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A handful of shell tools from Chelbacheb Islands (Rock Islands), Palau

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ABSTRACT

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During the archaeological surveys as part of the project *Documentation of monuments threatened by climate change in Palau* some shell artefacts and places with deposited *Tridacna* shells could be discovered and, in some cases, undoubtedly be interpreted as workshops or knapping ateliers for the production of shell tools. Shells from gastropods and bivalves are a suitable raw material which can be transformed to different artefacts. In fact, artefacts – in the sense of tools, like shell adzes/axes, knives, chisels, scrapers, or projectiles – made from shells are often not recognized as such or receive little attention. In the Pacific region, especially on low atolls and coral islands, due to the lack or rarity of suitable raw material like basalt, chert or obsidian, these shell tools are an essential, if not the most important part of the inventory.

KEYWORDS

Shell tools, Technology, Cultural Heritage, Climate Change, Palau

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Introduction

1 An intensively and comprehensive archaeological survey program was conducted in the Chelbacheb Islands (Rock Islands) of Palau in 2022. The program was within the 'Ground Check Project *Cultural Heritage and Climate Change*' of the Commission for Archaeology of Non-European Cultures of the German Archaeological Institute[1]. The main goal of this program was to detect and document the negative effects of climate change such as sea-level rise and severe weather events on archaeological sites in different parts of the world. Within this global program, the sub-project *Documentation of monuments threatened by climate change in Palau – Dokumentation vom Klimawandel gefährdeter Monumente in Palau* is integrated. The necessary permits to meet this ambitious challenge have been issued by the Bureau of Cultural and Historical Preservation, the Palau Historic Preservation Office Permits (HPO) which acts under the Ministry of Human Resources, Culture, Tourism and Development. Access to the different islands and archaeological sites was coordinated with the Koror State Office, the Koror Department of Conservation and Law Enforcement (DCLE) and the staff for Archaeological Research[2].

2 In the Republic of Palau, Western Pacific Region, two field seasons were conducted through the Commission for Archaeology of Non-European Cultures to

1 Projectleader: Dipl.-Ing. (FH) Christian Hartl-Reiter, Dr. phil. Annette Kühlem. The project is supported by: Federal Foreign Office, Germany and the Honorary Consul in Palau, Thomas Schubert. Partner: Bureau of Cultural and Historical Preservation Palau. https://www.dainst.org/forschung/projekte/groundcheck-dokumentation-vom-klimawandel-gefaehrdeter-monumente-in-palau/5795 [2024-09-19].

2 Research permit from the Koror State Office was signed by Honorable Governor Franco Gibbons and Honorable Governor Eyos Rudimchand, by Director Kiblas Soaladaob and Chief Sunny Ngirmang from the Bureau of Cultural and Historical Preservation and by Julita Tellei M.A. from the Palau Resource Institute. The Department of Conservation and Law Enforcement (DCLE) is the agency tasked with the management and implementation of the Management Plan for the Rock Islands Southern Lagoon. Jennifer S. Olegeriil, Director of the Department of Conservation & Law Enforcement and Outreach Officer Ms. Dora Benhart from DCLE were coordinating the survey program with the rangers. The Office of the Palau Automated Land and Resources Information System PALARIS provided detailed maps of the research area.

