

by

K.E. Koch & M. Siebenhüner

During geological investigation in Northern Thailand jointly executed by the Department of Mineral Resources and the German Geological Mission between 1966 and 1968, several locations with stone age artifacts were newly discovered – see figure 1. Though most of the sites furnished surface-finds only, these seem of sufficient interest because some of the assemblages found can be attributed to pleistocene-holocene stratigraphy.

The first three locations here described are situated near or at the Salween River near the Thai-Burmese border.

Location 1 (see map fig. 1, No. 1)

About 55 Km northwest of Amphoe Mae Sariang, Mae Hong Son Province, at 650 m. altitude.

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Grid 3 41 000 E., 20 40 000 N.

The site comprises an elongated, rather broad-topped hill, with an altitude between 650 and 620 meters, over which passes a foot and elephant path, leading from the Huai Mae Tae Luang to a Karen village near the Salween River. The hill is formed by argillacious slate, practically bare of soil. Vegetation consists of a rather poor summerdry dipterocarpus- quercus forest, with scarce or no undergrowth.

All along the extension of the hillcrest (about 1.5 Km) pebbles or fragments of pebbles are found at morphologically suitable places – that is, where the inclination of the slope is not too steep. On first sight these pebbles seem to indicate relics of an old plio-pleistocene terrace of the Salween River. This might be true, but observations in the surrounding area and the fresh surfaces of the pebbles rather speak against it. It is more probable that suitable pebbles were brought here to be transformed into tools.

There are relatively few pebbles that show no trace of dressing. More than 100 artifacts were collected from this site, most of them from the western part before the footpath begins to descend into a relatively narrow valley. Besides complete tools there are many broken ones and a large amount of artificially produced tri- or polygonal to rounded small flakes, indicating that the place had been used as a chipping site. All the tools show remarkably little weathering, with only a slight bleaching of the surface excepting a few artifacts made from slate, limestone or calcareous conglomeratic graywacke. Most of the tools are made from porphyric rhyolite or quartzite.

Apart from pebble tools, 4 small quadrangulary chipped and polished adzes were found-see figure 30. No fragments of pottery occur.

As the assemblages of pebble tools found at locations 1, 2 and 3 are practically identical, they will be described together below. The provenance of the tools is indicated on the figures.

Location 2 (see map figure 1, No. 2)

About 65 Km northwest of Amphoe Mae Sariang, Mae Hong Son Province, in the immediate vicinity of the Salween River.

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The location is situated on the slope descending to the Salween River, on a terrace formed by the latter and a small tributary coming from the east. The vertical height of this terrace increases from about 40 m. at the Salween to about 60 m. towards the east-see generalised cross-section, figure 2. The gravel of the terrace is more or less strongly cemented by calcareous tuff, which was deposited from the water of the small tributary during the time of sedimentation of the terrace-gravel. The outcrop is slightly covered by a dark, reddishbrown loam. Vegetation consists of bamboo and summer-dry dipterocarpus forest with some teak. There is no undergrowth. Geological knowledge of the region is not yet advanced enough to give the exact age of this morphological feature *per se*. A correlation with Burmese stratigraphy is attempted below-see page 272.

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Sheet 44 66 II Ban Tha Pha Daeng 45 66 III Ban Khun Kong Sum 1:50 000

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All along the extension of the hillcrest (about 1.5 Km) pebbles or fragments of pebbles are found at morphologically suitable places that is, where the inclination of the slope is not too steep. On first sight these pebbles seem to indicate relics of an old plio-pleistocene terrace of the Salween River. This might be true, but observations in the surrounding area and the fresh surfaces of the pebbles rather speak against it. It is more probable that suitable pebbles were brought here to be transformed into tools.

There are relatively few pebbles that show no trace of dressing. More than 100 artifacts were collected from this site, most of them from the western part before the footpath begins to descend into a relatively narrow valley. Besides complete tools there are many broken ones and a large amount of artificially produced tri- or polygonal to rounded small flakes, indicating that the place had been used as a chipping site. All the tools show remarkably little weathering, with only a slight bleaching of the surface excepting a few artifacts made from slate, limestone or calcareous conglomeratic graywacke. Most of the tools are made from porphyric rhyolite or quartzite.

