

The GEOGRAPHICAL JOURNAL

Vol LXXX No 6



December 1932

EXPLORATIONS ON THE BURMA-TIBET FRONTIER: *A paper read at the Evening Meeting of the Society on 25 April 1932, by*

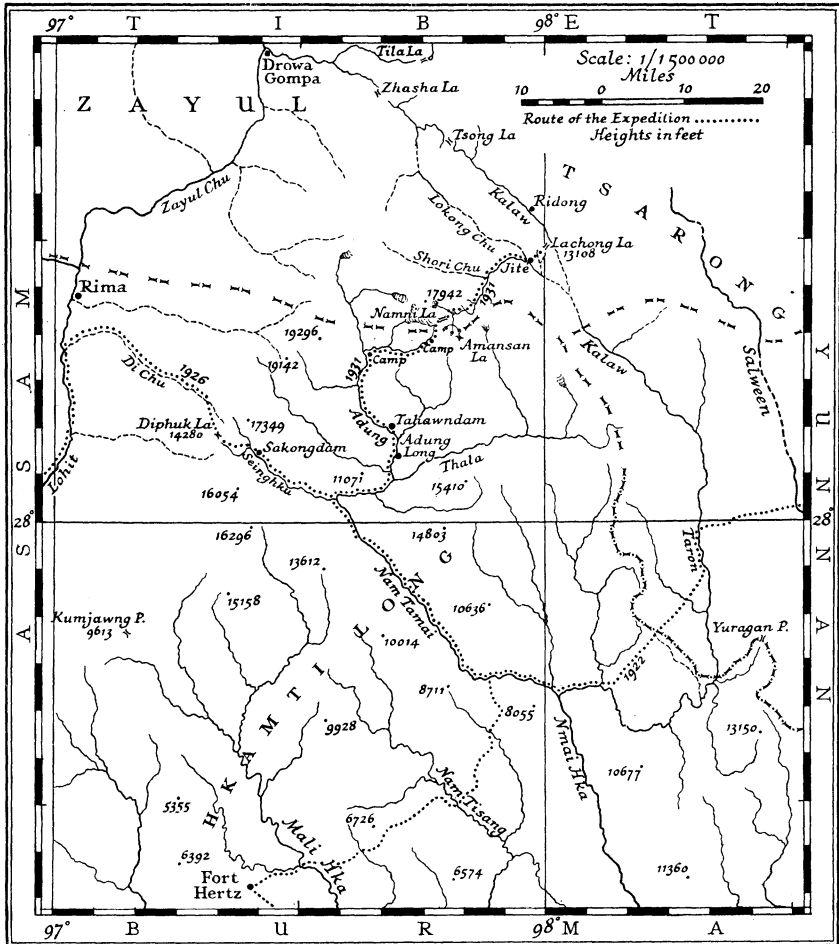
F. KINGDON WARD

IN 1930 Lord Cranbrook and I arranged to make an expedition to the sources of the Irrawaddy. Our objects were: (i) to collect specimens of the fauna and flora, and to introduce into Britain new hardy plants from that area; (ii) to cross the pass at the head of the Nam Tamai valley directly into Tibet, and link up our route, if possible, with that of any other traveller farther north; (iii) to make observations on the glaciers of this region, as to whether they were retreating or advancing, and how far they had formerly extended. I had previously undertaken several journeys at the headwaters of the Irrawaddy, but much remained to be done, especially farther north than I had hitherto penetrated. As in 1926 and 1928 the Trustees of the Percy Sladen Memorial Fund gave a grant towards the expenses of the expedition.

We arrived at Rangoon in November 1930, and proceeded by train to Myitkyina. The expedition finally left Myitkyina on November 26, reaching Fort Hertz on December 16. Here we were held up for several days. We left Fort Hertz on the 27th, and from that date onwards collecting work began in earnest. There is a cold-weather mule path from Fort Hertz to the Tamai river, eight marches in a north-easterly direction, and, when the Tamai bridges are in repair, for six marches up the Tamai, as far as the Seinghku confluence; but owing to the intransigent attitude of the Yunnan government, Chinese mules working in Burma are not allowed to travel east of the Mali Hka, so after leaving Fort Hertz we had to rely on coolies for transport.

Between the Mali Hka and the Tamai, the mountains reach a height of 6000–8000 feet, and are densely covered with a type of evergreen forest which may be called hill-jungle. This forest extends eastwards from the foothills of Nepal and Sikkim, across Assam and Upper Burma, into Yunnan, in a continuous belt. It is possible now to lay down its limits with some degree of accuracy, and it is surprising how many tree species extend right across, linking up the Himalayan flora with the Chinese flora. On this journey I was able to extend the known distribution of many Himalayan trees eastwards, as well as of several Chinese species westwards, establishing beyond question the continuity of the forest flora in an east-west direction.

We reached the Tamai river a few miles above its confluence with the Taron on January 7. Progress was slow, on account of the shortage of transport, and we did not reach the Seinghku confluence till the 25th. At this point the Seinghku, from the north-west, joins the Adung (as the upper Tamai is called) which flows in from due east, and the combined river swings abruptly through



Sketch-map of part of the Burma-Tibet frontier

135° to flow south-east as the Tamai, continuing the direction of the smaller affluent.

Hitherto we had been on a proper path, even a mule path in the dry weather, but from the Seinghku-Adung confluence there is only a native track up either valley. I had been up the Seinghku valley in 1926; I now proposed to follow the Adung valley to its source, and ascertain whether or no there was a practicable pass into Tibet at its head. In 1926 I had crossed the Diphuk La, at the head of the Seinghku valley, and descended direct to the Lohit river, just

below Rima; this pass therefore straddles the Irrawaddy-Brahmaputra divide. But a pass at the head of the Adung valley, though it would lead directly into Tibet, would not cross the Irrawaddy-Brahmaputra divide. The general direction up this valley being north-east, or north-north-east, it must lead directly into the upper Taron valley, the main source of the Irrawaddy. Therefore, in order to reach the Lohit, it would be necessary either to bear more to the west, or to cross two passes.

The first European to see the Adung valley was the late Captain B. E. A. Pritchard, who in January 1913 ascended about 12 miles to the village of Adung Long, or Lama Ne. He was drowned in the Taron a few months later, during the course of the same journey. A few years later, Mr. P.M. R. Leonard, of the Burma Frontier Service, ascended to the last village, called Tahawndam, and continued a few miles beyond that. So far as I know, they are the only two who preceded us; at any rate no subsequent officer had been beyond the point reached by Mr. Leonard. Native surveyors of the Survey of India had however been up to, or nearly up to, the head of the valley in 1920-22, so that we had a good map of our proposed route. Unfortunately maps show neither political nor climatic obstacles, and having met with no difficulties as far as Tahawndam, the last village in Burma, we became rather too sanguine as regards the rest of the journey. We started up the Adung valley on February 2. At the confluence the river bed stands at 4000 feet above sea, and the mountains on either side, though very precipitous, are thickly forested. The end of the spur in the wide angle between the two rivers however is truncated in a series of escarpments, on which grow scattered trees of *Pinus excelsa*, a Conifer which, from this point onwards, is never far away. At the base of this great cliff, and at an altitude of only 4000 feet, a Tibetan family has settled, the advance guard of a movement southwards down the Irrawaddy ridges. This Tibetan migration wave is moving athwart a westward moving wave of Lisus from the Salween valley; and both are impinging not only against a solid block of Kachin tribes who already occupy the best sites, but also against a definite northward movement from the plains of Upper Burma towards the hill tracts. It will be interesting to see which prevails.

The first day's march lay up the left bank of the Adung, mostly in thick forest, never high above the river, and occasionally in the river bed. Easy as the path was, we made barely 5 miles (measured off the map) in seven hours; nor did we see any huts, though we met a party of Darus. Though we saw no huts—which are widely scattered and well concealed higher up the slopes—there were not lacking, in the rope and suspension bridges, and even in the trail we followed, signs of the presence of man; in the evening we came out on to a cultivated slope. On the following day we had a shorter and more interesting march. It was both more difficult, where we had to climb the cliffs, and cross a precipitous rock face, and at the same time easier, where down below we crossed several cultivated terraces; but as usual the jungle huts were not on the path. We had now changed our direction, and from marching eastwards were again marching northwards towards our goal. On February 4 we had an easy march up and down the cliffs to Adung Long, situated in a wider part of the valley, where the vegetation begins to change

