THE PALAEOLITHIC SITE OF ARUBO 1 IN CENTRAL LUZON, PHILIPPINES

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ABSTRACT

The discovery and investigation of a Palaeolithic open site in the province of Nueva Ecija in Central Luzon in 2001 by the University of the Philippines Archaeological Studies Program has delivered a rather unique artefact assemblage for Philippines' earliest history. The finds include a classic proto-handaxe, bifacial cleaver and a variety of flake cores. Arubo is at present the only known prehistoric site in the Philippines in which chert as raw material for lithic production was quarried and transformed into stone tools. Wear traces on the artefacts indicate that the people from Arubo used this site also as a camp. Considering the morphological elements of the Arubo artefacts, the site is of early Palaeolithic age. Its artefact assemblage is very different from the controversial 'Cabalwanian' industry of the Cagayan Valley in Northern Luzon. The presence of bifacial technology and selective core preparation in Arubo also contradicts the classic 'chopper/chopping tool industries' scheme of Hallam Movius, and adds to ongoing discussion of the concept of the 'Movius line' in the Southeast Asian Palaeolithic.

PALAEOLITHIC ARCHAEOLOGY IN THE PHILIPPINES

In the Philippines, a number of open sites and caves have yielded prehistoric strata and artefacts which can be characterized as Palaeolithic (Pawlik and Ronquillo 2003). They are mainly situated in Palawan Island and in the northern part of Luzon (Figure 1). Organized archaeological excavation and research has been undertaken since 1922, particularly by H. Otley Beyer (1949), who conducted archaeological surveys, investigations and collecting tours in Luzon, Palawan and the Visayas. In the 1960s, Robert Fox, then head of the Anthropology Division of the National Museum of the Philippines, led a six-year archaeological research project in Palawan, where he focused mainly on the caves and rockshelters of Lipuun Point, of which Tabon Cave is the best known. Excavated under the direction of Fox from 1960 to 1967, Tabon Cave yielded Upper Palaeolithic lithic industries and the oldest remains of *Homo sapiens* in the Philippines so far, a frontal and two mandibular fragments (Fox 1970). The frontal bone has recently been dated by Institut de Paléontologie Humaine in Paris to 16,500±2000 BP by U/Th gamma ray counting (Dizon 2000). Fox estimated the lowest level in Tabon Cave to be 50,000 BP, close to the new uranium series date on a human tibia, also conducted by Institut de Paléontologie Humaine and published as 48,000±10,000 BP (Détroit *et al.* 2004).

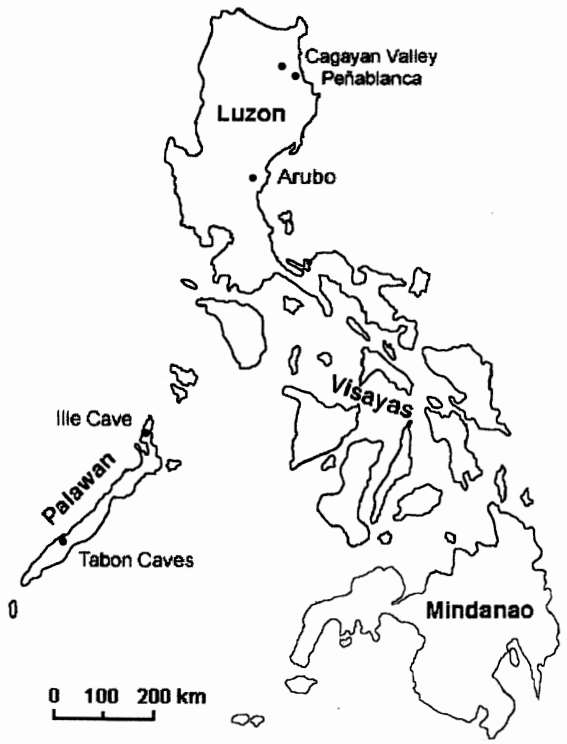

Figure 1: Palaeolithic sites in the Philippines.