Apart from pebble tools, 4 small quadrangulary chipped and polished adzes were found—see figure 30. No fragments of pottery occur.

As the assemblages of pebble tools found at locations 1, 2 and 3 are practically identical, they will be described together below. The provenance of the tools is indicated on the figures.

Location 2 (see map figure 1, No. 2)

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 II, Ban Tha Pha Daeng
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The location is situated on the slope descending to the Salween River, on a terrace formed by the latter and a small tributary coming from the east. The vertical height of this terrace increases from about 40 m. at the Salween to about 60 m. towards the east-see generalised cross-section, figure 2. The gravel of the terrace is more or less strongly cemented by calcareous tuff, which was deposited from the water of the small tributary during the time of sedimentation of the terrace-gravel. The outcrop is slightly covered by a dark, reddishbrown loam. Vegetation consists of bamboo and summer-dry dipterocarpus forest with some teak. There is no undergrowth. Geological knowledge of the region is not yet advanced enough to give the exact age of this morphological feature *per se*. A correlation with Burmese stratigraphy is attempted below-see page 272. Short ane: Semicircular or ellipsoid axe with the butt end broken off straight. Sometimes broken "Sumatralithes"?

Waisted axe: Mostly rather elongated implements of conical outline with straight to concave flanks, and a relatively broad cutting edge. There are many transitional forms between "Sumatralithes" and waisted axes, as shown in fig. 25.

In almost all cases rather flat pebbles with a round or oval outline (ellipsoids with one axis much shorter than the other two main axes) were used, with the exception of those implements made from Normally the pebbles were halved more or less slate or gneiss. parallel to their flat sides first, a very astonishing accomplishment (as one can easily test oneself), thus obtaining a planoconvex, round to oval form (primary chipping). The next step was accomplished by radial or longitudinal dressing, from the natural surface of the piece, according to the type of tool wanted (secondary chipping). This step sometimes was scarcely necessary, because a sufficient cutting edge had been obtained by primary chipping already, as may be shown schematically in fig. 3, representing sections through flat pebbles, vertical to their round or oval outline, and the cleavage-plain of primary chipping. In fig. 3 (a) a cutting edge is directly obtained along the lower part of the pebble, whereas in fig. 3 (b) the hatched part has to be removed by secondary chipping.

Secondary chipping is mostly rather crude (fig. 13), and apart from a few exceptions is generally done from the natural surface, which itself may show some "pseudo-chipping" in the form of traces of use. None of the pebble implements show a fine secondary chipping or even part-polishing, as is normally characteristic for the neolithic period. Naturally the secondary chipping shows considerable differences, mostly due to different physical features of the rock used, as can easily be seen by comparing tools made from rhyolite, quartzite, paragneiss, graywacke or chert (see fig. 8, 13, 26, 28, 27).

The different rocks used in the lithic industry presented here, and their percentage of the whole assemblage of locations 1, 2 and 3 are: Porphyric rhyolite 61%, quartzite 17.1%, sandstone and fine conglomeratic, mostly calcareous graywacke 11%, slate 6%, lydite 1.8%,

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SOME NEWLY DISCOVERED PREHISTORIC SITES IN NORTHERN THAILAND 265 basic eruptive rock 1.3%, gneiss 0.9%, and? limestone or? marly limestone 0.9%.

The shape of the mostly planoconvex tools, found at locations 1 to 3 varies from unifacial discoidal to elliptical scrapers and choppers (fig. 7-11) to hand-adzes (fig. 6), and more or less elongated, conical axes with straight to concave flanks (fig. 18-23). Some artifacts show different shapes, designed here as long choppers (fig. 4-5), pseudo-hand-axes (fig. 27-28) and short axes (fig. 13). The latter might rather represent long oval choppers or "Sumatralithes" (fig. 11), broken accidently.

Between the long oval choppers ("Sumatralithes") and the long waisted axes all transitional types imaginable exist, as schematically shown in fig. 25. The division between choppers and axes was made according to the appearance of the cutting edge, in almost all cases between type c and d of fig. 25.