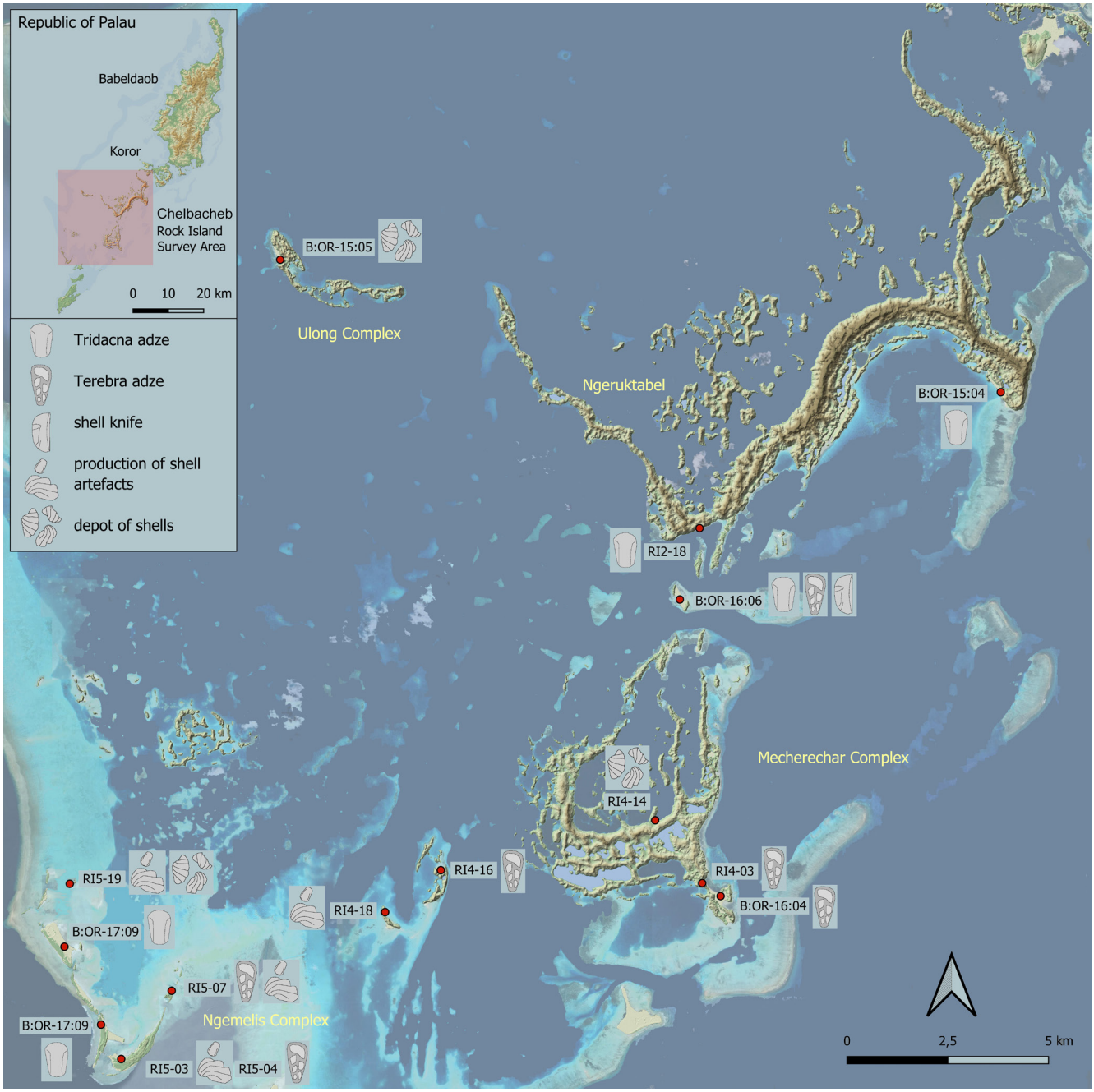

Fig. 1: Map based on Google Earth (Satellite Image) and PALARIS Automated Land and Resources Information System, Palau (Digital Elevation Model).

identify jeopardized archaeological sites (Kühlem 2022; Hartl-Reiter – Kühlem – Moser 2024). In January 2022 and in November to December 2022 the two main island groups of the Rock Islands (Chelbacheb Islands), Ngeruktabel (Urukthapel), Mecherchar (Eil Malk) and the smaller islands Ngemelis, Dmasech, Omekang and Ulong were surveyed along the coastline (Fig. 1).

3 An intensive systematic and comparative analysis of the inventory of the shell tools in the sense of a recording and measurement system and the documenting of conventional attributes through metric data and feature parameters as well as a more detailed description and the classification of the finds were not possible, as the research permit granted was limited and did not allow the artefacts to be removed from their context of the find situation. Macroscopic and microscopic examinations as well as laboratory work and use wear analysis of the finds were also not possible. The only documentation technique was to briefly describe and photograph the finds in situ under sometimes difficult lighting conditions in the dense forest.

Fig. 2: Typical cockpit karstforms of the Rock Islands.

4 The Chelbacheb Islands (Rock Islands) archipelago in the Koror State of Palau is composed of almost 300 limestone or coral uprises, covering an area of approximately 40 km^2. The highest elevation is 207 m above sea level. The islands are showing typical cockpit karstforms and partly isolated karst towers. Access to the karst islands varies depending on the geographical, morphological and geological conditions of the terrain and on the tidal level. Zones with low and shallow bays as well as beach areas allow effortless access from the water to the land and the interior of the island. Access via rocky and steep areas at the coast can be extremely difficult or especially in places where the karst rock shows undercuts and overhangs in the bank area even impossible. (Fig. 2).

5 Constant intertidal wave-undercuts over a long time period have hollowed the base of the islands and have given them their characteristic mushroom-shape.

