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## What plants might potentially have been used in the forests of prehistoric Southeast Asia? An insight from the resources used nowadays by local communities in the forested highlands of Palawan Island

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## ABSTRACT

Pleistocene and Holocene lithic assemblages found in Southeast Asia are characterised by simple production techniques and a paucity of formal stone tools. This situation led some scholars to hypothesise that this situation reflected an adaptation of prehistoric human groups to the rainforest and that these simple stone tools had been mainly used to manufacture more complex implements made of bamboo. Microscopic use traces observed on stone tools could support this hypothesis since many result from plant processing. However, it remains unclear whether these traces were produced by working bamboo or other plants, due to the lack of a suitable use-wear reference collection. To be able to clearly discriminate the use-wear resulting from bamboo processing, such a collection needs to encompass use traces resulting not only from bamboo processing but also from working various other plants, which might potentially have been used by prehistoric groups. We present here the results of a three month field work among Pala'wan communities aiming to know what plants from the forests of Palawan, Philippines are used nowadays, are therefore useful to humans in general and might have been used during the past as well. We recorded the use of 95 different plant species belonging to at least 34 different families. Archaeobotanical studies confirm that some of those plants were available and used by humans in the past while others would have been extant at least in forest refugia, even during glacial periods. Those plants are processed by the Pala'wan at all life stages from seed to dead trees and the parts involved are very diverse. While the most frequent type of use that we witnessed was technological in nature (67 plant species), plants are also used for alimentary, medicinal, ornamental, and sanitary purposes, and even for producing poison. The observations presented here can serve as a basis for use-wear analysts to design experiments in relation to plant exploitation by humans during the past, and to enlarge reference collections.

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## 1. Introduction

A large portion of Pleistocene and Early Holocene lithic assemblages from Southeast Asia consist of unretouched flakes and pebble tools. They are characterized by the paucity of formal tool types and simple production techniques, which remained, unchanged, for thousands of years (Movius, 1948; Moore and Brumm, 2007; Reynolds, 1993, 2007). This situation contrasts with what is found in Europe and Africa, which led some researchers to suggest that this might reflect a specific adaptation of prehistoric human groups to this region of the world and its environment. According to them, the early inhabitants of Southeast Asia did not invest much effort in stone technology and used these simple stone tools to manufacture a more complex industry made of a lighter material, more adapted to a mobile lifestyle in the forest: bamboo (Boriskovsky, 1967; Gorman, 1969; Fox, 1970; Solheim, 1972; Hutterer, 1977; Testart, 1977; White, 1977; Pope, 1989; Forestier, 2003, 2010; also see Ford, in this volume).

Organic materials do not preserve well in rainforests and no bamboo tool has been found so far in the archaeological record. A method which allows finding clues of materials that have disappeared long ago is use-wear analysis or traceology. It is based on the observation of micro-wear resulting from the use of the artefacts (Semenov, 1970; Vaughan, 1985). Traceological studies showed that the use-wear present on many Southeast Asian stone tools results from plant processing (e.g. Bannanurag, 1988; Pookajorn, 1996; Mijares, 2002, 2008; Davenport, 2003; Teodosio, 2006; Lewis et al., 2008; Xhaufclair and Pawlik, 2010, Pawlik, 2012; Borel et al., 2013; Reynolds et al., 2013). Nevertheless, it is unclear whether these traces were caused by processing bamboo or other plants, due to the lack of an experimental reference collection adapted to the region (Bar-Yosef et al., 2012).

To be able to discriminate the use-wear resulting from bamboo processing, such a collection has to encompass use-wear resulting not only from bamboo processing but also from working other plants. The question immediately following is: what are the plants, other than bamboo, which might have been used by prehistoric groups in Southeast Asia? Archaeobotanical studies constitute a precious source of information to answer this question as they provide an increasingly precise picture of plant exploitation during prehistory. This picture is nevertheless still fragmentary in many aspects and a way to gain some knowledge about other plants that might potentially have been used during the past is to look at the current situation: in a similar environment, which are the plant taxa that are used by extant communities and that can be profitable to humans in general?

