A TRIP TO PU BIA IN FRENCH LAOS.

By A. F. G. KERR.

On March 13th, 1932, accompanied by Nai Noe Isarangura, I left Bangkok with the intention of visiting the mountain known as Pu Bia, in French Laos. Pu Bia, which is 2,880 metres (9,450 feet) in height, is the second highest mountain in the Indo-Chinese Peninsula. The highest is Mount Victoria (3,350 metres, or 11,000 feet) in the Arakan Yoma, latitude 21° 15° N.

The first part of the journey, as far as Bua Yai, was made by train. From Bua Yai motor-buses were taken to Kawnken. On reaching Kawnken I determined to make a detour, and visit Pu Wieng, a curious circular hill lying about 75 kilometres to the west of Kawnken. The motor lorry which carried us there took about six and a half hours, over very sandy roads, to reach Pak Chawng, a gap in the circle of hills forming Pu Wieng. This is the only break in the circle, and is situated on its eastern side. On each side of this gap, which is about half a kilometre wide, the hills are low, about 100–150 metres high, which is very much lower than they are on the western side of the circle. Within the circle the ground is a level plain, about 300 kilometres in the east to west diameter and somewhat more in the north to south diameter.

The hills forming Pu Wieng are rocky, the rock being sandstone, which dips towards the centre of the ring. This dip inwards was noticed both on the east side, at Pak Chawng, and on the west side, which was visited in the previous year. In consequence, apparently, of this dip, the outer slope of the hills forming the ring is steeper than the inner; the former is, indeed, precipitous in many places.

In the neighbourhood of Pak Chawng the whole ridge is clothed with deciduous forest, of the 'teng-rang' type; 'teng' (*Shorea obtusa*) and 'rang' (*Pentacme siamensis*) being its commonest trees. On the west side, where the ridge is much higher, its top is clothed with dry evergreen forest.

Three guardian spirits, Pra Pūm (พระภูมิ์), Pra Pan (พระพาน) and Phra Krut (พระกฺริด), are said to preside over the Pak Chawng gap;

through which runs the road to Ampô Pu Wieng, situated in the middle of the central plain. These spirits are still held in some respect, but not to such a degree as formerly. Now they have to share one shrine; whereas formerly they had a shrine each. A few years ago a traveller would not think of riding through the gap, he always got off his pony and walked. Nowadays motor cars rattle through, and few riders even think of dismounting.

Through the gap also flows a stream, the Lam Bawng (ลำบอง); or, rather, it flows in the rains, for in the dry season there is no running water, only a series of stagnant pools. By the stream, within the gap, was a grove of high trees; a welcome relief from the small trees of the 'teng-rang' forest, which covers so much of the country here. The chief trees in the grove were yang (*Dipterocarpus alatus*), krachao (*Holoptelea integrifolia*), and takraw (*Schleichera trijuga*). In this pleasant spot we pitched our camp, and remained for three nights.

During our stay here numbers of a swallow-tail butterfly, apparently the common *Papilio aristolochiae*, were seen hovering low down over the ground in the grove, and occasionally alighting on a small shoot. On closer examination it was seen that they always alighted on the young shoots of a species of *Aristolochia*, which were just appearing above the ground; and that they were laying their eggs on these shoots. I examined sixteen consecutive shoots of this *Aristolochia*, some of them only four or five inches above the ground, with leaves not yet unfolded, and found on every shoot one or more eggs of the *Papilio*. This observation led, later on, to the discovery of an interesting plant.

On March 18th we returned to Kawnken and the next day went on to Nawngkai by car. Nawngkai is strung out along the Me Kong, the water in which was now quite low. The next day was Sunday, when all government offices are closed, so we had, perforce, to wait till the day after before continuing our journey. On Monday morning we visited Wiengchan, or Vientiane, as it is now officially spelt, to obtain leave from the French authorities to tour on their side of the boundary. This permission was readily granted, and word was sent ahead to the next post to arrange transport for us.

I should here like to express my thanks to the officials of French Laos for the facilities they so willingly afforded us. In consequence of this official help we found the all important arrangement of transport comparatively easy.

We proposed to start northwards for Pu Bia from Paksane, a post lower down the Me Kong, which could be reached by boat. There are launches, both French and Siamese, running on the river, but we decided to go by the ordinary river boat, which, though much slower, could be stopped at any interesting spot for as long as one liked. We got off about mid-day on Monday the 20th, and, travelling very leisurely, took four days to reach Chaiyaburi, camping each night on a sand-bank. During these four days we had an opportunity of seeing something of the very interesting flora along the Me Kong, a subject to which I will refer later.

Chaiyaburi is a village on the Siamese side, directly opposite Paksane on the French side of the river. At Chaiyaburi there stretches out from the river-bank a very extensive sand-bank, about eight kilometres long and half a kilometre broad, which is under water when the river rises in the rains. We camped on this sand-bank, and found our first night there uncomfortably cold. This cold was rather surprising, coming, as it did, in the middle of the hot season. It was caused by a stiff, cold, north-easterly wind, which not infrequently blows here. This wind dropped the day after our arrival, when the camp became uncomfortably hot.

Arrangements for our overland transport were made by the very obliging officer in charge of the post at Paksane, M. Joseph Bonacorsi. It was arranged that carriers would be ready for us on the 26th. Our party crossed the river on that morning, to find the carriers waiting as promised. After a short delay, arranging the loads, for which twenty-seven carriers were required, we struck northwards, away from the Me Kong.

Just beyond the village of Paksane we had to cross, by raft, to the west bank of the Nam Sane. By this crossing was growing a white rose, *Rosa clynophylla*, which is not uncommon along many of the streams entering this part of the Me Kong. Most of the first day was spent in marching through a type of bamboo forest very

common both here and on the Siamese side. The bamboo in this type is entirely of one kind, 'mai lai' (*Oxytenanthera albociliata*), a rather low, tufted species, with spreading and often branching culms. Through the bamboo were scattered some large trees, among which were *Dipterocarpus costatus*, *Anisoptera sp.*, *Shorea sp.*, *Elaeocarpus sp.*, and others. It is probable that this type of forest is a secondary growth which has come up on ground cleared for temporary cultivation; the scattered trees representing the few that are usually left standing on such clearings. Farther south, particularly in the Malay Peninsula, these clearings are more commonly followed by a growth of lalang grass (*Imperata cylindrica* var. *Koenigii*), which, with the trees left standing, produces a typical savannah. The bamboo forest here might well be called a bamboo savannah, the only difference from the ordinary savannah being that bamboo replaces grass. Besides this bamboo forest, some patches of open deciduous forest, with 'hieng' (*Dipterocarpus obtusifolius*) as the dominant tree, were passed. Most of the next day was again spent in passing through 'mai lai' forest, which was not very attractive from my point of view, as the number of plant species to be found in it is very limited. Usually it has little or no undergrowth. The last part of the day's march was along the bank of the Nam Sane, where there were some patches of open forest. In these patches were some fine trees of 'kabek' (*Lagerstroemia calyculata*), towering, white and leafless, over their neighbours. Here also were numerous trees of 'koi' (*Streblus asper*), whose bark is used in Bangkok for making paper. In this district, however, it is known as 'sompaw', not 'koi'.

About mid-day the large village of Borikane was reached. The headquarters of the government of the district was formerly at Borikane, but some years ago they were moved farther south to Muang Mai, or 'New Town'; hence Borikane is sometimes known as Muang Kao, or 'Old Town'.

The inhabitants of Borikane are chiefly Tai Nua, who are, for the most part, ancestor-worshippers, not Buddhists. However, besides the spirits of their ancestors, these villagers, like most others in this region, have a great respect for certain other spirits or 'pi,'

particularly those to be found in the forest. Our guide informed us that the three chief jungle spirits were: (1) *Pi Kawng Koi*, which is small, about half as high as a man's knee, with long hair falling about its shoulders. It wears only a sin (skirt), and frequents streams, living on crabs and turtles. The Pi Kawng Koi is a malignant spirit, getting into the bodies of its victims and devouring their entrails. When one is in the forest it is dangerous to cook crabs or turtles, as the smell of the cooking may attract the Pi Kawng Koi. (2) *Phya Wai* is a spirit like a gibbon in appearance, and comes with wind and rain. It sometimes eats men. (3) *Pi Sang Lao* is a spirit which may also eat men. It comes with a mighty wind, which blows down the trees to form a path through the forest for it.

