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Par

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ANALYSIS OF THE LITHIC MATERIALS RECOVERED DURING THE
2000-2001 ARCHAEOLOGICAL EXCAVATIONS OF TABON CAVE,
PALAWAN ISLAND, PHILIPPINES

Présente le vendredi, 16 Juin 2006
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CHAPTER I. INTRODUCTION

Site Description

The Palawan Island is situated on the westernmost part of the Philippines (Figure 2). Its west coast is facing the South China Sea and is oriented northeast to southwest (Figure 1). In the Municipality of Quezon, there is a complex of caves and rockshelters called the Tabon Caves, named after a Megapodius species, which locally known as Tabon that lay eggs inside these caves (Dizon 2002).

![Figure 1. Map of Southeast Asia showing the Philippines](image)
The Tabon Cave is one of the 53 caves in the Tabon Cave complex that contain cultural materials, among the 200 caves explored and identified since the archaeological research started in 1962. After more than 30 years since the last archaeological fieldwork was conducted in the area, the Tabon Cave was re-excavated by a team from the National Museum of the Philippines in May 2000. Tabon Cave is 38 meters in length from the entrance. Its mouth is 8 meters in height and 16 meters in width, and approximately 36 meters above sea level (Orogo 2000a) [Figures 4, 5, 6]. The entrance chamber which is about 46 meters in length is lit throughout the day (Figure 9).
Figure 3. Map of Lipuun Point and immediate vicinities showing some of the caves that have cultural materials.
Figure 4. Contour Map of Lipuun Point
Figure 5. The mouth of Tabon Cave.
CHAPTER II. REVIEW OF ARCHAEOLOGICAL EXPLORATIONS AND EXCAVATIONS IN THE TABON CAVES AND CAVES OUTSIDE LIPUUN POINT

II.a. Archaeological Excavations and Explorations of Robert B. Fox (1962-1966)

The archaeological explorations and excavations in the Tabon Caves started in 1962 until 1966 and were pioneered by Robert Fox. Fox’s primary objective at that time was to determine a cultural chronology for the area. He identified four chronological sequences, which were based on four C-14 dates he obtained. “Based
upon the *preliminary analyses*, four broad cultural “Ages” have been established and used in the descriptions of the sequences: (1) the *Paleolithic Age*; the *Neolithic Age*, with “Early” and “Late” periods and phases; the *Metal Age* with “Early” and “Developed” periods and phases; and the *Age of Contacts and Trade with East* (Fox 1970:1; Ysip).”

Below is the list of caves with their respective Cultural Assemblages in the Tabon Cave complex that have been identified and explored by Fox (Table 1).

<table>
<thead>
<tr>
<th>Name of Cave</th>
<th>Cultural Assemblages Established</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agung</td>
<td>Jar Burial (surface)</td>
</tr>
<tr>
<td>Batu Puti</td>
<td>Neolithic Burials; Jar Burial</td>
</tr>
<tr>
<td>Bubulungan I</td>
<td>Metal Age Jar Burial; Jar Burial with Sung Pottery; Paleolithic (?)</td>
</tr>
<tr>
<td>Bubulungan II</td>
<td>Jar Burial (surface)</td>
</tr>
<tr>
<td>Decalan</td>
<td>Jar Burial</td>
</tr>
<tr>
<td>Diwata</td>
<td>Metal Age Jar Burial</td>
</tr>
<tr>
<td>Dugyan</td>
<td>Jar Burial (surface)</td>
</tr>
<tr>
<td>Guri (Chamber A)</td>
<td>Habitation with flake and Blade Tools</td>
</tr>
<tr>
<td>Guri (Chamber B)</td>
<td>Early Metal Age Jar Burial</td>
</tr>
<tr>
<td>Igang Kabuwan</td>
<td>Jar Burial (surface); Jar Burial with Sung-Yuan potteries</td>
</tr>
<tr>
<td>Karung</td>
<td>Jar Burial (surface)</td>
</tr>
<tr>
<td>Liyang</td>
<td>Neolithic Burial and Habitation; Jar Burial (surface)</td>
</tr>
<tr>
<td>Manunggul (Chamber A)</td>
<td>Neolithic Jar Burial</td>
</tr>
<tr>
<td>Manunggul (Chamber B)</td>
<td>Metal Age Jar Burial</td>
</tr>
<tr>
<td>Mutya</td>
<td>Jar Burial (surface)</td>
</tr>
<tr>
<td>Ngipe’t Duldug</td>
<td>Neolithic Jar Burial</td>
</tr>
<tr>
<td>Nigi</td>
<td>Jar Burial (surface)</td>
</tr>
<tr>
<td>Pagayona</td>
<td>Metal Age Jar Burial</td>
</tr>
<tr>
<td>Pawikan Ledge</td>
<td>Jar Burial</td>
</tr>
<tr>
<td>Pugay</td>
<td>Jar Burial (surface)</td>
</tr>
<tr>
<td>Ranggaw</td>
<td>Jar Burial (surface)</td>
</tr>
<tr>
<td>Rito-Fabian</td>
<td>Metal Age Jar Burial</td>
</tr>
<tr>
<td>Sarang</td>
<td>Jar Burial (surface)</td>
</tr>
<tr>
<td>Sarang Fissure</td>
<td>Jar Burial (surface)</td>
</tr>
<tr>
<td>Tabon</td>
<td>Paleolithic Flake Assemblages; Early Metal Age Jar Burial</td>
</tr>
<tr>
<td>Tadyaw</td>
<td>Metal Age Jar Burial</td>
</tr>
<tr>
<td>Tarungtung</td>
<td>Jar Burial (surface)</td>
</tr>
<tr>
<td>Ukir Ukir</td>
<td>Cave Burials</td>
</tr>
<tr>
<td>Uyaw</td>
<td>Early Metal Age Jar Burial</td>
</tr>
<tr>
<td>Wasay</td>
<td>Jar Burial (surface)</td>
</tr>
</tbody>
</table>

*Table 1. The Cultural Assemblages of the Tabon Caves (After Fox 1970).*
Aside from the Fox’s explorations and excavations of the Tabon Caves, he also explored caves and rockshelters within the surrounding areas, which included one of the most important cave sites in the area, the Duyong Cave (Figure 3), an early Neolithic Site with a flexed burial with stone and Tridacna shell axes-adzes (Table 2).