6 Due to the uplift of the islands older wave-cuts and niches can be observed in the cliffs several meters above recent sea level (Fig. 3 and Fig. 4) These marine notches with white rock faces provide an excellent painting 'canvas' for rock art since prehistoric times. The most prominent rock paintings are the galleries 'Olechukl ears' at the northwest coast of Ulong, the 'Taberrakl White Face' at the east coast of Ngeruktabel, the paintings at Ngermeuangel and at Siskemeduu. The rock art has not yet been dated. The archaeological and cultural context is so far unknown (Liston – Hoerman – Sasao et al. 2021: 323–324).

7 The earliest peopling of the Palau Islands has been determined by radiocarbon dating to 3,100 BP. Settlement structures and remains of villages can be found on some islands of the Rock Islands group and are dated back to the period between 950 and 500 BP (Clark 2004: 26–33; Clark 2005: 349–380).

8 On the Chelbacheb Islands various features in the sense of architectural structures such as platforms, stone bars and wall-like barriers, artificial stone mounds, alignments, enclosures and dwelling foundations could be observed at the flat coastal areas during the surveys. These during the fieldwork observed features were very often associated with potsherds of different types and designs. The architectural structures

Fig. 3: Taberrakl ‚White Face'. Intertidal wave-undercuts with prehistoric rock paintings.

Fig. 4: Rock paintings gallery 'Olechukl ears' at the northwest coast of Ulong.

and the pottery will not be considered in this article. Instead, the focus will be on a tool category that often receives little attention. At some places different accumulations of shells and shell middens could be discovered. These shell middens, so-called *køkkenmødding* (Danish) or kitchen middens are the waste products of meals and have been associated with settlement sites or isolated, temporarily used resting places (Fig. 5).

9 Apart from these shell middens at various locations scattered accumulations or deposits of shells and shell fragments, mostly *Tridacna* less often Triton and other species, could be detected at the find spots RI 5-04, RI 5-07, RI 5-19 and RI 4-18 of the Ngemelis Complex in the southwestern part of the Rock Islands. Due to the appearance of waste products like shell flakes they can undoubtedly be interpreted as workshops or knapping ateliers for the production of shell tools (Fig. 5, Fig. 6, Fig. 7, Fig. 8, Fig. 9, Fig. 10, Fig. 11).

10 Shell tools as an artefact category are still very often unrecognized and unnoticed. Shells are a suitable raw material, which can be transformed to different tool types. The knapping characteristic or striking technique can be compared with a stone tool production method.

Earliest mentions of shell artefacts and shell tools

11 Tools like axes or adzes[3], scrapers, chisels, or knives made of organic material like shell or bone are comparing to stone tools in prehistoric contexts atypical. In the Pacific region due to the lack or rarity of suitable raw material like basalt, chert or obsidian, which often had to be imported through barter, these shell tools are an essential, if not the most important, part of the inventory, especially among smaller coral atoll and makatea islands of Micronesia and Polynesia.

12 A coexistence of a stone adze and shell adze industry in the SE Asian pre-ceramic Neolithic was observed, in the same archaeological context, in Duyong Cave on Palawan Island in the Philippines. In Duyong a male burial was found together with a polished stone adze and four adzes of *Tridacna* shells (Fox 1970: 63, Fig. 19 a, b). Simultaneity of stone adzes and shell adzes was reported and documented also from Nan Douas, Nan Madol, Micronesia (Ayers – Mauricio 1987: 28). The missionary Ernst Wiese, who lived on Ponape during the German period 1899–1914, acquired the mentioned shell tools from *Tridacna* and some polished stone axes. These artefacts can no longer be found in the Museum für Völkerkunde (now the Weltkulturen-Museum in Frankfurt/Main), but they have at least been inventoried and illustrated (Ayers – Mauricio 1987: 28, 29, Fig. 1; 2).

13 In the context of a preference of the raw material shell Ayers and Mauricio are stating that: "*There are manufacturing and use advantages to shell as raw material, in addition to stone and shell availability factors, which clearly influence the mix in some contexts*" (Ayers – Mauricio 1987: 27). And further: "*In some early Melanesian aceramic cultures there appears to have been a marked cultural preference for shell over stone even though stone was available*" (Green 1976: 10 after Ayers – Mauricio 1987: 27).

14 The earliest mention of artefacts – including their designated purpose for using – made of the raw material shell can be found already in the travelogues of early South Sea expeditions end of the 16th century. In 'The Voyages of Pedro Fernandez de Quiros 1595 to 1606' (translated and edited by Sir Clements Markham 1904) is described in the chapter on Santa Cristina – July 1595, that the inhabitants from Santa

3 In the old publications the terminus 'axe' (German: Axt) was very often used instead of the terminus 'adze' for tools with the cutting implement with the cutting edge transversely to the long axis (German: Querbeil or Dechsel).

Fig. 5: Shell midden with an accumulation of shells and snail shells.

