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Lithic drill points: an ethno-historic case study from Motupore Island (Papua New Guinea)

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Abstract

Motupore is the name of an island and the archaeological village site located upon it in the Central Province of Papua New Guinea. The occupants of this site have been described as specialist manufacturers of earthenware clay pots. During the late 1800s and early 1900s ethnographers recorded 15 different pot types, two of which were dominant in the assemblage. The pots were transported by voyaging canoes to the Gulf of Papua and primarily exchanged for sago. This exchange network, known as the *hiri*, began when the site was first occupied about 800 years ago. A recent excavation on Motupore Island in 2016, led by M. Leavesley and T. Beni, found a series of 80 lithic pieces with relatively standardized dimensions. These pieces were collectively categorized as 'drill points' based on their relative homogeneity, but this categorization can be misleading. The first aim of the study was to analyze lithic tools from a techno-morphotypological perspective to better characterize the drill points on Motupore Island. Specifically, our objective was to determine whether a standard production process was followed to manufacture homogeneous points or conversely did production processes vary to manufacture heterogeneous drill points with a few dominant types. Based on quantitative and qualitative characteristics, five morphotypes were identified: truncation, shouldered piece, triangle, bore and point. The second aim of the study was to propose functional uses of these 'drill points' based on macroscopic observations of retouch on the surface of pieces, and to test hypotheses proposed by ethno-historical sources.

Keywords: Papua New Guinea, Motupore island, *Hiri* exchange network, drill

point Résumé

Localisée dans la Province Centrale de la Papouasie-Nouvelle Guinée, Motupore est une île, mais également un village-site archéologique du même nom. Les occupants du site ont été décrits comme des fabricants spécialisés dans la production de poterie. Au cours des XVIII^{ème} et du XIX^{ème} siècles, les ethnologues ont recensé 15 types de pots différents, dont deux étaient dominants dans les assemblages. Les poteries étaient transportées en pirogue vers le Golfe de Papouasie, puis échangées essentiellement contre du sago. Ce réseau d'échange, connu sous le nom de *hiri*, a débuté dès la première occupation du site, il y a environ 800 ans.

En 2016, sous la direction de M. Leavesley et T. Beni, une fouille sur l'île de Motupore a mis au jour 80 pièces lithiques avec des dimensions relativement standardisées. Cet ensemble d'artefacts avait initialement été, sur le constat de leur apparente homogénéité, classé en « drill points ». Cette appellation pouvait cependant être trompeuse. L'objectif de cette étude a été d'analyser ces outils lithiques selon une perspective techno-morpho-typologique afin de mieux caractériser les « drill points » de l'île Motupore. Plus précisément, existait-il un standard dans le processus de production suivi d'un traitement de mise en forme homogène, ou inversement des traitements de mise en forme différents des « drill points » comprenant quelques types dominants ? En se basant sur des caractères qualitatifs et quantitatifs, cinq morphotypes ont pu être identifiés : troncature, à cran, triangle, bec et pointe. Enfin, des hypothèses concernant les modalités d'utilisation de ces « drill

points » sont proposées, elles s'appuient sur le repérage en macroscopie d'arrachements sur les arêtes des pièces qui valident les hypothèses proposées par les sources ethno-historiques.

Mots-clés: Papouasie Nouvelle-Guinée, île de Motupore, réseau d'échange *Hiri*, forêt en pierre

Introduction

Motupore Island is located at the entrance of Bootless Bay, at the south-eastern end of the Gulf of Papua on the southern coast of Papua New Guinea. Bootless Bay is one of many bays along the coast of this region, 13 km from the capital Port Moresby, and less than 1 km from the mainland of Papua New Guinea. The island is relatively small in size, with a length of 0.9 km, maximum width of 0.3 km and an area of 174 km² (Figure 1).

The first archaeological research undertaken on Motupore Island was conducted by R. J. Lampert and J. Golson in 1967 (Lampert and Golson 1967). During their excavations they discovered faunal, lithic and pottery remains, and a layer without pottery underlying layers rich in pottery sherds. In 1968, R. J. Lampert described the importance of this lithic material, as at the time it represented the only archaeological traces of human occupation predating the use of pottery along this coast of Papua New Guinea (Lampert 1968). He also identified the lithic artefacts as drill points manufactured from siliceous rocks.

Following this early work, J. Allen and others, including staff and students from the University of Papua New Guinea (UPNG) conducted extensive excavations (1970-1976), on a natural inlet formed

