

BURMA'S ICY MOUNTAINS

by

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*Illustrated from photographs
taken by the author*

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P R E F A C E

BURMA, north of upper Burma (which may be said to end, with the railway, at Myitkyina, though very few Burmese are to be found north of Katha), is still a remote and little known region.

Though it has been surveyed on the $\frac{1}{4}$ -in. scale (and much of it on the $\frac{1}{2}$ -in.) to the modern scientific explorer it is virtually unexplored and what we already know of its fauna and flora is only enough to tantalize us about what remains to be revealed.

In particular, we know very little indeed of its flora, beyond the bare fact that it is one of the richest regions for its size in south-east Asia, if not in the world.

Although I have made four major expeditions into the mountains at the sources of the Irrawaddy, I am fully conscious that I have only skimmed the surface of the flora. We know more about the birds and mammals, perhaps, mainly because there are fewer of them. Much remains to be done in this field also; and as regards lower forms of life, we know next to nothing.

On the extreme northern frontier rises a group of snow peaks, nearly 20,000 feet high, which will one day attract the mountaineer; and on the eastern frontier are other snow peaks, whose exact position and height are unknown. Thus the Irrawaddy is largely a glacier-fed river, a fact which geographers have been slow to recognize.

It is hoped that this book will interest the naturalist and anyone engaged in modern scientific exploration whether in Burma or elsewhere. Perhaps it is too much to hope that it will interest the general reader — if there really *is* such a person — whose tastes are presumably — well, general rather than particular.

In conclusion I would like to thank my friend Dr. George Taylor, Deputy Keeper of Botany, Natural History Museum, who has been so kind as to read the manuscript, and see the

book through the press during my absence abroad. Dr. Taylor is not only a distinguished botanist, but is himself an explorer who has done fine work in Tibet, on Ruwenzori, and elsewhere. I am therefore more than usually fortunate in having enlisted his help, and have profited by his criticisms, for all of which I am grateful.

F. K-W.

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ILLUSTRATIONS

- A NUNG FISHERMAN harpooning fish in the Nam Tamai, one of the sources of the Irrawaddy. The harpoon is a long bamboo, with a detachable head consisting of four plain hooks, each separately fastened by a string to the long main line; it is really a grappling instrument. When the head of the bamboo strikes a fish, the hooks come loose
frontispiece
- A KACHIN WOMAN IN HER GALA DRESS. The ear lobes are pierced and gradually enlarged to take these huge amber 'pencils'
facing page 32
- THE DAINTY SLIPPER ORCHID (*Paphiopedilum Wardii*) with chocolate and green flowers. It grows on rocks and banks in the rain forest at 5000 feet altitude 49
- PINUS INSULARIS* LOOKING OVER THE MOUNTAINS INTO CHINA 64
- VIEW FROM THE 10,000 FEET CAMP above the Nam Tamai over the mountains. The last fir trees (*Abies*) on the exposed windy ridge. Undergrowth of dwarf bamboo (*Arundinaria*) and *Rhododendron*. Clouds in the valley of the Nam Tamai 80

A NUNG WORKING HIS WAY ACROSS A ROPE BRIDGE	<i>facing page</i> 96
TIBETANS PLOUGHING WITH YAKS in the Adung Valley	112
KA KÁRPO RAZI, 19,269 FEET HIGH, Burma's Icy Mountain, seen from the ridge above the Gamlang river at a distance of two miles	144
A LASHI GIRL wearing a long skirt. She carries a vanity bag — a finely woven cane basket of beautiful workmanship	160
MOUNTAIN BIRCH IN WINTER	176
A CLIMBING GENTIAN with large funnel-shaped pinkish-purple flowers	192
A FINE SLIPPER ORCHID (<i>Paphiopedilum villosum</i>) with honey-yellow and green flowers	208
LISU WOMEN DRESSED IN THE CHINESE STYLE. They have brought chickens for sale. They have retained their customary colours and wear small silver ear-rings of good workmanship made in China	224
A LISU WITH A HUNTING CROSS BOW. The Lisus came from China and are gradually migrating westwards into the mountains of Burma	240
AN IMPROVISED MULE CANE SUSPENSION BRIDGE. Note the main support cables, too high to hold	257
THE CHINESE COFFIN TREE (<i>Taiwania cryptomerioidis</i>) is used for making Chinese coffins, and rears above the other forest trees to a height of nearly 200 feet. The straight trunk towers up like a temple pillar, unbranched for 80 feet. The tough stringy bark is a reddish colour	272

M A P S

Northern Burma and its Frontiers	9
Ka Karpo Razi and adjoining Districts	101

To

The Leaders of the Vernay-Cutting Expedition to North-East Burma

CHARLES SUYDAM CUTTING

and

ARTHUR VERNAY

And to the other members of the expedition my companions

J. K. STANFORD and HAROLD ANTHONY

*this book is affectionately dedicated
by the author*

CHAPTER ONE

ON June 19th, 1937, I left Rangoon by train, travelling to Mandalay, and thence to Myitkyina, where the railway ends, and the roads to China and to Tibet begin.

My friend, Beresford Barrett, the Divisional Forest Officer, met the train, and carried me off to his bungalow, where he and his charming wife entertained me for the next few days.

For the third time in twelve years I was bound for the mountains beyond Fort Hertz, at the sources of the Irrawaddy.

I had no wish to stay in Myitkyina longer than was absolutely necessary, although it was already so late in the season that an extra day or two could make no material difference. Normally for a monsoon plant-hunting expedition I should have started from Myitkyina early in March, certainly not later than the beginning of April.

Before I could move on, however, I had to find transport and servants, having sent my two Sherpas, Pemba Lama and Tashi Thondup, back to Darjeeling; it was unfair to take these highlanders through the malarious Burmese valleys during the monsoon, thereby exposing them to almost certain fever. As for transport it was hardly possible to obtain coolies in Myitkyina now. The floating population had already returned to their hill villages; the locals, even the more or less unemployed and casual labourers, abhor carrying loads at any time, and prefer to be idle. Mules were out of the question. Chinese muleteers work their animals in north Burma during the cold weather, but owing to the prevalence of surra, an obscure disease to which ponies and mules in these wet jungles quickly succumb during the rains, they had long since departed for the healthier plateau of Yunnan where the dread disease appears to be unknown. The only available form of transport therefore was bullock carts; Indian cattle are immune from surra. I might have done worse.

Through the kind offices of the Deputy Commissioner I hired three bullock carts for the 139 miles to Sumpra Bum at a cost of 40 rupees each, this sum including the return journey. There is an all-weather cart road from Myitkyina to Sumpra Bum, more than half way to Fort Hertz. In the dry season it is just fit for motor transport — so long as one is not caught in a depression from the Bay of Bengal. A cruel fate which occasionally overtakes the busy touring officer is to reach Sumpra Bum in two days by car and from there watch the rain come pelting down for forty-eight hours, turning large sections of the road into an impassable morass which takes a week to dry up.

Servants were another problem, their quality largely a matter of luck, since I had to take what I could get. In the end what I got were a famished-looking Hindu out-of-work and a Shan ne'er-do-well of no fixed abode, both drawn from that vague but dubious stratum known as the bazaar. They were not the type of people one would select for a long expedition into the jungle, but they lasted me to Fort Hertz.

During the five days, June 23rd-27th, I spent in Myitkyina the highest maximum temperature was 90°F. the lowest minimum 72.9° with a highly saturated atmosphere all of the time.

When it rained for twenty-four hours, however, the temperature did not rise much above 76° and one felt chilly. The barometer remained around 29.4 in. with no violent fluctuations, while 3 in. of rain fell. The average annual rainfall over a period of years is about 90 in.

One hot afternoon we paid a visit to the game sanctuary a few miles from Myitkyina, but the only animal I saw was a white-browed gibbon which is coal black all over except for its frosty eyebrows, and a white patch where its tail would be if it had one.

Some forest rangers brought in a baby porcupine. The young of almost all animals are said to be pretty; even the young of crocodiles move the sentimental to crocodile tears. But surely

it depends on how young and also perhaps on how helpless they are. Neither new-born kittens nor unfledged birds appeal to my aesthetic sense, and young cobras are scarcely disarming. This little porcupine had a face exactly like a guinea-pig's which had got crumpled, and its quills, soft as indiarubber and almost colourless, were so short that much wrinkled pink flesh was exposed, giving the creature an absurdly senile appearance in spite of its youthful face and figure. Whatever its age it was far from helpless, and it could run with astonishing speed. Porcupine flesh is regarded as a delicacy; I don't know whether this one was destined for the pot.

Two sights I saw in Myitkyina which impressed me. First the ironwood trees — *Mesua ferrea*. The leaf buds were breaking and the spinach green of the older foliage was so laced with fiery crimson that the whole sombre crown seemed to glow with light as though it dripped red hot lava. Nor is that all, for the leaves, which while young hang limp and soft as velvet, slowly fade as they grow from the vivid red of their birth to carmine, then to a rosy blush like the red stain of the sunset sky changing finally to a delicious pale apple green which in turn deepens by easy tints to the sage green of the mature leaf. Rarely, however, is the ironwood in young leaf from head to toe — not all the leaf buds open at the same time, at least in Myitkyina. Usually not more than half the tree, perhaps only one or two branches, unfurl their young leaves together; thus the tree displays many colours. Is this succession of breaking buds, wherein branches behave almost as independent trees, an effect of unequal light? It would be instructive to compare the behaviour of trees so far south as Singapore, for example, with trees growing in the forests north of Myitkyina. Equally remarkable was it to see the green parakeets (*Psittacula krameri*) at dusk returning from their feeding grounds in the jungle near the foot-hills to their sleeping quarters in the teak plantation south of the town. They came in thousands, wave after wave in flights so large as sometimes to cover a considerable wedge of sky. They kept perfect formation wheeling and banking together as

one and, considering their numbers, speed, and swift changes of direction, it seemed remarkable that so far as one could tell they never had a collision. A master brain controlled each individual bird welding the entire flight into one organism which obeyed a single command. As they flew, hastening home at dusk, they screeched to one another — code calls perhaps for some such general instructions to the flight as 'danger front', 'spurt', 'left incline' and so on; or perhaps mere exuberance. One evening I walked over to the teak plantation to watch the flights come in to roost; but so thickly grew the trees and so large are the leaves of the teak that it was almost dark inside when they came, screeching and bustling and fluttering in the tree-tops where the birds must have been more congested than any ghetto. As the sun went down the noise gradually grew less, then finally ceased; and so they settled down for the night. It was difficult now to believe there were thousands of parakeets up in those trees, though they must have been sitting along the branches cheek by jowl. I believe they go off at dawn in small parties since it is only when the day is far spent one sees the immense flocks described. How far they go to their feeding grounds is not known. It may be the fig trees which attract them to the evergreen forest at this season; at other times one finds them — or an allied species — equally abundant in the pine forests of the higher hills.

Few birds are easier to identify in flight than the parakeet, its sharp triangular cut and long pointed tail making it immediately recognizable. Add to this its swift linear motion, its raucous screech and its habit of flying in compact well-drilled formations and it becomes unmistakable. However, there are actually four different species in Burma and the layman might be puzzled to know which is which in flight. The one here described is, perhaps, the commonest and most widely spread of all.

To return to our more immediate problems. By June 27th I was ready to start and the actual start was fixed for the following day. Of course the carts came very late and were not

loaded up till midday. However, in Burma, where omens and signs have a habit of being unpropitious at the last moment, one learns to be thankful if one gets away at all on the chosen day. I gave the carts a few hours start; then after tea my hostess drove me out the first stage of eleven miles to Alam. We soon overtook the carts which did not arrive at the rest house till after dark.

We had scarcely started the following morning when I heard the hoot of a car coming up behind and next minute Mrs. Beresford Barrett appeared round the corner. She had been feeling uneasy about me the previous evening, thinking that perhaps my carts and the servants had not arrived at the rest house. So like a Good Samaritan she had come to see if I was all right. She caught us up at the twelfth mile, and leaving the carts to plod on I joined her in the car where we sat and drank shandy. When the carts were well out of sight we started again and stopped immediately; nor would anything we did — and we did a lot — make it go again. It presently dawned on me that it was, for the inexpert, a serious breakdown; and having spent two hours blowing into pipes, dismantling the carburettor, and cleaning plugs, all to no purpose for I am no mechanic, I had to confess myself beaten. I decided I must return to Myitkyina for help before it got dark, leaving my companion, who could not have walked the fourteen miles home, to look after herself. So we walked back the short distance and I left her at the rest house.

It was a foul journey. After covering the first six miles in fair time much of it at a jog trot I developed such a blister on one heel that I had to slow down a lot. However, I took only a little over two hours for the whole journey, called at Beresford Barrett's office — he himself had gone on tour — sent for a taxi from the bazaar (there were two) and went on to the Deputy Commissioner, who gave me some tea. The D.C. volunteered to drive out and bring back Mrs. Beresford Barrett so when my taxi arrived we set forth. I, of course, had to go on and catch up with my carts. We reached the rest house in good time and

found the lady quite comfortable. After a second tea I took the taxi on another ten miles to Chingkrang Hka where I found my carts, while the others set out for Myitkyina dragging the obstinate car. Next day June 30th we really did start.

The moral seems to be: Good Samaritans sometimes cause trouble; don't try to speed the parting guest twice over!

We were still on the Myitkyina plain which extends northwards for thirty miles, hardly 800 ft. above sea level, as far as Weishi where we arrived the same evening. The village of Weishi stands at the foot of the hills where the Mali Hka (or western branch of the Irrawaddy) and Nmai Hka (or eastern branch) unite a thousand miles above the Bay of Bengal. At the confluence, rocks visible at low water stick up from the river bed causing big rapids and barring navigation; the current here during the rains flows fast, the water swirling and foaming amongst the jagged blades of rock. But though Weishi marks the limit of navigation, and though the first defile, where the river pours through a long narrow gorge between Myitkyina and Bhamo, is impassable during the rains, yet for a thousand miles the Irrawaddy is one of the finest waterways in the world. Including its delta, this fertile valley scooped through the dried-up heart of Burma, brings the means of communication to twelve million people.

The Indian bullock cart, a vehicle which has doubtless been in use unchanged for a thousand years, is drawn by a pair of yoked oxen, and on a hard level surface will carry up to ten maunds (800 lb.) of kit and cover ten or twelve miles a day, so long as there is grazing for the bullocks. They require a feed of grain or dried beans morning and evening, and a daily pinch of salt to keep fit. In the hot weather they usually travel by night, often without lights, the driver fast asleep, to the peril of motorists on the main roads unaccustomed to the ways of Ind. During the heat of the day the carts outspan beneath the ample shade of a peepul tree, the bullocks grazing not far away, the men cooking their rice or sleeping. Towards sunset they are on the road again and will plod steadily on all through the night.

But now that the rains had come there was no need to travel by night even on the hilly road to Sumpra Bum, though we rested in the middle of the day. It is, however, a slow form of transport and we rarely travelled faster than one and a half miles an hour. I had kept one cart for my own personal use, laying my bedding on the floor so that I could sit in some comfort while it rained as hard as it liked, or even lie down with my feet sticking out at the end. But most of the journey I did on foot. On account of the mud my carts carried only about half the normal load.

The vegetation of the Myitkyina plain would, but for man's work, be monsoon forest, a proportion of the trees -- perhaps the majority except along water courses or where there is underground water -- shedding their leaves in the hot weather. However, save in the game sanctuary, there is not much forest left (though there are plenty of trees), the plain being partly cultivated, but mainly given over to rough grazing. This is certainly not putting the land to the best possible use; and when later an increased area of land is required to be brought under cultivation, the soil may be found to be completely exhausted. Fire and sword, in peace as in war, and over-grazing by cattle and goats have so impoverished the soil that in this climate the vegetation cover is in many places no cover at all, comprising little but scattered dwarf date palm (*Phoenix humilis*).

Along the 'Great North Road' a different effect is seen. Here dense thickets of *Ageratum*, beautiful in flower but dull during ten months of the year, line both sides, growing so high as to shut out the view. This alien weed which has taken so kindly to monsoon lands everywhere, quickly smothers the local flora, which hardly puts up a fight. Only the forest can defy it; once that has been destroyed the *Ageratum* surges into the breach, digs itself in and becomes impregnable. The more it is cut and burnt the stronger it grows; and since few plants can grow up under its deep shade the forest has no chance to come back. However, it would be a mistake to regard this ubiquitous invader as a complete disaster. By merely covering the ground

it prevents total erosion of the soil especially in the foothills into which it has advanced, and adds to the supply of humus; it also conserves moisture. If one can but find trees which will grow up beneath its shade and in turn shade it out of existence as they increase in size it is possible to make a staunch ally of it.

Here and there are a few Shan huts in the midst of a little paddy cultivation. Their presence is revealed by the spreading banyan or peepul tree, and by clumps of banana and giant bamboo. Of this last there are two common species, the commonest of all perhaps being *Dendrocalamus Hamiltonii*, a densely tufted very tall bamboo, the stems near the base sometimes six inches in diameter. Both species had flowered the previous year and nearly all the clumps were dead giving them a very forlorn appearance. Those few which still bore green leaves had not flowered.

On July 1st we entered the foothills of the Mali valley.

CHAPTER TWO

AFTER leaving the river confluence at Weishi the road begins to climb till it is several hundred feet above the Mali Hka, which flows swiftly through the narrow wooded valley. The foothills are not steep, though here and there the road overhangs a cliff.

We now began to suffer from some of the discomforts which, day and night, make the rainy season in the jungle so unpleasant, chiefly sand flies and mosquitoes. In the rest houses, most of which were overrun with cockroaches and dreadful-looking spiders, one dare not hide one's hands under a book without wearing gloves. Sometimes sand flies got inside my net at night and then there was no peace and little sleep.

The first day of July ushered in a break in the rains. Before dawn a dense white mist overhung the river just as in the cold weather, but the rising sun immediately dispersed it. The almost saturated air heated up quickly so that, even while seated in my cart, I sweated.

Nsop Zup, forty miles from Myitkyina, formerly a military outpost, was now deserted and already half overgrown with rank weeds, especially the ever-encroaching blue-flowered *Ageratum*. Even from a distance one could see that the place was derelict. For the first time we enjoyed a pleasant breeze.

Looking south we saw the plain flaring out from the foothills at the mouth of the Mali valley till it was lost in the haze; all round us now rose the mountains covered with their green mantle of forest.

Nsop is charmingly sited in a little bay in the hills above the river at the mouth of a brawling torrent. The bed of the Mali is cut up by long groins of grey schist on which above flood mark grow small azaleas (*Rhododendron Simsii*) smothered with bright crimson flowers in April. Cream roses, the flowers borne

in generous trusses, grow in the sandy coves, but they also were over. It is curious to find two such different plants, both of northern genera, growing here in a sub-tropical climate less than a thousand feet above sea level. Of the two, the rose is the more curious; for whereas the Himalayan region is the very fount of the vast rhododendron family, roses as Hooker noted long ago are comparatively uncommon there. On the other hand *Rhododendron Simsii* is known elsewhere only from Japan and the China coast 1500 miles distant — a significant distribution to which far too little attention has been paid by geographical botanists.¹

In the river bed are several plant associations of interest to the botanist. Some plants grow in the sand, others on solid rock, others again only amongst pebbles and boulders. Mud there is none, save where a sluggish stream from the jungle spreads a narrow delta on the foreshore. What species grow in the river bed, however, depends mainly on another factor than soil, namely their ability to withstand a ducking when the river rises in summer, and their resistance to scour. Submergence may last for some time but it is rarely total or continuous; a strong root system is essential for survival. In what appears to be pure sand a species of grass is one of the first plants to form a continuous cover, together with the prostrate creeping fern *Goniopteris prolifera* and a *Cyclea*.

Very different from those shrubs which, growing low down in the river bed, suffer intermittent submergence during the rains, are those which grow on sand dunes at high water level, forming a barrage against the flood. One would perhaps expect the ordinary jungle to meet the river at this point, and where it rests on solid rock it usually does so; but not where sand dunes fringe the river bed. Here grow several curious shrubs not often seen elsewhere, notably species of *Eugenia* and *Camellia*. Such an association is met with in the valley of the eastern Irrawaddy. In river training and reclamation schemes it is important to know what plants will aid the work, and it is only

¹ *Taiwania cryptomerioides* has a similar distribution.

by studying them in the valleys of these mountain rivers that we can gauge their value.

The fine weather continued for a week, the sky clear at dawn and often in the evening. Sometimes rain came on after ten o'clock and lasted several hours; it was not unwelcome, for when the sun shone at midday the damp heat was hardly bearable. It was a relief when on July 4th we finally left the river and gradually ascending another thousand feet, followed the ridges northwards. After we left Kadrangyang, seventy-six miles from Myitkyina, we did not see the Mali Hka again till we crossed it at Nongkai on July 21st. Now that we were clear of the low valley there were fewer biting flies at least by day. But if one left the road for a moment, as I frequently did to collect plants in the jungle, one emerged covered with all kinds of burrs and sticky fruits and seeds of grasses and other plants which cling to one's clothes. The smoother the cloth therefore the better. But it was difficult to know what to wear. The fewer clothes of course the cooler for walking, and the less uncomfortable when one got wet, as one did every day; but every bit of flesh exposed was soon covered with irritating bites and anything which sucked blood could bite through thin or loosely woven material.

For six months in the year the climate of this low-lying valley is not unlike that of Singapore 1800 miles to the south. Only during the other half-year is it much colder, though even then the relative humidity is perhaps not very much lower; but there is far less rain. Hence it is not altogether surprising that many Malayan trees grow so far north as Fort Hertz, especially when we consider that a band of mountainous country clothed throughout its length with evergreen forest is continuous from the sources of the Irrawaddy on the edge of the Tibetan plateau to the equator.

Some of the commonest trees here are: *Stereospermum chelonoides*, *Terminalia myriocarpa*, *Duabanga sonneratioides*, *Ficus hispida*, *Sarcocephalus cordatus*, *Cedrela Toona*, *Engelhardtia spicata*, *Elaeocarpus obtusus*, with species of *Pandanus*, several bamboos

and small palms. On the roadside banks grow violets *Torrenia*, *Disporum*, *Canscora*, ferns, mosses and *Lycopodium*.

The following day also broke like a cold weather dawn, with this difference, that the mist which lay over the river was not dripping from the trees. The sun rose swiftly, being now almost on the prime vertical (that is to say, rising due east) and at once lapped up the mist. It crossed the meridian almost at the zenith. Mercifully clouds came over and rain fell for a couple of hours, but by three o'clock the sky was clear again. On the 4th and 5th we had scarcely any rain; I found that even 'Ideal' milk curdled in this climate within twenty-four hours, once the tin was opened. I still walked most of the way, though the sweat poured out of me; the road was deep in mud and the cart wheels sank six inches. We had splendid views across a broad valley to the western ranges, now beginning to take on a firm outline. The Kumon hills, a southern extension of the Irrawaddy-Brahmaputra divide here, separate the valley of the Mali Hka from the Hukawng valley where the Chindwin rises.

One fair evening I looked across the road from the bungalow over the tops of the great trees to where a cluster of lovely rose-coloured flowers hung suspended from the crown of a tree. It was one of the big jungle climbers, bursting into flower like a rocket as soon as it had reached the top of its ascent. The stem was perhaps 100 feet long and as thick as a man's forearm. It was a species of *Chonemorpha* which belongs to the same family as that to which in the temperate zone only our poor little periwinkle belongs, and it had flowers like a carmine catherine wheel. The not rare *Chonemorpha macrophylla* has white flowers with a pale yellow centre, and this may have been a colour variety.

Amongst less common trees I found a species of *Nephelium* with a red tuberculate fruit, very like the Chinese lichi to which it is closely allied. The white flesh which completely encloses the coffee-brown seed was firm and juicy and very refreshing.

So we marched steadily northwards deeper and deeper into the hills which grew ever higher, halting each evening at the

rest house after completing the stage of ten or twelve miles. So easy was the gradient that though we had climbed a couple of thousand feet since leaving the river we hardly noticed the ascent. The country is cut up into a series of parallel north-south valleys and ridges which are linked together in a wide-meshed diamond pattern; and it was along the zig-zag crests of these ridges and round their flanks that the cart road wound its way. When it was fine I would botanize along the edge of the jungle and enjoy the magnificent sunsets over the wild Kumon range. Most days I walked ahead of the carts, though when the sun shone all day and the heat became intolerable I was glad to lie for a time on my bedding under shelter of the bamboo roof. Never before had I travelled this road in the height of the monsoon, and I now got an entirely new impression of the flora.

Above 200 ft. several charming Gesnerads adorned the clay banks — species of *Didymocarpus*, *Chirita*, and others with the bamboo orchid (*Eria bambusifolia*), *Sonerila*, begonias, grasses, ferns and *Lycopodium*. Most of the *Didymocarpus* flowers were small and impish but gaudy coloured, and were borne so generously and carried in so delightful a manner as to give a very pleasing effect. One species with mauve flowers larger than the others reminded me of a *Ramondia*. Another bore immense panicles of tiny orchid-like flowers of a shining magenta.

One evening I found a large moth, something like a death's head moth, with a similar though not identical pattern. When I touched it gently as it rested it jerked its body upwards by straightening out its legs, keeping its feet planted; this it did several times each time giving vent to a queer little rasping squeak. Then still planted on the same spot it began to flutter its wings rapidly rather like an aircraft 'revving up'. Not often does one meet with either butterflies or moths which make a sound audible to the human ear.

This was the time, as it was the place, for insects of all kinds; and every day when the sun was shining I saw many gorgeous butterflies. Some species band themselves together into a

company, others — and particularly the shade-loving species such as *Thaumantis* which haunt the jungle — are solitary. In north Burma you commonly find great numbers of one or two species drinking from a patch of wet sand, particularly if cattle regularly trample it. Insects, like all life, crave salt of which there is a lack in this country; butterflies are notable salt consumers, and that is why they are to be found on the droppings of animals and where cattle gather. In spite of the heavy rain, butterflies, and in fact all insects, are far more abundant here throughout the hot, moist summer than they ever are during the fine winter, in spite of almost continuous sunshine. Immediately the rain ceases out come the butterflies in countless numbers to dance and feed in the sunshine for a few hours, before seeking cover once more. Many species are no doubt entirely seasonal, appearing only during the wet monsoon when the days are hot and the air humid and when the night temperature never sinks below about 70°F. Others, mostly small butterflies, produce two distinct broods, a wet season brood and a dry season brood, with marked differences between them. One would naturally connect this increase in the butterfly population with increased food supply, as in temperate lands. Undoubtedly more plants flower during the rains than during the cold weather; and since butterflies feed largely on nectar — unlike their larvae they must take all their food in liquid form — one would expect to find them more numerous when more honey is available. But that is not the whole story.

Not a few trees as well as other plants flower in the cold weather and still more in the hot spring weather, when the butterfly population is yet small. Again, larvae, dependent not on flowers but on leaves, swarm everywhere during the rains but are much rarer during the cold weather. Many of them perhaps feed on the leaves of herbaceous perennials which die down to the ground during the cold weather; few perhaps feed on evergreen trees, and those which do are likely to prefer young leaves to old. But many trees in north Burma produce young leaves and even flowers at any season — in other words their

rhythm is not a twelve-month rhythm giving birth to new flowers and foliage at approximately the same time each year, but something less, perhaps nine or ten months, thus completing the cycle in less than a full year, with the above-mentioned result. One would expect larvae to be most numerous when butterflies are most numerous. But the ratio between butterflies seen and larvae seen is a direct one only on the assumption that (1) the larvae seen are in fact those of the butterflies seen, (2) that the butterflies seen do breed at this season and (3) that the larvae emerge from the eggs soon after the eggs are laid. Unless, therefore, the life cycle of these rains butterflies is almost exactly completed in half a year or some multiple of half a year, there is not necessarily any direct connection between numbers of butterflies and numbers of larvae visible in the rainy season. Of course it is probable that things are so ordered for the benefit of the future race rather than for the benefit of the individual; that since it is essential for the larvae to be born during the rainy season in order that they may get the food they need, the butterflies are also abroad then, even though this is to their disadvantage as individuals. I have never seen any statistics of butterfly and larva populations at different seasons integrated with their life histories; there might be a vast field for the naturalist to explore here.

The forest changes above 2000 ft. altitude, hill jungle of a more or less sub-tropical type replacing tropical rain forest, though the change is not very apparent below 3000 or 4000 ft. The one passes insensibly into the other; there is no change of vegetation type, only one of species. Oaks, chestnuts, maples, birch and hornbeam now appear or become more frequent, as also do several *Magnoliaceae*, laurels and other trees. At the same time there is a decrease in the number and size of the figs (especially the strangling species), of palms and of big woody climbing plants, but an increase in the number and variety of epiphytes, due perhaps to the increased humidity which is essential to their mode of life. By July 6th we had covered ninety-five miles to the village of Tingpai. The road was very

muddy and we took over seven hours to do the eleven-mile stage. The barometer was 27.8 in. so we were fairly well up. Rain set in again and it grew much cooler.

One of the most frequent trees seen in these hills is a *Dipterocarpus*, notable for its ash-white trunk, tall, straight, unbranched for 50 ft., and its splendid compact crown. It is one of the few trees which rises above the average height of the canopy; being in flower now and newly fledged it was doubly conspicuous. The flowers, some two inches across, many of which lay on the ground, are white, each of the five petals having a pale pink band down the centre. Some trees when isolated from the jungle, left standing perhaps because they are too big to cut down, gradually die; but not *Dipterocarpus*. With it is often associated a species of *Shorea* (*S. assamica?*).

We met few travellers on the road. At this season the Kachins are not busy in their clearings, but they do not travel much in the rains. Moreover there are few villages, and those small, along the cart road. Most of the Kachin population is concentrated in the hills east of the Mali Hka and west of the Nmai in that mountainous oblong area known as the 'triangle'. Here and there a few coolies were mending the road. Occasionally one met a Kachin woman with fruit, vegetables, rice, chickens or eggs for sale. On one occasion I bought five eggs for two annas, which satisfied the seller and myself though the price fixed by Government was three pice ($\frac{3}{4}$ anna) each, and my cook could never get them under an anna and a half! Government has also fixed the weight of load a hill woman may legally carry at 30 lb. But if any Kachin or Nung woman restricted herself to this she would not feel that she was carrying a load at all. However, reforms must begin somewhere; they are rarely popular, even amongst those they are designed to benefit, at the start. Comfort is relative. Discomfort is anything one is unaccustomed to, as both the prince and the pauper discovered in Mark Twain's famous story.

As already remarked we passed through only a few poor villages where sometimes there would be a Chinese shop openly

selling kerosene oil, matches, condensed milk, rice and perhaps — though less openly — opium. Before the six years war the Chinese had established themselves all up the road between Myitkyina and Fort Hertz whence they kept touch eastwards through the medium of pedlars, who cross into north Burma from the village of Yeche on the Mekong in summer, when the passes are open. They have completely ousted the Indian traders who early established themselves in Fort Hertz, under-selling and underliving them. More than most minority communities the Chinese keep to their own standards in the art of living and never allow themselves to be unduly influenced by their surroundings.

On July 8th we covered fifteen miles, the carts taking nearly ten hours; and the following day after a long uphill march we reached Sumpra Bum, the District Headquarters. The fine spell came to an end and we found ourselves in thick cloud which swaddles these hilltops for six months in the year.

A few miles from Sumpra Bum I noticed a remarkable plant growing high up on the bank out of reach. It was one of the ginger family and had rounded shield-shaped flowers like those of *Costus*, but instead of being white as snow they were red as blood. Another plant with rather striking flowers was a small tree bearing large cherry-red flowers on the old wood (*Saurauja macrotricha?*).

The last four miles of the ascent seemed very long. The houses were in full view, only a mile away, but the road kept looping round the mountain to cross the numerous ravines, without advancing, till I felt we would never arrive. However, I got in about four o'clock, very wet and muddy, to be warmly welcomed by the sub-divisional Officer, Mr. C. McGuiness, and the officer commanding the detachment, Captain J. M. McGill.

Sumpra Bum consists of half a dozen small European-style bungalows, stone walled and iron roofed, scattered along the sloping ridge, barracks for a detachment of the Frontier Force — mainly Gurkha — a few Indian and Chinese shops and several Kachin huts dotted about in the background. During my

brief stay I lived in the travellers' rest house, taking most of my meals with McGuinness.

This was as far as my carts could go. McGuinness therefore collected for me twenty-one Kachins who agreed to go with me all the way to Fort Hertz. This took him a few days, so I was able to rest. We lived literally in the clouds — Sumpra Bum means 'misty mountain' — and it lived up to its name. Rarely did we get so much as a glimpse of the surrounding country. The average rainfall of Sumpra Bum is over 100 in. a year. One afternoon we walked to the top of the hill and looking eastwards towards the Mali Hka caught sight of the high range which divides the eastern and western branches of the Irrawaddy. It was but a glimpse; then the clouds blotted out the whole landscape once more.

In the cold weather this hill commands a magnificent view northwards to the Irrawaddy-Brahmaputra (Lohit) divide ninety miles distant, beyond the saucer-like depression of Hkamti Long.

The barometer on July 10th was 26.50 in. corresponding with an altitude of about 3700 ft.

CHAPTER THREE

ON July 14th, with twenty-one Kachin coolies to carry my kit, I set out for Fort Hertz. Machega the first stage was only seven miles, and down hill all the way, so we did not bother to make an early start. It rained in the morning but cleared up as we got down into the valley, and the evening was fine. Never again did we ascend so high as 4000 ft. till we were beyond Fort Hertz and east of the Mali Hka.

Many plants of the ginger family, conspicuous for their gaily coloured flowers, grow in the hill jungle. They are all perennial herbs, often attaining a height of 8 or 10 ft. on the plains, growing in colonies where the ground is swampy. In the hill jungle, however, they are less tall and usually more scattered, but often have larger flowers in closer contact. Especially notable are the *Hedychiums* which have a bottle-brush type of inflorescence, white, cinnabar, or flame yellow, occasionally both red *and* yellow. Each individual flower looks not unlike a gorgeous stick insect with long questing antennae thrust forward — actually the combined stamen and style. Below Sumpra Bum grew the scarlet-flowered *H. coccineum*, a white-flowered species, and *Costus speciosus* also with snow-white flowers. I have already mentioned the supposed red-flowered *Costus*; I never saw it again.

Of the many fine trees noticed in such variety above 2000 ft. I need mention here only *Acer niveum*, with entire leaves pure white beneath, *Gmelina arborea*, *Magnolia pterocarpa*, *Quercus Thomsonii* and *Q. semiserrata*, *Sterculia* species, several figs, and chestnuts (*Castanopsis*). The ironwood (*Mesua ferrea*), which was over when we left Myitkyina, was in full bloom here, covered with its great camellia-like flowers as big as saucers, of a lovely old ivory tint, contrasting with the shock of golden stamens in the centre. From a little distance this Kate Greenaway tree looks as though it were covered

with yellow dog roses. Everywhere the green mantle of the jungle lay warm and moist over the hills, softening their harsh outlines.

Beyond Machega we passed close by magnificent specimens of *Ficus* and of *Dipterocarpus*, the latter in full bloom. It had shed all last year's leaves which lay in wet heaps in the mud together with an occasional pink-and-white flower. The heavy top-shaped fruits as big as walnuts also lay on the ground. Provided with two long diverging strap-shaped wings, they spin rapidly as they hurtle down.

Trees which shed their leaves in the rainy season — and perhaps at any season — are never quite bare; and young *Dipterocarp* leaves were already fledging the branches, a lovely fresh green amongst the lily-like blooms. The leaves of sapling *Dipterocarps* grow to a great size, the parallel secondary veins being then peculiarly prominent.

We were now on a good bridle path almost as broad as the cart road. In tropical jungle a broad road is very necessary to the naturalist; otherwise he is in blinkers all the time. If the track is narrow, like the ordinary native path, he must watch his step and guard his face; he has little energy left for observation, and everything is seen too close up, though only what is seen close up is seen at all. On a cart road one can walk all day like Little-Johnnie-Head-in-Air, and suffer nothing worse than a fright when one just avoids stepping on a snake. In the hills such a road gives one incomparable views of the jungle, never obtained on the plains. Here one can look down the slant of a hillside, over the heads of the trees into a valley where a river meanders through swamps covered with high grass and clumps of bananas; there one gets a close-up view of the crown of some forest giant over which great creepers sprawl in the sunshine, resting themselves after their long climb to the top storey — only their thick stems are visible from inside the forest, and it is impossible to say what they are; and of ranks of epiphytic ferns, orchids and other plants perched on the stout limbs or clinging to the topmost branches. This world of the tree-tops is indeed

a new world; from the plains it is never seen, hardly even suspected. In the hills one is indeed always getting fresh glimpses of the jungle in all its phases, of rare trees, and of many different plant communities.

There is another advantage of the road through the hill country not shared by the plains road. It is often necessary to make deep cuttings, leaving a high bank on one side, with a ditch or perhaps a gentle slope or a precipice on the other, as the road winds round a spur or traverses a cliff face. Elsewhere the path follows the undulating crest of a ridge, which falls steeply on either side to the tree-tops below, one side in shadow the other exposed to full sunlight. And the road must be kept cleared of vegetation otherwise in the hot damp summers of north Burma it would quickly become impassable. It is not enough to clear the actual pathway; the verge on either side for some way back must be kept clean. Trees which overhang and drip on to the road must be felled to let in light, the rank vegetation slashed and burnt periodically, and even the high sandy banks scraped.

In this way fresh soil is being constantly exposed, vacant spaces opened in an otherwise closed community. The banks furnish ideal ground and endless opportunity for the germination of seeds, not only those of neighbouring trees, but also for those of plants which one would discover only by chance in the dim recesses of the jungle. Not that they do not grow there; but suitable conditions are rarely found in nature, hence the plants themselves are comparatively rare. On landslips, many of them do doubtless find temporary refuge, but their tenancy is short lived because the jungle quickly springs up and smothers them. But along the road, the jungle once it has been destroyed is not given a chance to come back, and there is always fresh ground to colonize, though one cannot but wonder whence some of these strangers are derived. I have already referred to *Didymocarpus*. A species not rare here but one which I had not previously seen bore loose clusters of purple-and-cream *Calceolaria*-like flowers on their wiry pedicels, trembling in the

breeze. Other plants found in cuttings were a magenta glossy flowered *Lysionotus*, blood-red *Aeschynanthus*, large colonies of lurid purple *Impatiens*, a *Begonia* with big elephant-ear leaves, moulded to the shape of the rock on which it grows, and *Acrotrema* (most of the species of this purely East Indian genus come from Ceylon).

Careful search amongst ferns, club mosses and a wealth of herbaceous plants reveals many tree seedlings coming up, notably those of birch. In fact examination of the roadside banks will reward the botanist with a very fair cross section of the hill jungle. I have also found a number of peculiar and seemingly rare plants along these bridle paths. It may be objected that the chief result of opening up a road through the hills is to let in already established weeds which greedily seize the opportunity to enlarge their domain; for such invasive foreign weeds from the plains will travel by road exactly as plants do along a railway embankment in England. It is true that the ubiquitous *Eupatorium* has already pushed its way into north Burma, and the same is true of several other Composites. But the number of alien weeds which can compete successfully with the native flora will always be small. Strong fast-growing bushes like *Eupatorium* and *Lantana* certainly do establish themselves in the foothills, and would do so road or no road, by colonizing the fallow hill clearings. But they are ill adapted to penetrate deeply into north Burma, where cold winters will presently check them, even should they be able to resist indefinitely the pressure of the Indo-Malaysian jungle. Beyond Nsop Zup, one does not see many alien weeds occupying cultivated slopes for example. Though a few aliens may seize upon fresh ground as soon as it becomes available and thereby march irresistibly onward, the banks and ditches, the clearings and roadside verges seem for the most part to be occupied by often widely scattered plants of the local jungle, here fortuitously brought together. The alternative to a deliberate offensive against the alien weed — often well-nigh hopeless — is to find a use for it; and no pains should be spared to find a

profitable use for some of the invaders, which can the more easily be destroyed as allies later than as enemies now.

It is worth remarking that the type of *sere* or temporary plant association short of the climax which occupies a clearing after the climax itself (here evergreen rain forest) has been destroyed, varies not only with the situation, but also with the type and continuity of the destruction. In other words, there is more than one possible recession of the vegetation to be reckoned with. The only factors which can be changed by repeated destructions, once the climax has gone, would seem to be soil and, depending partly on soil, water content; and it is noticeable how along the verge of the Fort Hertz road, one slope will be covered with clumps of banana, a second and apparently similar slope, with mixed shrubs and saplings, a third almost completely with bamboo, a fourth with rank grass; and these differences may, I think, be attributed in part at least to differences of soil and water content, brought on by more or less regular destruction of the vegetation.

There is yet another way in which a wide path through the jungle helps the botanist. Here he can pick up fallen flowers, fruits, leaves, sometimes even whole branches of trees, and thereby obtain specimens which otherwise he could only obtain with difficulty, if at all. The road is in fact at all seasons littered with such clues, telling him what trees compose the jungle, and often what species a particular tree is. Nor is this advantage confined to the botanist; the zoologist and especially the entomologist and the ornithologist also score. Birds will be seen some little way ahead in the trees on either side of the road, or crossing it, or feeding on it; while as for animals, bear, tiger, deer, wild dog and other creatures use the road for the same reason that man uses it, namely to get quickly from one place to another with the least trouble. Sometimes one can follow the tracks of bear or tiger along the road for a mile or more; nor is it unusual to meet such animals face to face. Monkeys, of course, and the several kinds of squirrel which inhabit the hill jungle, from the giant black *Ratufa*, as big as a cat, to the little striped

Tamiops, which is smaller than our red squirrel, one sees often. It is only necessary to choose a spot anywhere in the jungle and sit quietly for half an hour to be pretty sure of seeing one or the other, so common are they.

The rest houses in which we stayed at night were comfortably furnished and dry. But their roofs were thatched with fan palm leaf (*Borassus*) and harboured much assorted live-stock, from solitary wasps and other insects, to snakes, lizards and several kinds of birds; probably also bats. Insects still made life a burden, both by day and by night. Mosquitoes were perhaps the least venomous, but as the malaria-carrying *Anopheles* were common, they had the worst long-term effect. My Indian cook and several of the Kachin coolies went down with bouts of malaria. I doctored them with quinine but the supply was limited, and it proved perhaps more of a palliative than a cure.

On July 18th there was such a tearing wind blowing that we were little troubled by insects, most of them seemed to be blown away. But this respite, was exceptional. Yet one could not reasonably complain of the weather. Often it rained, nor was rain unwelcome — a cloud cover in the middle of the day was always welcome. But we enjoyed bright sunny hours, even whole days, when to have sat still would have been a joy, but to march was purgatory. Thus July 20th was as hot and sticky as a poultice, nevertheless the distant glimpses of indigo-blue mountains with puffs of silver-white cloud nestling against them, like fledglings against their mother bird, seen across miles of dark green jungle to the north, put new life and hope into me. Most delightful of all were fine evenings when the stars shone clearly and the air was filled with the urgent croaking of frogs and the strident chirrup of countless crickets, friendly though unmusical sounds which made one feel less lonely.

If I left the path to collect a specimen in the jungle even for five minutes I would pick up half a dozen leeches, small enough to get inside one's boots even through a lace hole, and so through a woollen sock to the thin skin over the instep, their bite was incredibly irritating; at night especially the many bites



on my legs itched terribly, as did the blood blisters raised on my wrists by the little yellow-banded blister flies. Some places are infested with these tiny creatures, others are comparatively free; but only when a strong wind is blowing are they completely lacking for a time.

The path itself was comparatively free from leeches, which live mainly in the long grass and on bushes, quickly transferring themselves to your clothes, and so to your person. Several times when I came to take off my sodden boots, I found my socks soaked with blood. Even ants, which usually attend to their own business unless disturbed, became troublesome here, and once without any provocation I found myself covered with them, seeking salt from the sweat which poured from me.

On the bridle path we met even fewer travellers than we had done on the cart road, though we passed through, or close to, several rather wretched villages. The only type of cultivation was *taungya* (to use the Burmese word) — that is hill clearings; the crops looked thin and poor. Yet there seems no reason why contour terracing should not be successful here; only lack of population forbids it. Everywhere the southern slopes of the hills are chequered with second growth, early stages on the long journey back to climax forest, which goal they will probably never reach. One does sometimes see old cultivation which has been abandoned for ever, either because the population has died out, or moved on — though in that case it is probably because the soil has become so impoverished that it is no longer capable of yielding crops; and under these conditions it must be equally incapable of returning to forest within any foreseeable time. But most *taungya* are cleared and planted again after the lapse of a few years — giving a sort of crude rotation.

South of Sumpra Bum, between the villages of Tingpai and Maihtawng Ga, about a hundred miles north of Myitkyina, I had noticed an attempt at wet rice cultivation. It was amateurish, but undeniably a start had been made, and I have no doubt that within a few years, from sheer necessity, terracing will be introduced into these hills on a fairly big scale. Other-

wise there will be starvation and emigration, and perhaps warfare. Such an agricultural revolution, which implies also a revolution in the diet of the people, will necessarily bring with it many other changes, some foreseeable, others not.

The Kachin coolies travelled faster than the carts had done, and we kept up an average of two miles an hour. True, their loads were not heavy, about fifty pounds; nevertheless these Kachins were good fellows, willing and cheerful, which was more than I could say for my two servants. The path was bad, and got worse as we approached the northern plain. Several men had heavy falls on the slippery clay surface. Bottles were broken; one man injured his leg and decided to return to Sumpra Bum, his place being taken by a man from another village. However, despite fever and accidents, all but two of the original twenty-one completed the nine stages to Fort Hertz.

The country between Sumpra Bum and the rim of the Hkamti plain is, like all of north Burma, much dissected, and the path crosses a number of rivers which, rising in the western range, flow tortuously eastwards to the Mali Hka. Two of these, the Hpungin Hka and the Hpungan Hka we crossed on consecutive days (July 15th and 16th). They flow in deep rocky gorges heavily lined with jungle. But the softer folds which further south roll down into the Myitkyina plain, have by now crystallized out, their hard high outlines showing up sharply against the sky; one would expect no less so close to the sources of the Irrawaddy. To the north, buried in cloud, is the great Lohit-Irrawaddy divide, to the west its offspring, the Chindwin-Irrawaddy divide, between the Mali Hka and the Hukawng valley where the Chindwin rises; to the east is the rugged watershed between the eastern and western branches of the Irrawaddy. And over all, covering hundreds of square miles of empty land, surges the invincible jungle.

The path runs for some distance beside the Hpungin Hka. Here some of the trees seem to reach an exceptional size. *Ficus glomerata* is a strapping giant with a smooth ash-white

trunk like a Corinthian pillar. An appreciable fraction of the lower hill jungle consists of fig trees, especially of umbrella-shaped strangling figs, those thugs of the plant world which demand hospitality, then throttle their hosts, growing up on their limbs, and gradually embracing them to death in an ever-tightening network of roots from which there is no escape.

In some places the road passed through the most luxuriant jungle, where grew many small erect palms such as *Livistona Jenkinsiana*, and the fearfully armed but stemless *Zalacca*; tree-ferns, thorny climbing palms and noble trees, including many beautiful laurels, the handsome *Chisocheton* and others with large compound leaves like great fern fronds — *Disoxylum*, *Cedrela*, *Ailanthus*, *Engelhardtia*; *Kydia calycina*, *Pterospermum* and many others. Then it would emerge on to a ridge, climbing from shadow to sunshine, and slant steeply up the hot face of a sandstone cliff to the rest house at the top, perched three thousand feet above sea level.

On July 19th we reached Masum Zup — (literally 'three confluence', that is where three streams meet, or as we might say, watersmeet). This place has an unsavoury reputation for blister flies, and lived up to it. There is a salt lick not far from the bungalow, but it is probably the shallow streams heavily shadowed by trees, and not the salt lick, or the animals attracted to it, which the flies find so irresistible. Beyond Masum Zup the path winds gradually down to the valley of the Nam Yak and the plain of Hkamti Long, the marches lengthening out to twelve or fourteen miles. In the moist heat and deep mud the stages were long enough. There is no appreciable change in the evergreen forest, except that there seemed to be a few more leafless trees here. In a cool temperate climate like that of Britain we see our native trees in flower, or in full leaf, or bare, at roughly the same time each year, because there are four contrasted seasons of equal length in a year, passing gradually from one to another; and this imposes a well-marked rhythm on the vegetation. But in a monsoon climate such as that of north

Burma there are only *three* seasons, and those of *unequal* length, namely a hot rainy season of about five months, a hot fine weather season of two or three months, and a cold fine weather season of four or five months. Thus a different rhythm is imposed, and whereas the majority of any given species will flower say in the rainy season, or in the hot weather, this allows of considerable latitude in the actual month; so much so that individual trees of many species have, it would seem, as regards flowering, or leaf-fall, or leaf-break, not a twelve-month rhythm but a nine- or ten-month rhythm, or even perhaps no rhythm. The result is they may flower, or shed their leaves, or flush with new leaves in a different month each year, and so in course of time in any month. Only thus can one account for the observed leaf-fall and flowering of trees out of season, though we must not overlook the fact that the climate of Fort Hertz is rather different from that of Myitkyina, and very different for half the year from that of Malaya, where nevertheless grow many species of trees found in north Burma. But until we have careful observations of particular trees extending over several years it is not possible to state general principles. A corollary to the above is that one may come across trees of a single species, in flower, in fruit, leafless, or in full foliage, all at the same time. This was true of *Stereospermum chelonoides*, for example, between Suphka Ga (July 3rd) and Masum Zup (July 19th). Other trees in young foliage now were *Cinnamomum*, *Manglietia* and *Goniothalamus*, each a different shade of green. Trees bare of leaves, though probably not for long, included *Ficus nervosa*, *Sterculia colorata* whose twigs glowed with its cinnabar-red flowers, and *S. villosa* which was in fruit, the follicles gaping widely to display their scarlet insides.

On July 21st the sun was mercifully hidden again behind greasy grey clouds, and the heat was less scathing than it had been the previous day, though the air was still and heavy. In the steamy atmosphere my skin had grown squidgy as a toad's and was all too easily punctured by insects. It was rather horrible to see the hordes of famished leeches advancing

immediately one entered the jungle. It is almost indecent how they smell their victim and sway their way towards him, the foliage shivering to their regular movements.

All along the road beyond Masum Zup a great many dead insects and other creatures lay in the mud: millipedes, centipedes, scorpions, worms, beetles, even crabs. What fate had overtaken them it was impossible to guess. Ants were busy removing the corpses, but these scavengers could hardly have been responsible for the mass murders. More likely it was the result of an epidemic disease.

There had been so little rain during the past fortnight that the Nam Yak, usually uncrossable at this season by reason of its size, and the whirlpools caused by sunken rocks, might have been safely crossed by dugout. This is the cold weather route. In the rains, one follows a path to the Mali Hka which is spanned by a suspension bridge half a mile below the turbulent Nam Yak confluence, and recrosses by boat well above the rapids, a safe diversion at any height of the two rivers.

We had now come down in the world again, and at Nongkai, on the Mali Hka, were no more than 1200 feet above sea level, perhaps 600 feet above the Myitkyina plain. The river bank was clothed as usual with luxuriant rain forest. Amongst a great variety of fine trees were fine specimens of the umbrageous *Echinocarpus assamicus*, with dark green glossy leaves and bunches of spherical fruits like long-spined crimson sea-urchins, hornbeam (*Carpinus viminea*), horse-chestnut (*Aesculus punduana*), indiarubber tree (*Ficus elastica*) and *Garcinia*, one of the mango-steen family some of which yield gamboge.

After another early morning mist, reminiscent of the cold weather except that dew was not dripping from the trees, on July 22nd we walked the remaining fourteen miles to Fort Hertz across the level plain in six hours, once more diverging from the Mali Hka. The greater part of the plain south of Fort Hertz is swamp covered with high grass. In the ditches grow clusters of a saprophytic *Burmanna* with stiff divergent arms, along which are borne the rows of papery lavender-violet

flowers with orange tips; they looked like sign posts illuminated with tiny glow lamps and were most attractive.

Not far from Fort Hertz several superimposed terraces with short steep escarpments wind across the plain. They mark former courses of the Mali Hka when that river flowed at successively higher levels. For the most part these old river terraces are sufficiently high above the swamp to support climax forest, and are covered with jungle, or with impenetrable scrub. Fort Hertz itself stands on the highest river terrace.

In Fort Hertz I found Major Hervey Stubbs, commanding the post and acting as sub-divisional magistrate as well. During the few days I spent here I lived in the Travellers' Bungalow, and had my meals with Stubbs.

CHAPTER FOUR

THE plain of Hkamti Long, or Putao, closely surrounded on three sides by high mountains which pour their innumerable streams into this central sump, is not a pleasant place in summer. The rainfall for six months averages 150 in., the humidity rarely falls below 75 per cent saturation, rising to over 90 per cent, and the average maximum temperature for the same period is about 90°F. Briefly the plain is a hot and sticky marsh; and the narrow peninsula on which Fort Hertz is dispersedly built, juts out like a break-water into the marsh. But the fine winters and superb views of the mountains, glazed with snow, are some compensation for the many discomforts of the rainy season.

The government buildings consisted of the barracks at the northern apex of the terrace, three or four foreign-style bungalows, with smaller bungalows for subordinates and clerks, and the usual offices. At one period a whole battalion of the frontier force, with two British officers, was stationed here. That was in the hey-day of Putao's political importance, as headquarters of a Division, with its own Deputy Commissioner. In those days there were five or six Europeans in the station. Now that Putao had been relegated to a Sub-Division, and the military establishment reduced to conform with this humbler status, half the buildings stood empty, and Major Hervey Stubbs, monarch of all he surveyed, was Lord High Everything.

The first and most difficult part of my journey to the headwaters of the Irrawaddy was now over; at this time I had no thought of going further from Fort Hertz than was necessary for my purpose. I was impatient to start serious work and reckoned that I could reach the nearest alps, above the Tamai river, in about a fortnight's time.

My cook was again down with fever and announced that he would not be able to go on. Nor did I discourage this laudable

decision. The Shan youth also disclaimed any intention of going further into the wilds, so I parted from them both without sorrow and packed them off to Myitkyina. Of the Kachins who had come with me from Sumpra Bum, five volunteered to go on to the Nam Tamai, and nothing loath, I took them. One, named Marang, a pleasant-looking fellow who spoke a little Hindustani, I took on as my personal servant and cook. This meant living still more simply, with boiled rice, chuppatties and fried eggs as the staple meals, together with carefully rationed jam, tea, biscuits and a few other tinned foods, which I had brought with me. But that worried me not at all. I was much better off with one willing man than with two unwilling ones. Moreover Marang was of the country, an important consideration. The weather continued fine on the whole, though there were thunderstorms in the hills, and we had rain at night and occasional showers by day. On July 23rd there was a full moon, and at sunset, when it rose over the purple hills, a cool breeze was blowing. The rain-washed air was clear as crystal and the mountains looked very close. Away to the west, the ranges which separate the Mali Hka from the Dihang, a tributary of the Brahmaputra, rise abruptly from the edge of the plain, so near that they mask the 12,000-foot peaks just behind them. Further north, the Irrawaddy-Brahmaputra divide grows higher, Noi Madive, a peak almost due north of Fort Hertz, and 30 miles distant, rising to over 15,000 feet; and another 30 miles north of Noi Madive is the Diphuk La, one of three or four passes over the Irrawaddy-Lohit divide in 120 miles. Ten miles north-east of the Diphuk La is the snow peak Ka Karmo Razi, 19,269 feet, the highest mountain in Burma.

Then working round the apex of north Burma, where it thrusts upwards into the Tibetan plateau, and coming south again, across the Mali Hka to the east of Fort Hertz, we see the lower ranges of the Mali Hka — Nmai Hka divide, the backbone of the 'triangle'. There is a wide gap hereabouts, the main range not rising much above 8000 feet though both to north and south are peaks of over 10,000 feet. A little south of

east the Shingrup Hkyet (pass) over the main range can be seen. In winter these mountains appear as a wide arc of snow.

Meanwhile I was busy sorting and repacking loads, pitching my two tents, and generally making everything shipshape. I wrote a last batch of letters, and purchased supplies of flour, rice, dhal, sugar, potatoes, sweet oil, kerosene and a little rum, and was ready to start. Stubbs had promised to get me transport as soon as possible, but I did not expect to get away for several days.

July 26th was very hot. In the middle of the night there was a terrific thunderstorm over the hills. We awoke next morning to see the small Putao river in spate, and watched it carry away the foot-bridge. Much burnt timber was being carried along — it was this which being flung against the piles, had caused the bridge to collapse — so perhaps there had been a cloud burst on a newly cleared *taungya*. In a few hours the flood subsided.

And here I might say something about the extraordinary summer rise of the Irrawaddy, a subject on which there has been some misconception.

As rivers go in south-east Asia, and particularly as compared with the rivers on either side of it, namely the Brahmaputra to the west, the Salween and Mekong to the east, the Irrawaddy is a rather small, or at least a short river. It is barely 1500 miles in length, whereas the Brahmaputra is over 2500 miles, the Mekong about the same and the Salween not less than 2000 miles. At Myitkyina the Irrawaddy, at 1000 miles from the sea, is an imposing stream 600 yards wide even at low water, with a gentle current. In the flood season the breadth at peak load, increases to 800 or even a 1000 yards and the current flows at 4 or 5 miles an hour, probably faster in the centre. Meanwhile it has risen some 30 feet. If we take the average increase of depth to be 20 feet, the average speed of the current at 4 m.p.h. and the breadth of the river at 800 yards, it is easy to calculate the extra flood discharge here. In round numbers it works out at about 290,000 cubic feet per second. These are rough figures, if anything conservative, but they do give some

approximation to the truth. This represents a huge volume of water; and yet, within 25 miles of Myitkyina, this enormous river suddenly divides into two comparatively small streams, unnavigable even for country boats, which in the cold weather appear almost insignificant, hardly more than big mountain torrents, and obviously of no great length. The longer of the two rises on the edge of Tibet rather more than 200 miles to the north as the crow flies. Moreover if we look at the whole catchment area north of Myitkyina, between the Kumon range in the west and the Salween-Irrawaddy divide in the east, it appears at first sight incapable of giving rise to a river as large as the Irrawaddy. Whence then does it obtain so vast a volume of water? The fact is, the way it suddenly appears, a full-size river, out of the hills above Weihsi is deceptive. One can imagine how Herodotus, had he known of the existence of the Irrawaddy, would have loved to ponder over this problem.

It may be said at once that the phenomenal rise is not due entirely, or even mainly, to the heavy rainfall; and this though the annual rainfall averages more than 100 inches over the whole area, almost all of which falls in six months. North of Myitkyina the mountains at once begin to rise steeply to commanding heights. Within 25 miles, the southern end of the Kumon range ends in a peak almost 8000 feet high. Kambaiti, on the China frontier, within 45 miles, is over 10,000 feet; Imaw Bum 80 miles distant is over 13,000 feet and Ka Karpo Razi, which gives birth to one of the 5 main sources of the river, 200 miles to the north is over 19,000 feet. Yet the Irrawaddy by no means depends on a few outstanding peaks for its summer rise, but rather on the generally high-level, dissected nature of the country, and a winter snowfall comparable with the summer rainfall. North Burma is actually a much dissected plateau with a general slope to the south and south-west; the extreme north stands at an average elevation of about 15,000 feet, and a great proportion of the whole at 10,000 feet. For some reason which is not very clear, almost as much snow falls in winter as rain in summer — though I by no means intend to imply that

if the snow were all melted it would be equivalent to a 100 inches of rain. The first snow falls in October — earlier at high altitudes, later in the valleys. But the really heavy snowstorms begin about Christmas and continue till March, April or even May. Usually there is no possibility of crossing any of the passes into China or Tibet, or even the internal passes beyond Fort Hertz, between January and June. Throughout the early months of the year fierce snow storms sweep over the plateau, coming mostly from the north, till snow lies deep as far down as the 9000 foot contour; and actually falls, though it does not lie long, so low as 6000 feet.