The elongated conical axes with straight to concave flanks, ranging in length from 9 to 17 cm. apparently according to the size of the pebbles used do not for the most part show secondary chipping at their narrow end, and at the cutting edge secondary chipping may or may not be observable, according to necessity as shown above (fig. 3). They generally show longitudinal chipping along their flanks to produce the wanted shape.

One waisted axe from location 2 with an extremely well preserved surface shows some scattered but distinct polishing of the flanks at the narrowest point, indicating that some sort of handle had been attached here, which during use polished the tool by friction. This shows clearly that this type of implement was really used as an axe. Fig. 24 shows an attempt for a reconstruction of tool-attachment to the handle, assuming, by the asymmetric appearance of the heavy traces of use on the cutting edge of the tool, a longitudinal setting in respect to the handle.

Most probably a suitable branch or trunk of a young tree, the wood of which is rather easily bent and worked on if fresh, was split from one end, and was then adapted as well as possible to the form of the tool to be inserted, by carving or bending over a fire and producing a kind of pincers. The tool was then put into place and was fitted with bast, perhaps mixed with pitch or tree-wax as is still done nowadays by cultures of neolithic tradition. The tool and handle were then fixed together tightly with bast or some other kind of wet plant-fibre. When the fibre and the wood had dried off and contracted, the tool was kept fairly firmly in place.

Two waisted axes from the same location might show identical traces of setting as described above, but in these cases conservation is not good enough to be conclusive.

location	1	2	3
scrapers, choppers, hand-adzes, short axes	55	29	15
choppers, long oval ("Sumatra- lithes") or long with subparallel flanks	7	4	2
axes, conical, with straight or concave flanks, waisted axes	43	20	12
long choppers	4	2	0
pseudo-hand-axes	3	2	0
broken, not determinable	9	5	2
	121	62	31

The table above shows an attempt for a division by number of the different categories of the pebble tools found at the three locations. As the number of the different types of tools would be too small to be of any value for a statistical comparison (if all distinguished categories were counted separately) bigger groups were made. Thus in the first

group all scraper- and chopper-like implements were put together, including hand-adzes and short axes, with the exception of the long oval choppers ("Sumatralithes") and those with subparallel flanks. The division between the latter and axes was made according to the appearance of the cutting edge, in almost all cases between type c and d of fig. 25.

This attempt may be regarded as crude, but it shows a remarkable constancy of ratio between the different groups of pebble tools, found at the different sites, a fact which might indicate that the implements were manufactured for different purposes during one period, or during a longer time by a more or less constant population.

The Question of Age

One certainly needs to be careful with the interpretation of surface finds, such as those collected from the sites described, in the matter of age. Pebble tools in the Far East persist with relatively little technological evolution from the middle pleistocene well into holocene times, their respective differences lying more in terms of refinement. Therefore not too much stress should be put on typology alone. This has been made clear by others (v. HEEKEREN 1961, CHENG TE- K'UN 1959, and others). Nevertheless one may state the following:

- With the exception of the sporadical occurrence of quadrangulary chipped and polished adzes (fig. 30), only pebble tools were found. The polished tools are of a completely different type, and certainly belong to the neolithic period. No pottery was observed at any of the sites.
- 2) All pebble tools collected show roughly the same type of dressing, the secondary chipping being of the same rather crude type throughout.
- 3) Location 3 and especially location 2 clearly show that the artifacts are of the same age (or slightly younger) as a fluviatil terrace with a vertical distance of 40 to 60 m. from the actual riverbed, according to the horizontal distance from the main drainage system of the region, the Salween

River. As shown in the table above, by means of statistics, no observable difference exists between the assemblages of pebble tools from the three locations, so that the same age can be assumed for the implements from locations 2 and 3, and location 1 as well. None of tools found show any fluviatil transport (rolling).

4) Regarding the shape of the artifacts, one is inclined to observe a certain evolution, leading from the discoidal and oval choppers over elongated choppers with subparallel flanks towards the waisted axes, which really have been used as such, as shown above. Even among the axes an observable trend seems to prevail, leading from elongated conical forms to those with concave flanks, and then to rather broad and short ones (fig. 23). It may be mentioned again that really all the intermediary forms have been found. This "evolution" does not necessarily represent a difference in time, but may as well show the summary of achievements of one period.