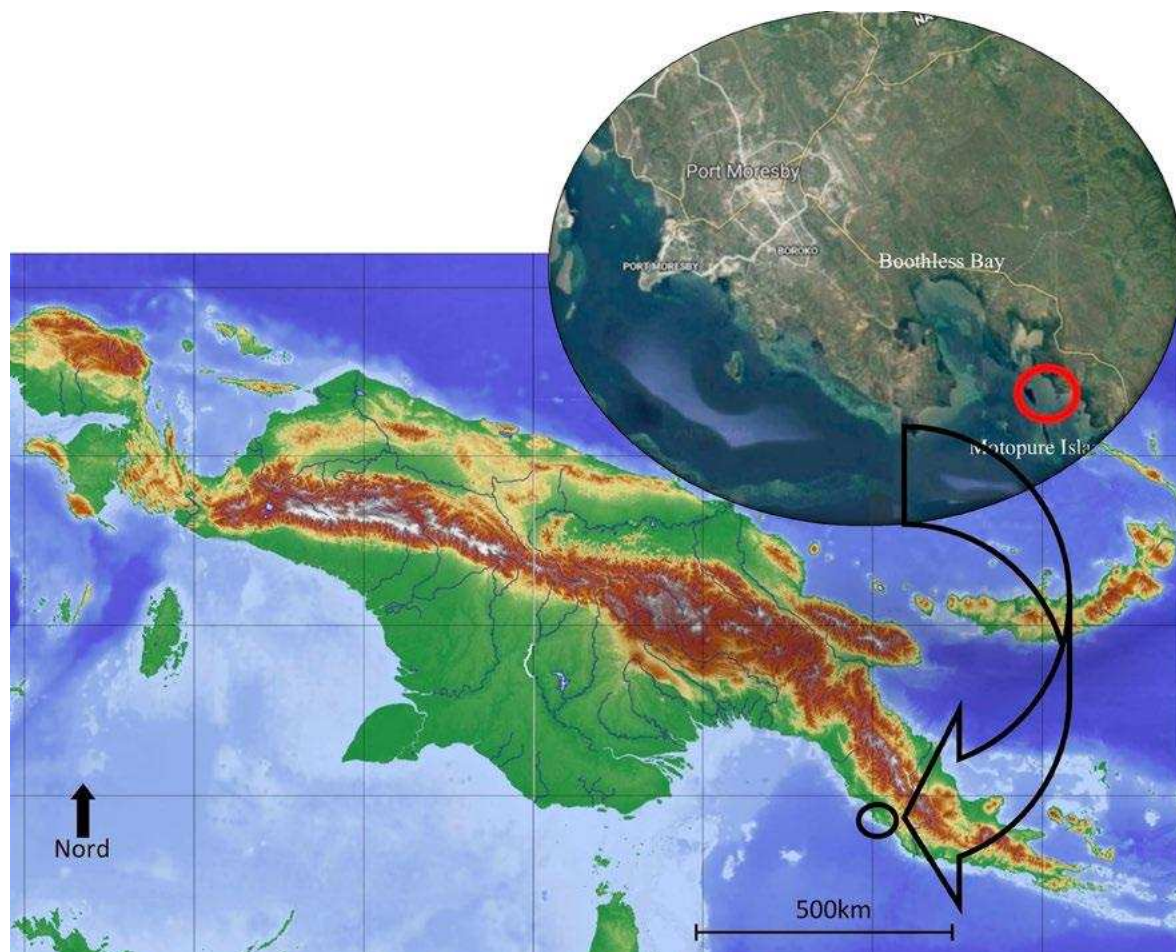


Figure 1. Physical geography of Papua. Inset, the area south of the Gulf of Papua and the island of Motupore (Google Earth modified).



Figure 2. Motupore island. One distinguishes the present buildings and the area of the excavations (© J. Allen, 2017).

by white coral sand, the only area on the shoreline not occupied by mangroves (Figure 2) and where three houses are located today.

Between 1978 and 1983, L. Groube pursued archaeological research by opening a long trench 20 m in length, west of the previous excavations. More recently, a team from UPNG, led by T. Beni, M. Leavesley and J. Allen, have restarted archaeological research on this site.

Researchers chose to start working again on Motupore island 50 years after the first discoveries, because it is a rich archaeological area close to Port Moreby. This island is also a crucial area for understanding the origins of the traditional 'Hiri', a trading network of the Motu people along the Gulf of Papua New Guinea through which clay cooking pots (*uro*) and others gifts are exchanged for sago (*rabia*) (Oram 1982; David *et al.* 2009, 2010, 2016; Skelly *et al.* 2017).

Early archaeological results from Motupore emphasise the importance of the site as a place of pot production and lithic knapping. Given that earthenware pottery has high archaeological visibility and utility, this site is central to our understanding of the entire trading network. The precision of dating techniques, such as radiocarbon, has increased dramatically since the early research carried out by Allen and others. Therefore, our new study programme (2016) aims to re-date the site so as to provide a better understanding of the site chronology, stratigraphy, artefacts, and by extension, the entire area from which pottery was traded.

The lithic material presented in this study is from the last excavation period (2016) and was discovered associated with other perforated artefacts (e.g., ceramic, pumice stone). It is mainly composed of lithic drill points which are characteristic objects and well-represented in the archaeological assemblage of Motupore. Analyzes were based on direct observations of the shaping of these pieces, their dimensions and morpho-structures. We aimed to categorize pieces into different morphotypes, to determine their defining characteristics and their diversity.

Drill points are very distinctive and unusual pieces; their obvious morpho-structural standardization must be demonstrated by a metric study, and hypotheses regarding their functions can be accepted or refused by observing their marks.

Material and method

The focus of this study is the 99 lithic pieces excavated by the UPNG archaeology team (ML TB, ML and JA; 2016) which are from a clear and well dated stratigraphic context. Among this assemblage were 80 artefacts identified as drill points plotted in the upper part of the stratigraphy. They were retrieved from 9 layers of sediment identified during excavations in square A and B (Table 1).

The deepest layer, layer 9, was formed by white sand and was archaeologically sterile, but the presence and dating of an echinoidea shell gave the oldest date, 2 267±18 BP (ref. N23-ES001/Wk 47848). This result agrees with the deep dating obtained by J. Allen who did not detect occupation on this site before 900 years BP (Allen, 2017, p. 119-120, vol. 1). Layer 8 and 7 could not be dated because of lack of samples for dating (organic matter).

Layer 6 contained human occupation but without the presence of drill points. It was dated from charcoal samples at 958±17 BP. (ref. N23-CS006/Wk 47847). The lowest part of the stratigraphy, from layer 9 to 6, did not contain drill points.

Finally, only layers 3, 4 and 5, with a total thickness of 85 cm contained drill points and gave a dating from charcoal samples, of respectively 620±16 BP (ref. N23-CS005/Wk 47846), 621±17 BP (ref. N23-CS003/Wk 47844), 611±17 BP (ref. N23-CS004/Wk 47845) and 410±19 BP (N23-CS002/Wk 47843).

No reliable dating material from layers 1 and 2 were used for dating, due to an absence of samples and/or top soil disturbance making sample origin uncertain (Allen 2017: 88, vol. 1).

It is clear that drill points are associated to the period of most intense economic activity on the island, which corresponds to the top archaeological layers and a period of human occupation between 600 and 400 years BP, so from the 14th to 16th centuries.

Methodology was based on the decontextualisation of the 80 drill points from their ethno-anthropological context, which is later taken into consideration in the discussion. We considered these archeo-historical artefacts using a typological and morpho-technological approach. Results were confirmed or rejected using ethno-anthropological and ethno-historical data. Beyond the archaeological and technological interest of these artefacts, as a testimony of past knowledge and expertise, our approach validates the interpretations of these lithic artefacts originating from an ancient technological context. The technological ‘memory’ has not been forgotten because it was integrated within a trading system and also present in oral traditions and recent history (Figure 3).