Let us now return to Myitkyina, where about the middle of March the weather begins to get hot. In Mandalay, temperatures of 90° in the shade are already being recorded, and Myitkyina is not much cooler. However, at this season the greater part of Burma is still rainless, though in April there are likely to be 'mango showers' when a few inches of rain fall. In April the Irrawaddy shows a rise at Myitkyina. Spring has come in the northern valleys, a richer, swifter spring than in England, almost explosive in its violence. Trees are bursting into leaf, violets, anemones, meadow rue rippling into flower in wide drifts; thousands of birds are arriving; they linger amongst the fragrance and colour of the waking world, before passing on to their breeding grounds in the far north, or they remain to nest in the green forest. So it is at 6000 feet in the Seinghku, Adung and other valleys; while a few thousand feet higher up the snow is melting fast and every day the river is rising, covering more of its stony bed. Rain falls from time to time, never a week passes without some rain; and rain at 6000 feet means snow at 10,000 feet. As April passes into May, warm air from the deep narrow valleys pushes its way north, melting the snow faster than it falls.

The first rise of the Irrawaddy at Myitkyina then is due to melting snow alone. Rainfall at this season is negligible and what rain does fall is probably all taken up by the thirsty soil and the growing plant life. Moreover the great accumulation

of snow in north Burma chills the air flowing in from the plains and from the sea and adds still more rain — and snow. In the mountains heavy precipitation is frequent, long before the monsoon breaks in central Burma.

In June, by which time the heat in Myitkyina has become almost unbearable, the monsoon breaks with a clatter, ushered in by terrific thunderstorms. Thenceforward, throughout Burma, an almost continuous deluge of rain descends, and this quickly begins to make its effect felt — especially in the mountainous north. The Irrawaddy rises fast. Meanwhile all along the 400 miles of the China frontier more snow water is pouring into the mountain scuppers.

It is commonly believed that all the snow in the Burmese alps has disappeared before June. This is far from being so. In the Seinghku, Adung, Gamlang and other alpine valleys I have seen large snow beds lying unmelted throughout the summer, while above 15,000 feet there are many permanent snow beds, the last remnants of glaciers which once covered almost the whole of the country north of latitude 26°. These snow beds are no longer glaciers only because they have so far shrunk that the weight of snow is not sufficient to form ice. But though motionless, they are relatively as permanent as glaciers. There is a more curious reason for the persistence of snow beds at low altitudes, sometimes so low as 10,000 feet, throughout the summer, in north Burma. The mountains at the headwaters of the Irrawaddy are exceedingly steep, alpine valleys like the Seinghku and its tributaries exceedingly narrow and deep. As a result, quite early in the year, the snow begins to avalanche down their sides and pile up in immense mounds, blocking the streams, which presently tunnel beneath the beds. Some of these avalanche beds cover several acres, and sunk deep in the ravines never get an hour's sunshine. Further protection is afforded by a layer of earth and stones, dust and vegetable debris which rapidly accumulates over the surface, some of it washed down the alluvial fans, but much of it blown by the wind; eventually it may reach a thickness of several inches.

Melting, however, goes on continuously month by month, thanks to the conservation of snow in the high valleys; though naturally the May-June rise with mounting temperature when the large area of loosely compacted snow at moderate elevations is melting, is greater than the summer rise, when the snow melt supply has steadied down.

One final point. The Ka Karpo peaks are not the only snow peaks in north Burma. The whole length of the Salween-Irrawaddy divide for some 200 miles north of latitude 26° is sprinkled with snow peaks. In 1922 I crossed the Gompa La between the Salween and the Taron, or eastern Irrawaddy, and was greatly impressed by the amount of snow lying on this range; and in 1931, from near the source of the Taron, I had an even better opportunity of seeing the many small glaciers amongst which its four major streams rise.

This then seems to be the true explanation of the great summer rise of the Irrawaddy: heavy precipitation in the mountains throughout the year, together with a locking up of a vast quantity of water during half the year, followed by its release to swell the heavy flood caused by continuous rain during the other half. It is easy to show the summer rise of the river at Myitkyina in graphic form. If we plot the height of the river in feet on a vertical, and the months along a horizontal, we shall find the rise and fall of the water level in the course of a year makes a simple humped curve, its apex reached in July or August after which it falls steeply. As both rise due to snow melt and rise due to rainfall more or less coincide we cannot say what proportion is due to each. If graphs were carefully constructed showing the rise and fall over a series of years, it might be possible to disentangle them to some extent, but not otherwise. In normal years rise due to snow melt and rise due to rainfall are supplementary, and the one masks the other. But up to a point they are in inverse ratio; the finer the weather, the more snow melts, and vice versa. It seems likely, therefore, that in some years our simple curve would be a double-humped curve, showing two maxima, one due mainly to snow water,

the other mainly to rain. On the other hand, it may be that a curve due to rain only would always show a double hump, since there is almost invariably a longish break about the middle of the monsoon; and that this does not reveal itself on the graph only because the deficiency is made good by more snow melting while the fine weather lasts. Exactly why north Burma gets so much rain and snow, especially during the winter monsoon, is, as already remarked, not very clear; but we must remember that this region is not very remote from the sea. Fort Hertz is within 600 miles of the Bay of Bengal, within 1000 miles of the Gulf of Siam, within 700 miles of the Gulf of Tongking. If we take Fort Hertz as centre, and with a thousand-mile radius describe an arc from the east coast of India to the south coast of China, it will include nearly half the Bay of Bengal and the entire Gulf of Tongking, just touching the Gulf of Siam — a sea area larger than the whole of Burma. There will be water to the south-west, south and south-east.

But proximity to the sea alone does not ensure a heavy rainfall even in a mountainous country. It is rather the position of the sea in relation to the desert region that is effective in setting up atmospheric currents, and it will probably be found that north Burma, besides being an elevated region, is peculiarly well placed with regard to all the year round currents between the sea and the desert. For just as there is a large area of sea within a thousand miles southwards and south-eastwards, so there is a wide area of desert within 500 miles northwards and north-westwards. In no other region in the world is perpetual turbulence and a continuous passing of great air currents more likely than over the network of deep sub-tropical valleys and snow-covered peaks of north Burma; and the peculiar formation of the country itself contributes to their birth, maintenance and evolution. It is possible that owing to the continuous destruction of forest by the agriculturally nomadic hill tribes, with consequent loss of soil, quicker run off, and lack of roots to take up water, the Irrawaddy is gradually rising to greater flood heights in less time than formerly. But against these factors

must be set the possibility of a diminishing rainfall due to the same cause, and a dwindling snow melt, due to a general warming-up of the climate and consequent raising of the snow line. Air currents are apt to rise higher when they strike against mountains denuded of their original forest cover, and perhaps pass right over them, to precipitate their water content elsewhere. As for the snow line in north Burma, the glaciers have long been in retreat, and would appear to be still retreating, while the 'permanent' snow beds may be decreasing in size. If there is a general amelioration of climate, whether due to warming up or to a smaller precipitation, the snow line will rise and snow melt be reduced.

One thing is certain. If the momentum of the Irrawaddy rise is on the increase, the fate of Myitkyina is sealed. It will ultimately be washed clean off the map, quite possibly at a stroke.

The Hkamti plain is dotted with a number of small Shan villages each with its rice fields. The largest is Putao itself, immediately below the terrace on which Fort Hertz is built. Here and there, sometimes from the midst of the paddy fields, clusters of crumbling pagodas rise, and there are unpretentious monasteries in the villages where a few yellow-robed monks with shorn pates perform the rites of the Buddhist religion. The sweet tones of the gongs ring out across the plain at all hours.

Three distinct types of vegetation are met with, namely, forest, occupying the terraces and drier ground; swamp, as noted already south of Fort Hertz, covering much of the plain to the north too; and pasture in the neighbourhood of villages. Besides tall reeds, shrubby *Compositae* and *Labiatae* grow confusedly in the swamp land. The forest is composed of the same trees met with at similar altitudes — up to 3000 feet, more or less — on the road. There are stretches of magnificent forest to the east, between Fort Hertz and the Mali Hka, which bounds the plain on that side. Near villages, much of it has been reduced to a dense growth of scrub and fern by cutting for firewood. Amongst a great variety of trees I noticed *Quercus*

semiserrata, *Altingia excelsa*, *Pterospermum* (*P. semisaggitatum?*), *Garcinia*, *Magnolia*, various Laurels, figs, *Elaeocarpus*, *Sterculia* and a tree with narrow oblong leaves over a foot in length, probably a species of *Goniothalamus*.

Wide stretches of artificial sward occur near Putao and elsewhere on the banks of the many small streams which wriggle across the plain. A small crimson flowered orchid (*Spiranthes*) and a creeping *Lysimachia* with golden-yellow flowers, very like the British *L. Nummularia* or money-wort, grow in the turf, but the ground was now sodden and the flowers over. A variety of plants grow in the villages and in Shan gardens, many of them flowering gaily in the cold weather. Very striking then are the hedges of sunflower. By July 27th everything was ready. Stubbs had promised me transport for the morrow; and on the 28th I left Fort Hertz on what I believed to be the final lap of this long drawn out journey.



CHAPTER FIVE

FROM Fort Hertz to Pangnamdim on the Nam Tamai is eight stages, or about 90 miles. The *direct* distance is 39 miles! The bridle path is fair, and in the cold weather mules or ponies can go the whole way. They might have gone as far as the Nam Tisang, about half way, now, had we been able to get any.

Time means nothing when everybody conspires to ignore it. If the 07.45 to town in an industrially organized society is half an hour late, civilization totters; the lost half-hour is never found — it has seeped through a dozen strata and escaped. Clerks are late at the office, urgent letters involving orders worth thousands are held up, executives fume and fret, typists blanch. In north Burma, where a primitive agriculture is the chief preoccupation of the people, the conception of time is less rigid. On July 28th I was up at 5.15 as usual, and packed. The coolies — some coolies — arrived at 8 o'clock, and actually started at 8.30. However, a considerable pile of kit was still lying when I had breakfast with Stubbs at 9. Eventually a rather undersized elephant arrived and removed it. At 10.30 Marang and I started, and were ferried across the bridgeless stream. Presently catching up the coolies, who had not got far, we took the path which leads straight across the plain to the river bank, through ten miles of grand jungle. Between the big trees grew clumps of a short slender palm with a stem like a bamboo (*Pinanga*), snake-like prickly climbing palms (*Calamus*), screw-pines with saw-edged leaves, and many shrubs and large herbaceous plants. From the branches of the trees hung streamers of moss and the long furry stems of *Lycopodium*; many of them were covered with epiphytic ferns, orchids, aroids and lanky shrubs such as *Aeschynanthus*, bearing narrow tubular flowers of deep blood-red colour. Creepers twined sinuously up the trunks or scrambled up anyhow clutching at the nearest

support; some grew in orderly fashion, holding close to the trunk by means of roots, and hiding the bark behind a mosaic of leaves. Though we had passed the 27th parallel of latitude, the rain forest here is not so very different from the equatorial forest nearly 2000 miles distant. The early morning rain had ceased, and though we were wet through it was an enjoyable walk.

After ferrying across the broad but smooth Mali Hka we halted for the night at Kankiu, the last Shan village, on the left bank. The elephant, unfortunately carrying most of our comforts — food, cooking pots, tea, my bedding and a change of clothes — did not arrive till dusk, having followed a different path to the ford higher up stream. Here it tactlessly staged a sit-down strike. My bedding suffered accordingly.

Our Fort Hertz coolies, having brought us to the edge of the plain, had done their bit; even the elephant had fulfilled its contract and more. It was now up to the peasants of Kankiu to carry on, and the Hkamti Shans are usually difficult. Consequently the previous morning's delays were repeated on the 29th; but I was surprised that there were any coolies at all. It is only when the transport is in camp with you that you can expect to catch the 07.45 so to speak; and not always then. Nevertheless we got away from Kankiu shortly after 8, having been up since 5.30. It was a very wet day, the rain driving down from the hills, now so close, but invisible through the clouds. General direction for the next three marches east-north-east.

The strip of plain between river and foothills was a swamp through which we floundered and squelched, while leeches clutched at us as though they were drowning, and then clung to us like — leeches. We streamed with blood. Several rather striking species of *Strobilanthes* — one with straw-yellow tubular flowers — grow here. Soon we left the marshy plain for good, and, entering the forest, began to climb the first range. About 1500 feet above the plain we reached a gap, from where, on a clear day, one can look back and see the mountains of Assam far in

the west. All we could see now was a mass of pasty-looking white cloud with an occasional hole in it, through which gleamed emerald paddy field or dark jungle. So we turned our backs on the plains, and dropped down into the deep humid valley of the Ti Hka, a boisterous torrent slamming its way over well-rounded boulders of crystalline rock, in which quartz and felspar are polished to an aching whiteness by the ceaseless grinding of sand in suspension.

The watershed between the Mali Hka and the Nai Hka is formed by multiple ranges all parallel to each other, and, roughly, to the streams they separate. Four ranges of hills and four rivers must be crossed in a distance of sixty miles, before we reach the Tamai; in an air line the distance is just thirty-two miles. The country is almost uninhabited, and covered with evergreen forest; only in the valleys are there scattered Nung or Daru villages, mostly very small.

Now for the first time we come in contact with the real subtropical hill jungle at 5000 feet and over. South of Fort Hertz the road passes through only the lowest stratum of this forest type, and it is difficult to perceive any difference between it and the tropical rain forest of the Mali valley. Here, crossing the ranges at 6000 feet, one finds a great many trees and herbaceous plants not seen before, as well as some common to lower altitudes.

The muddy path descends about a 1000 feet to the Ti Hka on a slanting traverse, winding round the hillside and crossing several gushing torrents. The great variety of herbaceous plants, always prominent on the road banks during the rains, attracted my attention. I noticed particularly an herbaceous species of *Thunbergia* bearing large flimsy rather vacant-looking yellow flowers, a dwarf banana with scarlet bracts and thin pale leaves hardly 18 inches long (*Musa sanguinea* perhaps), giant *Paris*, the enormous solitary leaf of an *Amorphophallus*, its sleek stem mottled like a python's skin, various *Impatiens* with brightly coloured flowers. Clumps of *Begonia* with long falchion-shaped leaves instead of the usual elephant ear grew in the rocky

torrent beds. I have never met with this species anywhere else. On the next range at 6000 feet on the hog's back ridge grows an epiphytic *Begonia* with thin curiously narrow heart-shaped leaves, the surface rough as sand paper, drawn out into a long drip tip. The flowers of both species are white. This plant also, in my experience, grows nowhere else but along this half-mile of cool rain-swept ridge, where it is confined to rough-barked trees.

Some of the coolies did not reach the Ti Hka hut till long after dark, and two did not arrive till the morning of the 30th, having spent the night in the jungle. It seemed advisable to rest a day before starting on the long march over the range; I was not feeling well myself. It was a wet day, and I was glad to rest.

In the forest here, at about 3000 feet altitude, grows *Wightia gigantea* — an epiphytic tree with the same technique towards its host as the strangling figs, though belonging to a very different family, *Scrophulariaceae* — *Elaeocarpus*, a beautiful tree bearing huge numbers of tiny white flowers, like lace sleeping caps, *Nephelium*, *Garcinia*, *Schima*, *Engelhardtia*, *Bauhinia*, *Michelia* and other *Magnoliaceae*. *Dipterocarpus alatus* was shedding its flowers, and I picked up fruits of another *Dipterocarp* — *Parashorea* bearing a plume of wings. A large fig tree was just putting out new leaves, but another apparently of the same species was almost bare, with no sign of breaking leaf buds. Evidently there is no really dry season or hot weather here; winter is cool and damp, spring warm and damp. I found a shrub of the custard-apple family (*Anonaceae*: probably *Unona*) in flower, the first I had ever noticed. They are probably common enough in these forests, but are generally inconspicuous in flower, though sometimes conspicuous in fruit.

The great trees are covered with epiphytes, especially small shrubs like the white trumpet-flowered *Fagraea*, also with clasping roots, and pouting scarlet-flowered *Aeschynanthus*, mosses, ferns and small orchids. There are also many climbers, so that the trunks of the trees are almost entirely hidden.

On July 31st we got away in good time. Two of the coolies had fever and one of them was unable to carry a load, so the others took turns to carry a double load. It is a long climb to the top. There is no 'pass'. The track winds round the mountain-side, finally ascending a ridge to the crest of the range, along which it runs for a mile, then drops over, following a spur down the far side to the wide flat valley of the Tisang. The crystalline rocks, which compose the bulk of the country, decompose to form a sticky reddish-yellow clay retentive of moisture. Even on steep slopes, however, the rock is hidden beneath a thick layer of humus, though outcrops of naked limestone deeply pitted are of frequent occurrence near the summit, and the foundations of the hills are exposed in every stream bed.

Ascending towards the summit ridge we continued at about 5000 feet altitude through hill jungle where oaks, chestnuts, birch, yew, *Altingia excelsa*, *Terminalia myriocarpa*, *Bucklandia populnea* and aromatic laurels are prominent; amongst the last named are species of *Litsaea* most of which flower in winter, *Cinnamomum* and big-leafed *Actinodaphne* with a lovely almost phosphorescent bluish bloom. On the bank grew violets, begonias of several kinds, dwarf *Chirita* with yellow-throated blue-violet flowers, *Selaginella*, *Impatiens*, *Torrenia*, tiny *Sonerila* with mottled leaves, cuckoo-pint (*Arisaema*) and golden-flowered *Lysimachia*. On the summit ridge, where the strange-leafed *Begonia* already described adorned almost every tree trunk we met with the first Rhododendrons I had seen since leaving Nsop Zup, epiphytes like the tiny-leafed and tiny-flowered *R. vaccinioides*, and the bigger-leafed *R. dendricola* with glorious trumpet-shaped flowers visible as a little white cloud high up in the canopy, and the tawny bold tree species *R. stenaulum*, with curiously shaped delicate-looking pink flowers; all these, however, were long since over.

Plenty of light reaches the summit ridge, which has been partly cleared of jungle, and all along the top a splendid white flowered *Begonia* grows on the bank; lower down is a species

with pale yellow flowers. Altogether there are not less than six species of *Begonia* here, some of them undescribed. Dense forest clothes the flanks of the ridge, the trees heavily draped with moss which hangs in festoons from the stumpy malformed branches. It is rather surprising to find plants growing, and flowering, in some of the deep gullies which slash this ridge, where the light intensity must be extremely low. Yet not only mosses and ferns, but gesnerads, gingerworts, aroids and other plants thrive. Some gesnerads, such as *Didymocarpus*, certainly prefer the light. Epiphytic undershrubs, especially *Vacciniaceae* and *Ericaceae* which are numerous, strive to reach the light as do most, though not all, climbing plants. These two classes of plants, both dependent on the forest for their very existence, react differently to the climate. Woody climbers are rarer in the upper strata of the hill jungle than they are lower down, while the number and variety of epiphytes steadily increases as one ascends, reaching a maximum at 6000-7000 feet in north Burma. The reason seems to be that climbers need heat before humidity, while epiphytes need humidity first — and the air is more constantly moist throughout the year, and nearer its saturation point at 5000-6000 feet than it is lower down. Above 6000 feet humidity does not increase, and at 7000 feet the advantage of complete atmospheric humidity is outweighed by the disadvantage of a shorter growing season and lower temperatures all round.

The range we were crossing forms the watershed between the Mali Hka and its tributary the Nam Tisang; to the botanist it is perhaps the most interesting region hitherto met with, containing many new species of plants, some of unusual beauty. Amongst these may be mentioned two species of *Eugenia*, shrubs with heads of flowers having the appearance of a rounded bottle brush, deep crimson in one, mauve in the other: a slipper orchid, *Paphiopedilum* (*Cypripedium*) *Wardii*, *Rhododendron dendricola*, several begonias, *Gesneriaceae* and other plants.

The day was comparatively fine and from the far end of the crest ridge we looked down into the shining green valley of the

Nam Tisang and the mountains beyond. Everything looked clean and fresh. Northwards the hills grow higher, the country more finely dissected. Descending by a ridge, with good views into the tree-tops immediately below us, we slanted down to a torrent, and suddenly reached the rest hut in a small clearing at an altitude of about 3000 feet. It was the last day of July.

As often happens during a break in the monsoon, a severe thunderstorm with heavy rain swept over the hills in the middle of the night. Water poured through the thatch roof. Beyond Fort Hertz there are no bungalows, but a rest hut marks the end of each stage. These huts are not furnished and there is nobody in charge, but they usually afford shelter and all the conveniences of a *basha*. During the cold weather, when people travel, one does not notice whether the roof leaks or not unless it is so far gone that you can count the stars through it. In the rains almost every rest hut roof leaks, for in this climate a palm leaf thatch roof rarely lasts more than a couple of years. This one would probably be repaired next cold weather.

On August 1st we continued the descent and after a few miles of very rough and slippery going, in the course of which we passed through a dense grove of magnificent bamboo, some forty feet tall, we reached the level bank of the Tisang river, or Nam Tisang. Large clumps of an aggressively armed palm (*Zalacca*) spring up in the peaty swamps which are a feature of the flooded valley, and a ditch by the pathside was full of orange-and-violet flowered *Burmannia*. *Oxyspora* with long pyramidal festoons of purple flowers made a great display, and on the river bank grew thickets of gregarious shrubs such as *Strobilanthes* and *Rhyncholechum*. We were back in the tropical forest region again, less than 2000 feet above sea level.

The Tisang, which in the cold weather can be forded almost anywhere, in the rains becomes a good-sized river, eighty yards wide here, with a fair current. The water was clear and warm. Arrived at the ferry opposite Nogmung, we were paddled across in two dugouts to the rest house on the river bank. In winter this is a delightful spot, but now blister flies by day and

sand flies by night made life very uncomfortable. The altitude is 1798 feet. As I had to change coolies here I decided to rest a day and dry my clothes and specimens. I was staving off fever with liberal doses of quinine, but even so I felt far from well.

Nogmung, in the distant past a Nung slave village, is today a Christian Kachin settlement with a few Nung families thrown in. The people are great church goers, and the cracked bell of the little wooden church often rang, calling the people to prayer.

The headman, a sturdy, pleasant-looking Nung with a round honest-to-God face, promised me coolies by the 4th, brought me a crude wooden table and chair from his own hut, and did everything in his power to make me comfortable.

When one first sees the Tisang valley in winter one wonders why it is not thickly populated. At Nogmung the land on either side for half a mile or more from the river bank is flat, covered with jungle and apparently suitable for agriculture. But except for Nogmung itself the valley is practically uninhabited — 15 or 20 thousand acres of rich soil in a sub-tropical climate going begging! However, it was now easy to realize why. In the rains the valley is a swamp. The hill tribes cannot endure to live below about 2500 feet, and certainly not in a swamp. Even the poor Nungs with next to no clothes, prefer to live well above the Tisang, which will rise several feet in a night and fall again a few hours later. On August 2nd we awoke to find the river well up, the water muddy, owing to rain in the night; but after midday it became clear again, and was falling.

The damp heat exhausted me. Even sitting still in the hut the sweat oozed from every pore. It was better to move about, and I went back across the river to look at some plants.

Two more ranges, separated by yet another deep valley, must be crossed before we reach the Nam Tamai. Between Nogmung and Pangnamdim the bridle path runs almost due north. On August 4th we set out again. The first march, an easy one, took us six hours; but then comes a long ascent to the top of the first range at 6000 feet, where the path keeps along the ridge

for a mile before it begins to descend. This is another paradise for the botanist; the hill jungle is at its best here, growing richer as we approach the main water parting between the eastern and western branches of the great river.

Ascending through a forest of oaks and chestnuts, *Magnolia*, *Michelia*, *Ilex*, birch, maple, alder and finally rhododendron we reached the ridge, where *Bucklandia* grows amidst a wealth of laurels, *Illicium* and other almost warm temperate trees, and saw all round us a heaving rolling sea of jungle crested here and there with the breaking foam of blossom. It is a little curious that *Rhododendron arboreum*, which in the Khasi hills is common so low as 5000 feet, should hardly be found in north Burma. The only tree species here is *R. stenaulum*.

Several slips are seen near the top, and below the crest of the ridge, in the newly exposed earth, will be found numbers of little saplings, herbs and shrubs; it is interesting to observe these early arrivals. One notices many small birch trees, *Bucklandia*, alder and rhododendron, all of which have wind-borne seeds. Other competitors are *Gaultheria*, *Luculia Pinceana*, *Rubus lineatus*, *Carex baccata*, *Lycopodium* and the common fern *Gleichenia* — all plants found in the neighbouring forest, whose seeds it seems are drifting about looking for a home to settle in. A few, such as *Rubus* and *Carex*, are probably brought by birds.

From the topmost stratum of hill jungle at 6000 feet we descended once more to lowland tropical rain forest by the brawling Nam Hat, a wild threatening region where three streams meet beneath high trees and half-concealed cliffs which cast a murky gloom. The trees, notably *Ficus*, *Caryota urens*, *Dysoxylum* with lovely pinnately compound leaves, *Terminalia myriocarpa*, smothered by epiphytic *Fagraea*, and a *Goniothalamus*, are as fine as any to be met with in north Burma.

A rickety cane suspension bridge spans the Hat river which luckily is not wide, though it runs like a mill race. In the cold weather one hardly notices there is a river at all! The hut stands in a clearing which was now alive with leeches: the altitude is 2248 feet, not very much higher than Nongmung.

One of the coolies shot a big black squirrel (*Ratufa*) with his cross bow, and I picked up a dead green tree lizard. The Nungs ate them both. Some Nungs who visited us that afternoon brought me an immense moth; unfortunately I had no means of preserving it.

On August 6th we faced the last and highest range between the Mali Hka and the Nam Tamai, the real watershed between the eastern and western branches of the Irrawaddy. I was glad to leave the deep Nam Hat gorge, a depressing rather sinister spot. It rained all day, and we took a long time to cross the bridge, one by one, and a wide swift torrent beyond, which we had to ford. Even so we reached the hut, half way to the top of the main range, in six hours. At one place there is a limestone outcrop where grow a sleek-leaved *Asarum* (*A. cordifolium*) and a curious *Begonia*, the flowers well concealed beneath the leaves. The path crosses a high cliff which sticks out right across the route, descends a thousand feet very suddenly, then ascends another thousand feet more gradually to the rest hut at Shinshangku — an empty name, for there is no village anywhere near; the country is uninhabited and indeed so precipitous as to be uninhabitable. In the deep ravine at the foot of the cliff an *Impatiens* with bright cadmium-yellow flowers of curious shape grows amongst the rocks.

The Shinshangku hut stands in a clearing on the hillside at an altitude of 4043 feet. A whole grove of *Albizzia* trees has taken possession of the place since the forest was felled. Other trees and shrubs which spring up in secondary growth at this altitude are *Ficus Cunia* and *F. obscura*, *Callicarpa arborea*, *Saurauja*, *Litsaea*, *Alnus*; all plants which can stand light. As they grow taller, they begin to give shade to other plants which can only grow in shade, and so regeneration of the forest proceeds stage by stage. It takes time.

That night for the first time since leaving Sumpra Bum I slept under a blanket. This place is noted for its stormy winds, but we had no storm, only steady rain. Crossing the range next day in dreadful weather we entered the clouds, and visibility

was reduced to a few yards. We were all soaked to the skin before we reached the top, and shivering with the cold, though the altitude is only about 6500 feet. This is no doubt due to the proximity of much higher mountains as soon as we are across the watershed. Temperature influences the forest also. But the real reason why the forest on this range differs from the forest in the Mali valley at the same altitude is to be found in the nearness of the Chinese flora which now begins to cast its spell. Here the Indo-Malaysian and Chinese floras are really in contact for the first time.

Many fine trees, though not of lofty stature, including gnarled rhododendrons, with bark which peels off like tawny tissue paper, occur in this forest, and at the very top I halted to admire a beautiful glaucous-leaved rowan which was in full fruit. Perhaps it was for that reason I stopped, in spite of the cold lashing rain; it seemed somehow odd to find a rowan in ripe fruit in August. Rowan berries usually ripen in October. It had rather small leaves with six or eight pairs of leaflets and great bunches of crimson berries, more gorgeous than a rowan should be, and sprang from the bole of a larger tree which grew on the high bank and partly overhung the road. It was within reach, so I went along to collect a branch. Next time I was feverishly collecting every fruit! Rowan? It had the same neat rather delicate compound leaves, almost white beneath, and the same ample bunches of crimson fruit; seen through the cloud and rain, a short distance away, it looked exactly like a rowan! But a close up view showed that the crimson berries were really crimson capsules, each of which had opened to expose several orange seeds! Now I looked at it with a new interest, while it seemed to grow more and more beautiful in my eyes! It was no rowan. Nor was there any doubt what it was — the aromatic fruits told me that. It was a *Zanthoxylum* — perhaps the last thing I should have expected it to be — one of the citrus family! How thankful I was I had not ignored it. ('Just another rowan!') And I had reason to be, for when I passed this way four months later it had been cut down! I never saw another bearing flowers

or fruit — and those I did see might have been rowans! However I collected and sent to England a small packet of seed (K.W. 12900).

This remarkable plant is a small deciduous unarmed tree, or large shrub, usually growing epiphytically in the warm temperate rain forest at 6000-7000 feet. The leaves turn crimson in December. The flowers, which I have never seen, probably appear in the cold weather.

From the top of the range in fine weather one looks due north, across the gorge of the Tamai river to the Tamai-Dablu divide, 20 miles distant, and to the snow-clad mountains at the sources of the Dablu 20 miles beyond that. The furthest visible range is the massive headland, part of the Tamai-Taron divide, whence spring both the Dablu and Tazu rivers; and it owes its existence as a separate feature to the curiously erratic course of the upper Nam Tamai, or Adung river. This headland, carved out of the ancient Irrawaddy plateau, has a uniform altitude of 14,000-15,000 feet, and is snow covered for eight or nine months in the year. On its southern face rise the short Dablu and Tazu which flow south, parallel to and between the Tamai and Taron; the former a tributary of the Tamai, the latter of the Taron where it bends suddenly westwards to link up with the Tamai; all four united make up the Nmai Hka or eastern Irrawaddy.

However, I could see nothing, not even the Nam Tamai immediately below; the gorge was filled with cloud, which reached up to where I stood. But I remembered the view of the rocky ridge over 10,000 feet high, and now so close; I had made a special note of it some years before. I was tired of marching. It was August; in most years I would be thinking of the approaching harvest by now, and I hadn't even begun to find alpine plants yet! For six months I had been on the move, the alps getting nearer, then receding, and then getting nearer again, in the most exasperating way. I longed to settle down in camp in some alpine valley and botanize quietly — and rest. Straightway I made up my mind I would reach the rocky ridge

above Pangnamdim and spend the rest of the time between there and the Tamai valley. It would not take more than two or three days to reach the far ridge. With a light heart I began the long descent. Rain had cut a deep groove in the ridge, which is steep and slippery at any time. A small river now rushed down the channel, moving the very stones beneath ones feet. Several times I slipped on a rolling stone and fell. So did the coolies.

At last we reached the river, crossed by the cane suspension bridge, which is wide enough for mules to pass, and so to the rest house on the left bank at an altitude of 3345 feet; I had 8000 feet still to climb before I could expect to find alpine plants in any quantity. I decided to rest a couple of days here while asking the way.

CHAPTER SIX

MY first act was to inquire for a Nung hunter who knew the hills and who had been across to the Dablu. I was told there was such a person in the next village, and someone went off to find him. Two days later that is on the 8th he arrived, a wizened little man with humorous eyes and blackened teeth. He wore a cloth round his middle, supported by a cane girdle, and a towel about his body loosely held in place by a silver-grey monkey-skin bag slung over either shoulder, and a long knife in a wooden half-sheath; otherwise he was naked. The blister flies and sand flies, which were a curse here, did not worry him in the least.

There was a track up to the peak called Pasoï Hpawng he said. I must go a day's march up the Tamai to the next hut and start from there. Meanwhile he would arrange for a party to go ahead and clear the track which was completely overgrown.

Pangnamdim is a small Nung village on the river bank. The Nungs and their close relatives the Darus, who live even deeper in the jungle, are a scattered and almost nomadic tribe, with little cohesion or organization. Some villages remain for a decade or so, rarely much longer, but the largest comprise hardly a dozen huts. Odd huts and smaller satellite villages are widely dispersed, well hidden in the folds of the foothills above the bridle path, reached by steep narrow tracks through the jungle. These people have never been able to protect themselves save by cunning and knowledge of the jungle from their more powerful and rapacious neighbours, the Shans to the west, the Kachins to the south and more especially the Chinese to the east and the Tibetans to the north. It is not very many years since Chinese and Tibetans annually raided the country picking up what they could carry off including women and children, who became virtually slaves in an alien land. During the

season when the passes were open the Nungs habitually slept in trees at night and hid their meagre store of grain from the raiders. Since the British came to Hkamti Long, they have received a measure of protection, and the good old days — for the raiders — have gone. Perhaps, since the Second World War, they have returned.

In spite of the altitude and the nearness of the snow-clad mountains, the vegetation of the valley is still sub-tropical, though temperate pine forest soon begins to appear as we go higher up the valley, or climb the flanking ranges. By day the shade temperature rose to well over 80°F. and the atmosphere was steamy. The minimum, which on the 12th was 69°, never fell below 65°; in winter it may go down to 40°, but then the air is drier. Tree ferns (*Alsophila*) grow in the deep gullies, and many kinds of bamboo both large and small, including climbing bamboo; but there are very few erect palms, this being the northern limit of the sago palm (*Caryota*) on the eastern Irrawaddy. There is also a falling off in the number and variety of figs, the large strangling species being almost entirely absent. The commonest tree figs are *Ficus Cunia* with edible fruits, *F. obscura* which has curiously lop-sided leaves, *F. hirta* and *F. clavata* not of large size. In the rocky river beds the gregarious *F. pyriformis* is a common shrub, and there are a number of other small shrubby and climbing species.

During four days spent here I explored the river bed, where an interesting *sere* is developed between low and high water marks, and *at* high water mark, the species met with varying with the nature of the ground, rock or boulders, more rarely sand, and with the frequency and length of submergence. On rocks above high water *Rhododendron Simsii* is still found, with *Ficus pyriformis* (the latter surviving also below high water) and *Astilbe* together with a few ferns and grasses. Where a sandy cove occurs above normal flood level, a greater variety is found including *Polygonum capitatum*, *Thalictrum*, *Oxyspora*, *Equisetum*, *Pueraria* and other creeping *Papilionaceae*, *Gnaphalium*, *Carex* and *Neillia thyrsiflora*. But though the association of these plants

may be typical of the sand banks, not one of them is confined there as *Rhododendron* and *Ligustrum*, for example, are confined to rocks in the river bed.

A little higher up and well above any likely flood, grow *Albizia Julibrissin*, *Dobinea vulgaris*, *Ficus Cunia* and other species of fig, *Rubus*, *Saurauja*, *Luculia* and a number of climbing and scrambling plants like *Vitis*, *Mussaenda* and *Streptolirion volubile*, which take advantage of the light; and this open fringe passes gradually into the closed jungle above.

At first sight there appears to be a good deal of cultivation on both sides of the Tamai to a height of a thousand feet or so, suggesting a fairly large population. This is deceptive. A semi-nomadic agricultural people, or any people who raise crops on temporary clearings, require a good deal of land, and much of the apparent cultivation is, as a matter of fact, abandoned cultivation, already becoming covered with second growth. Only slopes facing south to west can be cultivated at all, and practically all such, up to an angle of 60°, are or have been cultivated. The yield is certainly poor.

On August 10th, after three very wet days, it turned fine again, and very hot; the sweat oozed out of me like juice from a grilled chop. I had taken on a cook from the Nogmung coolies, a good fellow — but a bad cook — named Hpung; and was feeling the effects of his handiwork. However, I bought a few supplies here, including a freshly trapped fish, very bony and quite tasteless, and some eggs not so fresh.

On August 12th we left Pangnamdim for the next hut up the valley, still following a good bridle path. The general direction of the Nam Tamai from the Seinghku confluence to the Taron confluence is south-east, but just above Pangnamdim it turns eastwards and continues to flow in this direction for ten or twelve miles, almost to its junction with the Taron, when it suddenly resumes its southerly course. The day was fine and hot, but most of the time we were in the shade of the forest. It was therefore all the more surprising to meet with such temperate plants as forget-me-not, a fern-leafed umbellifer,



anemone (*A. hupehensis*), valerian, a small crucifer, and the blue pea (*Parochaetus*) growing by the path; while under the trees the banks were still covered with pink begonias, *Sonerila*, *Hedyotis* and other sub-tropical herbs. Somewhere between Pangnamdim, in latitude $27^{\circ} 45'$ and the Seinghku confluence just north of $28^{\circ} 0'$ there is a sharp change in the flora, sub-tropical hill forest giving place to temperate pine forest; here sub-tropical plants, when they occur, are incidental. In a transition zone so dominated by the proximity of high mountains, the floras are bound to dovetail into one another often in the most bewildering way.

We met two Chinese pedlars on the bridle path. They said they had come from Atunze in Yunnan over the mountains to Rima, thence over the Diphuk La to the Nam Tamai. It seemed a roundabout route. They were on their way back via the Taron gorge and the Yuragan pass to Sukin on the Salween river. They looked rather derelict I thought. These Chinese pedlars who penetrate to the remotest villages are invaluable to the Nungs and Darus, for they bring with them cotton clothes to a people who cannot sew, and yarn to a people who can weave but who grow no cotton. At Pangnamdim the previous day, a well-dressed and well-spoken Chinese merchant, with a dozen coolies, had passed through, also on his way to the Yuragan pass. He said he came over every year, bringing salt and cloth which he exchanged for various medicinal roots found in these mountains, also animal skins, musk and gold dust.

There were more birds here than we had seen in the Mali valley. Very mournful was the cry of a bird which day long repeated one note in a minor key, at frequent intervals, perhaps an owl. More cheerful were the flocks of snow-crested laughing thrushes which fed and squabbled beneath the bamboos; the snow-white crest on top of the head and white patch beneath the tail and black round the eye make this otherwise drab bird quite beautiful.

Arrived at the next bungalow I awaited the Daru hunter who

was supposed to be getting the path cleared and arranging for porters. He did not turn up that day, or the next, and when on the 14th he did arrive, he reported cheerfully that he had done nothing yet. However, we were bidden to his village in the foothills.

Another hot day, August 13th, and at noon, when the shade temperature was 88°, the relative humidity, under the influence perhaps of a very light breeze, had dropped to 57% of saturation. However, by 6 p.m., in still air with the sky overcast, it was back to 95%. On the 14th at 8 a.m., after a night's heavy rain, with low cloud hanging over the valley it was 82%.

Without warning the Darus now began to bring me a miscellaneous collection of snakes, frogs, some small fish like bullheads, a crab, several beetles including a handsome longicorn, and a bird's nest with three eggs. As I paid for whatever I accepted I think they expected me to eat them. It was incomprehensible that I could want such assorted live-stock for any other purpose, just as I could only be collecting plants to concoct drugs, probably aphrodisiacs. Did not bands of Chinese come over for just that purpose?

As was to be expected, the Tamai was in flood and would have been high without any rain at all owing to the snow and ice melt. The current was moderately swift, but there are few serious rapids at high water. I can see no reason why timber should not be floated down at least from the Seinghku confluence — or higher — to the Taron confluence, after which the stormy Nmai Hka takes charge; and no reason why it should not be floated down the Nmai Hka to Myitkyina, in spite of rapids. The mountains of north Burma are steep, and it would be an easy matter to slide or drag logs down to the river, especially on the upper Tamai. So far as this river is concerned, men armed with long bamboos standing on the bank could keep the logs moving. In the low water season, planks could be rafted down the Tamai, and probably down the Nmai Hka also, as they are rafted by the Chinese down lesser, more turbulent streams.

If it be asked what logs? I reply, both hard and soft woods. Of the latter, the most easily accessible is pine (*Pinus excelsa*) with hemlock and silver fir in unlimited quantity higher up. There is also some larch, usually more scattered. Pine, in the Tamai valley, appears at 5000 feet, where it is mixed with broad-leafed trees; but from 9000 feet, where hemlock occurs in quantity, up to 12,000 feet, almost pure conifer forests cover the slopes. As for hard woods, until these mountains have been explored it is impossible as yet to say what trees they contain; but it is certain that a great variety of temperate species, such as oak, maple, birch, chestnut, walnut and many more occur, not to mention rhododendron, which is one of the hardest woods in existence. A little further south, in the valley of the Nmai Hka itself, many sub-tropical trees grow by the river.

On August 15th the porters turned up, mostly girls, and we set out for the hunter's village. After following the main bridge path for half a mile and crossing a big torrent, we left the Tamai and turning straight up into the hills, struck a hardly visible path away from the river. We crossed much second growth, and steep fields or gardens of hill rice, maize and millet, with patches of *Colocasia*. Mixed with the cereal crops are cucumbers, gourds and large marrows. No cotton is grown. Precautions have to be taken to keep wild animals out of the crops, otherwise deer, pig and monkeys would get the lot; as it is they get more than their share. A small hut, raised high on stilts, is built overlooking the steep *taungya*, and here young people sit up at night during the harvest season, clapping bamboos together in the intervals of love making.

They also use a simple machine as noise maker. This consists of a big flexible bamboo, about six feet long, pivoted a little beyond the centre like a see-saw, the shorter part hollowed out, the other end split in half. Water is led by a gutter into the hollow end, which, when full, overbalances and drops, thereby tipping up the far end, but also tipping out the water, so that the other end is no sooner up in the air than it falls again clapping loudly as it does so. It would be interesting to know

whether animals, suddenly startled by this noise, gradually come to realize that it happens at regular intervals — and that nothing else happens. Nor are the larger animals, or even rats the only enemies to be feared. One Daru brought me the heads of some hill crop, covered with small hairy caterpillars which were eating the grain; a plague of these might easily destroy the entire crop.

Some of the *taungya* we crossed were so steep that had there not been a narrow path, we could not have traversed them. Presently the clouds parted and we saw the main ridge ahead of us, about eight miles distant; it looked precipitous on this side, and was serrated like a saw.

Wherever the path ran through jungle it was fringed with a pretty labiate, *Plectranthus macranthus*, bearing long spikes of slim tubular pink flowers, and with white anemones (*A. tetrasepala*).

We reached a grassy alp, where sad-eyed mithan grazed, and shortly after came to the village, a few small bamboo huts perched above the stream. The altitude was only about 4000 feet.

Our hut, though small, was comfortable, and the hunter gave me one of its three rooms for myself. Not that I had much privacy, for the Darus, though not noticeably curious, are certainly not shy; especially the girls. The floor, of split cane matting, was pleasantly springy to lie on, and the roof of grass thatch kept out the heaviest rain. Only the posts and beams were of timber, the walls of split bamboo matting.

The pathfinders started at dawn the next morning, and we followed more leisurely a little later, the ten porters I needed being in no hurry. However, we did start and that was something.

We descended to the torrent, crossed it by a flimsy rigid bamboo bridge, and began to climb straight up the opposite face of the spur, which abutted onto the main watershed. Once astride the crest of this spur, we had only to follow it — if we could — up and down, but chiefly up, till we reached the divide.

There is no finesse about the hillman's track, no search for an alignment: and we had a stiff ascent of 2000 feet to the top, through forest of which we could see little of the trees, so steeply did the ground rise before us. There was moreover a fairly thick undergrowth of *Arundinaria*, a bamboo of medium height which does not form clumps, but sends up separate haulms from its rhizome. Not much cutting had been necessary however, and the trail was marked more by footprints in the spongy humus than by cut branches. At first the trees were those characteristic of the upper sub-tropical hill jungle. Oaks, chestnuts and laurels were abundant, *Magnoliaceae* occurred sparingly, with *Bucklandia* and many other species. Small epiphytic shrubs were also conspicuous.

A big-leaved climbing palm tangled the trees, their limbs now so thickly padded with moss that they looked like baseball champions; and several species of *Sorbus* appeared. Many small epiphytic shrubs, amongst which I was thrilled to see first *Rhododendron Nuttallii*, and a little later *R. bullatum*; these told of a cool damp atmosphere. Nor were these the only species of rhododendron for both *R. stenaulum* and the crimson flowered *R. eriogynum* grew on the crest of the ridge. The last few hundred feet of the ascent was very steep, but at the top the ridge at once flattened out, and for the first time, we could look down over the tree-tops to the valley below. We now turned eastwards towards the main north-south watershed and the peak. The forest was still thick and luxuriant with a great variety of trees, not outwardly very different from what it had looked like 3000 feet below. Epiphytic shrubs were more numerous here than lower down — I noted scarlet flowered *Aeschynanthus* and *Medinilla* besides orchids and aroids — woody climbers less so. There was plenty of bamboo undergrowth, which in places grew so thickly as to be impenetrable; but along the ridge it was like the parting in a man's hair would seem to an adventurous ant and we made good progress. I felt that we were on the verge of a great change in the vegetation, and that at any minute rhododendrons might replace shrubs like *Lasianthus* —

whose deep lapis-lazuli berries are decorative — *Ardisia* and others. It was clear we were passing into another zone of vegetation altogether; no longer could it be described as subtropical, rather had it already become temperate. Consequently when at 2.30 I caught up with the coolies to find them making camp, I was annoyed. They said there was no water further on, but there did not seem to be much here either, and it was six o'clock before we got half a bucket full and Poong made me some tea. At the back of my mind was the thought: 'If there is no water on the ridge here, there will be even less higher up, and what shall we do in November when the rains are over!' However, it is no use meeting trouble half way; wait and see, I decided.

Still, it was an uncomfortable spot, so cramped that my 60 lb. tent, in use for the first time since we had left China, sagged weakly. Biting and tickling flies swarmed, though I suffered even more from the itching of previous sores. However, my spirits, temporarily damped by the chill air, hunger and disappointment, soon revived. After all, tomorrow we should reach the alps now only four miles off. The barometer, which read 26.27 in. at the village now stood at 23.50 in. so we had climbed at least 2500 feet from the stream. The day had been fine, though the sun was hidden. It flashed out for a moment at sunset; and after dark the cicadas, which had been making a great noise, quietened down. I turned in early.

On the 17th we woke in the clouds, for it had rained all night. Rolling up the wet tents was a business, but the rain stopped and we got away about 9. The ridge now became exceedingly steep and I was jubilant; at this rate, I thought, we must quickly reach the alpine region. But no sooner had we climbed several hundred feet, than we lost half of it on a long descent. Every ridge and range is notched by streams in this way — thus passes are formed — and so becomes toothed like a saw; but here forest blunts the teeth. More ascents and descents, the former short and steep, the latter longer but less steep. When we camped we had on balance climbed barely 1000 feet above our starting point.

(At 6 a.m. B. 23.6 in. T. 63° Camp 3.30 p.m. B. 22.5 in.)

On a rock outcrop, right at the start, I found some pink begonias in flower; herbaceous flowering plants are rare in the forest, but wherever rock outcrops, one may expect to find something of interest. There was as yet no difference between the trees along the ridge and those on the flanks; in fact there was sometimes no ridge, only a steep face. Nor was there any sign of bush rhododendrons, sure herald of an approach to alpine conditions. For the first time *R. arboreum* appeared, with *R. Maddenii* and another tree species, related to *R. irroratum*. Rhododendrons need light and unless they grow on trees, or are themselves trees, they have no chance in such thick forest as clothed this mountain. There were many epiphytic shrubs, notably *Agapetes*, *Sorbus* and *Aeschynanthus*. I also picked up a few small yellow corollas fallen from a rhododendron; but I could not see the plant, which was evidently high up in the tree-tops. This absence of rhododendrons was less strange than the almost total absence of conifers. I saw one sorry-looking pine (*Pinus excelsa*) and either a *Taxus* or a *Tsuga*, I could not be sure which. Yet we were now over 7000 feet, and the trees here included hollies (*Ilex nothofagifolia* and others), *Gamblea ciliata*, *Viburnum Wardii*, *Magnolia rostrata*, maples, *Michelia* and several oaks; of more sub-tropical genera, *Elaeocarpus* (I picked up its lace-like flowers), *Cinnamomum* with parchment-like leaves, *Schima* and *Echinocarpus* with huge spiny fruits like vicious sea-urchins, occurred. The undergrowth was chiefly a species of *Arundinaria*, dense and impenetrable in places, but sometimes very open — few plants took advantage of the open spaces — small *Impatiens*, *Lysionotus* on rocks, one or two small orchids, even a *Cymbidium*. The type of forest was plain temperate evergreen rain forest, but the absence of conifers puzzled me. We must I think have been nearly at the eastern limit of *Pinus excelsa*, which a little further north-west is plentiful at 5000 feet. Somewhere east of longitude 98° *Pinus excelsa* disappears completely, to be replaced by *P. insularis* which is found also in the Khasi hills.

About midday we caught up with the pathfinders, which was not helpful. Gloomy forebodings that we should get nowhere the next day either, now assailed me, and yet the main watershed could have been no more than two or three miles distant. It was this slow progress which worried me. Yet why worry! If we made good only two miles a day we must soon get there! So long as we moved at all!

It poured with rain while we were making camp — the site again determined by the available water supply, always difficult on these narrow ridges. The place was scarcely better than the previous night, but I was glad to get into my soggy cold tent, change my wet clothes, and at five o'clock sit down to a cup of scalding hot tea, and the day's collection of plants.

CHAPTER SEVEN

AUGUST 18th, at 7 a.m. B. 22.55 in. T. 58°, a clear clean dawn, the sky like aquamarine, and presently the sun hurling shafts of golden light between the peaks — a fit beginning to a memorable day. The four pathfinders were up and away long before we were ready to start, and they had need to be. We got away at nine, the water shortage causing some delay. Soon after we started the broad shoulder narrowed to a knife-edge rock ridge; surely, I thought, the thickets would contain rhododendrons. But I found only stunted oak and other small trees, such as whitebeam (*Pyrus*), *Sorbus*, maples (*Acer Wardii*) and *Viburnum Wardii*. The oak was mainly *Quercus pachyphylla*, which bears long spikes of knobby confluent cups as though they had softened like wax in the sun, and flowed together; the acorns are almost entirely hidden within these lava-like hard masses, only the tips showing. It ascends higher than any other species, except perhaps *Q. Ilex*, in north Burma. The pathfinders had cut a track for the coolies here, but before long we found ourselves on a broad slope, with open forest again, and isolated clumps of bamboo instead of the carefully spaced haulms so abundant lower down. Between the bamboo clumps and scattered gnarled trees were open areas, almost completely devoid of plant life except for a thin carpet of creeping dwarf *Rubus*. Here and there grew a yellow *Impatiens* or tiny *Panax*: but this poverty of flora, where there was so much free space, was rather surprising when one considers the wealth of vegetation nearby. We continued to ascend, and my spirits rose at every step; crossed several shallow rocky water courses, all conspicuously devoid of plant life, and reached the ridge again. Suddenly we emerged from the gloomy forest onto a hilltop, surrounded by bushes and stunted trees from two to six feet high. And here at last was what I sought. The bushes consisted of rhododendrons belonging to at least five species

including: *R. tephropeplum*, *R. Martinianum*, *R. megacalyx*, *R. Madennii* and *R. triflorum*, with Gaultherias, *Vaccinium glaucalbum*, *Daphniphyllum*, *Skimmia Laureola* and other shrubs. These grew so thickly that the pathfinders had a hard job cutting a track along the ridge, and we were almost at a standstill for the next hour. This at least gave me ample time to botanize. The cicadas were making a terrific din here. Occasionally a big swallow-tail butterfly, fine and gay, rocketed past, whereas on the previous day I had seen only dull coloured forest species.

Our altitude was about 8000 feet. We were on a relative alpine top; but I could not shut my eyes to the fact that a whole belt of conifer forest was missing, and that we were still at least 3000 feet below the level beyond which trees *cannot* grow, whatever the shelter. If trees did not grow here, it was owing to quite local conditions; certainly there was a thick forest of broad-leaved trees in considerable variety below the crest of the ridge. But at least we had reached the *critical altitude* for alpine plants below which, in this latitude, they never grow, possibly because their life process is geared to lower temperatures, or to shorter spells of activity, or even to a different light intensity, or to the absence — or presence — of actinic rays at high levels. But whatever the reason, though alpine plants in these mountains will descend far below their normal habitat, they never descend below a certain critical altitude, which is here about 9000 feet.

There was an undergrowth of moss, dwarf *Gleichenia*, and twining gentian beneath the rhododendron bushes, and below the ridge grew thickets of *Enkianthus himalaicus* and *E. pauciflorus*, *Clethra Delavayi* — almost the only shrub in bloom, its long tapering spires of white blossom with carmine calyx most attractive — and small trees of rowan, crab-apple, *Cinnamomum* and several others. But even more surprising than any rhododendron was the discovery under the bushes of a creeping dwarf *Cornus*, indistinguishable from the alpine *C. suecica*¹ of north Britain and Greenland, or for that matter *C. canadense*. It had

¹ This plant has been removed from *Cornus* into a new genus, *Chamaepericlymenum*, which includes all the dwarf species.

the same little central pyramid of minute flowers surrounded by four milk-white bracts followed by dull red pear-shaped fruits. The white bracts are often tinged pink almost as in *C. florida*. Imagine a creeping *C. florida* on the rock garden!

A little further along we reached some bare granite tors, with one outstanding tower, like an obelisk, fully exposed. Here was a fresh crop of plants. In rock crevices clumps of *Cassiope*, though not in flower, made a welcome addition; also a *Coton-easter*, *Rubus lineatus*, and several herbaceous plants, *Sedum*, *Luzula*, *Carex*, *Hypericum*, *Diapensia himalaica* and two tiny lily-like plants, *Tofieldia* and *Smilacina*. At the base of one rock, a delicate pale blue-and-white gentian, its frail lace-like flowers nodding, grew in the damp moss. (*G. grata?*). On one of the menhir-like stones crouched a juniper, the third conifer I had seen. This was a cool temperate, almost an alpine flora.

Keeping along the ridge as close to the broken crest as possible, following in the wake of the pathfinders whose progress was at the rate of about 250 yards per hour, we presently reached the highest point we were destined to reach this day. Now we could see the main ridge very clearly, and the 10,000 ft. peak called Pasoj Hpawng, not two miles off. There was no prospect of reaching it before dark at our present rate of progress.

It was now late afternoon and further progress along the ridge was barred by a cliff. Even had we been able to climb it, we should certainly have found no water at the top. Nevertheless I still hoped we should go on, and it was a bitter disappointment to see the pathfinders descend the flank of the ridge. Down we plunged through thick evergreen forest and lush undergrowth to a clearing just above a stream, where the men said we must camp; and nothing loath, for we had been going for seven hours and I was wet, cold and hungry, we pitched the tents. I was afraid that if I did not agree, they might go lower still — as it was we had lost several hundred feet of our hard-earned altitude. At 6.30 Marang brought me some tea, and at 8.45 I got a little dinner. When I turned in for the night bright moonlight filtered through the forest roof, and I could see stars twinkling.

My guide had brought his little girl with him, though she did not look more than eight or nine years old, and she carried her own kiddie load. Most of the way she stuck close beside me, and I was amazed to hear her singing a song to the tune of 'Auld Lang Syne' or something very like it. Towards the end she tired, and whimpered a bit, complaining to her father, who answered briefly. But though like me she must have felt cold and hungry as well as tired, the next minute she would be laughing and singing again. It was obvious that she had to *act* her part of being hungry, by crying, as a little animal would cry for food. No use just telling her father, he must see for himself, otherwise he would not be impressed.

In some respects at least the day had been a triumph. True, we had not found a single genuine alpine plant. On the other hand it is just this temperate belt, between 7000 and 10,000 feet in north Burma, which is the most interesting and the most likely to give results; the true alpine belt is better known. I therefore decided to stay where I was. From the point where we had been forced off the ridge, a scarcely visible track descended to traverse round the base of the cliff, and ascend again to a gap in the main ridge beyond Pasoj Hpawng, known as the Mungu Hkyet or pass. Thus we were camped at the base of a high granite cliff, in a forest composed of broad-leaved trees, both deciduous and evergreen, many of which, such as *Rhododendron sino-grande*, *Magnolia Campbellii* and *M. rostrata*, *Pyrus Harroviana* and *Gamblea ciliata*, had unusually big leaves. There were also two species of oak, maple and several hollies. Smaller trees and big shrubs included *Illicium*, *Euonymus*, *Cinnamomum*, *Eurya*, *Litsaea* or *Lindera*, *Myrsine* and species of *Pyrus* and *Rhododendron*. Such was 'Big Tree' camp.

Most of the trees were thickly padded with moss, which covered their trunks and hung, dripping, from their branches, like bunches of seaweed from a pier when the tide is out. In this spongy mass are embedded the roots and even the stems of epiphytic shrubs, notably species of *Gaultheria*, *Vaccinium*, *Rhododendron*, *Agapetes*, *Leucothoe* and *Aeschynanthus*. A minute

Utricularia is also commonly met with on rocks and tree trunks and a filmy fern. In the undergrowth the gregarious fern *Lomaria* occurs abundantly, with scattered flowering plants like *Sarcopyramis Arisaema*, *Globba*, *Polygonatum* and colonies of *Elatostema*. This 'moss forest' contains a fairly constant assemblage of species, with well-marked characteristics, and may be regarded as a distinct, if local, type of vegetation. The frequent occurrence of drip tips to the leaves of epiphytic shrubs, and of turnip-like swellings on their stems, apparently of water-storing tissue — a strange provision in so aqueous an atmosphere! — are typical. The big leaves of some of the trees have been referred to; but others like *Ilex nothofagifolia* have very small leaves.

The following day, August 19th, with two guides, I started for the Mungu Hkyet. It had rained heavily in the night, and the forest was wet and gloomy but now the rain ceased. A scarcely visible track traversed round the crescent head of the valley at the base of the cliff, before ascending sharply to regain the ridge at no great distance from where we had left it the previous day. Yet it was a tiresome two-hour scramble, up and down across gushing brooks, fallen trees and other obstacles. But when at last, after a final steep climb, we reached the ridge, I felt well rewarded. It was at once obvious that this was not the spur which we had been following for the last three days, but the main north-south watershed. The view eastwards was terrifying in its stark grandeur. We stood on the sharp edge of a gigantic cliff, and far below us was the invisible Dablu river, here no more than a torrent. Of pass in any sense of the word there was no visible trace, nor any way down the precipice; it was a parachute jump. Eastwards less than five miles away across the Dablu valley a range of spiky rock peaks rose out of the forest and jabbed the sky. Everywhere one looked the same terrific landscape met the eye; the whole horizon was prickly with peaks like some celestial city of towers and spires, over which frothed the grey monsoon clouds. I could see no village below; it was a savage land, tilted on edge.

Such then was the Mungu Hkyet.

We now turned our attention to the steep ridge which runs northwards towards Pasoi Hpawng. In places it was clothed with bamboo brake, through which we had to cut our way, or with mixed shrubs, including some juniper. Both flanks were thickly wooded, and the precipitous east face was covered with a particularly dense growth of small trees, *Quercus pachyphylla*, maples and rhododendron being abundant, together with a big leafed *Ilex*, willow, *Daphne*, a laurel (*Litsaea?*) *Viburnum*, *Cotoneaster*, whitebeam, *Enkianthus*, *Daphniphyllum*, *Berberis hypokerina* and *Sorbus Harroviana*. I noticed a solitary silver fir (*Abies*), stunted and rather battered, but there was no fir forest, and with the exception of juniper and an occasional *Taxus*, no other conifer. In places smooth slabs of granite outcropped, and we came upon several grass blanks, where grew a striking *Patrinia* with fat rhizomes out of which grew the leafy stems ending in clouds of tiny cream-white flowers. It belongs to the valerian family, and the fruit is provided with a dry membranous orbicular wing, beautifully net-veined. After climbing a few hundred feet we reached an impassable chasm cutting across the ridge; and as the precipices on each side were unclimbable this was as far as we could go. The barometer read 21.6 in. (in camp, 22.2 in.) corresponding with an altitude of between 9000 and 10,000 feet.

