu, S.K. 1980a. Three species of *Dryopteris* Adans. (Aspidiaceae) re-interpreted, *Proc. 67th. Ind. Sci. Congr., Part III (Abstracts)*: 23.
- _____ _____ 1980b. Three species of *Dryopteris* Adans. (Aspidiaceae) mis-interpreted, *Indian J. For.* **3**(3): 266-271.
- _____ _____ 1982a. Nomenclatural notes on two species of *Cheilanthes* Sw. (Sinopteridaceae), *Taxon* **31**: 102-104.
- _____ _____ 1982b. Taxonomy of *Dryopteris hirtipes* complex (Aspidiaceae) in India, *Proc. 69th. Ind. Sci. Congr., Part III (Abstracts)*: 71.
- _____ _____ 1983. Correct identity of two Indian taxa included in *Dryopteris patentissima* complex (Aspidiaceae), *J. Econ. Tax. Bot.* **4**(2): 603-605.
- _____ _____ 1984. Three species of *Araiostegia* Copel. (Davalliaceae). *J. Econ. Tax. Bot.* **5**: 845-850.
- _____ _____ 1985a. Nomenclatural notes on *Leucostegia yaklaensis* Bedd. (Pteridophyta), *Proc. 72nd. Ind. Sci. Congr., Part III (Abstracts)*: 14-15.

- _____ 1985b. Nomenclatural Notes on Three Species of *Araiostegia* Copel. (Davalliaceae) in India, *Proc. 72nd. Ind. Sci. Congr., Part III (Abstracts)*:15.
- _____ 1985c. A supplementary note on *Araiostegia hopei* Panigr. et S.K. Basu (Davalliaceae), *J. Econ. Tax. Bot.* **6**: 470-471.
- _____ 1986. Nomenclatural Notes on *Athyrium macrocarpon* (Bl.) Bedd. (1984) non Fee[sic] (1852) (Pteridophyta), *Proc. 73rd. Ind. Sci. Congr., Part III (Abstracts)*: 75-76.
- _____ 1987 ["1985"]. Nomenclatural notes on *Leucostegia yaklaensis* Bedd. nom. illeg. (Pteridophyta), *Bull. Bot. Surv. India* **27**(1-4): 113-115.
- _____ & Das, A. 1982. Taxonomic studies on *Microlepia* (Dennstaedtiaceae) in India, *Proc. 69th. Ind. Sci. Congr., Part III (Abstracts)*: 70.
- _____ & Dixit, R.D. 1966. New records of ferns for Madhya Pradesh. *Proc. Nat. Acad. Sci. Ind. Allahabad* **36**: 222-233.
- _____ 1969a. Studies in Indian Pteridophytes - II. The Family Osmundaceae in India, *J. Indian Bot. Soc.* **48**: 90-101.
- _____ 1969b. Studies on the systematics of a few taxa of family Gleicheniaceae in India, in Santapau, H. *et al. (eds.)*, *Bull. Bot. Soc. Bengal. J. Sen comm. vol.*: 469-476.
- _____ Gupta, B. & Swami, A. 1991. A note on two species of *Leptolepidium* Hsing & S.K. Wu (Sinopteridaceae) in India, *Indian J. For.* **14**: 67-69.
- _____ & Manton, I. 1958. Cytological and taxonomic observations on some members of the *Cyclosorus parasiticus* complex, *J. Linn. Soc.(Lond.)* **55**: 729-743.
- _____ & Patnaik, S.N. 1961. Cytology of some genera of Polypodiaceae in eastern India, *Nature* **191**: 1207-1208.
- _____ 1962. Cytotaxonomic studies in *Aglaomorpha coronans* (Wall.) Copel., *Proc. Nat. Inst. Sci. India* **19**: 54-58.
- _____ 1965. New combinations in the Polypodiaceae. *Curr. Sci.* **34**(4): 127-128.