We can at least, summarize by saying that the age of the assemblage is limited by a stratigraphical feature below, and by typology above.

In attributing pebble cultures to a certain age, not too much stress should be put on typology alone, as mentioned already. This is clearly the case for rather uncharacteristic types, such as scrapers, choppers and related forms. This seems less the case for rather developed implements, such as the long oval choppers, which as "Sumatralithes" are regarded as typical for early mesolithic times (Hoabinhian) in Sumatra (van HEEKEREN 1957, pp. 69, 141), Indo-China and Malaysia (TWEEDIE 1953, p. 10). Moreover, the waisted axes surely represent a distinct technological evolution, and they are regarded as some kind of index-form in the assemblage described here.

The very detailed Sai-Yok excavations by the Thai- Danish Prehistoric Expedition, which furnished abundant archaeological finds, ranging from a pre-ceramic pebble-tool industry to metal-age arti-

facts (van HEEKEREN & KNUTH, 1967) did not produce waisted axes sensu stricto. One type of tool however, from pre-ceramic horizons of considerable thickness, called "narrow Sumatralithes" (loc. cit. fig. 8 and pl. 11), which is identical to an implement from location 1 (fig. 18), shows a clear trend from "Sumatralithes" sensu stricto towards the waisted axes. I n the present case this type of implement from the Salween (2 specimens found) is even regarded as failed specimens of waisted axes, as transitional forms between both types of implements do occur.

The "narrow Sumatralithes" represent a very small percentage only of the Sai-Yok assemblages in the different layers (below 5% of the total number found in each layer, and missing completely in many layers). The most representative sequence with this type of tool seems to be Sector A of the rock-shelter (loc. cit., pp. 64-66, fig. 29), where the complete sequence of more than 4 m. thickness contained single "narrow Sumatralithes" from a depth of 300-325 cm. up to a depth of 150-175 cm., all well below neolithic horizons, which seem to reach not deeper than 100 cm. approximately.

In Sector f and g (loc. cit., pp. 57-64) "narrow Sumatralithes" occur from the lowest (375-440 cm) to the uppermost level (0-45 cm), and neolithic artifacts reach to a depth of 65 cm. This sequence does not seem conclusive, as the upper layers are of mixed nature.

Apart from the "narrow Sumatralithes" the other types of pebble tools from the Sai-Yok excavations also correspond clearly with the tools described here. According to the associated fauna at Sai-Yok, which is recent throughout, the assemblages of pre-ceramic pebble tools can probably be regarded as of holocene age. For the oldest strata found van HEEKEREN & KNUTH (loc. cit., p. 107) suggest an age of 8-10,000 years B.C. .

One reference to waisted axes *sensu stricto* could be found in CHENG TE- K'UN (1959, pp. 119-120, pl. V, fig. 3). They occur at the upper Yangtse together with pebble tools of similar type as described here. As most of the Chinese sites do not provide any stratigraphy either, the implements were described from a typological point of view. The assemblage of interest here is referred to by CHENG TE-K'UN as Group A, and is characterized by the absence of polished tools, which first occur in Group B. One site in the gorges of the Yangtse at least showed some possible stratigraphy (loc. cit., p. 122), where chipped tools of Group A were found at a depth of 14 feet below the surface, pottery not deeper than 9 feet, and a bronze pin within one foot below the ground. It should be cited here that some axes of Group A clearly show a trend towards shouldered axes of the neolithic period (CHENG TE- K'UN, pl. VI, fig. 1-2), and are correspondingly denoted.

According to CHENG TE-K'UN (loc. cit., p. 150, 155) waisted axes occur in the neolithic Shih-Pei-Ling culture in Manchuria, and in Indo-China and Japan as well. Unfortunately neither a description nor pictures are given, and the publications concerned are not available here.

By comparison with other cultures CHENG TE-K'UN (loc. cit., p. 123) comes to the conclusion that the tools of Group A are mesolithic to early neolithic in date.

The most advanced type of waisted axe, found at location 2, is still clearly more crude in appearance (fig. 23) than the corresponding artifact depicted in CHENG TE-K'UN (loc. cit.), and no type of implement occurs here showing any trend towards the shouldered axes of the neolithic period. From the typological point of view the artifacts described here seem to be clearly somewhat older, at least as far as the waisted axes are concerned.