Several interesting sub-alpine plants grew here, but no exclusively alpine species. Tuffets of an aromatic-leaved rhododendron clung to the rocks — it looked like a stunted form of *R. pruniflorum*; another gregarious shrub was *Gaultheria Hookeri*. Then there was *Berneuxia thibetica*, with glossy leaves and compact teasel-like heads of white flowers; *Vaccinium glaucalbum* and *V. modestum*: and finally a *Nomocharis* in fruit, its bulb usually embedded amongst the bamboo rhizomes, whence it was impossible to extract it entire.

I sat down in the rain and ate a little lunch.

On the way back to camp, I found a 'Petiolares' *Primula*, perhaps *P. euosma*, growing in the rocky bed of a brook; the first *Primula* I had seen. The flowers were long since over and the

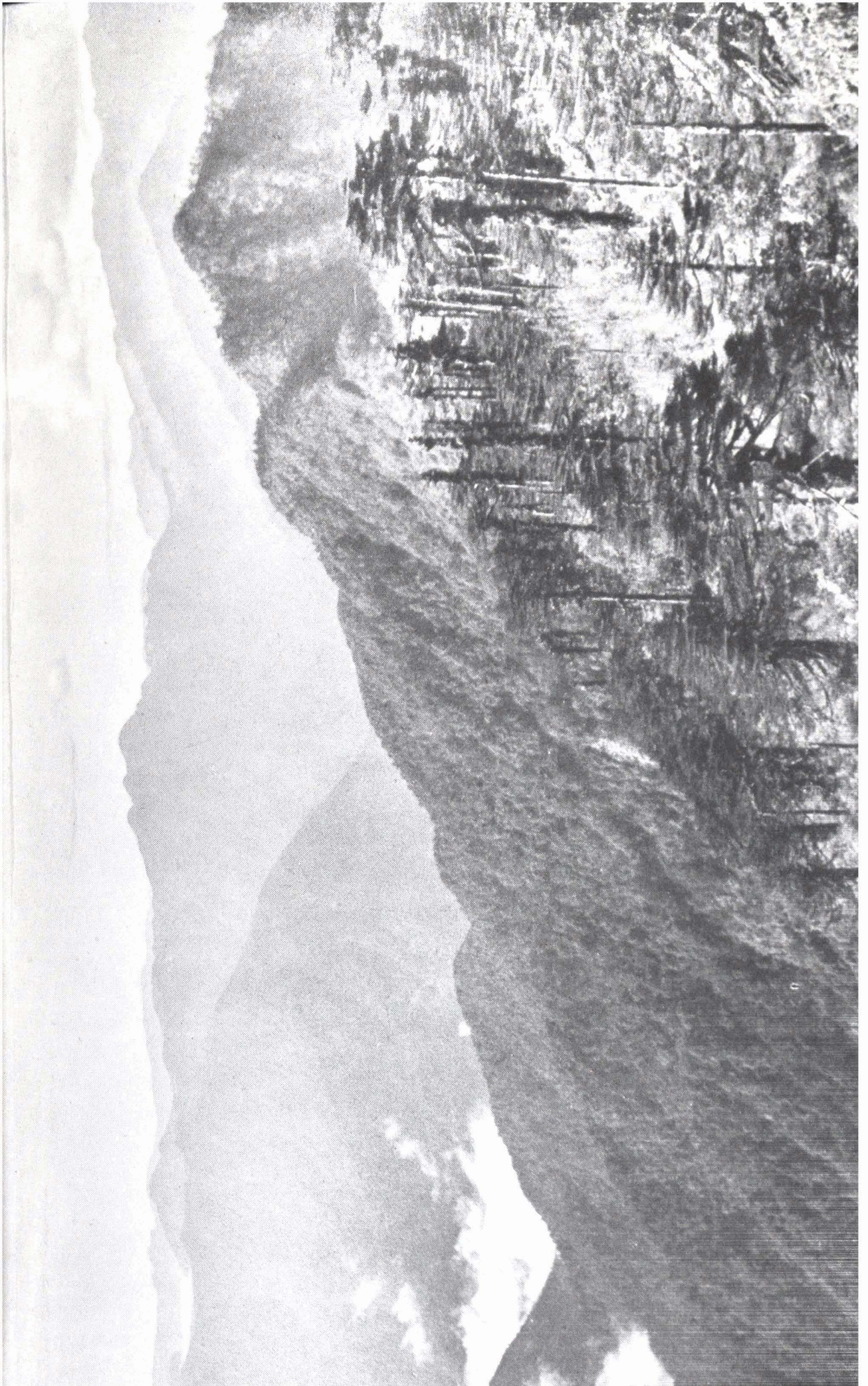
foliage was lush. The dwarf *Cornus* was plentiful just below the ridge but there seemed to be no fruits ripening.

The coolies had returned to the village, after promising to come back in a few days' time, and we clung to this camp through another four days of almost ceaseless rain. At night it beat a devil's tattoo on the great leaves of *Rhododendron sino-grande*, by day the cloud swirled amongst the trees, and out on the ridge a sharp wind flung the rain spitefully in my face. Still, I enjoyed it all. I climbed the cliffs above our camp, between the main ridge and the spur by which we had ascended. I again followed the main ridge above the *hkyet*, and another day climbed the cliff which had stopped our direct approach to Pasoi Hpawng, whence I followed the ridge down to the chasm which had stopped me the first day; and again I climbed all over the crescent cliff, which rose right above our camp, sometimes ascending to the ridge this way, instead of by the path. Indeed it was here I found one of the most delightful of all the plants I came across — a dwarf *Allium* with little nodding white flowers like miniature snowdrops. I was trying to find a way to the top of Pasoi Hpawng, but owing to the weather, and the precipices all round, I failed. Nor did the mountain look inviting; bare granite cliffs to the south, and the rest covered with dense bamboo brake. Three months later I reached 10,000 feet and found *Rhododendron fulgens* amongst the thick cover of bamboo brake. The south-inclined cliffs of the crescent were, like all granite cliffs, rather bare. In more sheltered gullies, however, and along joints in which soil could collect, many shrubs had established themselves — *Berberis hypokerina* its holly-like leaves silvered beneath, later turning scarlet, *Edgeworthia Gardneri* with large spherical heads of deliciously scented yellow flowers, the four-petalled *Rosa sericea*, *Hydrangea*, *Juniperus*, dwarf *Sorbus*; *Rhododendron euchaites* still in flower, and *Rubus lineatus* grew thickly. Herbs, besides the *Allium* mentioned above, which was not abundant, included *Parnassia*, *Carex*, *Luzula*, *Pedicularis*, *Impatiens*, *Begonia* and *Primula*. It was remarkable how the pseudo-bulbs of *Pleione* clung to the steep

bare slabs, so that whole turves could be peeled off, leaving only naked rock beneath. By following the narrow scuppers, and, when one became too steep, traversing across to another, I ascended directly to the ridge above the chasm by this route, and so almost to the summit of Pasoi Hpawng. It was a short cut to the top, and real rock climbing, hand and foot.

On August 24th I got back to camp earlier than usual and found the coolies returned. They were busy clearing the steep slope around our camp so that we could get a better view when we next came up in November. As movement was very restricted here, and we had not yet reached the alpine region, I decided to go down next day and try again elsewhere.

The scramble up to the ridge did not take long. It had seemed a long descent when we were losing our hard-earned height, but actually it amounted to very little. The men had cut a path through the slim *Arundinaria*, which filled the gully, all lying down the slope as though pressed down by some heavy weight. Then, with a ready-made path along the ridge, we made good progress and soon reached the forest again, passed camp II, and at 2.30 camped a little above our original camp I. I now looked out especially for the yellow-flowered rhododendron whose corollas I had noticed on the ground on the ascent; it would be easier to spot now, as we looked over the crowns of the trees. I did see one bush, but it was high up, out of reach. It is no exaggeration to say that one might climb a mountain such as this half a dozen times in a single month and notice new plants each time, so large is the number of species. Of course, coming down, I had quite a different view of the forest from that obtained on the way up, and noticed several plants which had previously escaped me, notably a *Vaccinium* with small box-like leaves and small black berries. I also paid some attention to the numerous bamboos met with. The tall bamboo of the 8000-foot ridge which forms ill-defined clumps, with open spaces and scattered trees between, has already been mentioned as the chief constituent of temperate bamboo forest. It grows some thirty to forty feet tall, and has



smooth bottle-green stems with a glaucous bloom under the sheath. Along the narrow ridge mixed with many shrubs is the dwarf yellow *Arundinaria*, its solid stems very tough and unyielding; while in the moss forest grew a third bamboo with slender yellow wand-like stems, easily bent over — this was in flower. It had beautiful glaucous leaves. In the middle temperate forest at about 6000 feet, the most abundant species is another *Arundinaria* with long creeping, not clump-forming, rhizomes; the hollow stems bear a ring of spikes round each node and are best left alone! If clutched carelessly, they tear the hands. Below 6000 feet many kinds of bamboo occur. Considering the almost unlimited usefulness to man of these forest grasses, and the almost unlimited quantities of them available here, we should learn more about them.

It rained all night but ceased soon after dawn, and the sky grew bluer and bluer as we descended into the sunlit valley. From the spur, we even had a view of the mountains to the north-west, on the far side of the Tamai river. At about 6000 feet I noticed several blue pines, widely scattered as they are here, and we passed through a dense undergrowth of *Arundinaria*, the beautifully coloured broad-leafed fern *Dipteris*, and another fern, *Gleichenia*. After leaving the crest of the ridge, we got into typical hill jungle at 5000 feet, with *Bucklandia*, a big-leafed *Castanopsis*, small stemless palms, climbing palms and big root-climbers like *Raphidiophora*. At 3.30 we were back in the village, having come down easily in two days; the Daru coolies without heavy loads, would come down in one day. I estimated our ascent as follows:

1st day, to camp I 3000 feet
2nd day, to camp II 1500 feet
3rd day, to camp III 500 feet (to Mungu Hkyet 500 feet).

Though we had never reached the alpine region — because there was no alpine region within reach — it had been a successful trip. Altogether I had found twenty species of rhododendron, but only one *Primula*. The most interesting

plant met with, however, was the dwarf *Cornus*. The distribution of *C. suecica* is circumpolar, if we regard *C. canadense* as a geographical variety. Its discovery in north Burma has therefore to the botanist all the thrill of discovering a new species. The latter may propound no particular new riddle, whereas the finding of a supposed endemic species such as *Rhododendron fulgens*, here, and still more of a plant so far from its known limits as *C. suecica*, at once raise problems of distribution of the highest order.

On the 27th we returned to the Tamai valley by a different route, and after crossing a spur, descended to sunshine and blue skies in the valley a few miles above where we had left it a fortnight previously. We soon reached the hut, where I decided to halt for a few days and take stock of the position. I had left half my luggage at the first hut, and that was now brought up. The fine weather came to an end, and for three days and nights it rained steadily, the roof of the hut leaked badly, and the river rose several feet, flooding the bridle path at one point: the rain must have been widespread for the Tamai to rise so swiftly, and fall again suddenly. It was a grand sight. To see its irresistible rush as it slammed its way over the rocks and gradually faded away into the mist gave one some idea of its enormous power. Yet how tranquil and harmless it looked during the winter!

The evening mist which still hung over the river was curious. It was not more than five feet deep, and could only have been due to the colder water chilling the air immediately in contact with it, causing some of its vapour to condense as cloud — another hint that much of the water is derived from melting snow and ice. Sand flies were very numerous, and a torment. At night I always had two naked candles burning to attract them: but though hundreds were burnt to death, the numbers did not diminish. It seems astonishing that so minute a creature, a dozen of which could sit on a pin's head can cause so much anguish and irritation. A few getting entangled in one's hair can drive one almost to distraction. No oil that I know of

discourages them — I have tried citronella, lemon grass and others. What with sand flies and other common Diptera, rain, sweltering heat by day and a leaky roof by night — and every time I moved my bed, the drips seemed to break out afresh — the last few days of August by the Tamai were unrestful. A welcome break came when Stubbs sent along some letters and papers from Fort Hertz.

We were now back in sub-tropical forest, altitude about 3500 feet, and climbing plants were again much in evidence. Amongst the commonest were: *Entada scandens*, *Vitis*, *Dioscorea*, *Smilax*, *Pueraria*, *Ficus*, *Piper*, *Jasminum*, *Kadsura*, *Acacia*, various *Asclepiadaceae*, *Apocynaceae* and many others. There was also a great variety of ferns, of which probably 100 species occur in the Tamai valley alone. Other vascular cryptogams include several species of *Selaginella*, and of *Lycopodium*, and a horsetail (*Equisetum*).

A small-leaved tree with fluffy white flowers was in bloom on the river bank: this was a species of *Eugenia*.

I had now to decide on my next venture. I still hoped to reach the alpine belt on the Tamai-Dablu divide, though the high mountains west of the Tamai would do equally well if there was any means of reaching them. Given time there is no reason why any peak or ridge should not be reached: it is mainly a question of hiring men to cut a way through the dense forest. Moreover there are many unknown paths leading to hidden villages or clearings, or used only by hunters, which take one far into the hills. Unfortunately I had neither the time nor the money to proceed by trial and error. The next effort must succeed, or the expedition fail in its main object. Studying the map, I believe it would be possible to reach 11,000 feet or higher on the watershed above the village of Gawai; and as Gawai was only two marches up the valley, I selected this point for attack. I still had no idea of going far; but if there was no means of reaching the watershed here, I would have to try further north. And already September was upon us.

CHAPTER EIGHT

SEPTEMBER 1st, a fine sunny day, found us on the road again. The barometer was 26.3 in. at the start, 26.5 in. 24 hours later, and 26.3 in. at Gawai the same evening.

We passed through a good deal of second growth, but did not see a hut or a village all day. Here and there patches of bamboo jungle replaced the broad-leafed forest. The commonest bamboo was a tall broad-leafed thick-stemmed *Dendrocalamus*, which formed huge clumps. Young shoots, now eight or ten feet tall, are a bright purplish pink. People had been felling stems and shaving down suitable lengths to make drinking cups and arrow cases; my coolies did the same. A second tall clump-forming species has thinner-stems. Still thinner and much branched is a climbing species which had lately been in flower. It scrambled to the tops of the tallest trees.

The blue pine was now a common sight; it did not descend to the river yet, but was conspicuous in the forest about a thousand feet higher up. In the evening rain fell, with a thunderstorm some distance away.

On the following day we had to cross a large torrent by a very bewhiskered cane suspension bridge. It looked unsafe; but the only person who met with a mishap was myself. I had crossed the river, and was about to descend the bamboo ladder to terra firma — for the bridge was suspended from a tree some height above the river bed. I put my hand on the guard rail, a rotten bamboo, which immediately broke, and I lost my balance. To save myself I jumped and landed in a heap on the stones in the river bed 10 feet below, where I lay half stunned. I was shaken but otherwise unhurt.

Again we met with temperate plants, now becoming more common on the roadside banks and in marshy places: *Hydrocotyle* and another umbellifer 8 or 10 feet high, not unlike hedge

parsley, *Plantago*, *Epilobium* and *Valeriana* were common weeds. There also appeared a number of small pea-flowered undershrubs, some of them prostrate, of the genera *Lespedeza*, *Crotolaria* and *Desmodium*, all with brightly coloured but tiny flowers. In damp shady spots, often by trickling streams, a plant bearing long spikes of attractive little blue flowers was abundant — *Rhynchospermum*. For the first time the bridle path climbed high above the river, giving us a fine view far down the valley. No high peaks were in view: but the fact that we had crossed several fairly big streams since leaving Pangnamdim showed that the Tamai-Dablu divide must be high. It was also evident that the watershed lay well back towards the Dablu, much nearer that river than it was to the Tamai, as suggested by the view previously obtained from the Mungu Hkyet. It seems to be generally true in north Burma, that the watershed is always pushed as far over to the east as possible — no doubt because the rain comes chiefly from the south-west.

As far north as Gawai the Tamai valley is comparatively thickly populated, though few villages are visible from the bridle path, even across the river. Unlike the Kachin villages, and the relatively huge villages of some of the Assam hill tribes, the tiny Daru villages are not perched on the shoulders of the spurs, staring truculently across a glen at one another, but are hidden from sight amongst the folds of the hills, no village being visible from any other village. The larger and stronger of the hill tribes seize upon defensible positions and, like wasps, seek security by warning enemies not to try conclusions with them, lest they be worsted; a mixture of bluff and resolution, for, like the wasp, they carry a sting.

Not so the poor hunted Daru, who is anybody's prize. His only safety lies in concealment; sting he has none. The smaller villages, as previously noted, are short lived, here today and gone tomorrow, owing to their system of destroying the forest in order to cultivate crops in a region where there is little arable land. When all suitable slopes within reach of a village have been cleared and cultivated one after the other, the people

must either start again at the beginning, that is with the earliest cleared slope, and clear it again, or move elsewhere. It requires several years for a cropped area to recover sufficiently to be cropped a second time, or for jungle which can be cut and burnt to grow up; and meanwhile the best soil is first impoverished, and then removed altogether by rain. Nevertheless, the same area is cropped again and again, and in thickly populated regions, like the Assam hill tracts, at shorter and shorter intervals. It would be interesting to know what are the yields per acre over a succession of years. Possibly the natural rotation, or rather succession of vegetation, following the total destruction of the original cover, does benefit the soil; but it seems improbable that it will ever again be so fertile as it was for the first cropping, immediately after the cutting and burning of the climax forest. After two or three crops have been raised, each perhaps poorer than the last, it may need a quarter of a century to recover its fertility — or it may in extreme cases, be left as bare rock.

On the other hand, if a certain minimum number of years were allowed to elapse after each cropping, and precautions taken to conserve the soil, it is possible that the fertility might be preserved indefinitely. Clearly there is room for experiment here. Maize is the chief crop in the Tamai valley, though rice could be grown. The Darus also eat a certain amount of fish, and on special occasions, such as wakes, harvest festivals, the planting of the seed and other ceremonies, chicken, pork, and even *mithan*. There are fish in the Tamai, and the Darus catch them in thorn-lined conical fish traps and in nets, or they harpoon them. They also snare barking deer, gooral, monkeys, serow, pheasants, and shoot them with cross bow and poisoned arrows. In fact the Daru is not dainty about food, and on occasion will eat anything from frogs and snails, to lizards, snakes and wasp grubs — most of which it must be confessed are highly nutritious, and when cooked, hardly distinguishable from more expensive fare. It would be difficult to sustain an argument that the Daru's taste in victuals is coarser than our own; but he lacks our culinary resources.

All the familiar blood-sucking pests were abroad when it rained, leeches being troublesome even on the road now. When the sun came out, blister flies swarmed, but there were fewer sand flies at night than hitherto. Our first day at Gawai was really fine, and a strip of blue sky appeared all down the long valley, like unrolling a silk carpet in heaven. The headman came to visit me, and when I had told him what I wanted, he said yes, it would be possible to reach the eastern ridge. He promised to arrange for pathfinders and coolies — he himself would be my guide. He was as good as his word and I spent only two days in Gawai; by the evening of September 4th all was ready.

My spirits rose. There had actually been a cold weather mist in the early morning, and heavy dew! At 9 a.m. atmospheric humidity was 86 per cent at 2 p.m. 61 per cent. The maximum shade temperature was still over 85°, but there was some breeze after midday. Sunshine all day in September seemed almost too good to be true; the sky clouded over after dark and there were distant flashes of lightning and ominous rumblings; later came the rain. Water poured through the worn thatch in a dozen streams and I spent a busy midnight hour saving specimens which were scattered about, and also trying to keep my bedding and myself reasonably dry. Next day the headman and his coolies arrived in good time, and we started soon after 9, the sky rapidly clearing. Barometer 26.3 in. Entering a nearby gulley, where a noisy torrent flowed, we followed a track freshly cut through the bush undergrowth and up a forested slope so steep and slippery that I frequently had to grip the bamboos to prevent myself from falling, or to haul myself up. Thus on the north flank of the spur which bulged into the valley we ascended direct to the crest, and topping it saw the Tamai again, shouldering its way southwards. The south face of the ridge was covered with high grass; it had probably been cultivated at one time, but the grass now seemed to be permanent.

We found a well-marked track up the ridge, and presently

entered the forest to emerge into a second grass blank later. This marked the utmost limit of past cultivation; the barometer was 25.0 in., so the altitude must have been about 6000 feet. From this point till we reached the alpine region we were never out of the forest.

And what a forest! full of the grandest trees, not tall but sturdy and with noble crowns; deciduous and evergreen, together with shrubs of all kinds, climbing plants, carpeting plants, undergrowth, epiphytes. When one meets with what appear to be different types of forest on every mountain, the difficulty of a simple classification is obvious. The best one can do is to arrive at some sort of generalization. Of course an intensive study of all the species and their relative abundance is necessary before one can frame a complete classification of forests; nor is it possible to say offhand what local influence such important factors as light, humidity and temperature may have in effecting small alterations, without much study and comparison. The forest here was different from the forests of the Mungu Hkyet at the same altitude: but *how* different? In a journey such as this it was impossible to obtain more than a cursory knowledge of the immense flora of north Burma. Nevertheless I did succeed in making out a preliminary classification of forest types. But here let us be content to take the trees and shrubs in the order of their appearance leaving the question of forest types till later.

From the gulley in which we started to the point where we finally entered the forest on the ridge at about 6000 feet altitude we were amongst broad-leaved mainly evergreen trees with an occasional blue pine towering above the canopy, or a graceful juniper. Other trees here were maple, *Machilus* (which was in fruit), *Cinnamomum*, *Schima*, *Engelhardtia*, followed on the ridge itself by *Bucklandia* and *Eriobotrya*. The appearance of the last two, and the disappearance of such trees as *Saurauja*, and the last of the climbing palms (*Calamus* or *Daemonorops*) and of the larger fig trees at about 6000 feet, marks a change in the type of forest.

We continued to ascend and presently met with thickets of shrubs growing amongst the rocks: the sticky *Rhododendron vesiculiferum* and *R. megacalyx*, *Cotoneaster*, *Ilex* and *Berberis incrassata*. This last makes a great display in June when its long gawky stems bear at intervals great spherical bunches of gamboge flowers, clustered like bees. Later these give rise to plum-coloured berries on crimson stalks. The leaves are crinkly, and spiny as holly leaves at Christmas. In November I collected a spray bearing 153 purple berries on 4 inches of stem. We were well into the temperate zone, of that there could be no doubt.

I saw few birds. Those going north had long since departed, and were not due to return yet. In spring, when many trees, and especially rhododendrons, are in flower, a host of birds visits the upper regions of the Irrawaddy; perhaps after June they depart, or spend the rainy season in the alpine region.

Several handsome shade-loving butterflies flitted amongst the trees; most of them when disturbed — and they rarely moved till they were underfoot — went only a short distance before settling invisibly again. The finest and rarest was a species of *Kallima*, the upper surface all shimmering peacock blue, otherwise like *K. inachus*, resembling a brown dead leaf when at rest. Rather common was a smaller insect, almost black above slashed with a diagonal cream band. There was also a large amber butterfly with a slow deliberate flight.

Finally we came to rocks over which we had to clamber, and so to the foot of a massive leaning tower under the shadow of which we camped. The cliff sloped up over our heads, a sort of Stonehenge overgrown with forest, and gave us sufficient protection from the rain; all about us were fallen blocks, entangled amongst the roots of trees and overgrown with moss.

The barometer was 22.5 in. a fall of 3.8 in. since leaving Gawai; our altitude therefore corresponded closely with that of Mungu camp. The last of the blue pines had been left below, and in one day we had ascended nearly 4000 feet, from sub-

tropical hill jungle to temperate forest and the beginning of conifer forest.

I had an hour in which to botanize before it grew too dark to see. The ridge was well forested though the trees along the crest were stunted and gnarled and in the most exposed places only shrubs could find foothold. The north flank was steep, covered with normal forest but the south flank was precipitous. Here trees could not possibly grow upright; they stuck out at all angles sometimes almost horizontally. We could see over their heads and far down the valley of the Nam Tamai; but northwards and eastwards we could see nothing. Amongst big-leaved trees here I noticed *Gamblea ciliata* again, *Magnolia rostrata*, and two rhododendrons, *R. sino-grande* and *R. sidereum*. Also oaks (*Quercus pachyphylla* and *Q. lanuginosa*). *Illicium*, birch, hemlock, spruce, *Sorbus*, *Ilex*, *Rhododendron neriiflorum* and a species with tawny bole related to the Chinese *R. irroratum*. None of the rhododendrons was in flower.

Sand flies were troublesome in this camp but we smudged them out with a smoky fire. After dark a number of soft-winged beetles with glow lamps at the ends of their bodies came into my tent.

Early in the morning it began to rain. We continued up the ridge in an easterly direction, sometimes climbing steeply for short distances to such good purpose that presently silver firs appeared and quickly increased in numbers. But we halted earlier than usual; at the start B. 22.6. T. 59° at camp B. 21.3 in.

The pathfinders were still ahead of us and had blazed the trail with a minimum of cutting. Only where, as occasionally happened, we came to a broad face which swept steeply upwards was there any doubt about our direction. With silver fir ushering in the highest belt of forest, appeared for the first time also great candelabra trees of *Rhododendron arizelum*, its noble leaves thickly felted beneath with a chocolate-brown or reddish fur. *Tsuga*, rather battered, was the only other common conifer but there were many small deciduous trees including *Acer Wardii* with beautifully dissected five-pronged leaves,

the central point sharpened to a drip tip. Wherever the ridge narrowed grey granite rocks outcropped, with bushes instead of trees growing amongst them. Two more new-comers were *Rhododendron chaetomallum* and *R. pruniflorum*. At the same time the epiphytic *R. megeratum* grew like bunches of mistletoe when in bloom even more deserving to be the Golden Bough had there been anyone to worship it.

We descended a little, to camp in a vile spot amongst bamboo, though perhaps the fact that it was raining steadily made it seem viler than it really was. Anyway the headman said it was the only place where we should find water. The great difficulty on all these ridges is shortage of water, and the steeper and narrower the ridge, of course, the less water there is, or rather the further one has to descend to find it. To be compelled to go down — and up — 500 ft. every time you want a bucket of water ensures economy of washing rather than of drinking. It seems curious that in so moist a country one should ever be short of water. But after all rain falling on the crest of a ridge which slopes at 60° or 70° on either side is like rain falling on the ridge pole of a house; it slides down quickly and one must go down to the head of a gulley where a spring comes to the surface to get water. Wherever streams flowing down opposite sides have cut a deep notch there may be a water hole on the saddle itself; but this does not often happen. In the rainy season one can often obtain water from bamboos, but not in great quantity.

At Landslide camp our water came from a gulley below a rock slip from which the vegetation had peeled off leaving a bare shallow funnel-shaped face lined with lush meadow; behind, where the rock held firm, a dense growth of shrubs appeared, and below were forests of silver fir.

I was glad to camp early as I had collected a good many specimens; also when I saw the gulley I wanted to explore it, hoping to find a *Primula*. It looked just the place. However, though such temperate plants as *Roscoea*, *Adenophora*, *Fritillaria*, *Delphinium*, *Astilbe* and *Rodgersia* grew here, no *Primula* greeted

me; the nearest thing to it I could find was a creeping *Androsace* shrinking under the bushes.

On the solid rock outcrops were *Corydalis*, *Parnassia* and saxifrage, and in the phalanx of shrubs too solid to force a way through I noted *Deutzia*, and rhododendron with some juniper. We were surrounded by fir forest with hemlock more scattered now and *Rhododendron arizelum* in a sea of *Arundinaria*. The altitude was about 10,000 ft. some 1200 ft. above Stonehenge camp. We had only to climb another thousand feet in order to reach the alpine region or at any rate an alpine flora; a few stragglers, or pioneers, descend so low as 10,000 ft. Though we were hardly four miles east of the Tamai river we were quite free of the warm air influence and more under the influence of cold air derived from the near presence of large quantities of snow.

September 7th was a very wet day and we were in the clouds almost the whole time as for four hours we marched along the ridge, gaining height slowly. When after a final sharp ascent we reached the main ridge it was hard to realize we were really on the watershed at last. We turned south and almost immediately caught a glimpse through the clouds of deep valleys on either side and of high mountains on our left hand. My aneroid barometer did not function above 10,000 ft. and our altitude was now about 10,500 ft. All the way up we were in silver fir — hemlock forest, mixed with a few broad-leaved deciduous trees, *Rhododendron arizelum*, and *Arundinaria*. The ground was covered with a thick felt-like carpet of moss, soft as a feather bed, in which nestled tiny orchids and a minute chocolate-flowered umbellifer with linear leaves, dwarf creeping *Rubus*, *Vaccinium* and *Clintonia alpina* with white or pale blue-violet flowers. The tree-trunks also were fat with monstrous sponge-like growths of moss which gave them a peculiar bloated appearance. Some of the silver firs, their tops broken off by wind or snow, had as many as three different species of rhododendron growing on them one above the other — *R. megeratum* with neat little leaves, electro-plated beneath, *R. micromeres*,

with squinny jaundice-yellow flowers, and an unnamed dwarf.

So we camped on the ridge, clearing a small space amongst the rhododendron bushes and bamboo which promised an all-round view as soon as the clouds lifted.

In the afternoon I went out to reconnoitre. It was for me a great day when after six months of travel and frustration I at last reached what was in fact, if not in theory, the alpine zone of Burma. What treasures would I find I wondered?

Not far along the ridge was a depression where the ground had sunk six or eight feet owing to undermining at a gully head. Here was a natural well or dew pond. It was overhung by tree rhododendrons and dense clumps of a thin-stemmed bamboo which bent gracefully over as though looking for its reflection in the muddy pool. This was to be our water supply, but it lasted only a day.

Crawling through the tangle of rhododendrons to the top of the bank I found myself on the edge of a cliff, down which I was able to let myself by holding onto the branches until the slope eased off; I was amongst lush herbage up to my waist. Presently I stood on a scree with a clear view below into the funnel of an open gully which gradually narrowed as the slope increased until it finally plunged headlong over the cliffs to a larger valley dimly seen far below. No better place could be imagined for alpine plants; it was exactly what I wanted. The gully began with the low cliff down which I had half tumbled, followed by bare scree; just below that came a patch of meadow and there was a hard core of gnarled trees whose crippled trunks were forced to conform to the angle of slope. On either side the rock-lining of the funnel rose up ledge on ledge more and more steeply till it ended in vertical cliffs whose brows were furred with forest. But even at this source, and at the height of the monsoon, where the mountain was wasting away round the ultimate springs, we had to descend a couple of hundred feet to find visible water running; and it was here the coolies had to go, down and up again, carrying buckets of water after the pond ran dry.

This gulley, with the cliffs on each side, became my principal hunting ground; the only other one was the steep rocky ridge itself above and beyond our camp, which culminated in a peak 11,000 ft. high and perhaps a mile distant.

On the sheltered flank, facing east, the silver firs skirmished in extended order right up to the view of the ridge like the scouts of an army anxious to discover what lay beyond the range. The flattened branches curled up their emerald tips like babies' fingers. But what was really remarkable about these trees was that despite their dwarf stature and juvenile appearance they were fully mature, often well stricken in years, for they bore numerous sleek bluish-violet cones perched in rows along the branches like fat candles on a Christmas tree; they glistened with congealed drops of colourless gum. The miniature habit is, of course, a climatic effect.

No *Tsuga* here! But where *Abies* will grow, and often where it won't, *Rhododendron arizelum* will also grow, and this filled in much of the space between the trees. Wind and snow and lack of soil keep open the razor edge of the ridge and I could get along quite well, so long as I kept to the ridge. The east face was impassable without cutting one's way, and the west face was a precipice.

Wherever rocks gave some protection from the howling wind small bush rhododendrons grew in great variety. In bloom they must have formed a rainbow sea, the pink of *R. Martinianum* mingling with the flashy yellow of *R. triflorum*, crimson of *R. chaetomallum* purple of *R. tephropeplum*, and deep plum of *R. pruniflorum*. Other common shrubs were species of *Viburnum*, *Pieris*, dwarf *Ilex*, *Pyrus*, *Berberis*, juniper, and strange to relate, *Litsaea*. To find a laurel in the alpine region was surprising, the vast majority of the family being sub-tropical though the bay laurel is hardy enough in Britain, and *Sassafras* in eastern North America. As I only proposed to spend a few days here the coolies decided to stay too. They built themselves warm little nests fenced round with bamboo and branches of silver fir to keep off the wind. Inside was a fire of rhododendron

wood round which they lay curled up like kittens. As already related they soon emptied our water hole and had to go several hundred feet down the gulley, which was so precipitous that it took an hour to carry up half a bucket full. I got a little extra sweet water from the pond by the simple expedient of laying a waterproof sheet under the bamboos after a night's rain and shaking them over it. Two days I devoted to exploring the funnel and its surrounding cliffs. Except for the top 50 ft. the funnel itself sloped at a fairly easy angle but rapidly became steeper as the cliffs on either side converged; the actual gulley corresponding with the stem of the funnel was precipitous. The rock ledges were covered with a solid growth of dwarf rhododendron and were climbable. I found it possible to descend about 500 ft. from the ridge, which brought me well into the gulley.

On this face from which the forest had been stripped were gathered together a remarkable assemblage of first-class garden plants belonging to several well-defined and well-contrasted exposures. Take, for example, the funnel with its loose gravel chute, ample water supply and perfect drainage. From the splayed-out top sprang the colony of tight little trees — they looked no more than big shrubs — surrounded by meadow. Then above that came an almost vertical gravel cliff where neither shrubs nor meadow plants could find safe anchorage. Here were a few small scattered herbs — a violet with vivid chrome-yellow flowers delicately veined, and the smallest creeping *Gaultheria* I had ever seen. This last formed a network of fine threads bearing minute leaves and pink flowers. Yet when autumn came, the snow-white berries swelled up to an incredible size glistening like hailstones. The central colony of trees consisted mainly of birch with warm red ragged bark; but there were also one or two magnolias with dumpy crimson fruits — *M. globosa*. The tall meadow plants amongst which they grew included species of *Aster* (like *A. fuscescens*), *Strobilanthes*, *Phlomis*, *Thalictrum*, *Pedicularis*, *Astilbe*, *Rodgersia* with big horse-chestnut leaves, *Polygonum* and in fruit a plant which at

first glance I took to be a species of *Meconopsis* and which was probably the yellow-flowered *M. villosa*. It was rare, but I found several capsules containing ripe seed.

But it was on the cliffs that the best-looking plants grew. All flowers were long since over and, with the exception of rhododendron, the seeds of most species were being sluiced out of their capsules by the rain; but one look at them convinced me that the majority were treasures. Here were the scattered solitary urn-shaped fruits of an *Omphalogramma* and the top-shaped capsules of a dwarf *Nomocharis* both with ripe seed; the heather tufts of *Cassiope*; cushions of *Diapensia*, and a blue-berried *Gaultheria*. Dwarf rhododendrons formed three-quarters of the rock flora, and to these I paid special attention, it being more difficult to distinguish the species of these plants when not in flower. I recognized the dwarf prostrate *R. repens* each leafy shoot glued to the rock ending in an erect crimson capsule; *R. calciphila* not quite so prostrate; *R. haematodes* a little larger and rarer, and one or two others. There were at least six species interwoven along the ledges.

Finally down in the stem of the funnel, jammed into crevices above the splashing water, I spotted two plants from a little distance, and with beating heart clambered down to them. One was the small tufted *Allium* with narrow grass-like leaves and nodding white flowers already described. It is an extraordinarily dainty rock plant. At sight of the other, though the flowers were long since over, my heart leapt. There was no mistaking the strap-shaped leaves, like well-worn washleather, or the stem with its cluster of crumbling charred-paper capsules packed with coffee-brown seeds. It belonged to the royal race of *Primula* and to the élite of that race called by botanists 'Nivales'. These 'Nivales' are often robust plants (though there are dwarfs too) usually bearing large gorgeously coloured flowers, and they are unmistakable aristocrats. I would dearly have liked to see this plant in bloom, the first alpine *Primula* I had found since coming to the Tamai valley; but I was three months too late. Probably it was a form of *P.*



Agleniana; anyhow it was in ripe seed, and that was something. While scrambling on the ledges above the gulley which sloped downwards and outwards making it necessary to follow a zig-zag route, I found a dwarf *Rhododendron* new to me. It bore a certain resemblance to *R. campylogynum* but as there were no flowers I could not tell how different it really was. I found only the one plant bearing a single capsule so it may be imagined with what care I marked the exact spot. When I returned in October I collected the ripe capsule and guarded the seed as though it were gold dust. Later the village cows had an all-in wrestling match with my seeds, which got the worst of it, and it seemed that the new *Rhododendron* failed to survive the bout. However, as will be related in due course, it was finally rescued, and all was well.

It rained hard most of the time, and it was cold on the windy ridge when one was wet through. Banks of grey yeasty-looking clouds smothered the entire landscape and all day long the mist rolled up out of the Tamai valley 6000 ft. below, and came scudding over the ridge. It gave one a faint idea of the tremendous amount of evaporation which is going on all over the earth all the time. Nor could I persuade the coolies to come out with me when it was raining. If rain came on while we were out, they would creep back to their fires at the first opportunity; for they were ill clad.

One other plant I found is worth mentioning; a large tussock-forming *Hypericum*, bearing a score of flowers or rather capsules, for the flowers, which must have been large were long since over. I met with only one specimen, at 10,000 ft. On the ridge also I found a dwarf *Primula*, but in very short supply; it too had ripe seed — no flowers.

Besides the plants mentioned I collected many of no special interest except to the botanist, and others long known to the gardener. Amongst the latter was *Rhododendron fulgens*, a Sikkim species not previously known to occur in Burma or indeed anywhere outside the eastern Himalaya.

On September 9th, a day of unremitting rain with a blank

wall of mist all round, was my most successful day in the gulley. I got back to my tent at four o'clock wet to the skin and shivering with cold; changed into dry clothes; and had tea. To celebrate my success I had two biscuits, jam on all chuppatties, and sugar in all three cups of tea. My diary adds dryly: 'However, the same old dinner of soup and rice, dhal and two potatoes.'

On the 10th I went up the ridge again to search for more of the second *Primula* but was not successful, though I found many other cool temperate plants, as larkspur, *Corydalis*, *Ajuga* and *Pinguicula alpina*. I went some distance, but owing to cliffs on the west side and impenetrable thickets on the east I dared not leave the ridge. It was colder than I should have thought possible at 11,000 ft. with a raw wind. How I looked forward to my warm little tent and dry clothes!

It had been so consistently wet for 72 hours, day and night, that I thought it might be fine on the morrow and was willing to stay one more day and chance it. But the coolies had finished their food and wanted to go down, so down we went. I was not sorry.

Reaching Landslide camp in quick time I nevertheless halted. We could easily have reached Stonehenge, but I thought it might pay me to explore the landslide a little more thoroughly and also I wanted to collect seed of the *Androsace*. It was a terrible day for plant hunting on a steep insecure slope in impenetrable vegetation. I found a few *Androsace* plants and got a few seeds from them, nothing else of note. It was hardly worth it.

Starting early in pouring rain on September 12th we reached the Tamai valley in good time. At Stonehenge, lying on a rock right out in the open I saw a small snake between two and three feet long. It looked like a viper and it had a dark zig-zag mark along its back something like the common English viper. An epiphytic 'Maddeni' rhododendron was in bloom here. The primrose-yellow flowers were larger than those of the brassy-yellow-flowered epiphyte discovered on the Munghu Hkyet

route; it bore also half-ripe capsules so it must have flowered once already, in the spring. It is unusual for rhododendrons to have two flowering periods, spring and autumn, as this one undoubtedly had, though alpine species will produce an odd flower or two out of season.

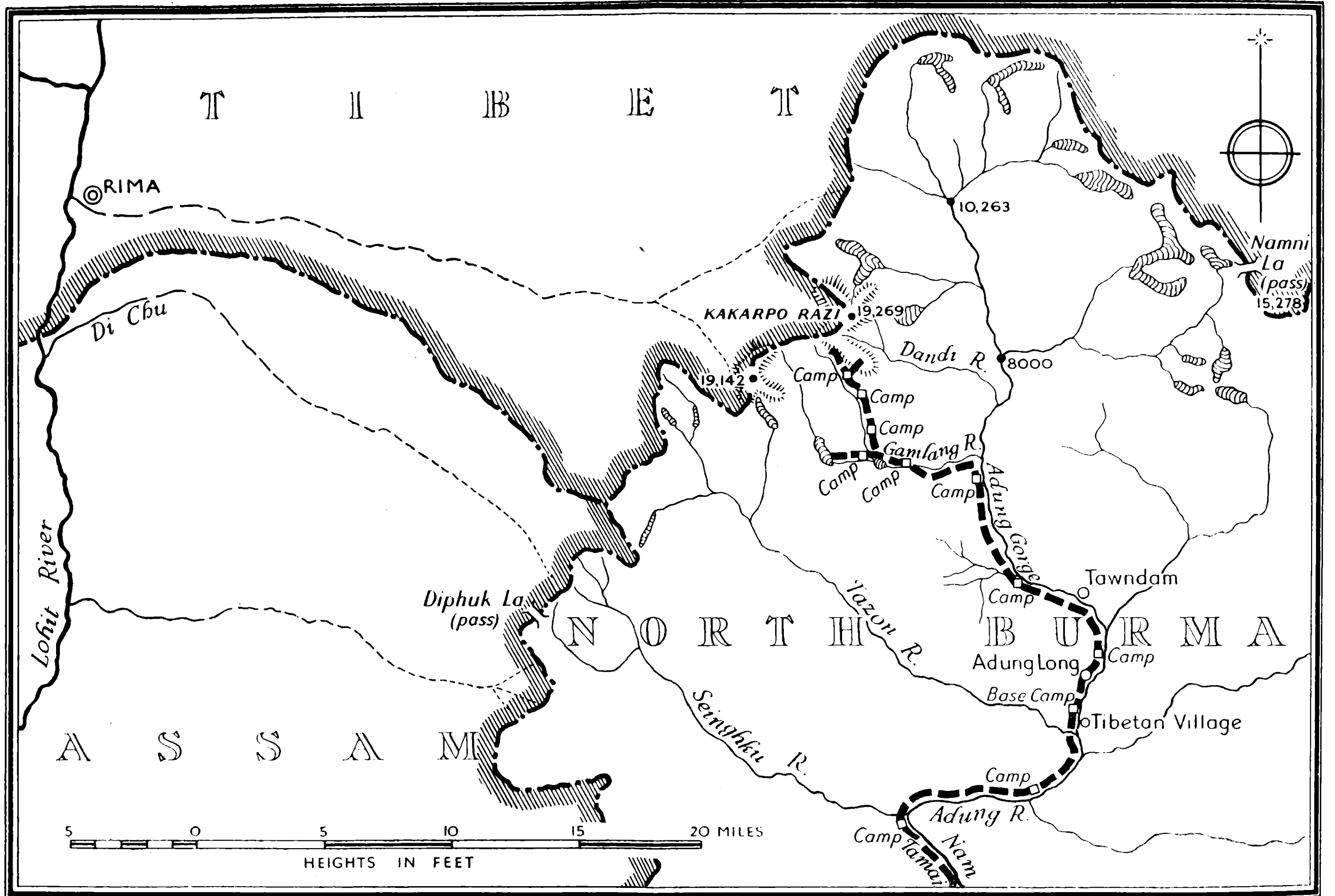
No sooner were we back in the warm valley than we were plagued by swarms of sand flies; we had been free of these pests at least on the alpine ridge.

CHAPTER NINE

THE question now was — what next? It was September 12th. I could not start collecting rhododendron seeds before the end of October. Should I seek a third way up to the range east of the Tamai? All this country was unexplored, so it hardly mattered where I went. The flora of the Mungu Hkyet and of the mountain from which we had just returned were different enough to justify any number of visits to different parts of the same range. Besides, I said to myself, think how restricted is the distribution of many species here, both alpine and temperate. There was, for example, *Rhododendron imperator*, of which I had found a solitary plant in the Seinghku valley; *R. myrtiloides*, found once in the Chawngmaw valley; *Meconopsis violacea*, a few plants within a small area in the Seinghku valley; *Paphiopedilum Wardii*; *Meconopsis villosa*; *Rhododendron fulgens*; the *Sorbus*-like *Zanthoxylum*, the clumpy *Hypericum*. Almost every ridge has its peculiar plants . . . no doubt the rareness of some was more apparent than real; but so long as over 200 square miles of north Burma remained unexplored for every square mile explored, that would continue. Rare or common, there are any number of desirable plants. . . .

Then I remembered Ka Karpo Razi, Burma's icy mountains, which I had caught sight of some years earlier. I would make an effort to reach them, to reconnoitre the approaches at any rate. It meant a fairly long journey — much longer than I had contemplated. When first I came finally to the Burmese Oberland, after our sterile journey into China, I was so weary of fruitless effort in search of an alp that my one desire had been to reach a point, any point, 10,000 feet above sea level, and stay there. Now the position was different. I had found my alp — two of them, or perhaps one and a half; and a fair number of plants. I wanted a change. So — why not break new ground, and combine topographical with botanical exploration?

KA KARPO RAZI AND ADJOINING DISTRICTS



No sooner was the idea put forward than it was settled. I spent two days packing and drying specimens. A strong breeze was blowing up the Tamai valley from the south; it ceased suddenly, and down came the rain in torrents.

As I have already remarked, the forests of north Burma are arranged in clearly defined zones, almost entirely dependent on altitude, and very little on latitude — the whole country covers no more than 5° from south to extreme north.¹ Longitude, however surprisingly, does make a difference, and the flora of the Nmai Hka valley and ranges to the east differs a good deal from that of the Mali Hka valley and ranges to the west, at the same altitude. Here the reason is the proximity of an entirely new type of flora — that of China, or the eastern Asiatic flora. The meeting line of this with the Indo-Malaysian flora is probably along the Irrawaddy-Salween divide. The major climatic barrier, however, runs — not north to south, as one might expect, but more nearly east to west (about west-north-west to east-south-east) following the alignment of the high peaks between 28° and 30° .

As I remarked before, bamboos, or tree grasses of all kinds, are found in every forest zone in north Burma, right up to 12,000 feet, though the greatest variety occurs between 2000 and 5000 feet. I found several types of bamboo thicket, which might be classified according to altitude roughly as follows: (i) bamboos of the lower forest, 4000 to 6000 feet, where climbing species ascend to the tops of the tallest trees, and mixed with rattans (climbing palms) impenetrable thickets. Tall clump-forming species also occur here; (ii) bamboos of the temperate forest, mostly species of *Arundinaria*, which are non-clump-forming rhizomatous bamboos of the undergrowth, which can be thick and impenetrable, or fairly open. Some species are armed with a ring of spikes round the nodes formed from arrested roots; (iii) bamboos of the moss forest. One

¹ But though latitude, as such, is of no importance, the proximity of the hot plains to the lower mountains in the south, and of the snowy mountains in the north, does introduce a disturbing factor. Hence plants found at 7000 feet in the vicinity of Myitkyina may be found at 4000 feet near Pangnamdim.

species at least forms big more or less isolated clumps, much taller than *Arundinaria*. It occurs on rocky ridges, amongst scattered trees. I might remark that whether bamboo undergrowth renders the forest impenetrable or not depends a good deal on aspect and on topographical detail. Bamboos, like other plants, have feelings, or at any rate likes and dislikes, and grow densely in a gulley, and more sparsely on a ridge, and so on; (iv) dwarf bamboo (cane brake) everywhere from 9000 feet up, mainly in the open, but also in forest. A solid-stemmed species about 5 feet high, impenetrable. There are other solid-stemmed, sub-alpine species, some taller and growing more densely, like the very graceful little bamboo of the water hole described in the last chapter.

The above makes no pretence to be a scientific arrangement; I merely note in passing that each forest zone has its peculiar bamboos as it has its peculiar or characteristic trees and other plants, and can be partly defined by them.

On September 15th we set out on our new venture. It was a terribly wet day, and even on the bridle path leeches were bad.

The path still lay on the left bank, but a few miles above Gawai we had to cross to the right bank by a cane bridge, the floor of which was nowhere more than three canes wide. The canes were slippery in the rain, and the bridge, which was high above the river, here forty yards wide, sagged low in the middle. I found the crossing unpleasant and was astonished to see a small dog which had been following us trot casually across, though the gaps in the basket work were large enough for it to fall through. More than that — half way across it stopped and looked round coolly to see if anyone was following and rocking the bridge, as though it were saying to the coolies: 'Wait a sec. you chaps, till I'm over before you start; it's devilish slippery.'

There were high cliffs rising from the water on the left bank now, and even the right bank was steep. We presently came to a torrent spanned by a very questionable bridge, and shortly after reached the rest hut. This, though very small, was water-tight. A runner from Fort Hertz, sent by Stubbs with my mail,

caught me up here. The country beyond Gawai is very wild, the mountains become more and more precipitous, villages are few, small and widely scattered. The forest if possible grows thicker than ever.

On September 16th after a tiresome march by a badly overgrown track, we reached the Seinghku confluence and the end of the bridle path. We could hardly have brought laden mules so far as this, even had we been able to get them over the Nam Tamai, which would be impossible in the rains. In the cold weather no doubt we could have swum them across, or rafted them. But the water was now far too violent.

For the last few miles the gradient steepens perceptibly and the river bed is cumbered with huge rocks. Many of these are so big that their tops stand clear of the water, even at high flood; but others are awash, or just covered, the waves swirling over them with a roar, to ebb back and expose sides sculptured and polished by the grinding flood. When the sun shines they glisten like snow.

But there was no sun this day, the clouds having descended almost to the river itself.

I was fagged out by the time we reached the confluence, having caught a chill on the liver which brought on a bad attack of diarrhoea. It was therefore a relief to find a bamboo hut with a sound roof on it standing close to the confluence and 75 feet above the river. The roar of the meeting waters made a fine clamour which echoed from the tall cliffs. Blue pines grew right down in the valley now; and here we rested for four days.

The Seinghku is no more than a big mountain torrent. It falls 10,000 feet in 40 miles and is a formidable obstacle all the way; but especially just here where it is 40 or 50 yards wide and littered with huge rocks.

Before we can proceed further, it is first necessary to cross the Seinghku by cane foot-bridge. These cane bridges do not last for ever. In fact, their life is but a few years, since cane, tough though it is, quickly deteriorates under the combined action of heat and cold, rain and damp. If the cables are weak, crossing

in the rainy season may be a risky business. This bridge looked particularly decrepit.

Just above the confluence a Daru ropeway spans the Adung as the main river is now called. The cables which are bound to trees high on either bank, hang forty feet above the middle of the river; and it needs some nerve, as well as strength and skill, to sit in the big cane ring threaded on the cables, and haul oneself across fifty yards of racing pounding river, hand over hand. It is not for timid souls; but Nung women, with babies on their backs, will tie themselves to the ring and pull themselves over quite gaily, as a matter of course.

At the confluence, in spite of the generally dense evergreen jungle, the blue pine advances right down to the river bank, though it does not become common till 5000 feet altitude is reached. The position of the hut is $28^{\circ} 0' N.$ Latitude; $97^{\circ} 35' E.$ Longitude, and the altitude almost exactly 4000 feet.

Nam Tamai is the Shan name for the river formed by the union of the Adung and the Seinghku. The latter, which is the smaller of the two, flows from the north-west, and it and the Tamai are in the same straight line; that is to say the Tamai flows in a general south-easterly direction.

At the height of the rains the confluence of these two rivers, owing to the head-on angle at which the Adung hits the Seinghku, is a turmoil of raging waters. The Adung, flowing deep and unruffled though swiftly towards the west, swings suddenly through 130° to flow south-east as the Tamai. This abrupt change of direction — even sometimes a complete reversal of direction — is by no means unusual in this corner of Asia. The Taron, the Wi Chu — a tributary of the Salween — even the mighty Yangtze itself near Likiang, all make these hairpin bends, and so also do other rivers.

This is due in the first instance to the two different river drainage patterns which have been impressed on the plateau, the first when it lay beneath a grinding ice sheet, the second as the result of the melting of that ice sheet. The largest glaciers, like those of the Adung and its feeders, were naturally the last

to disappear, and their valleys were still blocked by ice when lesser valleys like the Seinghku were being rapidly cut out by water. Hence, even a large river like the Adung had to adjust itself to the straight course taken by the Seinghku-Tamai, instead of the other way round.

In the wide angle between the two rivers a gaunt gable-shaped cliff to whose rugged ledges the twisted blue pines cling desperately, rises to a height of over 4000 feet above the confluence.

We spent the next four days waiting for coolies. It is always difficult to collect the Darus who flit uneasily through these twilight jungles, for food is scarce, and extra rations must be carried if journeys to the passes are in prospect.

The forest is still composed mainly of broad-leaved evergreen trees, including several figs (*Ficus Cunia*, *F. obscura*). Ferns particularly revel in the cool damp atmosphere of the deep Adung gorge, and occur in great variety. The bird's nest fern (*Aspidium*) is a common epiphyte, together with a yellow brown-spotted gesnerad, and a fleshy *Peperomia*, also such shrubs as *Aeschynanthus* and the lovely white flowered *Rhododendron taronense*. Many of the tree trunks are completely concealed by large-leaved climbing plants which cling close to them, aroids such as *Pothos* and *Raphidiophora* being particularly noticeable.

On the 18th two Tibetans from Rima, who had been collecting *pai mu* — which is the little white bulb of *Fritillaria Roylei*, valued by the Chinese as a drug — at the sources of the Adung valley, arrived. They told me of a path up the Gamlang river, which rises close to the snow peaks I was in search of. In view of the limited time I could spend there, I decided to explore this route, rather than try to reach Ka Karpo from the north as I had at one time intended to do. As it turned out, the southern approach proved impossible, for the Gamlang river does not rise directly from the peak, and even if it did the south face of the mountain is a sheer rock precipice. The next nearest river, the Dandi, does indeed rise from the glacier at the foot of the precipice, but the valley itself is impassable. We would have

done better perhaps to have continued up the Adung river to the 8000 feet confluence and thence up the northern branch to its source on the north face. But I had neither the time nor the rations for so long a journey.

And here it will be useful to say just what is known of the approaches to Ka Karpo Razi.

About fifty miles above the Seinghku confluence the Adung river splits into two almost equal streams, one from the north, the other from the east.

In 1931, Lord Cranbrook and I had camped at this confluence, the altitude being 8021 feet. We were in two minds which branch to follow; but finding there was a fair track up the eastern branch, and that it led to a pass over the main range, we eventually chose that, followed it to its source, and crossed the Namni La into Tibet. Our main summer camp, however, was a long march from the Namni La at an altitude of 12,000 feet. From this camp I climbed the western flank of the valley, and from the pass at about 15,000 feet, saw Ka Karpo Razi for the first time, twelve or fourteen miles away, almost due west of me.

From the 8000 feet river camp confluence it was exactly six miles distant in a direct line, west-north-west. But there was no track up the northern branch of the river, and I only got a mile up the valley, finding it hard to make any progress. The river was already in flood, very swift and turbulent.

Between the last village in Burma and the confluence three streams from the west join the Adung: the first rises south of Ka Karpo, but the other two, the Gamlang and the Dandi, seem to rise amongst the snow peaks themselves; one of them might therefore prove a good approach — if one could get into it. As related, I chose the Gamlang.

There is, however, a third possible route, namely from the Lohit river west of the range. Rima is the obvious starting point, but the mountains to the east of Rima are entirely unexplored, so little can usefully be said. It may, however, be noted that there is a possible route up the Di Chu valley from

near the Diphuk La, which is more easily reached from the Seinghku valley than from the Lohit. It would be well worth while exploring the valley which joins the Di Chu from the north-west — that is from the direction of the snow peaks, as this seems a possible approach. The river which enters the Lohit from the east, just north of Rima, looks even more promising.

During the four days we spent at the confluence it rained ceaselessly, and fine weather seemed further away than ever. The Seinghku quickly became yellow with mud, but the Adung flowing under the pleached trees which lean out from either cliff, retained its lovely colour, the green of thick smooth ice.

By the 20th we had got the ten Daru coolies we needed, and next day we started up the Adung. First we had to cross the Seinghku by the swaying cane foot-bridge, which was getting rotten after the damp heat and rain of the summer. It was slippery too. We followed a barely visible track through the gorge, with plenty of climbing and scrambling to cross the ravines, and occasional descents into the river bed, though the going over the boulders was no easier than in the forest.

It was infinitely fascinating to watch the bottle-green water as it slid massively by, and listen to the long drawn hiss as huge boils swelled up from below to burst at the surface. Despite the comparative calm, there was wild turmoil in the depths, where the real rapids lay.

I noticed many laurels and figs here, also an *Albizzia*, like *A. Julibrissin*, *Eugenia*, oak, maple, alder, mixed with tree ferns and enormous climbers. The rocky river banks below the forest level were in places covered with a moss-like creeping plant with little shining leaves and tiny violet berries, not unattractive (*Rubiaceae*).

That evening we camped well round the right-angled bend of the Adung, above which it flows definitely and finally from the north. The weather began to improve, and I hoped that the monsoon was at last ending.

On September 22nd we crossed over to the left bank by a cane

suspension bridge, thus avoiding a dangerous cliff; and shortly after came to a small Tibetan village of half a dozen wooden huts scattered in the mouth of a tributary valley. Here I learnt that the village of Taundam, which had served as our base camp in 1931, when we were exploring the Adung valley, had ceased to exist, and that the little colony had migrated down the valley to this point in order to escape the attentions of the self-appointed tax gatherers who cross the mountains from Tibet, ostensibly to collect *pai mu*, but also on foray.

I bought a hunk of butter from the Tibetans, and looked forward to having buttered chuppatties for a change. But Marang had other ideas, and converted it into ghee for cooking before I knew what he was up to.

A tall Tibetan with a Roman nose and a shock of lank hair which fell over his forehead now appeared before me. His face was pock-marked and crimped. He wore round his neck a piece of greasy string to which was attached a leather locket containing yak hair — a charm to ward off evil. His coarse hempen chupa was loose above his wrist, and his long legs were encased in ragged cloth boots, which reached almost to his grimy knees. Though he had aged fully twelve years in the six years since I last saw him as the gay loon of Taundam, I recognized him at once. It was 'George', the laughing cavalier, the last of the old brigade who had helped us in 1931, when we went to the source of the Adung. He told me that the summer after we left, the bad men from the other side of the mountains came over the pass as usual, to collect *pai mu*. They had come right down to the village, and had stolen cattle and much of the food. And the same thing had happened next year, only then they had taken away one of the Daru girls who worked as slaves for the Tibetans. In the third year the crops had failed, and some of the cattle died. So they had given up the struggle and moved down the valley, to this spot, and were licking the austere land into shape for the growing of crops, and the grazing of cattle. The medicine gatherers let them alone, as they did not dare to come down the valley as far as this, and the settlers were

happy. So Taundam was no more, and Adung Long too had gone, and the last Daru hut was only a couple of miles up the valley, on the right bank of the river.

There is not much population in this corner of the world, but life is crude and the strong prey upon the weak without correction. Man wages endless war on the jungle, he fights against the avalanche and landslide, against flood and the failure of scanty crops, coaxed from a lean soil, against pestilence and the ceaseless attacks of hordes of insects, against the wild beasts of the forest which tear down his fences and ruin his fields, and against cold and heat, and unremitting rain. For him the commonest verdict, perhaps the only verdict, is death by misadventure. Almost the only danger which never threatens him is drought.