Unlike the men farther south, who 'hap' their loads, that is, sling a divided load at each end of a pole carried on the shoulder, most of the villagers here preferred the 'bek' method, in which a single load is carried on the back, slung from the shoulders and forehead. Our loads had been arranged for the 'hap' method, but Nai Noe soon re-arranged them to suit those who wanted to 'bek'.

On leaving the village the next day, a belt of scrub had to be traversed. This scrub consisted chiefly of *Eupatorium odoratum*, a weed known in Northern Siam as 'ya muang wai', but here called 'ya pang'. This American plant has now spread all over the Indo-Chinese Peninsula, though it is of comparatively recent introduction. It was interesting to find that the villagers of Borikane put its first appearance here at only about four years previously. This, no doubt, is very much of an underestimate, but still points to a very recent invasion. Soon the path entered hilly country, and here another type of forest was encountered. Bamboos still dominated the scene; but these bamboos were tall and evergreen, unlike the small, deciduous 'mai lai', and gave a welcome shade. Two species, known as 'mai hia' and 'mai sawt', were common. Here, too, there were trees scattered among the bamboos; but, for the most part, they were different species to those in the 'mai lai'; among them being *Anthocephalus indica, Hibiscus macrophyllus, Tetrameles nudiflora, Duabanga sonneratioides and Parkia sp.* One small

tree, a *Saraca,* was a blaze of red flowers. Though the country was hilly, the path was well-graded, so ascents and descents were not as tedious as they usually are. The next day, marching through similar country, we saw the effects of a curious hurricane that had recently passed over these hills. It had, as it were, mowed regular lanes through the forest, levelling bamboos and big trees alike; though here and there a tree-trunk stood erect in the tangle, its branching top snapped clean off. On the sides of these lanes, which were about one hundred metres broad, the forest stood upright and unharmed. The lanes of destruction sometimes crossed our path, when they considerably impeded our progress. Where, however, the path was cut out of the side of the hill, the fallen bamboos and trees formed a roof over it, and we were able to get along fairly well in the tunnel so formed. Our carriers considered this devastation the work of the 'Pi Sang Lao'. We learned from them that these winds may last only two or three hours, and that they are inconstant in their direction, quickly changing from one point of the compass to another. A wind strong enough to do damage, such as we saw, occurs only once in two or three years. The strength of such winds usually diminishes before they reach the plains.

Rainy weather now set in, and from this on till we returned to the Me Kong seldom a day passed without one or more heavy showers. In the forenoon of April 1st, we left the hills and descended into the valley of the Nam Sane, here dotted with many villages. Our path now lay along the bank of the river, which we followed up. The valley was mostly cultivated, but here and there were patches of open scrub with stunted trees of kabek (*Lagerstroemia calyculata*) and koi (*Streblus asper*). Many of these trees were heavily loaded with epiphytes: mosses, ferns, orchids and a species of *Pothos.* Most of the orchids were not in flower, but on the top of one tree we saw a long spray of red flowers, which turned out to be *Renanthera coccinea.* It is, at first sight, rather curious that the heaviest loads of epiphytes are found on trees in two very different situations; namely, on the ridges of high mountains and in rather narrow valleys by streams, particularly in the latter case, where they are growing more or less openly. In both cases the

Path of the hurricane.

Tatom.

predominant factors favouring epiphytism are probably moisture and light.

Early on the morning of April 2nd we reached the picturesquely situated village of Tatom, and remained there two nights, housed in comfortable quarters assigned to us by the Governor. The people of Tatom are Lao Puan, or, as they sometimes call themselves, Tai Puan. This appellation is derived from Muang Puan, the old name for Chiengkwang Province. Their dialect is slightly different from both that of the Tai Nua and that of the Lao of Nawngkai.

During our stay at Tatom we visited one of the smaller rocky limestone peaks to the west of the village, but did not manage to reach the main limestone ridge. The end of the dry season is not a good time for the limestone flora; but, though most of the herbaceous vegetation was dried up, there were still some interesting plants to be seen. Among the lower rocks a small spreading tree, a box (*Buxus sp.*), was common. Near the top a rather large shrub was dominant. It was nearly leafless, but bore large yellow flowers, at a distance rather like those of an *Allamanda*. The shrub was, however, one of the Bignoniaceae, probably a species of *Radermachera*. Another noteworthy point about this shrub was the large number of orchids which grew on its branches. The most abundant of these was a *Desmotrichum*, not in flower. Among the others were *Dendrobium chrysotoxum, D. calceolaria, Bulbophyllum spp., Sarcanthus spp.* and *Saccolabium micranthum*. Of these, only *D. chrysotoxum*, a *Sarcanthus* and *Saccolabium micranthum* were in flower. No species of *Dracaena* or *Pandanus*, common genera on limestone, were seen here.

On April 4th we left Tatom, turning westward, away from the Nam Sane. Soon after midday we reached the Nam Che, a tributary of the Nam Ngiep. By the river were a few houses, inhabited by a people called Pu Teng, probably a branch of the Kamuk. Here we camped for the night, after crossing the river by boat. Along each side of the river there were stretches of damp sand, on which butterflies were settling in dense patches. White butterflies of the genus *Appias* predominated, but there were also species belonging to *Prioneris, Papilio, Pathysa, Zetides, Paranti-*

copsis, Tros, Hebomoia, Danais, Euploea, Cyrestis, Cirrochroa, Issoria, and *Libythea,* as well as large numbers of small blues and skippers. Many remained on the sand long after the sun had gone behind the hills. Some were still there at 6.10 p. m., when I had to discontinue the observation. These patches of butterflies showed a partial sorting of species, for some patches were chiefly formed of species of *Appias,* others of *Euploea* and *Danais.*

A great part of the forenoon march on April 5th was through bamboo, though the streams were usually fringed with trees. Among the latter a horse-chestnut (*Aesculus sp.*), in full bloom, was conspicuous. Early in the afternoon the Nam Ngiep was reached. Soon afterwards we crossed the river to a large village and put up at the rest-house there. This village is usually marked on maps as Tawieng, or Ta Viang, but the inhabitants call it Ban Dôt (เด็ด). It is in the commune of Tawieng. As Tawieng is the better known name, it seems preferable to adhere to it. The villagers call themselves Tai Dam. The men usually wear dark blue trousers and coat; the women a long, dark blue sin, adorned at the lower edge with a red and yellow pattern, and a dark blue coat, or breast-cloth. Some of the words used by this people are peculiar, e. g. they say 'im' for mother, and 'ai' for father, but, on the whole, their language seems very close to Lao. The headman stated that there were three tribes in the district, which he distinguished as follows: (1) *Tai Dam,* who wear black (really dark blue) clothes, and worship the spirits of their ancestors. (2) *Lao,* who are Buddhists. (3) *Pu Teng,* who are spirit-worshippers, and cannot make their own clothes.

A tree just outside the village afforded a side-light on the beliefs of these people. On this tree were suspended several wicker-baskets, each basket containing a number of empty bamboo joints. On enquiry it was found that these joints had contained rice, 'kao lam', which had been eaten by women expecting to become mothers. At such a time, after the rice has been eaten, the joint which contained it must not be simply thrown away. If that were done, the joint would be defiled by pigs or chickens, in consequence of which the baby would develop skin diseases. To prevent this the joints are hung up out of the reach of these domestic animals.

Up to this point we had been following the main route from Paksane to Chiengkwang. On leaving Tawieng, however, we turned off to the west, following up a small stream, the Hui Nam Pang. Along this hui were a number of cultivation-clearings; in some maize was just beginning to sprout, others had only just been burnt. In one recently burnt clearing, hundreds of butterflies, all of one species, a *Euploea*, were flitting about and settling on the burnt wood. We soon left the stream, and began a steep ascent, into high evergreen forest with very little bamboo.