If one does not suppose the culture described here to represent a local, eventually isolated and therefore retarded development, one is inclined to regard it as slightly older than Group A of CHENG TE-K'UN. That would mean that it clearly belongs to the mesolithic period. This assumption is strongly supported by the fact that no fragments of pottery were found at any of the locations described. Whether a connection between the culture described by CHENG TE-K'UN and the one described here really existed, or whether both simply represent a homologue development (which is not very probable, as one has to admit, in regard to such characteristic forms as the waisted axes) of different cultures, must be left to speculation for the time being. Nevertheless it may be stated that both rivers,

the Yangtse and the Salween are coming roughly from the same area, only 70 to 80 Km apart from each other at the narrowest point. A migration of prehistoric men might well have taken place along these rivers, the only easily accessible migration-route during these times. At least a connection between both areas does not represent a geographical impossibility. As support for this hypothesis, the negative fact could be used that until now waisted axes have not been found farther away from the Salween River anywhere else in Thailand.

COLANI (1931, p. 330, pl. 43, fig. 9 and 42, fig. 3) shows tools similar to the waisted axes, found in Annam, and regarded there as an untypical form of big axe ("hache grossière atypique") occurring together with other pebble tools of palaeolithic type ("Paléolithes"). Attribution to stratigraphy could not be established there either.

The most important criterion for the age of the assemblage presented here is derived from stratigraphy. As mentioned already above, it could be shown that the tools are of the same age (or slightly younger) as a terrace with a vertical distance of 40 to 50 m. from the actual riverbed. With minor reservations only, it seems possible to correlate the terraces of the Salween at the Thai-Burmese border with the stratigraphy established by DE TERRA (1949) in Burma, by means of palaeontologic, morphologic and prehistoric evidence, starting from the Irrawady basin, and continuing from there to the Northern Shan States until the Salween River.

The terraces observed by DE TERRA in Burma to be discussed here in relation with the ones observed at the Salween River are terraces 4 to 5 (T_4-T_5) , cited below with their vertical distances from the actual riverbed in metres, and the probable correlation with the terraces observed here. Whereas DE TERRA is certain about his correlation of terraces between the Irrawady and the Nam Tu, the correlation between the latter and the Salween at Kunlöng is tentative (loc. cit., pp. 317-18). As the Salween River belongs to a different drainage-system from that of Irrawady and Nam Tu, and is included in a mountainous region, with a relatively young and steep

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relief, it is very well possible and even probable according to our experience that the terraces of the Salween generally show a larger vertical distance than the corresponding ones of the Irrawady-Nam Tu system. The following table is arranged according to this assumption, thus postulating a still younger terrace 6 (T_6) at the Salween, not observable in the Irrawady basin.

Pleistocene	Holocene		
Distances in meters	T ₄	Т ₅	Т _б
Irrawady River	20-23	ca. 13	
Nam Tu River (Northern Shan States)	ca. 40	8-10	

?

Salween River at Kunlöng (Northern Shan States)	ca. 50	23-26	ca. 13
Salween at Thai-Burmese frontier	? 100	40-50	15-20

As can be seen from this table the vertical distances of the terraces in Thailand are bigger than those observed at Kunlöng. This seeming discrepancy may be explained the following way:

- In regions more or less undisturbed by very young vertical tectonical movements, a general increase of the vertical distance of a terrace is normally observed, following the river downstream.
- 2) In such a section of a river where it passes from a broad valley into a narrow one, the relative distance of a terrace may increase, according to the smaller cross-section of the valley.

Both facts can be applied to the present case. The Thai locations are situated roughly 600 Km downstream from Kunlöng, and here the valley is narrow and V-shaped, whereas it is rather broad at Kunlöng. Another argument which shows that a correlation of the terraces at Kunlöng and in Thailand is well founded is given by the fact that T_5 at Kunlöng (here T_6) with a vertical distance of about 13 m. is well above the local highwater level of the Salween River, as DE TERRA (loc. cit.) explicitly mentions. Correspondingly the lowest terrace observable at the Thai-Burmese border with a vertical distance of about 15 to 20 m. from the actual riverbed is situated above the highwater level as well.