The study we conducted on this archeo-historical material also has an anthropological value, because it is part of a ‘go-between’ with two temporalities (recent past and present) which are addressed by archeology and anthropology in a dual process of decontextualization/recontextualization (Figure 3).

We used the software Access to manage data from the 80 artefacts (Microsoft®Access® 2016-16.0.10287.20118). Data obtained from each drill point was entered on a standard form which

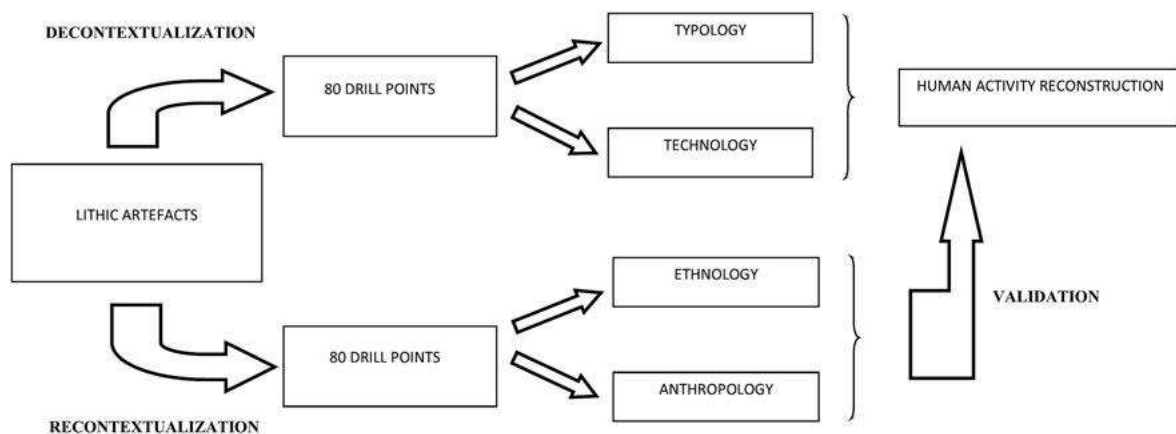


Figure 3. Diagram of the decontextualization/recontextualisation approach applied to the drill points.

listed 20 variables. Some variables were quantitative, such as length, width, thickness (a numerical value from a measurement using a calliper), inventory number, and morphotype code, and some were qualitative (macroscopic observations directly observed on the piece), such as preservation state, transversal or longitudinal profile, detachment type, butt morphology and preparation, distal shape and artefact name. Finally, a last categorical variable was related to more general observations. The definition used to describe the detachment type, butt morphology, distal shape, for example, and to distinguish between notch, beak and truncation was taken from an handbook on lithic technology and typology (Inizan *et al.* 1995; Shott 2015).

The morphotype of each drill point was individualized according to three qualitative criteria: the morphology of the tip (particularity of the active part), the morphology of the prehensive zone (the nature and the location of the notch) and finally, the general silhouette of the artefact (symmetrical/ asymmetrical). This step allowed us to classify the pieces into five main morphotypes, despite some intermediate morphologies that did not influence the classification of the 80 artefacts defined as drill point. All the analyzes were made using this data bank.

Results and discussion

Based on the general morphology of the pieces within the assemblage, we characterized a set of five morphotypes (Figure 4). Although there are morphometric traits specific to each morphotype there are also some similarities among morphotypes (Figure 5). In addition, according to the nature and position of particular retouches for each piece (when visible), we identified 32 different sub-types within the five main morphotypes (Figure 4), which were coded accordingly (Table 1). Codes were: truncation [T], notch [C], beak [B] or point [P].

For the points and beaks, a comparison of the apex position and morphological axis of the piece (dejeted or axial) further categorized the sub-morphotypes. Thus, points and beaks were identified as: axial point [PA], axial beak [BA], dejeted point [PD], and dejeted beak [BD].

The axial beaks [BA] and truncations [T] are very rare in the assemblage, as only one piece was found for each type. In contrast, the axial points [PA] dominates the assemblage with 39 specimens (Table 1). Standard deviations of the three measurements (length, width and thickness) for the 80 pieces showed that the stone carvers followed a standard production for the manufacture of the pieces as shown by the measurements: an average of 16.9 mm for the lengths, 6.2 mm for the widths and 4.7 mm for the thicknesses. This strategy is very apparent when considering the length of the pieces which show a small 3 mm standard deviation and 0.9 mm standard deviation for the width and the thickness, respectively (Figure 6).

The average dimensions of the total assemblage of 80 drill points is 17 x 6 x 5 mm (Figure 6); standard deviations are very small, especially for thickness and width. Therefore, these pieces are standardized, as confirmed by the unimodal Gaussian normal distribution curve (Figure 6). Conversely, if these parts were not standardized, we would have obtained a bi-modal or poly-modal distribution.

The degree of homogeneity in drill points is particularly important for students of Motupore archaeology and the *Hiri* more generally for a number of reasons. While pots were known in the region at nearby Caution Bay 2900 years ago (McNiven *et al.* 2011) it is only with the *Hiri* that archaeologists have invoked explanations that revolve around notions of specialized trade and degrees of specialization in pot production (Irwin 1991: 508). In this context specialization has been proposed with reference to the sheer quantity and relative homogeneity of the pots that were produced for the *Hiri*. While pot sherds dominate the assemblage the importance of other activities at the site, including shell bead manufacture, were also important and was recognized from the start of the study. If homogeneity is indeed an indicator of specialized production then