By the afternoon we had reached a height of about 1,070 metres (3,500 feet). Here there was a fairly level stretch, with large limestone rocks scattered about under the lofty trees. These rocks were clothed with numerous epiphytes, including several gesnerads, none of them, unfortunately, in flower. From this we descended slightly, part of the way through a forest largely composed of a giant bamboo (*Dendrocalamus sp.*), known as 'mai hok'. That evening we camped by a stream at the eastern end of the Muang Awm valley, the altitude being about 910 metres (3,000 feet).

This camp was notable for the number of insects that swarmed in and around the tents. Some of these, like hover-flies, were annoying, but comparatively innocuous; others, such as sand-flies (*Simulium*) and horse-flies (*Tabanus* and *Chrysops*), were actively aggressive.

There are several small villages in the valley, each with its own name, but collectively known as Muang Awm. At the bottom of the valley flows the Me Awm; rice-fields occupying the low-lying ground near the stream. On either side of the fields the ground is undulating, covered with rather closely-grazed grass, and, in places, also with scattered, small trees. Outside this again come the hills, clothed with evergreen forest. Towards the western end of the valley, precipitous limestone cliffs rise behind the hills on its northern side. These cliffs are part of the limestone rampart round Pu Bia.

The rice-fields were now dry and uncultivated, but some of them were quite yellow with the flowers of a small *Gnaphalium*. The grassy ground bordering the fields showed a greater variety of colour. Particularly notable were the crimson and pink inflorescen-

ces of a *Curcuma*, which dotted the ground in all directions. Here also were the pink flowers of a ground-orchid (*Eulophia Burkei*), the yellow ones of a *Crepis*, and the white ones of a *Gerbera*. Much less conspicuous, in fact very inconspicuous, was a small gentian (*Gentiana pedicillata var. rosulata*)[1] whose tiny flowers rarely expand. Here and there were also patches of a tall *Artemisia* and a large labiate, neither in flower.

The scattered small trees belonged chiefly to the genera *Glochidion*, *Aporosa*, *Randia* and *Albizzia*. From many of them hung tassels of the purple, yellow and white flowers of *Dendrobium crystallinum*. At the edge of the evergreen forest one striking tree was not uncommon; a species of *Styrax* with drooping white flowers. At a little distance it looked rather like a cherry-tree in bloom.

This flora, though chiefly tropical in aspect, is subject to quite severe cold in the winter. Judging from the accounts given by the villagers, hoar frosts are not uncommon in the valley during the cold season.

On April 8th we continued our journey, travelling westwards up the valley, passing near several of the villages on our way. On reaching the end of the valley we ascended through evergreen forest to the top of a small ridge. The descent on the other side was chiefly through old clearings. Some of these clearings were overgrown with a thick growth of wild bananas, others with a tall grass (*Thysanolaena Agrostis*), others again with the ordinary lalang (*Imperata cylindrica* var. *Koenigii*). At the foot of the ridge we came across a small patch of open forest, composed chiefly of an oak (*Quercus Griffithii*), and a conifer (*Keteleeria Davidiana*). This conifer, belonging to a genus nearly related to the silver-firs (*Abies*), was quite an unexpected and a very interesting find. It is curious that this genus, which extends from China to Southern Annam, has never been recorded from Siam.

About noon on this day we caught our first glimpse of Pu Bia, through a gorge in the limestone cliffs to the north of our path. These cliffs extend a great part of the way round the mountain. On

[1] I am indebted to Mr. C. V. B. Marquand for the identification of this gentian.

its southern and western sides they are nearly continuous, only interrupted here and there by narrow gorges. The other sides we did not see.

Close by this gorge was a grove of spreading oaks (*Quercus Griffithii*), beneath which the ground was dotted with hundreds of tufts of the purple and white flowers of *Kaempferia rotunda*. At a little distance these flowers have very much the appearance of crocuses; a likeness increased by the absence of leaves at this stage. It is sometimes said that the Tropics cannot produce a show of flowers like a bank of primroses or a bluebell dell; such a grove as this, however, or a grassy meadow gay with the inflorescences of a *Curcuma*, is not unworthy of its temperate rivals.

We now went westward, along the slope of the hills, keeping the wall of limestone cliffs on our right; much of the way through lalang savannah. The cliffs reached an altitude of 2,000 metres (6,760 feet) or more. On their tops could here and there be seen what looked like a small palm. I greatly regretted not getting an opportunity of climbing to the summit of these cliffs. No doubt a very interesting flora would be found at that height on the dry limestone. The limestone peaks of Doi Chiengdao, of about the same height, have a flora very different from that of any other mountain in Northern Siam; so it would have been very interesting to see how these two limestone floras compared with one another.

That night, April 8th, we camped on the hill-side, close to a wooded ravine. We pitched our tents in a small, open, grassy patch, but the carriers elected to sleep under the trees near by. About midnight we were aroused by loud, concerted shouting; the usual means of scaring off a beast or devil at night. When the shouting had subsided, we found that no one had sustained any damage, beyond a fright. It appeared that three carriers were sleeping side by side, wrapped from head to foot in their blankets. The middle one of the three suddenly felt a blow on the shoulder. He was so frightened that at first he dared not move or make a sound. On receiving a second blow, however, he found his voice and shouted; his shouts being quickly taken up by his comrades. Something was heard to move off into the jungle, but in the dark nothing could be

seen. If, as most of the carriers were convinced, the visitor was a tiger, the man had a very lucky escape. There was not much sleep for the men for the rest of the night. They all came out in the open and kept fires burning, but there was no further alarm.

Soon after starting on the morning of the 9th, we crossed a fairly large stream, the Nam Fen. One route to Pu Bia follows up this stream; but this path was now much overgrown, as the Meo were no longer working along it. Leaving the Nam Fen, we had a steep ascent on to a ridge, where we found a deserted Meo village, called Ban Pakatai. It had been deserted only about a month previously, on account of the number of deaths occurring there. Judging from the symptoms, as described by one of the former inhabitants, the deaths were due to epidemic pneumonia.

Round this village, and round other Meo villages met with later, there was a thick scrub, five or six feet high. In some places this scrub was an almost pure growth of *Solanum torvum*. In others the *Solanum* was mixed with species of *Rubus*, *Melastoma normale*, *Gelsemium sp.*, and other plants. One of the species of *Rubus*, *R. efferatus*, had a good crop of delicious yellow raspberries. Early in the afternoon we descended into a valley, very similar to that of Muang Awm. This was the valley of the Nam Cha, to which the name Muang Cha is commonly given. There is now, however, no village representing Muang Cha. At one time there was a Lao village here of that name, but it was deserted some fifty years ago and has quite disappeared. The rice-fields of the valley are, however, still cultivated. In the season the Meo come down from their hill villages to plant them.

In the valley we passed through a grove of oaks (*Quercus Griffithii*), on many of which orchids were growing. Notably one old tree, in a dying condition, with many of its branches dry and leafless, was heavily loaded with orchids. Among them were three striking species in flower, all of *Dendrobium*: *D. pendulum*, *D. nobile* and *D. Denneanum*. Most of these, being high up on dead branches, could not, with any degree of safety, be reached.

Beyond this grove we turned northwards, through a rocky defile, bounded by limestone crags. Through this defile flowed the

Meo village, Ban Hao.

Meo children.

Nam Cha, before entering its open valley. The slopes at the foot of the cliffs had, for the most part, been recently cleared and burned. Some way up this defile, on a small hill at the foot of a limestone pinnacle, we came on a Meo village, Ban Hao. Here we had to camp, as from this point we were to start the ascent of Pu Bia. The vicinity of the village did not look inviting for a camp, as the place swarmed with children, pigs and cattle; but finally we found a suitable spot down by the river.

At Ban Hao we had to wait for two days, before we could get a sufficient number of carriers for the ascent. The Meo had no objection to climbing the mountain light, but they objected to carrying up loads. We had no difficulty in getting an advance party, of eleven men, to go ahead and clear a path where necessary. This party reached the top and got back to the village on the afternoon of the second day.

The route we proposed to take was that followed by McCarthy [1], when he ascended the mountain in December, 1892. Since that time several survey parties have made the ascent, at least one of them by the Ban Hao route.