“The region surrounding Lipuun Point and the Tabon Caves-falling roughly within the new Municipality of Quezon, Palawan-has about 30,000 hectares of scattered limestone exposures which also contain hundreds of caves and rockshelters. Brief periods of exploration in this region have revealed thirty-five additional cave sites. And, only a very limited portion of this area has been systematically searched. One small but extremely rich cave near the mouth of the Iwahig River-Duyong Cave-was completely excavated (Fox 1970:9).”

<table>
<thead>
<tr>
<th>Cultural Sequences</th>
<th>Caves and Characteristics of the Assemblages</th>
<th>Date and Method of Dating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Proto-Historic: Age of Contacts and Trade with the “Great Traditions” of the South and East Asia, particularly South China</strong></td>
<td><em>Kuruswanan Ledge (Kuruswanan Area)</em> Primary burial in boat coffin</td>
<td>Early 14th or late 13th century A.D. associated with Chinese pottery of the Yuan Dynasty</td>
</tr>
<tr>
<td></td>
<td><em>Magmisi Shelf (Iwahig Area)</em> Secondary burial in earthenware jar</td>
<td>12th or 11th century A.D. associated with Chinese pottery of the “Late” Sung Dynasty</td>
</tr>
<tr>
<td></td>
<td><em>Bubulungan Cave I-B (Lipuun Point)</em> Secondary jar burial with iron and Indo-Roman beads</td>
<td>11th to late 10th century A.D.; associated with “Early” Sung Trade pottery</td>
</tr>
<tr>
<td><strong>Metal Traditions: Developed Metal Age</strong></td>
<td><em>Lungun Cave (Kalatagbak Area)</em> Multiple and secondary log coffin burial in association with iron and locally made pottery</td>
<td>c. 900-700 A.D. (?) by cultural comparisons; no Chinese pottery but “modern” types of iron implements</td>
</tr>
<tr>
<td></td>
<td><em>Sasak Shelter (Kalatagbak Area)</em> Stratified habitation and burial</td>
<td>c. 600-400 A.D. (?) or earlier by</td>
</tr>
<tr>
<td>Site/Location</td>
<td>Description</td>
<td>Date/Comparison</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
<td>----------------</td>
</tr>
<tr>
<td><strong>Metal Traditions: Early Metal Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Guri Cave: Chamber B</strong> (Lipuun Point)</td>
<td>Jar Burial with bronze but no iron; a few glass and gold beads; jade ear pendants</td>
<td>c. 100 B.C. to 300 B.C. by cultural comparisons</td>
</tr>
<tr>
<td><strong>Uyaw Cave</strong> (Lipuun Point)</td>
<td>Jar Burial with bronze adze and spear; stone adze; iron (±); jade ornaments; ancient glass beads and bracelets</td>
<td>c. 300 B.C. to 500 B.C. by cultural comparisons</td>
</tr>
<tr>
<td><strong>Duyong Cave</strong> (Iwahig Area)</td>
<td>Jar burial with small Late Neolithic tools; bronze tools and iron (?); many ornaments of jade; no glass beads or bracelets</td>
<td>c. 300 B.C. to 500 B.C. or earlier by cultural comparisons</td>
</tr>
<tr>
<td><strong>Lithic Traditions: Late Neolithic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Manunggul Cave: Chamber A</strong> (Lipuun Point)</td>
<td>Jar burial with sophisticated and highly decorated pottery; ornaments of jade and stone; no metals</td>
<td>C-14 dates of 2660 +/- 80 B.P. (710 B.C.); and 2840 +/- 80 B.P. (890 B.C.)</td>
</tr>
<tr>
<td><strong>Ngipe’t Duldug Cave</strong> (Lipuun Point)</td>
<td>Jar burial with stepped adze; stone and shell beads</td>
<td>c. 1000 B.C. to 1500 B.C. or earlier by cultural comparisons</td>
</tr>
<tr>
<td><strong>Lithic Traditions: Early Neolithic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Duyong Cave</strong> (Iwahig Area)</td>
<td>Flexed burial with stone and Tridacna shell axes-adzes; shell lime containers and ornaments;</td>
<td>C-14 date of 4630 +/- 250 B.P. (2680 B.C.)</td>
</tr>
</tbody>
</table>
and Neolithic habitation level C-14 date of 5680 +/- 80 B.P. (3730 B.C.)

Pilanduk Cave (Iwaig Area) Edge-ground stone tool and flakes; jar burial c. 3500 B.C. to 4500 B.C. (?) or earlier by cultural comparisons

Small Flake-and-Blade Assemblage a “hafted technology” (Mulvaney 1966)

Duyong Cave (Iwahig Area) Small flake and blade tools in shell midden C-14 date of 7000 +/-250 B.P. (5050 B.C.)

Flake and Flake-and-blade Industries

Guri Cave (Lipuun Point) c. 2000 B.C. to 5000 B.C. and a late C-14 date of 4070 +/-80 B.P.

| Flake tradition of “nonhafted technology; flake tools are a persisting Upper Paleolithic tradition; blade tools represent a new technology | Flake tools but with more common (?) secondary retouching; blade tools appear in upper strata; all assemblages in thick midden of marine shells and animal bones | 
| Upper Paleolithic “Tabonian” flake assemblages; a “nonhafted technology” (Mulvaney 1966) | Tabon Cave (Lipuun Point) Flake Assemblage 1-A | c. 8500 to 9500 years ago |
| Flake Assemblage 1-B | C-14 date of 9250 +/- 250 B.P. |

Table 2. (From Fox 1970:14)

Fox determined five flake assemblages during his excavations in Tabon Cave. Flake assemblage I-A, which is approximately 25 cm. from the surface has an estimated date of 8500 to 9500. This has a maximum depth of 25 cm below the surface and flakes were recovered mostly from the surface. Immediately underneath this level lies a “hard limestone floor, which varies considerably in depth… Beneath this floor still another assemblage was discovered, the stratigraphic relationship of which is still uncertain. This lower assemblage has been tentatively related to Flake Assemblage III although it might be a distinct flake assemblage (Fox 1970:25).”