DE TERRA (loc. cit.) and MOVIUS (1943) draw the boundary between Pleistocene and Holocene, and correspondingly the boundary between Palaeolithic and Mesolithic between T_4 and T_5 of the Irrawady system.

Taking together all criteria found concerning the age of the pebble tool assemblage described here, the following can be stated:

From the point of view of stratigraphy an early holocene age seems very probable if not certain. This corresponds well with the point of view of typology, which indicates an early mesolithic (Hoabinhian) industry, as shown by the "Sumatralithes", perhaps developing without hiatus into middle mesolithic times, as hinted at by the rather specialised and "modern" form of the waisted axes. This then would postulate a chronological hiatus between the pebble industry described, and the sporadical occurrence of quadrangular adzes of clearly neolithic type.

We shall now describe five more sites with artifacts, some furnishing pebble tools, the others flake tools, all of different types from those described above.

Location 4 (see map fig. 1, No. 4)

10 Km northeast of Amphoe Doi Saket, Chiang Mai Province, besides the car-track leading to Amphoe Wiang Papao.

Sheet 48 67 IV, Amphoe San Sai 1:50 000 Grid 5 22 000 E., 20 90 150 N, On an old, plio-pleistocene peneplaine with lateritic loamy cover, occasional pebble tools from quartzite may be found. They show a rather crude working, and range in appearance between those described above and those described from location 5. From the typological point of view they might belong to the palaeolithic or early mesolithic period.

No specimens were collected here. The location is mentioned for completeness only.

Location 5 (see map fig. 1, No. 5)

About 15 Km South of Amphoe Pai, Mae Hong Son Province, about 500 m south of the Pai River at 500 m altitude.

Sheet 46 68 I, Ban Thung Yao 1:50 000 Grid 4 41 050 E., 21 24 750 N.

A flat-topped hill formed by granite, practically without a cover of weathering soil, and with very scarce summer-dry vegetation, is littered with fragments, chipped from pebbles of quartzite. The few bigger tools found show a very crude working of palaeolithic type (fig. 31-33). Besides these a number of small, mostly rectangular flat scrapers could be collected (fig. 34). Fragments of pottery are missing. According to typology the bigger tools at least could very well date from the palaeolithic period.

Location 6 (see map fig. 1, No. 6)

About 15 Km northwest of Nan, in the valley of the Huai Kasai (rivulet), about 1 Km west of Ban Ta Lai.

Sheet 5167 IV, Ban Phu Wiang 1:50 000 Grid 6 75 800 E., 20 85 750 N.

Here a road for timbering trucks cuts the slope of a small hill to a maximum depth of 2 m. (see fig. 35), uncovering about 1.5 m. of yellowish loam and a layer of about 30 cm. thick full of artifacts. They are all made from a very fine grained, dark grey, felsitic rhyolite, which forms the hill, and which crops out in the riverbed below. Most of the tools are rather big (up to 15 cm. length), and relatively

thin, triangular or polygonal in circumference (fig. 36-41), sometimes in the shape of long, narrow blades (fig. 42-45). Others are thick and heavy, and may weigh up to 1.5 kg. a small specimen of which is shown in fig. 46-47.

Some of the very big artifacts have most probably been really used as tools, whereas others represent nucleï, of which specimens up to several kilograms in weight were found. Altogether more than 100 implements were collected.

Flaking generally is done on rather a large scale, favoured by the most suitable physical features of the rock. Secondary flaking or chipping is rather scarce. From the point of view of typology these implements are clearly of palaeolithic appearance. They can be thought to be of the upper palaeolithic age.

Because of a certain pyrite content, the artifacts show a soft yellowish crust of decomposed material throughout, which may become 1 to 3 mm. thick. The features of the tools are nevertheless excellently preserved. Unfortunately no lacquer for conservation was at hand when the tools were collected. They were transported carefully wrapped, but still some were slightly damaged during transportation. This damage is not shown in the drawings to avoid confusion with secondary chipping.

The large number of tools, as well as the nucleï found, indicate without doubt a production site, most probably situated on the small hill itself and on its southern flank. Prospects for an excavation at this easily accessable location would be extremely good, especially in respect to possible and probable fireplaces, which would allow determination of absolute age by means of C^{14} . No tools were found in the loam above the layer containing the artifacts described.