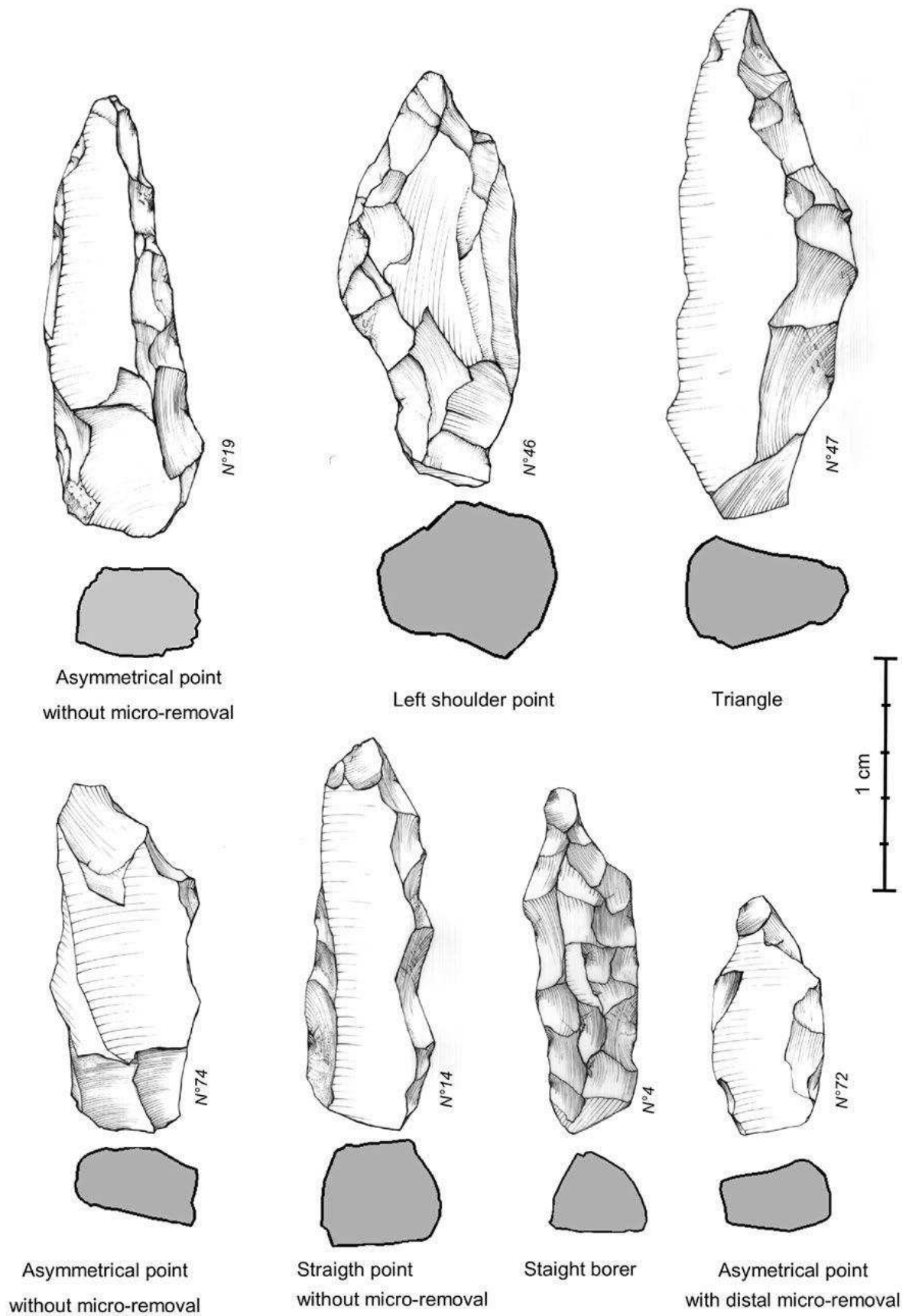


Figure 4. The main morphotypes of the drill points.