Besides Palawan, the Cagayan Valley of Luzon has also contributed to the Philippine Palaeolithic (Ronquillo 1982; Mijares 2002:28). Beyer's collection of Pleistocene faunal remains from here attracted the attention of Ralph von Koenigswald, who travelled in December 1957 to Cagayan and surveyed between the Rio Chico and Cagayan rivers, collecting fossils of Pleistocene mammals and stone artefacts at various places. He described them as archaic-looking pebble tools, made of large quartzite and sandstone pebbles. Some seemed to have a handaxe-like form but were only unifacially modified. Koenigswald however, denied any similarity to the unifacially retouched Sumatraliths of the Epipalaeolithic Hoabinhian tradition, and called this assemblage 'Cabalwanian' (Koenigswald 1958). Philippine archaeologists later adopted this term for the lithic pebble and chopping tool industries of northern Luzon in general (Fox and Peralta 1972).

In 1976, the Cagayan Valley Pleistocene Project started as a joint venture of the National Museum of the Philippines, Iowa State University and the University of Iowa, to investigate Cagayan geomorphology in order to determine the ages of the artefacts and faunal remains. More than 100 open sites have so far been discovered. The lithic materials consist mostly of simple unretouched flakes with a few unifacially retouched pebble tools (Fox and Peralta 1972:104; Peralta 1981:7; Moser 2001:132). Although it is not possible to give certain dates, the unconfirmed association of the stone tools with a Middle Pleistocene fauna conjured images of Early Palaeolithic hunter-gatherers (Shutler and Mathisen 1979:113). A recent study of the Cagayan Valley lithic materials has raised questions about the artefactual nature of some of the items (Moser 2001:134). Fox and Peralta's claim of secondary modification on 30% of all flaked artefacts could not be confirmed, and even the distinction between artefact and geofact seems problematic for many.

ARUBO - A NEWLY DISCOVERED PALAEOLITHIC SITE IN CENTRAL LUZON

In 1995, Jon Aves, grandson of Nicanor B. Aves, Sr., owner of a piece of farmland called Arubo near the town of General Tinio, Nueva Ecija, found two stone tools together with pieces of fossilized wood. Mr. Aves reported the findings to the National Museum in Manila, which examined the site in 1996 and suggested further investigation (Dizon 1996). One specimen was a typical proto-handaxe, the other a large flake tool with a retouched tip (Pawlik 2001). With the support of the Fritz Thyssen Foundation, Düsseldorf, the site was investigated in April and May 2001 within the Summer Fieldschool Program of the Archaeological Studies Program of the University of the Philippines (ASP). The fieldwork included an extensive survey, exploration and initial test excavations, conducted in cooperation with the National Museum of the Philippines. The investigated site was named Arubo 1 (Figure 2).

Arubo 1 is located at 15°22'02.4"N and 121°05'52.5"E, and lies approximately 100 m above sea level, based on measurements with 2 GPS receivers and a digital altimeter. The site is situated around a fishpond and has large boulders of chert and other rocks scattered on the present surface. Extensive bulldozing brought these stones to the surface, after approximately 2-3 m of topsoil had been removed to dig out the fishpond. The surrounding spoil heaps also contain numerous chert boulders. There are several more fishponds nearby with outcropping chert blocks, and the potential to find more lithic artefacts. Nowadays, most of the fishponds have been abandoned; Arubo 1 was just a residual pond in 2001, used only for gathering snails and mussels.

In total, nine sites similar to Arubo 1 have been detected in an area of 2 x 2 km, recorded as Arubo 2-10. All showed the same pattern of chert blocks outcropping at the surface, and some yielded a few flakes. The majority occurred in association with former fishponds.

At Arubo 1, a grid with 10 m² units was laid out oriented north-south, and teams of 2-3 students plotted artefacts within the grid (Figure 3). Elevations of the whole area were taken and used to create a topographic map and a three-dimensional surface model of the site. It was very soon observed that, despite the disturbance created by bull-dozers, two significant concentrations of chert can still be

Figure 2: View of Arubo 1.

recognized. Two 2 x 2 m pits within the chert concentrations southwest of the fishpond were excavated by the participating ASP students (Figure 4), and another two pits were opened by the National Museum team on the elevated area east of the fishpond, hoping to find undisturbed stratigraphy (Garong 2001:6). Additionally, the elevated area southwest of the chert concentrations was augered by the National Museum team, but only a soil dump was found (Garong 2001:8). The excavations within the chert concentrations very soon reached the sandstone bedrock, indicating that the bulldozing had left only a thin undisturbed layer of consolidated clayish sediment beneath the modern topsoil, mixed with eroded sandstone from the underlying sandstone bedrock.