Flake assemblage I-B that was 20 cm below the surface has a C-14 date of 9250 +/- 250 B.P. (UCLA-284) and from 50 cm to 70 cm below the surface has a C-14 date of 21000 B.P. (UCLA-285). This assemblage was present only in a very small section of the cave that according to Fox may represent a brief occupation period. In this level there was a noticeable absence of marine shells, which “would indicate the
The presence of a land shelf in this area to 9250 +/- 250 years ago. The level of the sea 9000 to 10000 years ago according to Fairbridge (1962), would be 30 meters below the present level, producing an extensive land shelf along this area on the west coast of Palawan (Fox 1970; Robles 2006; Voris 2000) [Figure 7]. There is thus a close correspondence between the C-14 date and the absence of marine shells in Tabon Cave and Fairbridge’s (1960 and 1962) studies of the changing sea level during the Late Pleistocene (Fox 1970:26).”

Figure 7. Depth Contours of Palawan during the Last Glacial Period (Voris 2000).

Part of the deposit of flake assemblage II was eroded revealing on the surface some of the flake tools. The thickness of these strata varies from approximately 50 cm to 70 cm. This has dark brown sediment, hard and granular, and pitted with nests of
mud-dauber wasps. “The deposit contained hundreds of pieces of chert representing all stages in the manufacture of flake tools, as well as many small fragments of fossil animal bones, human and animal teeth, bits of charcoal, but no marine shells (Fox 1970:26).” Directly below this deposit lay a thick calcareous floor laminated with layers of hard travertine, which varies in thickness from about 20 cm to a maximum of 50 cm. A charcoal associated with flake assemblage II was found lying on top of this hard calcareous floor and was dated by C-14 to 21000 B.P. that may be the oldest date of flake assemblage II. This hard calcareous deposit between flake assemblage II and flake assemblage III may suggest a paleo-climatic phenomenon such as a possible pluvial period in Palawan during the Late Pleistocene (Fox 1970).

“Additional support for this view is provided by broad and flat stalagmites which were uncovered in the main lateral trench at exactly the same level as the hard stratum. Stalagmites of this type are formed only when there is a heavy water percolation and drip in the cave, such as would have occurred during a wet period of a glacial advance. The C-14 determinations for Flake Assemblages II and III, >21,000 and 23,200 +/-1000 years respectively, provide approximate dates for the upper and lower limits of this wet period or at least a period when Tabon Cave was wet and dump. The maximum of the Last Glacial, as noted, is believed to have occurred 20,000 years ago (Fairbridge 1960 and 1962) which is precisely when the hard floor in Tabon Cave was formed as shown by the C-14 dates” (Fox 1970:27).

Flake Assemblage III was an intensive level, which was found in the main longitudinal and lateral trench towards the middle and rear of the cave at depths which vary below the present floor from approximately 85 cm to 115 cm for the level dips down in the center of the cave. Many charcoals were recovered from these levels which were products of cooking fires along with bones of birds and bats and other small mammals, few fossil bones, and hundreds of pieces of chert which represent various stages of stone manufacture. Basalt choppers-large nodules unifacially trimmed and basalt hammers used in knapping the chert were also excavated. The charcoal samples were dated more than 22,000 years ago (Fox 1970).
This assemblage was composed of hundreds of lumps and nodules of chert, cores, waste flakes, primary flakes, as well as utilized flakes.

“Man not only lived in Tabon Cave but spent much of his time in the cave manufacturing suitable flake tools. The presence of numerous and clearly defined workshops provides thus an opportunity for a preliminary description of the techniques of flaking used by the Tabon inhabitants” (Fox 1970:29).

Preliminary analyses of Fox of Flake Assemblage III were based on Shawcross’ (1964) analyses for New Zealand flake industries, and Oakley (1950) for European materials. Fox initially stated in general that the methods of manufacture of flake tools in the Philippines during Paleolithic times do not infer recognizable forms of tools that might be used in typological studies.
Fox noted that Flake Assemblage III (Figure 8) flakes were produced by percussion technique using stone hammer. He also recognized that some flakes have indications that the anvil method was also used. Flakes may have been struck solely “from cores but also from any scar of a larger flake which would have provided a striking platform (Fox 1970:31). Fox gave the term primary flakes referring potential tools but were not utilize as such. On the other hand when the flakes were determined to have been utilized, they were called utilized flakes or flake tools. Furthermore he noted that secondary retouching were present on one surface of
the working edges of the tools and added that this is not present elsewhere in the flake assemblages in the Philippines.

“It must be stressed, as discussed by Shawcross (1964:10) in his analysis of the flake assemblages of New Zealand that the forms and sizes of the primary flakes and utilized flakes of the Tabon flakes were not predetermined by the flaking technique. For, there is no evidence of core preparation or the shaping of cores which would have allowed for uniform sizes and shapes of flakes, as in the types of Late Neolithic blade tools excavated in the Bato Caves of Sorsogon Province” (Fox 1970:33).

The manufacturing technique in Tabon Cave clearly produced flakes of varying sizes and forms. They do not have distinct and recurring forms. Fox attempted typological classification and description on the flakes but eventually abandoned the idea.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) <em>Unaltered Lumps of Chert</em></td>
<td>2</td>
</tr>
<tr>
<td>(2) <em>Cores</em></td>
<td>22</td>
</tr>
<tr>
<td>(3) <em>Waste flakes or materials</em> (angular lumps or flakes of chert which were a product of flaking but too small to form either cores for further flaking or too small and irregularly shaped for use as tools)</td>
<td>53</td>
</tr>
<tr>
<td>(4) <em>Primary Flakes</em> (potential tools but no showing evidence of use)</td>
<td>6</td>
</tr>
<tr>
<td>(5) <em>Flake Tools</em></td>
<td>16</td>
</tr>
<tr>
<td>(6) <em>Flake tools with Secondary Retouching</em></td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3. Sample Classification of Chert and their Percentages of Flake Assemblages III. (From Fox 1970:35).