About 11 a.m. on the 12th April, we finally got together sufficient carriers; largely owing to the energy of Nai Noe Isarangura, who personally went round to some of the other villages to make up the necessary number. We took twenty-five men with very light loads, several others accompanying us unloaded. A great part of the kit was left at Ban Hao.

Leaving the village we first ascended to the ridge dividing the Nam Cha from the Nam Fen drainage basins. This ridge, about 1,460 metres (4,800 feet) in altitude, separates the main mass of Pu Bia on the north from a lofty limestone pinnacle on the south. Up to this point we had been passing through clearings, some quite overgrown with scrub, others recent. On these clearings the Meo cultivate maize, opium-poppy, tobacco, potatoes, beans, gourds and various other crops. Here and there they had planted peach-trees, at this season in very young fruit. Just below the crest of the

[1] Surveying and Exploring in Siam, by James McCarthy, London, 1900, p. 182.

ridge was an abandoned hut, near which there was water, the last to be met with for some time.

On leaving the ridge we soon entered evergreen forest, which continued to the summit, though changing in type. The ascent was steep and, at first, fairly continuous. Our ascent was accompanied by continuous whistling, for the Meo carriers on a steep ascent make a curious whistling noise with each inspiration. At about 1,800 metres (5,900 feet) we stopped for tiffin. Though there was no water to be got here, this did not trouble us, as most of the men had brought some with them, and the cooking had been done before starting. Here we were still in high evergreen forest. Some of the trees were getting mossy, but not to any great extent. At 1,930 metres (6,330 feet), we came across the first of the large conifers known as 'bia'. It is from these conifers that the mountain takes its name. They proved to be a species of *Thuja*. One of them measured 3.47 metres in circumference at breast-height, and was about 25 metres high. Larger specimens were seen later, but were not measured. The wood burns very readily, even when green, and is used for torches. It is noteworthy that, with the exception of *Podocarpus* and *Gnetum*, the *Thuja* and the *Keteleeria* were the only gymnosperms met with on the trip. From this point the ascent was less continuous, and we had a good deal of up and down work to do. The trees now carried more moss and other epiphytes. Among the epiphytes a *Dendrobium* with large white flowers was conspicuous and common. It seems to be an undescribed species, related to *D. formosum*.

We camped that evening in a small hollow at an altitude of about 2,120 metres (6,950 feet). Misty weather had prevailed all the afternoon, and in the evening rain came on, fortunately after the tents were up. For the rest of our time on the mountain we had cold, wet weather, mist or rain, with only an occasional gleam of sunshine. The next day we continued our way towards the summit, now frequently ascending and descending small ridges. Here the trees were smaller, and thickly coated with moss, filmy ferns and other epiphytes. At 2,290 metres (7,500 feet) a composite (*Ainsliaea pteropoda*), with small white flowers, began to get very common in the undergrowth, and continued so nearly to the summit. In this region was a magnificent rhododendron; a tree

about twenty metres high with very large, pure white flowers, up to fifteen and a half centimetres in diameter. Our attention was first drawn to it by seeing these enormous flowers lying on the ground, brightening up the dark, damp undergrowth. Looking straight up, it was not easy to distinguish the flowers against the light, and more or less hidden by the foliage of other trees; but later we were able to look down a steep slope on to the top of a tree in full bloom, a striking sight. About here another white-flowered orchid (*Coelogyne ochracea*) was very common, growing in large masses on the trunks and branches of the trees. Some two hundred metres higher up, a shrubby plant, about one and a half metres high, bright with yellow flowers, became common along the bottoms of ravines. Though very different from one's conception of a loose-strife, this was one. It was collected in the same province, on Pu Sam Sum, by F. H. Smiles, in March 1893, and sent to Kew, where Hemsley described it as a new species, under the name *Lysimachia grandifolia*. In addition to this large one, there were two small, herbaceous species of *Lysimachia*, also with yellow flowers. At this altitude the undergrowth was often composed of an almost pure growth of a small *Ophiopogon*, growing in tufts about thirty centimetres high. A very common epiphyte here, and on to near the summit, was a species of Solomon's seal (*Polygonatum sp.*) with rather small, greenish flowers. Among the trees were oaks of several species, and a maple.

Shortly before mid-day we reached the top of a subsidiary peak, at an altitude of about 2,590 metres (8,500 feet), where moss formed a very dense coat on all trees and branches, even small twigs were not free from it. This coating was often several inches thick, and gave the branches a deceptively stout appearance. On the ground was an equally thick carpet of sphagnum. With the moss grew other epiphytes, including ferns, a *Gaultheria*, and several species of *Vaccinium*. The most attractive of them all, however, was an orchid, a species of *Pleione*, probably undescribed, for which the name *P. laotica* is proposed in another paper. Thousands of its graceful, pale pink flowers, unencumbered by leaves, dotted the surrounding tree trunks, standing out in striking contrast to the dark background of moss. This *Pleione* was another of the plants

collected in Laos by Smiles, and sent to Kew, where, however, it was not named at the time. He got it on March 29th, 1893, on Pu Lai Leng, a high mountain on the Laos–Annam border, some 180 kilometres E. N. E. of Pu Bia.

There were, no doubt, numerous other epiphytes on these trees, but they were not in flower, Towards the end of the rains, about the end of October and beginning of November, would probably be the best time for seeing the epiphytes, as well as many terrestrial herbaceous plants, in bloom.

In the evening we pitched our camp a little below the summit, on a piece of level ground near a small stream, at an altitude of about 2,740 metres (9,000 feet). Again we were lucky in getting up our tents before a thunderstorm, with hail, came on. We passed rather a cold night, the thermometer registering a minimum of 9°C (48° F). Our carriers collected sheets of moss from trees for their beds. The moss would have made very comfortable beds, if it had been dry, but it was sopping wet, and their fires could hardly have dried it much before bed-time.

Next morning we arranged that our camp should be moved further down the hill, while we went on to the summit, which was soon reached. The knoll constituting the summit is covered with a dense growth of shrubs, reaching a height of about three metres, except for a few small open grassy patches, in one of which was a stone and concrete pillar marking the highest point. It is not unlikely that this growth of shrubs is a secondary growth, on a clearing made by the surveyors; for some of these shrubs were to be seen as small trees on the tops of some lower peaks. Rhododendrons predominated in this growth. There were two, possibly three species; one had white, another pale yellow flowers. Besides the rhododendrons, one or two oaks and a *Symplocos* were common here. On the shrubs, particularly towards their base, there was a good deal of moss, but orchids were scanty. The exposed rock, here and lower down, was a shale. Owing to the cold and wet we only spent about an hour on the summit, then started down the hill. We slept one night at an altitude of about 2,420 metres (7,930 feet). The next evening, April 15th, we reached our old camp at Ban Hao.

Mossy trees at 2,550 m. on Pu Bia.

A new orchid, *Pleione laotica.*

Very little of animal life was seen on the mountain. Most of the large game has been driven off by the Meo. Kating (*Bos gaurus*) sometimes come in the wet season, when no one goes up to shoot them. The largest animals we saw were some gibbons, black with a white rim round the face, at an altitude of about 2,080 metres. Small birds were frequently heard, but only occasionally seen. Butterflies were very scarce, doubtless largely owing to the inclement weather. Above 1,800 metres only one was seen, and it was flying high up, round the tops of trees, at about 2,550 m. A few bumble bees were visiting the flowers of *Lysimachia grandifolia*, at about 2,300 to 2,600 metres. At night some insects usually visited our camps. They were most plentiful at the first camp (2,120 metres), where a good many moths came, as well as beetles and flies. At the camp on our way down, 2,420 metres, insects were scantier than at any other camp. There was very little wind at that camp, and it was the only night without rain. At our highest camp, 2,740 metres, two or three moths, a like number of beetles, several large tipulidae and a few other flies came to the light.