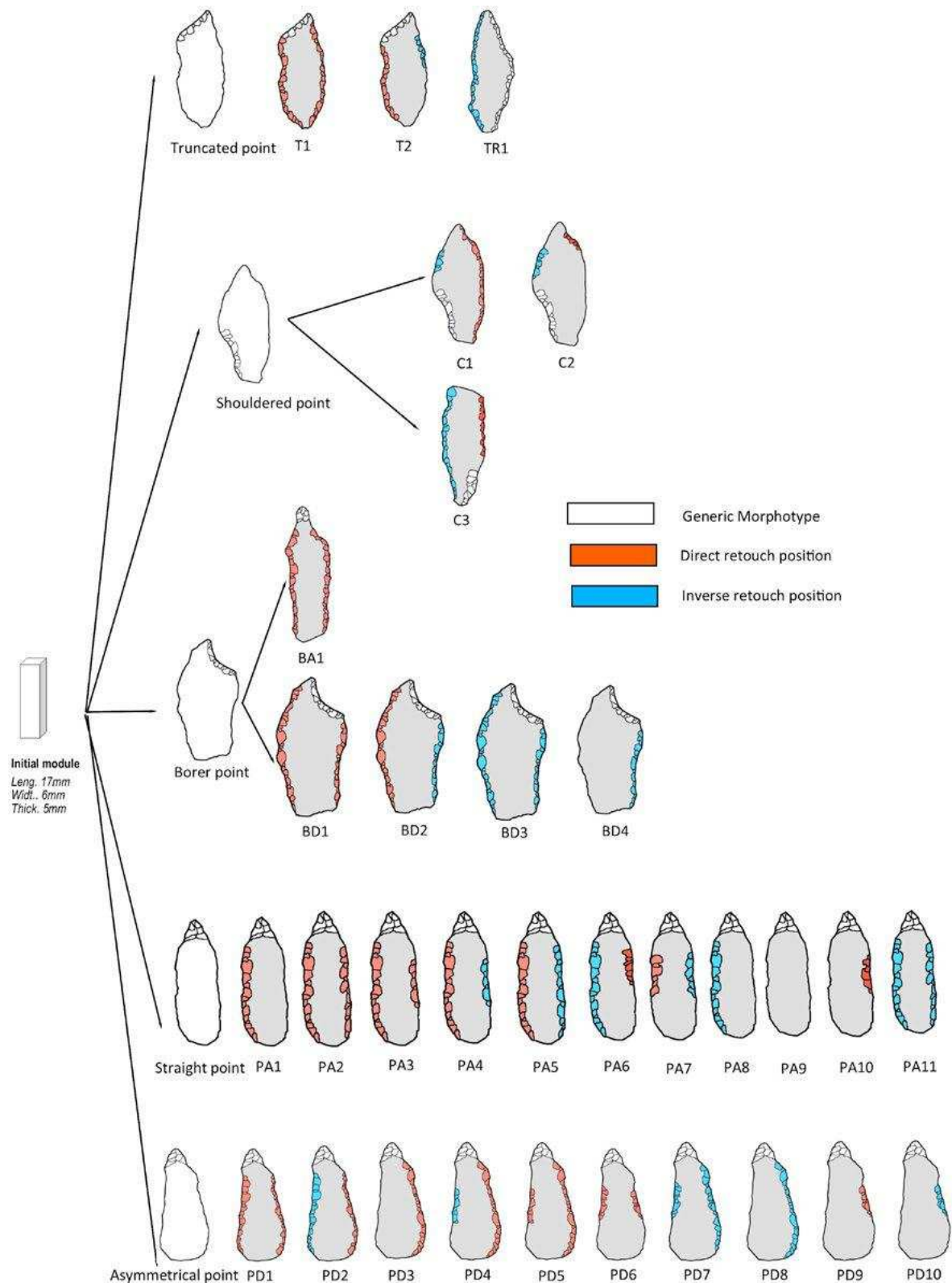


Figure 5. The 32 slot-morphotypes of the drill points.

investigating this in drill points is only one way to gauge the importance of shell bead production for the residents of Motupore island.

Local chert was readily available to manufacture drill points, but it was not used by the stone carvers of Motupore due to its low quality. It appears that the 80 drill points were made from

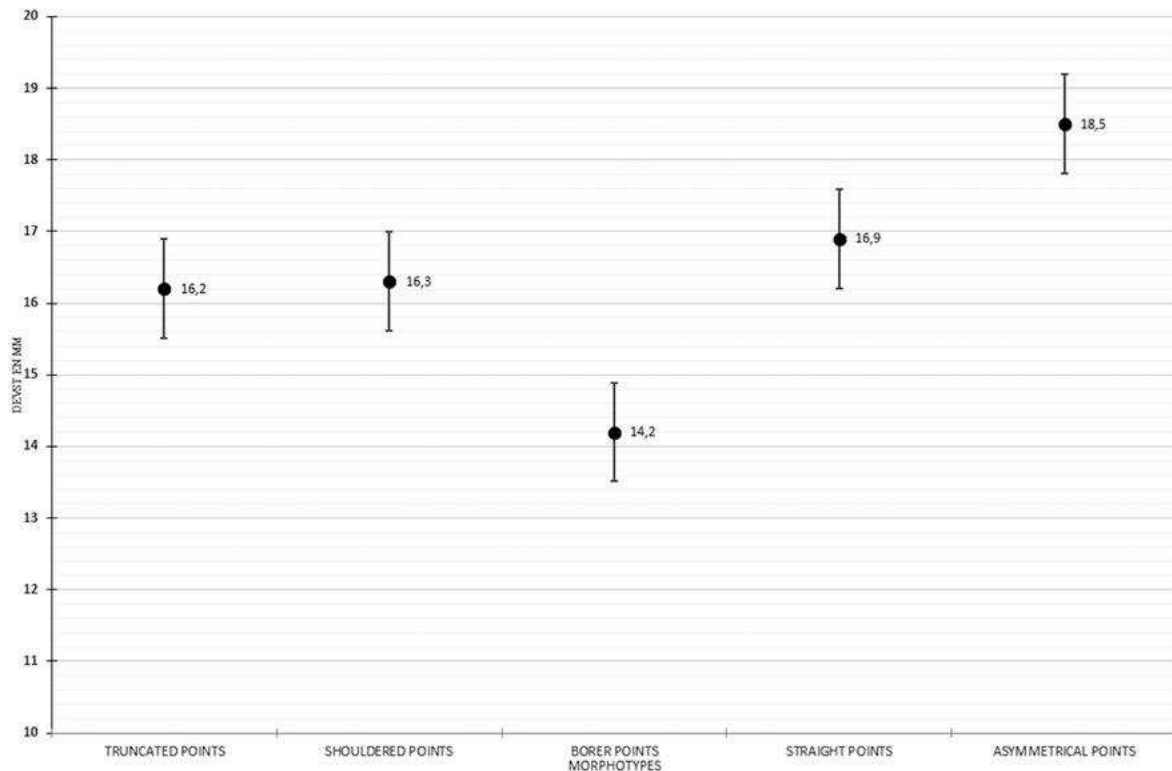


Figure 6. Length, width and thickness standard deviation of the drill points with a normal distribution (Gaussian normal curve).

different raw materials such as flint, jasper and chalcedony. These originate in detritic formations in the local environment at Bootless Bay, only 0.8 km from the island (Glaessner 1952).

The homogeneity of the pieces suggests that the stone carvers selected specific supports based on their overall morphology, similar in style to that of the final piece and with dimensions of around 17 x 6 x 5 mm. The few specimens found during the excavations demonstrate that drill points were made from small quadrangular blocks of raw material used as preforms which controlled and standardized manufacturing (Figure 6).

However, our knowledge of the complete '*chaîne opératoire*' remains incomplete, because we only observed the final product: the drill points. It is only through the recent work of J. Allen (Allen 2017) that we obtain more information on the '*chaîne opératoire*' and the different production steps taken to manufacture the drill points: the different products of the reduction sequences, the elongated/laminar flakes, the preforms of drill points, the multiplatform, and the bipolar or single platform cores (Figure 7).

Macroscopic observations show that the drill points have micro-removal on their edges which are morphologically similar to crests (Figure 8). These features are located on the part of the drill point which was in direct contact with the 'drill material', and could be the result of rotating hand-work, with probably a rotative instrument.

This type of instrument could be a 'pump drill with stone point' as suggested in the ethnographic and anthropological literature on Papua New Guinea (Leroi-Gourhan 1943). This proposition is only hypothetical but it finds some support from ethnographic collections.

The observation of the location of these micro-removals on the piece infer the diameter of the perforation they created. We noticed that some drill points generated wide diameter holes (around 1 cm) because the micro-removal impacted the length of the piece.