- _____ & Singh, S. 1990. Generic delimitations in Hymenophyllaceae Link vis-a-vis Lacosteopsis (Prantl) Nakaike and Ragatelus Presl (Pteridophyta), *J. Hill. Res.* **3**: 1-13.
- Pant, D.D. & Srivastava, G.K. 1962. The genus *Isoetes* in India, *Proc. Nat. Inst. Sci. India* **28 B(3)**: 242-280.
- Parks J. 1995. What is *Cystopteris dickieana*?, in Dyer, A. & Lindsey, S. (eds.), The ecology and conservation of Scotland's rare ferns, *Pteridologist* **2(6)**: 290-292.
- Patnaik, S.N. & Panigrahi, G. 1963. Cytology of some genera of Polypodiaceae in eastern India II, *Amer. Fern J.* **53**: 40-46.
- Pichi Sermolli, R.E.G. 1953. The nomenclature of some fern-genera, *Webbia* **9(2)**: 387-454.
- _____ 1955. Adumbratio Florae Aethiopicae - 4. Hymenophyllaceae, Negripteridaceae, Cyatheaceae, *Webbia* **12(1)**: 121-146.
- _____ 1962a. On the fern genus "Actiniopteris" Link, *Webbia* **17(1)**: 1-32.
- _____ 1962b. Adumbratio Florae Aethiopicae - 8. Gleicheniaceae, *Webbia* **17(1)**: 33-43.
- _____ 1965. On the nomenclature of *Pleopeltis lanceolata*, *Webbia* **20(1)**: 349-354.
- _____ 1969 ["1968"]. Taxonomical notes on *Nephrolepis cordifolia* (L.) Presl and related species, *Ann. Mus. Civico Storia Nat. Genova* **77**: 270-277.
- _____ 1970. A provisional catalogue of the family names of living Pteridophytes, *Webbia* **25(1)**: 219-297.
- _____ 1973. Fragmenta pteridologiae - IV, *Webbia* **28 (2)**: 445-477.
- _____ 1977. Tentamen Pteridophytorum [*sic*] genera in taxonomicum ordinem redigendi, *Webbia* **31(2)**: 313-512.
- _____ 1981a. Report of the committee for Pteridophyta, *Taxon* **30(1)**: 161-163.
- _____ 1981b. Report of the subcommittee for family names of Pteridophyta, *Taxon* **30(1)**: 163-168.
- _____ 1981c. Proposals for the conservation of four family names of Pteridophyta: Proposal for the conservation of the family name *Adiantaceae*; Proposal

for the conservation of the family name *Aspidiaceae*; Proposal for the conservation of the family name *Dryopteridaceae*; Proposal for the conservation of the family name *Peranemataceae*, *Taxon* **30**(1): 320-322.

_____ 1981d. The controversial typification of the Linnaean genus *Trichomanes* (Hymenophyllaceae), *Taxon* **30**(4): 809-815.

_____ 1982. A further contribution to the nomenclature of the families of Pteridophyta, *Webbia* **35**(2): 223-237.

_____ 1983. Fragmenta Pteridologiae - VIII, *Webbia* **37**(1): 111-140.

_____ 1985. The fern genus *Cosentinia* Todaro, *Webbia* **39**(1): 179-189.

_____ 1986. Report of the subcommittee for family names of the Pteridophyta, *Taxon* **35**(4): 686-691.

_____ 1987. Report 12 of the committee for Pteridophyta, *Taxon* **36**(4): 740-741.

_____ 1989. Again on the typification of the generic name *Notholaena* R. Brown, *Webbia* **43**(2): 301-310.

_____ 1993. New studies on some family names of Pteridophyta, *Webbia* **47**(1): 121-143.

Piggott, A.G. & Piggott, C.J. 1988. *Ferns of Malaysia in colour*: [I-XI, 1-] 88 [-458]. Kuala Lumpur.