The Adung valley, at least in spring, is surely one of the most beautiful mountain valleys on earth, but until man has found the means to quell some of the enemies which assail him there, he can earn scant leisure in which to enjoy that beauty. Those Tibetans and Chinese who, from a safer land, harass the Ishmaelites of the Irrawaddy, living dangerously in the jungle, have no wish to dispossess them of their lands. Rather is it to their advantage to keep these little people alive and up to a point flourishing, that they may the more readily extract tribute from them. Just as the slave owners took good care of their slaves, so do the people from the other side of the mountains treat the wretched Darus gently, the better to milk them. Why kill the goose that lays the golden egg!

Despite the hard living, there seems to be a steady, if slow, drift of peoples from the east into this enclave, due to pressure of population in the lands beyond the Irrawaddy.

George undertook to find twelve coolies for the Ka Karpo adventure, and to sell me rations. It would take a day or two to collect them. So we went on, and just above the new settlement, recrossed the Adung to the right bank. The bridge was slippery and I did not like the look of it. The faithful George offered to carry me across on his back, but I declined, and

taking off my boots made a safe crossing. The local people had prepared a pleasant little camp for me, with cosy grass huts. The sun came out, it rapidly grew hot, and I was able to dry specimens, tents, clothes, everything. Pleasant as it was to settle down here, we were still two marches from Taundam, and hence, two extra marches from our goal, however distant that might be. It couldn't be helped.

George had everything ready sooner than I expected, and we wasted only two days here. Meanwhile I explored the valley, finding a few huts widely scattered and well hidden. Out of the jungle the Tibetans had brought pasture for their herds on steep southern slopes by cutting and burning; the Darus too had their patches of cultivation, one of the chief crops being the *Arum*-like *Alocasia*, whose rhizome is filled with starch. They had to fight hard for a bare living — yet with better methods, better tools, perhaps even better crops, the Adung valley could support a few hundred families. Permanent terracing would be necessary.

I found the slopes where the Tibetans grazed their *dzo* covered with bracken and rank grass, with scattered pines almost the only trees; a few bushy shrubs also withstand the fires, perhaps mainly by luck.

The fine weather lasted barely a day. By the 24th it was raining again steadily, remorselessly, as though it never would stop. The valley was filled with cloud; so we started on our small adventure under quite depressing conditions.

CHAPTER TEN

WE made a late start. Four men had gone ahead the previous day to stamp a trail and to build bridges over the swollen torrents, but even so I had to watch every step. There was only the ghost of a path, and we scrambled along the slippery mountain-side uneasily balancing over the roaring river as best we could. We had also to climb over seemingly impassable cliffs. Accustomed as they were to these gymnastics my fifteen porters even so made heavy weather of it. We travelled at the rate of one mile per hour. In four hours we reached the site of Adung Long, the Daru village which had helped us in 1931. The village had disappeared. There was a cane bridge across the river to a couple of huts on the other bank; otherwise nothing. A mile further on we camped in the long grass of the river. The temperature was 65°. Though we were finished with the heat which in August I had found so enervating at Pangnamdim, we were not finished with the leeches and sand flies. In the rank grass of this dehumanized valley they were terrible.

By early morning the temperature had fallen to 59° (minimum). It was still raining hard. In 1931 a short march from Adung Long had brought us to Taundam, a Tibetan settlement and the last village in Burma. But the path no longer existed and we were nearing the end of the long rainy season.

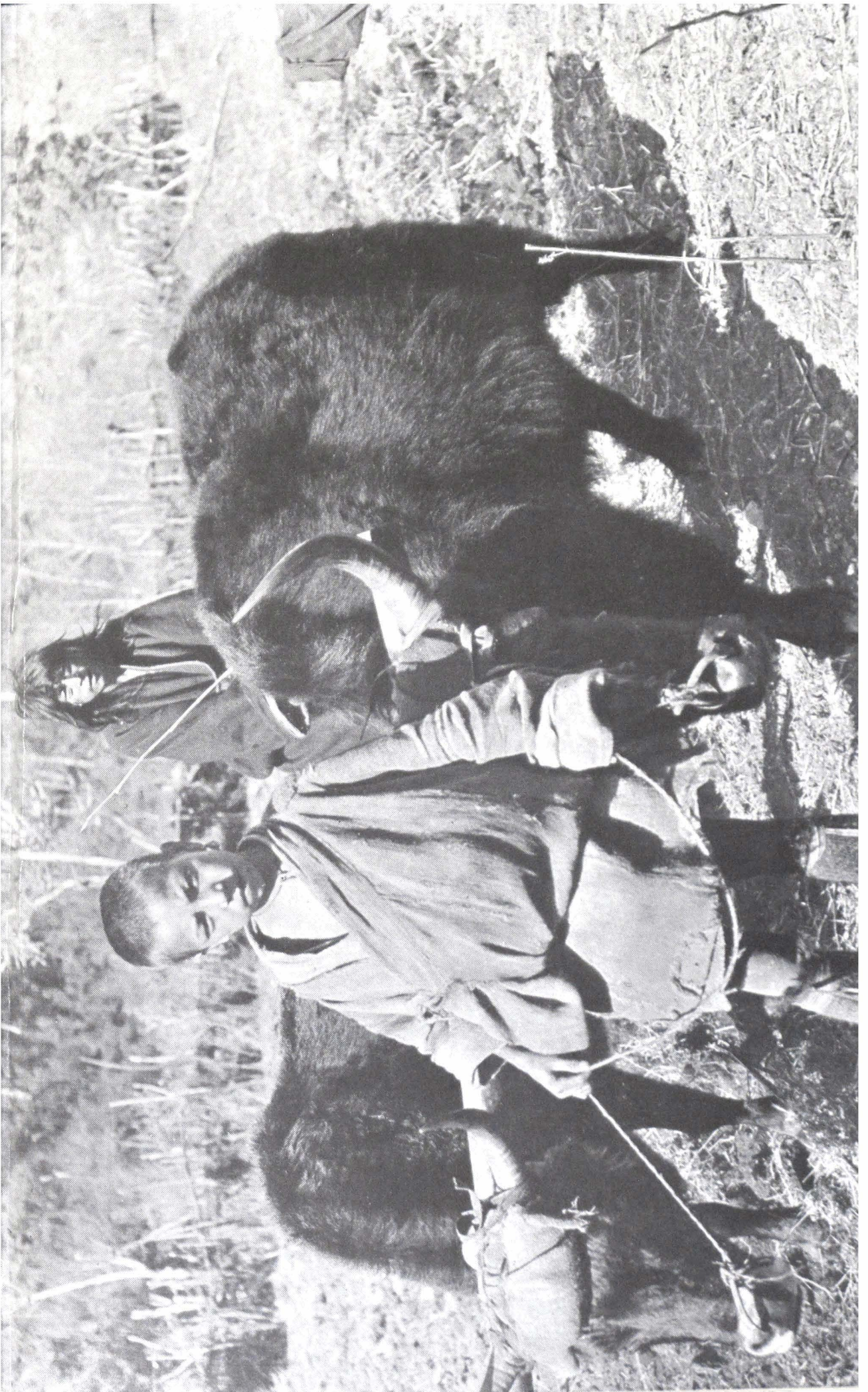
I shall not soon forget the next march. We could see the trail left by the pioneer company, who were not far ahead, but that was all. A dozen times I fell. Within ten minutes of starting I was soaked to the skin and shivering. The trail was a butter slide, and we had to force our way through the bushes. My hands, face and clothes were torn. In a couple of hours we reached the place where in 1931 we had crossed over to the left bank by the suspension bridge; half a mile above the bridge was Taundam. There was only a ropeway now, but we did

not cross; instead we continued along the right bank, and tough going it proved. Dense jungle clothed a precipitous mountain-side greasy with mud. I fell several times, only the thick vegetation prevented me from rolling into the river. At last we reached a point opposite Taundam, and I peered through the trees across the smoking river. All that remained of the once happy village with its pink peach blossom, its neatly fenced fields and wooden shacks, was one derelict hut. No smoke rose from its grass roof; the fields were overgrown with giant weeds; no cattle grazed, no dogs barked. It was a dead village we looked at.

One remarkable thing I saw. In 1931 we had made our base camp on the river bank a little above the village just beyond the mouth of a small *nalla*. While we were away in the alps there was a cloud burst high up on the mountain-side and the torrent had come down like a wolf on the fold bringing with it a landslide. We returned to the valley to find our camp overwhelmed by a sea of semi-liquid mud; a broad fan of still pasty earth stiffened with rocks covered our camp-site to a depth of several feet, turning it into a desert. This mud-flow had been spewed out of the *nalla* and spread over a considerable area; it only just missed burying the village. However, it had not remained a desert long. Seven years had sufficed to hide the scar. The whole alluvial fan was completely covered by a dense grove of alder trees thirty feet tall.

Presently we came to some old terraces where once had been cultivation, and the going became easier. I had hoped to reach the big torrent — in the spring of 1931 I had several times been up the right bank as far as that. But when five o'clock came and we were still a mile from it I decided to camp. The Darus said we should not be able to cross the torrent anyhow till the rain stopped.

It was not an ideal spot amongst the sodden rank growth of abandoned cultivation, but the ground was flat. The high grass was alive with leeches. So opened the last week in September, and in spite of the ceaseless rain, the dismal land-



scape with its dying vegetation and the leeches, I felt buoyant. I had reached the end of known ground; henceforth all was new, unexplored. Nor were signs of autumn altogether absent. True, no brightly coloured leaves shone in the forest, but there were coloured berries on some of the bushes. Our altitude was over 6000 ft. so the Adung falls 2000 ft. between Taundam and the Seinghku confluence, that is in a distance of 40 miles. At 4 o'clock the temperature was 65°.

I saw more birds here than at any time since leaving the Tamai valley; but whether they were resident or migrants on their way south I do not know. All my Daru porters were armed with cross bows, and evidently hoped to shoot something.

There appear to be two distinct types of Daru, a pygmy strain not over five feet high — women are shorter and really pygmy — which we will call Mark I; and a taller muscular well-built strain Mark II. How anyone succeeds in being of good physique on the meagre diet which the Daru gets is a mystery. It is for that reason, if for no other, I suspect Mark II to be a prefabricated type — an immigrant from outside who has come into this never-never land comparatively recently; he has not been here long enough to carry the stamp of the jungle, and become stunted for lack of food. Several of my porters, all young men between twenty and thirty years of age, had a distinct moustache, soft and downy, so that at a little distance it looked like a charcoal mark.

On September 26th it was raining as hard as ever. The men said there was no chance of crossing the torrent, so we might as well stay where we were. I agreed without enthusiasm. Anything more dismal than this murky mile of valley on a wet autumn day would be hard to imagine. The gaunt half-naked trees with their flapping leaves, the derelict cultivation, its sagging crops thin and lank as the locks of a witch, the huddled shrubs and lodged grass, the brown fern brake, dead and sodden, the mist of spray smoking over the river — all this against a background of scudding cloud which hid the mountains — made a feeling of depression inevitable.

Not always at such moments peering out of one's tent door into the soft rain does one remember to thank God one is out in the world fighting the battle of life, self-confident and at least unafraid, far away from all the frustration and petty tyranny and disappointments of a routine existence governed by clockwork. The barbed arrows of fate can wound us here too — we had had our share as I have related — but at least one feels one has only oneself to blame when things go wrong, and must rely on oneself alone, as much as is ever possible, to right them; success or failure is a personal responsibility and so also on a long view is doing one's bit in the world, in whatever niche one may happen to be. The helpless mood does not last long. Breakfast may be a scratch meal, the clothes one puts on may be chilly and damp — they will soon be wet through anyhow — the heavens may be weeping softly; yet the sight of the Adung river raging between tree-lined banks, leaping the boulders in its stride, the deep organ-like music of its onrush, a glimpse through the swirling cloud of lofty peaks and billowing forest, are a fine stimulant to endeavour. Presently one remembers it is only possible to thank God by deeds, never by words.

The weather was gradually getting colder — a good sign: minimum temperature the previous night (September 25th) 55°.

After breakfast I went out to look for seed of the Carmine Cherry (*Prunus cerasoides*); I had recognized a big tree the previous day, not far back. A long search of the ground beneath rewarded me with one seed, though there were not a few split shells: whether due to birds or squirrels I don't know. I returned to camp, collected two of the Darus, and told them to hack the tree down; we had no axe and it took them a long time with their soft knives. At last the tree fell with a crash and I clambered all over it, but not a single fruit remained. Perhaps this was not surprising at the end of September, for in the cold Adung valley the Carmine Cherry flowers in late March. So we continued the search for seed in the deep mould, and after another four hours' work in steady rain had massed exactly nine seeds. I shall refer to this tree again later.

The Darus brought me a yellow wagtail. It had been knocked over apparently by a cross-bow arrow and was completely dazed: a drop of blood had oozed from beneath one eye and solidified. But after half an hour's rest in my tent the wounded bird flew away, seemingly none the worse.

Next day, rain or no rain, I decided to go on and look at the river which was holding us up. The clouds hung low in shapeless drifts, and I was certain there would be no immediate change in the weather. No sooner had we started than the rain came down in sheets. We struggled along with some difficulty taking two hours to reach the torrent, a walk which I used to do regularly in half an hour in the early months of 1931.

We had now reached the end of what may by comparison be described as the open-air part of the Adung valley, where occasionally, as at Adung Long and Taundam, small bays, gnawed out between river and mountain wall, afford living space; these oases when cleared of jungle can be terraced for cultivation. What soil there is, though full of stones, is otherwise rich in humus washed down from the mountains. The gradient of the river bed, steep by plains standards, is mild compared with the gradient a little higher up. But it must be distinctly understood that not even at Taundam where the river widens, and for half a mile chatters merrily over the pebbles in winter, almost like a well-behaved brook—not even in the depth of winter when the snow fields and glaciers a few miles away are locked in an iron grip, and for ten days on end neither rain nor snow falls so that the water level slumps—is it possible to ford the Adung river. At its lowest this glacier stream, cold and clear as flint glass and deceptively shallow (being nowhere less than five feet deep), drives along at ten miles an hour: and the bottom moves with it as though on roller bearings.

So we reached the torrent and a complete change came over the scene. Immediately above is the entrance to the Adung gorge.

The river turns a sharp corner and comes crashing out of a

slit in the plateau flanked by granite walls. A high buttress on the right bank guards the entrance: and the grim temper of the rock is cloaked by wave on wave of glorious forest. The pioneer party had felled an alder on the bank of the torrent so that it dropped squarely across; and had apparently crossed safely, at least they were not here. So far as the bridge itself was concerned, it was safe enough: but it was not possible for any of us to cross now — for men carrying loads it would have been sheer suicide. The clay-coloured torrent swept down the glen like an avalanche, and high above the rhythmless roar of the waters we could hear the growl of invisible boulders grinding and pounding one another deep down in the bed. That ominous noise, with the water just under the bridge, was unnerving enough; but now the bridge was under the water, for a big wave curled right over the log, half of which was completely submerged. I attempted to cross but immediately became giddy on the all-too-narrow tree-trunk, and crawled back in dismay. No laden coolie could have crossed without overbalancing, or more likely being washed clean off. So we camped on the stricken bank and waited again. We were two days behind schedule already; but what is two days when you have set your hand to the plough?

I spent an hour hacking down another cherry tree, but it too was without fruit. Within the Adung gorge the type of forest changes abruptly. Gone is the last pretence of tropical vegetation. Most conspicuous is *Rhododendron magnificum*, which shares with hemlock spruce the lining of the gorge. In February the dark forest is lit up explosively by its immense trusses of rosy-purple, crimson-purple and carmine-purple blossoms; they look like balls of fire shining in the gloom. This great-hearted rhododendron forms much of the lower tier of forest and is especially common all along the cliffs overhanging the river wherever it is not unduly shaded by taller trees.

To pass from the sublime forest tree to a ridiculous rock plant — edging the muddy track through the open fields one notices, or hardly notices, a *Primula* of sorts. As all the horticultural

world knows, very few species of this incomparable genus but make us catch our breath when first we see them in all their naked loveliness; but *Primula dumicola* would be more likely to make us catch cold. One has to crawl on one's belly in the mud to see the little wretch, so tiny is it, so anaemic and paltry are the flowers — the colour might be called rusty pink, with a washy-yellow eye spot. Though the foliage has redeeming qualities, that is not enough to raise this Harijan to Brahmin caste. Even after flowering the plant does not, like so many of its kind, expand while ripening its seed; rather does it shrink, and as soon as the rains begin in earnest, deliquesces into the mud. Nor must it be imagined that I saw a trace of this detestable little slut now and I certainly did not miss her. I call attention to *P. dumicola* here as a hideous exception to a noble family, and because I believe this reach of the Adung valley is the only place in north Burma where it grows.

That night the rain ceased and next morning, the 28th, the torrent had actually dropped several feet; what was even more surprising the water was almost clean. The tidal wave had subsided, the bridge was dry. We quickly skimmed across, though I could plainly hear the muffled thunder of the boulders dragging along the bottom.

Now we began to climb. The path along the left bank which we had followed in 1931 was fairly good; but when I had looked across to the right bank and noticed those rugged cliffs with their feet in the raging river I supposed there was no way along them; while now from the right bank the left bank looked hardly more passable. Up the cliff went the little Darus like monkeys, scrambling from ledge to ledge and from one hold to another. There was one awkward traverse across a smooth face high above the river and for a moment, balanced on a ledge, my heart was in my mouth; and then we were climbing down again. Presently we reached a tolerable track through the forest, close to the thundering water.

Once round the corner the Adung river defies description. It is the most dynamic mile of any in its forty-mile course. The

gorge is short, full of colour and of dangerous music such as appeals to the emotions and inspires the imagination. To say that the valley is steep and that it is filled with stark and polished boulders big as Palaeolithic dolmens conveys but a poor idea of the fierce background. Above the poor little strips of cultivation around Taundam, where for a space the river flows swiftly indeed but almost gently, sheer cliffs suddenly hem in the waters and the gradient rises visibly. In the steepening river bed are jumbled together in the last confusion rocks of such size and weight that not all the glaciers along the high sierra above melting together could budge them an inch, though the power and violence of the flood even now are awful. It is not a waterfall. Rather is it as though a giant's stairway to the terrace of his airy castle had been hit by an earthquake, and shaken, and then hit again. The enormous blocks of glistening white porphyry check the storm of water, even threaten to balk it; stop it they cannot. The highly charged river, solid, liquid and gas in one, pouring over, under and round the rocks batters its way down the slope roaring with rage. Looking up stream from the mouth of the gorge it is impossible to see the level terrace at the top of the slope, perhaps half a mile distant, and two or three hundred feet above; only an irregular line of sabre-toothed rocks, like the mouth of a shark, is visible against the wedge of grey sky. The angle of slope in the gorge is about 15° . Dense forest, now sombre in colour, lines the river at flood level. But in spring the rising note of the water is matched in melody by the clash and ring of colour on colour — the hot breathless glow of rhododendron against the faltering greens and brave yellows of unfurling maple leaves, the sharp green bristling larches studded with crimson cones like prehistoric sea anemones, the cold marble white globes of *Magnolia* which glimmer in the darkness with an unearthly light. Add to these, slim fairy-like catkins swinging gently in the breeze, the stiff pyramidal jets of bird cherry, the rebellious aquamarine tassels of *Decaisnea*, and it will be realized that form as well as colour mingle in the magic of the scene.

Dimly one senses the terrible power of the Adung river as it moulds its deep wrinkle on the earth's hard crust. Yet after ascending a few hundred feet one finds it flowing, swiftly indeed but placidly, down a long gently sloping terrace humming to itself, no longer raging, its bed clear of big rocks.

Whence is derived this boulder stairway over which the Adung flings itself? What is the cause of this cataract?

At first sight one might suppose that the rocks had simply broken off the cliffs above and rolled down the slope; they might have been prised out along the joints by the everyday process of weathering, or by the leverage of tree roots. Water unaided at least could never have carried them here, even had the Adung river been twice as big as it is; though ceaseless grinding by sand in suspension has rounded their corners and polished their faces.

But if they have fallen from the cliff, why here only? Surely the whole valley up stream and down should be filled with boulders not less big; for the Adung is enclosed by cliffs throughout its course. Some would have rolled further than others, many would be covered with forest; but there could be no mistaking these boulder beds. On the contrary they occur only at considerable distances apart, and only where the gradient of the river bed rises sharply for a little distance before becoming normal again.

It is impossible that the river can have cut them out of the solid rock beneath itself; and again, were that possible — why here only?

An examination of the gullies immediately above the river whence alluvial fans spread out into the forest, does not suggest that these cliffs ever give rise to such monstrous offspring. Moreover no freshly hewn rocks are to be seen either in the river bed or in the forest.

If then the rocks were neither born in the river bed nor rolled down the cliff they must have been carried down the valley. Water we know could not carry them down; but ice could. And everything in the structure of the valley supports the view

that glaciers once descended at least as far as Adung Long, and most probably to the Seinghku confluence, in quite recent times.

Some miles up the valley high above the last forest and more than 15,000 ft. above sea level, rocks of this size could be, and in fact are, split from the storm-bound cliffs. So, one may believe, this fantastic broken granite stairway brimming over with colour, echoing back the roar of the waters, marks the foot of a glacier which for long stood stationary here, piling up a terminal moraine of giant blocks. It is over the remnant of this moraine that the Adung river rolls today.

Though we crawled along at the very bottom of the gorge we were more than 6000 ft. above sea level, squeezed between mountains which rose to 15,000 ft.; and as these are under snow for more than half the year, the climate is moist cool temperate. The forest consists of a mixture of evergreen, broad-leafed, deciduous and coniferous trees, the latter including blue pine, hemlock spruce and yew, with occasional larch and *Picea*. A thousand feet higher conifers become as common as broad-leafed trees.

Deciduous trees include birch, maple, cherry, walnut, ash, and *Tetracentron*, this last an undescribed species. Evergreens include species of *Ilex*, several rhododendrons and oaks. *Schima Wallichii*, a fine tree with a dark handsome crown, was in full bloom, its cream-white tea-flowers with a tassel of golden stamens thickly strewn on the ground. Some of the massive-limbed rhododendrons had been growing for a century; but so close grained and heavy is the timber they had attained no great size in that time. A wide-meshed network of creepers — vines, *Clematis*, *Kadsura*, *Aristolochia* and others — spread itself over the canopy and dangled long festoons between the tree-trunks.

The track was not easy. I slipped several times on the steep slope. Sometimes we were right on the river bank, at other times high above and almost overhanging the water. All morning we slogged along the gorge, shut in by the forest with an occasional glimpse across to the far bank where a casement

opened on the river. Above the stairway fall the river widened a little, for here it flowed along a comparatively narrow tread. There were no rapids, but the water bubbled like soda on a hot day and the current ran very fast.

The Gamlang was the next big tributary, and I hoped we should reach it this day; it looked close enough on the $\frac{1}{4}$ -inch map. Yet I could see not the least sign of any side valley ahead, the wall remained intact. At two o'clock the temperature was 58° , barometer 25.7 in., the altitude about 7000 ft. Anxious as I was to get on I was nevertheless not sorry to halt. The almost intolerable discomfort of struggling for hours along a barely visible slippery track on a steep slope, immediately above a violent river, when every step has to be looked at carefully before one dare take it, can be only faintly imagined by those who have never experienced it. With the water pouring out of one's boots, clothes wet through and clinging to one's body, leeches getting inside one's shirt, and the rain streaming down all the time, one is apt to get fractious. The quickest cure is to halt, make camp and drink hot tea; which we did.

On September 29th we started off in our usual leisurely fashion, but I was determined to reach the Gamlang today even if we had to go on after dark. To my surprise we reached it in two hours, so my heroic resolve was wasted. The pioneers had cleared a camping ground for me, but I felt we should have got here the previous day so I voted down a suggestion that we make use of it. The day was young; we had plenty of time to get into the Gamlang gorge.

To do this we had to climb steeply up the side of the mountain, cross the spur and descend more gradually towards the river at a higher level. And at once we found ourselves in a new world.

It was obvious why in the old days the path followed the left bank of the Adung for those crossing the Namni pass between north Burma and Tibet. The snow mountains lie to the west of the river so that the main tributaries come from that direction; and though this might be no great matter in winter, it is in the summer when for a few months the pass is open that

people use this route. The Gamlang confluence was, as I have said, immediately in front of us, and it would not have been possible to cross it here. Moreover on the far side the cliffs rose sheer and smooth for hundreds of feet; so even if we had been able to cross the Gamlang, it would have been impossible to continue up the right bank of the Adung without making a considerable detour. As for crossing the Adung at any point, that would have been even more impossible. In fact we seemed to have done not only the right thing, but the only possible thing. So on September 29th we entered the gorge of the Gamlang and a new alpine world.

CHAPTER ELEVEN

THE next 15 days were spent within a few miles of the highest mountain in Burma, and amidst a type of vegetation which even in Europe is seen only in the Alps or in the far north. As it is not perhaps generally known that such extreme conditions occur in what is usually regarded as a tropical land with a hot moist monsoon climate, this may be my excuse for describing the flora in some detail.

Only once did I get a close-up view of Ka Karpo Razi; it was too near us. Nor was the weather favourable, though one could hardly complain of that. I am not myself a climber and had no intention of making an attempt on the peak; but I wanted to find the right approach to it.

Meanwhile I was busy collecting seeds of alpine plants, particularly of rhododendrons which make up so much of the vegetation above 10,000 ft. This chapter is therefore largely a record of the types of vegetation met with in the ancient glaciated valleys of north Burma, and of the plants seen; and those who are not interested in plants and all that they stand for in the life, work, wealth and happiness of mankind — which means food and warmth and housing, and today also clothing, drugs, paper and many other things, as well as the search for tranquillity through their emotional appeal — can skip this chapter.

We climbed over the spur which rose like a wall between the Gamlang and the Adung, and soon we were two or three hundred feet above the river. The Gamlang crashed down a boulder-choked gorge which might have been split in the earth's crust with an axe so deep was it cleft. We then traversed across the slope through a thin forest of hemlock and pine, with occasional larch and *Picea*; but this was presently replaced by mixed forest containing many broad-leaved trees, both evergreen and deciduous. We had only to keep along a contour on the mountain-side for a mile or two in order to find ourselves close to the

tumbling water again, higher up, for the valley is amazingly steep. We crossed an earth fan where many small irises were growing, now in ripe fruit; altitude about 9000 ft. This was *I. decora*, a somewhat commonplace yellow-crested iris found on both flanks of the Assam Himalaya. A shrill yellow-flowered violet was also conspicuous, and I noticed a *Nomocharis* capsule. Near the top of the steep fall we had to cross the Gamlang by a crooked narrow log bridge. The water leaped and crashed over the rocks with a roar above and below the bridge. One false step, a momentary loss of balance, and that would be the end. I had lingered behind collecting plants and by the time I reached the bridge the last of the coolies was skimming across without a tremor. Uncertain of keeping my head in the deafening racket, with the reeling water all round me, I went down on all fours and shudderingly crawled slowly across.

Immediately I found myself in a forest of gnarled rhododendrons (*R. sino-grande*, *R. arizelum* and another) with a welter of small trees and shrubs the most notable of which were a species of *Euonymus* with falciform-shaped jagged-edged leaves, and a ferociously prickly hazel nut well named *Corylus ferox*. The almost invisible track was smothered beneath masses of ferns and lush shade plants from amongst which peeped a sturdy *Androsace* with kidney-shaped leaves. It was in fruit and the large umbel of jade-green cups containing the seeds promised a splendid head of flowers. Alas! *Androsace Henryi* is a fraud. The flowers are small, mean and dead white, with none of the sparkle which whiteness of the right quality possesses. For all its fine figure, the plant lacks breeding. We camped in the forest having marched for 7 hours; altitude 9500 ft. Next morning we awoke to blue sky again; but it did not last long though no rain fell all day. The temperature at 6 o'clock was 51°.

On the last day of September we followed the left bank of the Gamlang, at first through forest but soon reached open country, creeping round the bases of alluvial fans gay with late summer meadow flowers. The valley was V-shaped with a much easier gradient than lower down; the torrent still ran swiftly but had

not the unbridled fury it showed while tumbling the last thousand feet over the old moraines into the Adung gorge.

Presently we reached a large snow bed beneath which the torrent had bored a passage. The altitude was not more than 10,000 ft. and the snow had been melting for the last five months; in May it must have been piled up in the valley bottom to a depth of fifty feet or more. Hundreds of alpine flowers were in bloom on the alluvial cones, many of them out of season. They made patches of bright colour chequering the slope. I noticed especially saxifrages, *Cyananthus*, *Pedicularis*, *Geranium*, *Primula*, *Mimulus*, *Parochaetus*, *Astragalus*, gentians, *Ranunculus*, *Nomocharis*. The last named, a dark flowered form of *N. pardanthina*, normally flowers in the spring. Nor was it just an odd bloom, scores of plants were flowering and there were plenty of buds. The piled-up snow had retarded the spring flowers. On the other hand the gentians, saxifrages, *Cyananthus* and *Primula capitata* are autumn-flowering plants, we had here a mixture of early and late-flowering species. Some of the slopes were clothed with a rank growth of taller herbs three feet or more high, mostly rather coarse big-leaved plants such as *Rodgersia*, *Astilbe*, *Aconitum*, *Adenophora*, *Lactuca*, *Impatiens*, *Cnicus* and *Artemisia*. This type of meadow plant, as opposed to the smaller rock plants, preferred the stabler and more sheltered earth slopes.

By this time the valley had narrowed but was not particularly steep, though we had been ascending steadily. The general angle of slope of the fans on either side was about 45° . The torrent was still uncrossable except over a second snow bridge which we presently reached. We could see nothing of the tops of the mountains. We passed through a patch of forest where a tangle of rhododendron overhung the river. A high rock out in the torrent attracted notice by reason of the thick cap of vegetation which covered it. Amongst the shrubs were several rhododendrons different from anything I had seen before; and as they were in almost ripe fruit I marked them down to be collected on the return journey. They appeared to be hybrids.

It is a remarkable fact that although rhododendrons hybridize easily, so long as species which are closely related are the parents, yet amongst the thousands of square miles almost solidly covered with them in south-east Asia, an unmistakable hybrid is rather rare. Nor is this because allied species are not in flower at the same time. Hence it might seem either that hybrids are born but that they are liquidated in the struggle for existence before they reach flowering age; or else there are *no* hybrids, because even when cross pollination takes place inter-specific pollination also occurs and is always the more potent of the two. Whatever the explanation I can only recall one undoubted hybrid occurring in quantity, though isolated plants with peculiar characters which I have occasionally come across may possibly have been hybrids. Moreover the one just referred to as occurring in quantity was scarcely a true hybrid, the species in question (*R. chryseum*) producing two colour varieties, a plum-purple and a saffron-yellow form, which when crossed, gave rise to a whole range of pastel shades — peach, apricot, salmon and so forth. Isolated boulders in an alpine torrent bed are more than literally islands, comparable with oceanic islands as regards the protection they can offer to experimental species while finding their feet.

At a height of 10,500 ft. the Gamlang divides into two almost equal streams; a wedge of forest clothes the spur between them. One stream flows from the north, the other from the west. As I was not quite certain which would be the better valley to follow I decided to camp here temporarily while I reconnoitred them both. Leaving the coolies to make the camp on a knoll a hundred feet or so above the confluence, I set out with one man to explore the north branch in the hope of finding a better camp site. There was no path. The track we had been following up the Gamlang valley had been made by generations of medicine gatherers, Chinese, Tibetan and Lisu who come into the Gamlang valley in summer to gather *pai mu* (*Fritillaria Roylei*). This plant grows in immense quantities in certain alpine valleys, though not apparently in all, or at least not

every year. These medicine gatherers have their regular beats, and keep open the paths to their most profitable collecting grounds, besides bridging the torrents which are otherwise impassable during the rainy season.

Above 13,000 feet which is rather higher than the *Fritillaria* usually grows, progress in any direction is comparatively easy; it is in the forest zone that footpaths are necessary if one is to get along at all.

Thus it was only with the greatest difficulty that we made our way now through the forest undergrowth, which was further obstructed by fallen trees. When presently we came out of the forest into the open we met with still greater resistance. Here scrub rhododendron grew waist high its inflexible stems almost forbidding any progress at all. At the end of two hours struggling we had covered less than a mile, but now we had reached the base of a great earth mound where the valley opened out slightly. Here amidst rank meadow was just the place for our camp, if ever the coolies could reach it. The mound — clearly an ancient terminal moraine — blocked the view up the valley, while the clouds which hung low all round us hid everything else. As at Gawai we had at last reached the alpine zone though not yet the zone of dwarfest rhododendrons; however they could not be far away. Of course no rhododendrons would be in flower at this season — an exception was the smeary-yellow azalea-like *R. trichocladum* which was blooming merrily. So we turned back and were lucky enough to strike an old path which made things a trifle easier.

On the way through the forest I noticed a few plants of *Primula likiangensis*, its nine-inch stem bears aloft a little sheaf of thin cylindrical capsules of a deep maroon red; but the seeds were not ripe. *P. likiangensis* is a woodland plant with modest vinous purple flowers, attractive in a quiet way, with cheerful foliage suggesting crinkly geraniums. It is not one of the best primulas, but is passable; nor had it been recorded from Burma before. Other forest plants noticed here were *Panax*, *Podophyllum*, dwarf *Euonymus* and creeping *Rubus*.

Arrived back at the river confluence I found that the men had pitched the tents, clearing the undergrowth beneath the spreading rhododendrons. These consisted of *R. arizelum*, *R. fulvum* and one or two other tree species, scattered through coniferous forest — chiefly silver fir and larch. I decided to spend another day or two here before continuing up the north valley.

Next morning October 1st the minimum temperature was down to 45°, scarcely cold enough to herald fine weather. The sky was overcast, but little rain fell. After breakfast I started up the west valley. Here too there was no recently used path and the going was hard till we reached the first snow bed. Narrow tongues of forest, separated by wide alluvial fans, alternated with irregular-shaped patches of meadow. On the screes grew primulas, larkspurs, aconite, *Epilobium*, cuckoopint (*Arisaema*) *Cremanthodium* and other *Compositae*, two or three species of wild onion, iris and hundreds of a stemless rosette plant the collar of overlapping leaves embracing a bosom of violet flowers almost flush with the ground (*Lactuca Souliei*).

While I was following a narrow track through high grass I had the unusual experience of being struck in the face by a small bird in full flight which was also using the passage, and not looking where it was going. I was wearing spectacles, but luckily it hit me a glancing blow on the cheek which hardly checked its flight. I was more astonished than hurt.

At an altitude of about 12,000 feet we came to an immense snow bed stretching some distance up the valley and out of sight. The north flank, which was high and steep was fringed with a band of vivid green vegetation, as though spring had come; but the south slope flared out thinly to moist earth where hundreds of shabby-looking alpine plants were dying down as they shed their seeds.

Here then was the strangest contrast. On one side of the valley the snow bed faced south-west, consequently it had been melting fast all the summer, and a wide belt of rich earth was crowded with fully grown alpines which, having reached their

allotted span, were now broadcasting their seeds. The other side faced north and here the snow was still piled up high almost to the foot of the cliffs. As it continued to melt slowly it revealed plants which had been overwhelmed by avalanches the previous spring. Buried alive as they were, the will to live was strong within them.

With leaves minute but perfectly formed and flowers complete in every detail but packed inside their bud scales like a chick inside its eggshell, they had gone into cold storage. For them time stood still. Now release had come and indifferent to the almanack they were surging into flower three months after their time. So we had the curious spectacle of alpine plants scattering their ripe seeds on one side of the snow bed, and just beginning to open their flowers on the other side, less than a hundred yards away.

These plants had enough water, derived from the gradually melting snow, enough warmth beneath an excellent blanket, enough oxygen to breathe, good soil; only light — that essential detonator to the chemical explosions which go on inside the green leaf—was denied them. When the cover was finally stripped from them they must have been bleached like celery, but it would not take them many days to recover their green complexion. As soon as they had turned green, flower and leaf buds, being already formed in miniature out of reserve food laid by in the previous year, had only to absorb water to swell and presently to expand and open. Nevertheless though complete in every detail they had starved so long that they remained dwarf in stature; only their flowers were normal. In this condition were golden *Trollius* (*T. yunnanensis*), sky-blue poppies (*Meconopsis betonicifolia*), *Primula sikkimensis*, *Pedicularis*, *Allium* and several others, making a brilliant patchwork of colour, none the worse for their long sleep, except that they had little chance of ripening their seeds so late in the year. There might still be time to pollinate them, for insects were by no means altogether lacking; but before they could ripen their seeds the plants would be frozen stiff or buried under snow again.

One must distinguish these June-flowering plants from those which, like *Cyananthus* and several of the most brilliant gentians, many saxifrages, aconites, larkspurs, *Primula capitata* and others, normally flower from late September onwards; these are in fact autumn-flowering plants, and are hardly affected by snow beds, since they come into bloom after all the low level snow has melted. They may occasionally be under snow till midsummer, but being mostly sun-worshippers they are usually confined to south-facing screes and alluvial fans, where they flower at the end of the rainy season in the bright winter sunshine. I have seen *Gentiana gilvostrata* in full bloom at over 12,000 ft. in November on bare sandy slopes, though the flowers were frozen stiff as parchment every night.

Above the snow bed the valley continued a long way, flanked by screes whose tops were lost in the mist. It seemed to curve away from where I judged the snow peaks to lie, so I returned to camp having made up my mind to concentrate on the other valley.

Marang had shot a small bird the size of a sparrow for my supper. It was too mangled to identify beyond the fact that it had feathers, and was so full of shot I almost feared I would get lead poisoning if I ate it. However no harm resulted.

I spent the next morning, October 2nd, in camp resting and writing up my notes. At midday it started to rain hard and continued for three hours, but in the evening it cleared again and I went out. Some of the coolies who had gone down the valley two days ago returned; so I decided to move camp on the 3rd.

That night the temperature fell to 44° but the rain continued; we went up the north valley as far as the first moraine, cutting our way through the scrub. It took us only a couple of hours. Though we were very little nearer the snow peaks, I thought it would be better to camp here and reconnoitre ahead as occasion arose. In the afternoon I pushed on up the valley, but it rained hard all the time and the clouds hung so low I could see nothing.

The structure of this valley was like a long narrow stairway

enclosed between high walls, the treads about half a mile long separated by sudden high steps or risers. The steps came at the ends of the moraines, and marked successive stages in the retreat of the glacier. Here and there I caught a glimpse of naked cliffs on one side or the other, very close to me. The rock was a pale granite weathering grey, with black mica in small quantity and large crystals of felspar.

Meanwhile the forest had become split up into wedge-shaped sections by screes and gravel fans which were sometimes bare but more usually covered with a thick scrub mainly composed of rhododendron. Gradually the wedges of forest grew smaller; we had almost reached the limit of forest. It was not to be wondered at that in these terrible corridors down which an icy blast raged for months, where whirling snow formed drifts 30 ft. deep and avalanches thundered, even the stoutest tree found it difficult to survive above 12,000 ft. However, on this particular afternoon I barely reached 11,000 ft. and still there were a few shreds and patches of forest between the cliffs and the torrent.

I now found that the coolies had only two or three days' food left, and some of them at least would have to go back to their villages to get more rations. Unless we moved immediately, therefore, we might have to stay here a week; so, wet or fine, I decided to move on again next day.

It was October 4th; minimum 41° — and fine weather at last! A clear dawn, the lane of sky above cloudless, the high crags to the west stained a brilliant yellow by the rising sun, though the rest of the valley lay in violet shadow. I was out of bed in a minute, and outside my tent. Now I could see far up the valley, three long steps, each riser embroidered with ragged trees between grey walls dappled with snow. It was too good to last; gradually the sky clouded over, till by noon everything was lost in the mist. A dismal drizzle set in.

We had not been idle. Immediately after breakfast I pointed up the valley to the just visible tops of the fir trees fringing the third riser — the last sentinels of the forest as I thought. 'That's where I want to go' I had said to Marang; and within half an

hour we were off, the coolies singing light heartedly. I hung behind collecting plants and seeds.

We soon reached the point where I had turned back the previous day, but the coolies did not stop. We climbed the second riser and found ourselves in a wide boggy valley the river flowing swiftly over pebbles between banks hidden beneath a continuous hedge of rhododendron bushes. Here and there rocks deeply rooted in the rich peaty soil beyond the river bank outcropped amongst the scrub; wide boggy pastures appeared.

The easiest route now was up the river bed itself; sometimes we plopped in up to our waists — and the water was icy cold. However, even this was preferable to forcing one's way through the inflexible scrub. Occasionally we could make out the walled sides of the valley, further away now; but their tops were hidden in the clouds. A few half-strangled fir trees braced themselves against the avalanche.

The vegetation was now pure alpine. In spring a spangle of flowers would blazon the landscape. Rhododendrons surged everywhere — *R. cerasinum* and *R. chaetomallum* both with blood-red flowers; *R. pruniflorum*, glaucous purple; *R. selense*, ivory, saffron, or sometimes salmon, apricot or pale cerise. Scattered through the mead, the skeletons of dead June flowers such as *Primula serratifolia*, *P. muscarioides*, *P. sikkimensis*, *Omphalogramma Souliei* rattled in the wind. Even at this height a few drifts of yellow *Primula melanodonta* delayed by snow, shone like clusters of fairy lamps against the soiled snow at the foot of an alluvial fan. Genuine autumn flowers were few but here and there a ripple of *Gentiana sino-ornata* gleamed blue as the waves on 'deep Galilee'.

Now appeared in front of us a third belt of ragged forest and a third riser over which the stream cascaded. We climbed the riser where it sloped up to join the cliff, but the forest proved more difficult and we had to hack our way through the tangle of rhododendron which ramped between the widely spaced trees.

By this time it was growing late, and the coolies had to get

down to the lower camp for the night. Thinly clad as they were with a single narrow homespun towel round the waist and another similar towel to throw over their muscular shoulders when they halted, they were already shivering. So on the far edge of the forest fringe we halted, and clearing a small space just inside the last trees, pitched the little tents. Beyond us rose great mounds of gravel covered with a wilderness of dwarf rhododendron and other shrubs. The coolies went down to get more food leaving one man with us to cut firewood.

The fine dawn was apparently a try-out, for the following day (October 5th) was wet as usual, and cloud blanketed the peaks. I went carefully over the bog where grew seven or eight species of dwarf rhododendron, besides a few larger species which crouched in more sheltered nooks under the cliffs. Perhaps 25 per cent of the scrub consisted of woody plants other than rhododendron, and of these several belonged to the rose family, namely rowan, cherry, *Cotoneaster* and *Spiraea* — but no rose itself. Other shrubs were willow (two or three species), *Vaccinium* (two species), *Gaultheria*, *Berberis*, *Viburnum*, honeysuckle (not the climbing kind), juniper and *Myricaria*. I was surprised to find no less than four genera of *Rosaceae* represented in these alpine thickets — though each had only one species; in fact amongst woody plants, they are second only to *Ericaceae* and *Vacciniaceae* in number of genera — not in species.

I have already remarked that for each 2000 or 3000 ft. of ascent in the Burmese alps we enter upon a new zone of vegetation, distinguished not only by different species in different proportions, but usually different in growth habit, as meadow differs from forest, or forest from scrub; or at least as broad-leaved forest differs from needle-leaved forest, or deciduous forest from evergreen.

We were now on the top storey — alpine vegetation. But in north Burma at any rate there are degrees of alpineness. Alpine scrub is a knee-deep tangle of stunted gnarled bushes, chiefly rhododendron confined to sheltered slopes, where the snow melts gradually. Alpine turf consists of a discontinuous

carpet of herbaceous plants and dwarf rhododendron tufts found on more exposed slopes. Alpine screes though largely naked also have a flora of their own. But the hall mark of the alpine region is dwarfness, whether of woody or of herbaceous plants, together with a wide range of variation. There is in fact an astonishing multiplication of species in many alpine genera, witness, for example, *Rhododendron*, *Saxifraga*, *Gentiana*, *Meconopsis* and *Primula*, to mention a few which appeal especially to the gardening world. On the other hand some genera, such as *Diapensia*, *Omphalogramma*, *Fritillaria* and *Diplarche*, have few or even one species only.

In the afternoon I went further up the valley, crossed the last line of limbless trees, and again found myself in unyielding scrub whose tough pleached branches reminded me of tea bushes in Assam. It is noteworthy how the evergreen rhododendron scrub shades out almost every competitor except moss.

Still another riser blocked the view ahead, and having scrambled up this I came to yet another boggy pasture beyond which was the fifth and last riser composed of large boulders; and this as usual was followed by a level tread. Thus step by step for six miles above the confluence at 10,500 ft. I ascended the valley towards the snow peak.

The head of the valley now began to widen like the mouth of a funnel; it sloped up gradually towards a gravel fan almost bare of plants. Several streams converged to form the river, some coming from snow beds, others from cascades which jumped the cliffs on either side. We were in a huge amphitheatre; but mist as usual overhung the tops.

After three hours hard going during which I had covered less than three miles I turned for home. And it was then that I experienced one of those rare moments of revelation. By chance I looked back like Lot's wife, though unlike that misguided dame I was under no obligation to curb my curiosity. At the same instant the cloud veil was rent in twain, the torn edges were lifted as though by giant hands, and for a full half-minute I gazed on what lay behind it.

Almost immediately as though I had been vouchsafed a momentary glimpse of heaven too dazzling for mortal eye to look on, the curtain fell again. But one glance was enough to tell me all I needed to know, though it was not till the emotional shock had passed that I realized the significance of what I saw. I stood spellbound. In that brief flash of revelation I had seen the head of the valley to the topmost pinnacle, still framed in cloud but complete in every detail. It seemed at first as though I had been looking at a Gothic cathedral in white marble, floating on an azure sea, encompassed by space. Every spire and vault shone with an unearthly luminous brilliance. Actually there was a glacier at the foot of the high black wall which enclosed the head of the valley; and beyond it I saw the tip of at least one of the major peaks. Yet this ethereal picture was not the one which persisted longest.

For the first time I found myself looking at the cliffs of the main ridge, and all thoughts of climbing Ka Karpo from the south vanished like clouds at sunset. Never have I seen so awful a precipice. At least 3000 ft. of sheer cliff, crowned finally by towers, battlements and spikes rose above the snow bed at its foot. There was no snow on the cliff except a streak here and there in a fluted buttress, or deep chimney, for none could lie. It was curious that the cliff should look so black, since the valley all round me was covered with piles of white granite stones which shone in the sun.

On the way back to camp I thought over what I had seen; the clouds had closed in again, but no more rain fell. I knew now that Ka Karpo could never be climbed from the Gamlang valley for the ridge which runs south-west from the main peak was like a gigantic spiked iron railing, or a series of church spires sheathed in ice sticking up into the cold sky. Even if one could have climbed the 3000 ft. wall to the tip of a spire, one would be no nearer reaching the summit. Nor did I then think it was possible to climb the wall — though later I modified this opinion.

Meanwhile here I was — I wanted to get a close-up view of

the mountain, and unless I saw it from the Gamlang valley I should have to abandon it for the present at any rate. I decided to take a light camp up to the foot of the glacier the first fine day and see if it would be possible to get astride either wing of the \cap -shaped valley head which so completely blocked my view of the high peaks, now only three miles away, but as well hidden as though it were 300 miles.

I was, of course, more interested in plants than in a possible route to the top of a mountain which I had no ambition to climb, and could not have climbed, myself. Yet Ka Karpo had cast its spell over me and I could not tear myself away from it without a struggle.

Another two days of heavy mist and rain followed, but I hung on — surely tomorrow the weather must change! It was always 'tomorrow will be fine!' I went out as usual — botanizing is almost independent of the weather. Autumn colours lit up the valley everywhere — the crimson of rowan, orange and vermilion of mountain cherry, sherry-brown and yellow of willow; even the alpine rhododendrons are not so evergreen as to disdain autumn colour altogether, the dying leaves of several species turning gamboge or red as coral. Studded amongst the dying leaves were the living berries of many dwarf shrubs, crimson, pillarbox-scarlet, or grape violet, some with a delicate bloom, some translucent, like beads.

The short days sped by, the long misty nights, with the rain pattering on the canvas, dragged. I turned in at 9 p.m. was asleep by 10 o'clock, but I rarely had a good night's sleep and was glad when a faint light showed in the east at 5 a.m. and I could get up. At 6 o'clock Marang brought me a cup of tea and the day's work began.

In these high alpine valleys running up to the glaciers and snow beds, one saw the soil of the plains being prepared from the raw material of the earth's crust. Transport lagged far behind production, however, and material continued to pile up. Nor could the vegetation possibly keep pace with the enormous accumulation of loose material, though this had been roughly

sorted and graded according to size. Of soil in the ordinary sense of the word there appeared to be none; yet plants grow here. Barren as the valley looked, it was difficult to escape the conclusion that wherever a plant grew there also was a pocket of soil of the right consistency with the right bacteria, and with the necessary physical and chemical properties, and, of course, water content; otherwise how could the plant live and grow?

Flowers were by no means finished, for the snow beds continued to melt and expose plants which had been buried since the previous winter. Late summer flowers, outstaying their welcome, also provided a small quota. Beneath the cliffs early colonists of the rubble fans included *Luzula*, one or two sedges and a few grasses, not showy but an important element in the alpine flora. Wherever there was a hint of shelter from the wind or a slightly richer soil this grass-sedge association was replaced by willow scrub. Boulders too encouraged the growth of dwarf rhododendron, *Cassiope*, willow scrub, *Diapensia* and ferns.

At these extreme altitudes plants are very sensitive to water supply, wind and to protection from direct sunlight. A slight alteration in aspect alters these values, and so alters the vegetation. Not only does snow lie longer on north and east than on southern slopes, but there is an infinite series of gradations between the two extremes.

This is reflected both in the type of vegetation, and also in the flora. Gradually one learns exactly where to seek rhododendrons, where to look for gentians, the most likely places for primulas, and so on; needless to say this is helpful.

Immediately opposite our camp was a snow bed, almost a glacier. It lay at the foot of the cliff, and though still melting would not completely vanish before winter shut down on it again. It had formed a small lateral moraine, it was crevassed like a glacier, its foot appeared to be solid ice. Snow beds which persist from year to year may be glaciers still; glaciers may shrink until only the snow bed which nourishes them remains. At dusk Marang shot an owl; and ate it.

CHAPTER TWELVE

AT last on October 8th another fine day dawned, with the minimum temperature down to 42°. Cloud soon came up and hid the snow peaks, but at least it did not rain: occasionally one saw patches of blue sky, a spark of sunshine. After breakfast I started up the valley on reconnaissance, determined to get another view of the precipices which stood between me and Ka Karpo. Marang, George and one of the Darus who had stayed behind came too.

The position, so far as Ka Karpo was concerned, was that if I could climb the cliff above our camp and look over into the next valley — the Dandi — then I must see Ka Karpo hardly two miles away. But the cliff was sheer, smooth and of unknown but considerable height. There was no way up it. Better I thought go to the head of the valley and have another look round, though the glimpse I had had of those forbidding precipices convinced me that there was no possible way up there either. Still, if there *was* a way — and the joint at the head of the valley where the second ridge met the main ridge seemed the most likely spot, much more so than either side wall — it would probably be here.

We reached the source of the stream in an hour, and the weather being fine, I had an excellent view of the cliffs all round me, of a glacier which swept down from the left-hand side, south-west of the peak, and of a small hanging glacier straight in front of me. High up in the left-hand corner I noticed a col which I thought it might be possible to reach. The glacier, too, came from the summit of the ridge, which it seemed to have breached. Could I reach the ridge via the glacier? An ice fall between the snowfield at the top and the glacier proper suggested that it would be difficult.

On the whole it was not a promising view. I decided to go on as long as I could, following the glacier, which was a real

glacier and not a snow bed. Leaving the three men, who were not warmly enough clad to go higher in the valley, I began to ascend the moraines, making for the visible col, which was at least 3000 ft. above me, or alternatively for the snowfield. The open ring of cliffs looked horribly forbidding: some of the gullies were filled with snow and ice; others seemed to be quite bare; all were sheer. I had to dodge the cliffs, first to the right, then to the left, but I got on reasonably well and was soon, as I judged, about a thousand feet above the valley floor. A glacier now appeared on my right, and I traversed to the left. There was no way up to the ridge here. Then a larger glacier appeared on my left. I therefore ascended the median moraine between the two glaciers, to where it petered out at the foot of some cliffs.

That was as high as I got. I scrambled down the steep moraine and out onto the left-hand glacier which was much the larger, but the ice was rather badly crevassed and I did not much like the look of those cold blue gaping lips into which streams of water poured ceaselessly. I saw no hope of a single climber, without so much as an ice axe, getting to the top of the glacier, but two or three roped men might have done so. The crevasses were lenticular; one could pick one's way between them, and there was no surface snow to hide them. I estimated the glacier foot at 15,000 feet altitude. One thing I noticed. All the glaciers were motionless, and withering away where they lay stranded, like dead whales. Soon there would not be enough weight of snow above to form ice below; the glaciers would vanish, snow beds would linger indefinitely in their place.

Cloud was now rising up rapidly, blotting out the view bit by bit. It was certain that to be caught high up on the glacier in a mist would be disastrous. I still had occasional views of the crags 3000 feet above me, but the ring of granite and ice was not an encouraging sight. It was time to start down.

Before the view completely vanished I examined the cliffs on the other — north-east — side of the valley, towards the high peak, but found no comfort in those cold dark cliffs. There

were no glaciers that I could see, and there was very little snow; but neither was there any sign of a pass, or of any conceivable route but the most desperate gully leading up to the spiky ridge. An experienced rock climber would have seen much that I missed, and might have picked a possible route; it was hardly a job for the amateur.

Amongst the vast mounds of rock accumulated at the head of the valley a few scattered plants poked up their heads and were lost in the stony wilderness. One could not help wondering why there should be any at all, or what enabled them to get ahead of many others which must have tried and failed. Mosses grew here and there, also a species of *Saussurea*, its dark inflorescence enclosed in thin papery yellow-bracts, making a large porcelain lamp-globe. Amongst high survivors were a Saxifrage, a grass, a *Luzula*, and by the streams a rosette-shaped Composite (*Senecio?*), a dwarf tufted rhododendron (*R. campylogynum*), and strange to relate, an orchid!

I now rejoined the Tibetan in the valley — the others had gone back to camp — having been just three hours on the climb. As we got away from the stone mounds and fans, and as the converging streams joined up, the vegetation on the floor of the valley rapidly increased: before we reached camp we were tramping over springy tuffets of undershrub as though we were on a grouse moor, only the tuffets were dwarf rhododendron, *Gaultheria*, *Ilex*, *Vaccinium*, *Cassiope*, *Salix*, *Berberis*, *Lonicera* and *Prunus* — almost anything except heather. Short-lived herbaceous perennials ascend as high as any plant here, and include several primulas which I could only recognize from their fruits, rocking in the wind. A fine fat 'Muscariodes' (grape hyacinth *Primula*), *P. Dickieana* and a tiny 'Amethystina' or Soldanelloid. But the mat-forming *Diapensia*, covered with pink stars, was in flower, long delayed by snow, and so was *Androsace Chamaejasme*. The shimmering blue *Corydalis cashmeriana*, deeper blue *Gentiana Wardii* and a crimson-purple *Pedicularis* were also flowering hopefully against the onset of winter. The only poppy was the many-stemmed prickly *Meconopsis horridula*. I

formed the conclusion that the abrupt petering out and disappearance of the vegetation at the parting of the stream was more a mechanical than a climatic effect. The talus slopes and moraines are too dynamic for plant life to survive; plants are always being bombarded, buried or uprooted, and there is very little soil. A few hundred yards down the valley, where the slope eases, and the main stream and its tributaries are better defined, there is less mechanical wear and tear, and a little sandy soil accumulates. Various woody plants help to prepare the ground for a more complex society. One of the earliest pioneers is *Rhododendron repens*, a perfectly prostrate shrub, not three inches deep. It will grow and spread over the barest-looking rocks. Other plants take advantage of it, grow on top of it. But it resents shade, rejoices in the open. It was common beneath some of the tuft-forming species, but grew thinly, bearing big leaves but refusing to flower. Gaultherias offered a puzzle in variation. Of the larger species there seemed to be two varieties, one with dark blue, the other with light blue berries; but these may be different species. Two had milk-white berries, one a prostrate mat plant, the other an undershrub. Two scarlet-berried gaultherias with white berries like hailstones also grew here: both have thread-like stems which creep far and wide, branching diffusely in beds of moss or on earth slopes and fans, but they do not form mats. One might overlook them in flower, never in fruit. At lower altitudes *G. trichophylla* with black berries, a real carpenter, occurs. So there were at least five good species, and several varieties or possibly hybrids.

Back in camp I found that two coolies had arrived with rations; so I had chuppatties again for supper, and eggs for breakfast.

The reconnaissance just described had shown me what the high alpine valleys of far north Burma really look like where plant life comes to an end and glaciers begin. It had demonstrated the enormous disintegration of these mountains at the headwaters of the Irrawaddy, and it had convinced me that it was quite impossible to reach or even to see Ka Karpo from the

Gamlang valley. Yet on this last point I was not yet completely satisfied, and when at 6 a.m. on October 9th I found the minimum temperature down to 37°, and the sky crystal clear, with a nip in the air and long shadows striping the honey-coloured cliffs, I decided to go up the valley once more, taking a light camp, and make a final attempt the following day.

Marang and I, therefore, set out with four coolies, carrying my Whymper tent (less the outer fly), bedding, a few supplies, collecting outfit and camera, and in the afternoon pitched camp on the last bit of flat ground below the screes, at an altitude of about 13,500 feet. The coolies returned to the main camp. The sky had become completely overcast by midday, and the weather did not look set fair: but I could at least see the cliffs and ice falls. My plan was to tackle the glacier again next day. As there was no snow, I could hardly fall into a hidden crevasse, and might get higher than I had done previously. However, it was certain that I could not reach the top of the glacier by myself, and I had come on a forlorn hope really, the object of which could only be to confirm what I already knew.

Leaving Marang to look after the camp and get the oil stove going, I went for a scramble. While searching the north-east cliffs through a field glass, I noticed a gulley which led right up to a sort of ice ledge, not far below the lowest gaps in the ridge. After a long scrutiny I came to the conclusion that I could climb the gulley, and that once having reached the ice ledge, I could follow it along to the extreme north-east corner. (The ice ledge referred to was a smooth gently sloping platform of varying width, sometimes very narrow, which jutted out between the upper cliffs, and the thousand-foot drop into the valley formed by the main cliff. It was a sort of high water mark, or rather ice mark, all that remained of the floor of the original glacier valley, before water took a hand and cut out the present valley.) It might even be possible to reach a gap in the ridge; if I could, I should be less than a mile from the summit of Ka Karpo.

Moreover it would be less dangerous in a mist than the

glacier, and it certainly looked a more promising route; there were gaps in the wall at 15,000 to 16,000 feet, so I only had to climb about 2000 feet to reach the crest of the ridge here.

Marang and I had supper inside the tent, which the stove warmed a little, and turned in early. I slept reasonably well, but was troubled with horrible dreams. I was up before daylight. At 6 a.m. the temperature was 40° — much too warm for fine weather, and already the sky was heavy with cloud; nor did we see the sun all day. It took us a long time to cook breakfast, and I did not start on my climb till 8.30. I carried a fairly heavy rucksack containing food and clothing in case of accident.