Flake Assemblage IV yielded flakes, cores, and flake tools identical in technique with that Flake Assemblage III. This assemblage was dated through a charcoal sample to 30,500 +/- 1,100 B.P.

Flake Assemblage V only revealed three flakes 160 cm below the present surface, and 40 cm directly below Flake Assemblage IV. Fox estimated the date of this stratum to 45,000 to over 60,000 years.
<table>
<thead>
<tr>
<th>Flake Assemblage</th>
<th>Depth Below Present Cave Floor</th>
<th>Estimated Age or C-14 Date</th>
<th>UCLA C-14 Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-A</td>
<td>Surface to approx. –25 cm</td>
<td>8500 to 9500 (Estimated)</td>
<td></td>
</tr>
<tr>
<td>I-B</td>
<td>-20 cm. -50 cm. to -70 cm. (to + 50 cm.)</td>
<td>9250 +/- 250 21,000 B.P. (maximum age)</td>
<td>UCLA-284 UCLA-285</td>
</tr>
<tr>
<td>III</td>
<td>-97 cm. -99 to -109 cm. 106 to 115 cm.</td>
<td>&gt;22,000 B.P. 23,000 +/- 1000 &gt;22,000 B.P.</td>
<td>UCLA-288 UCLA-699 UCLA-283</td>
</tr>
<tr>
<td>IV</td>
<td>-121 cm.</td>
<td>30,000 +/- 1100 B.P.</td>
<td>UCLA-958</td>
</tr>
<tr>
<td>V</td>
<td>-160 cm.</td>
<td>45,000 to 50,000 (Estimated)</td>
<td></td>
</tr>
</tbody>
</table>

**Table 4. The Flake Assemblages From Tabon Cave (From Fox 1970:24)**

Two of the most important discoveries during the field campaigns of Dr. Robert Fox were the recovery of the Tabon frontal bone and two fragmentary mandibles (Fox 1970; Jocano 1963). Macintosh conducted morphological analysis on the frontal bone and later these were brought to the Institute de Paléontologie Humaine in Paris, France for further analysis (Dizon 2000; Dizon 2002; Macintosh 1978; Winters 1975). Analysis of the frontal bone indicates that it belongs to a young adult female individual (Dizon 2002).

Another cave with very important archaeological significance is the Duyong Cave. Geographically, Duyong Cave is part of the Tabon Cave complex but the cultural materials found in this cave are significantly related to Tabon Cave. It is located along a stretch of beach, 11 kilometers north of Lipuun Point (Figure 3).

The entire surface of Duyong Cave, which is approximately 8 meters in length and 7 meters in width, was covered with bones of a sea-cow (locally known as Duyong, thus the name of the cave). The bones were believed to be ritual offerings during the Jar Burial Period (Fox 1970).

“A number pieces of chert of a small flake and blade industry, as well as a unifice chopper and a very large core of chert, were also found on the surface of Duyong Cave (Fox 1970:54)

“The single Neolithic burial is of considerable significance to Philippine Prehistory. It is the first Early Neolithic Burial,
insofar as the writer knows, to be excavated in the Philippines and the first C-14 date for this period (Fox 1970:54)”.

Another important cave outside Lipuun Point is Pilanduk Cave. It is located high in the north face of Mt. Magmisi, which is about 10 km northeast of Malanut Bay. It is about 20 meters by 40 meters. The cave is well ventilated and well lit by day.

“The cave was inhabited between 24,000 and 16,000 BC by Late Paleolithic hunter-gatherers. After 16,000 BC it was visited rarely, if at all, until some time after the turn of the first Millennium BC when it was used as a jar burial site. Analysis of the material culture of the Palaeolithic hunters revealed a highly sophisticated lithic technology containing at least seventeen readily identifiable types or tools produced by knapping techniques and/or edge deformation before or during use. The Palaeolithic occupations are divisible into four fairly discrete components. The lowermost, IV, was dated at 25,470 +/- 1000 bp (I-5490). The two youngest, II and I, were dated at 18,340 +/- 370 bp (I-5492) and 18,260 +/- bp (I-5488) respectively (Kress 2000:5)”.

II.b. Recent Archaeological Excavations Conducted by the National Museum of the Philippines

The recent archaeological excavation at Tabon Cave started in May 2000. A team from the National Museum of the Philippines led by Alfredo Orogo, Researcher II of the Archaeology Division conducted the excavation. Four field seasons were conducted from 2000 to 2001 (Orogo 2000a; Orogo 2000b; Orogo 2001a; Orogo 2001b).
The team noted that the old excavated squares (squares and trenches) were heavily damage due to visitors that frequent the cave. Apparently, there is no restriction for against people entering the cave. The same reference point or datum used by Fox was used by the team during the excavations (Figure 11). Using the longitudinal axis of the cave bearing N49°E as the center line, the team established grid lines at a 2-meter interval (Orogo 2000b; Peralta 1978).
Figure 11. The Datum Point established by Fox during the 1962-1966.
A new accession number was assigned by the team for these recent excavations to facilitate the recording of archaeological and cultural materials. The 2-meter by 2-meter square was further divided into four quadrants assigned with letters A, B, C, and D in a clockwise rotation. Two excavation squares were opened: S8 E2 and S9 E2.
Figure 13. One of the excavation squares showing the disturbance in the stratigraphy

Figure 14. The excavation squares inside Tabon Cave.
Figure 15. Grid map showing the excavations squares of Fox’s excavations and the recent excavations in Tabon Cave.
The excavation squares are named based on its proximity from the reference point or datum point with reference to the four basic directions and the size of each excavation square (Figures 15 and 16). All squares north and east of the point will have assigned names of Nn En starting from N1 E1. Likewise all squares south and west of the point will have names of Sn Wn starting from S1 W1. The same is true with the other two quadrants. Thus, the excavation square S8 E2 in a 2-meter grid is 16 meters south of the reference point and 4 meters on the east.