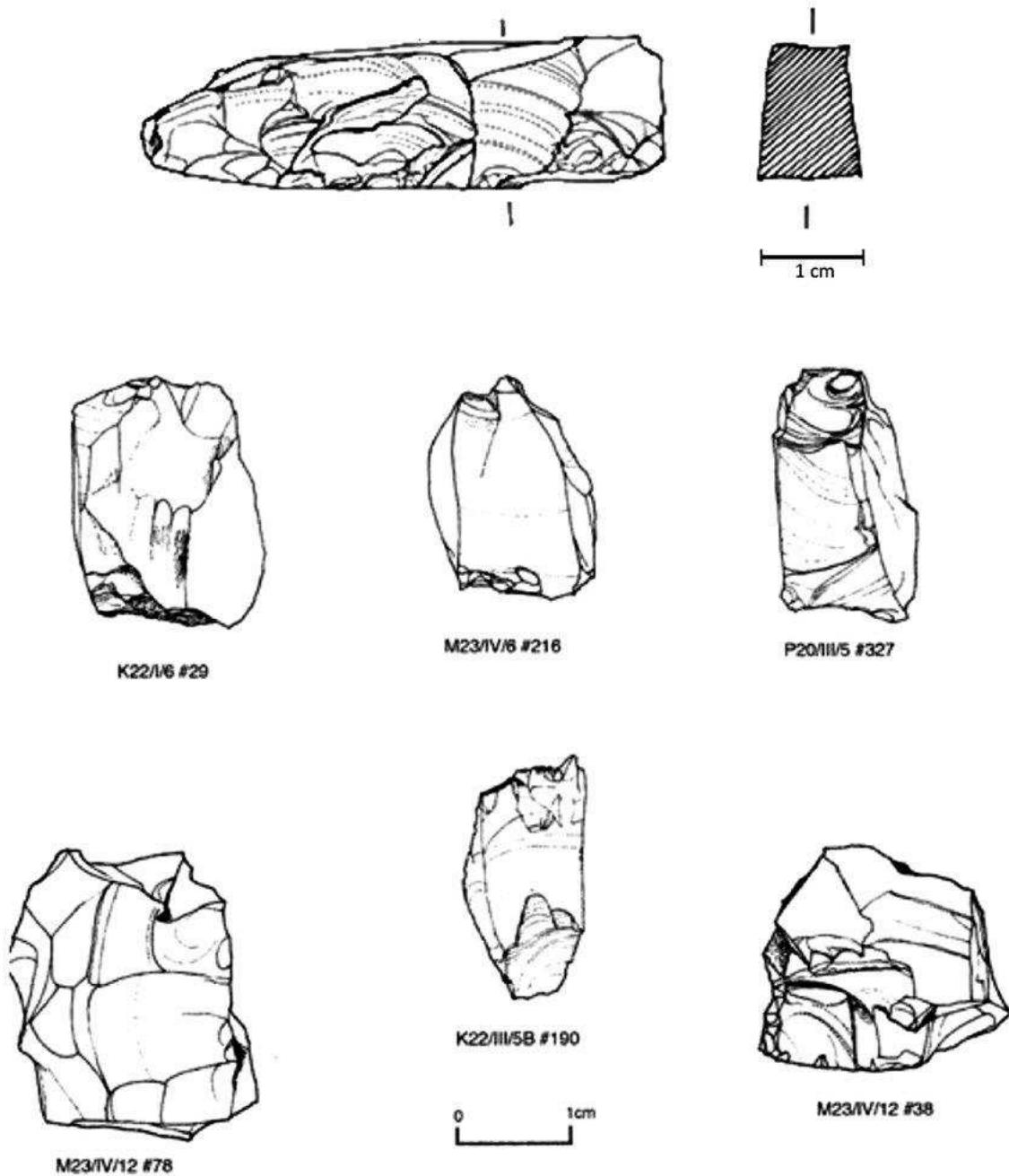


Figure 7. Top: preform drill point; down: unipolar or bipolar nucleus (Drawing J. Allen 2017).

These drill points were probably used for piercing pumice stones (Figure 9). Other drill points, with micro-removals limited to their axial part, suggest small perforations of a few millimeters on a softer material, which requires more precaution and precision on contact with the ‘drill-material’. During the excavations numerous cylindrical beads made from shell were discovered; these were probably pierced using these specific drill points. Further microwear analyzes can validate or reject these hypotheses.

Piercing was probably performed using the saw bow technique, or a drill pump technique if we refer to the ethno-historical data known in this region of Melanesia (Figure 10) (Cranstone 1961, cited by Allen 2017 p. 439). This hypothesis is also supported by the localisation and type of micro-removal present in alternate positions on the edges, the piercings being performed following clockwise or anti-clockwise rotations.