From this basal layer (Layer 2), three artefacts were recovered just above the sandstone bedrock. All other lithic finds were collected from the present surface. It is possible that the cultural materials were originally buried under 2-3 m of sediment, but this cannot be demonstrated since the upper stratigraphy has all been removed.

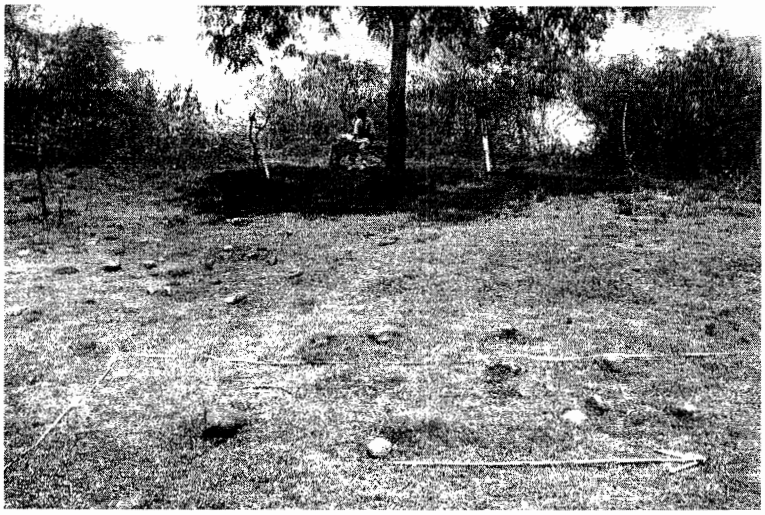

Figure 3: Artefacts and chert scattered on the present surface, Arubo.

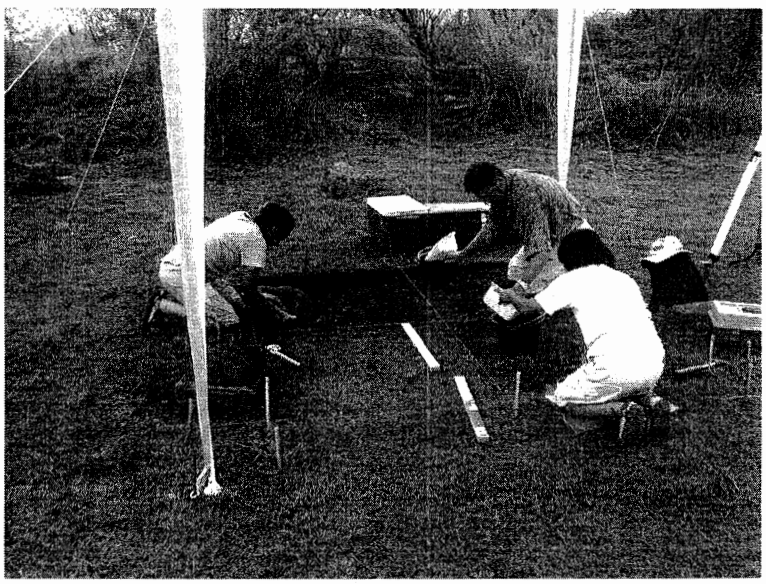

Figure 4: Excavations at Arubo 1, Pit No. 1.

THE LITHIC ARTEFACTS

Two hundred finds were collected in total, but only 18 (five cores, four core tools and nine flakes) carried the characteristics of intentional manipulation, whereas the others were mostly indeterminate cortical fragments and shattered pieces (Table 1). Three flakes had been retouched. A morphometric and microscopic use-wear analysis of these artefacts was undertaken.