At Ban Hao we were obliged to wait several days before we could get together a sufficient number of carriers for our return trip. We had to depend, for our transport, entirely on the Meo, who are a very independent race. In the past they relied but little on the outside world for their needs. Each village was a self-contained unit, producing almost all that was required for its daily life. The most necessary thing to be obtained from outside was salt, usually got by barter. Nowadays the Meo have to have some money in order to pay their taxes. They are also using money to buy things which they formerly made themselves, sometimes they obtain them by barter. A notable instance of this is their clothes. The women in these villages wear blue trousers, or a blue skirt, unlike the Meo women of the Siamese hills, who wear a short, grey skirt. When I asked the reason of this, I was told that their women also used to wear the grey skirt, made out of home-woven cloth. Now they had given up weaving, as they can buy cloth from the Haw (Yunnanese) traders who periodically visit the village. Again, many of the men now wear imported felt hats, instead of their usual black skull-cap

with a red button. One man was even so modern as to possess a tooth-brush, which he carried suspended from his neck-ring.

In spite of such innovations, the Meo are still very conservative in their methods and customs. The walls of their houses are made of hewn planks; no saw is used and no nails. Most of them, men and women alike, wear the large silver neck-ring. There appears to be no particular significance in wearing more than one ring. Many are contented with a single ring, but the dandies and belles like to wear several. In some cases the flattened out ends of the ring are free, in others they are joined by a silver chain, to which is attached a small silver plaque. On some of these plaques a crude, geometrical, human figure is engraved. It takes the silver of seven piastres to make the ordinary ring. As a rule the ring is worn constantly, and not even taken off at night. A few of the older men were not wearing rings; as they said they found them burdensome; but still, these men wear their ring when they go any distance from the village. The headman of Ban Hao had no ring; but on the back of his coat was sewn a rough figure of a man, cut out of red cloth. This figure, he explained, was for the same purpose as the ring, which is to keep the soul-spirit (ผีขวัญ in Siamese) from wandering away from the body.

This headman said that the Meo respected three external spirits, or classes of spirit, to which he gave Lao names, as follows: (1) Pi Pilang (ผีพิลาง), the most powerful spirit of all, which looks after the welfare of man. If angered, this spirit may, however, harm man. When going on a journey the Meo lights candles and prays the Pi Pilang to keep him safe and well till his return. If he is ill, he lights candles again, and prays to the Pi Pilang to be restored to health, promising a sacrifice of fowls or pigs if his prayer be granted. (2) Pi Pa (ผีป่า) and (3) Pi Pu (ผีภู) are the spirits of the forest and mountain respectively. If a Meo, after felling trees in the forest, becomes ill, he knows he has offended either the Pi Pa or the Pi Pu. He consults a medium as to what he should do to appease the offended spirit. A medium, it may be remarked, is either a man or woman, and is commonly used for solving life's perplexities. By suitable ceremonies Ancestor-Spirits are induced to enter the body of the

medium, by whose mouth they then give their advice.

All the Meo seem to grow opium, and smoke it; yet, on the whole, they are a very hardy race. One of the headmen, who accompanied us to the top of Pu Bia, carried with him his much-besilvered opium pipe, and every time we stopped, about every ten minutes or so, he lit it and took a few whiffs.

The Meo probably have considerable knowledge of the medicinal plants to be found in the forest, but we got very little information from them on this head. A species of *Gelsemium* grows very commonly in the scrub around their villages. They are well acquainted with its poisonous properties, and told us that it was often used as a poison, either for murder or suicide. Three leaves were said to be sufficient to cause death. There is also a big *Lobelia*, like *L. rosea*, which some of the villagers reported as poisonous, though others professed ignorance of its properties. Mr. H. B. G. Garrett informs me that the Karens of Doi Angka regard a large *Lobelia*, probably the same species, as very poisonous.

On April 19th we left Ban Hao, to return to Chaiyaburi. In order to cover new ground, we tried a different route from that taken in coming. Soon after emerging from the Ban Hao gorge, we left our former path, keeping somewhat to the south of it. We ascended through lalang savannah till we reached an undulating ridge, which we followed for some time, through a high growth of a coarse grass (*Thysanolaena Agrostis*). This grass reached a height of three or four metres, and arched over the path, so that we had to walk in a kind of tunnel. Like lalang, it is a secondary growth on old clearings. Soon after mid-day we reached a small Meo village, Ban Hui Paten, with about five houses. Here we had some trouble with the carriers, the headman of this village refusing to allow two of his men to go on. The difficulty was finally got over by a re-arrangement of the loads. On leaving this place, we had a steep ascent, which led us to the top of a hill known as Pu Muten, the altitude of which we made to be about 1,730 metres (5,660 feet). A survey party had been here a month or two previously and cleared the top, with the exception of a signal-tree. After a steep, short descent, we reached fairly level ground, where there was high evergreen

forest with an undergrowth of a small bamboo. In this forest we pitched camp, at an altitude of about 1,550 metres (5,100 feet). It took our guides some time to find water here, as it was some way away from the path.

Most of the next day we marched through evergreen forest, usually with bamboo undergrowth, over undulating, or, in places. nearly level ground. At mid-day we stopped at a spot where there was a patch of vegetation quite different from the surrounding high evergreen forest, and sharply marked off from it. This patch, perhaps a couple of hundred metres in diameter, had a sandy soil, and was covered with a small, quite leafless tree. This tree looked like a *Vaccinium*, but, as neither leaves, flowers nor fruit were available, this identification is uncertain. The trunks and branches of these trees were thickly clothed with moss, filmy ferns, lichens and orchids. The orchids were mostly of one species, apparently a *Bulbophyllum*, not in flower. On the ground were masses of *Sphagnum*, and a *Lycopodium*. At the edge of the patch was another species of small tree, a *Myrica*. This interesting type of vegetation appears to be allied to that known as 'padang-formation',[1] in the Malay Peninsula and Islands; a formation on a sandy soil, ill-drained in consequence of the formation of a hard-pan below the surfaee. Along one stream near here we unexpectedly came across a white anemone, growing in quantity. I had, indeed, been hoping to find an *Anemone*, as I knew that Smiles had collected one, identified as *A. Sumatrana*, near Pu Lai Leng, but I did not expect to find it as low as this, about 1,450 metres. There is little doubt that our plant is the same as that collected by Smiles, but whether it is the true *A. Sumatrana* or not, is another question.

In the afternoon we made a steep descent to a stream, called by our guides Hui Muang Ao, near which we camped; in a small open space surrounded by forest, and infested with leeches. Not long after we had all settled in, some of the carriers came to say

[1] Several authors have given descriptions of padang-formation. A summary of the literature is given in C. G. G. J. van Steenis, in Bull. Jard. Bot., Buitenzorg, Ser. III, Vol. XII, p. 179 et seq. A description of this formation at Ta Samet, in Siam, is given in "The Record", No. 33 (1928), where, however, the name 'padang' is not used.

The headman of Pak Munung.

Crossing the Nam Ngiep.

that they heard an animal prowling in the forest, close to the camp. They asked for a candle, in order to light it while making their prayers to the Jungle Spirit for protection against this beast. Unfortunately we had no candles with us, so they were content with the firing of a gun into the bushes. That method, on this occasion at least, proved effective, as we were not disturbed during the night.

The next day, April 21st, we continued our march, mostly following ridges, up and down, but not dropping below an altitude of 1,220 metres (4,000 feet). In the forenoon we came across an old clearing, where opium-poppy had been cultivated. This was the first sign of habitation we had seen since leaving Ban Hui Paten. Soon after midday we crossed the boundary from Chiengkwang Province into that of Wiengchan. In the afternoon, after a slight descent, we reached, and camped at the Meo village of Pu Tat. Here we had expected to change our carriers, but as the village consisted of only two houses, this was out of the question. East of the village lies a fairly high hill, Pu Sam Sao, with a bare top, devoid of trees. Pu Tat, from which the village takes its name, is a smaller hill, whose peak is behind the village, to the west.