The gulley proved to be more difficult than it had looked. There were one or two awkward places where a large boulder had jammed, but I surmounted or 'turned' these and reached the ice ledge in quick time. I was now at the foot of the second line of cliffs, which were set back. Colonies of *Primula serratifolia* and of a small 'Petiolares' *Primula* like *P. albiflos* grew here: they were not in flower. The altitude of the ledge was perhaps 15,000 feet. It slanted up towards the corner more steeply than I had supposed. After a short rest I turned in that direction, hugging the base of the cliff. The valley seemed a long way below me now. I passed several snow cones which had slid down gulleys in the setback cliff. Eventually I reached a big gulley at the bottom of which flowed a stream. This also I crossed. Then came a deep gash in the cliff with a gulley above, and I could see the sky beyond. Unfortunately to get into the gulley I had to scale a smooth eight-foot granite wall, and this was beyond my powers. Had I been able to surmount that obstacle it might have been a simple matter to have ascended the gulley to the crest of the ridge, from where I would have had a close-up view of my peak, less than a mile away. Meanwhile the clouds had gathered again: already the main sierra ridge above the big glacier was hidden, though I could hear the clatter of falling seracs and rocks. The going became harder, and as I approached the corner where the

Gamlang-Dandi ridge joined the main ridge, I was dismayed to see a deep dark gulley chiselling the cliff; it yawned below me. I clambered over more loose boulders piled on top of one another and then abruptly everything came to an end. There was the blank wall of the cliff as before, but now it was no longer set back; it went straight down as well as straight up, without any ledge to walk along. Across space was the upper part of the steep gulley; even had I been able to struggle across the vertical cliff face and reach it, I knew I could never ascend it. A stream of water from invisible snow poured down it. I could just see a bit of the main ridge above the top of the gulley; it was still hundreds of feet above me, and my own altitude could not have been less than 16,000 feet. Somehow I felt that an experienced climber would never have got himself into my position — I had not made a sufficiently detailed study of the route. Well, there it was: I was stymied and would have to go back — the way I came. I was feeling the weight of the rucksack; and a drizzling rain had set in. The last plants I observed, and they were some of the highest flowering plants in north Burma, comprised thin mats of dwarf *Rubus*, and not less dwarf *Polygonum*, tall conical-shaped *Saussurea gossypiphora* enveloped in clouds of cotton wool, a sedge, a *Luzula* and one or two others: besides moss and lichens. All were widely scattered, though here and there in favoured spots small colonies of *Primula serratifolia* flourished. I turned back.

On the way along the ledge I picked up a long dead pigmy hare (*Ochotona*). Except for the skin, it was well preserved, and I kept the skull. The descent down the gulley proved more difficult than the ascent, partly because of the weight of the rucksack. Several times I had to clamber out of the gulley and let myself down the steep face of the cliff, supported by dwarf rhododendron tussocks: the species here were *R. anthopogon* and *R. riparium*. *R. repens* was also abundant, but not much use as a support.

I reached camp soon after four, wet through and tired out. Marang met me with hot tea and the news that two Daru



coolies had come up. I had intended to spend a second night here, but the prospect of a warm bed and a camp fire was too much for me; we packed quickly and hurried down the valley, getting in just before dark.

Thus Ka Karpo Razi had utterly defeated me: I had not even seen it, and might have been a hundred miles from it instead of five! Except for the discovery that the southern approaches, and particularly the south-west ridge, did not 'go', I was no wit the wiser. We had been in the wrong valley from the start, and it was possible that had we been in the Dandi valley leading directly to the foot of the peak, it might have been possible to find a route to the summit from this side: possible — yet hardly likely. The head of the Gamlang valley was some 14,000 ft. above sea level, and the main ridge 17,000 or 18,000 ft.; that is to say the valley was shut in by cliffs 3000 to 4000 ft. high. The main peak, at the head of the Dandi valley, was therefore over 5000 ft. above the floor of the valley, and a 5000-ft. vertical rock face plastered with ice is not an attractive proposition even to the most skilled climber, however experienced. There must surely be an easier way up Ka Karpo than that — supposing I had pictured the south face correctly.

I slept better that night, but October 11th brought not the slightest improvement in the weather. In fact it rained hard all day and a dense mist hid every peak and battlement. I could not see a hundred yards up the valley. It was not nearly cold enough for fine weather, and yet I could not keep warm in my tent; my feet were like ice. I had much cataloguing and packing of specimens to attend to, and did not go out. I decided that if the following day were wet we must go down; if on the other hand it was fine, I would make one last effort to climb the Gamlang-Dandi ridge and get a close-up view of the peak. We had only two days' food for the coolies. I reckoned that making an early start we could reach the Adung gorge in a day, and the village in two, or at most three days. We left it at that.

In going over my notes, I came to the conclusion that in north Burma, above 10,000 ft. there are actually more plants

in flower in October, including late summer flowers, autumn flowers and delayed spring flowers, than there are in June. It is chiefly the red blaze of acres of rhododendrons which makes June appear a month of flowers. There may be more colour in June, as wide drifts of *Primula* splash into flower, with molten lakes of rhododendron and other social plants setting the hillside afire; but for number of species October leads. For in June much of the ground above 10,000 ft. is still under snow, while above 12,000 on sheltered slopes and 13,000 on exposed slopes, hardly a plant is in flower; whereas in October there are plants flowering up to 15,000 ft. Even a few early summer rhododendrons open an odd flower or two, enough to reveal what they are. I found a hundred species of flowers between 10,000 and 15,000 ft. in the first half of October.

On the whole it would be true to say that June is the month of flowering shrubs, October of herbaceous plants. Many of the former have already laid down the framework of their flowers in the previous growing season, in the form of resting buds. It needs only warmth and water to conjure them alive and build on the foundations. Herbaceous plants have no such credits on which to draw; they died down to the ground in the winter.

CHAPTER THIRTEEN

As I have said the cliffs behind our camp at the base of the Gamlang-Dandi divide were sheer and offered no prospect of a successful route to the summit. The wedge of fir and rhododendron forest on the fringe of which our camp stood concealed most of the ridge, and the only direction in which we could really see anything was up the valley. Returning to camp the previous day I happened to glance up along the Dandi ridge and for the first time noticed — what I had missed during the ascent to this camp from below — a broad alluvial fan which breached the ridge and flared into the valley just beyond the fir trees. This breach was quite invisible from our camp. It appeared to have its source in a col, and to offer an easy route to the summit of the ridge. Its base would not be difficult to reach; a little cutting through the tangled scrub and we would be out in the clear. It was to try this route that I decided to stay another day — if fine.

And fine it was, the sky clean once more. We started early on the 12th — but not early enough, and reached the base of the cliff after some delay getting through the scrub. Then we went straight up, keeping to the shallow gullies and traversing diagonally from one to another. Was the visible brow not far above us the real summit, or did that lie still further back and higher up? I wondered. After ascending about 1000 ft. the slope eased off, and we came to patches of turf, rock slabs and gravel pockets. Another brow line came into view. So far the climbing had been easy; now the gulley again grew steeper. Enormous blocks of stone were piled on top of one another as the cliffs on either side closed in. Getting from block to block proved difficult. As we approached the skyline I grew more and more excited. Marang and the Darus were ahead. I clambered on alone, at times scared by the chasms which yawned all round me. At length I found myself isolated on a vast slab of rock

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separated from the summit only by a deep crack. I would have to jump across to a higher rock beyond which was nothing but the sky. The top! It was now or never — my courage was oozing out faster than the sawdust from a torn doll. Measuring the gap with my eye very carefully I stepped back and jumped, landed safely on the last slab — and shrank back, crouching, appalled at what I saw.

We stood on a saddle-shaped gap between two rock towers, which might perhaps be called a pass. The men were huddled in a corner seeking shelter from the icy wind and I crawled forward to the edge of the cliff.

Which really caught my eye first — the sheer drop over the edge into the Dandi valley two or three thousand feet below, or the grey Gothic spires of Ka Karpo Razi rising sheer into the clouds three thousand feet above our heads, I cannot say. Anyhow it was a staggering, an awful sight. I sat down on the cold rock in the bitter wind while I slowly took in the terrific scene. The view was set in a narrow frame of violent grandeur, but in spite of a bulge in the mountain on our left which hid the corner where our ridge joined the main ridge, we could see everything that really mattered to north, east and west. Had we been an hour earlier we should have had an even better view of the peak itself, for the cloud was only just beginning to gather round its head, but was gathering fast. Yet from the shrivelled glacier at its foot whence issued the Dandi river to the topmost jagged spire, we could see the whole 5000 ft. southern face of Ka Karpo streaked and freckled with snow, and the ice on its brow. One could almost have tossed a stone into the jinking Dandi river which showed as a white thread far below; to see the summit of Ka Karpo one had to lift up one's eyes.

Eastwards we could see some way down the Dandi gorge to the misty mountains on the other side of the Adung river, darkly chequered with fir forest all the way. Direct air distances were absurdly short; only the terrible crushing and grinding out to which the mass of jumbled mountains had been subjected made journeys on foot long and arduous.

I have described the saddle as though it were a pass but indeed there was only a chimney hundreds of feet deep leading down to the Dandi valley. The altitude of the saddle was something over 15,000 ft. with Ka Karpo two miles distant. I judged it to be unclimbable from this side.

Across the Dandi river was the tremendous eastern spur of Ka Karpo, a jagged ridge forming the other wall of the Dandi gorge. The gorge itself would have been a tougher proposition than the Gamlang and could have served us no better as an approach to the peak; so far as choice of route was concerned we had been right.

The sun had now disappeared behind rising cloud and it was bitterly cold. I climbed a few hundred feet up the slope to the north but felt too listless to get anywhere, so we started down after having spent almost an hour on the summit. Before we reached the bottom the mist came all round us and we lost the way, getting mixed up with cliffs and other awkwardnesses; on the way up where the fan was wide, it had seemed hardly possible to go wrong; but now we found it easy enough. In the lower part of the gulley were fine clumps of *Gentiana gilvostriata* and of another gentian. The flowers had closed for lack of warmth, but placed inside a tin box in my tent they opened their shining blue eyes.

Other plants I saw here were two species of *Cremanthodium*, one aromatic, the other remarkable for its finely divided leaves, like hedge parsley, *Primula triloba* and *P. Dickieana*.¹ At about 14,000 ft. I saw a pygmy hare pop into a hole under a rock; this little creature, a goral (which occurs further north) and the common marmot are three of the highest mammals in Sino-Himalaya.

I have recorded that it was owing to the luck of finding an alluvial fan we reached the top of the cliff; and certainly there *was* an alluvial fan below, spewed from the mouth of the gulley by which we ascended. But there was more than that. For the very conspicuous breach in the cliff had been made, not by

¹ Other alpiners in flower were *Cyananthus*, *Astragalus*, *Ranunculus*, *Lactuca*, and even a small orchid, besides the regular autumn-flowering *Primula capitata*.

water but by ice. Long ago a glacier had ploughed its way across the Dandi-Gamlang divide at this point; and though no vestige of it remained the hall-mark of flowing ice it had left behind was unmistakable.

There was now nothing to detain us. After a rather cold night — minimum 32° — October 13th broke fine with a clear sky and brilliant sunshine. We easily covered three stages of the upward journey, camping well down the main valley at 9500 ft. As we went along I collected seeds, and so did not reach camp till late. Between the confluence camp (at 10,500 ft.) and the lower camp at 9500 ft. we crossed five snow beds, which emphasizes not only the heavy snowfall, but also the steepness of the mountain gullies. On one snow bed, covered with a thick insulating layer of earth, *Primula melanodonta* was in flower! Close alongside, many plants which had been buried alive — as *Mimulus* and *Trollius* — were likewise celebrating their recent release from cold storage by bursting into flower. So we went slowly down from the alpine valley, across the bogs, through the tough scrub, wading down the stream again to the meadows with their scattered trees and the silver fir forest decked in sombre green where the broad-leaved trees were dropping their leaves. A pleasant scent arose from the dwarf aromatic rhododendrons, and a familiar musty scent from *Cimicifuga* in the meadowland. The gullies were daubed with colour, from the tarnished scarlet of *Berberis* to the flamboyant gamboge of *Viburnum*. I collected seed of the hybrid rhododendrons on the big boulder which I had found in the torrent three weeks earlier. It grew appreciably warmer as we got away from the snows, and I found myself sweating; yet my feet were cold as ice inside my tent. I had not been in camp an hour before some insect gave me a vicious bite; as always in this country there was no lack of militant life, from small snakes at over 12,000 ft. — rather torpid just now — to biting insects at all altitudes. But birds were still rare and far from conspicuous. The fine weather did not last. We were rationed to one day at a time it seemed; or to half a day.

In the night it began to rain hard and the 14th was very wet. A half-resolve to spend a day here was still-born, and we went down the valley to the thunderous roar of the Gamlang river, turbid as ever. Three hours later we were in the Adung gorge and I was collecting the black fruits of the silvery leaved *Berberis amabilis*. On the way down I also got a little seed of the remarkable bamboo-leaved — or falchion-leaved — *Euonymus*; *Corylus ferox*; and of several rhododendrons.

I had hoped to reach the big torrent in a single march but met with an accident which delayed me somewhat. As already described, the track along the right bank of the Adung traversed a rather steep face and was often some little height above the river. Here and there bamboos which obstructed us had been cut off six inches above the ground and pushed aside, leaving sharp spikes sticking up like *panjis*. When I slipped off the edge of the path and went down the *khud* it was one of these *panjis* which held me; it drove up straight into the armpit, thus arresting my fall by impaling me. I gave a yelp which brought Marang to the rescue and he helped me to unhook myself and pulled me back onto the path, with nothing worse than a lacerated wound; but it was very painful. Later we crossed a torrent much swollen by rain, and camped at dusk not more than half way to the big torrent. I went straight to bed after taking a few aspirins, and became light headed. I could do nothing about the hole in my armpit except pour iodine into it — probably the worst possible treatment; but it did sterilize it. The Darus shot a flying squirrel with their cross bows; it went into the pot.

I slept fitfully but was all right in the morning. It rained most of the night and we started in a drizzle. My arm was stiff and painful and I kept falling down through inattention. Again I went over the edge, but was held up by some shrubs without hurting myself; the coolies coming along behind hauled me back onto the path. In the afternoon we reached the big torrent. In spite of the rain it was no longer in spate and we crossed by the tree trunk to our old camping ground.

The Adung, however, was still in flood hurling spray high into the air so that the whole valley seemed to smoke faintly. Yet for all its noise and fury the Adung cannot degrade its bed very rapidly. In the first place it has to cut its way through solid rock, and in the second place as fast as it clears out its bed the cliffs and gullies tip more material into it and fill it up again. It is clear that the whole Adung valley was once a glacier not less than fifty miles long; and though the river has been working on it for thousands of years it cannot wash out the marks.

The rain continued all night and all next day so the journey was being made as difficult as possible for us. However, it was more comfortable being wet and warm than wet and cold; the 6000 ft. descent since leaving our alpine camp made a considerable difference to the temperature. While the rain continued we could not hope to reach our base camp in one march — the track was too slippery. So I took things easily and we camped at Adung Long as we had done on the way up. All the way I had been collecting seeds and fruits of anything that looked promising, including a *Pyrus* with gold-whiskered leaves and several rhododendrons.

A short march on the 17th brought us to the Tibetan settlement and my old base camp. Directly we turned the last corner we saw blue sky ahead; but the wet grass was cloudy with sand flies and I had a warm reception from these horrible little creatures. However, it was good to be back after a rather tough journey which had lasted three weeks and three days. I remarked now how relative was one's appreciation of the forest, according to the direction of approach. Perhaps also the assessment was tinged with wishful thinking! At any rate on the way up I had written in my diary at this point (altitude 6000 ft.): 'The vegetation is daily becoming more temperate. No more tree ferns or palms, but many oaks, maples and hollies, besides conifers. Rhododendrons too are becoming more plentiful.' Yet on the way down I find at the same place this succinct remark on the same vegetation: 'We are back in that beastly jungle again!'

Now I began drying my seeds, plants, clothes, everything. I stayed in camp two more days for the purpose while the sun shone brightly. It was pleasantly warm, the temperature not falling below 52°. Every morning the grass was saturated with dew. I bought fresh milk and butter, and eggs — not so fresh — from the Tibetans. Take it all round life was very pleasant here the only fly in the ointment was the sand fly — millions of him. When I went outside my tent at 6 a.m. a haze of them greeted me, and they were inside my tent before I could do anything to stop the infiltration. Consequently I was badly bitten and soon covered with bumps. Then I sprayed my tent, and drove off the skirmishers by lighting a smoky fire. Sand flies seem to be more numerous in the vicinity of human habitations; or at any rate where there is cultivation.

On October 20th we made a late start as George had forgotten to notify the coolies. Only the fact that we had to cross three cane bridges — two over the Adung and one over a tributary, made it worth while to pack and unpack. But for these bridges we could easily have reached the Seinghku confluence in a day's march. Compared with the Gamlang gorge the path down the Adung seemed a highway. For some reason everyone was out of humour. I shot a rock dove for breakfast but nobody laughed. Even the irrepressible Marang was subdued. The fine weather merely aggravated the general gloom which had settled over us like a blight. The sunshine only made the shadows darker by contrast. Such grey days when nothing seems to go right inevitably occur now and then on a long expedition.

The winter flowers were now coming into bloom; the brown-spotted sulphur-yellow foxgloves of a *Gesnerad* (*Tremacron Forrestii*) lolling negligently from the tree-trunks, *Spatholobus* a woody climber bearing showers of little reddish-purple pea flowers, and finest of all, masses of pale pink *Luculia*, distilling sweet fragrance.

In the river bed was a huge rock which had become a home for lost *Ericaceae*; a milling crowd of rhododendrons (*R. Nuttallii*,

R. taronense), *Vaccinium*, *Gaultheria*, inextricably mixed up with the yellow intestines of an orchid, festooned round them as pig's guts are festooned round the neck of the scapegoat in a Tibetan monkish festival of spring. That is to say the entangled orchid stems *looked* like guts, but ended in such fairy sprays of spidery white flowers that one forgot all about their apparent enteric origin.

The Adung river was falling fast, and had turned a lovely bottle-green colour again, a sure sign of the approaching freeze-up in the alps. The last march to the Seinghku confluence was enjoyable in spite of the fact that the sky was gravid with cloud and the atmosphere oppressive. A big storm threatened. I bought the skin of a tiger cat.

Just below the Seinghku, a cane rope bridge high in the air spans the Adung. I watched a Daru hauling himself across with a small child clinging to him exactly as I had seen a baby monkey cling upside down to its mother as the latter swung from tree to tree. However the child, unlike the monkey, was tied on.

We slept the night at the hut and went straight on down the Tamai valley. *Wightia gigantea* with little purple flowers was in full bloom, the leaves still green on the tree though it is normally deciduous, the flowers appearing in November after the leaves have fallen. In the comparatively cold Adung valley it is never obviously epiphytic, though I have sometimes seen its massive trunk pressed close up against a support and held there by horizontal clasping roots like steel bands. The first march below the Seinghku is one I have always disliked, and sand flies were bad again, owing to the large areas covered with high grass.

At last on October 23rd we reached Gawai whence I had set out so hopefully on September 15th, more than five weeks earlier. The weather at once began to deteriorate again.

I spent the next three days making preparations; then on October 27th following our old trail started up the ridge towards the alp to collect rhododendron seed and anything else I could find.

It may be useful to summarize here the little that is known about Ka Karpo Razi and the way thither. Some day a mountaineer will turn his attention to the highest mountain in Burma, and even the little we know may help him in his choice of route, and save him much time. I have actually walked more than half way round the snow mountains and as a result of this reconnaissance can at least indicate the most likely approach.

Ka Karpo was first observed and its height measured by a small party of Indian surveyors under Petters in 1923, during routine survey operations north of Fort Hertz. Petters did not get anywhere near the peak, nor was there any reason why he should do so; it is visible from many points to south and east and almost certainly from the west also.

Now the obvious approach from the Burma side is via the Adung valley. In 1930-31 when Lord Cranbrook and I were exploring the sources of the Irrawaddy, I saw Ka Karpo for the first time. We *had* followed the Adung to its source in the Namni pass, where our base camp was situated at an altitude of 12,000 feet. From here I ascended a scree on the west side of the valley, whence I reached another pass at about 15,000 feet. From here the peaks were clearly seen miles distant. However, there is no need to approach them by so roundabout a route.

A few miles above the Gamlang confluence, and three marches below the Namni pass, the Adung river splits into two branches. The Namni pass stream which we had followed flows in from the east, and is commonly regarded as the main stream. The other stream which is certainly as large, flows from the north. It is more likely that *this* is the main stream, as it is usual for the pass to lie at the head of a minor stream in north Burma, or anywhere else.

Be that as it may I followed this north stream for about a mile. There was no track of any sort and I was stopped by unbridged torrents; but it would not be difficult to cut a path here. Most of this water must be derived from Ka Karpo

which is only a very few miles to the west of the confluence. Probably the stream rises in the northern glaciers, swings round through 180° , and so southwards. This valley then seems to me to be the most worth while reconnaissance on the Burma side. From the river confluence, altitude 8000 feet, an ascent of 11,000 feet is necessary, but I feel confident that if the river is followed to its source a way onto the northern slopes of Ka Karpo via one of the many smaller valleys will be found.

From the south the mountain is in my opinion definitely unclimbable, and hardly to be reached; the ridges are far too narrow, broken and, what is worse, crumbling. The fearful precipices, glazed with ice, and horrid splintering crags, make an assault from this direction an impossible task; and if the northern face is the same, then indeed Ka Karpo may be invincible. But I think the north face may be quite different. There is, however, another possible approach, this time from the west via the Seinghku valley. The Seinghku flows into the Adung from the north-west. At the head of its valley is the Diphuk La, a comparatively easy pass about 14,500 feet high. After crossing the pass one follows the Di Chu valley north-westwards, straight down to the Lohit valley. About 2000 feet below the pass, that is at an altitude of 12,500 feet, the stream from the Diphuk La joins a larger stream flowing in a good-sized valley from the north-east; and this valley which looks quite easy has never been explored. Unless it changes direction the stream must come from near Ka Karpo, collecting its water from the northern and western flanks of the snow peaks. Following up this stream, one should be able to reach an altitude of 15,000 to 16,000 feet without any difficulty as in other big valleys; and from that point one could carry out a final reconnaissance of the northern and western approaches. Moreover the Diphuk La can be reached as easily and as quickly from Assam as from Burma.

The best season for the venture is early winter, which is the pleasantest time for travel in Burma and Assam. But though Ka Karpo is not high as Himalayan peaks go, it would never do to try to climb it in mid-winter; and though you can travel

here well enough during the rainy season once you *are* here, the difficulty is to reach the interior after the rains have broken. August and September might be the best months on the peak itself — June would be better if one could get there so early. My own preference would be to make the journey to the mountain as late as April or even May and hope to climb the peak in June, in spite of the difficulty in getting back across swollen rivers. Finally it should not be supposed that because Ka Karpo is under 20,000 feet it must be easy. Height is not the only weapon in the armoury of the Sino-Himalayan mountains. The fact that it towers more than 2000 feet above the surrounding ridges suggests that it is different, and perhaps not so easy. There may or may not be a ridge that 'goes'; the northern glaciers may or may not offer a straightforward route to the top. There are peaks in Sikkim no higher than this which are I believe regarded as unclimbable; Ka Karpo Riza may prove to be just another unclimbable peak.

As to the origin of the name, Ka Karpo on maps of north Burma, the name of the peak is spelt 'Hkakabo'. The source of this name is not difficult to trace. Indian surveyors coming up from the Kachin country south of Fort Hertz, and inquiring the name of the high snow peak they caught sight of on the frontier, were told by the Tibetan and Daru inhabitants of Adung Long that it was 'Kakarpo' or 'Kakarpu'. Naturally, they thought *Ka* must be the familiar word *hka* (water) they had heard so often in the Kachin hills. In fact *Hkakapo* is a good phonetic rendering of the words they heard, or thought they heard. But neither the Tibetans nor the Darus of the Adung valley speak Kachin, and in fact the local word for water is *Ti*. It is unlikely that the Darus would have any name for these snow peaks, which they can rarely have seen, whereas the Tibetans who came originally from north of the passes would be certain to name them, as they name all conspicuous snow peaks, and this name would be used by the Darus also. In Tibetan, *Ka* (or *Kang*) means snow, *Karpo* means white, and Ka Karpo (=white snows) is often used to designate the name

of a range of snow mountains, the word *ri* being added to indicate a particular peak. Thus we have Ka Karpo Ri, Kang Ri Karpo, and similar combinations. *Razi* is evidently the local pronunciation of *ri*. Thus 'Hkakabo Razi' is really Ka Karpo Ri, or as we may continue to call Burma's highest mountain, to distinguish it from other Karpo Ris, Ka Karpo Razi.

CHAPTER FOURTEEN

OCTOBER 27th; minimum temperature 54° , weather fine, but sun hidden behind great banks of cloud. On the 25th it had been 56° and by the 26th it had dropped to 53° . Now it was rising again and that usually means rain in north Burma. It never even approaches freezing in the Tamai valley, though it can be very raw.

The trail we had cut in August was still visible and we reached the ridge early in the afternoon. Now I went leisurely, collecting seeds by the wayside. In the forest even the brightly coloured berries of *Lasianthus* and other *Rubiaceae* made little impression on the prevailing green gloom, but a few winter flowers decorated the open ridge; amongst them *Senecio scandens*, *Gentiana* (*Crawfurdia*) *campanulata* and a white flowered *Aster*-like plant were prominent. In the zone of *Bucklandia* and *Quercus pachyphylla*, at 6000-7000 feet, *Berberis*, *Cotoneaster* and *Hymenopogon* showed the red lights of autumn. A small tree with loose panicles of pinkish-purple flowers (*Saurauja*) was in flower, also the *Eriobotrya* previously referred to. Most of its leaves were gone, but there were large brown fruits very like sapotas to look at, and tight clusters of flowers smelling of hawthorn. At Stonehenge it was cold in the shadow of the rock, but we were no longer plagued by flies. We soon had a big fire going; luckily there was no trouble about water though it was some distance down the slope. I felt in good spirits when I turned into my little tent hugging a hot water bottle.

Next morning the minimum was down to 43° but the weather proved deceptive. For the first hour it was clear; then the valley began belching mist as a bonfire belches smoke. It rained all day with sleet thrown in for good measure. The view was ruined; but at sunset we had a momentary glimpse of infinite mountain ranges to the south. Suddenly it was dark.

This day we had two steep but not very long ascents aggrega-

ting about 2000 ft.; as against 3500 ft. of ascent the first day.

The colours of the leaves grew brighter as we came into a more temperate climate and I was able to pick out shrubs I had not previously seen here. The deeply stained leaves of *Enkianthus*, *Viburnum*, *Acer Wardii*, and even *Rhododendron Martinianum* shone like beacons from rock towers along the ridge. What pleased me most, however, was to find both the epiphytic 'Maddeni' rhododendrons not only in ripe seed but in flower as well, the primrose species which was new to me, the other with deep crocus-gold flowers. The latter had been in flower in August at the Mungu Hkyet, and here it was still in flower, or flowering a second time.

From now on I was kept busy collecting seeds. Any plant which gave colour—whether of foliage, flower, or fruit—in spring or autumn was worth collecting.

One tries to distinguish between plants of purely botanical interest and those worth cultivating for their intrinsic beauty; but what constitutes botanical interest? and where does beauty begin? Obviously the two overlap. Moreover if one is going to start dividing plants into artificial categories one would surely begin with economic plants of which horticultural plants form a small section, though they appeal to the aesthetic sense only, and are not a raw material of industry. In fact the uses of plants are legion; and the whole animal creation is ultimately dependent on vegetation for its existence. Industrial crops are, of course, of paramount importance to an industrial nation, second only in importance to mineral wealth. The power of Japan, a country singularly poor in minerals, was largely dependent on the textile industry. One of the chief differences between the hill tribes and the plains people of Burma is that while the former must grow almost entirely food crops in order to survive, the latter can grow industrial crops also as well as a greater variety of food.

As a field botanist I was interested in plants of all kinds; but so far as seeds were concerned I limited myself almost entirely to those which had some aesthetic appeal. There may



be plants of unknown economic value in these mountains; there are almost certainly drugs, known to the hill tribes, of which we know nothing. But totally new plants of economic worth are not likely to be numerous for the reason that most food and fibre plants have been known to man for thousands of years. Nowadays it is the methods of dealing with such plants on a big scale and their application in new industrial combinations which are new — not the plants themselves.

We were very short of water at Landslide camp astride the ridge, and being unable to cook any rice we all turned in early. It poured with rain in the night and the sky was lowering when we rose next morning; the temperature was down to 34° . It was the change of the monsoon, when turbulent air currents are in conflict over the mountains. A gusty wind buffeted us and drove stinging showers across the spurs; the sky was overcast when we started. I found a dozen plants of the dwarf *Cornus* but they bore only one seed between them. I felt I should have to write off that tantalizing plant as a dead loss. We reached the top early in the afternoon and camped near the water hole which was dry as before. At sunset the clouds lifted for a moment and the world became a sea of violet breakers crested with golden foam. The light faded swiftly, the gold changed to base metal; night fell. I decided to stay here a week, wet or fine; I would not go down till I had explored every cliff and gulley I could reach and collected all the seeds marked on my first visit.

Though it is never fine in these mountains for long surely we might I thought expect a week of clear weather now.

Next morning the temperature was down to 32° and a film of frost glistened on the leaves. When the dawn came up a world of mountains across the Tamai was laid bare. I had expected it to be colder. Almost immediately mist began to fly up, but it kept fairly fine all day, and I had a long outing in the big gulley. The two Daru coolies who had remained with us had to go far down to get water; it took them an hour to bring up one half-bucket full.

As recorded, *Magnolia globosa*, which is a shrub rather than a tree, grew on the gravel slide. Its branches swept the slope so that some of its fruits touched the ground; they had been gnawed by rodents though one would have thought they would be unpalatable, so strongly impregnated with oil are they.

The last day of October dawned, the temperature down again to 28°. As usual the early morning was fine but soon clouds came up with a sprinkling of rain. I returned to the big gully but did not find much that was new, though I collected a lot of seeds.

That night the gods unleashed a tempest, and it rained furiously to the accompaniment of vivid lightning; the thunder was like the slamming of many doors. The noise of the rain drumming on the tent canvas ceased abruptly and a queer silence fell. Next morning the whole world was white with snow and a thick mist lay packed in the valleys till a bitter wind stirred it up.

After breakfast I went up the ridge. No sooner did I reach the exposed part than snow began to fall; the flakes were whirled about by the wind. I reached a point rather under 11,000 ft. beyond which the ridge descended. Dwarf bamboo grew thickly here with a dense tangle of rhododendron, including *R. fulgens* and *R. arizelum*. Here the forest came to an end even on the sheltered slope, with battered fir, whitebeam and juniper. Unpleasant as the weather was, I thoroughly enjoyed the outing and when the sun actually appeared for half an hour I felt that life was good.

I had now been three days on the ridge and still had not enjoyed a view all round. Most of the seed collecting, however, was finished and this was as well because on November 2nd the weather became really bad. From daylight onwards it snowed hard. So thick was the cloud it was impossible to see a dozen yards. In an hour the whole ridge was white, every tree, bush and bamboo clogged with snow. It was useless to go out so I stayed in my tent shivering; I could not light my stove till the evening because I was short of oil. The men seemed cheer-

ful. I was glad when evening came; but I could not raise the temperature in my tent much above 40° . However, the storm almost cleaned out the atmosphere, and next morning the sun rose over a fairyland decorated with a million Christmas trees. The slim bamboos were all weighted down with snow and lay across the path, so that it was difficult to get by. Below 10,000 ft. it had mostly melted.

At last on November 4th the perfect dawn came for which I had waited patiently. I dressed hurriedly and went outside. Just before the sun rose the temperature inside my tent was 29° , outside 27° . The sky was cloudless and the air very still. Snow crisp as sugar lay on the ground and covered the upturned branches of the fir trees with icing. Westward I could see far down the Tamai valley to its confluence with the Tazon, and count every gulley and spur for miles. In every direction the skyline was hard and menacing as a naked blade. Suddenly away to the north through the powdered Christmas trees my eye caught the distant flash of snow. The ridge with its ups and downs blocked the view to the north but by climbing a knoll I was able to see over the heads of the nearby fir trees. And, not thirty miles distant, a white stripe across the pearly sky, I saw in one glorious panorama the snow range I had been seeking; I had not realized that Ka Karpo was still so close, or that it would be fully visible from this point. I could plainly make out where the gorge of the Adung split the range which further east seemed to roll away in endless peaks and ridges to China. To the left of the thin gash made by the Adung, Ka Karpo and its three satellite peaks rose like the white sails of yachts gracefully riding the blue rollers. Still further round to the north-west the pale treeless alps were lightly glazed with snow and the deep furrow ploughed by the powerful little Seinghku was plainly visible. But southwards the ranges grew lower and dimmer and more confused as the network of rivers spread. Then still further round to the south-east, along the China frontier they grew higher and sharper again and there was more snow.

The first thing that struck me was that, though the snow peaks

stand on — or appear to stand on — a single ridge which strikes north-south, from here they appeared as a single *transverse* range running east-west. This range rises 2000-3000 ft. above the average level of the surrounding ranges, and viewed from here it stretched over 70° of arc, thus occupying more than one third of the northern horizon. It is from this cross range that the Irrawaddy rises. The second thing that struck me was the extraordinary levelness of the ridges. In whatever direction one looked every ridge maintained the same level for miles, like a wall unbroken by any conspicuous peak or hump. That is to say, discounting the furrows made by rivers, the country had the appearance of a plateau, sloping down gradually towards the south and west, rising higher in the north and east. It was possible to divide the whole northern skyline, covering about 110° of arc (that is from due west to north-north-east), into four blocks as follows.

(1) Starting in the north with a group of snow-clad peaks bearing 6° there is first a jagged sierra, knife-edge ridges connecting one peak with another. They are too precipitous to hold much snow, though due north (359°) rises an isolated pyramid with a long snow slope. Immediately west of that the ridges fall abruptly to the Adung gorge.

This block in part separates the Adung from the Tazon and is crossed by the Namni pass. From its southern edge rise the Dablu and Tazu rivers. The highest peaks are about 18,000 ft.

(2) The Adung gorge separates the massif just described from the snow peaks. Beginning with a smooth shoulder which rises steadily to Ka Karpo Razi (bearing 335°) it continues as a broken rocky ridge followed by a steep slope culminating in a twin snow peak (bearing 326°). Beyond that is a saddle, apparently an unused pass at the source of the Tazon river.

(3) Between the Tazon saddle and the Diphuk La which forms a visible notch at the head of the Seinghku is a fairly level topped snow-covered massif with no outstanding peaks to break the line.

(4) From the Seinghku valley to the last visible snow,

roughly where the watershed between the eastern and western Irrawaddy systems merge with the main Irrawaddy-Lohit divide. Apart from an isolated pyramidal limestone peak above the Diphuk La (bearing 297°) there is nothing outstanding here. Following the Tamai valley southwards, the level Tamai-Tisang divide presently frays out and loses itself in a maze of lower and lesser ridges where many small rivers rise.

Such then was the view seen from this point about 10,000 ft. above sea level.

The finest part of the view was of course the four 19,000 ft. peaks, the two ends of the range subtending a horizontal angle of between 60° and 70° . From the dome shape of several peaks I concluded that the highest range was composed of igneous rock thrust up through stratified rocks, the dip of which was often made manifest by snow bands, but I could not tell in which direction they dipped. Though the river gorges are deep incisions on the face of the plateau they have made singularly little impression on the shape of the country as a whole, in spite of their formidable appearance at close quarters.

Not only did the snow peaks arrange themselves as a transverse range in a region which appeared to be dissected along meridional lines, the whole country was now seen to be a plateau whose surface had once been no more than gently undulating. It still retained much of the typical plateau appearance though ravaged by a thousand centuries of monsoon weather.

The long spur by which we had ascended, now seen in profile, told a different story. The Tamai river flowed almost at our feet, that is to say within five miles of us, and nearly 7000 ft. below. I recalled how we had ascended steeply from the river for over 3000 ft. the first day; from there the gradient had eased, the next couple of miles accounting for only a thousand or fifteen hundred feet; after which there had been another sharp rise. Almost every spur had the same type of profile; and a section across the Tamai valley here would reveal, not one valley but two — a valley within a valley. A glacier made the

first shallow valley, slowly and clumsily, like a bulldozer scraping out a trough. The Tamai river cut the second narrower valley within the glacial trough swiftly, as though a sharp knife had been drawn along it, sinking deep.

By November 5th I had collected seed of more than forty species, nearly half of them rhododendrons; and as I had no lamp oil and not much food left I was not sorry this was my last day on the ridge — now that I had seen all I wanted to see of this amazing country.

Early on the morning of the 6th — which happened to be my birthday — the sun was shining brightly again; minimum temperature 24°. By evening we had reached Stonehenge, where we camped. I noticed a rhododendron which was a small tree in the middle forest at 8000 ft. but which never flowered there. It was distinguished by its fawn-coloured bark peeling off in sheets as thin as gold leaf, to expose the greenish lower layer. Higher up it forms a large shrub, and it was from here that I got seed of it. It is allied to *R. neriiflorum* and to *R. euchaites*.

It was much warmer at Stonehenge than on the ridge — minimum on the 7th 40°. The day began well. Poong caught sight of a gooral, dashed into my tent for the .410, and disappeared. Shortly afterwards we heard two shots and presently he returned in triumph with the gooral. To shoot a gooral with a collector's .410 was surely no mean feat; the Darus were jubilant. Before leaving Stonehenge we ripped off the skin and cut up the meat so as to distribute the weight.

The *Eriobotrya* growing on top of the rock was now in full leaf, the new leaves appearing immediately the old ones had dropped off; thus the plant is never inactive.

As soon as we reached the village I started cleaning the gooral skin and began laying out my seeds to dry. I was suffering great irritation from tick bites; Marang said they caused fever, which seems not improbable.

A new rest house was being built in the village but as it had no roof yet I parked myself in the end room of a Daru hut. I wanted to dry and pack all my seeds before going on, so I had

my tent pitched — that also needed drying — and laid them all out on newspapers on the floor waiting for sunshine. The large capsules of some rhododendrons took up whole sheets; but there were others of which I had two or three capsules only — rare species. A single rhododendron capsule contains many seeds, and one good capsule full may be enough to establish the plant in cultivation — if the seeds are viable and the seedlings flourish. As a matter of fact there can be few plants which produce such a high proportion of good seed to flowers as these Asiatic rhododendrons. Usually a plant which is prodigal of its seed is careless of what happens to it, and so may rhododendron be. But if so, it is remarkable how freely it germinates — in the forest, on the moss-covered branches of trees, in clearings. In newly burnt forest I have seen thousands of saplings springing up as thickly as mustard and cress, the plants touching one another, 2-3 ft. high (*R. magnificum*). But several years must elapse between collecting rhododendron seed in Asia and the flowering of the plants in an English garden; and unless the experiment is conducted on a fairly generous scale there is plenty of room for failure at one stage or another.

It was pleasantly warm by the river, but not wildly exciting. After four fine days in a row (November 5th-8th) a new depression set in and once more the valley was filled with cloud and fine soft rain, which also lasted four days. It would be snowing in our alpine camp.

The headman brought me a small flying squirrel, a furry little ball of fluff as soft as eider-down. The overall colour was steel grey. They told me it ate seeds — so it had come to the right place! It made no fuss at finding itself a prisoner in the small bamboo cage I had made for it, nor did it show any sign of fear; rather did it display a philosophic calm and a dormouse-like capacity for sleep; perhaps it did not like so much daylight. Most of its time it slept, its little head sunk between its forepaws, the folds of its parachute neatly folded up and put away, its body hunched up into a sort of rugby football, its long fluffy tail laid flat over its back. It drank milk but would not

touch boiled rice or papaya. Also it greedily ate bamboo shoots and the scarlet fruits of a *Polygonum*. However, the problem of feeding it was of short duration. I was at work in the rather dark room when I heard a curious intermittent tapping on the bamboo mat floor and glanced up just in time to see my squirrel covering the last lap to the door in a rapid succession of jerboa-like leaps. In a flash it was through the open door. Though the hut was raised a couple of feet off the ground, the fugitive did not wait to become airborne; it ran down the ladder. I was on its tail by this time, but alas! it was too nimble even on so strange a medium as earth and it quickly disappeared into the nearest patch of jungle. I looked at the bamboo cage. One of the bars had been gnawed through — a flying squirrel possesses two pairs of very efficient chisel teeth. I should have known that for rodents bamboo bars do not a prison make.

When I peeped inside my tent next morning a scene of utter devastation met my shocked gaze. I noticed that several of the guy ropes were slack, and a few pegs had been pulled out; but I thought nothing of it till I drew aside the flaps. Then my guts suddenly seemed to melt. I could hardly believe my eyes. Seeds, fruits, catalogue numbers, notes written on scraps of paper, were all mixed up together in hopeless confusion. It was like a jumble sale. Several newspaper sheets had been chewed to pulp and their contents trampled in the mud. Others were piled on top of one another. It was a debacle.

At first glance I thought that all was lost, that nothing could be saved from the wreck, and that the fruits of that climb at any rate were Dead Sea fruits.

Nor was it hard to reconstruct the crime — the village cows had run amok; or rather they had been on one of their periodical forays for salt, and perhaps were not averse from exploring the possibilities of a new diet. They had certainly sampled the rhododendron capsules, the potato-like fruits of *Eriobotrya*, and several other seeds, but not finding any notable quantity of salt they seemed to have registered contempt and despondency by stamping around and blowing, with a careless

indifference to the classification of plants which was painful to see. The confusion was complete.

All day I worked over the wreckage sorting seeds and capsules, assigning correct numbers, rescuing specimens from the mud. By evening order was restored. I had remembered that a rare rhododendron I feared was missing was in fact quite safe; finding it difficult to distinguish from another species and fearing the two might get mixed up, I had never even unwrapped it! Thus I salvaged and re-classified the whole collection, and in fact lost little if any of my precious harvest. But it was a lesson to me to be more careful.

The headman was very distressed. He even admitted liability by offering me two rupees compensation for damage done! He promised to have the cattle tied up at night while I for my part fastened the flaps more securely and had a bamboo fence built round the tent. It was rather like locking the stable door after the cows had gone.

The Darus were cleaning the gooral skin. They were curiously like children. I gave them knives, told them what to do and left them to it. For perhaps half an hour they worked steadily at scraping off the fat. Then they grew tired of it. One by one they sidled away, ostensibly to get something; but they never returned. At the end of an hour I looked in on them, found the skin stretched out, the tools scattered about, the work half completed. They had gone off to play at something else. In the end Marang and Poong finished the job. Once or twice I strolled down to the river. The water had fallen a lot and was quite clean. On the rocks three dwarf species of *Impatiens* formed bright spots of colour. Two of them had yolk-of-egg yellow flowers — these grew only where spray could drench them so that they lived in a perpetual aqueous haze, totally submerged in summer but now well above the water line. The third had flowers of a screaming magenta colour not uncommon in the genus. Two shrubs, a *Litsaea* and a *Prunus*, were in full bloom.

Under grey skies, with wisps of cloud clinging to the tree-tops

half way up the mountain, the valley looked damp and dismal. Sand flies were as bad as ever. Morning and evening they attacked in hundreds. Nevertheless there was a certain rhythm, as though new broods were being released every few days, dwindling again in numbers almost from the start. Possibly bats kept them in check.

As there seemed no prospect of fine weather just yet I decided to move off at once. On November 13th, therefore, under a gradually clearing sky, we went down the valley to the next hut. High above the river on a crumbling bank of granite sand heated by the sun, dozens of birch saplings had sprung up, and with them two bushy gaultherias, *Boehmeria*, a fig with long narrow lop-sided leaves, and several other seedling trees. The rapidity with which plants spring up on newly exposed earth in this country is impressive; and yet such upturned earth cannot contain much humus — if any.

One of the Daru coolies brought me a freshly killed water shrew (*Nectogale*). It is a small mammal about six inches long, including the short tail, with soft mole-like fur, smoky grey in colour, and paddle-shaped feet, also something like a mole's but used for swimming, not digging. *Nectogale* lives in the swift rocky mountain torrents and spends most of its time in the cold water probably looking for water insects. It is a powerful swimmer and the strong tail is almost eel-like, flattened from side to side, widening suddenly just beyond the root, then tapering gradually. The skull is broad, and flattened from above downwards. The fur too is curious, consisting of two kinds of hairs, short grey black-tipped hairs and longer bristle-like white hairs which give it a glistening appearance. It never gets wet. In the museums of the world no mammal is rarer than *Nectogale* — except perhaps the almost extinct Sumatran rhinoceros. But *Nectogale* is not rare in the torrents of north Burma.

Wightia was in bloom everywhere. It must be one of the commonest trees of the warm temperate forest belt. Flowering branches were leafless but the tree rarely flowers all over, and

non-flowering branches retained their leaves. I saw one specimen growing on top of a *Bucklandia*; both were in flower. Another large specimen was twining round its host like a liana.

Insects now seemed to work in shifts in an all-out offensive to undermine my morale. There were blister flies, active as long as daylight lasted but most virulent when the sun shone brightest; sand flies, especially active towards dusk; mosquitoes after dark. Conditions in the valley are too good for them; they have not enough enemies. It ought to be a crime to kill any insectivorous bird or mammal. More and better birds, bats, shrews, spiders, ichneumons, not to mention fungi might be introduced and surely *some* insectivorous plants! The natives decimate the insect-eating life, especially the birds, and suffer accordingly. But clearing the jungle is an even more effective way of increasing the blood-sucking insect population. They brought me a tree shrew the size of a small squirrel which had been shot with a cross-bow arrow so that its gut protruded from the wound. It could crawl about, and it squeaked. I cleaned up the hole and tried to keep the animal alive. It seemed ignorant of the fact that it was mortally wounded and merely felt a certain inconvenience. In the night it died quietly. At first sight one might easily mistake *Tupaia* for a squirrel, except for its pointed muzzle. One glance at its teeth, however, shows that it is no rodent.

Carnivores appear to be numerous and in fair variety, though mostly small creatures — civet cats, leopard cats and the like.

When the sun topped the ridge on November 14th I knew that the storm was over. The mist in the valley melted away, and mountain, jungle and river were once more bathed in golden sunshine. North Burma became Arcadia.

CHAPTER FIFTEEN

I HAD only one more climb to complete my work for the season — to the Munghu Hkyet. I hoped that in another fortnight I should be on my way back to Fort Hertz; I would arrive in time for Christmas.

The march over the lower spurs to the Nung village took nearly the whole day, and the sun was setting as we came down into the little hollow. I was walking ahead of the coolies near the top of the ridge and had just turned a corner when suddenly three small animals the size of a spaniel came romping up the hill towards me. They saw me almost as soon as I saw them and halted abruptly. Head, body and long bushy tail were black but the breast was yellowish, the colour continuing round to the back of the neck. The head was long and pointed. I say these creatures were romping because that just describes it; they appeared to be playing like puppies, pawing and chasing one another by turns — I watched them thus for a few brief seconds. At the very moment they scented danger, one of them had its paw lifted exactly like a terrier. There was a noise something between a deprecatory cough and a grunt. Then all three after a brief look at me standing stock still within twenty yards of them took fright, turned and scampered off. They kept to the path at first as offering the easiest route, then abruptly disappeared into the forest. They were more dog- than cat-like in appearance; racoons probably.

We did not waste any time at the village but started up the mountain next morning, November 16th, a long and hard day's climb, the stiffest part coming at the end when I was tired; perhaps I was getting stale. At the Nung village the barometer was 26.5 in., at the first camp 23.6 in. Every coolie carried in addition to his load a bamboo full of water since there was none on the ridge. A few orchids were in bloom notably a species of *Coelogyne*. Some autumn-flowering shrubs were: *Euonymus*,

Illicium (rose-red flowers), *Eugenia*, the epiphytic *Rhododendron taronense* and *Pentapterygium flavum* its cold yellow flowers like little frosted glass tubes. *Bucklandia populnea* was also in flower. Up to about 6000 ft. — which is roughly the upper limit of what I have called sub-tropical hill jungle (or of sub-tropical pine forest where that occurs) — there is no complete winter sleep, only a slowing down of the life pace; many trees and shrubs flower or put out new leaves or ripen their fruits in October-November. At most there is a slight lull during the two coldest months.

But above 6000 ft. the forest behaves more and more as it does in north-western Europe and in temperate North America; that is to say all growth ceases for a time, trees shed their leaves, buds remain dormant, and there is a distinct resting period. Up to 8000 feet or so this is not very conspicuous owing to the number and variety of evergreen trees — rhododendrons, oaks, laurels and others; yet there are many deciduous trees also as maples, *Sorbus*, *Pyrus*, *Magnolia* and *Viburnum*. When we reached camp I sat down and began detaching the ticks from my arms and legs; the fine weather has its price.

We were now well above the early morning mists which are an important factor in helping to determine the sequence of vegetation. When I awoke on the 17th the fresh morning air was sharp and dry. There was no trace of dew. It was very still — no wind coming up from the valley laden with hateful cloud. The sun shone all day — but it was a very short day now. At camp I B. 23.6 in., at camp II, 22.5 in. We began with a stiff climb and finished with another, but on the whole it was an easy day, as the barometric readings suggest. There is a gradual transition from sub-tropical to temperate forest throughout. By evening we were enjoying the brilliant autumn colours of rowan and other trees. *Magnolia rostrata* was leafless its tall beaked fruits stiffly erect. *Gamblea ciliata* was only half bare. On the ground lay many knobbly fruits of *Michelia*, its scarlet seeds revealed, and near our camp the common *Euonymus* still bore showers of chocolate-red stars, each hung on a trembling pedicel. On a rock what I had believed was a

saxifrage, revealed itself now as a little white-flowered *Sedum*. Coming to climbers, a root-scrambling *Hoya* bore glistening flesh-coloured rosettes of perfect symmetry, every pedicel of exactly the same length, every flower a regular pentagon with a perfect coronal cone of stamens in the exact centre. This geometrical precision gives the flowers a coldly mathematical look, as though they had been designed in the drawing office instead of in the rough and tumble of competitive evolution.

I recall one rather significant incident during this march. We were in the zone of *Arundinaria* (bamboo) two species of which grew in company, each 20-25 ft. high. One species had very narrow grass-like leaves, the other wider rather glaucous leaves. It was as I have said a delicious day of bright sunshine and cloudless skies and the ridge was dry and hot. Several times I heard the sharp crack of a bamboo splitting; and once, just as I passed beneath, one split open lengthwise and squirted out a good pint of water. Such stored water may be of some importance in the dry season. So far as I could see the bamboos do not split because they contain water — in other words they may split whether they contain water or not. I had occasion later to inquire further into the matter in the hope of discovering what species contain water and under what conditions. Was there any means of telling whether a bamboo contained water or not, without cutting it down? It seemed to me that any bamboo and any haulm *might* contain water, but that there was no way of telling except by trial and error. It is, of course, of inestimable value for a man 'bushed' in the jungle to know that he can rely on getting water from bamboos; but it would be of even greater value to know *what* bamboos. Whether its name be *Dendrocalamus*, *Bambusa*, *Arundinaria* or *Melocanna* does not concern him; it is enough that he knows a bamboo when he sees one. But cutting down bamboos on a big scale is a tiring business, and it would save him no end of trouble if he could be certain beforehand of obtaining water from a given haulm. The naturalist has an urge to reduce knowledge to some sort of order to find out all there is to be found out; and having dis-

covered that the hollow joints of bamboos sometimes contain water, he naturally goes on to ask — do *all* bamboos contain water? If so, in which joints is it most likely to be found, the lower ones or the top ones? and why? is it more abundant at one season than at another? One could frame more questions — the matter became of vital importance during the late war in tropical Asia — but I do not think we know all the answers. Much investigation and the collation of a large number of observations will be necessary before we can be said to have solved the problem.

We made the same stages now as we had made in August on the way up; and not having to do any cutting, the third march was a short one. We reached our old ground at Big Tree camp, a few hundred feet below the crest of the ridge, at noon; and I went straight on up to the Munghu Hkyet.

By the obelisk rock everything was scorched and dried up; for the sun raked the 8000 ft. ridge fore and aft. Even the black berries of *Vaccinium* were shrivelled. All the bush rhododendrons had opened their capsules — which they never do in damp air — and scattered their dusty seeds; there were no fruits on the dwarf *Cornus* — if there ever had been any they had fallen. The harvest festival it seemed was over. Even a pink-flowered *Agapetes* was fruitless — and in bud again. The leaves of *Berberis hypokerina* had turned a burning scarlet.

There was still plenty of water in the big rock scupper close to our camp, and in the moss forest, where everything that could hold moss — rocks, tree trunks, lianas — were swaddled in it. There was moisture just below the surface. At gulley camp in the early morning the barometer was 22.5 in. T. 44°; at Big Tree camp B. 22.2 in.

During six days — 18th-23rd — spent here I found new ways up the cliff, and going over my old routes, I collected seed of everything to which I had taken a fancy. The weather was fine but the sky usually became overcast in the middle of the day as though working up for another storm; towards sunset it would clear again. The view eastwards from the Munghu

Hkyet was a little disappointing; it had lost much of its dramatic quality as the mountains had lost much of their snow. Seen clearly against the immense background of sky they did not look so aggressively steep as they had done in August, when their snow-streaked gullies had loomed vaguely through the cloud wrack. The Dablu-Tazu divide is 14,000-15,000 ft. high.

Southwards I could see the deep chasm of the Nmai Hka, and south-eastwards a mountain range on the horizon rising high above the jumble of nearer mountains, in spite of its loss of apparent altitude due to the earth's curvature, was probably the Salween divide. South-westwards the ranges between the Nam Tamai and the Hkamti plain are comparatively low — the Shingrup Hkyet which crosses the main watershed below the Tazon-Tamai confluence is only 8000 ft. It is not till we get south of the Shingrup Hkyet that the main divide, which a few miles to the north of Pangnamdim is 15,000 ft. high, rises again to the respectable height of 11,000 ft.

The reason why it is so much lower between the Shingrup Hkyet in the south and the Pangnamdim pass in the north — where for a distance of 40 to 50 miles no peak is as much as 9000 ft. high — seems to be that the Pleistocene glaciers here swept south-westwards over the Tisang valley and down to the Hkamti plain — at that time a large lake. The level-topped ranges bear this out. The total length of the divide between the eastern and western branches of the Irrawaddy is about 750 miles. Low as it is, especially opposite Pangnamdim, it is nevertheless a barrier to the free exchange of animals and plants and probably birds also; and the flora of the Nam Tamai and still more of the Nmai Hka into which it flows differs markedly from that of the Mali Hka, a difference by no means entirely due to the small difference of altitude. I had long suspected that the hullock monkey did not reach the Nam Tamai; and it was with no little surprise that I heard the familiar hoot of this anthropoid ape one morning while I was at Pangnamdim. It was not close, however, and may have been high up on the main divide and perhaps only just this side of the crest. At any rate



it is very rarely heard here and the most obvious explanation is that its favourite food is lacking in the Tamai valley — perhaps a species of fig.

Descending the crescent cliff one day by a new route a juniper onto which I was holding suddenly broke and I only just saved myself from falling over a precipice. After that I was more careful; there were rugged cliffs in every direction and one would come upon them quite unexpectedly in the course of a mild descent of the face, through forest. I found a small *Androsace* growing with a little *Allium* in the fluted gullies of the crescent cliff but all the seed had fallen.

I had been asked to make a special effort to collect 'blueberries' — that is to say vacciniums — for an American grower who was raising these plants and breeding them, in Oregon I think. I did meet with several striking alpine and cool temperate species, notably two epiphytes in the moss forest, and was able to send him seed of six or eight species; but what success he had with them I never heard. Of two which were new to me one had scarlet berries — so it was hardly a 'blueberry', perhaps not even a *Vaccinium* (K.W. 13174) — the other polished black berries like boot buttons (K.W. 13435).

One of the most curious things I found on the crescent cliff was a thick bed of large size hailstones packed in a deep gulley, evidently a relic of the last storm. It was odd that they had not melted.

On November 19th I followed the main ridge by which we had ascended from the village beyond the point where we had left it to drop down to Big Tree camp; this meant climbing the cliff which had baulked us — nor did it prove difficult. I soon reached the main divide well above the Shingrup Hkyet and not far from the top of Pasoi Hpawng itself. Here for the first time I found the dwarf *Cornus* plentiful in fruit, though no plant bore more than one or occasionally two seeds — actually one-seeded fruits. *Cornus suecica* is not I think a first-class rock plant, and neither was this. Both are freaks; whereas the American tree species *C. Nuttallii* and *C. florida* are beautiful and so is the

Indian species. But from the botanical point of view it was a discovery of considerable importance to find the circumpolar *C. suecica* in north Burma. The top here was densely clothed with bamboo brake tall enough to conceal most of the dwarf rhododendrons — *R. tephropeplum*, *R. Martinianum* and *R. pruniflorum*; only *R. euchaites* stuck its head up above the grassy sea.

Here I found another rhododendron which, though not a new species — even of that I could not be quite certain as it was not in flower — had strayed far beyond its known orbit. I took it to be *R. fulgens*, a Sikkim species discovered by Hooker nearly a century ago and never yet found east of the Himalayas.

Nomocharis saluenensis was widely scattered along the ridge, but the capsules were nearly all empty so I dug up several bulbs most of which broke into separate scales before I could extract them from the underworld of *Arundinaria* rhizomes with which they were lovingly entwined.

Besides rhododendrons there were several other shrubs nearly all submerged beneath this tiresome grass: *Rosa sericea*, *Berberis hypokerina*, *Cotoneaster Simonsii*, *Euonymus*, *Eurya*, *Sorbus*, *Juniperus*, *Gaultheria*, several vacciniums: the only one which kept its head above grass level was *Rhododendron euchaites*. The ground beneath was covered with a carpet of grass, moss and *Lycopodium*.

Next day I returned to the attack on Pasoi Hpawng by this route — a half-hearted attack I must confess as I did not specially want to get to the top unless there was something there. I brought with me two coolies to cut a passage through the *Arundinaria* which was almost impregnable without, and to gather *Cornus* fruit; but though we again reached the main divide a good way above the Munghu Hkyet we were halted a few hundred feet below the summit by another chasm. However, there was no visible change in the vegetation; a sea of dwarf *Arundinaria* swept up the slope to the very top.

I got frequent whiffs of lemon-grass oil on the open ridge and was surprised to find that it came from a species of *Litsaea*. It

was remarkable that so strong a scent should come from a shrub which at this season had neither leaves nor flowers.

The days were short now, and I had to make the most of the light, sometimes not returning to camp till dusk. I should not care to have been overtaken on those cliffs by darkness. It was an enjoyable time the more so for being strenuous. The temperature never went down to freezing point in the forest while I was there, 38° on the 19th and again on the 20th being the lowest I recorded: but it must go down to freezing in January. There was already ground frost on the open ridge. On the 23rd the weather suddenly broke and as I had finished my seed collecting I decided to go down.

It sleeted, rained and even hailed spasmodically, and pushing our way through the wet bushes on the ridge was a vile uncomfortable business. We went on to a small clearing between camps in the hope of finding water, but found none on the ridge, and supper was *ad hoc*. So we put out every pot and pan we had to catch the rain off the tent roofs. After dark a high wind got up and the rain ceased. The forest here — moss forest — had been ten days without rain: probably it never goes much longer without some sort of precipitation: but the next fall would be snow.

We got some tea early but the coolies had to go a long way down the slope to get enough water to cook rice and it was ten o'clock before Poong gave me breakfast. We felled an *Ilex* tree scarlet with tiny berries: there must have been a vast number of them, since they were only about half the size of our holly berries, and the tree, a big one, was ablaze. Common also was the *Michelia* whose glowing vermilion seeds lay scattered around. Another conspicuous tree was a species of *Cinnamomum*.

In August I had picked up the brassy corollas of a rhododendron hereabouts, but had been unable to reach the only plant I saw, high up in the forest canopy. Now I collected ripe capsules of what was undoubtedly this species. But in all probability I had already collected it above Gawai.