Price, M.G. 1990a. Four New Asian Loxogramme, *Amer. Fern J.* **80**(1): 4-8.

_____ 1990b. Philippine fern notes, *Contrib. Univ. Michigan Herb.* **17**: 267-278.

Proctor, G.R. 1985. *Ferns of Jamaica - A Guide to the Pteridophytes*: I-VIII, 1-631. London.

Punetha, N. 1985. Taxonomic observations on some athyroid ferns from the Pithoragarh District of Kumaon (N.W. Himalayas), *Indian Fern. J.* **2**(1-2): 22-31.

_____ 1990. Taxonomic observations on thelypteroid ferns from Pithoragarh District (N.W. Himalayas), *J. Indian Bot. Soc.* **69**: 175-181.

_____ & Kholia, B.S. 1989a. *Polystichum makinoi* (Tag.) Tag. - a new record for India.

Curr. Sci. **58**(6): 317-318.

_____ 1989b. Additions to the pteridophytic flora of Pithoragarh District of Kumaon (West Himalaya), *New Bot.* **16**(1-4): 115-126.

_____ 1990. Two new varieties of *Christella dentata* (Forssk.) Brownsey et Jermy, *J. Bombay Nat. Hist. Soc.* **87**(2): 264-266.

_____ & Sen, A. 1988. Cytology of *Christella multiauriculata* Punetha. *Curr. Sci.* **57**(8): 439-440.

_____ & Kholia, B.S. 1991. Taxonomic observations on pteridophytic flora of Pithoragarh District of Kumaon (North-West Himalaya): fern-allies, in Gupta, B.H. (ed.), *Higher Plants of Indian Subcontinent, Add. Ser. Indian J. Forestry* **5**: 125-142. Dehra Dun.

Rajbhandari, K.R. 1994. *A Bibliography of the Plant Science of Nepal*: I-VI, 1-247. Kathmandu.

Ranker, T.A. 1987 ined. *Experimental Systematics and Population Biology of the Fern Genera Hemionitis and Gymnopteris with Reference to Bommeria*: I-XII, 1-156. Ph. D. thesis, Univ. Kansas. Lawrence.

_____ 1989. Spore morphology and generic delimitation of New World Hemionitis. Gymnopteris and Bommeria (Adiantaceae), *Amer. J. Bot.* **76** (2): 297-306.

Rasbach, H. & Reichstein, T. 1990. The chromosome number of *Anogramma leptophylla* (Adiantaceae: Pteridophyta) from Europe, *Fern Gaz.* **13**(6): 341-348.

Ravi, N. & Joseph, J. 1990 ["1979"]. A new species of fern from South India. *J. Bombay Nat. Hist. Soc.* **76**(2): 348-350.

Raymond, M. 1962. An interesting *Aeschynanthus* from Thailand, *Mém. Jard. Bot. Montréal* **55**: 31-35.

Reichstein, T., Viane, R., Rasbach, H. & Schneller, J. 1994. *Asplenium adiantum-nigrum* L. subsp. *yuanum* (Ching) Reichstein *et al.* stat nov. and the status of *A. woronowii* Christ (Aspleniaceae, Pteridophyta), *Candollea* **49**.

Reed, C.F. 1968. Index Thelypteridis, *Phytologia* **17**(4): 249-328.