On April 22nd we pushed on to the next village, Pak Munung (พักม้อหนึ่ง 'rest a while'). To reach this we had to cross the southern shoulder of Pu Sam Sao. The forest here was mostly evergreen, without bamboo undergrowth. The finest looking trees were a *Terminalia* (*T. myriocarpa*), some of which reached a large size. In the afternoon we had to make a steep descent, down a slope covered chiefly with bamboo. Here the ground looked comparatively dry, showing no sign of such rain as we had had further north. At the foot of the slope lay Pak Munung, its altitude being about 640 metres (2,100 feet). Here we camped, by a stream flowing westward past the village, and known as Hui Sangtai ('dead-elephant stream').

Pak Munung is a Pu Teng village of about ten houses. It looked unusually clean for a mountain village. The reason for this was that, a couple of months previous to our visit, the whole village had been burnt down, and had to be built anew. Since then there had not been time for much dirt to accumulate. This kind of accident is not at all uncommon in these villages, built, as they are, of

bamboo and thatch. The inhabitants had come here from the Muang Cha district, about eight years previously. The headman thought they would have to move on again next year, or the year after, as nearly all the sites suitable for cultivation-clearings had been used. As a rule, a clearing is planted for one year only.

Along the stream by the village was some high evergreen forest in which a *Taraktogenos* was common. It looked rather like *T. Kurzii*, the true 'chaulmoogra' tree, but was not in fruit. We paid a visit to the rocky hill known as Pu Lawek, to the south of the village. The lower slopes were covered with bamboo, but higher up was an interesting forest of small trees, among which a *Podocarpus* was common. At the highest point reached, 1,420 metres (4,660 feet), epiphytes were beginning to get common on the trees. Unfortunately we did not leave ourselves sufficient time to go higher.

We had with us, while at this camp, a villager with a good knowledge of local plants and their uses. Such men are not easy to find, so we tried to persuade him to accompany us on the next stage of our journey. To this, however, the headman would not agree, as this man was the 'Paw Ban', or 'Father of the Village', whose duty it was to attend regularly to the Spirits, who could not be neglected without harm befalling the village.

On April 25th we left Pak Munung, bound for the village of Nahan. At no great distance we passed another Pu Teng hamlet, where there was quite a thicket of the Mexican tree-sunflower, *Tithonia diversifolia*. The inhabitants said someone had brought plants here ten or eleven years previously. This sunflower was also noticed at some of the Muang Awm villages. Though it seems quite naturalised here, it is not yet becoming a pest, as it has in some other countries. That evening we camped on the bank of the Nam Yuak, by a small village, Hat Yao, inhabited by Tai Nua. Soon after leaving Hat Yao, we reached the Nam Ngiep, into which the Nam Yuak flows. The Nam Ngiep was very deep here, and had to be crossed by raft. At this crossing there were only two very small bamboo rafts; one of which could take four passengers, the other only one. In consequence it took some time to get all our men across. Once over the river, we had to cross some low hills, chiefly through old

clearings and bamboo forest. In these bamboo forests a very large butterfly, a species of *Stictopthalma*, was common. It belongs to the subfamily *Amathusiidae*, butterflies haunting shady forests. These butterflies do not visit flowers, but usually settle on the forest floor, among the dead leaves, where they are very difficult to see when at rest, owing to the neutral colouring of the underside of their wings. Many of them, however, are strikingly or even brilliantly coloured above. It was so with the *Stictopthalma*. One sometimes was almost startled by the sudden apparition of this great insect from the ground at one's feet. All the specimens seen were in bamboo forest, or forest where there was some bamboo. When on the wing they usually fluttered lazily along, two or three feet above the path. They easily took fright, when they would go off into thick jungle.

In the forenoon of April 27th, we reached Ban Nahan, which we found quite a small village. Many of the houses were deserted, owing to the prevalence here of some disease, which, from the description, seemed to be leprosy. We camped a little beyond the village, in an open spot where there were salt diggings. This place is known as Muang Baw. In former times there was, it is said, a large village here, with some two hundred or three hundred houses, and two temples; now there is no sign of this village, but its name, Muang Baw, sticks to the locality.

At daybreak next morning I found hundreds of a large tabanid buzzing round inside my tent. Within half an hour all but two or three had disappeared. We were camped at a grassy spot, to which buffaloes came to graze. The tabanids, no doubt, preyed on these buffalloes, and found my tent a convenient shelter for the night; otherwise they shelter in the thickets.

On the 28th most of the day was spent in passing through rather monotonous 'mai lai' forest. At starting, however, we traversed a strip of evergreen forest, where, in a small ravine, we found quantities of an interesting plant. This was an *Orchidantha*, a genus with curious flowers, resembling, as the name implies, those of an orchid. The chief point of interest about its occurrence here is that it is a predominately Malayasian plant, and has never, to my

knowledge, been found so far north before. Apparently its furthest extension north, previously known, was Patalung Province, in the Malay Peninsula.

Another interesting find was a species of *Platanus*, of which we saw a single tree growing by a stream. The genus *Platanus* was not known before to occur wild in South-eastern Asia. Moreover, all the species of *Platanus* hitherto known have more or less lobed leaves, while the leaves of this one showed no sign of lobing.

Leeches were rather troublesome here. They were not in this case solely a nuisance, for, as well as blood, they drew some interesting information from our guide. He said that when leeches feed on cows or ponies, they stiffen and eventually die; being, apparently, unable to digest such blood. On buffaloes, or human beings, they feed with impunity. He told us, moreover, that routes frequented by cattle were, as a rule, free from leeches; as they had all died from the effects of imbibing cattle-blood.

On the evening of the 28th, we camped on the bank of the Nam Ngiep, at the village of Hat Kam. The next day we engaged boats for the remainder of the journey to Chaiyaburi, which we reached on the 30th. On May 3rd we left Chaiyaburi, continuing down the Me Kong. Our boat went at a fairly leisurely pace, and we usually did some walking along the bank each day. In this part of the river most of the vegetation on the immediate banks is a secondary scrub, unless the ground is cultivated. We had no difficulty in finding a suitable sand-bar for camping on at night; for at this season of the year, with the water low, numbers of sand-bars are exposed. One night we had quite an unexpected experience. A violent storm arose very suddenly at about 1 a. m. Both tents gave way, but fortunately there was no rain. The wind died down again within an hour, and the next morning we retrieved all our bel ngings without trouble, as the wind was luckily from the river.

This part of the trip gave us an opportunity of seeing something of the riverside flora of the Me Kong in this region. This flora contains a number of species which, though often of a wide distribution elsewhere, have not been found in Siam outside the Me Kong basin. Some of these seem not to spread much beyond the

banks of the Me Kong, while others extend up the tributaries.

The following is a list of some of these plants:—

Ranunculus pensylvanicus Linn. f.
Ranunculus sceleratus Linn.
**Melilotus indica* All.
Rosa clynophylla Thory
**Potentilla supina* Linn.
**Finetia rivularis* Gagnep.
Eugenia Thorelii Gagnep.
**Celsia coromandeliana* Vahl
**Rumex* sp.
Chenopodium sp.

Those species marked with an asterisk belong to genera not elsewhere known wild in Siam.[1] It will be noticed that many of these species belong to genera best developed in temperate regions, i. e., *Ranunculus, Rosa, Potentilla, Melilotus, Rumex,* and *Chenopodium.* A possible explanation of the appearance of these more or less temperate species at such low altitudes in the tropics is that their seeds have been carried down from cooler regions by the river. Some of them are annuals, and frequent sand-islets in the middle of the river, where they have, most probably, been brought by currents.