The chert raw material used for the artefacts is locally available. Although its silica content is currently unknown, and therefore a mineralogical classification as chert or flint cannot be given (Rottländer 1989:9), the term 'chert' is used following Philippine convention. The whole area of Arubo is scattered with large chert boulders, of varying grain size, colour and texture (Figure 5). Based on the specific weight of chert (approx. 2.5 kg/dm^3), a weight of over 100 kg for the larger boulders is estimated. They seem to be more or less *in situ* (aside from the effects of the bulldozing), and might be residuals from the former Tertiary limestone formation that once covered this region, surviving today in the limestone massif of Peñablanca, 200 km north of Nueva Ecija (Ronquillo 1981:2). Relicts of that limestone formation still exist 10 km southeast of Arubo at Tarundong Bato, where the Rio Chico cuts through the limestone. The limestone formation of Bulacan lies 20 km south of Arubo, and its karst system, with the historically important Biak na Bato caves, is connected to the karst of Tarundong Bato (Fernando Siringan pers. comm. 2001). Beyer (1949:5) reported

> ...five palaeolithic implements (of flint, chert and chalcedony) from the Rizal-Bulacan Collection. All from Middle or early Late Pleistocene sites in Rizal Province.

The raw materials of those artefacts are similar to the chert from Arubo and might have the same origin, but unfortunately they were not available for comparative analysis.

No signs of fluvial transport can be seen on the Arubo material, and there are no river beds in the

Table 1: List of lithic finds from Arubo 1

Category	Quantity
Shatter and undeterminable fragments	182
Cores	5
Core tools	2
Bifacial core tools	2
Cortex flakes	3
Flakes with dorsal ridges	3

immediate vicinity, except for artificial canals. The bed of the Rio Chico lies 300 m away and 35-40 m lower than Arubo 1, so could not have served as the carrier for the chert. Surveys conducted along the river bed revealed no chert pebbles at all. Although some artefacts can be typologically described as 'pebble tools', their nodules were not river pebbles. As of now, Arubo is the only known source of chert in primary location in the Philippines.

A total of 16 different varieties of chert were identified among the lithic materials. Predominant is a yellow-grey patinated and relatively fine-grained chert. The proto-handaxe and several other artefacts were made out of that material. There is also a pitted chert of coarse structure, and a porous, siliceous pseudo-tuff. Despite the presence of large boulders of fine grained homogenous material, this rough and pitted sponge-like material was also used for flaking. Aside from petrified wood fragments no other materials were detected.

Figure 5: Large chert boulders at Arubo.

SPECIMEN DESCRIPTIONS

Despite their relatively small number, the artefacts from Arubo yielded a lot of information about the lithic technology performed at the site. Several cores were found with different preparation techniques and reduction sequences, ranging from simple circulating reduction (Figure 6d) to a horse-hoof-shaped core (Figure 6b), similar to those found in Java (Pajitanian industry; Koenigswald 1936) and Australia (Mulvaney and Kamminga 1999:44). One core on a wedge-shaped fragment of a chert nodule resembles an artefact which was noted by the author among the assemblage from the Upper Palaeolithic Son Vi culture site of Lang Vac, in Vietnam (Figure 6a).

Very interesting is a core on a large flake (Figure 6e), made of a honey-coloured chert of similar texture to the material of the proto-handaxe. The rectangular, bar-shaped flake is steeply domed distally. The striking platform seems to be on a natural joint plane, although a visible dorsal reduction points towards platform preparation. The flake has two dorsal ridges, one partially removed by lateral flaking. Both lateral edges and the distal end are fully retouched. The ventral face served as a striking platform, and the sizes and shapes of the dorsal negative flake scars indicate an intentional production of flakes. Subject to use-wear analysis, this artefact is more likely a core than a used working tool. The dorsal face bears at least ten negative flake scars.

A relatively flat ovoid pebble with complete unifacial retouch resembles a Sumatralith (Figure 6c), but it served most likely as a core for thin and large flakes. Nevertheless, it shows partial lateral retouch near its distal end which might indicate multi-functionality. No recognizable use-wear can be detected.

The most outstanding artefact from Arubo 1 is the bifacially worked proto-handaxe, which if found elsewhere would certainly be regarded as typical for the Early Acheulean (Pawlik 2001:264). It is made of fine-grained chert, and possesses a smooth rind at the base. The artefact is 150 mm long, 98 mm wide at its base, and 74.5 mm thick. It weighs 958 g (Figure 7). The distal part of the tool shows complete edge retouch with good control, and both lateral edges have been made slightly concave to produce an endscraper-like tip.