- Reid Smith, A. 1975. New species and new combinations of ferns from Chiapas, Mexico. *Proc. California Acad. Sci., ser. 4*, **40**(8): [209-] 223 [-230].
- _____ 1990. Thelypteridaceae, in Kramer, K.U. & Green, P.S. (eds.), *Pteridophyta and Gymnosperms*, in Kubitzki, K. (ed.), *Families and Genera of Vascular Plants 1*: 263-272. Berlin, Heidelberg, New York.
- Reynolds, D.R. & Taylor, J.W. 1991. DNA specimens and the "International Code of Botanical Nomenclature", *Taxon* **40**: 311-315.
- Rödl-Linder, G. 1990. A Monograph of the Fern Genus *Goniophlebium* (Polypodiaceae). *Blumea* **34**(2): 277-423.
- Roy, R.P. & Pandey, S.N. 1963. Cytotaxonomical studies of the fern-flora of Parasnath hills. *Proc. 50th. Ind. Sci. Congr., Part III (Abstracts)*: 48.
- _____ & Sakya, A.R. 1963. Chromosome numbers of ferns from Kathmandu, in Fabbri, F. (ed.), *Primo Supplemento alle Tavole Cromosomiche delle Pteridophyta di Alberto Chiarugi, Caryologia* **16**: 237-335.
- _____ Sinha, B.M.B. & Shakya, A.R. 1971. Cytology of some ferns of Kathmandu Valley. *Brit. Fern Gaz.* **10**(4): 193-199.
- Rumsey, F.J., Sheffield, E. & Haufler, C.H. 1991. A reassessment of *Pteridium aquilinum* (L.) Kuhn in Britain, *Watsonia* **18**: 297-301.
- Saiki, Y. 1984. Note on Ferns (2) Asiatic species of the *Aleuritopteris farinosa* complex. *J. Phytogeog. Taxon.* **32**(1): 1-14.
- Sankari Ammal, L. & Bhavanandan, K.V. 1995 ["1994"]. Karyomorphological studies on *Dryopteris Adanson*, *Indian Fern J.* **11**(1-2): 89-93.
- Sastry, A.R.K. & Chowdhury, S. 1972 ["1969"]. *Arthromeris jarettii* - a new species of Polypodiaceae from Subansiri District, NEFA, India, *Bull. Bot. Surv. India* **11**: 442-443.
- Satija, C.K. & Bir, S.S. 1985. Polypodiaceous ferns in India, in Bir, S.S. (ed.), *Aspects Plant Sci.* **8**: 1-132. New Delhi.
- Schelpe, E.A.C.L.E. 1963. The identity of some fern types in the Thunberg herbarium. *J. S. African Bot.* **29**(3): 91-92.

- _____ 1976. New Angolan fern taxa, *Garcia de Orta, ser. Bot.* **3**(1): 53-54.
- Sen, T., Sen U. & Holttum, R.E. 1972. Morphology and anatomy of the genera *Davallia*, *Araiostegia* and *Davallodes* with a discussion on their affinities, *Kew Bull.* **27**(2): 217-243.
- Serizawa, S. 1979. Supplementary notes on the Japanese species of *Deparia* Sect. *Athyriopsis*, *J. Jap. Bot.* **54**(6): 178-183.
- Sharma, S.S. 1986 ined. Cytotaxonomy and Reproductive Biology of some W. Himalayan Ferns. Ph. D. thesis, Panjab Univ. Chandigarh.
- Sheffield, E. 1995. Two approaches to the taxonomy of Scottish bracken 2: Molecular markers, in Dyer, A. & Lindsay, S. (eds.), the ecology and conservation of Scotland's rare ferns, *Pteridologist* **2**(6): 296-297.
- Shieh, W.C. 1973. *Quart. J. Chinese For.* **6**(4): 98.
- Shing, K.H. 1981. New taxa of the genus *Coniogramme* Fée from China, *Act. Bot. Yunnanica* **3**(2): 217-238.
- _____ 1990. *Hemionitidaceae*, in Ching, R.C. (ed.), *Flora Reipublicae Popularis Sinicae* [etc.] **3**(1): [216-] 263 [-274 et addend.]. Beijing.
- _____ 1994. A New Genus, *Paragymnopteris* Shing Separated from *Gymnopteris* Bernh., *Indian Fern J.* **10**(1-2): 226-231.
- Singh, S. & Panigrahi, G. 1990. Is *Lepisorus* (J. Smith) Ching generically distinct from *Pleopeltis* Humb. & Bonpl. ex Willd. (Pteridophyta)?, *J. Hill. Res.* **3**: 14-27.
- _____ c.1997 ["1995"] in press. *Pteridophytic Flora of Arunachal Pradesh* **1** (Tirap Distr.). Dehra Dun.
- Sledge, W.A. 1956. The nomenclature and taxonomy of *Athyrium nigripes* (Bl.) Moore, *A. solenopteris* (Kunze) Moore and *A. praetermissum* sp. nov., *Annal. Mag. Nat. Hist., ser. 12*, **9**: 453-464 et tt.
- _____ 1957 ["1956"]. *Microlepia speluncae* (L.) Moore, *M. trapeziformis* (Roxb.) Kuhn and *M. firma* Mett. in Kuhn, *Kew Bull.* **3**: 523-531.
- _____ 1960. The Polypodiaceae and Grammitidaceae of Ceylon, *Bull. Brit. Mus. Nat.*