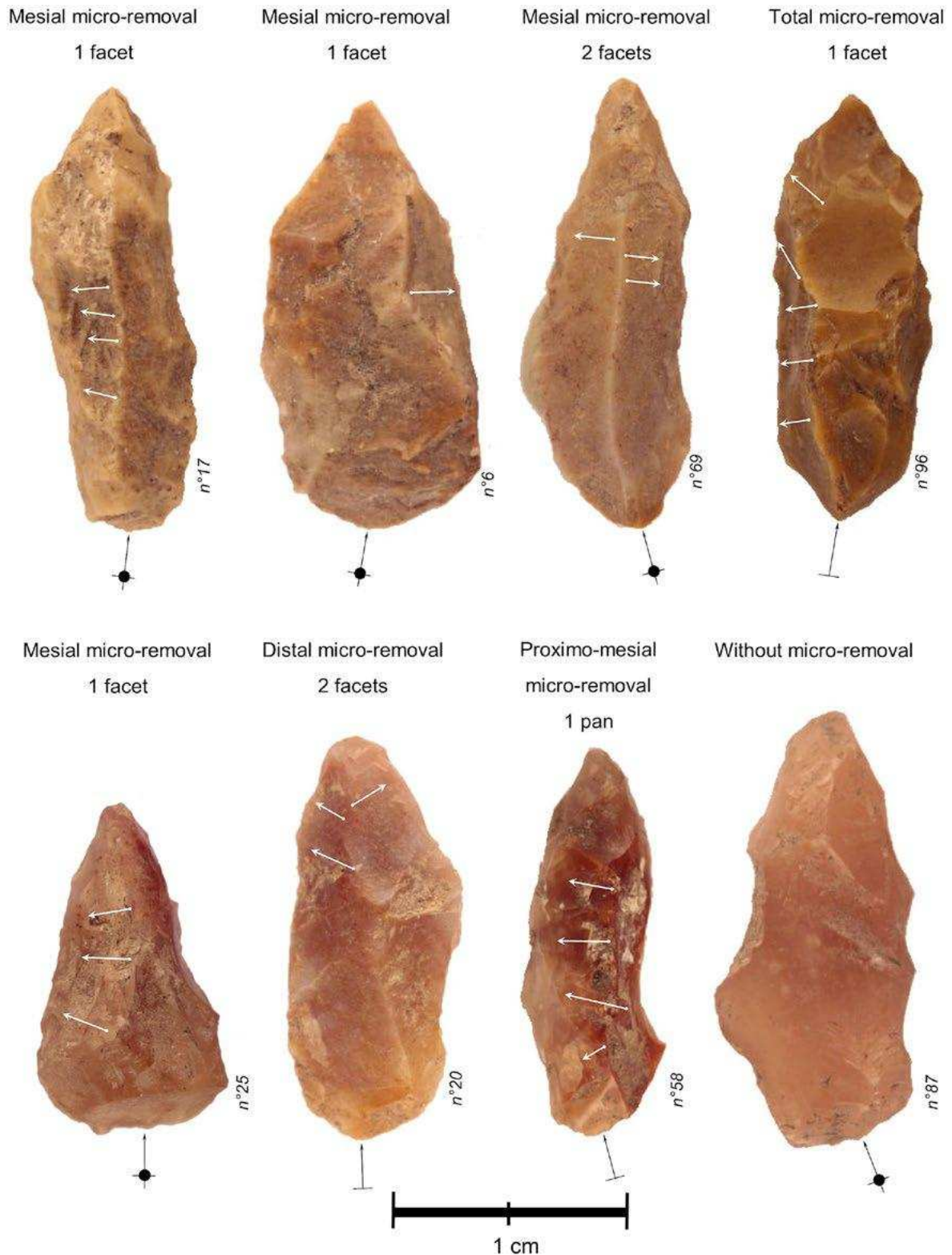


Figure 8. Location of areas with micro removals on the drill points.

Due to descriptions made by missionaries at the end of the 19th century, and ethnographic reports, we know there was an ancestral ‘fair-trade activity’ along the gulf of Papua interrupted after the Second World War. Named the ‘*Hiri* trade circle’ (Allen 1977, Groube 1973, Skelly *et al.* 2017), this network was mainly coastal and of average size, involving population groups speaking Austronesian, the *Motu* (Figure 11). Since then, the *Hiri* motu has been a trade language used in the south-east part of the island, one of 800 different languages spoken in Papua New Guinea. Within

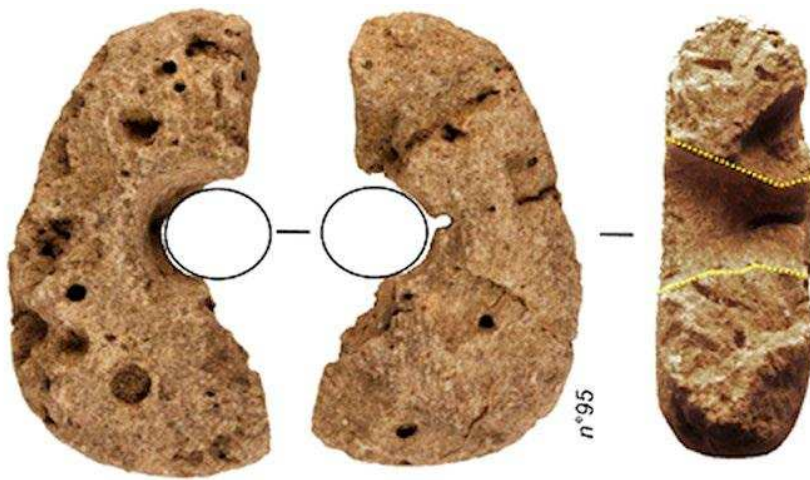


Figure 9. Pumice stone and ceramic shard drilled.



Figure 10. Forest to pump
(© Museum of Orgnac, France).



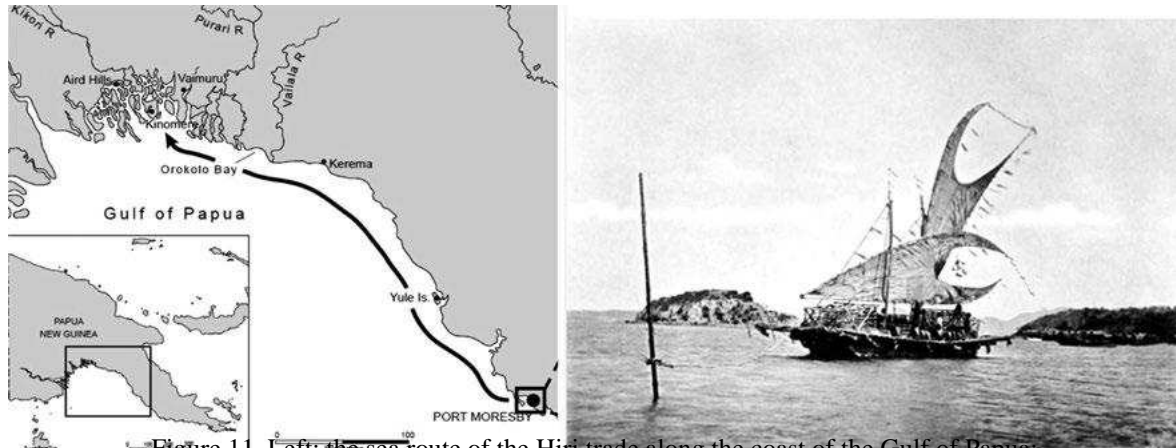


Figure 11. Left: the sea route of the Hiri trade along the coast of the Gulf of Papua, right: The lagatoi: a traditional boat used for Hiri trade (© M. J. Mennis 2014).

this context, populations from the southern part of the Gulf of Papua exchange, over distances of 400 km, pottery, beads and bracelets made in shell, and other material items made in bone, for sago starch which does not grow in the Port Moresby region (Figure 11).