The excavations proceed at a 10 cm random level, bagging and sorting materials in 10-cm level per quadrant and per square. The basic tool used in the excavations is a mason trowel. Each lithic material that was found inside the excavation square was each measured 3-dimensionally. The back dirt was sieved away from the excavation squares and samples were collected for flotation to recover minute materials.

The stratigraphic profile and description (color, texture, etc.) of sediments are done after the excavations would have been completed.

All the materials that were recovered were washed (except those that are chosen not to be washed so as not to compromise certain laboratory procedures),

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1 n is the number assigned in succession relative on how far the excavation is from the reference point.
sorted, and entered into the Inventory Record Forms of the Archaeology Division of the National Museum of the Philippines (Figure 10). The accession number, the square number, depth from the datum point, depth from the surface, the 2-dimensional measurements (distance from N-S; distance from E-W), description of artifacts, and the remarks, are all entered into the form as much as possible. Cultural materials recovered from the surface are duly noted. Each artifact or ecofact is then bagged separately with all the information mentioned above entered into the bagging slip.

The sterile earth, after the sieving was placed in sacks to contain mess inside the excavation and facilitate movements of people.

During the second field season of the year 2000, the team excavated the same excavation squares again and encountered the hard, compact travertine described by also encountered by Fox during his excavations in the Tabon Cave as an important paleoclimatic event that happened in the cave (Orogo 2000a).

The recent excavations recovered 11 fossilized human bones (Detroit 2004) [Table 5].

<table>
<thead>
<tr>
<th>Accession Number</th>
<th>Square Number</th>
<th>North-South Coordinates</th>
<th>East-West Coordinates</th>
<th>Depth (Surface)</th>
<th>Description and Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV-2000-T-0170</td>
<td>S7 W2</td>
<td>87</td>
<td>174</td>
<td>18</td>
<td>diaphysis of left fibula</td>
</tr>
<tr>
<td>IV-2000-T-0184</td>
<td>S7 W2</td>
<td>40</td>
<td>89</td>
<td>3</td>
<td>fourth proximal left foot phalange right temporal bone, mainly consisting of the mastoid process</td>
</tr>
<tr>
<td>IV-2000-T-0188</td>
<td>S7 W2</td>
<td>86</td>
<td>126</td>
<td>21</td>
<td>axial skeleton: lumbar vertebra</td>
</tr>
<tr>
<td>IV-2000-T-0195</td>
<td>S7 W2</td>
<td>43</td>
<td>156</td>
<td>17.5</td>
<td>lower limb bones; right tibia</td>
</tr>
<tr>
<td>IV-2000-T-0197</td>
<td>S7 W2</td>
<td>34</td>
<td>177</td>
<td>16</td>
<td>occipital bone</td>
</tr>
<tr>
<td>IV-2000-T-0372</td>
<td>S7 W2</td>
<td>73</td>
<td>140</td>
<td>36</td>
<td>right third metatarsal</td>
</tr>
<tr>
<td>IV-2000-T-0259</td>
<td>S7 W1</td>
<td>158</td>
<td>147</td>
<td>12</td>
<td>upper limb bones; right ulna proximal epiphysis</td>
</tr>
<tr>
<td>IV-2000-T-0276</td>
<td>S7 W1</td>
<td>191</td>
<td>163</td>
<td>16.7</td>
<td>right fibula distal epiphysis</td>
</tr>
<tr>
<td>IV-2000-T-0442</td>
<td>S7 W1</td>
<td>148</td>
<td>183</td>
<td>77</td>
<td>right calcaneus</td>
</tr>
<tr>
<td>IV-2000-T-0365-B</td>
<td>S7 W1</td>
<td>148</td>
<td>183</td>
<td>60</td>
<td>immature atlas</td>
</tr>
</tbody>
</table>

Table 5. Fossilized Bones Recovered from Recent Archaeological Excavations at Tabon Cave.

Specimen with accession number IV-2000-T-0197 was dated 47 ± 11/-10 kyr BP, along with other specimens that belong to the archaeological excavations of Fox. The right mandibular fragment (PXIII-T436 Sg 19) was dated 31 +8/-7 kyr BP, the frontal bone (P-XIII-T-288) was dated 16.5 +/- 2 kyr BP (Detroit 2004; Dizon 2002).
II.c. Comparative Discussions on Fox’s Archaeological Activities and the Recent Archaeological Fieldworks

The archaeological excavations of Fox were hampered by technological constraints. Recent developments in dating methods, which now include dating sediments, were not available during his time. Dating methods were limited to carbon 14 dating, which of course has its own limitations. Although Fox mentioned and gave some evidences of paleoclimatic phenomenon that occurred in Tabon Cave, they were never sufficient to support a conclusion (Fox 1970).

In the lithics materials, which he stated some conclusions; he failed to present some statistical data that would support his findings and appropriate discussions on his methodology in arriving to such generalizations. However, some of the findings that he presented were very well within the same framework with the findings that would later be presented in this paper.

However, it is should be noted that the materials recovered from the recent excavations were from a disturbed context, such that, comparisons between assemblages of Fox and the recent excavations would be inappropriate (Figure 13).

CHAPTER III. ANALYSIS OF THE LITHIC MATERIALS RECOVERED FROM THE RECENT EXCAVATIONS

III.a Scope and Limitation of the Study

The lithic materials that are the subject of this paper are the property of the Republic of the Philippines, with the National Museum of the Philippines as the custodian and repository of these materials. These materials have accession numbers that start in IV-2000-T-. The accession number assigned to the recent excavations of Tabon Cave.