The rind at the base of the handaxe is smooth. Under the stereo-microscope, a polish-like handling gloss appears on some portions. Furthermore, gloss occurs on the edge of the rind and the adjoining retouched surface, and is therefore not just natural. The lateral edges and tip of the tool show visible rounding resulting from use, perhaps on plants, soft wood or animal tissues. Phytolith-rich plants seem

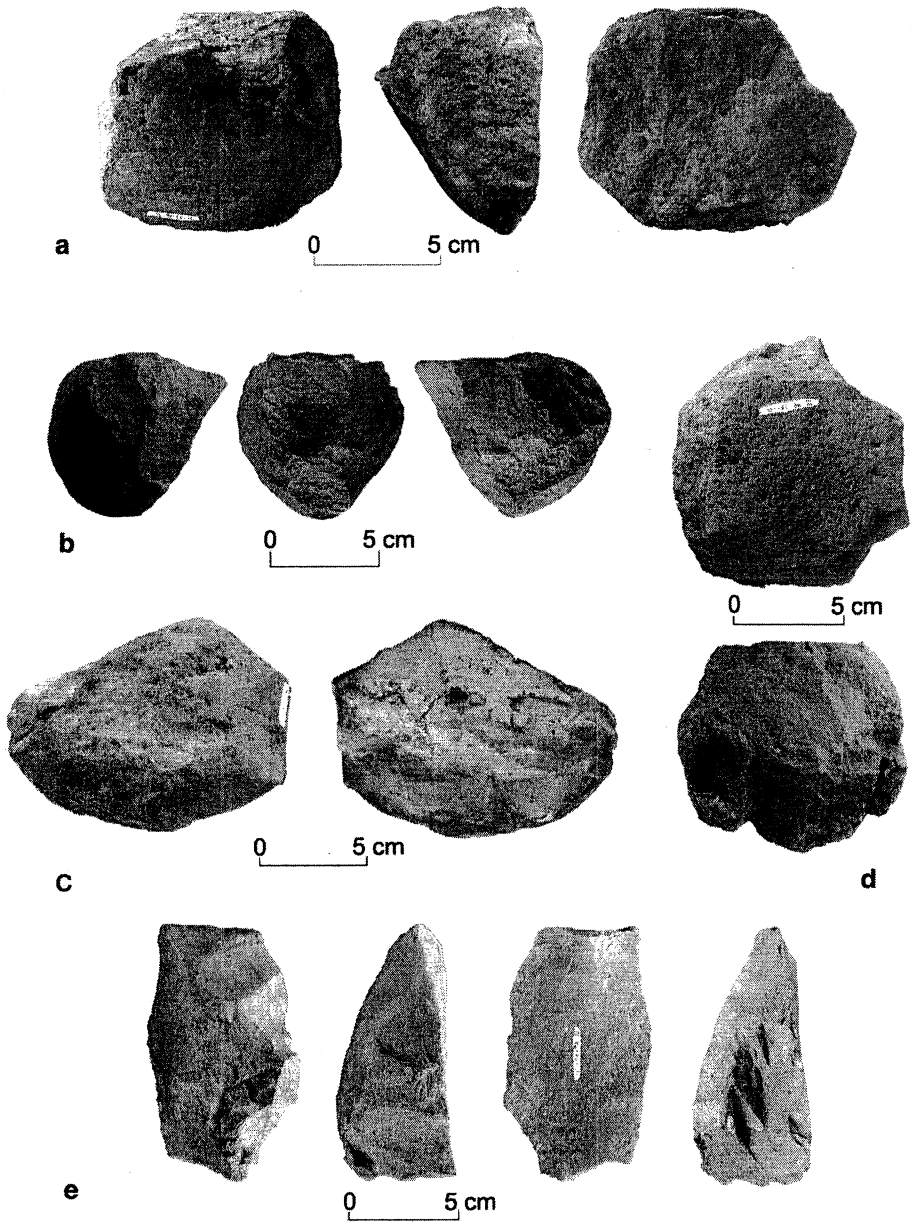

Figure 6: Cores from Arubo 1.