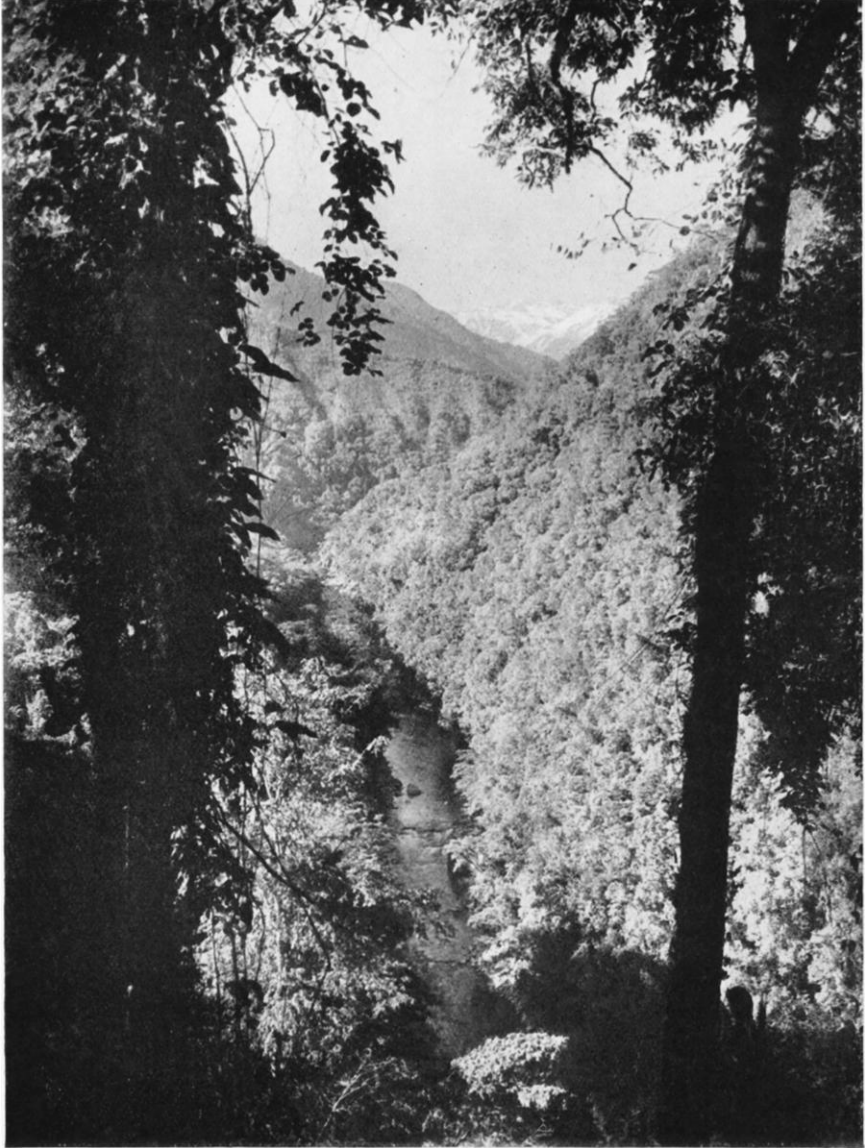
from predominantly hill jungle of Indo-Malayan type to warm temperate, with a considerable admixture of deciduous trees.

From Adung Long to the Seinghku confluence, the river falls about 1000 feet in 13 miles. We had left behind us three big tributaries, two from the east and one from the west; but as these rise amongst the high snow-covered hills of the interior fastness, at this season they bring down very little water, and the Adung river had not shrunk greatly at Adung Long. The steepest gradients in the river bed occurred just below each confluence, which suggests that the river is comparatively young. Indeed, the course of the Adung, as of so many rivers in this region, is altogether odd. The Seinghku appears to have been originally the upper course of the Tamai, no doubt when all the country north of Adung Long was under glacier ice, and very little water was flowing down the Adung valley. At any rate it is significant that the Adung valley, at least as far south as $28^{\circ} 3'$, appears to have been glaciated; the lack of overlap in the spurs—almost, one might say, the absence of spurs—the rounded summits of the hills, the extraordinary levelness of the ridges, no less than the wide profile of the valley and the straight sides of the escarpment often set well back from the present gorge, all point to glacier action. But naturally forest growth has obscured much of the detail, nor has the climate helped to preserve the harsh outline of a thoroughly glaciated region. It was only when we got farther up the valley, and indeed found living glaciers, that the last doubt vanished. The rock is everywhere of igneous origin, mainly granite; and this formed characteristic slab-faced outcrops and escarpments, bare of trees, on all south-facing slopes. At Adung Long there are whole broad slopes clothed with grass and bracken, dotted with widely scattered trees; but these pastures owe their treelessness largely, if not entirely, to fire.

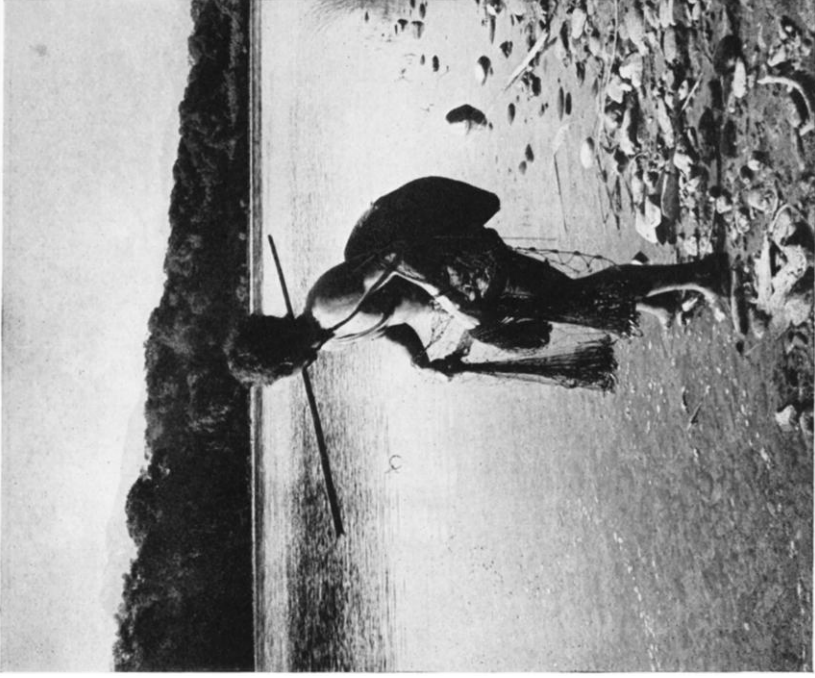
On February 5 a short march by an easy path, ascending however nearly 1000 feet, brought us to Tahawndam, the last village in Burma, on the left bank of the Adung river. About halfway we passed the junction of the last big tributary of the Adung, both below and above which are furious rapids. Here the valley, which lies north-west to south-east, widens out again, before finally contracting to a deep and narrow gorge a few miles farther upstream. By this time the forest is definitely warm temperate, and the Himalayan Pine (*P. excelsa*), together with oaks, maples, rhododendrons, and *Michelia doltsopa* grow along the river bank at the bottom of the gorge.

Tahawndam is the spearhead of the Tibetan irruption into the Irrawaddy basin. The political status of these headwater valleys has long been a subject of controversy, not only between the Indian, Chinese, and Tibetan governments, but between different schools of thought in India. British official opinion appears to be strangely inclined towards geographical frontiers, especially watersheds, irrespective of the implications. At the sources of the Irrawaddy such a frontier is impossible, as well as undesirable. It would imply administering territory on the far side of a great snowy range, inaccessible during six months of the year; territory which has moreover long been administered by Tibet, or at any rate by Tibetans.

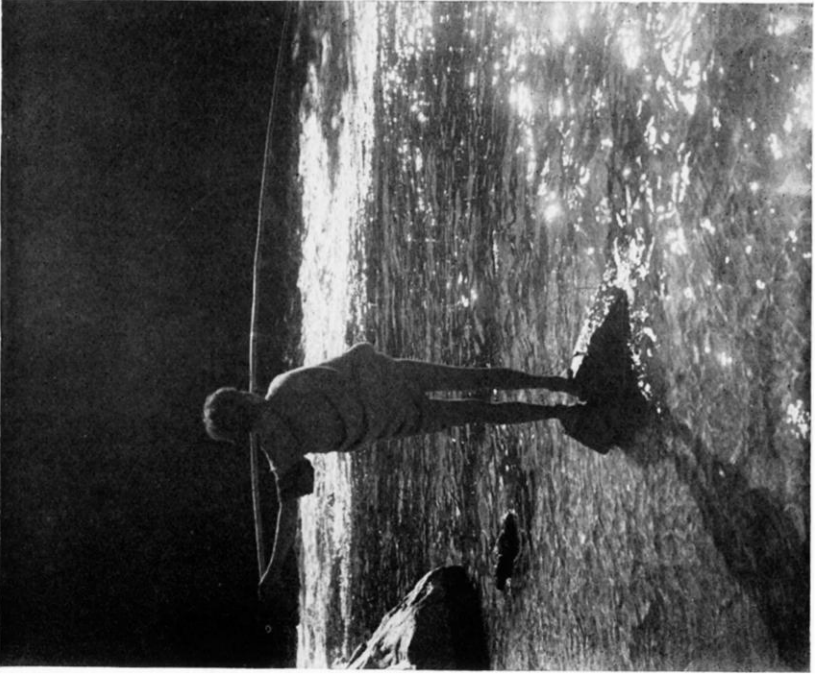
For this reason the Taron valley was definitely and finally excluded from the North-East Frontier of Burma and Tibet's (or China's) claim to it recognized. As the frontier had now to cross the gorge of the Taron somewhere,



Looking north up the Nam Tamai towards the Tibetan frontier range



A Nung fishing with casting net in the Tisang



A Daru harpooning fish in the Tamai

efforts were made to find a suitable line; and one was found based on Pritchard's report on his explorations on the upper Taron, in the course of his last fatal journey.