Hist., Bot., **2**(5): 131-158.

_____ 1967. The genus *Elaphoglossum* in the Indian peninsula and Ceylon. *Bull. Brit. Mus. Nat. Hist., Bot.*, **4**(2): 79-96.

_____ 1972. The tectarioid ferns of Ceylon, *Kew Bull.* **27**(3): 407-424.

_____ 1973a. The dryopteroid ferns of Ceylon, *Bull. Brit. Mus. Nat. Hist., Bot.*, **5**(1): 3-43.

_____ 1973b. Native and naturalised species of *Adiantum* in Ceylon, *Ceylon J. Sci., Biol. Sci.*, **10**: 144-154.

_____ 1975. *Lunathyrium* in the Azores, *Fern Gaz.* **11**(2-3): 81-85.

_____ 1977. *Lunathyrium* in the Azores; a postscript, *Fern Gaz.* **11**(5): 331-336.

_____ 1978. The identity of *Nephrodium malabariense* Fée, *Kew Bull.* **34**(1): 77-81.

_____ 1981. The Thelypteridaceae of Ceylon, *Bull. Brit. Mus. Nat. Hist., Bot.*, **8**(1): 1-54.

_____ 1982. An annotated check-list of the Pteridophyta of Ceylon. *Bot. J. Linn. Soc.* **84**: 1-30.

Sleep, A. & Reichstein, T. 1984. Typification of *Asplenium varians* Wall. ex Hook. & Grev. (Aspleniaceae, Pteridophyta). Studies in *Asplenium* for "Flora Iranica": 5. *Candollea* **39**: 675-691.

Smith, A. R[eid]. 1993. *Thelypteridaceae*, in Morin, N.R. et al. (eds.), *Flora of North America North of Mexico* **2**: 206-222. New York. Oxford.

_____ & Fraser-Jenkins, C.R. 1982. *Dryopteris paleacea* is a synonym of *D. wallichiana*, *Taxon* **31**(2): 327-329.

Smith, J. 1875. *Historia Filicum - An exposition of the nature, number and organography of ferns [etc.]*: I-XIV, 1-408. London.

Srivastava, G.K., Pant, D.D. & Shukla, P.K. 1993. The Genus *Isoëtes* L. in India. *Amer. Fern J.* **83**(4): 105-119.

Stewart, R.R. 1942. The ferns of Mussoorie and Dehra Dun, *150th Ann. Vol. Roy. Bot. Gard. Calcutta* **2**: 159-172.