This camp, 6000 ft. altitude, marked the lower limit for an

assemblage of trees, shrubs and herbaceous plants which may be called warm-temperate, as opposed to sub-tropical, a distinction which becomes clearer if we compare the forest at say 5000 ft. with that at 7000 ft. under the same conditions. For whereas in the upper belt we find several tree rhododendrons and a number of small epiphytic species, together with various deciduous trees such as *Betula cylindrostachya*, *Viburnum Wardii*, *Fraxinus floribunda*, *Sorbus* and a wealth of shrubs both evergreen and deciduous, in the latter the characteristic trees are oaks, magnolias, laurels and maples: nor should we ignore the presence of sub-tropical trees such as *Spondias*, *Garcinia*, *Sterculia*, figs and many others, besides climbing palms, none of which go so high as 7000 ft.

We must, however, beware of defining the limits of these vegetation belts too rigorously by contours. Altitude as such — that is to say atmospheric pressure — may have little if any effect on plant life, but it is impossible to dissociate it from temperature and humidity. In north Burma the same conditions may be found at altitudes differing by as much as 2000 ft. Nevertheless the vegetation obviously does change more or less regularly with increasing altitude, as anyone will admit: and one notes the average altitude where one type of forest passes into another type. Thus the 6000-ft. contour may be said to separate hill jungle with its tropical evergreen trees, its palms and screw pines, its tree ferns and woody lianas from temperate forest with its more familiar northern trees, not a few of which are deciduous.

In spite of the late start we reached the Nung village at sundown. There was much cloud, but we had no more rain. In the valley I noticed many orchids, both ground and epiphytic species in flower. After dark a hullabaloo broke out in the hut next to mine where the villagers talked, or rather shouted, till far into the night: later came sounds of weeping and groaning so I guessed they had been drinking rice beer rather freely: one or two of my coolies were certainly drunk. Hervey Stubbs had sent a runner with my mail which kept me up half the night.

November 25th was fine and sunny again though there was still plenty of cloud about. The mountain knot at the sources of the Dablu and Tazu, to say nothing of Ka Karpo itself, is an efficient cloud-maker at any season, and local storms skid off the peaks at short notice to appear now here now there until they have spent themselves.

In spite of the previous night's debauch we got away from the village at a reasonable hour and reached the Nam Tamai in the afternoon. At the Nung village B. 26.4 in., at the hut by the Tamai 26.8 in. I decided to go straight on to Pangnamdim next day and rest there. On the way down I saw some remarkable plants of *Callicarpa rubella*. The berries are about the size of no. 4 shot, borne in tight bunches in the axils of the opposite leaves, making complete whorls round the stem every two or three inches. They are of an indescribable grape juice purple mauve with a brilliant gloss. One plant had twelve leafless stems each three ft. long carrying twelve whorls of berries: as fine a berrying shrub as one can imagine. It is not hardy in Britain but has been grown under glass.

Below the Nung village the winter crops had been harvested, by rooting up the plants. Men and women were winnowing the grain with palm-leaf fans, turning the heap over from time to time with their feet. It had been pounded in a wooden mortar made from a hollow tree trunk.

The pink-flowered Labiate *Plectranthus macranthus* was in bloom still — it seems to flower almost throughout the year here — and so also was *Gentiana (Crawfordia) campanulata* whose large funnel-shaped pinkish-purple flowers are very attractive.

On November 26th by the Nam Tamai B. 26.9 in. We reached Pangnamdim in the evening and found the villagers rebuilding the cane bridge. Though we could have crossed the river by bamboo raft I decided to stay here a few days while I dried the rest of my seeds and repacked my boxes: I would wait till the new bridge was finished. I had been climbing and walking continuously for the last fourteen days so I felt I had earned a rest. The hut was comfortable, the weather fine, and

we could get food here. I settled down to take life easily for a time, and spread out all my seeds to dry, this time out of the reach of cattle.

I had often wondered how the tribesmen set about building a cane suspension bridge, and particularly how they kept the cables spread the correct distance apart; so I watched these engineers in wood with interest. Eighteen 100-foot canes were used, two bundles of five each going to the two main support cables. All these were attached to one or two trees on the right bank then rafted across to our bank and given a couple of turns round trees there. They sagged almost to water level. To take up the slack a cane was tied to each in turn, the other end being wound round the wooden bar of a windlass which revolved in bamboo bearings and was laboriously turned by means of handspikes — a most primitive machine; the turns round the tree-trunk were tightened, and the cane knotted and spliced. The remaining eight cables, at first tangled like strands of unravelled rope, were eventually sorted into four pairs and after being attached to trees tightened in the same way. As this was to be a mule bridge six feet wide, these four strands had to be correctly spaced and kept apart to carry the fairway which was done by passing them over a horizontal bar before anchoring them. Each strand was then tightened or slackened as required. After that it was a simple matter to suspend the fairway from the support cables by means of cane tie-rods — actually thin slivers — thereby knitting the whole compactly together; and to lay a flooring of split bamboo. So the bridge was completed within a week, though the Nung artificers certainly took things easily.

On the left (Pangnamdim) bank the bridge hung fifteen or twenty feet above our heads and was reached by means of a ladder. It was wide enough for one to walk down the centre without the support, moral or otherwise, of the suspension cables: all the same it swayed and squirmed and wriggled and writhed beneath one like an unpleasantly live serpent. At best one could only hold on to one of the cables — and even that

meant walking perilously near the edge; the other was then out of reach. Pack mules, though at first suspicious and reluctant to venture — and that is where the value of a sagacious leader comes in — will cross such a bridge one at a time.

When crossing the ordinary foot bridge one retains one's balance on the swinging canes by holding on to both support cables with outspread arms like a tight-rope walker: it is only the first and last few yards, where the cables flare out to their supporting trees that one has to do a balancing act.

While at Pangnamdim I added several plants to the list for the Nam Tamai valley, mostly herbaceous. In spite of the low altitude the vegetation is barely sub-tropical, though there are plants in flower at any season of the year. Not many trees flower between December and February, though one can pick up a variety of fruits: e.g. *Mangletia*, *Michelia*, *Combretum*, *Ventilago*, *Acer* and many more. Even hard woody fruits which ripen and fall during the rains, however, quickly disappear, reduced to mould by the ceaseless activities of saprophytic fungi and the myriads of insects, worms, slugs and snails, besides birds and small mammals. After that no doubt bacteria take up the work, helping to incorporate the products in the rich forest soil.

A few *Araliaceae* with slender palm-like stems unbranched for 20-30 feet bearing aloft a crown of large leaves also rather palm-like were in flower. The inflorescence froths out of the foliage in a fountain, made up of umbels arranged in long racemes though the individual flowers are no larger than those of ivy, and very similar to them in structure. Several epiphytic shrubs were in flower including a sleek *Medinilla* whose precisely veined leaves and rose-pink flowers disarticulate in the most aggravating way when specimens are pressed: and a *Pentapterygium* with ruby flowers. Both *Ericaceae* and *Vacciniaceae* form an important and conspicuous element in the flora of north Burma at all levels above 3000 ft.; but I estimated that even lumping both families together the number of rhododendrons exceeds that of all other species put together by 2 to 1. Thus

Gaultheria numbers about a dozen known species, and *Vaccinium* ten: *Agapetes*, *Pentapterygium* and *Desmogyne* perhaps another ten: *Enkianthus*, *Cassiope*, *Pieris*, two each: and *Craibiodendron*, *Clethra* and *Leucothoe*, one each. Total forty-one. Between eighty and a hundred species of *Rhododendron* have been described, and there are certainly more. It has always struck me as curious that no species of heather should be known from Sino-Himalaya.

I have already mentioned *Gentiana campanulata* and *Plectranthus macranthus*. The fast-growing stems of the former soon outgrow their strength and flutter loose in the wind, whereupon, turning, they twine round each other till the trailing ends are knit up in some confusion. Thus they wreath the bush with flowers like a may-queen. In the Khasi hills *Plectranthus macranthus* is a shoddy weed, so inferior to the Nam Tamai plant that I am not at all sure they are the same species. The flowers of the Burma plant are plumper, longer, of a clearer more school-girl complexion forming haughty yet dainty spikes.

On November 30th another mail, forwarded by special messenger from Fort Hertz, arrived. Some unknown well-wisher in England sent me a *Windsor Magazine*: I only wish he — or she — could know what a godsend it was and how deeply I appreciated the human touch and the kindly thought which prompted it.

The weather was still fine and sunny — there had been no rain in the valley for a week — but the mist stayed till fairly late and so kept the forest damp. The minimum temperature varied between 46° and 48° at the end of the month. However, on the 30th — minimum 48° — the sky, hitherto so bright, began to cloud over heavily until all was grey once more: rain was evidently coming up. It arrived next day — minimum 50° — and brought out the sand flies; on the other hand the lack of sunshine kept the blister flies subdued. Of the two one enjoys sand flies least.

I had intended to start for Fort Hertz on December 2nd but as it was still raining hard I decided to stay another day. The headman brought me a small bird which had been shot with a

cross bow: the arrow had broken one wing and made a wound in its chest. It was about the size of a sparrow, the body more or less black or at least very dark, but it had a metallic lustre which in a bright light gave it a purplish-green shimmer: the throat was sooty. It had a chrome-yellow crest on top of its head, and equally bright yellow breast. The tail was short and so was the black beak. The bird died 24 hours later without any fuss. Most animals seem far less conscious of pain than humans, and less apprehensive of death, or even aware of its approach. Their chief concern seems to be to die tidily and above all privately. Almost to the end this bird, which I tried to keep alive, was quite perky. Suddenly without warning it weakened, lay on its side in its little box, trembled for a minute and died. It had pecked viciously at me as I tried to clean up the wound and once I wrung a screech from it by my clumsiness: but that was the only sign of pain it gave.

On November 29th I ate my last bit of gooral meat. My share had given me one square meal a day for twenty-three days, so it was good value. Now I was back on rice and dhal, eggs when I could get them, chuppatties and the odd chicken. I had plenty to eat without the temptation to over eat.

CHAPTER SIXTEEN

ON December 3rd we unofficially opened the new bridge, not by cutting a tape with a pair of golden scissors but by the more realistic method of walking across it; though several of the Darus cut capers by dancing across it. With seventeen laden coolies, Marang, Poong and myself we were a party of twenty all told. It was a bright sunny day though the clouds had not yet gone from the peaks. The two days' local rain was due to an injection of warm air into the mass of cold air which always hangs over the snow peaks. So long as the wind blew down the valley we enjoyed fine weather.

At Pangnamdim the barometer was 26.9 in. At the top of cultivation, 26.2 in., so it was not much over 4000 ft. The crop was Job's Tears (*Coix*). That renowned pessimist might well weep to know what a miserable cereal had been named after him.

A little above the highest cultivation we entered the forest which had been considerably freshened up by the recent rain. It showed few signs of the cold season, though many leaves, flowers and fruits had been beaten to the ground. *Wightia*, always epiphytic here, was as abundant as ever, its flowers glowing with a subdued incandescence in the billowy roof of the forest. All the specimens I saw were leafless or almost so; but non-flowering branches are apt to retain their leaves, which suggests some connection between the formation of flower buds and the formation of the abscess layer preceding leaf fall. Little white clouds nestling high up in the green canopy indicated the presence of *Rhododendron dendricola*, unseen until one gets a snap view looking over the tree-tops below, or across a gulf to the next ridge. Here and there maple and rowan added flashes of colour to the otherwise dark roof beams; but both are small trees compared with the sturdy oaks, chestnuts, magnolias and laurels which make up the bulk of

the forest; and the fiery scarlet trail of a vine only served to show up the overwhelming green of the whole.

At the top of the divide the barometer was 24.1 in., a difference of 2.75 in. I was impressed by the size of *Rhododendron stenaulum*. One tree growing by the roadside, 30-40 ft. high in spite of an injured top, was 4 ft. in girth, 5 ft. above the ground. Such a tree might easily be 200 years old.

Looking back from the top for the last time I saw the craggy peaks to which on four separate occasions I had ascended with so much effort. From this altitude they looked very close; an aircraft would have hopped across in five minutes and landed me on the Dablu divide. Far to the north I could see the snow-blink on the Tibetan ranges at the sources of the Adung river.

Immediately one crosses the watershed the forest becomes noticeably more tropical in appearance, though it would be difficult to say exactly what constitutes the difference — perhaps in the very texture of the foliage, which in the damper air of the western flank is thinner. *Pandanus* becomes conspicuous and I saw the curiously truncated leaves of a *Passiflora*.

Every branch and twig of a deciduous *Litsaea* was furred with bright yellow blossom, and I noticed a fair number of *Euphorbiaceae* which hitherto had not been plentiful. We camped several hundred feet higher than the Pangnamdim hut — B. 26.3 in. — but compared with that austere valley the night here seemed soft and almost balmy. The air vibrated with the whirring sound of crickets and the croaking of frogs. I also saw a troop of grey langurs.

Wightia I noticed, like *Ficus*, always overtops the host tree, and in the cold weather its flowering crown is leafless. Other epiphytic shrubs are *Eriobotrya* and species of *Sorbus*. All of these form independent trees in the colder Adung valley. I saw no conifers. We seemed to be beyond the zone of *Pinus excelsa*, which descends to 5000 ft. further north.

Here the trees are richly festooned with epiphytes of all kinds, ferns, mosses, orchids, *Lycopodium*, rhododendrons and other shrubs. It is rather surprising that the seeds and spores of

plants should be so freely lifted in this damp and often stagnant air; but they are mostly small, light and frequently winged. There is probably a greater variety of epiphytes between 5000 and 8000 ft., or say in the upper part of the sub-tropical hill jungle and lower part of the temperate rain forest, than in any other zone.

There is no doubt that in deciduous monsoon forest epiphytes are less frequent. At 3000-4000 ft., where they occur more abundantly, the air is moister and the forest more evergreen than at lower altitudes, though in deciduous forest they certainly get more light, particularly in the hot weather, when many of the trees are bare. It is then that the orchids flower. Evidently they have to strike a balance between their craving for light and their not less great need for water. The importance of moisture — not necessarily water, but a damp atmosphere — is shown by the preference of epiphytic orchids in the plains for trees which overhang *bhils* and streams; indeed there are few species — *Vanda Teres*, however, is one — which will grow on the plains otherwise. One suspects that the epiphytic habit has been developed to enable certain plants to survive in a changing climate.

The examples quoted of plants found on both flanks of the main Irrawaddy divide which grow as epiphytes or as earth plants according to the conditions, are then conditional epiphytes. There are also many casual epiphytes, that is plants which may start life as such, but which cannot be regarded as permanent residents of the tree-tops. *Rhododendron* seeds in particular often germinate on the moss-covered boughs of trees, carried thither by wind, only to perish as they grow up; and this is especially true of tree species such as *R. sino-grande*. Nor need one go to Burma to see something of the sort. Many people must have observed common terrestrial plants, including small shrubs, growing in the boles of pollard willows in England.

It is in the gloomy damp equatorial forests of the Amazon and the Congo, and on islands like Madagascar, Sumatra and New Guinea that exclusive epiphytes are found, if anywhere,

especially amongst the orchid family, the *Bromelia* (pineapple) family, and others. Maybe all ground representatives of these plants have been suppressed — but cattleyas can be grown in pots.

Yet we cannot dismiss the subject as easily as that. Accustomed as they are to the tree-tops, incapable as they are of growing on the ground, it is even for these absolute epiphytes still mainly a question of light and air and moisture; high living as such seems to mean nothing to them.

Epiphytes are most numerous in the tropics and in ever-wet forest. They are almost non-existent in temperate lands, entirely lacking in arid lands — again underlining the supreme importance of humidity. Thus epiphytism seems to be largely a matter of sufficient moisture. Without a certain degree of humidity there can be no epiphytism.

On the other hand their association with the tropics and with the highest form of tropical vegetation, where competition is most intense, may be due to congestion. For where every available square foot of ground is occupied already, plants are not likely to overlook so obvious a place, so advantageous a site, as the bole of a tree. And if further we consider the conditions brought about by the glaciation of the Burmese mountains and the congestion which must have ensued amongst the refugee population, as the highland flora fled southwards, it would not be altogether surprising if plants in their anxiety to get away from the clutching hand of death began to play leap frog, to climb on top of one another. Epiphytism in fact may be no older than the last ice age.

Finally we must note the aggressive epiphytism of plants like the strangling figs and of *Wightia gigantea*, which start as epiphytes, gradually strangle their hosts and henceforth lead an independent existence.

The next two stages to the Nam Tisang reached on the 6th passed without incident. The weather was delightful and I enjoyed every minute of the march however tired I might be feeling towards the end of the day. A bird cherry was in fine

bloom besides many other trees and shrubs, including *Illicium*. I rested a day at Nogmung — minimum 52° with a thick mist lying on the river. Next day the 8th — minimum 53° — we set out for Fort Hertz and on the 10th reached the first Shan village, Kankiu. Coming down through the foothills I noticed a charming pink-flowered *Hibiscus*; the tall *Disoxylum* and the cherry previously mentioned I had seen almost every day.

It was on December 9th from the top of the range above the Tisang river that we looked over the last foothills and saw the plain of Hkamti Long; or rather did not see it, but only where it lay, for the great bowl was filled with yeasty cloud frothing fretfully in the sunshine. The climb up from the hut is all of 2000 ft. and the descent to the next hut in the gorge of the Ti Hka about the same. A number of handsome winter-flowering eugenias inhabit this range; one with dark cerise flowers I saw often here, another with white flowers once only. Nor did I ever see any of them anywhere else, though they must have a wider distribution. Other plants flowering now were *Litsaea*, *Wightia* — still common, *Plectranthus macranthus*, species of *Vaccinium* and several begonias. I collected a packet of seed of *Begonia hymenophylloides* on the summit, though this plant shrivels up to almost nothing in winter and I would never have found the capsules had I not known on which trees to look for them. I do not think any of the seed ever germinated; probably the best way to introduce it would be to cut out pieces of the bark containing the plant.

Paphiopedilum — formerly *Cypripedium* — *Wardii*, so abundant here a few years previously had almost entirely disappeared; I saw only two small plants, neither of them in flower. Constant cutting back of the vegetation and scraping of the banks to keep open the path has let in a horde of grasses and wastrel weeds and the aristocratic slipper orchid seems to have been crowded out. There may, however, be other reasons connected with the disappearance of fungi from the soils. Meanwhile it seems to have popped up afresh at Htawgaw about 120 miles away; at least it is difficult to believe that it can have escaped detection

there during the last 25 years if it had been there all the time.

In the Nam Ti gorge I found two begonias new to me — both belong to the small group distinguished by having a 4-celled and 4-winged ovary instead of the more usual 3-celled 3-winged ovary common to most of the north Burma species. One of them was probably *B. Roxburghii*, not a rare plant. The climbing crimson-flowered *Thunbergia coccinea* dangled its podgy racemes by the path, and as we climbed over the last range of hills many characteristic trees of the hill jungle reappeared. On the other hand two plants I had marked down on the outward journey — a dwarf banana and the sulphur-yellow *Thunbergia lutea*, an exiguous climber, had gone out without leaving a trace.

The coolies caught a tree shrew (*Tupaia*) uninjured. Arrived at Kankiu I fed it on banana which it nibbled greedily, though it is a genuine insectivore.

So we crossed the last range and went down to the Mali Hka on the edge of the plain in the evening. While the sun shone it had been pleasantly warm; but even on the plain it was chilly after sunset and I was glad of a roaring fire. A heavy white mist came down and settled over the river like eider-down hiding the moon. The temperature dropped to 54°. Hervey Stubbs had sent me a cheerful note of welcome and asked me to stay with him.

As I still had forty packages of drying seeds and fruits I decided to spend a day at Kankiu to reduce them, besides having an all round clean-up before presenting myself at Fort Hertz. By evening thanks to the bright sunshine all day the parcels had been reduced to twenty, besides twenty packages of dried seeds, all neatly labelled. I had time to stroll by the river, now low in its bed. It was pleasant to hear the cawing of crows, the soft cooing of doves again. I thought of the blistering winds away up on the icy ridges at the sources of the Irrawaddy and shivered. Still it had been a wonderful four months after the early misfortunes, and I had few regrets. Altogether I had

collected nearly a thousand species of plants, with seed of 150 species; I had also begun an intensive study of this remarkable north Burma flora.

It was December 12th, Min. Temp. 55°, B. 28.8 in., and the usual dense winter mist; not for some time did the sun come through. I followed the old road up the left bank of the Mali, past the white pagoda, to the confluence of the small Putao river, where I crossed the Mali by the cold weather bamboo trestle bridge, and so up the left bank of the stream to the village. There were some dugouts on the far bank but I was impatient and waded across, the coolies following. I had now walked ten miles but hardly had I reached the paddy fields beyond the river when I met Stubbs, his orderly and three ponies. He greeted me warmly and we rode the few miles slowly across the fields where pretty Shan women were reaping the winter paddy; and so through the village and up onto the ridge along which the outpost straggles. But now I felt like a pricked bladder. After four months alone I am tongue-tied — I had so much to say and to ask that I did not know how to begin or how to find words with which to express my thoughts. So I was almost silent. Twenty minutes later we were having tea in front of a roaring fire; at last I felt at ease. Speech returned.

How good it was to be back in the pleasant atmosphere of an Englishman's home — if temporary home — on the frontier, to talk with an educated man, to have a hot bath in comfort if not in luxury. In the evening we went across to the new Assistant Superintendent's bungalow — Hervey had shed one of his unpaid jobs — to hear the news over the wireless. The A.S. a pleasant Anglo-Indian lad of good family named de Glanville, entertained us while we listened to the news. I forget what it was but I suppose the average Englishman at the end of 1937 had still no inkling of the wrath to come. The Japanese armies were rolling up the map of China.

Hervey had been almost as much spiritually and mentally alone in Fort Hertz as I had been in my mountain fastness, and



we discussed a wide range of topics with strange silences between while we sought for words.

For a week I enjoyed his company and hospitality while I revelled in the magnificent view all round us. The rest, and more varied food, did me good though I was fit enough when I arrived. I finished packing seeds or developed photographs, repacked boxes of specimens. All too quickly the time passed; it was difficult to believe I had been here a week. Hervey had to visit one of his outposts soon, and as his way also led south for a couple of days, we arranged to leave together. I found some ration mules returning empty to Myitkyina; an elephant belonging to one of the Shan Sawbwas was going down the road at the same time.

On December 21st we all set out together. Two days later Hervey's road and mine diverged. I parted from him with real regret — he had been a good friend and pleasant companion. So we went our ways. I did not meet him again till we were all leaving Burma in 1942.

It looked very much as though we should have rain at Christmas, which is not unusual in these parts. For two or three days before the sky had been overcast. But the 25th was fair. We did long stages now that the weather was cool, the Chinese mules travelling well. Sometimes we marched till dark if there was a Kachin village where I could halt for the night. Poong went down with fever, and as he came from a nearby village I paid him off at his request and left him behind. For a casual untrained cook picked up on the road he had done me well.

We met many Lisus come to wash the river sands for gold. Each carried his pack and a corrugated board like a housewife's scrubbing board. Some of them brought out little packets of gold dust which they said came from the Ahkyang valley. They showed me fused pellets which were almost black, and also thick dull yellow flakes which may or may not have been gold. They swore it was found like that which seemed to me unlikely — if it was gold at all. They were taking it to Myitkyina to sell

to Chinese shop-keepers, whence much of it finds its way to the goldsmiths of Rangoon. The Lisus wanted R 7/- for as much gold as the weight of a 4-anna bit; but it was impossible to tell how pure it was — certainly there were some impurities such as silver mixed with it.

Most of the gold which used to be dredged from the bed of the Irrawaddy at Myitkyina is brought down by the eastern river, not by the Mali Hka, though there is gold in the western tributaries of the latter also.

The *Dipterocarpus* fruits were hanging from the trees, wings pointing downwards. Immediately they drop they turn a somersault and start spinning, the wings now acting the part of blades.

On Christmas Day I marched fifteen miles, on Boxing Day seventeen miles and on the 27th eighteen miles which landed me at a wretched village near Wasat Hka. The mules arrived an hour after dark, and we were all tired and hungry. By next morning we felt happy again thanks to a good night's sleep; and, the sun shining all day from dawn till dusk, we covered sixteen miles to Maithong Ga reached about 4 o'clock. Many beautiful birds were abroad; I saw scarlet minivets, babblers, king crows and parakeets; also a gorgeous bird with a red breast and a short square tail, no doubt a woodpecker. The tree shrew which I had kept alive for a fortnight had escaped on Christmas Eve not for the first but unhappily for the last time. It was an amusing pet though it never became accustomed to being handled. When I picked it up it screeched dismally and in desperation bit my finger. However, its teeth are so small it could not even draw blood. While I was in Fort Hertz it escaped several times but it never went far and was twice recaptured in the garden after being away some hours. But this time it did not return.

On the 29th looking north from Wasat Hka I saw the snow-covered ranges at the sources of the Mali for the last time. Gibbons were hooting long after dark so close that I could hear them jumping about in the trees; they may have been disturbed by a leopard or other night marauder.

On the 30th still keeping up our speed we marched eighteen miles to Kadrangyang. Then the muleteers said they could not do any more double marches as the mules were getting exhausted; so on the last day of the month we halted at the next bungalow about ten miles distant. In the afternoon I secured four fruits of the rose-pink *Chonemorpha* which had excited me so much in July. They were green and obviously not quite ripe, despite the passage of five months. These fruits hang in twos like a pair of bow-legged compasses, some 16 in. long, rounded, slim and sharp pointed. The seeds were green and soft, obviously not ripe. They are Indian-club shaped but flattened, in two rows, one row on either side of a tough partition, and overlapping. Each seed has a cockade of glistening white hairs like spun glass loosely attached to the handle, this acts as a parachute so that when the fruit splits open the seeds travel a short distance as they float down. I had hoped the fruits of this fine climber would ripen gradually after plucking, but the seeds I sent to Singapore Botanic Garden apparently did not germinate.

New Year's Day found me swinging down the road to Tiang Zup and the Mali Hka once more. Next day, after I had walked ten miles, stopping only to take photographs of the magnificent *Ficus* trees which grow hereabouts, I saw a fine trogon, rose breasted with black-and-white barred tail fly across the road. I was in the act of taking a photograph of a leafless fig tree, when in that immemorial silence I suddenly heard the unmistakable hoot of a car, and next minute round the corner came the Beresford Barretts. I had not expected to meet them for another two days at least, and was improperly dressed for a social occasion — my clothes torn and none too clean, my boots worn and muddy. I had intended to walk as far as Weishi, thirty miles from Myitkyina. However, there it was. . . .

We drove the remaining mile to Nsop, and halted for lunch, while we waited for the mules to catch up. B. B. had brought a lorry for my kit, and we off loaded some of the mules and bundled the stuff into the lorry. At 3.30 we started back for

Myitkyina forty-two miles distant. The sun went down and it grew very cold — it would have been better to walk I thought. However, we arrived at 6 o'clock as darkness fell.

The expedition was over; and for the next two months I lived in considerable comfort. Those who sneer at our civilization, thinking only of the mistakes we have made, should try doing without it for five or six months on end. It is of course possible to make oneself reasonably comfortable on a long trek, even in far northern Burma during the monsoon. But for various reasons I confess I did not succeed in being comfortable at any time during my long journey to Burma's icy mountains. A few days later we left by launch for Sinbo twenty-five miles down the river at the head of the first defile. Here I had to say good-bye to the kind B. B.s. One of Steel's men gave me his motor launch for the trip through the defile to Bhamo where friends put me up for a few days. Then I resumed my measured journey, this time by river steamer to Mandalay and so by train to Rangoon.

CHAPTER SEVENTEEN

SUYDAM CUTTING and Arthur Vernay, old friends of mine, having invited me to join their expedition to north-east Burma as botanist in the cold weather of 1938-39 I hurried back from the eastern Himalaya and took ship from Calcutta to Rangoon. The leaders of the expedition were still in America; and my instructions were to join J. K. Stanford, who had already arrived out from home with most of the gear, in Myitkyina. He and I were to be the advance guard.

I had some knowledge of the country for which we were bound, having spent two 'rains' in the Hpimaw hills; the prospect of a third visit — the naturalist might spend ten years there and not exhaust the secrets they hid — in the 'open' season, with good companions, was alluring.

I arrived back in Myitkyina on November 16th, 1938, and there was Stanford on the platform to greet me. I had met him once, twenty years before, with Reginald Farrer and E. H. M. Cox, when we had all dined together at the Pegu Club in Rangoon. I was on my way home from the Hpimaw hills. Stanford had just come out to join the Burma Civil Service after the First World War, where he had won his M.C. with the tanks in Flanders. Though I had never met him since that night, I had often, when passing through Burma to China and other places, heard of him, and of his deep interest in and knowledge of birds. Such spare time as in those days fell to the lot of a civil servant in charge of a big district, he had devoted to field work, and his acquaintance with the birds of Burma was unique. I was to get to know him better during the next six months.

I looked forward to a day, perhaps two days, in Myitkyina, hearing more about the aims and plans of our leaders, with whom I had not been in touch during the preparatory period. Being a somewhat leisurely traveller, I always like to spend a day or two at the last possible filling station before launching

into the blue, to go over all the things I have forgotten, and remedy such sins of omission as can be remedied.

'Well,' said Stanford after our first greetings, 'we'll push off. You can have *chota hazri* on the launch — she's leaving in half an hour. We must be at Washaung tonight.'

So that was that. I had, it seemed, cut it rather fine. Indeed had it not been for several days' unseasonable rain, Stanford would have started for the interior before this. I had never passed through Myitkyina so swiftly and easily before. While he made some final purchases in the bazaar, I got my kit carried to the river bank where the government launch awaited us.

Presently we were off on the four-mile run down river to the Shan village of Waingmaw, on the opposite bank, where the road to China and to the Hpimaw hills starts.

Over morning tea on the forward deck, with the cold blue mountains rising range beyond range above the shining arc of water, the dark olive green of the jungle, the fainter outline of the northern highlands, and the mist on the rice fields, Stanford unfolded the plans of the Vernay-Cutting expedition. It was a zoological and ornithological expedition on behalf of the American Museum of Natural History. Our objective was the upper Ngawchang — a tributary of the Nmai Hka or eastern Irrawaddy: from there we would visit the passes into China, and Imaw Bum, the mountain I had climbed twenty years ago. We were to collect takin and other more mythical if less heraldic beasts. But *our* immediate business was to go ahead and prepare the way, above all make ready the base camp. (This particular job Stanford proposed to delegate to me, as he would have to return from Htawgaw after dumping stores and kit, to meet the American leaders in Myitkyina.)

No better organizer than J. K., as we affectionately called him, could have been found. As an ex-Burma civil servant, who had served several years on the frontier with headquarters at Myitkyina, he spoke both Burmese and Kachin, and had many friends, mostly of questionable character and uncertain antecedents, in the district. All his spare time had been devoted

to the study of bird life, and he probably knew the birds of Burma better than any other man alive.

The mules, eighty in number, were waiting for us at Waingmaw, the loads already tied on the wooden racks; and with little delay we set off along the flat dusty road that leads to China. Through the bazaar and out into the open country the long file of mules plodded, and we let them get ahead.

Not till the evening of the third day when we reached Seniku, did we get our first sight of the Nmai Hka, a big swift river flowing through the crumpled foothills. From our hill top we overlooked a thousand square miles of country, and it was all mantled in green jungle; we could see no village, no hut, no smoke; the land might have been totally uninhabited — and so it was almost; yet we knew there must be a few scattered Maru villages, for we could see small clearings and lighter patches of secondary forest.

The fourth day's march brought us to the river bank, and for the next four days (November 19th-22nd), from Seniku to Chipwi, we marched beside it. The weather was now delightful, sunny and warm by day: minimum temperature 59° on the 21st, 56° on the 20th, with no mist, so that the dew quickly disappeared after sunrise, except in the deep gullies. The late November rain had washed the sky clean and polished up the jungle till it gleamed like jade. There was very little change of atmospheric pressure: B. 29.0 in. at Seniku, the highest point on the road between Myitkyina and Chipwi.

Immediately opposite Seniku, across the river, is an isolated sugar-loaf peak, about 4000 ft. high, a landmark for miles. It is as clearly visible looking north-east from Myitkyina as it is looking down the Nmai Hka valley from Lauhkaung.

We started early, halted for two hours in the middle of the day and completed the stage of ten or twelve miles in good time. I botanized along the road, while J. K. studied and collected birds, which were plentiful, many of them on migration. Amongst those frequently seen were bee-eaters, bulbuls, flycatchers, thrushes, redstarts, magpies and drongos. J. K. shot

a central Asian sand lark (*Calandrelia rufescens*), which must have lost its way — unless of course the books are wrong; and we saw a few scimitar babblers and spur-winged plovers in the river bed. Very striking also were the crimson trogons, and vivid green, gamboge and peacock-blue broadbills. Amongst trees to which birds resorted in great numbers were *Callicarpa arborea*, a common species, and various figs: but the open road, and still more the open river bed, attracted them no less. Under J. K.'s tuition and enthusiasm I soon began to recognize the birds we saw daily.

The forest of the Nmai Hka valley is like that of the Mali valley, and yet different. At least one notices different trees. Perhaps the same species are there in different proportions; I shall call it tropical evergreen rain forest, though I noticed a fair number of hot-weather deciduous trees on the scorching sands of the Nmai in April — for example, *Gmelina arborea*, *Bauhinia variegata*, *Stereospermum chelonoides*, *Sterculia villosa* and *S. colorata*, *Erythrina*, *Albizzia*, *Ficus*, *Cassia* and others. It was the vegetation of the river bed — where seres replaced tropical forest because of local conditions — which interested me particularly. As already noted, a river like the Nmai, fed by melting snow and the monsoon rains, falls twenty or thirty feet in the cold weather, and large areas of sand, boulders or rock were now exposed.

The type of vegetation occupying the river bed depends on several factors, not the least important of which is how long they are submerged, or partially submerged, during the summer rise. The speed of the current is also important, and still more so the nature of the ground which itself depends partly on the current.

The red azalea (*Rhododendron Simsii*) was common on rocks, growing at or above high water mark. It was scattering its seeds now; when we passed this way again in April the brick-red flowers were fading. On rocks which are totally submerged, tufts of grass (*Tripogon* and *Arundinella*), small ferns (*Dryopteris*, *Pteris Griffithii*), and *Justicia procumbens* grew along the cracks. In stony ground the curious *Cryptocoryne*, like a miniature dark

arum with a slim twisted spathe, and in sandy places, *Strobilanthes arenicola* were exposed. A common undershrub which can stand long submergence is the purple-flowered *Rhabdia lycioides*.

But the most characteristic river bed sere is the shrub belt which lines the high sand banks and protects the forest behind. The tangle of roots partly exposed by the flood almost suggests mangrove. Here one sees species of *Camellia*, *Eugenia*, *Elaeagnus*, *Ficus*, *Pourthiaea*, *Eurya*. Sometimes big gnarled bushes of *Eugenia* fifteen or twenty feet high form a thick screen lining the tops of the sand banks.

On November 21st we experienced our first earth tremor, which rattled the windows of the bungalow. Later these were to become so frequent that we hardly noticed them.

Not a day passed but we met travellers. Once we met a party of Kachins from the 'triangle' across the Nmai Hka — known to the irreverent amongst the hill tribes, who dislike the Kachins, as the 'pigpound'. Every man wore a close-fitting skull cap made from the white inner bark of a tree — Stanford, never at a loss for a simile, described it as like the inside of orange peel: it suggested a Gandhi cap after a communal riot. I could not discover from what tree it was derived — the Kachin name is *tang-kawng-pyi*.

We met parties of Lisus, who live in the top storey of the hills, coming down to the plains seeking work; and parties of Gurkha and Kachin Sepoys from the outposts, going on leave and therefore marching very much at ease. But the Maru tribe, who inhabit the lower slopes of the Nmai valley and its tributaries, are content to stay in their hills, rarely venturing down to the plains.

Not a day passed but J. K. added several birds to the collection, while I collected plants. We also saw several mammals, such as brown squirrels, striped squirrels (*Tamiops*) and, most evenings, bats. Somebody made the welkin ring one night when with a rifle he shot a civet cat, under the firm belief that he was being pursued by a tiger. Monkeys, including white-browed gibbons, were common, but these last were rarely seen, only heard.

An almost salmon-red *Impatiens* was one of the more striking plants I saw in flower. It grew in deep *nallas* in the jungle. Common trees were the Indian horse chestnut (*Aesculus assamica*), *Echinocarpus assamicus*, the Indian willow *Salix tetrasperma*, *Duabanga sonneratioides* — an unkempt tree with gawky branches and terminal bunches of large white fluffy flowers which very easily fall to pieces — *Sterculia* and *Dipterocarpus*. Large fig trees of several species were also prominent.

We reached Chipwi, eighty miles from Washaung, on the 22nd, and that marks the end of the low country. Chipwi is less than 1000 ft. above sea level.

On the 23rd we spent the morning pitching tents, re-organizing loads, and generally making sure that we had in our eighty mule loads what we believed we had; then, after a visit to the river bed where the Chipwi river hurls itself and its stones like David at the Goliath Nmai, forming rapids famous in the annals of the frontier for fighting mahseer fish of large size, we started on the nine-mile ascent to Lauhkaung. At least, J. K. went by the nine-mile mule road, while I took the short Maru cut which is considerably less than nine miles but considerably steeper than the road. At Chipwi the barometer read 29.4 in. at Lauhkaung bungalow, 4366 ft. above sea level, 26.5 in. At Lauhkaung, which is built along a narrow ridge overlooking the Chipwi on one side and the Nmai Hka on the other, we met Charles McGuiness, who was now in charge of the sub-division; I had last met him at Sumpra Bum on my way to Fort Hertz, sixteen months ago.

From the travellers' bungalow with its striking hedges of *Datura*, from whose branches enormous moon-white trumpet flowers hung in frozen clusters, we had a fine view down the shallow valley of the Nmai, its long overlapping spurs gently sloping from the ranges on either side. We could recognize the Seinku sugar-loaf peak, standing sentinel over the edge of the plain, quite clearly, though it was thirty miles away, almost due south-west (bearing 228°).

Above Chipwi the valley of the Nmai Hka grows steeper and

narrower, the peaks on either side within six or eight miles of the river rising to over 10,000 feet. The mountain range between the Nmai and the Salween maintains an average width of thirty to forty miles for the next hundred miles, then narrows again to a mere fifteen or twenty miles, at the same time crowning itself with peaks covered with eternal snow. The actual watershed between the Irrawaddy and the Salween lies far to the east, and is never more than ten miles from the latter river, often less. This leaves an average width of twenty to thirty miles for the western slope of the range. But *is* this Irrawaddy-Salween divide one range, or is it what it appears to be — a series of parallel ranges? Seen from the west, the long ridges rise from the Nmai Hka, one above the other like the banked seats round an amphitheatre of the gods to the shining glory of the main range; but sometimes the interior ridges are as high as, or higher than, the main divide itself. In fact the general level of peaks and ridges is surprisingly constant.

If we examine a large-scale map of the region we notice that all the tributaries of the Nmai rising from the main watershed have great difficulty in reaching that river. They all flow south, or north (or sometimes south *and* north) before they are able to effect a break-through.

On both flanks the mountains fall precipitously to the main rivers, then rise again as steeply beyond them, that is east of the Salween and west of the Nmai. The significance of these facts will not escape the geographer. What he sees in his mind's eye is not primarily a range of mountains, or a series of ranges, but a plateau which has been deeply scored by rivers working along shallow glacier-worn troughs. The imprint left by the glaciers is clear, in the shape of the valleys, in the moraines, in the form of the peaks which are hard lumps of resistant crystalline rock isolated by the rivers. They reached at least as far south as 26° on the Irrawaddy side, and 25° or further south on the Salween side; and they flowed it would seem in a general southerly, south-westerly and westerly direction, over the rim of the Yunnan plateau.

The result of the climatic changes, alternating arctic and sub-tropical ages, has been to make this one of the most interesting botanical and zoological natural sanctuaries in south-east Asia. The valleys today are tropical and sub-tropical; the mountain tops alpine. In between these extremes are warm and cool temperate zones. How many times, with slow relentless step not counting its losses, a refugee flora from China or from Tibet, has been driven across this plateau, to be followed in due course by a restoration, via the deep valleys, from the south and west, one cannot say. But that many plant communities have been churned up together, and re-sorted, according to their requirements and temperaments, is certain. We shall see something of the results in the course of the next few months.

It is the same also with the hill tribes. Driven by various pressures into this vacuum, they have segregated. They keep themselves *to* themselves. First to arrive were the Maru tribe, who took the best seats — naturally: they occupy the sub-tropical valleys, where crops grow easily. Later came the Lisus, poor folk who live in the top floor back. Across the Nmai, in the 'triangle', live the Kachin tribes.

It remained for the Lashi, who have Chinese blood in them, to occupy the best place of all, that of the middle Ngawchang Hka, where the climate is neither too hot nor too cold. Rice, tea, cotton and several fruits grow well here.

It may be remarked that the Salween flows consistently higher than the Nmai in the same latitude, the difference being not less than a thousand feet. Further north it would be feasible to divert the Salween into the Irrawaddy by means of a tunnel fifteen to eighteen miles in length under the mountains. When we remember that the Simplon tunnel, built fifty years ago, is twelve miles long, it should not be difficult to tunnel the Salween-Irrawaddy divide today.

The Salween river is comparatively useless anyhow, and its lower course would still get quite as much water as is needed anywhere, except possibly at Moulmein. But what the effect of doubling or trebling the volume of the Nmai would be lower

down, and particularly in the first defile, below Myitkyina, it is of course difficult to say. But what a use for atomic energy! And how much more exciting it would be to cork one of the great rivers of Asia, and to double the size of another, than to blow off atom bombs in the Pacific, or fire a rocket to the moon! It seems premature to worry about other planets until we have made a better job of this one.

The high ridge above Lauhkaung, which we would cross in a day or two, separates the lower Nmai Hka and the jungle from the pine forests and glaciated valleys beyond, and though only a spur of the main watershed, it is nevertheless an important geographical barrier.

We halted a day in Lauhkaung — maximum temperature 70° , minimum 47.5° , B. 26.3 in. We were now in the zone of subtropical hill jungle, which extends to about 6000 ft. It is also the zone of maximum human interference; above 6000 ft. cultivation is rarely seen. But where climax forest still persists, as on north and east slopes, it is full of interesting trees in great variety.

McGuiness was anxious to get seed of the big-flowered climbing gentian (*Crawfordia Helenae*) and had recently sent a man up to Htawgaw to look for it — apparently without success. When I showed it to him growing by the roadside within a few hundred yards of his own bungalow he was much relieved. We were indebted to McGuiness for much help and hospitality.

CHAPTER EIGHTEEN

ON November 25th (min. 49°) we were off again with our eighty mules, following a good path up the crest of the ridge. It was a really gorgeous day. The visibility is never so good in these regions as it is in November-December just after the monsoon. Dust and smoke from burning forest and grassland begin to produce haze after Christmas, and though the weather may be fine the views are rarely good, except briefly at high altitudes, or immediately after rain. On the other hand the sunsets, even during the height of the monsoon, are sometimes grand and terrible, though as seen from a mountain top they may last only a few minutes. They had now a queer elusive quality, as of some revelation half felt, half guessed, which holds out infinite promise as it slips swiftly from your numb grasp for ever, leaving you empty and forlorn. There is nothing in the sky to reflect colour. The air is hard and dry. One minute you see the world darkening slowly, the deep blue dome firmly shut like a well-fitting lid over the cold indigo ranges, the west pale rose, with a hint of gold. For a few precious seconds the heavens are luminous with the promise of a great light. Broad spokes of light, faint as yet, leap out of the void. Suddenly and very swiftly it all fades like a dream at daylight. One tries vainly to clutch at the dying day, and in the stillness there is an echo of mocking laughter. Stars twinkle palely overhead. A coldness sweeps over the world . . . it is night.

But this day we had little opportunity to enjoy the sunshine, for after a couple of miles along the crest of the spur, the path takes to the sheltered side of the great Pyepat ridge, winding up through the evergreen forest, with high cliffs on the right, wet with sliding water, and a drop on the left into the black bowels of the mountain. The path has been blasted out of the hillside, and is a mere ledge. On that shining smooth shale face down which water slithered and trickled, dripping from the fronds and leaves, I had first seen *Primula dictyophylla* in flower twenty-five

years ago, on my first visit to Htawgaw. It was still there — not in flower now, of course; and in several other places too. The large leaves are rough as a nutmeg grater, the fine-mesh net veining curiously raised. A forest plant, growing at 6000-8000 ft. altitude, it is not quite hardy in Britain, but is a much to be desired greenhouse plant. A little higher up I had found my first hill rhododendron — *R. dendricola*, an epiphyte growing in the tree-tops, betrayed by its fallen corollas like white-and-gold coffee cups, littering the ground.

Now an entirely different assemblage of plants attracted my notice; I particularly wished to study the trees of this zone — sub-tropical hill jungle below, temperate rain forest above, since forest is by far the most important type of vegetation throughout north Burma, from 500 to 12,000 feet.

Just breaking into flower at 5000 ft. I saw a cherry which a fortnight later had become a white cloud shot with pink. It seems strange that this tree should be regarded in herbarium circles as a mere form of *Prunus cerasoides* (*P. Puddum* of old).¹ It is a smaller tree than *P. Puddum*; the flowers are white, faintly tinged with pink, instead of flaming carmine; and it flowers in November-December, three months or more earlier than the Carmine Cherry. Moreover when the flowers of the Carmine Cherry are opening on the bare branches, the pale-faced one is in full foliage; each responds to a different rhythm. But different as they are in appearance and behaviour, because the leaves and flowers of the two trees show no outward difference of structure — the only criterion to the old-fashioned taxonomist with his rigid conception of species — the two are classed as the same species.

Nevertheless there is a mystery here, and the species problem is no simple one. For seeds which I collected myself off the Carmine Cherry in the Adung valley, when plants were raised in England, gave rise to a pale-flowered form!

¹ In a recent paper (Gard. Chron. Ser. 3 cxxii: 162 (1947)) Collingwood Ingram has given this cherry varietal status as *P. cerasoides* var. *majestica* (Koehne) Ingram. The Carmine Cherry has been named *P. cerasoides* var. *rubea* Ingram.

I myself am convinced that if these two trees are to be regarded as one species, then *Prunus campanulata*, another Carmine Cherry from Formosa, is also the same species; though *P. campanulata* does appear to come true from seed — there is a gorgeous specimen in the temperate house at Kew, raised I believe from seed. There is precedent, too, for Far Eastern plants after skipping central China, to reappear in north Burma; witness *Taiwania cryptomerioides* (Formosa), and *Rhodoleia* (Hong Kong), and many plants common to Japan and north Burma.

J. K. and I took the long winding ascent to the pass easily, for there was much to see, and much collecting to do.

The upper forest was full of oaks, chestnuts, maples, birch and especially laurels, with tree ferns in the ever damp gullies and more rarely a *Ficus* and *Bucklandia* towards the summit, where the big rhododendrons grew, but not a single conifer, unless yew, *Cephalotaxus*, or *Taiwania* grew here scattered, as they may do. The taller trees were swathed in moss and covered with epiphytic ferns, orchids, aroids and small shrubs, or draped with climbers. The undergrowth was largely *Arundinaria*, with many rambling shrubs. We did not move off the path, and did not need to; for we could see far more *on* the path than ever we could have seen had we plunged up to the neck into that welter of dull green jungle. And dull green it was, though never for a moment dull; sombre too in that damp heavy world of foliage, where even the birds seemed subdued. Yet when a shaft of sunlight struck through the dense canopy, or we could peep down a gulley and see across the slanting cushioned tree-tops, there was far more colour here than ever we had seen by the Nmai. Some trees were putting out new leaves, and a few were in flower; but almost every one had leaves of a different shade of green.

J. K. records that there were bush robins hopping along the path, and it was here he shot the first male 'Ward's trogon' (*Ptyrotrogon wardi*) ever recorded from Burma. He also shot a tree shrew (*Tupaia*). But J. K. was a real field naturalist, and



for every bird he shot he recorded valuable notes on three others he had seen.

The 15-ft. bank which bounded the up-slope side of the track afforded a useful cross section of the forest; for here sprang up, amongst the ferns, mosses, begonias, violets, *Impatiens*, *Paris*, *Chirita*, *Lobelia* and *Campanumaea* proper to such shady banks a host of seedling trees, few of which would ever reach maturity. I remarked especially the regeneration of *Bucklandia*, *Betula*, alder, a *Ficus*, *Saurauja* and rhododendron. In fact it was this bank that told me *R. stenaulum* and *R. facetum* entered into the composition of the forest on the Pyepat ridge, marking the transition from hill jungle to temperate rain forest. There were dense thickets of climbing bamboo also. However, hardly had we reached the pleasant temperate zone than we also reached the saddle at 7000-ft. altitude, and immediately began to descend towards the dawn of a new world; though this is not immediately apparent.

A short descent brought us to the little Pyepat bungalow, clamped on a bare windy shoulder, with the deep dark chasm of the Ngawchang river far below. Here we spent a cold night, the stove smoking evilly, and what heat it produced being blown away by the icy draught out of China. At dusk I stood on a jutting rock and stared northwards at a grim end-on view of the rows of naked ranges, staggered between the Irrawaddy and the Salween. They towered up from a pale grey sea, their near summits crimsoned by the dying sun, range beyond range, before meeting the gun-metal sky. Here the river is making its U-bend round Great Gable, which is the truncated end of a long spine. Great Gable tapers up to a jagged peak 12,000 ft. high, which you must throw your head back to see, and behind that is a still higher peak, and behind that again is Imaw Bum itself, 13,369 ft., the highest peak on the spine; we were within twenty-one miles of it, could we but fly there.

And in the cold dawn of the 26th — minimum 44°, B. 24.3 in. — J. K. and I again stood on this look-out point and watched the sun rise over the white-capped Salween divide, and tried to

solve the puzzle — namely why the fauna and flora of the Htawgaw hills should differ so much from those of the hills east of the Pyepat ridge; why, in brief, the Pyepat ridge should be a geographical barrier at all. Northwards, away from us, flowed the Ngawchang river; but a few miles to the east, it flowed straight *towards* us. I do not think we found the answer then, but later, when we observed the glaciation of the upper Ngawchang valley, the gorge it has cut for itself between the high peaks and the alignment of the high spots south of Htawgaw, we found at least a partial solution.

It would seem that the Imaw ridge, that long south-trending spine, which separates the two limbs of the river, does not end abruptly at the bottom of the loop, as it appears to do. It continues southwards to the Panwa pass and beyond. The Ngawchang river has found a soft spot in its otherwise hard core, and sawn clean through it, so that the river appears to flow round its southern buttress-like end; but that is an incident in its geological history. Actually the range extends a long way south, cutting off the interior valleys from the Nmai Hka so that western China, not Indo-Malaysia, has given the upper Ngawchang most of its animals, its birds and its plants.

After a quick breakfast J. K. pushed on the mules and announced that he was going back up the hill to search for a bird he had glimpsed on the way down the previous evening. So I too strolled up the hill, soon finding two beautiful laurels (*Lindera* species) in bloom, neither of which I had noticed before.

Suddenly I stopped. What was that up in the tree seen out of a corner of my eye? Oh, an orchid! Nothing unusual in that surely! Isn't this the land of epiphytic orchids? Ah, but — why, it's a *slipper* orchid, and that *is* extraordinary! For what is a slipper orchid, an earth orchid if there ever was one, doing up a tree? And, now that I came to look squarely at it, I felt it was not entirely the unusual situation in which it grew that caused my heart to beat faster; it was rather the size of the flower and its rich though subdued colouring, the bloated honey-gold slipper of frosted porcelain texture, the broad stiff wings, sharply

bisected, the upper half yellowish green, the lower half tessellated in coffee browns, the arrogant poise of the whole. I continued to stare, unwilling to move in case it was not true . . . At last I forced myself to move, climbed quickly up the tree, grabbed the prize. It was a slipper orchid *Paphiopedilum* all right, and an epiphyte. I could hardly believe my good fortune. Though several people, Farrer and Cox, Kermode and collectors from the Forest Department, Lady Cuffe and I myself had botanized along this trail during the last twenty years, there was no mention of any slipper orchid that I had heard of. Surely then it must be new — though it might turn out to be a Chinese species.

I sent a description of the plant together with pressed flowers to England, and in course of time learnt that my slipper orchid was *Paphiopedilum villosum*, no discovery, for it had already been discovered by Thomas Lobb, near Moulmein, 700 miles south of Htawgaw, many years previously. Later it had been discovered in the northern Shan States, 200 miles south of Htawgaw. However, this was at least a new locality, perhaps not far from its extreme northern limit, and I felt no acute sense of disappointment that it was not a new species.

My attempts to get more living plants, and to send them alive to England, involved me in difficulties and frustrations. The *chowkidar* (keeper) of Pyepat bungalow, being shown plants and promised great wealth for the discovery of more, collected a number of imitations, which he palmed off on the innocent and unwary J. K. as the genuine article; while the Postmaster in Rangoon knew so little of the laws permitting the export of live plants to the Royal Botanic Gardens, that he returned my parcels with the curt remark that they were prohibited!

I did, however, succeed in sending some live plant to the Maymyo Botanic Garden, in the hills near Mandalay, where they survived. I wonder whether they are alive today!

J. K. had been almost as successful as I had. True, he had failed to get the bird he was in search of; but he had collected two others — a rose finch and a laughing thrush — which

pleased him even more. As we left the Pyepat bungalow, the joyous cry of hulock gibbons reverberated down the deep gorges as though announcing our triumphs to a deaf and indifferent world.

So we went down the hill towards the Ngawchang in the wake of the mules, and a mile from the bungalow I found several big clumps of slipper orchid in bloom, this time on a more legitimate site, namely the vertical roadside bank, of reddish clay, amongst moss and grass.

In thickets the rare shrub *Pottingeria* was in flower, and on the bank seedling *Rhododendron Delavayi*, though there were no full-sized trees here. Down, down, down, like Alice, till we came to an enclosed valley, moist and warm, where the forest trees and especially *Quercus lamellosa*, reached an immense size, their limbs and trunks supporting in princely affluence an army of hangers-on, epiphytes and climbers and scramblers which did nothing for their hosts in return for free lodging, so far as one could see. There was also the handsome *Cedrela*, like a Chinese tree-of-heaven.

We climbed again to cross yet another ridge and the sunny slope was gay with the fragrant pink flowers of *Luculia intermedia*, in large *Hydrangea*-like heads, each flower the size of a crown piece. A curious tree which grows here is *Adinandra*, allied to *Camellia*. The fruits are eaten, and are said to attract bears also, which climb the trees to get them. Here were green pigeon, and we collected a golden-throated barbet. We met parties of Lisus driving herds of nibbling goats down to the plains. It must take them a long time to get there, if this was a fair sample of their progress. They would be mutton in Myitkyina. We spent the night at Lanyang resthouse, from where we looked across ridge and valley to Htawgaw crowning a limpet-shaped hill.

On November 27th, minimum temperature 42°, we continued the descent to the Ngawchang through secondary growth — for we were getting into a more thickly populated region with climax forest confined to inaccessible sunless gullies.

Trees frequently noticed were the evergreen *Engelhardtia* in fruit, and its leafless relative, the walnut, a fine red-barked birch, newly fledged with shrill green leaves and big catkins not yet fully developed; chestnuts (*Castanopsis indica* and *C. tribuloides*), several not very large figs, *Schima*, the pale-flowered early cherry, and *Kydia calycina*.

As we came down to the Ngawchang river by the corner where it swings round from a southerly to a westerly course, the scene changed. We crossed a spur and suddenly we were amongst pine trees, and the air was aromatic with their scent. The altitude was about 3000 ft. so that we had descended 4000 ft. from the Pyepat ridge, and the forest though still evergreen was no longer broad leafed. No sooner are we well within the Ngawchang valley than not only do the species which compose the flora as a whole change, but the very type of vegetation. And yet there is no great alteration of climate, though the air was certainly drier here than on the other side of the Pyepat ridge; for since crossing it there had been no early morning mists. The soil too had changed from a sticky red clay to a greyish more sandy better-drained type of soil.

But it is links with adjacent regions, due to the long turmoil of the ice age, which have left the most indelible marks. Here right before our eyes we see the successful invasion of north Burma by the Chinese fauna and flora at the expense of the Indo-Malaysian, resulting in an irregular mixture, with Sino-Himalayan elements from the north and east — Tibetan, Himalayan, and even North Temperate thrown in for good measure.

Here then is something for the naturalist to sort out — the naturalist of the next generation. I think the Vernay-Cutting expedition made a useful start.

Mixed with the dominant pines which prevail between 3500 ft. and 7000 ft. was the handsome conifer *Podocarpus neriifolia*, and conspicuous in the thick undergrowth were solid colonies of the graceful fan-leafed fern *Dipteris* and a big *Gleichenia*, its wavy fronds repeatedly branching dichotomously.

There were broad-leafed trees too, as *Terminalia myriocarpa*, and other sub-tropical species. All round us towered the hard grey crystalline cliffs with the river grinding its way down the steep gorge, leaping the boulders, and the immemorial forest climbing the steep flanks of the ranges. Ahead of us silhouetted against the blue sky Htawgaw crowned its hill-top like a limpet.

J. K. was in his element. The previous day he had failed to shoot a Kalij pheasant, and it still rankled. Today he made up for it by getting a Chinese long-tailed magpie, two species of trogon (these apparently went about in company) and several other interesting birds, besides making copious notes.

I both saw and heard more mammals than usual, and watched with interest a giant black squirrel with a white face (*Ratufa*) descend the trunk of a tree vertically then, from that awkward position near the base, make a surprising horizontal leap. A grey langur with a pleasant round black face and large liquid dark eyes on the other hand watched me with more suspicion than detached interest. These long-tailed monkeys have deliciously soft fur and are much sought after by the hill tribes, who make the skins into bags. Gibbons we heard too, though we saw none; and barking deer. The former ascend even in winter to 4000 ft. and perhaps higher. In the rainy season one hears them at 8000 ft.

So we climbed the long zig-zag hill, from the Ngawchang river (B. 24.8 in.) 3000 ft. to Htawgaw (B. 27.4 in.), through pine forest and scrub, and past carefully terraced paddy fields, till we could feel the cold breeze from the mountains of China in our faces. This was a landmark; here J. K. and I had to part company for a time. We had been twelve days on the road from Myitkyina, or eleven marching days for the 125 miles from Waingmaw to Htawgaw. The American leaders were due in Rangoon before long. J. K. was to go down to Myitkyina with forty empty mules to meet them, while he planned for me to go on to Kangfang, another four marches, dump the stores there, build the base camp, and hurry back to Lauhkaung to join the party on their way up. I was sorry to part from J. K.

and did not altogether relish the idea of returning seven days march to Lauhkaung; only to retrace my steps once more, when there was so much new ground I might have covered from Kangfang. But it was not my expedition, and naturally I fell in with the plans of the leaders which had been laid in New York and London.

J. K. and I spent the following day, the 28th, rearranging the loads. Once the headquarters of a sub-division, with a stone fort and barracks for a company of the frontier force — for Htawgaw does command, though in a rather prehistoric sense, the passes into China — the place was virtually abandoned some years ago when the frequent earth tremors began to rattle the fort to bits. It was now reduced to the Lashi village (scattered), the mission station, travellers' rest house, a few Chinese shops of the baser sort, a post office and bungalows of minor officials. *Sic transit gloria mundi.*

Snow occasionally falls, but it does not lie long. A little tea, of the dark 'Manipur' type or black Burma as it is called in Assam, is cultivated, and behind the bungalow is a young tree like a *Cryptomeria*, planted here long ago by some enthusiastic amateur botanist, probably Lady Cuffe. It is *Taiwania cryptomerioides*, the Chinese coffin tree. Astonishingly hard pears, but edible when stewed, and good oranges are grown; that is to say they are thin skinned, juicy and well flavoured, but the pulp is like chewed string. We met all the local officials unofficially — though they could never quite forget that J. K. had once been Deputy Commissioner of Myitkyina — the 'township officer', a fat and jovial Kachin, the Post Commander, also a Kachin, the P.W.D. overseer who was a Sikh, and several underlings. Only the Chinese kept aloof as Chinese do — they openly sold cloth, soap, matches, kerosene, excellent cakes, dried fungi and beads to the local inhabitants. I saw a Chinese woman hobbling on bound feet; the custom of a thousand years dies hard.