The author, being an employee of the National Museum of the Philippines requested, thru the Chief of the Archaeology Division and the Director IV, permission to bring them to Institute de Paléontologie Humaine (IPH) in Paris for Analysis. Initially, only 66 lithic materials were brought to IPH chosen subjectively for their relative large sizes. However, upon consultation with the author’s academic adviser, the rest of the materials would have to be sent to IPH as well. Thus, the rest of the
materials were sent to IPH by personnel of the National Museum. It should be noted that, prior to the idea that these lithic materials from the recent excavation of Tabon Cave be studied in IPH, a researcher from the Archaeology Division of the National Museum have chosen some flake with high potential to be tools for microwear analysis. During the summer of 2005, when the author started looking at the materials, there was a confusion at the Archaeology Division on whether those materials subjected for microwear analysis were already returned or not. And apparently during that time it was assumed that they were already returned but they were not. Therefore, when the findings will be presented in this paper, it is imperative to consider that not all of the lithic materials from the 2000-2001 archaeological excavations of the Tabon Cave were analyzed.

### III.b. Distribution of the Different Types of Lithic Materials Among the Excavation Squares

The lithic materials subjected to analysis were recovered from the recent excavations that were conducted from 2000 to 2001. Six (6) excavation squares were opened during this span of time: S7W1, S7W2, S8E2, S8W1, S9E2, and S8W2 (Figures 22, 23, 24, 25, 26, 27, and 28). A total of 139 lithic materials were analyzed. This number includes cores and flakes.

Chert is the raw material of all the lithics that were recovered. Chert is abundant in the riverbeds in the area surrounding the Tabon Caves complex (Fox 1970). The bulk of the lithic materials were recovered from the excavation squares S7W1 and S8W2. S7W1 yielded 101 lithic materials, 27 were recovered from S8W2, 9 from S7W2, and 1 from S8W1 (Figures 17, 18, 19, 20, and 21).
Twenty-two (22) pieces of these materials have very little or no diagnostic features that can be analyzed. Most of them were very small flakes or flakes that were heavily encrusted with lime. The team of the recent excavations has assigned the term chert chip referring to small flakes with an average length of 1.39 cm, average width of 1.00 cm, and average thickness of 0.41 cm.

The succeeding Figures show the different distributions of the lithic materials among the different excavation squares. The bulk of the lithic materials were recovered in the excavation square S7W1. It is to be noted that seven (7) of the eight (8) cores recovered came from this excavation square.
Figure 19.

Figure 20.

Figure 21.
Fourty-five flakes from the recent excavation, which were unfortunately excluded from this study, were subjected to microwear analysis. The flakes were examined under low power and high power microscopy. A 10x hand lens and 6-60x Olympus SZX-9 were used to determine scar terminations and edge rounding, while 100-400x magnification Olympus high power microscope was used to identify different types of polishes and direction of striation (Mijares 2004).

“The analysis of the recently excavated flake tools from Tabon Cave shows that they were mostly utilized for the manufacturing of wooden implements. This can be observed in the polish identified on their working edge, which is mostly from smooth-pitted to well developed polish...(Mijares 2004:addendum)”.

CHAPTER IV. METHODOLOGY

The length, width, and thickness of each of the flakes and chips were taken using the Vernier caliper. The length is measured from the proximal end to the distal end, while the width was measured at the maximum flake width. The thickness is likewise measured at the thickest part (Andrefsky 1998). All the flakes were oriented with the striking platform at the bottom (Inizan M.L.; H. Roche & Tixier 1992).

The amount of dorsal cortex was determined and numbers 0-5 were assigned, where 0 corresponds with the total absence of cortex; 1 corresponds to ¼ of the dorsal face have cortex; 2 refers to ¼ - ½ of the dorsal face has cortex; 3 corresponds to ½ - ¾ of the dorsal face is cortical; 4 refers to ¾ but less than 1 is cortical; and 5 if the dorsal face is all cortex.

The pattern of previous flake removals was also determined is it was unipolar, bipolar, orthogonal, entrécrois, transversal, and covergent.

The type of striking platform was classified into cortical, plane, dihedral, faceted, and abraded. Cortical striking platform is characterized by the presence of a cortical surface. The plane striking platform is characterized by previous removals, thereby the absence of cortex on it. Dihedral refers striking platforms that has two distinct surfaces. Faceted striking platforms refer to multi-surface striking platforms,
and an abraded striking platform is characterized by some sort of grinding the platform surface, wherein striking platforms are abraded or prepared before knapping.

Knapping can be performed using a hard hammer, such a stone hammer or a soft hammer, such a wood or an antler (Andrefsky 1998; Whittaker 1994). In some cases it is distinguishable but in some it is not. Physical attributes as reflected on the objective piece may not be sufficient to support such conclusion that one flake was produced by soft hammer or hard hammer. In some cases it is a matter of statistics and other factors should be considered. The best way however to determine if within a particular assemblage a hard or a soft hammer was utilized is by experimentation. In this particular study, there was an attempt to determine what kind of hammer was used in each of the flake that was studied. Unfortunately, the work was abandoned in futility. It was generalized that only a hard hammer could have produced all the flakes that are the subject of this paper, without the benefit of an actual knapping utilizing the same type of materials. It is however hoped that in the future knapping experimentation will be done to re-check such.

The slope of the flake edge was examined on whether they are flat, oblique or abrupt. The presence or absence of retouches was determined and identified if they were done deliberately or by utilization; as well the as the location of the retouches on both surfaces (direct or inverse), and their location on the edges (distal, proximal, lateral left, and lateral right). The size of the retouch and its regularity (regular or denticulate) were also examined. All the data were entered into the database using the Microsoft Access and were mostly analyzed using the Microsoft Excel. The Charts and graphs were formulated from the Excel.

Images of most of the flakes were taken by scanning them on a flatbed scanner and some of them were drawn.