The drill points found during past and recent excavations on Motupore island indicate the presence of a regional craft activity: the piercing of shells, pumice stones and pottery sherds, and less frequently bone (fish vertebrae) and tooth (mammal) items (Allen 2017). These pieces give us a better understanding of the *hiri* trading system and the exchange of manufactured products.

Conclusions

The first aim of our study was to analyze lithic tools from a techno-morphotypological perspective to better characterize the drill points on Motupore Island.

The second aim was to propose functional uses of these ‘drill points’, and thus validate or refute the hypotheses proposed by ethno-historical sources (Allen 2017, Skelly & David 2017). The techno-morphotypological approach determined that the lithic pieces excavated at Motupore were used as rotating pump drills from their utilisation features.

The characterization of five main morphotypes suggests that each could have been used on a different material (bone, shell, pumice stone, pottery, etc), and that human groups had specialized technical and craft work. In the absence of use-wear analysis this hypothesis cannot be tested.

The ethno-historical data obtained from Motupore site confirm this interpretation and include these drill points in a larger and more complex socio-economic system along the Gulf of Papua from 800 years ago to the present day: the ‘*hiri* trade circle’ (Allen 1977). Beyond this technical context, the ethno-historic background recontextualized these original pieces within a technical and trade system from the specific location of Motupore, well-known for its Motu people with *Motu* language, specialized stone-carver craftsmen in this region of Papua New Guinea.

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References

- Allen, J. 1977. Sea traffic, trade and expanding horizons. In Allen, J., Golson, J., Jones, R. (eds), *Sunda and Sahul: Prehistoric Studies in Southeast Asia, Melanesia and Australia*. London: Academic Press, pp. 387-417.
- Allen, J. 2017. *Excavations of Motupore Island, Central District, Papua New Guinea*. Otago: University of Otago, Working Papers in Anthropology, n°4, 2 vol.
- Cranstone, B. 1961. *Melanesia: A Short Ethnography*. London: Trustees of the British Museum.
- David, B., Araho, N., Barker, B., Kuaso, A., Moffat, I. 2009. Keveoki 1: Exploring the Hiri ceramics trade at a short-lived village site near the Vailala River, Papua New Guinea. *Australian Archaeology*, 68, pp. 11-22.
- David, B., Geneste, J. M., Aplin, K., Delannoy, J. J., Araho, N., Clarkson, C., Connell, K., Haberle, S., Barker, B., Lamb, L., Stanisic, J., Fairbairn, A., Skelly, R., Rowe, C. 2010. The Emo site (OAC), Gulf Province, Papua New Guinea: resolving long-standing questions of antiquity and implications for the history of the ancestral hiri maritime trade. *Australian Archaeology*, 70, pp. 39-54.
- David, B., Richards, T., Goddard, M., Dutton, T., Leavesley, M., McNiven, I. J., Mandui, H. 2016. Historicizing Motu ceramics and the Hiri trade. In Richards, T., David, B., Aplin, K., McNiven, I. J. (eds), *Caution Bay Studies in Archaeology 1, Archaeological research at Caution Bay, Papua New Guinea – Cultural, Linguistic and environmental setting*. Oxford: Archaeopress Publishing LTD, p. 65-73.
- Glaessner, M. F. 1952. Geology of Port Moresby, Papua. In Glaessner, M. F., Rudd, E. A. (eds), *Sir Douglass Mawson Anniversary*. Adelaide: University of Adelaide, pp. 63-86.
- Groube, L. M. 1973. *Hiri, in Anthropology in Papua New Guinea*. Melbourne University Press, Hogbin ed., pp. 100-105.
- Irwin, G. 1991. Themes in the Prehistory of coastal Papua and the Massim. In Pawley, A. (ed.), *Man and a half: Essays in Pacific Anthropology and Ethnobiology in Honour of Ralph Bulmer*. Auckland: The Polynesian Society Memoir, 48, pp. 503-510.
- Inizan, M. L., Reduron, M., Roche, H., Tixier, J. 1995. *Technology of knapped stone*. Meudon: Éditions du Cercle de Recherches et d'Études Préhistoriques CREP.
- Lampert, R. J. 1968. Some archaeological sites of the Motu and Koiari areas. *Journal of the Papua New Guinea Society*, 2(2), pp. 73-8.
- Lampert, R. J., Golson, J. 1967. *Archaeological site on Motupore Island, Papua*, unpublished manuscript, 5 p.
- Leroi-Gourhan, A. 1943. *L'Homme et la Matière : Évolution et Techniques*. Paris : Albin Michel, coll. Sciences d'aujourd'hui, Paris.
- McNiven, I., David, B., Richards, T., Aplin, K., Asmussen, B., Mialanes, J., Leavesley, M., Faulkner, P., Ulm, S. 2011. New Direction in human colonization of the Pacific: Lapita settlement of south coast New Guinea. *Australian Archaeology*, 72, pp. 1-6.
- Mennis, M. R. 2014. *Sailing for Survival. A Comparative Report of the Trading Systems and Trading Canoes of the Bel people in the Madang area and of the Motu people in the Port Moresby area of Papua New Guinea*. Dunedin: University of Otago, Working Papers in Anthropology, 2.
- Oram, N. 1982. Pots for sago: the hiri trading work. In Dutton, T. (ed.), *The hiri in history. Further aspects of long distance Motu trade in Central Papua*. Canberra: The Australian National University, Pacific Research Monograph number 8, pp. 1-33.
- Shott, M. J. 2015. *Works in stone. Contemporary perspectives on lithic analysis*. Utah: University of Utah Press.
- Skelly, R. J., David, B. 2017. *Hiri. Archaeology of long-distance maritime trade along the south Coast of Papua New Guinea*. Hawaii: University of Hawaii Press.