- _____ 1945. The Ferns of Kashmir, *Bull. Torrey Bot. Club* **72**: 399-434.
- _____ 1985 ["1984"]. Remarks on North Western Himalayan Ferns, *Indian Fern J.* **1**(1-2): 41-45.
- Sweet, A. & Hills, L.V. 1971. A Study of *Azolla pinata* R. Brown, *Amer. Fern J.* **61**: 1-13.
- Tagawa, M. 1939. *Act. Phytotax. Geobot.* **8**: 4.
- _____ 1949. *Bull Nat. Sci. Mus. (Tokyo)* **27**: 5.
- _____ 1950. Fern Miscellany (3), *J. Jap. Bot.* **25**(6): 113-116.
- _____ & Iwatsuki, K. 1975a. New or interesting ferns from Thailand 9, *Act. Phytotax. Geobot.* **26**(5-6): 169-172.
- _____ _____ 1975b. *Flora of Thailand* **3**(2):129-296. Bangkok.
- Tindale, M.D. 1961. Studies in Australian pteridophytes. No. 3, *Contrib. New S. Wales Nat. Herb* **3**(2): [88-] 90 [-92].
- Trivedi, B.S., Mehrotra, B.N. & Aswal, B.S. 1977. A note on the occurrence of *Asplenium indicum* Sledge var. *obtusum* (Bir) comb. nov. in western Himalaya, *Geophytology* **7**: 250.
- Tryon, R.M. 1941. A revision of the genus *Pteridium*, *Rhodora* **43**: 1-31, 37-67.
- _____ 1962. Taxonomic fern notes II. *Pityrogramma* (including *Trismeria*) and *Anogramma*, *Contrib. Gray Herb.* **189**: 52-76 et it.
- _____ 1970. The classification of the Cyatheaceae, *Contrib. Gray Herb.* **200**: 1-53.
- _____ 1980. Proposal to conserve the name Pteridaceae, *Taxon* **29**: 161.
- _____ 1987 ["1986"]. Some new names and combinations in Pteridaceae, *Amer. Fern J.* **76**(4): 184-186.
- _____ & Tryon, A.F. 1980. Proposal to conserve *Notholaena* with the type *Pteris trichomanoides*, *Taxon* **29**: 160-161.
- _____ _____ 1981. Taxonomic and nomenclatural notes on ferns, *Rhodora* **83**(833): 133-137.
- _____ _____ 1982. *Ferns and allied plants, with special reference to tropical America.* Berlin, Heidelberg, New York.

- _____ & Badrie, F. 1980. Classification, Spores, and nomenclature of the marsh fern, *Rhodora* **82**: 461-474.
- _____ & Kramer, K.U. 1990. *Pteridaceae*, in Kramer, K.U. & Green, P.S. (eds.) Pteridophyta and Gymnosperms in Kubitzki, K. (ed.), *Families and Genera of Vascular Plants 1*: 230-265. Berlin, Heidelberg, New York.
- Tu, V.N. 1979. Rod *Crypsinus* C. Presl (Polypodiaceae) flory Vietnam. *Bot. Zhurn. (Moskva, Leningrad)* **69**(9): 1313-1318.
- Vasudeva, S.M., Bir, S.S. & Kachroo, P. 1990. Pteridophytic flora of north-eastern India - III (Families: Aspleniaceae - Oleandraceae), *Indian Fern J.* **7**(1-2): 66-85.
- Verma, S.C. 1962. Taxonomic status of *Adiantum lunulatum* Burm., *Nova Hedwigia* **3**: 463-468.
- _____ & Khullar, S.P. 1965a. Cytology of some W.-Himalayan Adiantaceae (sensu Alston) with cytotaxonomic comments, *Caryologia* **18**(1): 85-106.
- _____ 1965b. Cytotaxonomy and cytogenetics of *Onychium contiguum* complex in W. Himalaya, *Caryologia* **18**: 555-556.
- _____ 1965c. A new W. Himalayan species of *Onychium* from *O. contiguum* complex: *O. fragile*, *Nova Hedwigia* **9**: 83-88.
- _____ & Loyal, D.S. 1960. Chromosome counts in some ferns from Nainital, *Curr. Sci.* **29**: 69-70.
- Viane, R. & Reichstein, T. 1986. Proposal to reject *Asplenium laciniatum* Don (Aspleniaceae, Pteridophyta), *Taxon* **35**(3): 605-606.
- _____ 1991. Notes about *Asplenium II*: some new names and combinations in *Asplenium* L. (Aspleniaceae, Pteridophyta), *Biol. Jb. Dodonaea* **59**: 157-165.
- Vida, G. 1969. Tetraploid *Dryopteris villarii* (Bellardi) Woyнар ex Schinz & Thell. in Rumania, *Bot. Közlem.* **56**: 11-15.
- _____ 1970. Genome analysis of *Cystopteris fragilis* by means of hybridisation and induced apogamy, *Publ. Demographic Res. Inst.* **32**: 51.