The whole flora of these sand-islets, which are covered with water for weeks or months at a time, is interesting. The islets may be of gravel, of almost pure sand, or of sand mixed with mud. Often an islet, which in its central part is pure sand, has a shelving margin of muddy sand. Such margins often bear a luxuriant and varied growth of annuals. The number of species of perennials that grow on them is limited. The commonest are *Homonoia riparia* and *Rhabdia lycioides,* shrubby species which will stand complete immersion for long periods. They are usually found on gravel islets. The seeds of of the *Homonoia* do not show much buoyancy. Fifty-six seeds, collected six days previously, were put in water at 10.30 p. m. Some of them sank at once. At 6 a. m. the next morning thirty-four of them were still afloat. On agitating the water, however, all but one

[1] Plants of a species of *Potentilla* are sold at Chinese herb-shops in Bangkok, in the green state. They are, no doubt, cultivated specimens.

of them sank. It is probable that these seeds are rolled along the bottom of the river, and drop into the interstices of gravel beds. Apart from these shrubby plants, the only common perennials in the periodically submerged islets are coarse, tufted grasses, such as *Saccharum spontaneum.* Though the seeds of *Saccharum spontaneum* can be readily carried by the wind, it is probable that water carriage is of more importance in distributing this plant to the islets; as one frequently sees sprouting sections of stem, or rhizomes that have drifted there. These coarse grasses often occur on islets of nearly pure sand. The list of annuals that grow on the islets is a very long one. More than thirty were collected, many of them sedges. Of these very few seem to have seeds capable of being carried by the wind. Only two at all common were noticed, both composites. Such of the others as were tested had seeds with some power of floating. In testing, seeds were left in the water for eight hours. The seeds tested, all of which showed more or less buoyancy, were:—

Ranunculus sceleratus
Portulaca oleracea
Celsia coromandeliana. In this case only 50% of the seeds remained afloat after eight hours in water.
Heliotropium indicum
Lippia nodiflora
Eclipta alba
Xanthium strumarium
Amaranthus spinosus
Rumex sp.
Cyperus iria

Seeds may reach these islets by a third method, that is on the feet of birds, which often frequent them in large numbers. It is probable that this is quite an effective method.

When we camped on the river islets the bird life often forced itself on our attention. The terns in particular screamed a noisy protest at our intrusion. Nor were they content with screaming. They resorted to more active measures. Again and again has an angry bird swooped down within a few inches of my head; even on

one occasion touching my hat. Their attentions often made walking on the sand-banks rather unpleasant. The birds were nesting at the time, which probably accounted for their conduct. Two species of tern were common on the islets, both equally aggressive. Their nests were simply hollows in the sand, in the full blaze of the sun. Those seen contained two or three eggs. It was difficult to see these nests, unless the sun was low and threw a shadow in their hollow. At one camp a bird had its nest within 50 metres of my tent. I noticed birds changing places at this nest several times, presumably cock and hen. These terns resent other intruders, beside the human. I saw them swooping at a crow and a heron, both of which were speedily driven off. Sand plovers were also very plentiful on the islets. They also were noisy in their protests as one approached them, but their tactics were different from those of the terns. They usually simulated a broken wing, flopping about on the sand till one was quite close to them, when they would fly a little further off only to repeat the process.

On May 7th, when some kilometres north of Ta Uten, we encountered a migration of a whitish butterfly, crossing the river from the French to the Siamese side. This butterfly was, in all probability, *Appias albina*, but no specimen was caught for examination. A few Euploeas were also seen, but while some of these were flying with the Appias, others were going in the reverse direction. The flight was noticed, in force, from about 7.50 a. m. to 11 a. m., during which time we travelled southwards about fifteen kilometres. Between 11 a. m. and midday there were still some insects flying, but fewer in numbers. In ten minutes, between 10.20 and 10.30 a. m., 53 butterflies (excluding Euploea) were counted, all flying in the same direction, which was about N. E. to S. W. They were usually in small groups, flying five or six feet above the surface of the water. At the time there was a fresh breeze from the E. S. E., so the direction of the flight was across the wind. The weather was cloudy, with sunny intervals.

Again on May 10th, when between Nakawn Panom and Tat Panom, a smaller unidirectional flight, of apparently the same species, was observed. The insects were again crossing from the French to

the Siamese side of the river, flying quite low, in groups of two to five. It was sunny and quite calm at the time, about 2 p. m., when the insects were first observed. This was a comparatively small flight, and its duration was not recorded.

These butterfly flights were much smaller than some of those recorded in Siam by E. J. Godfrey.[1] It is interesting to note that the direction of many, but not all, of the flights of Appias in Siam is southwards, and most of the large flights seem to take place in April, towards the end of the dry season. The direction of the wind has little apparent influence on the direction of these flights. The meaning of such butterfly flights seems to be obscure. Those interested in the subject will find a full discussion in Mr. C. B. N. Williams' book, "The Migration of Butterflies".

We visited Muk Dahan on May 12th, and the next day paid a visit to Pu Mano, a sandstone hill, of no great height, covered with 'teng rang' forest, of a similar type to that on Pu Wieng, visited two months previously. Now many of the herbaceous plants which flower in the early rains were blooming. One terrestrial orchid, *Eulophia nuda*, was particularly abundant, in its various colour varieties, from dark crimson to pinkish yellow. There were also species of *Geodorum, Curcuma, Kaempferia, Gagnepainia, Chlorophyton* and *Amorphophallus* in flower. It will be noticed that these are all tuberous species, which, after the long quiescence of the dry period, can start their activity by flowering.

After leaving Muk Dahan, on the 14th, while walking along a sandy track, I noticed a *Papilio* hovering about over the ground, in a similar fashion to those seen at Pu Wieng. As I did not, at first, notice any plant on which it would be likely to oviposit, I observed it closely. Soon it settled on what looked like a small dry twig sticking out of the ground. On going closer I found that the dry twig was the flower of a species of *Aristolochia*, which I had not come across before. The small elongate flower was brown, and projected straight from the ground, while the two or three dusty leaves lay quite flat on the soil. The whole plant was so inconspicuous that it probably would have been overlooked, if the *Papilio*

[1] Journ. Siam. Soc., Nat. Hist. Suppl., Vol. VII (1927).

had not drawn attention to it.

On the evening of the 14th we reached a fairly large village, Ban Dawn Tan, on the Siamese side of the river. From this point we made a trip to the evergreen forests lying to the west of the village, where 'mak nieng' or 'bastard cardamoms' are collected. These cardamoms are obtained from a species of *Amomum*, which we found to be not at all plentiful here. The forest is known as 'Dong Bang-i', but is now by no means a continuous one, as it is a good deal cut up by cultivation clearings. Where the forest was untouched, there were some fine trees, particularly dipterocarps belonging to the genera *Anisoptera*, *Shorea* and *Hopea*. One small tree, *Prismatomeris fragrans*, was very conspicuous, being thickly starred with large white flowers.

In the neighbourhood was a small rocky hill, Pu Wat, which we also visited. This was a sandstone hill, somewhat similar in structure and vegetation to Pu Mano, but with much larger expanses of smooth, bare rock. These sheets of rock were very unpleasantly hot to walk on when the sun was shining. In the rock fissures grew some interesting plants, such as *Gardenia saxatilis*, a densely-branched, small-leaved shrub, a bushy *Desmodium*, and a spiny, succulent *Euphorbia*, like *E. antiquorum*, but forming a dense growth only about half a metre in height. Where the rock was level, or nearly so, it was usually covered with a thin layer of soil on which was a scanty growth of dried up grasses. Among these grasses an interesting plant was growing abundantly. Its white flower buds were conspicuous, but no fully open flowers were to be seen, though the remains of withered ones were plentiful. This plant, perhaps more than *Kaempferia rotunda*, gave the impression of a crocus; not only were the white buds like those of a crocus, but it had long, linear leaves. A number of plants with fairly large buds were dug up and taken back to camp, where the expansion of the buds could be observed. They began to open at 6 p. m. into pure white flowers, which at 6 a. m. the next morning had already begun to wilt. The flowers showed this to be also a species of *Kaempferia*.

In the scrub at Dawn Tan were quantities of *Amorphophallus campanulatus*, whose fetid inflorescences were now expanded. These

inflorescences were frequented by a beetle, probably a carrion species. No other insects were noticed in the inflorescence. What appeared to be the same beetle was found in the inflorescence of several other species of *Amorphophallus*. It seems to remain in the inflorescence till the spathe commences to wither, when it probably moves to a new inflorescence, no doubt taking pollen with it.

On May 18th the journey down the river was continued, Chanuman being reached the same day. Here we had to change our boat, as the men from Chaiyaburi did not feel confident of being able to take us safely down Keng Sa, a rapid below Chanuman. The rapid was reached next morning, and our boat had to be let down the worst stretch by means of a rope. This was the only time we had to use a rope on the journey from Nawngkai.