Location 7 (see map fig. 1, No. 7)

About 12 Km southwest of Nan, about 5 Km west of the highway Nan-Amphoe Sa.

Sheet 5167 III, Ban Don Fuang 1:50 000 Grid 6 78 600 E., 20 58 000 N. On the western flank and especially on top of a flat hill (altitude 350-380 m.), which extends north-south for 1.5 Km, formed by almost chert-like felsitic rhyolite similar to the one of location 6, an immense number of superbly preserved artifacts may be collected. In some places the hilltop is literally paved with tools, the prevailing number of which represents the same type as described from location 6, and undoubtedly dates from palaeolithic times.

Occasionally one finds rather long, subrectangulary shouldered axes with fine secondary chipping of neolithic type (fig. 48). Their form is practically the same as that of the polished shouldered axes, found in many places in South and East Asia, and definitely still in use during historic times. The specimen illustrated might represent an unfinished tool.

This location represents a production site too, in use from palaeolithic to neolithic times, due to the excellent quality of the rock.

Location 8 (see map fig. 1, No. 8)

About 19 Km northwest of Nan, hills between the Nam Sanian and the Nam Mae Piang Pao, between 350 and 400 m. altitude.

Sheet 5167 IV, Ban Phu Wiang 1:50 000 Grid 6 72 000 E., 20 86 600 N.

A big footpath leading from the junction of the Nam Sanian and the Mae Piang Pao to the West passes over low hills extending in direction East-West. Between 350 and 400 m. altitude, pebble tools occur quite frequently, made mostly from quartzite and rhyolite. In topological appearance they range between those of location 4 and those of location 1 to 3, and might well belong to the mesolithic period.

Location 9 (see map fig. 1, No. 9)

A small cave, about 25 Km southeast of Mae Hong Son, Mae Hong Son Province, at 900 m. altitude.

Sheet 4668 IV, Ban Pong Fat 1:50 000 Grid 4 16 700 E., 21 22 350 N.

The cave was found on a partly carstic plateau of early palaeozoic limestone, and seems to be less than 10 m. deep. The ground in the cave is covered by a dark brown loam, mixed with some debris from the roof. Only a limited attempt was made to search for artifacts, which produced immediately two pieces, found at about 20 cm. depth: one scraper, made from slate, and apparently damaged from use (fig. 49), and a small cylindrical grinding stone, flat at one end, rounded at the other, made from sandstone. The pieces do not allow dating by typological means. A more detailed excavation should be done.

Apart from the locations described above, occasional surface finds of single tools were made on more or less all the suitable hilltops passed. As they seem of no significance they will not be described. It may be mentioned again that away from the locations near the Salween River, waisted axes have not been observed in the region until now.

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Fig. 2



Fig. 3



Fig. 4 location 1, porphyric rhyolite



Fig. 5 location 1, porphyric rhyolite



Fig. 6 location 1, porphyric rhyolite



Fig. 7 location 2, porphyric rhyolite





Fig. 9 location 1, porphyric rhyolite





Fig. 11 location 1, porphyric rhyolite









Fig. 14 location 1, porphyric rhyolite





Fig. 16 location 2, porphyric rhyolite



Fig. 17 location 1, porphyric rhyolite









Fig. 18 location 1, porphyric rhyolite







Fig. 21 location 1, porphyric rhyolite





Fig. 23 location 1, porphyric rhyolite



Fig. 24





Fig. 25





Fig. 27 location 2,*chert







Fig. 29 location 1, slate



Fig. 30 location 1, ? marly limestone







Fig. 32 location 5



Fig. 33 location 5



Fig. 34 location 5



Fig. 35 location 6

- (1) unweathered rock
- (2) loamy soil(3) layer where artifacts were found
- (4) debris from cutting containing artifacts





Fig. 37 location 6







Fig. 40 location 6



Fig. 41 location 6



Fig. 42 location 6



Fig. 43 location 6



Fig. 45 location 6

Fig. 47 location^{*}₄6

Fig. 48 location 7

Fig. 49 location 9