The second great headwater stream of the eastern Irrawaddy is the Tamai, which, as we have seen, splits into the Seinghku and the Adung; and here government has spoken with two voices. At one time it was proposed to claim only the Seinghku valley, which gave to Burma the Diphuk La, a pass giving direct access over the Irrawaddy-Lohit divide into Assam; the Adung valley was to be presented to Tibet, and is completely excluded from the administered area on Sheet 91 H of the Survey of India, on which no Burma-Tibet international boundary, demarcated or undemarcated, is shown. In 1930 however it was decided to retain the Adung valley as well, although owing to its remoteness its administration presents certain difficulties. The new policy is clearly dictated by the desire to make the watershed the frontier; hence the misgivings and complications when the Tibetans cross the passes and settle on the Burmese side of the frontier.

But obviously a pass of 15,000 feet is nothing to a Tibetan, who habitually lives at 10,000 or 12,000 feet altitude. The Tibetan is not stopped by physical, but by climatic barriers; and no boundary pillars are needed to make him respect these. His frontier is the verge of the grassland, the fringe of the Pine forest, the 50-inch rainfall contour beyond which no salt is¹ (until indeed you come to the sea), or the 75 per cent. saturated atmosphere. The barrier may be invisible; but it is a far more formidable one to a Tibetan than the Great Himalayan range. If he crosses it, he must revolutionize his mode of life. It is just here that the maps of mountainous frontier regions are apt to convey a false impression. These invisible barriers, so thoroughly respected by simpler civilizations than our own, cannot be depicted on an ordinary map, which unconsciously fixes our attention on mighty ramparts of rock.

Tahawndam itself comprises three Tibetan families, whose wooden single-roomed cabins, thatched with grass, stand amidst permanent cultivation in the valley bottom, at an altitude of 6000 feet. These people possess herds of half-bred yak, and goats, which furnish them with milk and butter; sheep, pigs, fowls, and two breeds of dog, the ordinary Tibetan mastiff watch-dog (smaller than those commonly met with in Tibet), and a small smooth-coated prick-eared yellow dog used for hunting. Yak are yoked to the plough. The Tibetans also hunt gooral, serow, and barking deer, and collect wild honey. They cultivate barley, oats, maize, buckwheat, millet, peas, and beans. In fact they live extremely well. Not so the Darus, of whom there are five or six families scattered up the slopes of the valley, where they grow crops on the old river terraces, sometimes nearly 1000 feet above the river. They have no cattle, and subsist precariously on their scanty crops, and on jungle produce. Such meat as they get comprises chiefly small animals—squirrels, flying squirrels, and bandicoots, though they also hunt larger game and snare pheasants. Temminck's tragopan occurs here above 8000 feet, and higher up the valley Geoffroy's blood-pheasant and the crestless monaul (*Lophophorus sclateri*).

One is tempted to think that the Tibetans are gradually ousting the Darus

¹See 'Diet and Race,' by F. P. Armitage, *Longmans, Green & Co.* 1922.

from these valleys, but this seems unlikely. The Darus may indeed give way before the Tibetan pressure, but the Tibetan will not willingly exterminate the Daru; he finds him much too useful, and might be hard put to it to survive in these sour jungles if he had not the Daru to work for him.

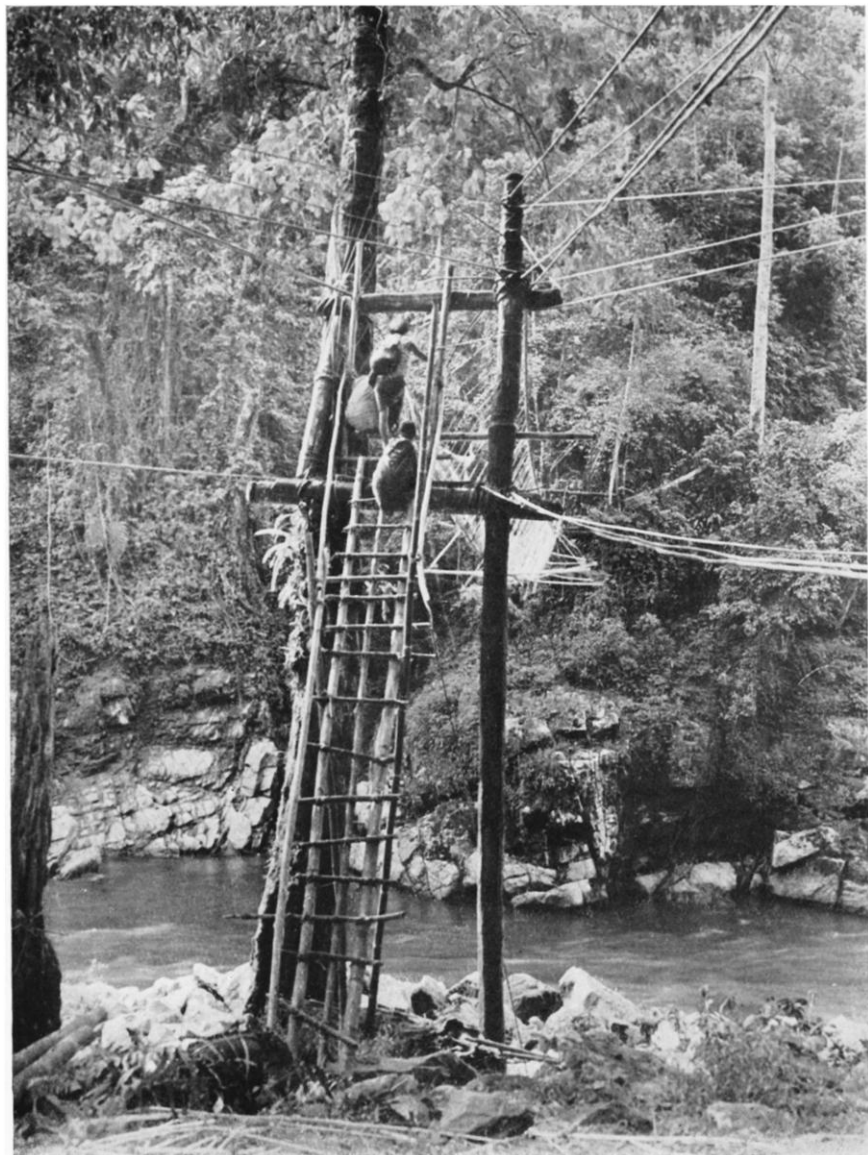
The Daru appear to be the only tribe of the upper Irrawaddy who have no generic name for themselves. The Tibetans call them Dalu or Talu. The English must have added the *r* sound. It is significant that the Mishmi, who live in the Lohit valley to the west, call the Lohit river the Tellu, which is obviously the same word. There is no evidence that the Daru have been pushed up towards the sources of the Irrawaddy from the south, nor is there any argument for such a theory. It seems to me much more probable that they came originally from the north and west, being forced over into the Irrawaddy by Tibetan pressure consequent upon Chinese pressure from the east. In other words, Mishmi and Daru are probably derived from a common ancestry in Zayul province; the Mishmi following the Lohit valley towards Assam, the Daru crossing the great range and lurking in the valleys of the upper Irrawaddy. They were prevented from moving farther south by the Kachins and the Shans, marching and counter-marching across the hill country south of Hkamti Long. Bailey, when he was at Rima, notes that the country over the range to the east of Rima, called Cho—in other words, the valley of the Tamai and its headwaters—is inhabited by a race similar to the Mishmi.¹

The Daru are the same as the people called Khanung by the Shans of Hkamti Long; the Khanung, or Nung, is simply a more cultivated Daru. The people of the Taron valley, to the east of the Tamai, called Talong or Dalong by the Tibetans, are of the same stock, and speak practically the same language; Talong being obviously the same word as Taron. The Daru, though wild-looking, are very timid folk. They are usually dwarf, not exceeding 5 feet in height, though exceptions are sufficiently common to require explanation; women are shorter than men. Girls often tattoo their faces with blue lines and circles, or crosses; there are several patterns in vogue, and as these are segregated in different localities they presumably indicate clans; but tattooing seems to be optional, and of no real significance other than ornamental.

Other peculiarities of the Khanung or Daru are their use of the "necktie" hoe (a short iron implement with a wooden handle, used for scraping weeds), their method of harpooning fish—the harpoon, with four detachable iron hooks fixed loosely into sockets at the end of a bamboo is perhaps more in the nature of a grapple than a harpoon—and their use of thorn-lined bamboo fish traps.

They burn their dead, the ashes often lying in state (in the open) for a considerable time awaiting a favourable, which means a financially favourable, opportunity for interment. It is the burying, not the burning, which is the significant ceremony. A wooden coffin, shaped, and sometimes rudely carved with a face, like an Egyptian sarcophagus, contains the ashes; and during the lying in state the material property of the deceased, together with a few takin or other horns, decorate the bamboo platform. The religion of all these tribes is a primitive animism, nor has contact with the Tibetans substituted even

¹"Journey through a Portion of South-Eastern Tibet and the Mishmi Hills," by Captain F. M. Bailey, *Geogr. J.*, April 1912.



Supports of a cane bridge spanning the Nam Tamai



A Tibetan of Tahaandam, Adung valley



Tattooed Daru girl

the most debauched Buddhist ideas for simple nature-placation; rather have the Tibetans who cross the range become infected with animism. The reason is clear. No Tibetan Buddhist monk considers it financially worth while to spread the gospel in such a country, amongst such a people.