- _____ 1974. Genome analysis of the European *Cystopteris fragilis* complex 1. Tetraploid taxa, *Act. Bot. Acad. Scient. Hungaricae* **20**(1-2): 181-192.
- Wagner, D.H. 1990. *Polystichum kwakiutlii* sp. nov., the Elusive Bipinnate Ancestor of *P. andersonii*, *Amer. Fern J.* **80**(2): 50-52.
- Wagner, W.H. 1981. Ferns in the Hawaiian Islands, *Fiddlehead Forum, Bull. Amer. Fern Soc.* **8**(6): 43-44.
- _____ 1988. Status of the Hawaiian fern flora, *Fiddlehead Forum, Bull. Amer. Fern Soc.* **15**(2): 11-15.
- _____ 1993. New species of Hawaiian pteridophytes, *Contrib. Univ. Michigan Herb.* **19**: 63-82.
- Walker, T.G. 1958. Hybridisation in some species of *Pteris* L., *Evolution* **12**(1): 82-92.
- _____ 1960. The *Pteris quadriaurita* complex in Ceylon, *Kew Bull.* **14**(3): 321-332.
- Wang, Z.R. 1985. Three new cytotypes of *Dryopteris chrysocoma* complex, *Act. Phytotax. Sinica* **23**(5): 344-351.
- _____ 1989. A preliminary study on cytology of Chinese *Pteris*, *Act. Phytotax. Sinica* **27**(6): 421-438.
- _____ 1994. New taxa of Athyriaceae from Hengduan mountains, China, *Act. Phytotax. Sinica* **32**(1): 82-92.
- Werth, C.R. & Lellinger, D.B. 1992a. Genomically preserved plants and their nomenclature, *Taxon* **41**: 513-521.
- _____ 1992b. Four proposals to amend the Code to provide for naming genomically preserved plants, *Taxon* **41**: 597-598.
- Widén, C.-J., Äyräs, P. & Reichstein, T. 1992. The phloroglucinols of *Dryopteris stenolepis* (Pteridophyta, Dryopteridaceae), *Ann. Bot. Fennici* **29**: 41-54.
- _____ Fraser-Jenkins, C.R., Reichstein, T., Gibby, M. & Sarvela, J. 1996. Phloroglucinol derivatives in *Dryopteris* Sect. *Fibrillosae* and related taxa (Pteridophyta, Dryopteridaceae), *Ann. Bot. Fennici* **33**: 69-100.
- _____ & Sarvela, J. 1997.(in press). A survey of

phenolic compounds in *Dryopteris* and related fern genera. Part II. Phloroglucinol derivatives in subgenus *Dryopteris* (Pteridophyta, Dryopteridaceae), *Ann. Bot. Fennici*.

Windisch, P.G. 1982. Specimens from Fée's Pteridological Collection at the Botanical Garden of Rio de Janeiro, *Amer. Fern J.* **72**(2): 56-60.

Wu, C.Y. 1983. See Ching & Wu (1983).

Wu, S.K. 1983. Notes on ferns of the east Himalayas (1), *Act. Bot. Yunnanica* **5**(2): 165-169.

Yoshikawa, N. 1990. Asian Ferns **1**, J. Nippon Fernist Club **2**(81): 26-30.