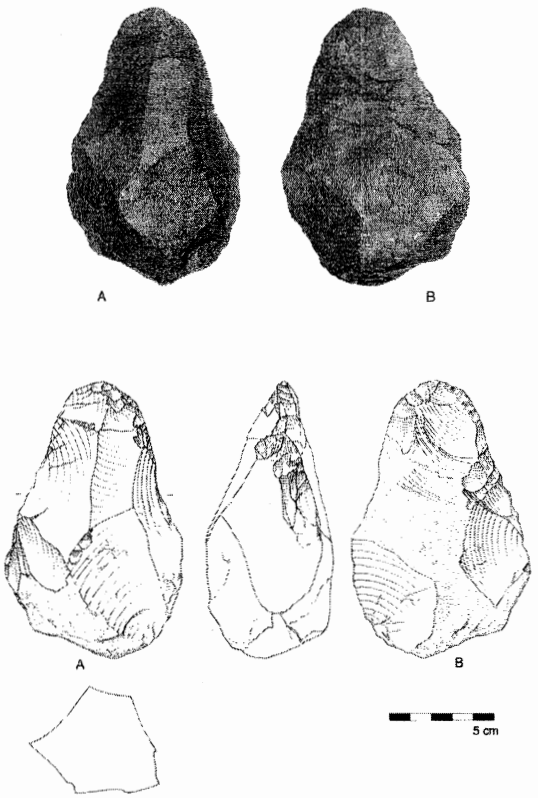

Figure 7: The proto-handaxe from Arubo.

unlikely since phytolith gloss is not present. Different shades of patination suggest rejuvenation of the lateral edges and tip, and the occurrence of different stages of modification over a long period of artefact use, implying curation. The very few and small scars from recent damage show that the natural colour of the chert is light grey to yellow, with a semi-opaque texture.

Another remarkable artefact is a 'pebble tool' with a thoroughly prepared tip on a large flake-like fragmented chert nodule (Figure 8c). Its lateral edge is fully retouched at almost at a 90° angle, and the other lateral edge is partially retouched. The retouch continues towards a spatula-shaped tip. The middle-brown coloured cortex of the piece appears pitted with pores and looks almost like a sponge. However, the interior shows fewer and smaller pores.

Figure 8a shows a large bifacial cleaver of a coarse-grained and porous brown siliceous pseudo-tuff. Despite its coarse structure, excellent flaking control produced a straight and sharp semi-circular curved edge. The base of the tool is broken off, perhaps due to the bulldozing, suggesting that the complete tool could originally have been totally circular and retouched. Figure 8b shows a straight-edged chopper with an edge angle of *c.* 60°. Use scars with step terminations suggest use on hard materials such as wood or bone.

FLAKES

Six unmodified primary flakes were found, three with cortex, and three unretouched flakes with dorsal ridges and negative flake scars. The cortexed flakes are significantly bigger in size than the others. None showed signs of further modification and/or use. In addition, one flake, unifacially modified and slightly edge-retouched, resulted from advanced Levallois-like core preparation, although without the characteristic facetted platform of a true Levallois flake (*châpeau de gendarme*). Figures 8e and 9 show a large flake with dorsal retouch, made of medium-grained, quartzitic chert. The circular distribution and truncated proximal ends of the dorsal flake scars point towards a Levallois-like flaking technique, but there is no characteristic Levallois facetted butt. Before an intentional use of Levallois techniques in Arubo can be suggested, the related cores have to be found. The Levallois technique has only been reported in Southeast Asia from the Upper Palaeolithic site of Leang Burung 2 in Sulawesi, with radiocarbon dates between 19,000 and 31,000 BP (Glover 1981). However, Levallois points can appear accidentally and not necessarily from a Levallois core (Hahn 1991:97). Only one of the illustrated points from Leang Burung 2 shows the typical inverted Y-shape of the dorsal ridges (well illustrated by Loofs-Wissowa 1984:445), but its 'Y' shape is created by various small negative scars and resembles best a Pseudo-Levallois point (Bordes 1950:22; Kelley 1957:9), rather than a Levallois point *sensu strictu*.

Other artefacts include a flake with a scraper profile (Figure 8f) made of a very inhomogenous chert with a conglomerate appearance. It has two platform remnants, positioned perpendicular to one another. Like other Arubo flaked artefacts, this scraper also derives from a double platform core, in which the platform remnant opposite the convex edge resulted from detachment. The convex edge has scraper-like edge retouch, but it is not clear whether this is due to intentional modification or use. There is also one blade-like flake on a relatively coarse and inhomogenous chert. The slightly concave edge has some edge damage on the dorsal face.