We made Tahawndam our base for the year, and spent the next three months here. To our chagrin we found that the Tibetans do not take their herds up the valley to the foot of the pass, as we expected, in the summer; they take them straight up the mountain side above the village. This made things more difficult for us. Our object was to cross the pass at the head of the Adung valley, but we discovered that the pass is more used by the people on the other side than by the local inhabitants. As the pass was six days' march from the village, and the first village on the far side was another two days' march, everything turned on the transport problem. In the middle of May we moved our camp three days' march up the valley to a point where the river bifurcates. The actual distance was no more than about 15 miles, but the going was hard for the coolies. Lightly laden coolies would do it in two days. The track follows the left bank of the river, through the forest, and for the last few miles is high above the stream, descending again at the point of bifurcation. We camped on the left bank of the eastern branch, here bridged by an enormous tree trunk (often impassable during the rains), at an altitude of 8000 feet. The forest here is temperate mixed forest, about 50 per cent. of the trees being Conifers. These latter, especially *Picea Morinda*, *Pinus excelsa*, and *Tsuga yunnanensis*, attain a great size. Birch, maples, oaks, hollies, and, of course, rhododendrons, comprise the bulk of the broad-leaved trees and shrubs. The rhododendrons, of which there were fifteen or twenty species hereabouts, were in full bloom, and coloured the cliffs. Several species grew socially, and it was these especially which produced such gorgeous colour effects.

The north branch of the Adung rises amongst a group of snow peaks over 19,000 feet high on the main (Irrawaddy-Lohit) divide. It is certainly as big as, probably bigger than, the east branch. The water at this season was milky white, in strong contrast to the clean snow water of the eastern branch, and the gradient of the valley, for the first few miles at any rate, is distinctly less than that of the latter. Unfortunately there is only a hunters' trail up the north branch, and this soon disappeared, though not before I had reached a snow bridge across to the right bank, at a height of less than 9000 feet. A steep snow-filled gully had thrown the snow across the river, and the bridge lasted into June, though it was wearing very thin when I last crossed it. There is said to be no pass at the head of this valley, which in itself suggests that this is the main branch, since it is unusual to find the pass at the head of the main valley; the northern branch also appears to be slightly longer than the eastern. On May 21 two Tibetans crossed the Namni La, the pass at the head of the eastern branch, for the first time that year. The winter of 1930-31 was a season of unusually heavy snowfall; and nothing could show more clearly the approach to drier Tibetan conditions than the fact of a pass over 15,000 feet high being open so early in the year. The passes to the south and east, 12,000-13,000 feet high, are rarely open before the end of June. In 1926 the Diphuk La, 14,300 feet, was not crossed till June 13. Farther north where the

climate, though severe, is much drier, the highest passes are open all the year round.

On June 6-7 we moved our camp another two marches up the valley, ascending 4000 feet in 10 miles. There was a large open boggy meadow or marsh here, surrounded by a fringe of Silver Fir (*Abies delavayi*), and bush Rhododendron; a short mile up the valley, and at 13,000 feet, more or less, on the sheltered cliff face, tree growth ceased. One may say that the tree line in the Adung valley lies between 12,000 and 13,000 feet, but that woody growth ascends another 1500 or 2000 feet. There is no plant growth above 16,000 feet. The snow-line is about 16,000-17,000 feet. We spent nearly three months in this camp before crossing the Namni La on September 1; thus we had plenty of time to explore the neighbouring valleys, as well as the main valley to its head. This marshy meadow is called Lung Sa—presumably “the valley (open) place or space”—which well describes it.

Perhaps the most surprising thing about the wild mountains we now found ourselves amongst was that there appeared to be no trace of any mammal larger than a cat-bear (*Aelurus fulgens*). Cranbrook hunted every valley assiduously, day after day, but saw nothing; neither did I on my many excursions after plants. At the top of the Seinghku valley I had frequently seen gooral up to 15,000 feet; here we saw none. A few weasels, and numerous Pika-hares in the open, and voles in the forest, represented the mammalian fauna. Blood-pheasants were numerous in one spot only, where there was a dense growth of *Arundinaria*. Temminck's tragopan was usually present in one high valley, and there was abundant small bird life. There were toads in the ponds, but we saw no snakes as high up as this. The alpine flora was of the usual Sino-Himalayan type, rich in species of *Primula*, *Rhododendron*, *Pedicularis*, *Saxifraga*, *Gentiana*, and other genera. There are also vast numbers of a species of *Nomocharis* (*N. Souliei*), and of *Omphalogramma Souliei*, and of two *Gaultherias*; while two families, *Compositae* and *Ranunculaceae*, together account for an appreciable percentage of the total alpine herbaceous flora.

The lateral valleys are all of the hanging type, and recently contained glaciers. We discovered two glaciers, as opposed to mere snow-beds, one at the extreme top of the valley, coming from a peak marked as 17,942 feet high on the survey sheet, the other in a valley to the south-east of our camp. The snow did not finally disappear from the highest ghylls till October. Thus the eastern branch of the Adung river, like the northern, may be said to rise in a glacier, and the Adung river derives some of its water, though not the bulk, from glaciers. One must however try to picture the whole of this region between the parallels of 28° and 30° N. and the meridians 92°-100° E. as covered at no very remote date, not so much with numbers of great glaciers, as with an almost continuous ice-sheet. In the neighbourhood of the Adung valley the uniform heights of the peaks and the long level ridges point conclusively to a plateau structure. This was clearly visible from our November camp immediately above the village of Tahawndam. Looking across the valley one saw the peaks on the other side sticking up from a uniform level of about 15,000-16,000 feet, which is the height of the highest glacier valleys. The heights of the peaks, which, as already observed, are remarkably uniform, give

the height of the ancient plateau. Out of this plateau a number of glaciers subsequently scooped wide comparatively shallow valleys, to a depth shown by the lips of the hanging valleys, say 13,000–14,000 feet. Lastly, as the glaciers shrank farther and farther, water cut deep V-shaped grooves in the wider ice-worn valleys.

When the ice was at its maximum, this Sino-Himalayan ice-sheet must have covered between 30,000 and 50,000 square miles; and the almost total disappearance of this vast quantity of ice, in the course of many thousands of years, has of course had a great influence on the flora, as well as on the shape of the country and on the climate.¹ In the alpine region it was noticeable how the hanging valleys occurred in tiers. Thus the side valleys overhung the main valley for 500–1000 feet. A tertiary valley overhung the side valley, also for 300–500 feet, and often a still higher valley overhung the tertiary valley. These steps probably mark a series of pauses in the retreat of the ice.

The core of the range is composed of granite, flanked on both sides by gneiss, schists, and slates, which dip steeply (45° – 70°) more or less north-north-east on the southern flank of the dividing range, that is to say in the upper Adung valley, and more or less south on the northern flank, that is within the Taron basin. Thus the general strike of the rocks is east and west. Farther west a belt of crystalline limestone cuts right across the country in a general north-westerly direction parallel to the Tamai valley, where it forms the watershed between the Tamai and the Mali Hka²; but we diverged from this, and nowhere did we meet with limestone. If this belt continues in the same direction, it should reach the Lohit valley just north of Rima, and presumably the Lohit river cuts across it.

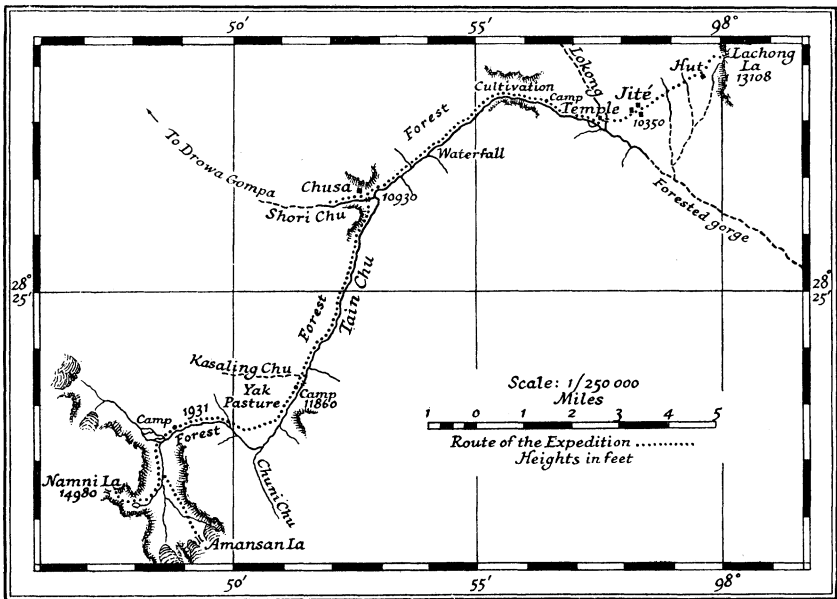
Every summer the Namni La is crossed by numbers of Tibetans, Lisus, Darus, and even Chinese, attracted to these inhospitable mountains by two things: the bulbs of a small alpine Liliaceous plant (*Fritillaria Roylei*) called *pai-mu* by the Chinese, and valued for its medicinal properties, and the skins of such animals as the goral and serow. People come from as far east as the Mekong. The Darus, in turn, cross the pass to buy salt, clothes, cooking vessels, and cattle from the Tibetans. During July and August a considerable number came over and spent a fortnight in the upper Adung valley and its tributaries digging for bulbs.