Zhang, L.B. & Kung, H.S. 1995. A taxonomic study on the fern genus *Polystichum* Roth Sect. *Metapolystichum* Tagawa from China (1), *Act. Phytotax. Sinica* **33**(5): 469-475.

_____ 1996a. A taxonomic study on the fern genus *Polystichum* Roth Sect. *Metapolystichum* Tagawa from China (2), *Act. Phytotax. Sinica* **34**(1): 68-76.

_____ 1996b. A taxonomic study on the fern genus *Polystichum* Roth Sect. *Metapolystichum* Tagawa from China (3), *Act. Phytotax. Sinica* **34**(2): 194-203.

Zink, M. 1989 ["1988"]. Affinities and delimitation of the genus *Lepisorus* (J. Sm.) Ching (Polypodiaceae), in Shing, K.H. & Kramer, K.U. (eds.), *Proceedings of the International Symposium on Systematic Pteridology*: 75-81. Beijing.

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ERRATA

1. *Polystichum* "woodseoides" (pg. 212-213) should be spelt *P. woodsoides*.
2. *Phanerophlebiopsis hookeriana* (C. Presl) Fras.-Jenk. was validly published in full in the reprinted version of my *Polystichum* monograph (originally published in *Aspects of Plant Sciences* 13: 249-287 (8 Oct. 1991), "A Guide to Himalayan Ferns (*Polystichum*). International Book Distributors, Dehra Dun (published 2 Oct. 1997), "where the relevant lines were not omitted. My comments above *sub Phanerophlebiopsis caduca* were in error as *Lastrea hookeriana* C. Presl was a valid *nom. nov.* for *Aspidium caducum* Wall. ex Hook. & Grev., *non Kunth* in [Humb. &] Bonpl., and has priority over *Cyrtomium caducum* T. Moore. The combination *Phanerophlebiopsis caduca* (T. Moore) Fras.-Jenk. is therefore not accepted by me in this work at its time of publication and is thus invalid.
3. I have recently found *Bolbitis angustipinna* (Hay.) Ching at Mahendra Gouffer (cave), N. Pokhara, Kaski District, W.C. Nepal, C.R. Fraser-Jenkins Field no. ,22 Dec. 1997, with U. G. & E. Tamang & U. Chhetri. The population has more densely scaly stipes and rhachides and more widely truncate pinna-apices than normal.
4. I have recently found *Pleocnemia winitii* Holtt. in a narrow, forested stream-gully opposite Chabise village, c. 2 km E. of Kairenitar, on the road E. from Pokhara to Damauli and Kathmandu, Tanahun District, W.C. Nepal. C.R. Fraser-Jenkins Field no., 27 Dec. 1997, with U. Chhetri; growing with *Pteris longipinnula* Wall. ex Agardh, *P. semipinnata* L., *Microlepia* "haflangensis" Nayar & Kaur, *Thelypteris loyalii* (Holtt.) Fras.-Jenk., *Bolbitis major* (Bedd.) Hennisman, *B. appendiculata* (Willd.) Iwats., *B heteroclita* (C. Presl) Ching, *Diplazium latifolium* T. Moore, *D. polypodioides* Bl., *Asplenium finlaysonianum* Wall. ex Hook., *A. obscurum* Bl. etc. This species has often been reported *sub P. leuzeana* (Gaud.) C. Presl, a S.E. Asian species not present in the Indian subcontinent (though listed by Dixit 1984a) in addition to (*P. winitii*), until separated by Holttum. I have found it commonly further east in Assam (near Digboi and in Nambar Forest), Arunachal Pradesh (Namdapha, with the *Scientific Exploration Society*) and Bangladesh (N. of Sylhet on the way to Jaflong), also below Mackaybari, Darjeeling. Mehra & Bir (1964) also found it in Sikkim; but it was not listed from Nepal by either Holttum (1973), "The fern-genus *Pleocnemia*," *Kew Bull.* 29(2): 341-357, or Iwatsuki (1988) and is a rather surprising find from so far west.