ARUBO AND THE SOUTHEAST ASIAN LOWER PALAEOLITHIC

The 2001 campaign at Arubo 1 delivered around 200 finds, made of locally available chert. Eighteen can be identified as tools, cores and flakes. Their morphological attributes and technology certainly indicate a rather old age for Arubo 1, a view supported by the stratigraphic position

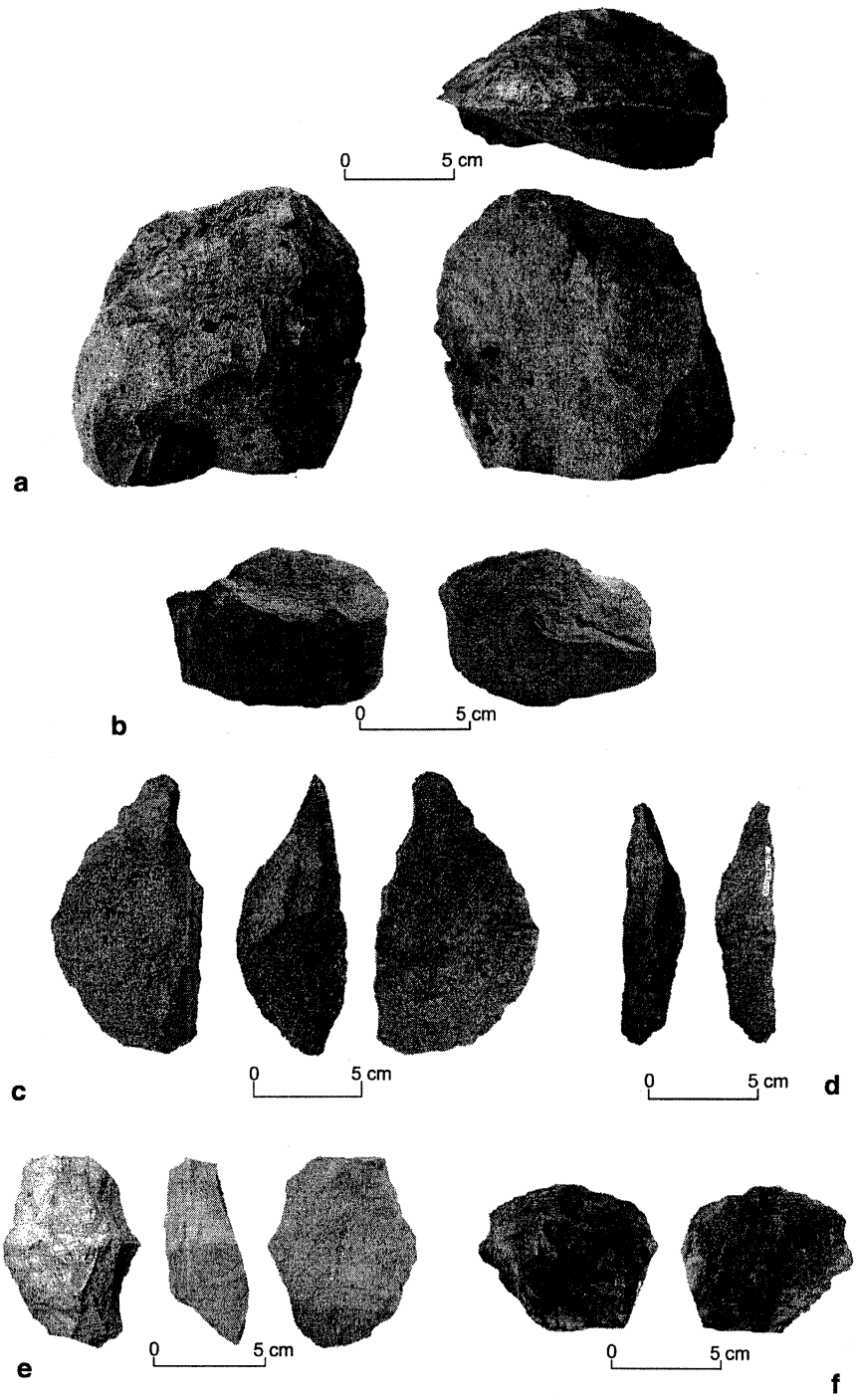

Figure 8: Artefacts from Arubo 1: Core tools and modified flakes.