Having persuaded ten of these people to carry loads for us on the return journey, we started on September 1 for the first Tibetan village on the other side, called Jité. It was a very wet day, with bad visibility. From near the foot of the glacier at the head of the Adung valley, the path turns due east, ascending precipitously to a hanging valley, whence the Namni Pass is reached over a snow-bed. The height is about 15,300 feet, and there is no view from the summit. Descending a precipitous scree and crossing a snow-bed we reached a beautiful glacier lake about 1500 feet below the pass, the water from which fell over a cliff into a larger valley. Descending steeply again, we saw three

¹See "A Note on Deglaciation in Tibet," *Geological Magazine*, June 1927, where I estimated the total known glaciated area in the "river gorge region" at a quarter of a million square miles, and the total amount of ice melted at 139 billion cubic feet.

²See Murray Stewart: various papers in the *Records of the Geological Survey of India*.

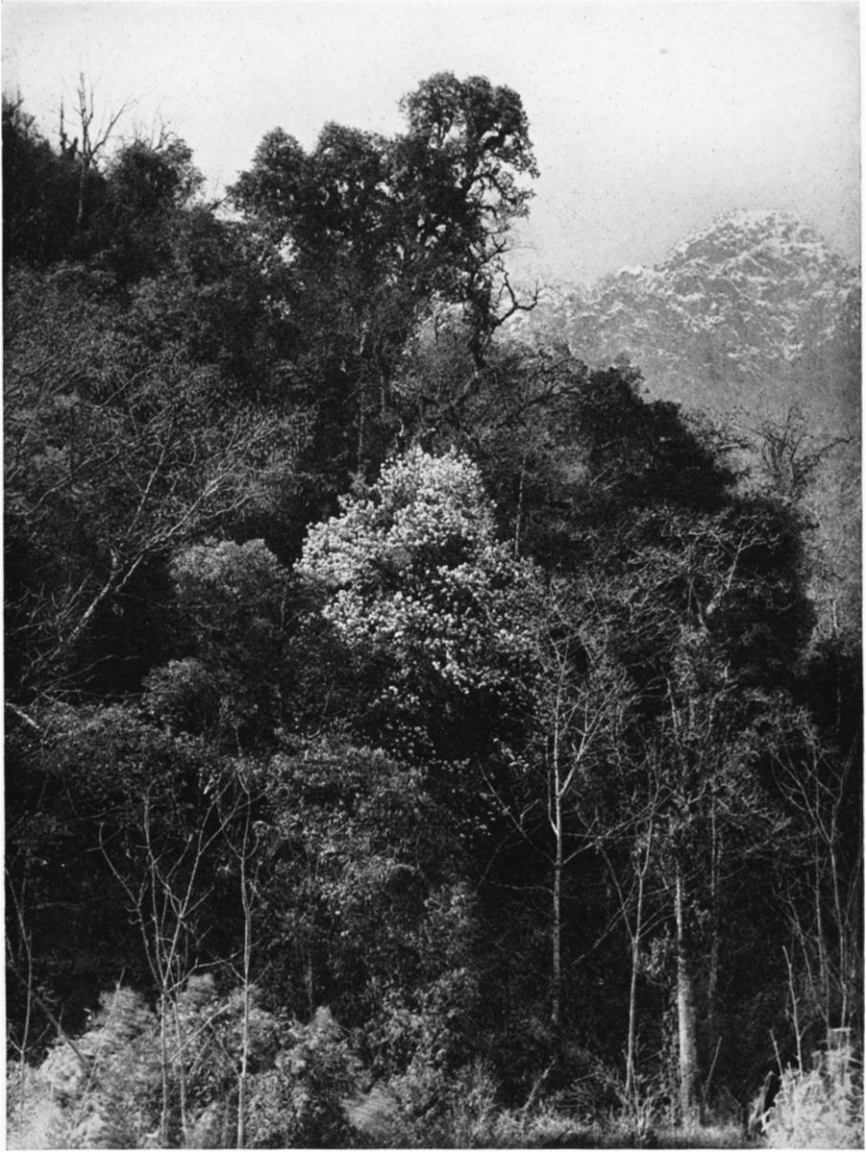
glaciers at the head of this valley, which we followed down to where the trees began, and here we camped. A large stream came in here from the west, and up this valley we noticed a fourth glacier. The alpine country on this side showed much deeper scars of ice work than the Adung valley, and it seems likely that it was more recently under ice. The main river was now flowing about east-south-east, and again it dropped very steeply over ice-smoothed granite rocks into a still larger valley, where it joined a river flowing north-north-east, which also probably rose amongst glaciers. A short march on September 2 brought us into this main valley, and we camped at midday in a huge flat pasture (a silted-up lake basin) over which scores of yak, sheep, and goats grazed. This meadow is known as Kasali; it is about $1\frac{1}{2}$ miles long and $\frac{3}{4}$ mile wide, at an altitude of 12,000 feet. Owing to the weather, survey work was



Route from Namni La to Jité; from a prismatic compass sketch by Lord Cranbrook

reduced to a compass traverse, faithfully kept by Cranbrook, who also obtained all the topographical information he could.

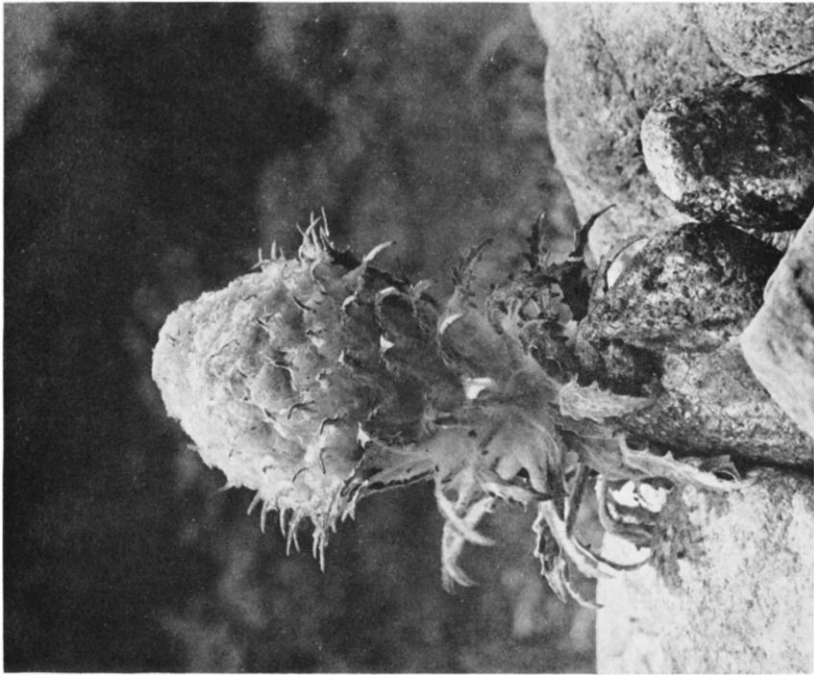
On September 3 we marched down the valley at first in a direction north-north-east, gradually changing to north-east and finally east. There is a good mule path all the way. After about 2 miles we crossed a large river—Shori river—from the west, by a good wooden bridge. There is a road up this river which leads to Drowa Gompa. It must therefore cross the Irrawaddy-Lohit divide, and probably reaches the Lohit in the neighbourhood of Chikung. This is the direct road from the upper Adung valley to Zayul. After marching some miles we camped in the forest, and next morning, continuing eastwards, we crossed another big river from the north-west, called Lokong Chu. This Lokong river, and the main river below the Shori junction, are about the same



Michelia doltsopa and temperate rain forest in the Adung valley at 6000 feet;
March



Aster sp. in the Adung valley at 12,000 feet; August



Saussurea sp. in the Adung valley at 14,000 feet; September

size; the combined river is, or was at this season, a formidable stream, as big as the Adung river at Adung Long. After crossing the Lokong river we ascended 1000 feet or more, to the village of Jité. From Jité the road leaves the river, which turns south of east, and crossing two more tributaries reaches Ridong, on the Kalaw river, in three marches. (See Survey of India, Sheet 91 H.)

I turn now to the question of the source of the Irrawaddy. On his journey from China to Assam in 1911 Bailey crossed two or three of the Irrawaddy headwater streams (*op. cit.*). The first one he reached he describes as 20 yards wide (on June 17 when it would be full of snow water). Bailey calls this an upper branch of the Irrawaddy, and was told that it flowed to a country called Lhoka or Tsong. Lhoka sounds suspiciously like our Lokong. Though he does not mention it, Bailey evidently passed through or close to Ridong. He followed this river (the Kalaw ?) for two days, until it was only about a yard wide, and then crossed the Tsong La. The river he had been following so far rose just north of the pass in some snow-covered hills. For some obscure reason the Survey of India have projected the main branch of this river some 16 miles beyond, east and north of, the Tsong La (Sheet 91 H), though Bailey's statement is explicit. Any one with any knowledge of this country knows that a stream a yard wide in mid-June is likely to have its source closer at hand than that. The map is therefore probably based on that of Bacot. After crossing the Tsong La, Bailey reached a river which flowed due south, "and must be the headwaters of the Tarawan, which passing through Hkamti Long, joins the Irrawaddy." Bailey's Tarawan is obviously the Taron wang; and it is this stream which is our Lokong river. Thus the eastern branch of the Irrawaddy, or Taron river, has four headwater streams—the Kalaw, Lokong, Kasali, and Shori. We do not know which is the largest, but the Kalaw, hitherto regarded as the source stream, is obviously smaller than the combined Kasali, Lokong, and Shori streams, and the ultimate source must be sought amongst the latter. The Lokong river appears to be longer than the Kasali branch; but at the junction I could see little difference in volume, though it is of course impossible to judge. A river like the Irrawaddy has in fact several sources, and we certainly had the satisfaction of discovering one of them.