Here we present a case study that can contribute to our knowledge of the useful plants from Southeast Asian rainforests which may have been used by prehistoric groups during the past. During three months, we documented the wild species used by Pala'wan communities who inhabit the forested foothills and highlands of Palawan Island, Philippines. They have a great expertise of the forest as they use its resources for their everyday life. As these kinds of information can be useful to use-wear and residue analysts as well as to archaeobotanists, we mention here, in addition to the plant taxa, the precise uses of these plants together with the part processed to achieve a specific goal. The data exposed in this paper complement ethnographic accounts about plant use in different parts of Southeast Asia (e.g. Haudricourt and Condominas, 1952; Conklin, 2007 – 1st ed. 1954; Condominas, 1957, 1972; Dournes, 1968; Barrau, 1969–70, 1974; Aubaile-Sallenave, 1987, 1997; Revel, 1990; Christensen, 2002). As there are thousands of plants in the tropical forests of this region, there is still a wealth of knowledge yet to be discovered, in

danger of becoming extinct (Puig, 2001), which can be useful to understand past practices.

Investigating the use of plants today to enlighten the past appears to be a valid approach even though the climate varied during glacial-interglacial cycles (Flenley, 1996, 1998; Stott et al., 2002; Rosenthal et al., 2003; Sémah and Renault-Miskowsky, 2004). During warmer periods, the vegetation cover was similar to what is found today in areas undisturbed by intensive exploitation activities. During stadial periods, which were dryer and slightly colder, the rainforest persisted in refugia where its resources remained available to the populations of the region (Whitmore, 1998; Puig, 2001; Sémah and Renault-Miskowsky, 2004; Sémah and Sémah, 2012; Hunt et al., 2012; Stimpson, 2012; Rabett et al., in this volume). These refugia might have played an important role in the mobility patterns of prehistoric groups, like lithic raw material sources did (Bar-Yosef et al., 2012).

In this context we use ethnoarchaeology to widen the range of possible interpretations (Gallay, 2011): to know what plants from the forest, other than bamboo, can be used by humans and for what kind of activities. The integration of this approach within the process of understanding archaeological remains and testing hypotheses is presented in Fig. 1.

## 2. Regional setting

The Pala'wan are an autochthonous group in the South of Palawan, Philippines and are estimated to be around 40,000 individuals. They practice shifting slash and burn agriculture but also gather many wild plants from the forest and fallow lands (Macdonald, 1977; Revel, 1990, 2007, 2013). This ethnic group is subdivided into the “Lowlands Culture” (itself subdivided) and the “Highlands Culture”. We conducted our fieldwork within the latter cultural area, which corresponds to communities living in small hamlets of 2–10 houses on the slopes of the Mount Mantaligahan between 100 and 1000 meters above sea level. (Figs. 2–4). It should be noted that what is called DAYAQ (Highlands) by the Pala'wan and subsequently by the anthropologists does not correspond to what the botanists call the montane forest floor, which is present in Mount Mantaligahan above 1000 m asl (Revel, 1990; Madulid, 2002). The vegetation formations present in the Pala'wan Highlands are detailed below.

The Pala'wan divide their environment into three categories: the house surroundings or LÁGWAS, the field, UMA, and the wilderness, TALUN. Vegetables, medicinal and ornamental plants are cultivated or protected in the house surroundings, the ground being otherwise, totally stripped bare, the earth being visible. When a portion of the forest, usually secondary, is cleared to make a field, trees and plants are chopped down and vegetation chunks set on fire. Selected trees are nevertheless protected from fire, for instance using leaf sheaths of banana pseudostems. The wilderness, TALUN, is divided into distinct vegetation formations. The three major formations are the forest, GÁBAQ, the fallow, or new growth of forest, BANGLĀY, and the cogon grassland, KÁKUGUNAN, (Revel, 1990, 2011) (Fig. 5). The forest, GÁBAQ corresponds to two botanical formations: the lowland evergreen forest or classical “tropical rainforest”, and the lowland semi-deciduous forest or “tropical semi-evergreen forest” (Madulid, 2002).

## 3. Method

### 3.1. Ethnoarchaeological investigation

A three month field investigation (HX - 3 months and TV - 1 month) was conducted in four hamlets in the Municipality of

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