CHAPTER V. DISCUSSION ON THE RESULTS

V.a Distribution of Cultural Materials in the Excavation Squares

Only four of the six excavation squares contained lithic materials. The charts below show the distribution of the different cultural materials that were recovered from these excavations squares.
Figure 22.

Figure 23.

Figure 23.
Figure 24.

Distribution of Cultural Materials in Excavation Square S8W1

Figure 25.

Distribution of Cultural Materials in Excavation Square S8E2

Figure 26.
Figure 27.

The raw materials utilized to make the flakes are chert of differing types and characteristics. At least 10 types of chert, mostly based on the color and texture of the materials, were identified. However, technical descriptions of their each of their characteristics were not yet done.

The method of manufacture as revealed by the data collected from the flakes and cores that were studied is opportunistic, wherein most of the flakes were removed by direct percussion using a hard hammer and the flakes that have the most potential to used as tools were chosen.

An attempt to identify the type of hammer percussion was done to determine whether some flakes were removed by hard hammer or soft hammer. Unfortunately,
as a matter of statistics and based on previous studies by comparison in other sites in the Philippines, it was decided that it would be impossible to isolate one from the other. As such, there will be no clear defining parameters to scientifically identify flakes removed by hard hammer and flakes removed by soft hammer from the materials that were studied. It was determined clearly however the opportunistic method of knapping wherein the best flakes of high potential to be used as tools was chosen.

**IV.b Results of the Analysis of the Lithic Materials from the Recent Excavation (2000-2001) of Tabon Cave.**

Cortex.

![Bar Chart](Figure 29)

Figure 29.

One hundred twenty-three (123) flakes with no cortex on the dorsal face have been identified. No flake fell under the “1/4 of the dorsal face” category, and one (1) flake each for the rest of the categories (Figure 29). First stages of flaking, which is to remove the cortex from the cobbles may have been done outside the excavation squares, thus, the absence of cortex on the dorsal face on most of the flakes.
Striking Platform

Figure 30 below shows the different types of striking platforms. Most of the flakes have plane striking platforms comprising 83% or 95 pieces of the total flakes analyzed; faceted striking platforms 8% or 9 flakes; 4% or 5 flakes have cortical striking platforms; 1% or one flake has dihedral striking platform; and 4% or 4 pieces have abraded striking platforms.

Figure 30.
The sizes of the flakes with plane striking platforms are well distributed within the range. Their average length is 2.22 cm and the average width is 2.06. Most of the flakes with cortical platforms are relatively larger with an average length of 4.59 cm and an average width 4.02 cm. Flakes with abraded cortical platforms have an average length of 2.72 cm and an average width of 2.93 cm. Flakes with faceted striking platforms have an average length of 2.61 cm and average width of 2.51. Only one flake has a dihedral striking platform with a length equal to 2.47 and width equal to 1.41 (Figures 30 and 31).
Morphology of the Edges

Figure 32.

Description of Flake Edges

<table>
<thead>
<tr>
<th>No. of Flake</th>
<th>Flat</th>
<th>Oblique</th>
<th>Abrupt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 32.
The edge with the smallest angle was the one measured because it has the most potential of being utilized as scraper.

Eighty-two (82) of the flakes have oblique edges, eighteen (18) have flat edges, and eleven (11) have abrupt edges. As shown in Figures 32 and 33, there is no diagnostic difference in terms of the length and width of the flakes relative to the type of their respective edges, except that six (6) of the flakes with oblique edges tend to be larger than the rest. However, in terms of thickness, there is a considerable difference in the respective averages; e.i. the average thickness of flakes with flat edges is significantly thinner than those flakes with oblique and abrupt edges with an average of 0.29 cm, while flakes with oblique and abrupt edges have an average thickness of 0.74 cm and 0.90 cm, respectively.
Retouch

Retouching has been observed on some of the flakes that were studied. Most of the retouches were caused by utilization and the rest were deliberately done. The retouch flakes are generally larger in length and width compared to the flakes without retouches (Figure 34).

Most of the retouching on the flakes could have been caused by utilization (Figure 35). The deliberately retouched flakes have an average length of 3.74 cm and average width of 4.10 cm. as compared to averages of length and width of the retouched flakes by utilization which is 2.66 cm and 2.53 cm, respectively (Figure 34).

Figure 34.
Sixty-four percent (64%) of the flakes have direct retouches, 17% have inverse retouches and 19% have retouches on both faces (Figure 36).
The location of retouches on the sides of the flakes (lateral right or lateral left) and on both ends (proximal or distal) have revealed that most of the flakes have distal retouches (13), lateral right (12), and lateral left (10). Five (5) flakes have retouches on both sides. Only one flake has a proximal left location of retouching. The rest of the flakes have right distal (3) and left distal (2) retouches (Figure 38). Most of the flakes with distal retouches tend to be wider and longer than those that have retouches on the left and right laterals (Figure 35).

The presence of retouches on the lateral right, left, and distal part of most of the flakes may suggest that these were utilized primarily as scrapers.

For the deliberately retouched flakes, the size of the retouches varies from small, small to medium, and medium to large. Four flakes have denticulate retouches and one has a regular retouch. For the five flakes that were identified to be deliberately retouched, three (3) of them have oblique slope of retouch, and the rest have shallow and abrupt slopes.

The flakes which have retouches by utilization have mostly small retouch size, shallow slopes, and more regular retouches. Eighteen (18) of the flakes have denticulate retouches and twenty-three have regular retouches (Figure 37 and 39).

![Figure 37. Regularity of Retouch](image-url)
Figure 38.

Figure 39.
Scar Pattern on Dorsal Face

The dominant patterns of previous flake scars are unipolar and orthogonal.
Forty-two (42) of the flakes studied have orthogonal pattern of previous flake scars and forth (40) have unipolar pattern (Figure 40).

![Patterns of Previous Flake Scars](image)

Table 6.