Jité is a small village of three wooden, slat-roofed houses, and one or two storehouses, standing amidst permanent cultivation on a shoulder of the mountain at an altitude of little under 11,000 feet. It is thus very much higher than Tahawndam. The inhabitants—Tibetans and a few Daru slaves—were rather shy of us at first, and held aloof; but after a few days they plucked up courage and sold us food as required, including turnips and potatoes; but transport to Ridong they refused, and here we stuck. The weather was atrocious throughout the fortnight we remained, and we were never favoured with a view in any direction. One thing was rather remarkable, and that was the difference in the flora on this side of the range; indeed I had noticed it almost as soon as we crossed the pass. We might still be in the Irrawaddy basin, but we were undoubtedly no longer in Burma. Imagine cultivation at nearly 11,000 feet, in Burma, to start with! In view of the far smaller rainfall on this side we hoped that September would be fine, but it rained persistently,

and by the middle of the month many of the trees were flying signals of autumnal distress.

On September 20 we broke camp, and with ponies to carry the baggage started for our Burma camp. The ponies had to be left at Kasali, coolies taking their place; and on September 23 we recrossed the Namni Pass in a deluge of rain, and reached our alpine camp. We had left a certain amount of food here, but not very much, and when our Tibetan coolies had departed, Cranbrook, our cook, and I found ourselves rather stranded. It was five marches to the village, and the headman, who was expected to meet us here, had not arrived, nor had a man we had sent to Fort Hertz with our mail. I had a fortnight's work seed collecting in prospect, and was in no mind to go down the valley, so Cranbrook undertook to return to the village and get help. He left on September 25 and reached the village on the 29th. A few days later coolies reached me with rations, enabling us to remain on in the alpine camp (12,000 feet) till October 19. The weather in October was the best we had had since the beginning of June, and there were quite a number of alpiners in flower. On the 19th we started down the valley for the last time, with coolies who had come up to help us, and that evening I rejoined Cranbrook, whom I found in a new camp at 10,000 feet. Here we were marooned for a week, waiting for transport, and the weather breaking again we were far from comfortable. With relays of coolies we finally reached our base camp and the village on November 2. But it was a week later before our cook and the kit, which we had abandoned in the upper camp, arrived. Meanwhile the man we had sent to Fort Hertz with our mail had returned, and by the second week of November we were a reunited party.

On November 20 we broke camp for the last time and started back for Fort Hertz, reaching the Seinghku confluence and a comparatively decent track on the 23rd. Retracing our steps down the Tamai valley, we crossed over into the western Irrawaddy on December 1, and nine days later reached Fort Hertz, after an absence of just under a year. We spent a busy five days here, sorting and packing our collections of plants, seeds, mammals, birds, snakes, and insects, and on the 16th we set out on the last lap of our journey. We reached Myitkyina on New Year's Day, 1932, after an absence of just over thirteen months.

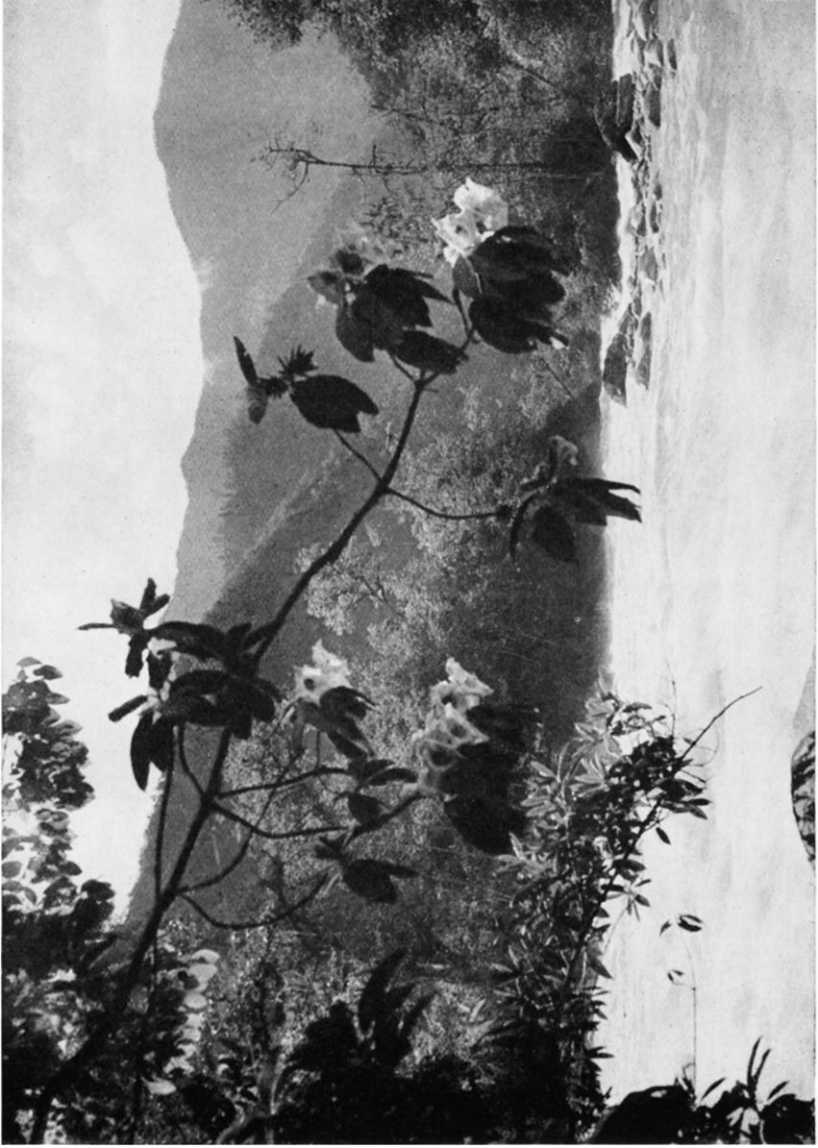
It will be some time yet before our collections are classified and named, but meanwhile it is possible to summarize some of the results of the expedition in a general way. Two problems present themselves when we come to consider the distribution of animals and more particularly plants, in south-eastern Asia. Which of the two great mountain systems—the east-west Sino-Himalayan system, or the north-south Sino-Malayan system—has mainly influenced distribution in south-east Asia: (i) in so far as a mountain system acts as a barrier, (ii) in so far as a mountain system acts as a carrier? (It may be remarked, in passing, that a great mountain system such as either of the above is itself a geographical area with its own endemic flora.) In other words, what are the relationships between the three botanical regions which are divided by, and also traversed by, these two mountain systems? The facts point to a continuous east to west flora, extending from the north-west Himalaya, eastwards through Bhutan, thence across the river system from the Tsangpo to



Rhododendron vesiculiferum in the Adung valley at 8000 feet; May



Gentiana gilvostriata in the Adung valley at 13,000 feet; October



Rhododendron Nuttallii in the Adung valley at 6000 feet; May

the Yangtze, through China to Japan and Formosa, rather than through Burma, the Malay Peninsula, and the East Indies; and this irrespective of any mountain barrier running north and south across the axis of extension. This view is strengthened as a result of our explorations and collections on the upper Irrawaddy. Thus, although the north-south ranges are such a conspicuous feature on an orographical map of south-east Asia, they have proved singularly ineffective in checking the east-to-west movement of the flora, or in advancing its north-to-south movement. We did however observe examples of this last movement, every one of which is striking.

This conclusion is of some importance in view of the much greater age of the Sino-Malayan mountain system. It indicates that the present distribution of animals and plants over south-east Asia is a geologically recent phenomenon, since it must obviously be post-Himalayan. But it is really much more recent than that. It was the advance and retreat of the ice in quite modern times which made for the present distribution, and which further accounts for most of the endemism in the mountain flora. It may be doubted indeed whether we can have any idea of the flora or its distribution here in pre-glacial times. What we see is the ultra-modern; even the recent is obliterated and a matter of conjecture. Our explorations at the sources of the Irrawaddy furnished further proofs of the great ice retreat (and of its one-time vast extension) throughout the mountains between the Brahmaputra bend and the Yangtze. We explored the upper Adung valley, crossed the pass at its head (thus proving a direct route from Burma into Tibet), and found one of the three sources of the Taron, besides disentangling other headwater streams. It may be pointed out here that the Diphuk La, at the head of the Seinghku valley, is the direct route from Burma to Rima and lower Zayul; the Namni La is the direct route to upper Zayul, *via* the Shori river, and to Tsarong and north-west Yunnan, *via* Ridong. The district round Jité and Ridong is neither Zayul nor Tsarong, and appears to be nameless. Finally, we discovered a number of glaciers, two at the source of the Adung river, and at least five at the source of the Jité river, proving how glacier-fed the eastern Irrawaddy really is.

Our collections of plants, animals, and birds are being determined at the Natural History Museum, and full details will no doubt be published later elsewhere.

APPENDIX

NOTES ON THE NATURAL HISTORY COLLECTIONS by members of the Staff of the British Museum (Natural History).