At Keng Sa the channel of the river is interrupted by wide stretches of rock. On these rocks was a growth of shrubs, and even trees; many of which were prostrate, with their trunks pointing down stream. The species chiefly concerned were *Homonoia riparia*, *Finetia rivularis*, *Eugenia Thorelii* and *Barringtonia* sp. In places, probably where a swift current could not develop, the *Finetia* grew into a fairly large tree, twelve metres or so in height. Except, perhaps, for the larger specimens of *Finetia*, the vegetation on these rocks must be completely submerged when the river rises in the rains.

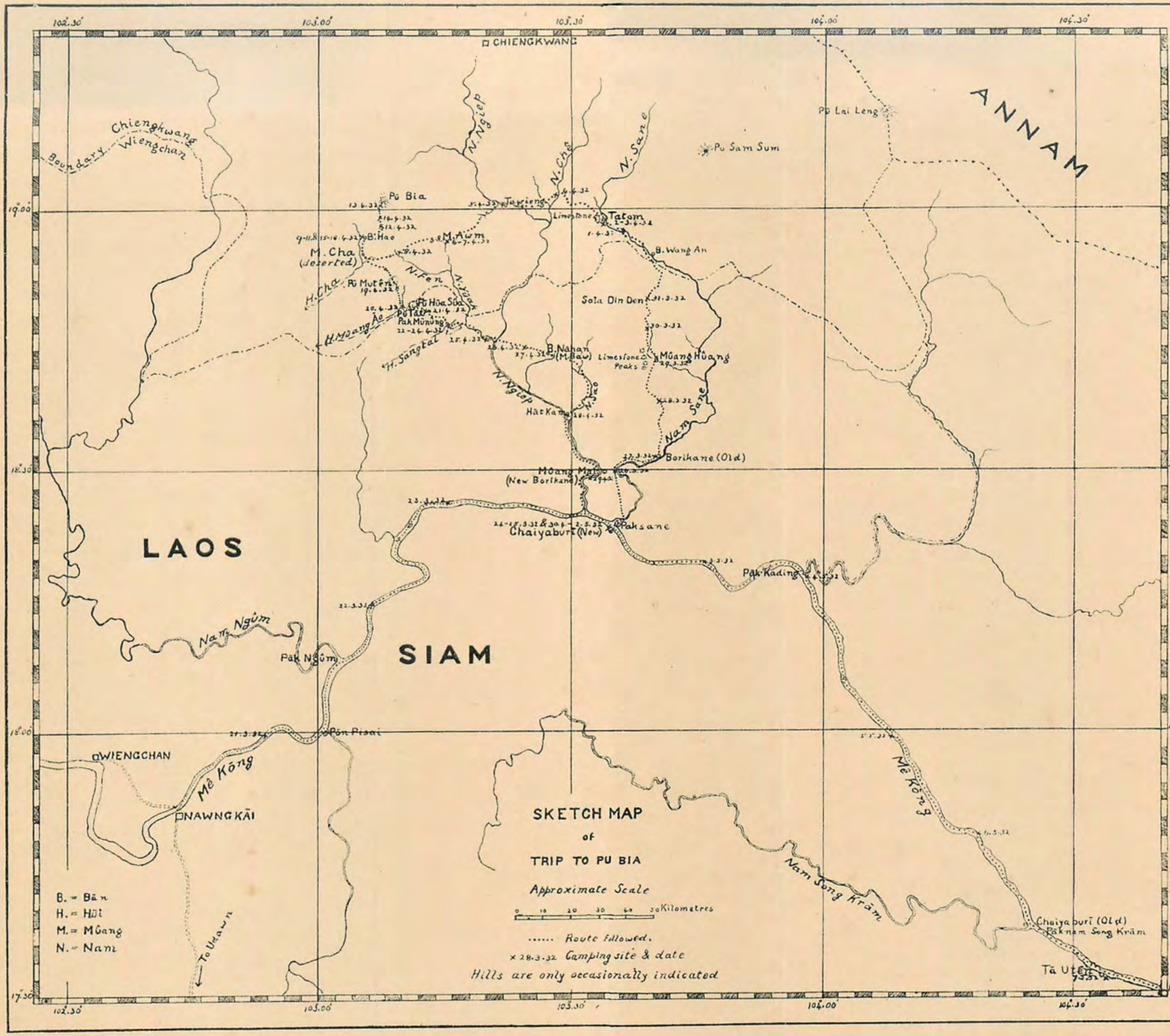
Kemarat was reached the same day, May 19th. Here the river journey ended, and we completed the trip overland by motor-bus to rail-head at Warin; only stopping for a day in some forest between Kemarat and Kulu.

Since the foregoing account of the trip was written Mr. J. Hutchinson of Kew has very kindly identified the rhododendrons collected on Pu Bia as follows:—

Rhododendron decorum Franch is the species with very large white flowers. It has been in cultivation in Europe for some years.

Rhododendron Johnstoneanum Watt is a shrubby species with white flowers, growing on the summit.

Rhododendron crenulatum Hutchinson is a new species. It grows on the summit and has pale yellow flowers.


CHIENGKWANG
ANNAM
Pu Lai Leng
Pu Sam Sum
Boundary Chiengkwang Wiengchan
N. Ngiep
N. Cha
N. Sane
Pu Bia
Tatom
B. Wang An
M. Cha
(deserted)
B. Hao
M. Awm
N. Fen
H. Cha
Pu Hua Sua
Pak Mung
H. Sangtai
Sola Din Den
B. Nahan
(M. Bau)
Limestone Peaks
Mûang Hûang
Hat Kam
Nam Sane
Borikane (Old)
(New Borikane)
Paksane
Chaiyaburi (New)
Pak Kading
LAOS
SIAM
Nam Ngûm
Pak Ngûm
Pon Pisai
WIENGCHAN
Mê Kông
NAWNGKAI
SKETCH MAP
of
TRIP TO PU BIA
Approximate Scale
0 10 20 30 40 50 Kilometres
...... Route Followed.
× 28.3.32 Camping site & date
Hills are only occasionally indicated
Nam Song Kram
Chaiyaburi (Old)
Paknam Song Kram
Ta Uten
To Udawn
B. = Bān
H. = Hōi
M. = Mûang
N. = Nam
102.30
103.00
103.30
104.00
104.30
19.00
18.30
18.00
17.30

Rhododendron rufosquamosum Hutchinson is another shrubby species with white flowers, growing somewhat below the summit.

NOTE. The following names are those that have been used on the labels of the collections made on this trip, and on the attached map. The names in parentheses are those of the provinces in which the various localities are situated. Some alternative spellings are given in italics: these have not been used on labels or the map, but many of them are commonly used on French maps.

Borikane (Wiengchan), *Borikan.*
Chaiyaburī (Nawngkāi), *Sanyaboury, Saiburi.*
Chiengkwang, *Xieng Khouang, Tran-ninh* (for the province).
Hāt Kam (Wiengchan).
Hūi Mûang Āo (Chiengkwang).
Mûang Awm (Chiengkwang), *M. Om.*
Mûang Baw (Wiengchan).
Mûang Cha (Chiengkwang).
Mûang Hûang (Wiengchan), *M. Huong.*
Nam Yūak (Wiengchan).
Pāk Kading, *Pak Ca Dinh.*
Pak Mûnûng (Wiengchan).
Pāknam Song Krām (Nakawn Panom), *Pak Nam Song Gram.*
Pāk Ngûm (Wiengchan).
Paksane (Wiengchan), *Pāk San.*
Pōn Pisai (Nawngkāi).
Pū Bia (Chiengkwang), *Pou Bia.*
Pū Hûa Sûa (Chiengkwang).
Pū Mutên (Chiengkwang), *Pou Ten?*
Pū Tāt (Wiengchan).
Tatom (Chiengkwang), *Tha Thom.*
Tā Utēn (Nakawn Panom), *Houthene.*
Tā Wieng (Chiengkwang), *Ta Viang.*
Wiengchan, *Vientiane.*

The map has been compiled chiefly from sheets issued by the French Government. A number of names, however, have been added on my own responsibility. It should be noted that the altitudes given in this paper are approximate only.