<table>
<thead>
<tr>
<th>Accession Number</th>
<th>Amount of Dorsal Cortex</th>
<th>Length (cm)</th>
<th>Width (cm)</th>
<th>Thickness (cm)</th>
<th>Type of Retouching</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV-2000-T-0468</td>
<td>2</td>
<td>4.88</td>
<td>4.39</td>
<td>1.85</td>
<td>utilization</td>
</tr>
<tr>
<td>IV-2000-T-0489</td>
<td>0</td>
<td>5.88</td>
<td>4.76</td>
<td>2.02</td>
<td></td>
</tr>
<tr>
<td>IV-2000-T-0485</td>
<td>0</td>
<td>2.69</td>
<td>3.6</td>
<td>1.16</td>
<td>deliberate</td>
</tr>
<tr>
<td>IV-2000-T-0450</td>
<td>0</td>
<td>5</td>
<td>3.57</td>
<td>1</td>
<td>utilization</td>
</tr>
<tr>
<td>IV-2000-T-0535</td>
<td>3</td>
<td>5.45</td>
<td>3.23</td>
<td>1.4</td>
<td>utilization</td>
</tr>
<tr>
<td>IV-2000-T-0534</td>
<td>0</td>
<td>3.96</td>
<td>4.11</td>
<td>1</td>
<td>deliberate</td>
</tr>
<tr>
<td>IV-2000-T-0542</td>
<td>0</td>
<td>3.37</td>
<td>2.44</td>
<td>0.73</td>
<td>utilization</td>
</tr>
<tr>
<td>IV-2000-T-0538</td>
<td>0</td>
<td>3.34</td>
<td>5.28</td>
<td>0.88</td>
<td>utilization</td>
</tr>
<tr>
<td>IV-2000-T-0533</td>
<td>0</td>
<td>5.18</td>
<td>7.23</td>
<td>1.76</td>
<td></td>
</tr>
<tr>
<td>IV-2000-T-0587</td>
<td>0</td>
<td>6.17</td>
<td>3.74</td>
<td>1.77</td>
<td>deliberate</td>
</tr>
<tr>
<td>IV-2000-T-0629</td>
<td>0</td>
<td>2.5</td>
<td>3.07</td>
<td>0.98</td>
<td>utilization</td>
</tr>
</tbody>
</table>
Some of the materials were scanned and drawn, though not all the digital images are presented in this paper. Table 6 presents some of the materials with some of their corresponding data (Figures 41, 42, 43, 44, 45, 46, and 47).

Figure 41. Flake No: IV-2000-T-0489
Figure 42. Flake No: IV-2000-T-0533
Figure 43. Flake No: IV-2000-T-0629
Figure 44. Flake No: IV-2000-T-0538
Figure 45. Flake No: IV-2000-T-0534
Figure 46. Flake No: IV-2000-T-0535
Figure 47. Flake No: IV-2000-T-0587
Figure 48. Flake No: IV-2000-T-0468
Figure 49. Flake No: IV-2000-T-0485
The number of flakes with cortex on the dorsal face and on the striking platform compared to the number of flakes and the cores may suggest that most of the knapping may have been done outside the excavations squares. Furthermore, the attempt of refitting the flakes according to the type of raw material that resulted only in one successful refit supports this idea. It would be assumed that the inhabitants of Tabon Cave may have collected chert nodules from the riverbed and did the first stages of knapping somewhere outside the excavation squares and brought cores inside the cave and removed the desired flakes to be utilized as tools. It should be
noted however that attempts of refitting were conducted but only one small flake was successfully refitted to another bigger flake. Most of the cores were discarded because of lack of convexity, the nature of the raw material (fracture pattern) and exhausted cores. All the raw materials that of the cores studied is chert. The last two flakes removed from Specimen IV-2000-T-0486 were approximately measured from the negatives. The lengths were 2.88 cm and 4.80 cm for the first and second negative, respectively, and 4.48 cm and 2.94 for the width of the first and second negatives, as well. Flake No. IV-2000-T-0550 was successfully refitted to flake no. IV-2000-T-0468.

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>Nature</th>
<th>Striking Platforms</th>
<th>Objective Piece (flake)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV-2000-T-0486</td>
<td>Core from a flake</td>
<td>2</td>
<td>Medium to large flakes</td>
</tr>
<tr>
<td>IV-2000-T-0490</td>
<td>Core from a flake</td>
<td>3</td>
<td>Small to medium flakes</td>
</tr>
<tr>
<td>IV-2000-T-0491</td>
<td>Core from a nodule</td>
<td>5</td>
<td>Medium to large flakes</td>
</tr>
<tr>
<td>IV-2000-T-0681</td>
<td>Core from a flake</td>
<td>3</td>
<td>Small flakes</td>
</tr>
<tr>
<td>IV-2000-T-0550</td>
<td>Core from a flake</td>
<td>4</td>
<td>Small flakes</td>
</tr>
<tr>
<td>IV-2000-T-0540</td>
<td>Core from a flake</td>
<td>2</td>
<td>Small flakes</td>
</tr>
</tbody>
</table>

Table 7. Cores from the Recent Excavation.
Figure 53. Core No: IV-2000-T-0490

Figure 54. Core No: IV-2000-T-0491
CHAPTER VI. RECOMMENDATION

The recent excavations of the National Museum of the Philippines in Tabon Cave have opened so far six 2-meter by 2-meter excavation squares, far less than the excavation squares opened by Fox during the 1968-66 archaeological excavations.
An attempt to compare lithic assemblages from the recent excavation squares and lithic assemblages of Fox may not hold credibility because of disturbed condition of the recently excavated squares (Mijares 2004). It is thus, recommended that further excavations in undisturbed areas should be done in Tabon Cave that would hopefully yield cultural materials that would bolster our understanding of the prehistory of the area and the Philippines as a whole.

Furthermore, knapping experimentation should be done using the raw materials in the area that were most likely used by prehistoric people, to determine and understand some of the parameters use to study the lithic materials, like, to be able to determine whether in one point during the course of the manufacture of stone tools by occupants of Tabon Cave, they have utilized a soft hammer and how often, and in what stage of manufacture.
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