A. MAMMALS. By Guy Dollman.

During their expedition to Upper Burma Lord Cranbrook and Captain Kingdon Ward collected some three hundred mammals, many of which represent very rare genera, and names will have to be found for four new forms contained in the collection. The latter include a new gooral from the Adung valley, with which it is proposed to associate the name of Lord Cranbrook, and a new squirrel, which is to be named after Captain Kingdon Ward. There is also a bat of the genus *Myotis* and a species of the genus *Rattus* which require description. Accounts of these various new forms will appear in the *Annals and Magazine of Natural History* in due course. Two species of monkeys are contained in the collection, namely *Pithecus shortridgei* and *Macaca nemestrina*. *Pithecus shortridgei*

is a grey-coloured langur monkey allied to *Pithecus pileatus*, but entirely lacking the buff tint of that species. It was originally described from Homalin, Upper Chindwin, Burma, by the late Oldfield Thomas and the late R. C. Wroughton. The Pig-tailed Macaque, *Macaca nemestrina*, is represented by two specimens, a young one from the Adung valley and a part of a skin made into a native bag along with a portion of skin from the new species of goral, from Nam Tamai.

Four species of bats were obtained and no less than ten genera of Insectivora. Amongst the latter are some exceptionally rare forms. Three specimens of the squirrel-like Tupaia, or tree-shrew, were obtained in the Hkamti Plain and Nam Tisang. This is the common Chinese tree-shrew described by Anderson from West Yunnan. The family Talpidae is represented by three genera, namely *Parascaptor*, *Scaptonyx*, and *Rhynchonax*, the latter two being very rare genera hitherto known only from a few specimens. The genus *Scaptonyx* was founded by Milne-Edwards on material from Kokonor and Szechwan, and the species was described as *Scaptonyx fusicaudata*. Some years later Oldfield Thomas described under the name of *Scaptonyx fusicaudata affinis* a new race of this species from Atungsi in the drainage area of the Upper Mekong. The only other specimen of *Scaptonyx* in Museum collections is one collected by the late Mr. Forrest from the Mekong-Salwin Divide which has been referred to this subspecies. The present specimens, some three in number, came from the Adung valley, and therefore may be looked upon as identical with *Scaptonyx fusicaudata affinis*. It should be noted however that all three of the new specimens have considerably longer tails than the type of *affinis*, but I do not feel justified in attaching any systematic importance to this character in view of the geographical side of the problem. *Scaptonyx*, like *Rhynchonax*, is one of the members of the family Talpidae which imitate the shrews, being more like a shrew than a mole. *Rhynchonax* was described by Oldfield Thomas as a new genus in the year 1911 on material sent home by Mr. Malcolm Anderson during the Duke of Bedford's exploration of Eastern Asia. Two specimens of this rare genus are included in the collection, both from the Adung valley, so that the distribution of *Rhynchonax* is now known to be considerably more extensive than was formerly thought, the typical series of *andersoni* coming from Omisan, South Szechwan. *Rhynchonax* is closely allied to the genus *Urotrichus*, with which are associated the genera *Uropsilus*, *Nasillus*, *Dymecodon*, and *Neurotrichus*.

Amongst the shrews are fine series of the two Giant Water-shrews belonging to the genera *Nectogale* and *Chimarroale*, which appear to be referable to the species *Nectogale sikhimensis* and *Chimarroale styani*. Of the true shrews a large series of the striped shrew-mouse was collected in the Adung Valley and another rare species found in the same locality was the short-tailed *Blarinella wardi*, named after Captain Kingdon Ward by Oldfield Thomas in 1915. The type of *Blarinella wardi* was collected at Hpimaw, Upper Burma, at about 8000 feet, the genus having hitherto only been recorded from Western China. A specimen of the long-tailed shrew-mouse, *Soriculus irene*, was also obtained in the Adung valley district. This latter species has an enormously long tail compared with the length of the head and body; in the type specimen the head and body measure 60 mm. and the tail 90 mm., and in the present specimen the tail is even longer, measuring some 101 mm. The type of this species came from Yuenchingsien, South-west Szechwan, and does not appear to have been recorded from any other locality except some specimens from Mount Omi, referred to this species by Oldfield Thomas.

Two large cats were collected at Nam Tamai, *Profelis temmincki tristis* and *Profelis temmincki dominicanorum*; the latter, which was described from Foochow, Fukien, China, has recently been recorded from Laos by Wilfred H. Osgood.

Two palm-civets (*Paguma grayi*), a leopard cat (*Prionailurus bengalensis*), a martin (*Charronia flavigula*), and a panda (*Ailurus styani*), were collected at Nam Tamai and Nam Tisang. Other members of the carnivora in the collection are a wild dog, two species of weasel, and a linsang.

The collection of rodents contains about sixteen different genera including specimens of the giant flying squirrel (*Petaurista yunnanensis*), the lesser flying squirrel (*Hylopetes alboniger*), the giant squirrel (*Ratufa gigantea*), the long-nosed squirrels (*Dremomys pernyi* and *Dremomys macmillani*), and two species of striped squirrels of the genus *Tamiops*. There is also a large series of the red-bellied squirrel (*Callosciurus erythroeus*) and two specimens apparently representing an undescribed form of the genus *Tomeutes*; these latter came from the Kachin Hills and a description of the characters will be published in due course. Among the rats is an interesting new species and about six other species of the genus *Rattus*.

The ungulates are represented by three Chinese muntjacs, a serow (a subspecies of *Capricornis sumatrensis*), and the new gooral. This latter form, a description of which will be published in due course, is a very handsome animal, and Lord Cranbrook and Captain Kingdon Ward are to be congratulated on securing such a fine new species. The type came from the Adung valley and a fragment of skin apparently belonging to the same species forms part of a native bag obtained at Nam Tamai.

B. REPTILES AND AMPHIBIANS. By Dr. Malcolm Smith.

The collection of Amphibia and Reptiles, although not large, is of considerable value. The region visited is of particular interest in that it is the meeting-place of the true Himalayan and the Trans-Himalayan faunas, the latter being mainly of Chinese origin. Altogether seven species were obtained. Among the Himalayan species, whose range is now extended farther east, are *Rhacophorus maximus*, one of the largest of the Indian tree-frogs, *Scutigera sikkimensis*, an interesting toad that has not hitherto been found below 14,000 feet altitude (this specimen was collected at 12,000 feet), and a Pit Viper, *Trimeresurus jerdoni*.

Two snakes with a wide range in Southern China were obtained, namely, *Natrix nuchalis* and *Elaphe mandarina*. The only lizard collected was an *Agamid* of the genus *Calotes*, and it proves to be new to science. It was caught in camp in the Adung valley, altitude 7000 feet. I have pleasure in naming it after the leader of the expedition. A description of this lizard will appear in the forthcoming volume on Lizards in the Fauna of British India series.

C. BIRDS. By N. B. Kinnear.

The collection of birds consists of some 152 specimens belonging to 92 species, and of these over a dozen are new to the Burmese list. One, a Bar-wing, is a new race of the Hoary Bar-wing of Nepal and Sikkim. Many of the birds are intermediate in character between those found in the Himalaya and Yunnan. Among game birds there is a Temminck's Horned Tragopan, with curious brilliant blue horn-like processes of skin on either side of the head; two young birds of Sclater's Monal; Kusier's Blood Pheasant, and a Black-breasted Kalij Pheasant. Pigeons include two species, the Snow Pigeon, and the large Grey-headed Imperial Pigeon. The only wading bird is a common Sandpiper obtained on migration on November 30 at Trang, near Myitkyina, while a Teal—a winter visitor to the Adung valley—was shot on February 27. A Burmese Barred Owllet is the only bird of prey in the collection, but the Woodpeckers are represented by three kinds of Pied and a beautiful Rufous Piculet, a miniature Woodpecker about the size of a Nuthatch. Of Sunbirds there is the brilliant Yunnan fork-tailed Sunbird, also Dabry's Sunbird with a brilliant scarlet breast and metallic purple

head, and the more sombre coloured Nepal Yellow-necked Sunbird ranging from Sikkim to Yunnan.

Two examples of Hodgson's Wagtail were obtained in May, and probably breed in the district. The Finches include several interesting species, but three examples of the Himalayan Siskin call for special mention, since, before Forrest obtained a single male on the Lichiang Range in 1925, it was only known from six specimens in the British Museum from Sikkim. There are several small Willow Warblers and two kinds of Thrush, one of which, the Black-throated Thrush, is a migrant from the north and has occurred in the British Isles as a straggler. A Wren indistinguishable from that of Nepal is represented by a single specimen, and there are two Brown Dippers similar to our bird but of a uniform brown all over. Among the Timalidae there are two birds of striking colour, the beautiful little Fire-tailed Mixornis, green all over with the outer webs of the tail edged with red, and Hodgson's Grandala, the size of a Thrush and of a deep violet-blue colour; this last was previously known only from the Himalaya and Szechwan. Of the true Babblers, three out of the five species have not previously been recorded outside Yunnan. The Tits include a miniature Long-tailed Tit, a race of our Cole Tit, and a Crested and Green-backed Tit. Among the Corvidae there is a form of the Indian Jungle Crow; a beautiful long-tailed blue-and-white Magpie, with a red bill; and a Green Magpie, or Hunting Crow, in which the yellowish-green colour changes after death to a dull blue.

D. INSECTS. By K. G. Blair.

Mr. N. D. Riley reports of the butterflies, on a preliminary examination, that they are all known species but include some interesting forms and that their affinities are entirely with Western China, not at all with India or Indo-China (*i.e.* Eastern Palaeartic, not Oriental).