It was a lovely night, with a young moon setting early over China; a wind sprang up and blew half a gale, making us

huddle round the stove. So on December 29th J. K. and I went our separate ways, he back to Myitkyina, myself on up the Ngawchang valley.

One cannot go in any direction from Htawgaw without first going down hill, and down hill we went, through pine forest and bracken, to the Ngawchang river and so to Hkamkawn on the right bank. We were now a thousand or more feet below Htawgaw (B. 26.1 in., at Htawgaw 24.9 in.), but it was very little warmer (minimum 42° and 45° at Htawgaw, 48° at Hkamkawn, on December 30th). The sky was overcast and there was no appreciable dew. Fresh, sometimes stormy, winds blow down the Ngawchang in the cold weather, and dry up the vegetation. Wherever an alluvial fan flares out rice terraces stripe the vertical landscape with close flights of short horizontal lines; for the Lashi alone amongst the hill tribes have learnt the art of irrigated rice cultivation, and practise it assiduously. All the way from Htawgaw to Kangfang, and up the Hpimaw valley to as high as 6000 ft., the gentle slopes are terraced, water being led to the fields along little earth ditches and bamboo flumes. We passed a number of Lashi villages, the long low thatched huts neatly stepped up the slope. We also met people on the road now, for the valley is comparatively populous, Lashis dressed in their sabbatarian blue everyday clothes, and occasionally Lisus, shabby like poor relations. The Lashi women have pleasant rounded faces, but are otherwise as amorphous and inclined to fat as boiled suet, while their *pan*-defiled mouths suggest the entrance to a bat cave. Skirts are worn long, and pleated.

The fourteen-mile march from Hkamkawn to Black Rock rest house is to the botanist at least one of the most enjoyable of the whole journey, ranking with the crossing of the Pyepat ridge in interest. Deciduous oaks (chiefly *Quercus serrata*) and pine trees mingle here on the rocky hillside in a russet sea of bracken and grass. In fact for the next thirty miles, to beyond Kangfang, pine-oak forest, born of a scorched earth, predominates. We might call it sub-tropical pine forest, to distin-

guish it from the temperate pine forest (*Pinus excelsa*) of the Adung valley. Yet it is the evergreen broad-leafed forest which fills the deep gullies and gorges, and clothes the cold damp northern slopes, that is so full of surprises. Here grow the lofty *Altingia excelsa*, and *Rhodoleia Forrestii*, with dusky-purple flowers the colour of Victoria plums, *Elaeocarpus dubius* bearing myriads of little white-fringed thimble flowers, *Wightia Aplinii*, *Schima*, elm (*Ulmus lancifolia*), hornbeam (*Carpinus viminea*), birch, alder and, at higher levels, the lovely *Gordonia axillaris* with cream-and-gold flowers as big as dog-roses.

At Black Rock, where the paths to Kangfang and to Hpimaw part company, the Ngawchang flows in a rock crack so deep and sheer and smooth walled that it is out of sight until one crosses high above it by a short wooden bridge. I have always believed that unguessed at plants lurk in that mile-long crack.

So we climb out of the gorge at Black Rock and turn sharply north through the pine-oak woods. And suddenly the valley widens again with gently terraced fields and villages in the folds, their thatched roofs hung with vines. An easy path threads its way through this mixture of the wild and the sown, with the mountains now higher, steeper, wilder, pressing in on us from every direction. And so without further ado we come to Kangfang up against the foot of the far hills, with Imaw, and the Chimeli peaks, and Sajyang so close that though we crane our necks trying to see their tops we cannot.

Beyond Black Rock *Quercus Griffithii*, now bare, but one of the most lovely of oaks when in fresh leaf, replaces *Q. serrata*; the two overlap but rarely mix happily — usually it is one or the other. A curious feature of *Q. serrata* is that though the leaves wither on pollard trees they do not fall off. East of the river limestone crops out here and there, and associated with it are plants not seen elsewhere. In a secluded ravine I found a colony of the rather undistinguished *Primula densa*, without flower or seed, a purely limestone plant which shrinks from the light; and in thickets a bushy small-leafed rhododendron with heads of tiny flowers like a Kurume *Azalea* (*R. microphyton*).

Other shrubs included here were *Ilex corallina*, *Stachyurus himalaicus*, *Quercus glauca*, *Berberis*, *Helwingia* and other temperate genera.

But the outstanding feature of the pine-oak parkland is the variety of fine herbaceous plants which come up in the grass-bracken stuffing. You may search the high valleys of north Burma and you will not find a single lily other than *Lilium giganteum*: and here above Kangfang are two, *Lilium Bakerianum* and *L. ochraceum* var. *burmanicum*, both over five feet tall in fruit. They flower during the rains.

So on December 1st, when I found two lilies, a *Primula* and a *Rhododendron* new to me, was a red-letter day.

We passed through the home village of Lamata, one of the expedition servants, and all the women and girls came down from the fields and out of the huts to press his hands. He wore flowers stuck jauntily in his hair for the occasion, and showed off modestly. Then each of his relations in turn took my right hand between two horny hands, pressed it, and thereby sealed a five-year non-aggression pact. Later we passed two Lisus squatting by the roadside while round them sprawled a dozen dogs, their heads on their paws. The dogs wore wooden yokes round their necks, like chain-gang slaves, or were tied together with the two ends of a stout stick between each pair, to prevent them from biting their masters — or each other. Certainly they were prick-eared curs of no breeding. Yet they were dogs, the friend of man. The fate in store for them was to be cooked and eaten. Their masters had brought them all the way from China and were taking them to the Laungvaw country beyond the Wulaw pass, to sell them. It seemed a long way to go just for the pot. There can be no more moral obloquy in eating a dog than in eating a lamb cutlet; it is sentiment that makes one dislike eating one's friends. But the dogs, if they knew what fate held in store for them, seemed bored and indifferent.

So we came to Kangfang, on the upper Ngawchang river at an altitude of 5400 ft.

CHAPTER NINETEEN

KANGFANG, the proposed base camp of the expedition, is a small Chinese trading post. On both sides of the river high mountains shut out all but a ribbon of sky, those on our side covered with straw-yellow grass, and nut-brown bracken; those on the opposite sheltered side with dark evergreen forest. Here and there small Lisu villages nestled in the dimples of the hills, their presence betrayed by clumps of fan-leaved palms and groves of slender bamboo (*Arundinaria*) with canary-yellow stems and sea-green foliage. Both plants have been brought here from China. The brown fibrous bases of the palm leaves sewn together are used by the Panthay muleteers to cover their pack loads in wet weather; they also make excellent rain cloaks.

Away up the gorge, out of whose gloomy shadow the river dances into the sunlight, the heads of higher and higher peaks rise above the shoulders of the nearer ridges. All are steep, sometimes precipitous. Just round the corner a tributary from the Salween-Irrawaddy divide, the Hpawte Hka, joins the Ngawchang river. It is a beautiful landscape seen through the crisp winter atmosphere, all warm brown, honey yellows and terracotta, criss-crossed with evergreen forest.

The air was sharp and dry, with good visibility. I made observations and measurements on the humidity to see how dry it really was. The lowest humidity recorded was 23% saturation at noon on December 8th; 27% at noon on the 7th (34% at 11 a.m.). After noon it rose fairly fast, 48% and 51% on the 4th and 7th at 4 p.m., and by sunset no doubt it was back to the fairly high degree of saturation seen in the earlier part of the day, viz., 73% at 8 a.m. on the 3rd, and the same at 9 a.m. on the 4th. Yet the scarcely visible rime at dawn indicated that the air was still comparatively dry. The wind which blew coldly out of the gorge during the day, helped to lower the

humidity. It would probably be correct to say that the three months' winter drought with humidity under 50% for several hours every day, is a factor which helps to determine the flora by eliminating a number of species. That the flora differs widely from that of the Adung valley is manifest; and that climate (of which annual rainfall is one of the least important items), plays a selective role, is not open to question. But the real reason for the difference is to be sought in underlying causes, particularly in the migration routes open to refugee floras on the one hand, and to colonizing floras on the other, throughout the million years of the late ice age. The influence of these was paramount.

I had plenty of work to do besides merely dumping stores here, and not much time for botanical exploration, though I managed to get out for a few hours each day. I put up the tents started a vegetable garden, improved the rest hut, collected firewood. The local Lisus and Lashis, if not the local Chinese traders in coffin planks, who were slightly apprehensive of these goings on, entered enthusiastically into the fun.

The next thing to decide was where to build a high camp. After thinking it over I selected the Chawngmaw valley, at the foot of the Nyetmo pass on the trail which skirts Imaw Bum. This would give the Americans a chance to climb Imaw and hunt takin if they wanted to. Also there were the giant bamboo rats in the Chawngmaw valley, and no doubt plenty of bird life. So the Lisus built a fine hut at the spot whence I had started on my ascent of Imaw twenty years previously; and in due course the expedition spent a week there. But it was then too late to climb Imaw which was under many feet of snow, down to 10,000 ft.

The winter paddy was reaped, and down the valley the Lashis were beating out the grain on bamboo mats spread in the stubble fields. On moonlight nights they stayed out till long after dark; the drowsy sing-song of the women, working in the tawny glow of the full moon, made a weird lullaby.

We had ground frost every night, the sheltered thermometer

showing minimum temperatures of 32° to 34° during the first ten days of December. I had to keep reminding myself that our latitude was only just over 26°, well south of Cairo, Shanghai, Miami and other places in the sun. This was to some extent reflected in the vegetation, which was a curious mixture of tropical and temperate plants.

The two contrasting vegetation types were (i) broad-leafed evergreen forest with scattered deciduous trees on northern slopes and (ii) the grass-bracken association, with pines, oak and alder as the dominant trees on southern slopes. A modified form of evergreen climax forest was seen in the dense thickets lining the river bank. Here grew many shrubs and stunted trees, including oak, rhododendron, *Hydrangea*, *Leptodermis*, *Eurya*, *Gaultheria*, *Hypericum*, *Euonymus*, *Schima*, *Berberis*, *Ilex*, *Ficus* and many more. The great variety of climbing plants was a measure of the humidity throughout the year; they included five or six species of *Clematis*, *Smilax*, *Derris*, *Periploca* and other asclepiads, a *Rubus* with simple leaves white felted beneath, and many herbaceous twiners and scramblers such as *Porana*, *Senecio scandens*, *Polygonum perfoliatum* with bunches of cyanide-blue 'berries', *Codonopsis*, *Crawfordia* and others.

To reach the gorge of the Ngawchang one had to cross the river by means of a decrepit cane suspension bridge which swayed and sagged ominously. Here the cliffs were covered with interesting and rare plants. A tall holly tree scarlet with berries, giving it quite a Christmas look, guarded the entrance to the gorge. The curious *Sporoxeia*, with compact fascicles of pink flowers springing from the axils of the almost circular leaves, was common. I would have liked to follow up the Ngawchang river to its source in Sajang Bum near the Wulaw pass, but that would have taken several days; nor could I interest the leaders in this plan, though the region is entirely unexplored. I had crossed the Wulaw pass on the occasion of my first visit to the Htawgaw hills, and knew it to be a naturalist's paradise.

As already remarked only an insignificant proportion of the

trees are deciduous. Those which had by now shed most of their leaves included *Acer* — champagne yellow, *Rhus* — coral red, *Prunus*, *Litsaea*, an oak and one or two others.

But the tree I was most interested in, the tree by and for which Kangfang exists, was the Chinese Coffin Tree — *Taiwania cryptomerioides*. This fine conifer grows — or did once grow — on the frontier ranges from Htawgaw northwards to latitude 28°; it is not known whether it grows in the Salween valley also. Near the source of the Ngawchang river, it occurs in pure stands at an altitude of 9000 or 10,000 ft; but accessible trees have mostly been cut out. There was a young tree growing in a village just across the river from Kangfang; but the nearest full-grown tree was alleged to be far up the gorge. As the name indicates, *Taiwania* was discovered in Formosa about 1906, and is not known to occur between Formosa and the Burma-Yunnan frontier, a distance of 1500 miles.

J. K. had sent Gabriel, one of the expedition's three skimmers, with me so that we could collect birds, which at this season were numerous many of them being perhaps on migration. Common was a redstart with a rusty-red breast and a circular snow-white cap on the crown of his black head. I usually saw it flitting from one rock to another in the river bed, but it was a hard worker, one of the last to quit at night. Every evening it sat on the fence near my hut till dusk, tweeting rather plaintively on one note. By the river also lived a black and white fork-tail; several times I saw a cormorant fly swiftly by, very close to the surface of the water. These are residents; but a honeysucker, all brilliant metallic blues and greens, brought in by the Lisus, was no doubt flying south for the winter. Two brightly coloured birds which attracted my attention were an orange-billed Chinese magpie, whose long pale violet tail was particularly beautiful, and a fly-catcher with rich Prussian-blue back, a white collar and reddish breast. Unfortunately a bird's song is not always as bright as its plumage: the handsome pie had a revolting voice. Other birds noticed included a bunting, several thrushes, a tit and some kind of hawk, apparently a

fishing eagle. I shot a barwing; and the Lisus, who ordinarily spend a good deal of their time hunting, brought in a monal and a tragopan, both beyond repair. It seemed a pity that J. K. was not already at Kangfang; he was missing the best month of the year.

On December 9th I climbed to the summit of the first ridge on our side of the river — altitude between 7000 and 8000 ft. — where frost still sparkled on the ground. Here I saw the lovely *Gordonia axillaris* in full bloom, its cream-coloured camellia-like flowers three inches across. With it was *Rhododendron decorum*.

In the high grass and bracken I found the two lily species in fruit again, within a few yards of one another; *Lilium Bakerianum* and *L. ochraceum* var. *burmanicum*. This ridge in summer with the tall lilies in flower, and other handsome meadow herbs, would be a brave sight; the only plant in flower at this altitude was a small gentian (*G. cephalantha*).

With so many birds about, and bats flitting round at dusk, and many plants flowering, Kangfang hardly gave the impression of winter, in spite of early morning frosts. True the birds were obviously not mating — some were flying south — and the number of plants in flower, or about to flower, was a very small proportion of the immense variety which occurs. Nevertheless winter at 5000 to 6000 ft. in the inner valleys can be only a brief interlude in the quick revolution of the life cycle. After January the pressure rapidly increases and every week more buds open, new birds appear, more insects become airborne. It is the comparative freedom from insect life during the brief winter lull that one appreciates.

On December 11th I packed my valise and with Gabriel started on the week's trek back to Lauhkaung. There was no change in the weather — minimum temperature 33° — but the wind was colder than usual. The Lashi women were at work in the fields as always. Like most hill women they take a certain pride in their highland dress, but both Lisu and Lashi women have adopted and adapted Chinese fashions, wearing loose

trousers, and sometimes the short Chinese jacket with long sleeves; but the men wear anything. It was odd to see Chinese women in Kangfang hobbling along on tightly bound feet, after the smartly dressed girls one had seen in Singapore dance halls, semi-westernized.

At Black Rock we returned to oak forest, the warm russet browns and sharp yellows of the leaves which still clung to *Quereus serrata* and *Q. Griffithii* illuminating the forest. *Q. spicata* is another common species, growing with *Michelia floribunda*. In the dense thickets which cover the cliffs of the gorge I saw *Wightia* in flower again — not the *Wightia* of the Tamai valley, but another species, *W. Aplinii*. It is a tree, not epiphytic, and uncommon. Other trees in the gorge are *Ficus lepidosa*, *Albizzia*, a small tree of the custard-apple family (*Anonaceae*) — perhaps *Fissistigma* — and the milk-white *Rhododendron dendricola*. High up across the chasm was a tree mantled with large ivory-white flowers, quite inaccessible. It was tantalizing to gaze at them through a field-glass and speculate on their identity; possibly it was *Gordonia*. On the road we met a barking deer, and the previous day I saw either a *Tupaia* or a squirrel. These were the first mammals I had seen north of Htawgaw, where the Lisus are active hunters of everything that runs or flies. But even they cannot kill everything.

At Black Rock the maximum temperature was 70° (on the 12th), the minimum next morning 41°. At 3 p.m. the humidity had fallen to 44% saturation — dry enough to *feel* dry.

Not far from Black Rock the road crosses a big torrent at the bottom of a deep gorge; and from the wooden bridge one can see — but not easily reach — an extraordinary variety of trees and shrubs. I found the silver-leafed *Berberis hypokerina* here, below 4000 ft.; in the Seinghku valley it does not grow below 8000 ft., where it is associated with hemlock spruce, and *Pinus excelsa*. *Rhododendron dendricola* was in full bloom on the cliff. Other trees and shrubs in the gorge were *Castanopsis indica*, *Engelhardtia spicata*, *Ficus Cunia*, *Prunus cerasoides* (*Puddum*), *Viburnum coriaceum* and *Clerodendron bracteatum*, besides those



previously mentioned. The contrast between the forest growing in these gorges, and the simple pine-oak forest of the grassy fern-clad open slopes is such that one suspects the latter to have been artificially brought about by man, who for centuries has inhabited the valley, cutting and burning the forest, terracing the alluvial fans, introducing economic plants of his own from China. The climax forest seen in the gorges does not owe its survival entirely, or even mainly, to shelter from sun and wind and to a moister atmosphere; it owes it in part at least to inaccessibility. Pine-oak forest here, like pine forest in the Tamai valley, seems to be a stabilized pre-climax type which will endure so long as man continues to cultivate rice, cut firewood and burn the grass in order to encourage its growth.

A great variety of orchids grow on rocks and trees between Htawgaw and Black Rock, encouraged it would seem by the better illumination provided by the more open type of forest. Species of *Thunia*, *Coelogyne*, *Dendrobium*, *Cirrhopetalum*, *Cymbidium* and many others occur. Few were in flower now. What did surprise me was to find small colonies of *Paphiopedilum* (*Cypripedium*) *Wardii* growing on the dry sandy bank in pine forest just below Htawgaw. It seemed unlikely that half a dozen botanists coming and going should have missed this plant in bygone years, and I suspect it to be a recent invader. I first saw it north-east of Fort Hertz, about 150 miles away, in 1922, collected and introduced it ten years later. By 1937 it had practically disappeared from its *locus classicus*.

On sunny granite rocks in the bed of the Ngawchang a species of *Agapetes* (*A. Lobpii*) was in an ecstasy of bloom, every branch frilled with hanging clusters of pointed tubular pinkish-purple flowers, so closely crowded that there was not room for any more; as though the rich sap surging within had suddenly erupted in a thousand jets, to relieve the pressure before it split the bark asunder. The flowers were remarkable for their vast numbers; the leaves were equally remarkable for their astonishing range of colour, from shining apple green to dull olive, and from salmon pink to cardinal scarlet. Sharing the

rocks with this prolific *Agapetes* was, as usual, *Rhododendron dendricola*, like clots of milk.

At Hkamkawn the minimum temperature was 46°, accompanied by heavy dew, and at Htawgaw next morning it was 45° (December 15th). It had seemed cold there on the way out, coming up from the hot valley of the Nmai Hka; now after the icy wind at Kangfang it felt warm, though there was a howling wind just the same.

On the hill below Htawgaw I noticed that the leaves of *Clethra Delavayi* had turned a sullen red, but remained on the branches; the long spikes of this shrub, even in fruit, are striking. In sheltered gullies the climbing gentian (*Crawfurdia Helenae*) made a wonderful display, a pure white form being perhaps the best, as it is the rarest. The common form has purplish-pink flowers. The fern brake which grows five feet deep in the pine woods includes *Gleichenia*, *Polypodium*, *Davallia*, *Pteris* and other handsome species; no such impenetrable ferny undergrowth is seen in the pine forests of the Khasi hills for instance, or in the Adung valley, where *Pinus excelsa* replaces *P. insularis*. Besides fern brake many shrubs spring up in the undergrowth. On banks, the sticky *Anisadenia pubescens* is a common weed, its little white bell flowers arranged in short spikes.

The rainfall of Htawgaw varies within wide limits. In 1935 it was 75 in.; in 1938, 107 in. The maximum temperature on December 15th was 66°.

On the 17th we set out for Lauhkaung — minimum 43°, maximum (at Lanyang) 67°. Between Htawgaw and Lauhkaung I saw many specimens of *Prunus cerasoides*, and they were in all stages of undress, from leafless covered with flower to fully fledged with hardly any flower at all. This is the early cold weather form, with pale faintly purplish-pink flowers which, in spite of their rather dowdy colour, look beautiful when seen against the turquoise sky. The carmine form was not recognizable yet, being completely bare.

South of Htawgaw we were back in a region where birds even in winter are plentiful. I saw crimson-breasted trogons and a

fine dark blue Kalij pheasant near Lanyang, and a whole school of white-crested babblers. One of the boldest little fellows was a Prussian-blue flycatcher-warbler which was often to be seen on the road. In his well-fitting blue coat and smart buff shirt-front he looked rather like a Corinthian of the Regency period. I was rather surprised at the speed with which a troop of monkeys crossed the road, swinging by leaps and bounds, or more properly bounding by leaps and springs, from tree to tree. *Wickstroemia floribunda* was in flower scenting the air deliciously.

Pyepat bungalow, though higher than Kangfang, and more exposed, was ten or twelve degrees warmer — minimum 42°. Still it was cold enough to make a fire very welcome. These bungalows, built by P.W.D. engineers who also built the roads, are comfortable, but suffered from the worst-designed central heating, in the form of an iron stove in the living room, it is possible to imagine. They did one of two things. Either they filled the bungalow with smoke and kept it full, or they set fire to it. In neither case did they warm it, except temporarily. Luckily this latter happened only once, and then some hours after we had left, through no fault of our own.

The Pyepat ridge as always was full of good things not noticed on previous visits. I saw *Pandanus*, tree ferns, climbing bamboo and a bird cherry (*Prunus Wallichii*) with sweet-scented flowers, besides more laurels, and *Rhododendron Kyawi*.

So I came down to Lauhkaung again through a mist of cherry trees, and at sunset looked obliquely down the long valley of the Nmai Hka to the sentinel peak above Seniku. The world seemed afire, the colours crude and dramatic as a theatrical scene. I was a day ahead of the programme and spent the 19th sorting loads and putting my collections into some sort of order.

December 20th was the great day. After breakfast I walked down the hill, and presently met J. K. and the Americans coming up. It was several years since I had met Arthur Vernay and Suydam Cutting; Harold Anthony, Curator in the Mam-

mal Department, American Museum of Natural History, I had never met. He was a big fair man who strode along like a Colossus, mopping his brow. He also had a command of dynamic simile, couched in picturesque vernacular which we found refreshing.

We had much to talk about. The Americans were tremendously enthusiastic and anxious to get on with the work at once. I handed over the thirty-five birds Gabriel and I had collected — an interesting collection with no startling discoveries — and told them about the plants found, and the camp at Kangfang waiting for them.

We were a large party. Besides us five and three skimmers, there were fifteen servants who between them spoke six or seven languages. But Kachin was to be the *lingua franca* — though we were not in Kachin country — and the only person who spoke that was J. K. I had some knowledge of Hindustani, Yunnanese and Burmese, and could rub along. But Suydam, who spoke Hindustani, was the only one of the Americans who could talk with anyone outside our own circle. So far as interpreting was concerned J. K. practically ran the show single handed.

We had about fifty mule loads of stuff with us, and how we all packed into the small camping grounds by the bungalows I don't know. But we did, pitching our tents on the edge of the precipice and sending the mules away at night.

On December 21st we started for Pyepat, and the Americans were deeply impressed with the country from the very start, as well they might be. Crossing the ridge, they got their first sight of the high crags of Imaw, and decided to spend a day at Pyepat, probably the smallest bungalow and most restricted camping ground, cut out of the steep mountain side, on the road.

It was a satisfactory day for all of us. There were plenty of birds: honeysuckers, barwings, sibilias, rose finches, bulbuls, fly-catchers and many more. Several squirrels were bagged, and Harold trapped a chimarogale (water shrew) and a land shrew. At sunset the air was gem clear and the rainbow colours of the

November snow which lingered in the deep couloirs high on Imaw's ridge, thrilled us all.

After a day's collecting at Pyepat we continued our slow and stately progress to Htawgaw, spending many hours of sunshine on the road. We reached Htawgaw on Christmas Eve.

There is perhaps no better example of vegetation type changing with altitude than that seen in crossing the Pyepat ridge from the Nmai Hka valley to the Ngawchang valley, a change by no means entirely confined to a mere succession of species. In three days one samples four distinct types of forest, from tropical rain forest in the valley of the Nami Hka to sub-tropical at Lauhkaung, warm-temperate rain forest on the Pyepat ridge, and so to sub-tropical pine forest in the Ngawchang valley. But whereas the sub-tropical rain forest of the Nmai is equivalent with the sub-tropical rain forest of say the Nam Tisang beyond Fort Hertz, we should probably find considerable differences in their constituent species. This difference becomes still more marked in the next higher zone — warm-temperate rain forest.

Christmas Eve dinner at Htawgaw was a merry occasion, though we were somewhat crowded. We might have been in London, whose music came to us over the radio.

Christmas Day was spent paying visits to officials and to the girls' school. The Lashi and Maru maidens looked very smart dressed in their party clothes, their velvet jackets encrusted with silver buttons and other ornaments. Bead necklaces were worn in lavish profusion. After dark we were serenaded by carol singers. The voices, though untrained, were not unpleasant, and if the words were unfamiliar the tunes were not. The girls held storm lanterns and shared their books; though rather shapeless as to figure, and nondescript as to features, they were not unattractive in an oblique way. In the end Arthur and Suydam had to pay them to go away or they would have sung, or at any rate stayed, all night.

We were invited to another show at the school. Suydam and Arthur were given to understand it was a smoking concert and

arrived smoking fat cigars. It turned out to be a children's service. The Kachin preacher seemed possessed, and the service went like a revivalist meeting conducted in a haze of blue cigar smoke.

On December 27th we marched to Hkamkawn, where a convention was being held by the local tribes, under the auspices of the Baptist Mission. As we approached the village some 1500 people, men, women and children, dressed in their Sunday best, lined the path or stood round to greet us, while the village chiefs fired gunpowder maroons in honour of the 'Bum Duwa' or Hill Chief — McGuinness, not us. It was certainly a unique opportunity to see the hill tribes Lashi, Maru and Lisu at play; the women and children in their highland costumes, wearing bead necklaces, metal ear tubes like telephones, glass bangles and silver buttons — the last in the form of rupees or other coins — looked very midsummer night's dreamish. We inspected rows of school girls on parade, which was rather like inspecting prize cattle, visited the clan headquarters, watched the children's sports, the dancing and the greasy pole act — this last a popular feature. There was a ham on top of the pole. We also saw the products of village industry where the word 'mass-produced' is unknown and the only raw materials are bamboo, cane, wood, cotton and vegetable dyes. A machine for ginning cotton, consisting of two rollers revolving opposite ways, with interlocking worm gears, laboriously cut out by hand, was an excellent piece of work.

The greasy pole at first defeated the most athletic men. But they were equal to the occasion. Climbing on each others' shoulders, the top man of four at last reached the prize; the promoters of the greasy pole had not bargained for this telescopic method!

On the third evening everybody collected inside the big *basha* for the farewell speeches. They sat in rows on the cold hard ground, several hundred women and children and a sprinkling of men, and were a model of good behaviour. Indeed for quietness they could have given points to any Western audience

at the pictures — there was no coughing or fidgeting or punching or chocolate chewing. They had been told they were going to hear the voice of London. Harold in charge of the radio did his best; but there can be no doubt that what they did actually hear sounded more like crackers being let off at Chinese New Year. Anyway the audience was impressed.

On December 30th we set out on the last lap to our base camp, determined to reach Kangfang without further delay. Not that we had entirely neglected our work during these festive days, but it suffered from lack of concentration.

There were still many birds in the valley, and certainly no lack of food for them, not only insects, including a few small butterflies like *Junonia*, and seeds, but also flowers containing honey. One of the most noteworthy which attracted many birds round the villages, was *Leucosceptrum*, with long fat bottle brushes of dirty white tubular corollas. As a plant it has no charms, but as a magnet for small birds it is irresistible. It is not always for the honey they contain that birds visit flowers; sometimes it is to get at the insects attracted by the honey. Flower-peckers, sunbirds and honey suckers sip honey; but many other visitors, such as sibilias and spider hunters, which lack the long thin beak, curved like a surgeon's scalpel, do not. I saw several cinnamon sparrows, and a yellow-bellied fantail fly-catcher, and shot a small nuthatch with blue-grey coat like a Poilu, and smoky-yellow shirt front; the under tail feathers were white with chocolate tips, and a thin black stripe was drawn sharply across each eye. Another interesting little bird was a redstart, breast and rump cinnamon, head blue, pencilled with smoke-grey like ripple marks. Not less than seven species of *Clematis* are found in the Ngawchang valley between Black Rock and Kangfang, and three of them were in flower: the deep amethyst-and-cream *C. nepaulensis*, *C. Buchaniana*, bearing showers of little straw-yellow thimbles, and the snowy-white *C. acuminata*. All are charming in flower and foliage, but several deciduous species bore only silvery puffs of seed heads. One of the most engaging shrublets common below Htawgaw, is *Wickstroemia floribunda*,

with tightly packed *Daphne*-like heads of squinny tubular flowers of a muddy-yellow colour, but with a most bewitching scent. Except for its more crowded flower heads it is very like the Himalayan *W. canescens*, found in the Khasi hills; that also is deliciously fragrant.

It is interesting to observe that in the Ngawchang valley the Lashis cultivate a number of sub-tropical plants such as tea, rice, cotton, *Alocasia* and the Chinese palm *Trachycarpus*.

So on New Year's Day of the fateful year 1939 the Vernay-Cutting expedition arrived at Kangfang.

CHAPTER TWENTY

ARTHUR was keen to shoot a takin, and had offered a reward to anyone who could locate a herd and lead us to it. Several parties of scouts were alleged to be tracking them. Meanwhile we settled down to our first spell of steady field work. With two or three guns out every day, and the long trap lines Harold set every evening, specimens began to pour in and the skinners worked overtime to keep pace with us. I went through the crops of many of J. K.'s birds, in order to discover what they ate, and thus was able to identify favourite seeds and types of insects making up their diet.

The lowest minimum temperature I recorded at Kangfang was 26° on January 3rd; $30-32^{\circ}$ was more usual. The weather was fine and sunny, with ground frost before dawn; maximum shade temperature 65° on the 3rd and again on the 4th. On the 3rd also by 10 a.m. humidity was down to 35% which with a drying wind at midday made the valley feel almost arid.

By this time I had collected about 200 herbarium sheets, and seeds of over 40 species. But already somewhat divided councils prevailed, what we should do and where we should go. Both Arthur and Suydam were restless, and neither of them cared to spend any length of time in one place. They wanted to visit all the passes into China, but had only the haziest idea how long this would take. Harold, who gave his opinions in vigorous and picturesque phraseology, wanted to spend more time collecting and less time travelling, but was generally for going to some better—but unspecified—place than the one we happened to be at. J. K., who was always in good spirits and full of energy, spent long days in the field with glasses and gun, and got results wherever he was. So also for that matter did Harold with his traps. As for me, the only member of the expedition with first-hand knowledge of the country, the more ground we could cover the better pleased I was, though I liked to explore a few

selected places in detail, the higher the better. It seemed obvious to me that with the immense quantity of gear we had brought — much of it was never even unpacked — our best plan now would be to make Kangfang our permanent base and choose a few high-level camps, spending a week or ten days at each. I wanted particularly to go up the main valley as far as the last Lisu village, as this was practically virgin territory; also it was reasonably high without being under snow. Visiting all the passes, and spending only five days at each would have consumed most of the available time, half of which would be spent travelling; though by splitting into two or three parties we could have covered them all with ease, including perhaps even the distant Sajang pass, far to the north at the source of the Ngawchang river. We did in fact visit four of them, though they were little more than flying visits; but unfortunately not the Sajang.

The passes into China within the Htawgaw hills district are, from north to south, as follows:

1	Sajang pass	12,000 ft.	} from Kangfang into the Salween valley.
2	Chimeli pass	13,451 ft.	
3	Hpimaw pass	10,998 ft.	} from Hpimaw into the Shweli valley.
4	Feng-shui-ling	8,562 ft.	
5	Lagwi pass	8,831 ft.	} from Htawgaw into the Shweli valley.
6	Hpare pass	9,346 ft.	
7	Panwa pass	7,665 ft.	

Kangfang is a convenient base for Imaw Bum, the Sajang pass and the Chimeli. For the Hpimaw pass and the Feng-shui-ling there is Hpimaw village; and for the remaining passes, Htawgaw.

As the Chawngmaw hut was already built and waiting for us, I played up the idea that we go there first, and this was agreed to. Meanwhile scouts arrived with news that takin had been located; and it was decided that Suydam, Arthur and I should hunt takin, while Harold remained at the base camp and J. K. went on a bear hunt.

Life at the base camp, under the perfect weather conditions, was pleasant enough, and so long as we got results, it was worth while staying on, even though most of the surrounding country was rather 'lived in'. The camp was well organized, and the expedition well found in every respect — thanks to Suydam and Arthur we lacked nothing. It was cosy at night, with the pressure lamps sizzling and the fire flickering on the floor in the centre of the room, and the wind howling outside, in spite of the draught through the bamboo-matting walls. Supper finished, the tables were cleared and we sat round telling yarns. J. K. was a good raconteur, and he kept the Americans in roars of laughter with his stories of a Burma Civil Servant's life. Over the fire was suspended a bamboo rack on which rested my plant presses and paper, drying in the smoke. On the mat walls hung field glasses, water bottles, cartridge belts and such like gear, and all round the room stood specimen boxes containing trays full of stuffed birds and mammals. In one corner were stacked the guns and rifles, in another corner was a table with the radio. But no one ever listened to *that*. The hut certainly gave the impression that work was being done.

Within a week we had trapped six or seven species of small mammals including shrews, voles and long-tailed mice (*Apodemus*) — little creatures which the townsman never sees — and shot a fair variety of birds, though none of our best birds came from here. A mole, however, proved too cunning even for Harold and dodged his most skilfully laid traps. The Lisus supplemented our efforts, bringing in skins of bamboo rat (*Rhizomys*), civet cat, tragopan, silver pheasant and other mammals and birds we had not seen — rarely the corresponding skulls, so necessary to the taxonomist. A dreary collection of small birds, all shot with cross-bow arrow and spitted like snipe on a sliver of bamboo, arrived one day. They were in various stages of decomposition and delapidation, from simple disembowelment to compound fractional pulverization and defeathering; few of them were worth preserving. The Lisus even brought us shrews and mice, which gladdened Harold's heart —

until he discovered they were stealing them from his own traps and re-selling them to him! The locals were invaluable for showing us what the country contained, but as collectors they did not shine.

On January 6th Suydam, Arthur and I started, marching a few miles up the Hpawte valley towards the Chimeli pass before turning up a side stream and camping close to the Lisu village of Sadulau, 6500 feet.

The banks of the Hpawte river were lined with a thick growth of forest trees and shrubs — oaks, both evergreen and deciduous (*Quercus Griffithii* was conspicuous), *Michelia*, maple, rhododendrons (*R. decorum*, *R. microphyton* and another), with masses of *Clematis*; but on the higher slopes was open pine forest.

Camp was pitched in a sheltered valley amongst the nut-brown hills, close beside a bubbling brook, a lovely spot. In the deep glens were dark wedges of broad-leafed evergreen forest. Lobelias eight feet high, together with lilies are conspicuous in the grass; one specimen of *L. Bakerianum*, six and a half feet tall, bore three capsules, all containing viable seeds. Specimens with two capsules were not rare, but one only is the rule. The vegetation of these park-like hills with their nests of fern brake, their scattered raddled pines, their stands of alder, oak and other deciduous trees, is a repetition of what I had seen in the Adung valley at the same altitude. But there are no lilies in the Adung valley to match *L. ochraceum* and *L. Bakerianum* — only *L. giganteum* in the woods. Also the pine is a totally different species — *P. excelsa* instead of *P. insularis* (*P. Khasia*).

In a monograph¹ on the Botany and Geography of north Burma, I distinguished *two* types of pine forest, sub-tropical dominated by *P. insularis*, and temperate dominated by *P. excelsa*, each with its own flora. But north Burma is so imperfectly explored that it seems to me quite doubtful whether the

¹ *Journal of the Bombay Natural History Society*, Vol. 44, 45, Nos. 1 and 2, Vol. 46 (1944-46).

distinction is a valid one. Both species of pine have a fairly wide, if interrupted, distribution and one would expect to find different species of subordinate plants associated not only with two different pines, but even with the same pine in different areas of its range. It is true that *P. excelsa* is never found so low as 3000 feet, nor is *P. insularis* ever found so high as 8000 feet. But it is clear that the pine-oak clique in the midst of the grass-fern clique, occurring between 4000 and 8000 feet altitude in regions of alternating wet and dry seasons, is a man-made association, occupying a man-maintained clearance, and is not a true climax. Thus the significance of different species of dominant pine is related rather to their areas of distribution, than to these climatic zones. The fact that *Rhododendron decorum*, *Gordonia axillaris* and *Rhodoleia Forrestii*, for example, do not occur in the Adung valley is no more surprising than the fact that *Rhododendron magnificum* and *Clethra Delavayi* are associated with *Pinus excelsa* in the Adung valley, and with *P. insularis* in the Ngawchang valley. Nor must we overlook the fact that both the Ngawchang and the Adung valley belong to the eastern Irrawaddy river system. Thus it would probably be more natural to regard *all* pine forest in the Sino-Himalayan region whether sub-tropical or warm-temperate as belonging to a single forest type, which is a stabilized pre-climax formation.

Sadulau is a wretched village. The people, especially the women, were dirty, diseased, undersized and certainly underfed. To scratch a bare living from this ungracious soil needs unremitting work, as hard, though probably not as monotonous, unhealthy or dangerous, as coal mining. There is rough cultivation up to 7000 feet, and it is amazing that these steep slopes, with great outcrops of granite bulging up here and there, yield any return at all.

The people were cutting the long grass, instead of burning it; it is used for thatching and bedding.

After supper we sat out by a big wood fire under the tawny light of a full moon, until our backs froze.

Next morning — minimum inside my tent 25°, under the fly, 23° — I visited a few traps I had set in the bracken the previous evening, and picked up three shrews and a white-bellied rat. Above 6000 feet shrews and, in the summer, voles, form a very conspicuous and no doubt predominant part of the small mammal fauna of north Burma. There is no need to stress this vast insect fauna! I also shot a parrot-bill, a restless little bird, which goes about in large noisy flocks, darting and wheeling from bush to bush; a chorus of querulous protest went up from the outraged flock at sight of the crime.

We continued up the little valley, whose singing stream threaded its way through the brown hills; progress was slow. At one point we came upon three deserted wooden huts; the inhabitants, finding it too cold to live there, had gone to live further down, preferring the long daily climb to their fields. When we finally camped at 7000 feet there was still one clearing just above us. Camp was pitched by the stream. Close by was a grove where I saw oaks (*Quercus pachyphylla* and *Q. lamellosa*), maple, *Schima*, *Michelia*, *Rhododendron stenaulum* and *Tetracentron*, its long catkin-like fruiting spikes hanging stiffly. *Coptis Teeta* was in flower under the trees. A little higher up, within the climax forest — temperate rain forest — I noticed *Bucklandia*, *Ilex*, *Magnolia rostrata*, *Rhodoleia* — which last regenerates freely in second growth at this altitude, in association with *Oroxylum*, *Alnus*, *Litsaea* and other fast-growing species.

The barometer in this camp registered 23.3 inches.

We were now close to where the trackers said they had located takin, but though five days had passed since they had found them, nobody seemed to be in any hurry, so presumably the takin were supposed to be static. The Lisu said we would hunt next day. My belief is that in winter, when the takin are driven by snow to seek food at lower altitudes, the herds break up, and that it is almost impossible to find solitary animals, or small parties, in this dense forest. In summer, when they gather in large herds above the tree line they are easy to spot. I felt sceptical about our Lisu hunters — perhaps they did not

really want us to find a takin. However, we know very little for certain about this strange creature, half goat half ox; possibly small herds *do* stay within a limited area throughout the winter.

If I had good reason to doubt the stories put out by our guides now, I had better reason after the first and, so far as we were concerned, last day's hunt.

The following morning we set out after breakfast with these Lisu trackers, crossed a difficult patch of second growth, clambering over huge charred logs which lay at all angles down the steep slope half-buried in the rank growth, and entered the forest.

The leading tracker now laid his cross bow on the ground, struck an attitude, repeated a number of incantations, then cast his bread upon the waters — in other words, flung a handful of rice into the forest. But whether he was praying that a takin be vouchsafed us, or for the safety of the herd, was known to few.

We followed the bed of a steep rocky torrent, and after an hour came on the first authentic signs of takin in the neighbourhood; a heap of dung. Everything now became hush-hush, speech was whispered, or conveyed by signs. We split into two parties. But as we crept upwards through the heavy undergrowth we made so much noise that the cloak-and-dagger business seemed rather like children playing robbers — make-believe. On the other hand it was real takin country, of that there was no question, and we came on various clues. But you cannot shoot a clue; and I felt that long before we could possibly see a takin it would have heard us and reached the next valley. Though we climbed to 9000 feet, we got no nearer our quarry, and it was a rather exhausted party which, after scaling an almost vertical cliff, at last reached the crest of the ridge. Here the forest was impenetrable, and we sat down on a rock in the sunshine to eat some lunch.

The forest consisted of hemlock spruce (*Tsuga*) and broad-leaved temperate trees, with occasional larch. At least a dozen species of rhododendron, including *RR. habrotrichum*, *tephropep-*

lum, *megacalyx*, *triflorum*, *neriiflorum*, *bullatum* and *vaccinioides*, grew on the cliffs, or as epiphytes, all easily recognizable by their leaves and fruits. Rather lower down were several big-leaved tree species, *R. sino-grande*, *R. siderium* and one or two others. It must have been an astonishing display of colour in early spring. As it was we came on *R. magnificum* just bursting into blossom, its immense pompons of rose-crimson bell-flowers lighting up the dark forest.

Other shrubs on the ridge were *Enkianthus*, quite leafless, *Gaultheria*, *Pieris formosa*. Lower down the striking crimson-flowered *Agapetes interdicta*, an epiphytic undershrub, blazed like a fiery comet caught in the bole of a tree.

We decided to call it a day. There was no chance of surprising even so dull an animal as a takin in heavy forest the way we were going about it. Let the Lisu hunters go by themselves!

So we returned to our camp and the Lisus went off next morning, while we explored lower heights for lesser game; we collected several small birds, including a sibia, a grey nuthatch, and a little bright green bird (*Chloropsis*). The Lisu returned empty-handed, and we prepared to return to Kangfang, reached on the afternoon of the 10th. On the way we met some men drying pine boards, split with an adze, over a fire. A flue had been made by undermining an earth bank and digging a hole to meet the tunnel, the shingles arranged over it, and a fire built against the bank. It is a wasteful method of cutting timber, as only one plank can be cut from each trunk where a saw would cut three. Making wooden boxes without nails is a local cottage industry.

We found both Harold and J. K. at the base camp, the latter triumphant with bear which he had hunted and shot. It was the common black Himalayan bear (*Ursus torquatus*), an awkward customer when cornered, and a brute for destroying the hillman's crops.

At four o'clock that afternoon the humidity was down to 16% saturation, the driest I recorded.



Hardly had we settled down to routine collecting at Kang-fang once more than Arthur, restless as ever, proposed we move without delay to my alpine camp on Imaw Bum. The start was fixed for the 14th. All five of us, the three skimmers and all our personal servants were to go, and as there was only a mountain trail, everything had to be carried by Lisu porters. Though a lot of the stuff, including stores, cine camera, spare ammunition, boxes of specimens and much else was left behind, we still required more than ninety pack coolies.

I had not yet found a mature coffin tree, but the coffin plank industry was in full swing. There were planks drying against the huts, and from time to time a Lisu would pick up one, balance it on his back, and set out over the mountains for China. It was a formidable journey via the Hpimaw pass or the Feng-shui-ling, with that immense load.

The largest coffin planks are about 9 feet long, $2\frac{1}{2}$ feet wide at one end, tapering to 18 inches at the other, and from 3 to 4 inches thick. The heaviest weigh about 130 lb. A man will carry a single plank weighing 100 lb. or more over the 10,000-foot Hpimaw pass, sometimes through snow, the journey taking him ten or twelve days — his pay is about fourpence a day, with free rice. We must have upset the local labour market for a time, as we paid one rupee a day, with rice.

The heaviest planks are usually carried by mule, when mules are available, the plank laid flat along its back, completely hiding the animal. Smaller planks are lashed one on either side, sometimes with a third plank on top resting on the edges of the other two.

The Chinese rich man's coffin is a rather weighty oblong box, comprising two side pieces, two small but immensely thick end pieces, a large bottom piece, and an enormous lid 9 feet long. The total weight of such a coffin is between 400 lb. and 500 lb. before any lacquer is put on. It is also very costly. Before the war at any rate the cost of living in China was low; but the cost of dying has always been high for the rich and is ever rising as timber becomes scarcer.

On the last day we invited the Lisus to a cross-bow competition. Eighteen entered, and after an eliminating round, five were seeded for the final. They shot, squatting on the bare ground, at a small wooden target at fifteen yards range. The bow is held at arm's length with the left arm fully extended, left hand under the trigger, while the right hand grips the butt, keeping it just clear of the body. The marksman plucks an arrow from behind his ear, licks it, squints along to make sure that it is quite straight, lays it along the groove of the handle, the point protruding beyond the edge, sights along it with his left eye, then squeezes the trigger with his left forefinger. The marksmanship was good; one young buck split the target twice with consecutive shots.

The hard wood of which the bow is made is said to come from China, and is not found locally; I could not discover what it was, though I have heard mulberry mentioned. The string is of hemp, the trigger and catch of bone. The bamboo arrow has a fire-hardened point, plastered with a mixture of pig's blood and aconite root; it is notched behind, to make it break off in the wound. The vane is a folded rectangle of split bamboo.

The arrow will transfix a squirrel to a branch; at fifteen yards it pierced a quarter-inch board.

On January 12th the temperature reached 62°, on the 13th 64° — good growing weather, though there were no spring flowers as yet. Autumn overlaps winter, and winter overlaps spring, so that it is hard to say where one ends and the other begins. There was a ground frost before dawn as a rule, though the temperature rarely fell below freezing point in the valley. It was still dry; humidity at noon on the 13th was 39% saturated. We were about to experience a sterner winter.

At Kangfang, as in the Adung valley at the same altitude, the four familiar seasons are well marked; whereas in the valley of the Nmai Hka below Lauhkaung, and even in the Ngawchang valley below Htawgaw, one can recognize but three — and those less conventional to English eyes — hot season, rainy season and dry season.

On the 14th — minimum 38°, which is warm enough for rain — we did only a short march, but climbed a thousand feet. At the outset we had to cross the river. None of us liked the look of the cane suspension bridge, so the Lisus had built us a trestle bridge of sticks and staves, very rickety, bound together with lengths of creeper. It was just as easy to fall off this into the ice-cold river as off the other, but there was not so far to fall. Above the Hpwate Hka confluence a torrent, flowing at the bottom of a deep gorge, enters the Ngawchang on the right bank. This stream rises on Imaw Bum, and our route lay up it, but as it was impossible to pass through the gorge we had to get into the valley higher up stream. After crossing the torrent at its mouth we climbed a spur and presently reached a basin in the hills where there was a Lisu village. It began to rain heavily, as predicted in our forecast, and before we could get the tents up we were wet through and chilled to the bone. However, after some hot tea and a change of clothes we felt better; the rain ceased, the sun came out, and the evening turned gloriously fine. We had a wonderful view of the eastern ramparts of Burma, powdered with fresh snow. Not far from our camp, I found all three lilies — *Lilium ochraceum*, *L. Bakerianum* and *L. giganteum* growing together. One plant of *L. Bakerianum* was especially curious. The dead stem stood eight feet high and bore eight capsules, six in a close ring and two more at the end of the shoot which had grown beyond the ring; the two terminal capsules were knit together like Siamese twins. We turned in that night excited at the prospect of new country covered in high climax forest; the gaunt mountains rose black all round us, very steep and very close.

CHAPTER TWENTY - ONE

THE storm cleared the air. The track now ascended steeply through second growth which had not been disturbed for some years, and became ever more rank as we approached the crest of the ridge. Memorable were the golden curtains of ragwort (*Senecio scandens*) which draped the brambles. Suddenly we found ourselves at the top. The contrast between the fiercely competing vegetation of the fallow cultivated slope to the south and the orderly stable forest we now entered was astonishing. The path traversed round the sheltered side of the hill, descending gradually towards the stream, through temperate evergreen rain forest in all its wild beauty. One of the commonest, as well as the largest, of the evergreen trees was *Quercus lamellosa*, with smaller cups than is usual for this species. There were at least three other oaks, several species of *Ilex*, laurels, magnolias and *Schima argentea*. Amongst leafless trees scattered through the forest I noticed species of maple, *Tetracentron*, *Betula cylindrostachya* and *Magnolia rostrata*. One big bare tree I had never seen before. From fruits, and from the disarticulated members of compound leaves I picked up beneath it, I feel confident it was an undescribed species of *Zanthoxylum*. I have previously referred to a remarkable species of the same genus, resembling a *Sorbus*, which I found in the valley of the Nam Tamai; nor have I ever met with either tree since.

Under the taller trees grew a second tier including rhododendrons and big-leafed *Araliaceae*, and under these again, mingled with a good deal of bamboo, were shrubs of all kinds. The canopy was not continuous, the crowns of the larger trees sometimes barely touching; but looked at from above, one beheld a billowy ocean of green with bare branches coming up to the surface here and there like pale seaweed. Over the ground spread colonies of herbaceous plants such as pennywort

(*Hydrocotyle*), *Strobilanthes*, *Elatostema*, with scattered orchids and fruiting aroids. Woody climbers included *Aristolochia* and *Clematis* and an occasional asclepiad; epiphytes were in greater variety, and comprised many small undershrubs such as *Vaccinium*, *Gaultheria* and rhododendron, together with a few ferns and orchids. It is rather remarkable that whereas in the tropical forest epiphytes are usually herbaceous, in the temperate zone the majority are woody. I saw no conifers, though *Taxus* and *Juniperus* at least must occur, possibly also *Taiwania*. Between 6000 and 8000 feet, however, the variety of trees is considerable, only a small proportion of which will be seen in the course of a day's march.

In the afternoon we reached the torrent and camped in a confined space; after dark a dozen camp fires flickered down the dark aisles of the forest, while snatches of song and laughter mingled with the murmur of the torrent.

As the sun rose over the ridge next morning (January 15th), melting the frost on the trees, the dead leaves came unstuck, falling in showers of bronze and gold. We crossed the torrent, but soon left it again, ascending a steep ridge between two streams. Above 8000 feet the forest had been burnt, not for agriculture — we were too high for any crops to ripen — but by hunters in search of game. Presently we reached a bare wet rock face, where grew the first *Primula* we had seen in flower — *P. Edgeworthii*. It was an early herald of spring; not far above us the snow still lay deep. The clustered heads of purple, violet, mauve, or occasionally white flowers, each with a watery yellow eye, shrank into the nests of half-furled saw-toothed leaves, which are lightly starred with twinkling silver powder. Great clumps of this bright little *Primula* had colonized the almost naked rock, at 9000 feet altitude.

The forest had changed its appearance, *Tsuga* was now one of the dominant trees, though many of them had been destroyed by fire. Crouched along the knife-edge ridge were stunted shrubs — a *Daphniphyllum* with narrow leaves, *Juniperus recurva*, several species of rhododendron, mixed with bamboo. As we

climbed out of the valley we got fine views of Imaw Bum, still 4000 or 5000 feet above us, and across the invisible Ngawchang valley to the ice-glazed Salween divide. Before we reached the pass we found ourselves in snow which lay deep under the bushes. From the Nyetmo pass itself (10,302 feet) we could see nothing on account of the thick cane brake which formed a fence all round. Again the contrast between the exposed ridge by which we had ascended, with its charred hemlock forest, and the sheltered slope clothed with fir forest and cane brake down which we plunged through deep snow, was startling. The snow extended right down to the Chawngmaw river, a thousand feet below the pass: we slid and slipped down the steep trail where the coolies had already stamped the surface hard, and at last reached the bottom of the hill and the Chawngmaw river gurgling amongst the boulders, half hidden beneath a covering of ice and snow. A few minutes later we came out into a clearing, and there beneath bare birch trees we found our hut, the coolies squatting round it in the snow. It was built of bamboo, roofed with split bamboo matting, and looked imposing.

For a week (January 17th to 23rd) we worked here on the flank of Imaw Bum, whence the Chawngmaw river has its source, in the heart of the snowbound silver-fir forest. The valley is a meeting ground of conifer and broad-leafed forest, but is exceptionally cold for its altitude, so that the fir forest (*Abies Fargesii*) descends below 8000 feet. Though the latitude is under 27°, the January sun shone on our hut for little more than six hours each day. Even so there was a surprising number and variety of birds until bush fires lower down the valley temporarily drove them out; and we trapped no less than fourteen species of small mammals, six of them shrews. Human interference, in the form of fire, has made the struggle between vegetation types more bitter than usual by introducing a man-made competitor of a lower order, namely meadow. The struggle now lies mainly between cane brake and forest of any kind on the one hand, and cane brake (or exceptionally, forest)

and meadow on the other; a struggle for survival on the part of almost every plant in the valley against the onward march of bamboo, which is defeating its rivals in detail.

The Lisus regularly burn the bush vegetation on the west flank, and here are wide stretches of open meadow — a dazzling green in summer, but now a dull sandy yellow — interspersed with patches of scrub, bamboo brake and scattered trees. Fires were lit down the valley immediately after our arrival — J. K. thought it was done to drive us out rather than the game. Perhaps he was right. But fires are certainly lit almost every year in the vain hope of increasing the meadow, though the only result in the long run is to increase the bamboo brake, which easily invades the meadow.

There were two species of bamboo — both I think *Arun-dinaria*. In some places they grow mixed together, but more usually each kept to itself, and no doubt there was a veiled antagonism between them. The taller species with pale green pubescent stems, commoner down the valley and especially by the river, grew so thickly as to shade out almost every other plant, though here and there solid clumps of *Ilex Pernyi* grew well in beds of moss. The dwarf solid cane — possibly *Phyllostachys* — had smooth stems, yellow or red at this season, rarely green, and its leaves were dead though they hung on; it was commoner up the valley, especially on the sheltered east flank of Imaw Bum, which it ascends almost to the summit.

As already mentioned the struggle between cane brake and fir on one flank was embittered by the struggle between bamboo and meadow on the other. The fir forest was rather ragged, the trees, some distance apart, stunted and crippled. From the number of fallen trees I concluded that the cane brake was getting the best of it.

Just what type of vegetation had originally clothed the west flank it was hard to say; probably mixed forest, with an impenetrable tangle of smaller trees and scrub, patches of which still survived.

It was in the meadow that some of the most interesting plants

occurred, though in the depth of winter only a few of these survived above ground. *Lilium giganteum* grew scattered where there were trees, and both *Nomocharis pardanthina* 6-8 ft. tall and *Notholirion hyacinthinum* were met with, the former fairly common. *Nomocharis* bulbs reach a large size here, some I dug up being 4 inches through, of a fine purple colour. It is easy to understand how these plants survive the fires, the bulb being six inches below the surface, protected by a thick fibrous mat of turf. Yet it is astonishing that within so small an area, there should be found not only three species of lily, but also the two lily-like plants just mentioned.

Another bulbous plant of the meadows is an *Allium*, with a large mop of amethyst flowers which I had discovered in 1914.

Besides these 'underground' plants, twining aconite, the glistening leaf rosettes of a biennial *Meconopsis* — perhaps *M. napaulensis* — *Thalictrum*, and several *Compositae* (*Lactuca*, *Senecio*, *Saussurea* amongst them) had left recognizable memorials of their presence. A bewildering variety of flowers would spring to life when the rains came. In one clearing I found a colony of *Rodgersia aesculifolia*, its handsome dark green leaves undismayed by snow.

Everywhere except in the open meadow — and that was exceedingly steep — the undergrowth of cane brake made progress off the trail arduous; the addition of snow made it impossible. Almost our only route was the one trail from the pass down the valley, following the right bank of the river; but it was possible, keeping to the meadow, to reach the crest of the east ridge, whence a marvellous view of the Salween divide opened up. Twenty years before I had camped here in mid-October, and when the river was low followed it to its source, and so to the top of Imaw Bum. I recalled how troublesome the cane brake had proved then, even at 12,000 ft. To follow the snow-choked bed of the Chawngmaw river now was more difficult. As for the east face of Imaw Bum, a direct ascent, up those forbidding cliffs, covered with fir and rhododendron scrub, cane brake and snow, was of course impossible. While

the others turned their attention chiefly to the lower part of the valley and the open flank, I concentrated chiefly on the upper Chawngmaw. On the 16th I went up the river bed, finding the banks lined with many kinds of rhododendrons. A tree species, *R. arizelum*, leaned out over the snow-bound rocks, its felted leaves hanging curled and stiff. Another had glabrous leaves which were twisted into tight narrow tubes, also pointing straight down. A third species, *R. megeratum*, did not curl its small leaves at all, though they had turned purple — it is a bushy epiphyte and so perhaps suffers less from the effects of radiation. Other species fringing the banks were *R. triflorum* and *R. heliolepis*. At about 10,000 ft. tall larch trees (*Larix Griffithiana*) appeared. This magnificent tree has a clean straight trunk unbranched for fifty feet or more and far overtops the silver firs. No moss or lichen discolours its bark. It is most beautiful in spring when its slender weeping shoots are bristling with tufts of new green leaves and the young cones are budding like purple anemones in coral seas.

Clambering over the snow-covered rocks, crossing deep ice-bound pools, with the chance of slipping or going through the snow crust into a hole at any moment, I made slow progress though that was better than a twisted ankle. Once I plopped into the river almost waist deep — how bitterly cold it was! Birds were rare, but I saw the tracks of several animals in the snow. I followed up and shot a white-throated dipper, a rare Tibetan species not previously recorded from Burma, but lost sight of his mate when a black and white kingfisher flew across the river in front of me.

Here and there rapids had flung up clouds of spray which, freezing on the trees and rocks, made enchanting patterns. Elsewhere ice had formed in clear lumps on the stones at the bottom of the stream which continued to flow above — almost a reversal of nature! This was due to the greater radiation from the stones cooling the bottom layers of water more than the upper layers, and to their slower motion; hence the bottom layers froze first and stuck to the stones.

According to J. K. there were probably fewer than twenty species of resident birds here. Sometimes after a long outing he returned almost empty handed; yet such birds as he did get were exceedingly interesting. One of these was the beautiful gamboge and black Tibetan grosbeak, a bird I had first noticed at 12,000 ft. altitude in the Adung valley some years earlier. I remarked then how fearless it seemed to be. The very first morning in the Chawngmaw valley I heard the unmistakable ringing bell-like call of the grosbeak and later a male was secured. J. K. got a new parrot bill, a rose finch, several black-faced laughing thrushes, a redstart new to Burma and a brace of blood pheasants (*Ithaginis kuseri*). One of my rat traps, set on the ground, caught two green Chinese magpies in rapid succession. Other birds collected here were a *Fulvetta*, a *Leioptila* — a bird with several distinct calls, one of which J. K. happily likened to someone rattling a bunch of keys — and a tree creeper. I dare say that during the week we saw half a dozen species we failed to collect (including my woodpecker), and there may have been half a dozen others we did not see at all. Of course there was not much food at this season. In the crop of the blood pheasant, for example, I found only moss. A species of crab-apple with hard little fruits was much visited not only by birds but by striped squirrels (*Tamiops*) as well. It would be interesting to know what migrants come this way in the spring.