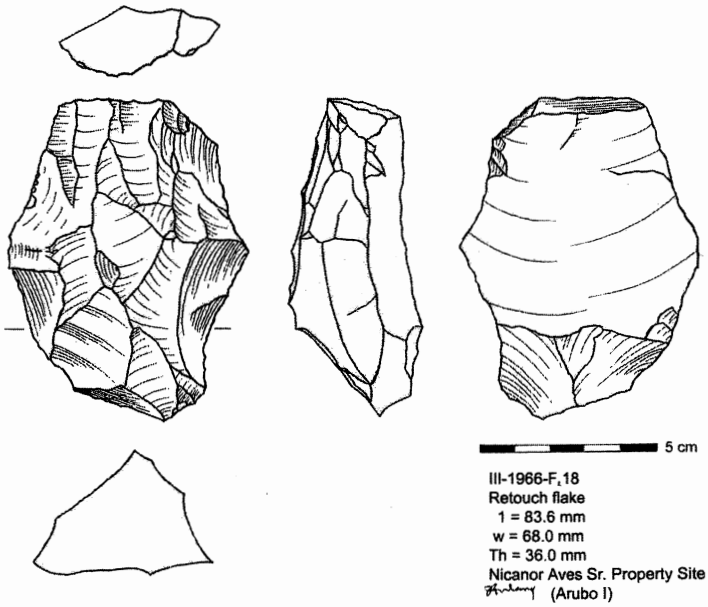

Figure 9: 'Quasi-Levallois' flake from Arubo. (Illustration: C. Tulang)

of the excavated artefacts just above the bedrock. However, the presence of pebble or cobble tools alone is not necessarily an indicator of a lower Palaeolithic date, especially not in Southeast Asia. Such choppers and chopping tools as *ad hoc* or expedient tools appear throughout the whole of prehistory until the Holocene (Ronquillo 1981:7). Nevertheless, the morphology of the Arubo artefacts, especially the bifacial tools, fits well into a 'western' Lower Palaeolithic. Arubo presents unequivocal evidence that handaxes can be found beyond the so-called Movius line (Movius 1944, 1948).

In China, a number of early Palaeolithic sites have been reported in recent years (e.g., Xiang Anqiang 1990; Xie Guangmo 1990; Schick and Dong Zhuan 1993; Leng Jian and Shannon 2000; Keates 2003). According to Yamei *et al.* (2000), bifacial technologies reached southern China around 800,000 years ago, associated with several handaxe sites in the Bose Basin of Guangxi. Numerous handaxes and other bifacial forms are reported from Chongokni in Korea, with dates ranging from 100,000 to 600,000 years (Bae 1988; Schick and Dong Zhuan 1993:32).

After archaeologists earlier postulated the existence of a '*Holzindustrie*' i.e. an industry of wooden tools for Southeast Asia (Narr 1966:133; Solheim 1969), the concept of a bamboo industry has gained popularity (see Pope 1989). As a substitute for a seemingly non-existent formal tool industry without handaxes and other bifacial tools, bamboo seems to have become the escape route from referring to Palaeolithic technology in Eastern Asia as 'backward'. But there is at present no archaeological evidence for the use of bamboo as a raw material for tools, nor have archaeologists presented convincing arguments for the former existence of bamboo tools able to replace heavy duty tools like handaxes and cleavers. Neither have they conducted comparative experiments with bamboo tools to compare them with handaxes and other stone tools. The idea of Palaeolithic bamboo tools remains speculative.

The site of Arubo 1 presents a different picture. Intentional tool preparation and selective tool use can be assumed, based on the presence of core preparation and on the handaxe and other modified artefacts. Curation, as a concept contrary to expedient tool use (Binford 1979), was practiced by the people of Arubo, especially on the handaxe. When this material was presented in the IPPA conference in Taipei in 2002, nobody in the audience seemed to have any objections against the author's use of the term 'Arubian' for the artefacts described above. In the spirit of von Koenigswald, the proposal of the name 'Arubian' for this biface assemblage is made again.

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