The Diptera consisted mainly of Tipulidae, of which Dr. F. W. Edwards finds forty species, almost all undescribed. The identified species are *Tipula hingstoni* Edw. recorded from Mount Everest and *T. wardi* Edw. from Southern Tibet. (The latter is probably identical with *T. splendens* Brun. from Garhwal.) The others show no noticeable affinity to Indian or Indo-Chinese forms, but several of them are allied to species known from northern Yunnan or Szechwan; others are related to European forms.

The Bumble-Bees have been examined by Dr. O. W. Richards, and show affinities with the Himalaya.

DISCUSSION

Before the paper the PRESIDENT (Admiral Sir WILLIAM GOODENOUGH) said: That great river, the Irrawaddy, a free translation of which I believe to be "the container" or "possessor of water," and which forms one of the great highways of Burma, though not, as many people think, part of its irrigation, has its source somewhere about the 28th or 29th parallel of latitude. I say "about," for, unless Mr. Kingdon Ward has discovered its source during his recent journey, the real source of the Irrawaddy is unknown. As the crow flies it is many miles from the mouth of that river, and as the river runs it is 1300 miles, for a thousand of which from its mouth it is navigable by good-sized steamers. I mention this to show how important the source of such a river is. It is the headwaters of that river of which we are to hear to-night, and we are to hear of them from one whose travels and investigations have made him one of the greatest authorities that we could call upon.

Mr. Kingdon Ward was at St. Paul's School, and after that at Christ's College, Cambridge. He started his journeys early, for in 1907, though you might not

think it to look at him, he was in Shanghai. He crossed China in 1909-10, and began plant-hunting in 1911. In 1913-14 he was travelling about Yunnan and the Burmese frontier, and after serving in the war he went back to Burma and made many journeys there. He went to Western China and found new routes back from those parts in 1924, 1926, and 1928. Then he explored certain portions of Assam and the frontiers which approach to those places, and in 1929 he made a very interesting journey through Indo-China across to Hanoi on the Annam border. In 1931 he and his companion, Lord Cranbrook, who is here to-night, were the first Europeans to reach the Tamai pass that leads into Tibet, but just missed joining up with the route followed by Colonel Bailey as he came down towards the south and west in 1911. It is of that journey that I will ask Mr. Kingdon Ward to tell us now.

Mr. Kingdon Ward then read the paper printed above, and a discussion followed.

The PRESIDENT: Although I said it in introduction of Mr. Kingdon Ward I think it will bear repetition, that is, that he and Lord Cranbrook were the first two Europeans to look over the Tamai pass into Tibet. Any new expedition of that kind bears the mark of the pioneer which we like to honour so far as we can in this Society. Lord Cranbrook is here this evening. I will ask him to address us.

Lord CRANBROOK: It is extremely embarrassing to follow Mr. Kingdon Ward because he always does things much better than I do. You have seen his photographs, but you have seen none of mine because none of them came out. I was following him the whole time and I am going to do the same now.

As he said, my job on the trip was mainly zoology. I do not know whether you realize what are the trials of a zoologist's life out in Burma. I am devoted to roast duck, and one thing I love more than any other is the nice brown fat skin. When one shot a duck and had to take that skin off for the Museum it almost broke one's heart, and when one brought it home to be told it was a common teal one's heart was completely broken. We got a few birds and a good few mammals, but, as Mr. Kingdon Ward said, most of the mammals are very small. I used to carry a rifle all over the place, a shot-gun, a catapult, and a butterfly-net. I did far more with the butterfly-net than with the rifle. We got one new big-game animal, a new species of goral. Apart from that the animals were all previously known.

Kingdon Ward showed how four areas meet in the district we traversed: those areas are Tibetan, Chinese, Malayan, and Indian; and he told you also that the flowers are very largely Tibetan and Chinese. In the same way the Chinese forms seem to predominate in both the birds and the animals. It is too soon to say anything definite yet because it has not been possible to work out the animals. We carried an enormous quantity of tackle to collect snakes and frogs and such things but were very unsuccessful. Snakes and frogs hid themselves whenever we approached. We brought back four snakes, one frog, and two of the most delicious and enormous slugs you have ever seen. They were absolute gems, but they are set as hard as rocks and nobody has found out what they are.

The PRESIDENT: You have heard Mr. Kingdon Ward speak of the governors of Burma. We have one here to-night, Sir Harcourt Butler. I will ask him to address us.

Sir HARCOURT BUTLER: I feel that I cannot add anything very important to the delightful addresses that you have already heard, but your President told me, and we all have to obey the President, that he wished me to say something about the lower reaches of the Irrawaddy. Mr. Kingdon Ward told us about the Irrawaddy as far south as Myitkyina.

The Irrawaddy is still the great highway of Burma. Lord Dalhousie, one of the greatest and most far-seeing of the Governors-General of India, added

Lower Burma to the British Empire after the Second Burmese War in 1852. It was one of his main objects to open the Irrawaddy to the commerce of the world. He called it, and it still is, a mighty avenue. The opening of the Suez Canal in 1869 completed the transformation of Burma; a great demand was set up for rice and other grain and raw materials, and the Irrawaddy from that day has been a very great highway of commerce. I swam across it somewhere about 200 miles below Myitkyina, where it was so rapid a stream that I was carried at least three-quarters of a mile down to the bank on the other side before I could land. I should not swim it now! I was told then there were no crocodiles, but towards the end of my time in Burma I did find a crocodile in a tributary of the Irrawaddy. The river is not however infested with crocodiles, as are the rivers of India. There are a few at the mouth. How they get there is not quite known. There is another difference as compared with the Indian rivers, and it is that the porpoise of the Irrawaddy is quite a distinct species from the gangetic porpoise which is found not only in the Brahmaputra and the Ganges, but also in the Indus. Geologists tell us that the whole of Northern India was once a great sea or lake.

The Irrawaddy at Mandalay has become rather a slower stream. Down to this point its course is fairly straight. Then it begins to meander. Mandalay is about 250 feet above sea-level, and the Irrawaddy runs over 700 miles from there before it reaches the sea. There are great variations in the level of the river. Between the lowest watermark and the highest flood-mark at Mandalay I think, speaking from memory, there is about 40 feet. Southern Burma is one vast rice plain through which the Irrawaddy discharges itself in innumerable streams. Hitherto we have not used the Irrawaddy for irrigation. The water is wanted to keep up the steamer service which is an excellent service run by the Irrawaddy Flotilla Company. The area of land to be irrigated between the hills and the river is said by engineers of Indian experience to be insufficient to make it worth while to develop a big irrigation scheme. We are making railways and roads, and in time no doubt the Irrawaddy will cease to be the important highway it is at present, and then perhaps its waters will be used for irrigation and also for water-supply to the towns.

The Irrawaddy is a beautiful river. You see all sorts of craft on it, canoes, sailing-boats, a sort of dhow, what they call sampans, and rafts with which they bring teak wood down to the coast. It takes five years to get a teak tree to the coast. The wood is so heavy that they have to kill it before it will float. A notch is cut round the base of the tree something like 6 inches deep. That lets all the sap out, and after three years the tree is felled and dragged to the nearest stream which flows into the Irrawaddy or other big river. The trees get jammed and they then use elephants and buffaloes to pull them out. Once the logs reach the big rivers they are made up into rafts with bamboos and other lighter woods, and they float slowly down the river to the coast.

The sunsets on the Irrawaddy are famous. Life there is very peaceful. People enjoy life and wear bright garments. They are altogether a most charming race. This is all I have to say about the lower end of the Irrawaddy, of the higher reaches of which we have heard in Mr. Kingdon Ward's and Lord Cranbrook's delightful addresses.

The PRESIDENT: Mr. Kingdon Ward, the size of this audience will have shown you when you began how eagerly we looked forward to your lecture, and I can assure you, both on my own behalf and on behalf of everybody here, that we have not been disappointed in your remarks, nor in any of the very lovely pictures which you have shown us. If we have one further wish, when you go again to that part of the world you will be able to satisfy it, for by then I hope we shall be able to supply you from this country with some plates for coloured photographs.

I know when you went last time you tried to take some and that something went wrong with them.

I was very glad to hear you give such praise to the maps of the Survey of India. There is a member of the Indian Survey here this evening, and he tells me that he would like to tell you how gratified he is to hear that those maps are correct. From time to time there have been criticisms of the maps, I will not say of the main features, but of some of the details of the maps, and it must be a great satisfaction to those concerned to know that you have found them so accurate.

You heard Mr. Kingdon Ward speak of the trials of travel to a middle-aged man. I am told by his companions that that is not the trouble they find. On the contrary, they wish he would take things a little easier sometimes so far as they are concerned. Some one remarked to me to-day: "Oh, Kingdon Ward, by Jove! You know, he really is as hard as nails." I am going to take advantage of my age and my position as President to tell Mr. Kingdon Ward that when he goes again we hope he will look after himself a little more, because we want to get a great deal more out of him yet. We do not want to see him breaking himself up unnecessarily.

I have not been in those parts myself. Very few people have. My business here is, as always, a very delightful one, and that is to convey the thanks of this audience to Mr. Kingdon Ward and Lord Cranbrook for a very charming evening. I did not mention before, and perhaps it is unnecessary to remind you now, that Mr. Kingdon Ward is a Gold Medallist of our Society; and after the way in which he has delivered his lecture, with no mention of hardships, difficulties, and dangers encountered, you may not be surprised. I beg you to accept, therefore, Mr. Kingdon Ward, our most sincere thanks for the admirable work you have done and for the delightful and, may I say, modest way in which you have described it.