Mammals apparently fared better and Harold had several good days, though on one or two occasions even the longest trap line caught very little. Amongst the sixty-odd mammals taken here were several voles, a few elephant-nosed shrews, two squirrels and a weasel. It was in this valley that twenty years before I had secured my giant bamboo rat (*Rhizomys sinensis wardi*). There were plenty of burrows near our camp and we could even hear them at work underground, but in spite of Harold's efforts to trap one they completely baffled him. However, one of the Kachin servants, with a native trap, secured a single specimen. Besides trapping two magpies on the ground,

I trapped two small mammals — a shrew and a rat — in a tree six feet above the ground.

Arthur, Suydam and J. K. went to the top of the east ridge and reported seeing a snow mountain with glaciers away to the north. It could only have been on the Salween divide so that I doubted the perpetual snow, as no mountain likely to be visible from here more than 15,000 ft. high is known to exist. Moreover on several visits to the ridge in 1919 I had never seen such a peak, nor from the summit of Imaw Bum either, though admittedly the weather had rarely been clear. Visibility was now excellent, and of course they may have been right; on the other hand the heavy winter snowfall in north Burma is deceptive and they may easily have been mistaken.

The leaders now decided on another change of scene, and we arranged to split the party once more; Arthur, Suydam and I were to continue round Imaw Bum, crossing the U-bend of the Ngawchang river from limb to limb, while Harold and J. K. visited the Chimeli pass.

On the 23rd we set out in opposite directions, the others to re-cross the Nyetmo pass while we three followed down the Chawngmaw river. After a troublesome march along a narrow path slippery with ice — in the course of which we gradually descended several hundred feet — we crossed the river knee deep and climbed the opposite ridge by a rugged track. In half an hour we were back at 9000 feet again, camping on the edge of the snow. There was hardly room to put up the tents, it was bitterly cold, and we were fagged out; but as it was by this time almost dark we had to make the best of it.

Near where we crossed the Chawngmaw river, I found *Rhododendron myrtilloides*, a dwarf undershrub with plum-purple, almost fluorescent perky flowers borne singly on two-inch stems, and little silver-plated leaves. It was growing on the very same boulder — was in fact the self-same plant that I had discovered twenty years before, grown a little — not much — larger. The altitude, about 8000 ft., is very low for *any* dwarf rhododendron, particularly for one of this ilk, its best-known relative, *R.*

campylogynum, ascending to 15,000 ft. and rarely if ever being found below 12,000 ft. *R. myrtilloides* has only been found two or three times, and appears to be a rare plant. The little bush was covered with gaping capsules, but I shook a pinch of seed out of them.

Another shrub which grew here was *Berberis pruinosa*, its vinous leaves, polished above, contrasting sharply with the glaucous blue fruits. I noticed also *Rosa sericea*, *Enkianthus pauciflorus*, *Symplocos* and *Clethra*. Hemlock spruce mingled with silver fir here, which as already noted descends to a low level in this cold valley, and there were many gnarled rhododendron trees. We passed several burnt areas, some still smoking.

It had been threatening to snow all day, but at sunset it began to clear again, and Imaw Bum emerged from the clouds. We turned in early.

We rose before dawn on the 24th, the temperature only a few degrees below freezing, and were rewarded with a splendid view of Imaw Bum, and a still finer one of the wavy mountains to the west, deep violet in shadow, crimson where the rising sun smote them. It was only a short climb to the pass over the ridge which separates the valley of the Chawngmaw river, flowing north-west, from that of the Laktang river flowing south-west, both streams having their sources in Imaw Bum. It was from this pass I had set out up the long west spur of Imaw for the summit, successfully reached at the third attempt. We continued down the snow-bound spur, and presently plunged steeply down the mountain-side towards the valley, passing through a forest of magnificent evergreen oaks, laurels, *Magnoliaceae* (both evergreen and deciduous), *Araliaceae*, and gigantic specimens of *Rhododendron stenaulum* and *R. magnificum*, the latter in flower. This forest was swarming with birds in considerable variety. I shot a scimitar babbler and then my gun — a .410 — broke in half.

At about 7000 ft. altitude we emerged from the forest into old secondary growth consisting of high grass, soft-wooded shrubs, brambles and climbing plants including a *Passiflora* with

truncated leaves like a tulip tree (*Liriodendron*), and massive golden clouds of *Senecio scandens*. *Rhododendron stenaulum* was in bloom here; its pinkish-purple exotic-looking flowers reminded me of the temple trees in Malaya.

We soon reached the first Lisu village, Laktang, which had been my base for Imaw Bum twenty years ago. As usual with the highest villages in these hills, the people looked wretched, nor had the village grown by so much as one hut. Finding ourselves on a good mule path, we went on to the next village and camped. We were now in a big valley scooped out of the northwest side of the Imaw range. Though visibility was already getting bad, due to the smoke of forest fires, nevertheless far down the valley we could see the Maru villages, each perched on the shoulder of an overlapping spur, lower and lower, bluer and bluer, and the chequer board of fallow fields surrounding each. In the other direction from which we had come, the satellite peaks which cluster round Imaw Bum, monarch of the range, were all snow-capped, their precipitous fluted cliffs converging round the funnel-shaped valley head.

One of our coolies went back from here. He had been carrying a tin of kerosene which leaked. Arrived in camp, he stood over the fire to dry his shirt. It burst into flame, and burnt his back badly. Even so, he had carried a load for one whole day uncomplaining, before we even heard of the accident. Though we had brought a colossal supply of drugs and instruments, we did not have with us at the moment anything for the treatment of burns except some antiseptic dressing, so we could do little for the man's flayed back. He returned to Kangfang by himself.

The days were now warm and spring-like again — minimum 40° on January 26th. We soon reached the first Maru village, altitude about 4000 ft., and continued up and down over the switchback spurs. There were hosts of birds, especially on the *Leucosceptrum* bushes, in every village, and up the little gullies we kept crossing. Like most amateurs we were especially attracted by the brightly coloured ones.

In the next village, where we camped, a huge thicket of *Berberis lomariifolia* was in bloom, some of the plants growing 12 ft. high. The large compound leaves with a dozen pairs of stiff prickly leaflets are concentrated in a palm-like crown, from which spring up tall jets of chrome-yellow flowers like shining metal beads. These soon spread out fanwise or horizontally, or they may hang down in long pale golden tassels. The flowers are followed by plum-purple berries, like small grapes.

We spent the next two days, 27th and 28th, at the Maru village of Rawngaw, about 1500 ft. above the Ngawchang river. From here we could see the mountains across the Nmai Hka over the top of the narrow rock blade which divides it from the Ngawchang. The vegetation here was luxuriant though little of the original forest remained on this, the populated, side of the valley. Trees were covered with epiphytes and draped with voluminous climbers. A species of *Vernonia* and a *Caryopteris* were in flower, also *Hedychium*. Two dead barking deer were brought in.

On January 29th we took the steep path down to the river coming into grand tropical jungle towards the bottom of the valley. Some of the trees were gigantic, getting on for 200 ft. high. Common were *Terminalia*, *Dipterocarpus*, *Engelhardtia*, *Castanopsis*, *Ficus*, *Quercus semiserrata*, *Stereospermum chelonoides*, *Duabanga sonneratioides* and sago palm.

It took us only two hours to reach the river and we camped on the bank close to the ferry, the altitude being 1720 ft. The maximum temperature was 73°. The confluence of the Ngawchang with the Nmai was about three miles distant in an air line.

A strange medley of shrubs grew in the sand along the river bank, half-submerged during the rains. The association is a specialized one and plays an important role in holding the river banks together under the terrific impact of melting snow and rain water combined, when the river may rise ten feet in a few days. Their tangled interlacing stems hold up masses of floating wood washed down on the flood, and help to break the force of

the water; their multitudinous mangrove-like roots anchor them firmly, so that even when wholly submerged, as they sometimes are for several days, they withstand the fury of the river throughout the rains to bask unharmed in the winter sunshine. All of them are stunted, their branches drawn out in the direction of the current. Amongst them are *Elaeagnus rivularis*, *Grewia disperma*, *Phyllanthus parvifolius*, *Cinnamomum Tamala*, *Ligustrum massalongianum* and *Pilea smilacifolia*. Between boulders in sandy pockets, submerged by a gentle current during the rainy season but now well above the river level, grew tufts of what looked rather like grass; but hidden amongst the narrow leaves were small chocolate-coloured arum-like flowers. This is *Cryptocoryne Cruddasiana* (*Araceae*), its presence always indicating the presence of sand and tranquil water, although the closely matted rhizomes of the colony would take some shifting.

A number of merry Maru girls with bobbed hair and cane belts on which were strung little brass bells, used to come jingling down from the village each day. They reminded me of the varnished ponies with harness attached we used to play with in the nursery.

The gradient of the Ngawchang is steeper here close to its mouth than it is at Kangfang, a fact I can only ascribe to the upper valley being blocked by glaciers while the river was scouring the lower course. The Ngawchang valley between the Htawgaw and Black Rock is a typical ice-scooped trough, and the rapids a few miles west of Htawgaw suggest that terminal moraines here mark the end of the glaciers, in lat. 25°.

The Chawngmaw has cut its way across the spine north of Imaw Bum, just as the Ngawchang itself has south of Imaw Bum; the former is much the smaller, but they are comparable because both rise on Imaw Bum and both follow independent courses to the Nmai Hka. Between Hkamkawn and Htawgaw the Ngawchang is cutting its way across the spine from east to west, between peaks 12,000 ft. high and only fifteen miles apart, one of them nine miles south, the other six miles north of it; the gorge at Black Rock where the river turns through 90° from

south to west, and the gorge a few miles below Htawgaw where it again turns through 90° from west to north, are the remnants of a continuous gorge which formed the cross-bar of the two vertical limbs.

We stayed here two days collecting birds, mammals and plants, which hitherto we had had no opportunity of doing in the tropical zone. The temperature did not fall below 42° nor rise above 75° , and the ground was drenched with dew each morning.



CHAPTER TWENTY-TWO

A CANE bridge spans the Ngawchang here, and is used when the river is high, but in the cold weather one can cross the river by raft. No sooner did we announce our intention of going on next day than twenty-nine of the Lisu coolies whom we had paid off previously, giving them R 4/- each for the return journey to Kangfang — which would have taken them about three days — materialized from nowhere and announced their intention of going on with us. We could easily have got the locals to carry for us. At least it showed that the Lisus were satisfied with the generous pay the American leaders gave them!

Across the river we found ourselves on a bridle path again; however, we had made arrangements for the mules to meet us at Lanyang, near Htawgaw. That first day of February we marched only a few miles, gradually ascending till we were more than a thousand feet above the river. The cobalt sky of the morning did not last, clouds coming from the east till the dome was a built-up area; but in the evening they disappeared as mysteriously as they had appeared. The valley was, or had been, well cultivated; *Mucuna pruriens* was common in the *ponzo*; despite their gloomy purple flowers, they have all the beauty of the butterfly when dissected. The path continued high above the river, passed through the large village of Cheshen — where there is a school — descended sharply again to the river; across the gorge we saw the heavy ribs of the central spine truncated to expose high bare granite cliffs streaked with black as though a giant had been tipping cisterns of ink over the edge.

There were plenty of birds in the *ponzo*, but we collected nothing new; through not being ornithologists we may have missed better birds than we hit without knowing it.

On February 4th we marched fourteen miles to Lanyang, passing close beside the Ngawchang at one point, then crossing

a spur to reach the main bridle path. We found the mules waiting for us, the head muleteer with a nasty wound in his leg, the result of a dog bite four days previously. Next day we reached Htawgaw, where we found Captain and Mrs. Perry. They had been as far as Kangfang, where they had seen J. K. and Harold, and were on their way back to Myitkyina. That night we all dined together and sat talking till midnight.

We made a late start next morning, the Perrys kindly giving us breakfast so that we could get the mules off early. Spring was in the air as we descended the hill. Not only were the fat yellow catkins of *Corylopsis* beginning to cast off their bud scales, not only were *Clematis* and the lolling snow-white pyramids of *Buddleja asiatica* in flower, but so was *Michelia floribunda*. Best of all, the polished buds of *Paphiopedilum (Cypripedium) Wardii* were peeping from between their green bracts; by the first week in March they were fully open — apparently this orchid — like *Prunus cerasoides* — flowers at any time between November and March.

Ten miles beyond Hkamkawn, and four from Black Rock, we found the wooden bridge which spans the gorge under repair: two-legged creatures like ourselves could cross, balancing on the single beam which remained, but the mules could not, so we camped on the Black Rock side away from the mules, the men carrying the loads across on their heads. Here we spent two days (8th-9th) while the carpenters continued to reconstruct the bridge. The granite cliffs of the gorge were honeycombed with narrow pot holes, which seen in section resembled nothing so much as the tubes made by borer beetles in timber.

On February 9th came the first real rain since November. But before that the servants who had built themselves a bamboo basha in which to sleep, managed to set it on fire. The resourceful Lupting, always to the fore in any enterprise, leapt onto the thatched roof, and began tearing it off in handfuls, thereby making just the draught the fire needed. It roared through the breach and within five minutes the hut was a heap of ashes. It was amusing to see the coolies issuing from the furnace like

irascible wasps: but the only voice which issued from the burning basha uttered unprintable words.

I have already alluded to the variety of rock orchids which flourish in the gorge, though I saw none of them in flower. It seemed to me that many rare shrubs and trees sheltered on these inaccessible cliffs, where the atmosphere was always damp.

In the second afternoon the repairs were so far advanced that by laying down a few loose planks, our mules were able to cross; so we packed up. At that moment a party of Chinese merchants with half a dozen mules hove in sight, and the carpenters hastily took up the planks again. They were only just in time. The merchants halted, and entered into conversation with the carpenters. Certain fiscal reforms were suggested, some money changed hands, the boards were laid down again and the mules crossed. Rarely have I come across anything so bare-faced. But the merchants took it all as a matter of course and went their way contented. After all it was no worse than likin, or local customs duty, on the highways of old China. The rain continuing, we spent the night at Black Rock and on February 10th reached Kangfang, having completed the circuit of Imaw Bum in fourteen marching days. A Lashi or a Lisu would do it in eight — but he would not collect anything en route.

J. K. and Anthony were still at the Chimeli, but they returned on the 13th from a wintry camp, under deep snow, laden with spoil, which did not include plants. By the 14th — another wet day — the snow was down to 8000 ft. and the country was beginning to assume its true winter aspect, which it would retain till June. Yet in the deep Ngawchang valley the buds were visibly swelling and bursting, and a film of emerald green was carpeting the dark earth beneath the dead bracken. Peach blossom, *Eurya*, *Daphne* and *Jasmine* were in flower, and the starry-white flowers of *Prunus Mume*, which looks like blackthorn, twinkled in the villages: *Rhododendron dendricola*, the earliest hill rhododendron to flower, not counting the crimson *R. Simsii* in the sub-tropical zone, trailed clouds of glory over the cliffs.

Along the river bank *Ilex corallina* still covered with violet berries, *Lindera* (or *Litsaea*) studded with sherry-yellow jewels in a coral setting, and yellow *Berberis* were in bud. Even the snow, one felt, was merely a quilt flung casually over the earth to protect the vegetation at this dangerous season — as indeed it was — and provide it with water later on — as it did.

So low was the river one could ford it almost anywhere and we presently saw coffin planks arrive at Kangfang. They came down the river made up into rafts, four or six planks to a raft each managed by a single Lisu armed with a long bamboo pole. A flotilla shot the rapids above Kangfang in fine style; then their crews grounded the rafts on a pebble bank below the village and tied them to stakes ashore. So the trees were cut up where they were cut down — Chinese carpenters came over for that very purpose — and planks, not logs, were floated down the river. Still I had not seen a fully grown coffin tree, but Lupting as usual said there was one around the next corner, a place I came to associate with where the rainbow ends.

Arthur who was concerned about the safety of the collections now decided to return to Htawgaw immediately, taking with him the specimen boxes and any other gear we did not need. The rest of us were to follow a day later and thence go on to the Panwa, a pass at the head of an almost mythical valley which none of us had ever seen. Breaking-up day was fixed for the 18th.

The early spring rains had set in, with heavy snowfall on the heights which would block the passes till May or June. The best of the season seemed to be over already, yet it was now that life in the mountains began to awaken from its brief sleep. Every evening swiftlets were seen flying round the village, snapping up insects, and I noticed two fly-catchers, one yellow breasted, the other blue backed. I always felt chary of shooting anything which preyed upon insects, which were far too numerous anyhow. The birds were flying north again. There were no frosts now. Between February 14th and 18th the minimum temperature varied between 42° (twice) and 44°; on the 17th I

recorded a maximum of 67°. The rain too after the long drought was welcome to the vegetation.

The time had come to dig up some lily bulbs; for though both *Lilium ochraceum* and *L. Bakerianum* have long been in cultivation, neither of them are common or so widely distributed as they deserve to be. Meanwhile I found a plant of the former species carrying no less than ten capsules, and though not all the flowers would have been open at the same time, yet they must have made a marvellous display.

The day before we finally broke up, Suydam and Arthur gave a farewell party to the local Lashis and Lisus, about a hundred of whom attended. The women at any rate never missed an opportunity of a treat. Or perhaps their men folk sent them. It was an unexpurgated edition of the feeding of the five thousand with boiled rice and a few fishes — dried. Everybody sat around on coffin planks, and after the meal received presents — packets of safety-pins, thread, buttons and similar bazaar goods, as at an old-fashioned children's Christmas party. Pressure lamps had been arranged round the field as we had intended to take cine pictures of the native dances with the aid of magnesium flares. The women did indeed dance: first the Lashis, then the Lisus, to the wail of flutes couched in a minor key and the twang of 'Jews' harps' which every tribesman makes out of a sliver of bamboo, to beguile his not inconsiderable leisure. Unfortunately the dancers would not face the magnesium flares. However, it was a real 'Merrie England' folk dance, and a good time was had by all.

Next day (the 17th) in pouring rain Arthur left for Htawgaw with the boxes of specimens and spare parts. It was curious that with all the experience and foresight which had been lavished on the expedition in London, no provision had been made for waterproof sheets to cover mule loads in wet weather, which in this climate is certain sooner or later even in the winter. But I suppose every expedition which was ever launched forgot something.

That night there was a severe thunderstorm and next

morning the four of us left Kangfang for the last time. It was still raining and we did only the short stage to Tatung. Again I explored the limestone gorge above the village where I had found *Primula densa* growing in December. This time I found a jasmine in flower and a species of *Fissistigma* in bud, besides several asclepiads in fruit. I rather regretted we had not made Tatung our headquarters, or at least visited the mountains behind the village. Places off the beaten path always attract me. Where evergreen forest has been replaced by *ponzo* there is a tendency for deciduous trees to spring up, at least to begin with, though how long they would last in competition with evergreen species, once these appear, I do not know. Possibly the seeds of deciduous trees are more easily dispersed, or they germinate more readily than those of evergreens; but the matter needs investigation. I was surprised to find *Trachycharpus*, an introduced palm, regenerating itself freely round the village, although goats nibble the tough leaves to the ground.

Near Kangfang I shot a cinnamon sparrow, remarkable for the dark cinnamon cap on top of its head, and a pale yellow bib. J. K. shot a tree shrew, it happened then to be on the ground where it is equally at home. I have often seen this little creature running about on old city walls in China.

There was another severe thunderstorm on the night of the 18th, followed by a wet and windy day. We started late, the weather slowly improving. When we reached the col where the Kangfang track joins the Htawgaw-Hpimaw bridle path we received a message from Arthur telling us to go on up to Hpimaw. Nothing loath we turned up the valley, and from the village climbed 1500 ft. up the hill to the bungalow, where we arrived at dusk, tired after our eighteen-mile walk. Food and warmth soon restored us, and we settled in for a few days' collecting at this probably the most collected spot on the frontier. Coming up the hill we found the open slope covered with thousands of plants of *Primula denticulata* in every shade of purple and violet.

The bungalow is at an altitude of 7630 ft. and the fort itself,

now dismantled, further along the ridge is 7870 ft. The view westwards across the deep Ngawchang valley to the Imaw ridge, now white with snow, has a savage beauty.

At Hpimaw fort we were already in the top layer of the temperate evergreen rain forest, although in the course of twenty-five years' occupation this had been cleared on the south-facing slope, at least in patches. The track to the Hpimaw pass follows the crest of the ridge south-eastwards. Not far from the fort there is a small grassy knoll, altitude 9000 ft., whence in clear weather signallers used to flash messages to Htawgaw, about fifteen miles distant. Above that comes solid forest. A few isolated trees still survive on the cleared slopes round the fort and give some indication of what the forest contains. Near the fort, in lone splendour, stood a fine specimen of *Manglietia insignis*, and along the ridge below 9000 ft. I collected *Magnolia nitida*, *Michelia doltsopa*, *Gordonia axillaris*, *Rhodoleia Forrestii*, *Quercus xylocarpa*, *Q. incana*, *Q. lamellosa*, *Bucklandia populnea*, *Schima argentea*, *Lindera cercidifolia*, *Machilus Kurzii*, *Illicium burmanicum* and several rhododendrons, a mere fraction of the trees characteristic of the temperate forest which, however, consists largely of oaks, laurels, rhododendrons and magnolias. Above 9000 ft. conifers became more common — *Tsuga dumosa*, *Taxus Wallichiana*, *Juniperus recurva* and *Abies Fargesii*, the last soon becoming dominant and forming almost pure silver-fir forest. The usual deciduous trees are mixed with the conifers at 9000 ft., where I noticed *Corylus ferox* coming into flower, its crimson-beaded tassels swinging in the breeze. Epiphytes such as *Lysionotus*, *Aeschynanthus*, *Pentapterygium* and several orchids. Woody climbers were less common.

Lilium Bakerianum grew eight feet high on the grassy slopes, bearing three and sometimes as many as five capsules.

One day Suydam and I went up to the pass, finding the snow lying deep on the sheltered slope above 10,000 ft.; it would be deeper yet before *Primula sonchifolia* opened its turquoise-blue flowers on the sheltered banks with the snow melting all round it.

Dressed in a style which was really a compromise between the more practical garb of the Chinese women and the more picturesque fashion of the hill women, comely Lisu girls visited our camp from time to time, bringing chickens and eggs for sale, so that we were able to take colour photographs both of them and of their Lashi cousins; for Hpimaw village is the metropolis of the Lashi tribe.

Though the rain had ceased there was a great deal of cloud about and the high ranges were hidden. There were comparatively few birds, but Harold trapped a good series of long-snouted shrews (*Neotebracus*).

Four days later Arthur, who had rejoined us after taking the specimen bones to Htawgaw, decided that we must visit the Panwa pass; so on February 27th, just as we were beginning to know our way about, we went down the hill and on to Black Rock. It was the first fine day we had had for a week and even Imaw Bum showed up momentarily through the frothing clouds, well caked with snow. Down below the sun was shining, trees were bursting into flower and leaf, birds singing; a thin carpet of green spangled with the mauve of primulas, was mantling the charred hillside. Not far from Black Rock a red flame showed on the river bank like a volcanic fire, glowing with a peculiar intensity against the porcelain blue of the sky and the quick green of the surrounding forest. I clambered over the rocks towards this dazzling billow of flame, to find the first carmine cherry in full bloom. For the next hour I basked in the radiance of its superb colour.

This was the largest specimen of the carmine cherry I had ever seen, and it hung poised over the foaming river like an unquenchable fire. Thousands of bees hummed amongst the blossom, which had attracted a multitude of brightly coloured birds. In an ecstasy of enjoyment, with much twittering and fluttering and squabbling, they probed roughly into the flowers in their search for insects, thereby causing a gentle rain of glowing petals, buds and bud scales to fall about me. Amongst frequent visitors were *Yuhinas*, *Ixulas*, *Ixus* and *Embereza*; never

could there have been less than a dozen birds in the tree together, and when I shot one, momentarily driving most of them away they soon returned, irresistibly attracted by the overpowering scent and colour.

At Black Rock *Michelia floribunda*, recovered from the buffeting by rain, had opened a fresh lot of flowers, and these too were sought after by birds, though not to the same extent as the carmine cherry. Some potters were at work in a field where a buffalo puddled the clay. The potter's wheel worked to and fro, with a treadle. The pots had no top or bottom, were in fact more like chimney-pots; bottoms are put on afterwards. They are used for fermenting grain.

I was told there was no valuable timber in these almost limitless forests, unless *Taiwania* be such, as to the Chinese it certainly is. The most used wood naturally is pine, but for outside work such as bridges it lasts only about three years in this climate; much longer inside. The oaks are said to be useless, but chestnut is used, and sometimes a little walnut. However, the whole question is one which needs looking into in the light of modern requirements and accessibility; we do not even know what trees occur in these forests, or in what quantity, except a few of the commonest.

On our way back to Htawgaw we were so enchanted with spring in the Ngawchang valley that we spent two days at Hkamkawn, about which I have already said so much that there is little more to add. Trees were bursting into leaf and flower, clouds of yellow pollen were flying from the purple-fingered pines. The oaks were fringed with silver-green tassels, several orchids bore fat buds amongst their leaves. Birds too were increasing daily in numbers, and to the laughter of white-headed babblers beneath the bushes by day was added the gentle hooting of owls from the trees by night. In another month the whole valley would be gloriously alive. But the rain came again on March 2nd, with lightning and thunder after dark, as though the very mountains were being rent in twain; maximum temperature 66°, minimum 52° at 4000 ft. So on

March 3rd we returned to Htawgaw, there to make ready for the final trip to the Panwa pass. All too soon the end of the expedition was in sight; though actually so far as the weather was concerned there was no reason why we should not remain in the field till the end of May. Unfortunately Suydam and Arthur were shortly due back in the States; and it would take them longer to travel the 800 miles or so back to Rangoon than to travel the remaining 8000 miles to New York.

CHAPTER TWENTY-THREE

Two days sufficed to get packed and to prepare everything for the final journey. Then, on March 6th, Arthur, Suydam and Harold started for the Panwa, leaving J. K., who wanted to finish up some work locally, and myself to follow a day or two later.

A Chinese merchant who lived in Htawgaw, hearing that I wanted to see a coffin tree, admitted that he owned one, and now volunteered to show it me.

The coffin tree was said to be quite close, only about three miles away in fact, but of course it proved to be further away than that. Lupting and I left Htawgaw in the late afternoon, retraced our steps down the hill towards Hkamkawn, crossed the Ngawchang by a high cane suspension bridge, and at dusk reached a village at the foot of the mountain. Here we spent the night.

I have already told the story of the coffin planks which pass through Kangfang. I will add here a few notes about the industry. A full-sized *Taiwania* may be 200 years old, perhaps twice that age, and will yield sixty or eighty planks. A Chinese businessman will pay as much as R 100/- to the owner of a tree — probably a Maru — or to anyone who, in the course of his travels, has found one in the forest. The purchaser, however, may hold on to it for years before cutting it down. So long as nobody else cuts it down on the sly — and that would not be easy — it is a sound investment. Every few years Chinese contractors from Tengyueh bring over carpenters who with saw, wedge and adze fell, and cut into planks, those trees which have been marked as ripe for felling. If a tree yields no more than fifty full-sized planks it is cheap at R 100/-, since the planks will be worth R 15/- each in Tengyueh, the town in western Yunnan where this coffin business is conducted. From R 750/-, however, must be deducted the cost of felling, of

cutting up and of transport. But even supposing the total expense to amount to half the selling price, the profit on a single tree seems attractive, while with a dozen trees a man might reap a small fortune.

In Tengyueh a coffin made of this valuable wood may cost R 80/- to R 100/- even before it is lacquered, the finished article probably twice as much. It will be realized, therefore, that, on the other side of China, such a coffin would be very costly indeed. Probably very few coffins made from *Taiwania* are seen east of Talifu, or at any rate Kunming.

It may be pointed out that to call *Taiwania* THE Chinese coffin tree is hardly correct; for there are other coffin trees, no wit inferior. Not all the *Taiwania* trees on the Burma frontier, together with those on the island of Formosa, could supply the demand for high quality coffins in the whole of China, so that we find other trees, indigenous in other parts of this vast country, equally sought after; amongst them I might mention *Libocedrus*, *Cunninghamia* and at least one laurel (a species of *Machilus*), the famous *nan shu* or 'southern wood'.

Apart from the fashionable angle, and the desire of every rich man to have the best obtainable, there is a good and proper reason why the mandarin wishes to own a coffin of durable timber. For the Chinese after death is first buried and then burned; and the interval between burial and cremation may be two or three years. Nay, the interval between death and burial may likewise be long. According to Chinese belief, it is important for the body (or at least the skeleton) to be complete at the time of cremation; otherwise it will be incomplete at the resurrection also and enter the shadow world a cripple. Unless the coffin can be guaranteed to hold together, which it can only do if made of some resistant, usually scented, wood, there is every likelihood that some of the bones will be lost, as almost invariably happens with the poorer classes who are buried in cheap coffins.

Ever since the first decade of this century, rumours of the Chinese coffin tree have come out of the remote corner of

Burma, the timber being at one time identified with *Juniperus recurva*, and possibly with other species. That the Chinese, who monopolize the trade, fearing competition, should attempt to hide the identity of the tree, is hardly surprising. But there is no longer any room for doubt that it is in reality identical with the tree discovered in Formosa in 1906 (and subsequently 1500 miles distant in the Htawgaw hills), known to botanists as *Taiwania cryptomerioides*.

The next day, that is on March 7th, with my guide and a man to carry my camera and other effects, I started off to find the coffin tree, following a scarcely visible track. Our path led through high grass and second growth, but we were soon ascending steeply along the crest of a ridge which sloped up at about 60°. The village from which we had started was not much more than 4000 ft. above sea level, so I reckoned we had some height to climb before we should meet with any *Taiwania*. After a couple of hours, however, in the course of which the path had degenerated into a deep rut down which water coursed furiously during the rainy season, and logs of wood were dragged during the dry season, we were well into the upper pine forest, and, as I should judge, some 7000 ft. above sea level. In places we had to bend double to get through the bushes, particularly where there were small cliffs to clamber up — and here in the damp gloom I noticed colonies of *Primula dictyophylla* with unusually large leaves. At last the forest began to grow a little thicker, with other trees besides pines, and a lot of bamboo undergrowth. Then came veteran trees of *Rhododendron stenaulum* in flower, and a smattering of large granite boulders, over which sprawled bushes of *R. bullatum*, their beautifully crimped rose-pink buds here and there expanded to scented ivory-white flowers with the faintest blush. I noticed also *Michelia floribunda*, *Rhodoleia Forrestii*, *Magnolia nitida*, *Bucklandia*, *Litsaea* and *Schima*; bunches of the crimson-flowered *Agapetes Lacei* hung like mistletoe from some of the trees.

Suddenly the guide, who for some time had been looking carefully about him, halted, and parting the bushes which grew

thickly on our right concealing, as I now discovered, a deep glen, pointed dramatically.

‘Look, Duwa!’

At first I could see nothing, or rather I could not see the trees for the forest, which was dense enough. But when he had hacked away some of the bushes I found myself looking down a steep slope into the crowns of the trees below, and presently made out a single tree which towered high above the canopy; its pyramidal top, seen against the sky, had rather the look of an idealized Christmas tree. Meanwhile the guide was cutting a path down the slope to the base of the tree, and when I had cleared out a few intervening shrubs, I got a very fair view of the trunk as well as of the top. Thus at last I found myself gazing in awe on a full-grown Chinese coffin tree; and presently I scrambled down to examine it more closely. The tall slender trunk — it was six to seven feet in girth five feet above the ground, with no trace of plank-buttress roots — rose unbranched for about fifty feet, a splendid pillar of timber, straight as a dart. I estimated the total height at about 125 feet, possibly more. The reddish bark was rough and stringy, reminded me of the Californian redwoods. I had no means of guessing what its age might be, but it could not have been less than 150 years, and might well have been nearer 250 years. I was interested to observe that one solitary specimen could be found growing in the midst of broad-leaved forest, consisting largely of oaks, magnolias, laurels, chestnuts and so forth — temperate evergreen rain forest, as I have called it elsewhere — although almost pure stands of *Taiwania* are said to occur further north. That there still exist a number of specimen trees in these mountains seems probable; but that the Chinese will extract every one they can find is certain. On the other hand, I was informed that the Marus, who are politely regarded as the real owners, having become alive to the value of this asset, are planting more trees for the benefit of future generations; a piece of foresight which, if true, is not a little surprising.

After photographing the tree and collecting various botanical

specimens, we returned to the village and thence retraced our steps to Htawgaw, where we arrived in the evening. J. K. had left for the Panwa, but the mules were standing by, and I spent the next day sorting out the loads, those which were to go straight down to Myitkyina and those which were to go with me to the Panwa. A high wind rose after dark, with violent rain and loud explosions of thunder as flash followed flash.

On March 9th, having seen thirty-five mules off to Myitkyina, I set out for the Panwa pass, the first really new country I had yet been in. The sky was overcast, and the snow had crept down the mountain-sides till it now lay at 9000 ft. This in the second week of March, in lat. 27°! Descending into a valley, we followed the stream for a few miles, passing through open wooded country where there had been much burning, but little cultivation. In one patch of forest I came on a colony of *Anemone begoniifolia* with flowers shining like moonstones; and on the burnt grassy slopes *Gerbera piloselloides* and *Primula denticulata* were flowering well. Next day a few miles' walk, up a well-lived-in valley, brought us to the small Lashi village of Hpare in the midst of cultivation, both temporary and permanent; and as I was suffering from fever, I went straight to bed.

We now faced a hard day's march, as we had to cross a pass over the high Pyepat ridge. Luckily the day turned out fine, and the fifteen miles did not prove so very formidable after all, in spite of some snow at the top. At about 7000 ft. we entered the familiar temperate forest once more, where hundreds of michelias were in full bloom, their shallow ivory cups gleaming in the bright sunshine. In places these beautiful trees grew in clumps, so that their falling petals created a small snowstorm. Towards the top, about 8500 ft., we came to a different type of forest with many big-leaved tree rhododendrons as well as small shrubs, bushes and tall hemlock spruce.

Crossing the low pass, where patches of snow lay under the trees, we began to descend, and after a couple of miles emerged from the forest into open pinewood country again. The grass

and bracken had only recently been burnt off, and the hillside was blackened over a large area. But already the charred earth was half-hidden beneath a mantle of luscious green where new shoots were springing from deeply buried rootstocks, and this green mantle in turn was in places hidden beneath a purple film, where thousands of primulas shivered and shook in the breeze. This is one of the better results of human interference with the vegetation, for assuredly the primulas did not grow here before man started cutting and burning the forest, at least not in such prodigious numbers. And the same thing goes for the two grassland lilies.

Across the torrent the steep sheltered side of the valley was still covered with forest, chequered with little bare patches where the soil had slipped; it looked rather as though it were pitted with small shell craters. Even as I stood there wondering what had caused these scars, a shiver seemed to pass down the valley, accompanied by a loud booming noise, which startled me. It was not a sudden explosion, however, but more like the prolonged roll of thunder echoing through the hills. An hour later when I had reached the rest house at Zuklang (or Sanlang), the same thing happened again, and now the bungalow shook, and the windows rattled; the muffled roar which accompanied the tremor — for earth tremor it undoubtedly was — seemed to proceed from under the ground. At first these little quakes were alarming, some more so than others; but we very soon grew so used to them that we took no notice, and this will not sound surprising when I say that during our short stay in this area, we experienced several hundred shocks! On some days there would be a dozen or a score, at the rate of perhaps one an hour, and no day passed without our experiencing several. But though some of the strongest and noisiest quakes startled us not a little, I never saw any rocks fall or any slip occur, or felt any wind, though the mountains all round the Panwa pass were, as already remarked, scarred with earth slips. The whole area within which these shocks occurred covered no more than two or three hundred square miles; and judging from



the bareness of the slips — most of which probably take place during the rainy season when the soil is saturated and loose — I fancy unrest had only recently broken out at the Panwa. Some years earlier, however, Htawgaw itself had been the focus of these shivering fits, which had split the little stone fort asunder, and caused considerable alarm, so that Htawgaw was abandoned as the headquarters, which were shifted to Lauhkaung. Yet during the months we were in the immediate Htawgaw area, never once did we feel a quake until we went to the Panwa pass. It would appear, therefore, that the epicentre had shifted southwards.

I made an early start next morning, hoping to join the others at breakfast. However, the distance proved further than I had supposed. Below Zuklang, I reached a larger and lovelier wooded valley and turned up stream. This was none other than the source of the Chipwi Hka which we had crossed at its confluence with the Nmai Hka below Lauhkaung, in November. There is a direct track to Lauhkaung from here, but the usual route to the Panwa pass is the more roundabout route via Htawgaw, the way I had just come.

The valley now became wider, and the slope eased off. The trees were wet with dew, frost sparkled on the ground where shadows lay. I heard the harsh cry of pheasants in the copse, and saw a brilliant little gold-headed blackfinch (*Pyrrhoptectus epauletta*). The valley opened up more and more, with low spurs flaring out from the receding ranges. I crossed small marshes in which the streams lost themselves amongst sedges, irises, primulas and other marsh plants — *Primula helodoxa* in all likelihood, though only the tiers of empty capsules remained. Quite suddenly, beyond a belt of oaks, I stepped out into the wide open funnel-like head of the valley and there before me was the tiny Lisu village of Chanyinku and the rest hut, perched on a knoll, at an altitude of 6942 feet. I was only just in time. It was ten o'clock. At noon on March 12th Arthur and Suydam were due to start for Myitkyina; for them the expedition was over.

It was with a heavy heart that I bade the Americans farewell and a good trip home. Not only had they paid the entire expenses of the expedition, in no niggardly fashion, so that we lacked nothing; more important than that, they had been good companions. Finally Suydam told me that he and Arthur had arranged for us three to stay on another month, up to the limit of Harold Anthony's leave from the American Museum. So in glorious weather, carrying with them enduring memories of this beautiful country at its best, the two leaders departed, while we stayed behind.

Immediately after lunch we set out for the pass; following a rough track which wound round the head of the valley, we crossed many trickling streams. The shallow undulating pastures, backed by steep wooded cliffs rising in some places to 10,000 feet, formed a glorious background against the vivid blue sky; and presently we came to small trees of *Rhododendron Delavayi* crowned with blood-red blossom. It would have been hard to find more gorgeous colouring. Many of the bushes had, however, been badly scorched by fire, their leaves toasted a rich brown; but this did not affect their flowering, the buds having been formed the previous year. It may be that the frequent fires, scorching the trees, stunt their growth.

After walking about four miles through the most enchanting scenery, we reached the pass, 7684 feet, and ascending a cleared slope on one side to the boundary pillar, had a good view into China, as well as in every other direction. Forty or fifty head of cattle were grazing close by, and further down on the Burma side a flock of sheep showed up. There was a sort of tamed savagery in the high landscape. Eastwards and southwards the immemorial peasant villages of Yunnan lay basking in the sun, and a white ribbon of road wandered down the valley towards the curved rice fields which shone like quicksilver. The smoke of fires smudged the air. We were looking down at the sources of the Shweli river, and across to the lofty Salween divide. Westwards a jagged ridge rose sharply against the flaming sky, its top white with snow. So we lay on the crisp brown turf

revelling in the scene, warm in the spring sunshine, while a little fleet of clouds sailed out of the north. Then it was time to return. Even as we rose to our feet, the ground beneath us rocked and shook, while a roar like that of an express train emerging from a tunnel told us that another spasm was troubling the restless earth.

So we wandered back past the stunted blood-red rhododendrons, which seen from above, glowed like hot ingots, past the drifts of mauve *Primula*, while larks sang overhead and pheasants called from the coverts. That night the hut seemed strangely empty without Suydam and Arthur to keep us company. Frogs croaked a dismal dirge in the marshes.

We spent the next three days at Chanyinku, and worked hard. It proved a good place for birds, but not so good for mammals. I found several more birds, their heads dusted with pollen, proving that they had been probing into rhododendrons and other flowers, perhaps in search of insects. The most unexpected of these pollen carriers were a spotted woodpecker and a nuthatch. A tit (*Parus monticola*) was also observed to be covered with pollen. None of these birds was caught *in flagrante delicto*; they were merely found with the goods on them, under suspicious circumstances; but the gem-like Dabryi's sun-bird, and a species of parrot-bill were frequently seen burying their heads in the scarlet corollas of *Rhododendron Delavayi*. The magnificent flowers of these shrubs, which open early, are far better adapted for pollination by birds than by butterflies, few of which are abroad yet.

Amongst other birds now becoming common were the little scarlet and black minivets — the female, dressed in dull yellow, is almost drab by comparison with her brilliant mate — green barbets, several buntings and tiny elusive wrens which cheeped in the undergrowth. Stone's pheasant, a handsome colourful bird very like the English pheasant, we saw every day and J. K. shot one or two. Harold shot a barking deer, so we did not lack for fresh meat.

The contrast between the dead pastures, all crumpled and

brown, and the forest, pulsing with life and colour, was rather surprising; the wind whistled through the bents and shook the empty capsules of *Primula helodoxa* — some of the stumpy iris capsules contained orange-brown seeds — but the trees were robed in fresh green, and hung out silken catkins, or like several of the rhododendrons, were smothered in flowers. Winter and spring ran in double harness.

One evening I ascended to 9000 feet, finding rhododendrons in great variety on the northern slope. In fact within this small region from the Pyepat ridge above Zuklang to the Panwa pass, lying within the headwaters of the small Chipwi Hka, I collected seventeen species; nor had we time to explore more than a fraction of the area.

March 15th we decided must be our last day, for we wanted to camp on the pass above Zuklang on our way back. Accordingly on the 16th we bade farewell to Chanyinku and turned our faces homewards. For us too the end of the trip was in sight.

CHAPTER TWENTY-FOUR

As we went slowly down the valley on March 16th, birds sang in the woods, dew lay on the grass, and all round us the trees were foaming into flower and leaf. Spring, urged on by golden sunshine and silver rain, had come in one flaming rush to the frontier hills. Burma the tropical land as known to the world, might be lying prostrate in the heat, its stubble rice fields baked hard, the dust of the plains thickening the listless air, its life-giving rivers shrunken like starved creatures between their bony banks, or dried up, its forests of gaunt ashen-barked trees naked in the white hot sunshine, even the patient buffaloes gasping for a breath of cool air; but up here in the Burmese Alps it was spring, spring as we people of the north know it, and the forest was waking from its winter nap.

Presently I shot a shrike babbler (*Petruthius flaviscarpis*) in a tree. I hit and disabled the bird, but did not kill it outright, and for half a minute it remained caught up by the branches. Suddenly another bird, no bigger than itself, made a savage dart at it and solved my problem for me by dislodging it; the two locked in a fierce embrace, came fluttering down to hit the ground with a whack, whereupon the assailant flew off. Was it paying off an old score? contemptuous of its disabled companion? or gone mad? Who can tell? It seemed the act of a lout; but there is no such thing as compassion in nature.

I watched the exquisite little Dabry's sunbird — and its mate in rifle green — raping the glorious scarlet flowers of Père Delavay's rhododendron. He stood perched, a thistledown weight, on the dome of closely packed cups, and his tail flashed like a jewelled sabre as he plunged his head again and again into the glowing craters; so long is his beak, however, that he probably gets little pollen on his head, though the stamens are arranged with such cunning that he can hardly fail to get some.

Harold came across a small snake which was apparently

harmless. Nevertheless he said it raised itself and puffed out a small hood, as though it were a cobra, no doubt for security reasons.

There were many catkin-bearing trees along the river bank, oaks being perhaps the commonest, and of these the metallic-leaved *Quercus spicata*, a variable species, was the most abundant, though *Q. xylocarpa* and another ran it close. Birch, poplar, willow and walnut were also common; a climbing thorny *Zanthoxylum* made barbed-wire entanglements. At Zuklang the peaches were in full bloom; their pale pink blossom, beautiful enough by itself, looked dowdy beside the carmine cherry.

It was only a few miles to the pass reached at noon, and we camped just below it amidst the bushes, at an altitude of 8200 feet. Rain came on in the afternoon, and it poured steadily. We were short of tents, and though we ourselves managed to keep reasonably dry at night, the men in leaky bamboo shelters, roofed with leaves, did not. Moreover our cramped quarters developed into a bog.

Trapping was good here; J. K. was delighted with the birds, especially the tiny wrens which swarmed; and I found a variety of interesting and rare plants, including *Rhododendron sulfureum* and *R. Genestierianum*, and the curious and rather insignificant little *Asteropyrum peltatum* (*Ranunculaceae*). The trees were heavily covered with moss in which epiphytic shrubs grew freely. There was not much undergrowth on the ridges, and no bamboo, nor would it have been difficult to make one's way to the summit at over 9000 feet, where hemlock spruce and silver fir met. Half the trees around our camp site were broad-leaved, evergreen preponderating, bulky rather than tall; oaks as usual were in the ascendant (*Quercus glauca*, *Q. xylocarpa* and others), species of *Ilex* frequent, *Magnolia nitida* which forms a fine evergreen bush, *Schima* and of course rhododendrons. There was even a species of *Ficus*.

We stood the discomfort of almost continuous rain for two days and two nights, and would have hung on longer but it seemed hardly fair on the servants, who were in much worse

plight. Accordingly we gave orders that if the rain continued we would return to Hpare on the 20th, and sent word to the muleteers to bring up the animals.

Quakes were as numerous here as they had been at Chan-yinku; they seemed nearer too, and noisier. Muffled by the forest, they reminded me of tipping tons of road metal out of a truck.

On March 19th it rained harder than ever, and we felt that the next day *must* be fine — if so we would sit tight. But the 20th too, brought torrential rain, and we waited shivering and damp for the mules, more than half hoping that they would not arrive. But they did, and we returned chastened to Hpare, with its dry huts, reached in four hours. We were all sorry to leave, J. K. and I perhaps most of all. In thick forest it takes time to observe and collect birds, but J. K. had seen enough to realize that the region was unusually rich. Amongst those collected here was the rare or at least rarely seen Chinese black-headed tit, one or two wrens which knew more about camouflage than most birds, quaker babblers (*Alscippe*) and bullfinches. What we did *not* see probably amounted to twice as many. As we got down to Hpare, to the temperate forest zone, spring was in full cry, laurels spangled with yellow buttons, *Michelia* still in marvellous bloom, pear, peach, quince and other fruit trees in the village, above all *Rhododendron stenaulum*, thickly lathered with pink blossom. As for the still fallow fields, they were daintily carpeted with the sky-blue pea, *Parochaetus*.

This *Rhododendron stenaulum*, which looks less like a rhododendron than most, is a remarkable plant. Some of the gnarled trees I saw here, so smothered in blossom that neither leaves nor twigs were visible, could not have been less than two hundred years old, which is a good age for any rhododendron. Neither in foliage in flower or in fruit would you readily recognize it for what it is, though the smooth reddish bole and thin peeling bark, like goldbeater's skin, are more typically *Rhododendron*, and the general appearance of the tree, when

not in flower is at least reminiscent of the well-known *R. arboreum*.

This *R. stenaulum* belongs to a group of about a dozen known species mainly confined to the sub-tropical mountains of south-west China, Indo-China, Siam and Malaya where the closely aligned ranges of the Burma-Yunnan frontier flare out like the fingers of a hand into the peninsula, and sink to lower levels. The distribution of each species is for the most part restricted; yet *R. stenaulum* itself has pushed its way far to the north, easily outdistancing its nearest relatives, till today it is found in far western China, northern Burma, north-east Assam and even in the south-east corner of Tibet itself, wherever a certain type of warm temperate evergreen rain forest prevails.

It is not too much to say that in almost any other group of plants modern taxonomists would make *R. stenaulum* the type of a new genus, removing it from *Rhododendron* altogether; the capsule alone — a long narrow cylindrical tube the valves of which remain attached to the top of the spindle, and the oddly winged seeds — would demand such treatment. But the same is almost equally true of other groups, and until we know rather more about the 800 species of this remarkable genus, it is convenient to regard them all as *Rhododendron*. It seems certain, however, that each of what the taxonomist of today regards provisionally as 'series' of the genus *Rhododendron*, the taxonomist of tomorrow will regard as genera.

From the moment we arrived at Hpare the rain ceased, and March 21st was as pleasant a day as one could wish for — maximum shade temperature 68°, with just enough breeze to keep down the heat. We all went out on our hunting chores as usual, and in the evening discussed what we should do with the few days which remained to us. J. K. and I were in favour of a quick trip to the Hpare pass; but Harold said reasonably enough that so far as his work was concerned he had already spent too much time travelling and too little time in a fixed camp, and he would prefer to do some trapping in Hpare. It was therefore decided that we two should visit the pass while

Harold set his traplines round the village. He was the more anxious to do this because the villagers had brought him a rare water shrew (*Nectogale*), caught in the stream which runs through the village, and he hoped to get a good series of this scarce mammal.

I found one *Taiwania* tree in Hpare. It was forty or fifty feet high, and must have been of fair age, but it had been ill-treated, many of its branches hacked off. But when I asked whether it grew locally, and if so where, I was met by a conspiracy of 'nothing known'.

Quakes still continued to rumble through the hills, but by now we were so accustomed to them that we hardly noticed them at all. The steep mountain-sides enclosing the valley were pitted with scars, however, and I was interested to observe that the shrubs and saplings which sprang up there bore little relation to the secondary growth which covered old cultivation.

Gibbons were common and we heard them calling at all hours, close to the village. J. K. managed to catch up with a party, which he thought were eating the flowers of *Rhododendron stenaulum*; perhaps they were attracted by the honey which this sweet-scented species produces in more than usual quantity, but rhododendron honey is toxic for humans — not necessarily for anthropoid apes! Or perhaps they just enjoyed getting drunk on it!

There is at least one mountain mystery we never solved. Harold was convinced that he saw a wolf, and the villagers agreed that there were wolves in the neighbourhood, though they very rarely met them. No wolf is known from Burma, however; and as Harold failed to collect his specimen, the matter is still unsettled.

On March 23rd J. K. and I took the road to the Hpare pass, ascending a narrow thickly forested glen where again the trees were thickly draped with moss. A mile short of the pass, at an altitude of about 7000 feet, we found a camp site on a grassy hillside just above the road, and pitched our tents. Vast numbers of *Primula denticulata* were in full bloom here, the colour

ranging from pure white to deep violet, and from mauve to purple; they were finely grown plants too, the mealy stems sometimes six inches tall. Some of the clumps bore a dozen mop heads, and were doubtless almost as many years old. In spite of its undeniable charm this plant must be regarded as a dangerous pest, an irrepressible weed, which is killing out more valuable pasture plants by sheer weight of numbers. The more the grass is burnt, the better the *Primula* likes it.

In the course of three busy days we enriched the collections of birds, mammals and plants quite considerably. J. K. saw — and missed — a tufted deer, and for the third time I saw a sandy coloured racoon-like animal with long black tail and black muzzle of whose identity I am still uncertain. A gorgeous crimson-flowered rhododendron, like *R. Thomsonii*, was in bloom at 8000 feet, its smooth tawny bole nearly eight feet in girth. Even more magnificent was a specimen of *Magnolia Campbellii*, leafless and every branch and twig smothered with its enormous water-lily-like cups, purple on the outside, but white as alabaster within. A hairy *Primula* with primrose-like heads of mauve-violet flowers was another find; also an epiphytic *Pleione* with frilled yellow flowers. The weeping glaucous juniper was not rare here, but I saw no other conifers except an occasional *Pinus Armandii* and, above 8000 feet, *Tsuga*; notable were laurels, a species of *Ficus*, *Gamblea ciliata* and other *Araliaceae*, a pink-flowered *Magnolia Campbellii*, and the usual oaks, rhododendrons and so forth. I found a *Nomocharis* and a *Meconopsis* on the bracken-covered slope above the pass, neither of course in flower; the first could only have been *N. pardanthina* I think. Interesting too were the large colonies of *Arisaema* spearing through the soft black earth, the majority of them male, which after setting free their pollen quickly die. I counted the male and female plants several times, finding on one occasion 48 male to 7 female, on another occasion 173 male to 117 female, mostly in small colonies.

Fantail fly-catchers and flower-peckers were busy snapping up insects by day, and at dusk bats wheeled and jinked round our

camp. I trapped several shrews as well as voles and mice, and we heard a cat of some kind yowling. J. K. shot a tragopan in fine plumage, and a male of my trogon (*Ptyrotrogon wardi*).

All too soon our time here came to an end. On the 27th we reluctantly struck camp and went down the valley, collecting all the way. At Hpare we found Harold in the seventh heaven of delight. He had garnered a complete series of *Nectogale elegans* — actually nineteen specimens, probably the largest series from any one locality in any museum in the world. Yet expert trapper though he was, not a single water shrew had come to his traps; the natives had taken them all by damming the streams and catching them by hand, after poisoning the water with aconite root.

We saw coolies carrying heavy loads of *Daphne* bark to China; it is used for making paper.

On March 28th — minimum 46° — we started for Htawgaw, and covered the two marches in one day, though the long climb up to the hill-top village coming at the end, proved rather a weariness to the flesh. The weather was still fine and warm, but the dazzle had gone out of the air which was thick with haze and smoke, reducing the landscape to mountains and clouds. Little but final packing remained to be done, and that took us only two days. Gibbons, absent during the short winter, cried out every morning, shouting their joy of life; during the mild heat of the day barbets beat a rhythmic tonk, tonk, tonk, like the measured throb of an artery; and after dark the soft hooting of an owl told us that the night raiders were out.

On the last day of March — minimum 54° — we set out for Myitkyina 75 miles distant, reaching Lanyang at noon. Here I decided to make a detour down the Ngawchang again and over the ridge north of Pyepat into the Nmai valley, rejoining Harold and J. K. at Chipwi. I got little that was new for my pains, except that the very first afternoon I almost collided with a barking deer standing on the path as I turned the corner.

It was a strange sequence to pass from the temperate climate of the hills, where the trees were newly robing themselves in

the lovely colours of spring, into the sub-tropical belt where they were stripping to the bare branches as fast as they could. We passed through a Black Country almost as devastated of green life as the Potteries. Fires still smoked and crackled and at night showed where the thin lips of flame slowly ate into the *ponzo*. *Rhododendron Simsii* formed pools of molten lava on the rocks in the river bed, visible afar. There were ripe raspberries, red and yellow, by the path and birds were busy stripping the cherries from the early form of *Prunus cerasoides*. Along the banks violets and begonias flowered side by side, with blue *Chirita*, deep yellow *Corydalis*, cuckoo-pint (*Arisaema*) and other early woodland flowers. I saw a great many birds, including three owls, in a tree, and then three squirrels, one of them sandy coloured. Many of them were no doubt displaced persons owing to the holocaust in the *ponzo*.

And so came April, the last month of the expedition, and for two more days I marched north, following the Ngawchang river. Only hidden in the gullies did the jungle survive, and now the trunks of the trees were hidden by leafy climbers such as *Pothos* and *Raphidiophora*, where yellow cowl-like spathes formed a reflector for the grey spadix. A species of *Hedychium*, with white flowers, grew high up on a tree, its long stems hanging down, its bottle-brush inflorescence erect (though to make it so the stem had to turn through 120°), its crimson styles all parallel, sticking out like the tongues of ant eaters. A fine tree with pale smooth bark and small leaves, its massive trunk supported by plank buttress roots, puzzled me. That it was a species of *Lagerstroemia* I felt certain, but I could find neither flowers nor fruits to confirm this.

Birds were still very much in evidence. Once a flock of green pigeon rocketed by. White-casqued babblers, a black-and-white magpie-robin, hoopoes and a bulbul — all black except for orange beak and claws — showed themselves. I watched with interest the wagtails — they go in pairs — strutting about, neck and tail always in motion, oscillating with the precision of a mechanical toy, a restless bird. It makes quick little darts for-

ward or at a tangent, and will spin round in a complete circle just where it stands, like a cockchafer on a pin. At sunset swiftlets darted and wheeled, snapping up insects.

Erythrina was draped in magnificent scarlet, *Styrax serrulatum* was a mass of blossom, and various other trees were responding to the season, either by casting off their old leaves, or by putting forth new ones, or by bursting into blossom. *Mayodendron igneum*, happily named, was a sheet of orange flame, and *Bauhinia variegata*, quite leafless, was a pale purple cloud.

On April 3rd we crossed the divide by a low pass and reached the valley of the Nmai Hka once more, though we could barely see the river; nor did we reach it till the following day. The Maru villagers, as usual were friendly, and all the old women wanted to greet me Maru fashion, palm pressed to palm both hands. I shook hands with the children who crowded round me also. As for the dogs, they barked and wagged their tails at the same time, as much as to say: 'Sorry, old chap, I'm really glad to see you, but I've got to bark, it's my job.' The path worked its way gradually down to the river over slabs of naked rock from which the forest has been gradually stripped: some day nothing but rock will remain, scarring the steep hillside like tombstones in a graveyard of abandoned villages.

The rest huts were full of fleas and I had little peace at night. Once a large grey bat flitted uneasily through the room, as though my presence had disturbed him in his own quarters. When it rained the roofs leaked, but as the sodden thatch settled into place the holes closed up.

On April 6th I reached Chipwi, half expecting to find that the others, grown tired of waiting for me, had gone on. However, they had spent two days at Lauhkaung hunting a tiger, and reached Chipwi the same day as myself.

On the vast bank at the confluence of the Chipwi Hka with the Nmai, across which a scorching wind blew, I noticed a fine *Echinocarpus* with other trees being gradually overwhelmed by sand. As I have said before, the Chipwi rises at the Panwa pass.

A few miles from the bungalow and high above the river is a cave, so next morning the indefatigable J. K. went off early with the village schoolmaster to explore it. He joined Harold and me the same evening at Tamu, one stage down the road; the cave he said was full of bats belonging to three species, all of which he secured. Our path lay largely in climax forest, where many kinds of fig were prominent by reason of the great bunches of fruit hanging from them, much sought after by monkeys. Other trees now conspicuous were *Dipterocarpus*, horse chestnut (*Aesculus assamica*), *Podocarpus*, *Cedrela*, *Ulmus* and *Duabanga*. On the hot sand banks across the river were many leafless trees, some of them in full bloom — *Gmelina arborea*, *Stereospermum chelonoides*, *Sterculia colorata*, species of *Ficus*, *Cassia* and others.

On April 10th we reached Seniku. Harold, who had to catch a ship in Rangoon, had arranged for a car to meet him here and drive the last thirty miles if not in comfort at any rate more quickly. The car arrived that evening and Harold went on next day, leaving J. K. and me to cover the remaining distance on foot. So we finished the expedition together as we had begun it, nor could I have wished for a more charming companion.

We did eleven miles that day, and heard that a fine tiger had been trapped a few nights before our arrival. Hanging from the limb of a fig tree was the most magnificent spray of orchid I had ever seen, one of the many *Dendrobiums* for which Burma is famous. Except that the flowers were a rather raucous purple, with no gentler colour to relieve it, they made a superb display. I shot a pin-tail green pigeon, a beautiful bird with a pale bluish bill — the colour of mouldy cheese — and vermilion claws. J. K. pointed out a graceful black and white harrier quartering a field within two feet of the ground. Day and night that infuriating cuckoo, known as the brain-fever bird, supplicated hell.

On April 12th we took a car the remaining twenty miles to Waingmaw along the level dusty road, crossed the river by the

ferry boat and walked into Myitkyina, a day behind Harold. There followed a few more days of sorting out and packing, then a quick trip up to Maymyo from Mandalay to clear up a few obscure points, and so to Rangoon, where we arrived on the 17th. For us too the expedition was over.

It was the lull before the storm broke.