Fig. 6: Depot of *Tridacna* shells.

Fig. 7: Shell knapping site RI 5-03.

Fig. 8: Shell knapping site RI 5-19.

Fig. 9: Detail of Shell knapping site RI 5-19 with scattered flakes and debris.

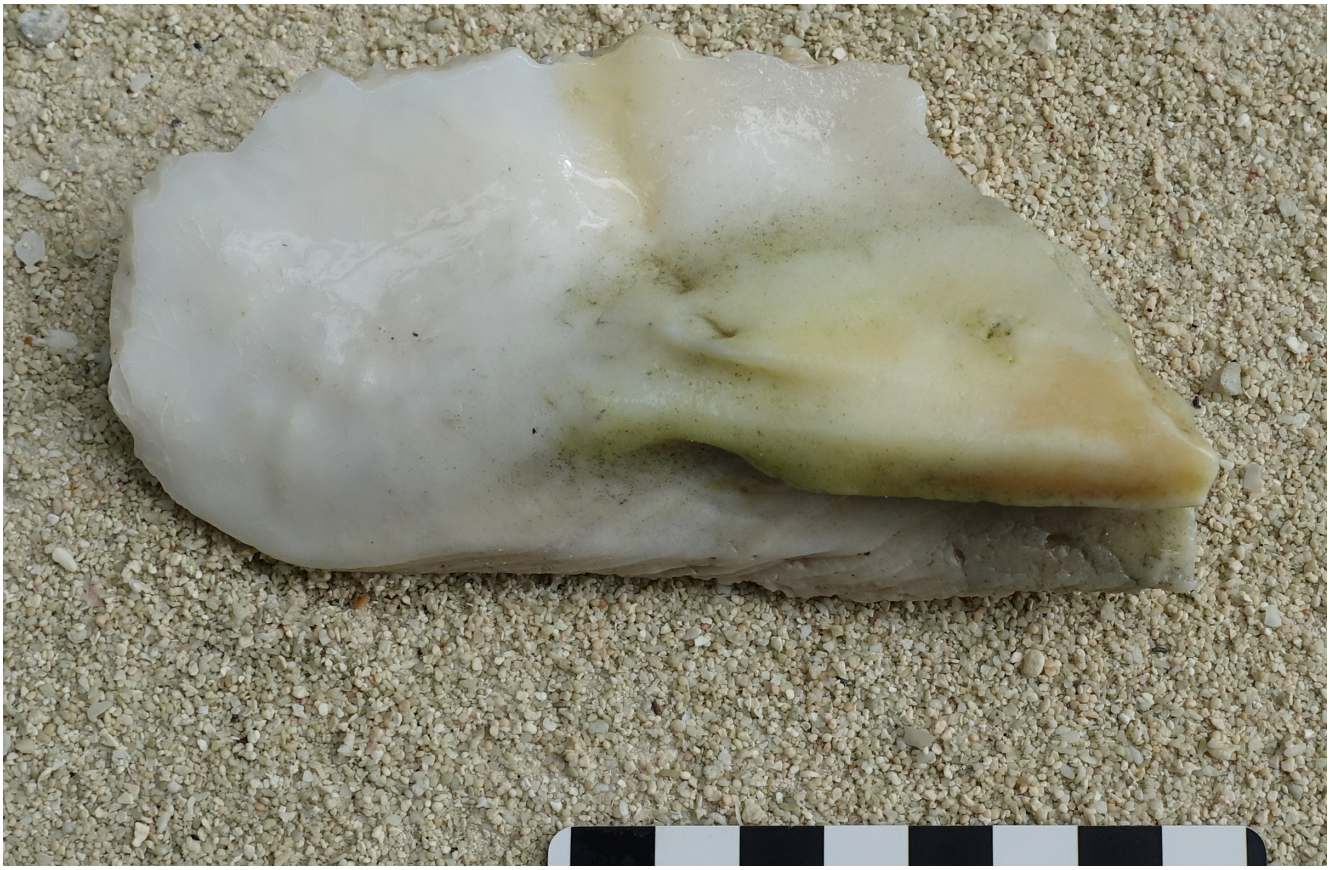

Fig. 10: Fragment of a shell knife with demaged 'serrated' cutting edge; site RI 5-19.

Fig. 11: Shell flake from site RI 4-16 F3.

Cristina (Tahuatu, Marquesas) used shell adzes for hollowing out the dugout canoes: "*Outside the village they had some canoes of a single tree... They work with adzes, which they make of thick fish-bones and shells. They sharpen them with large pebbles, which they have for the purpose*" (chapter 29 after Baumann 2018: 203 f.). Another early source that documents the use of fish bones, shells and mother-of-pearl as adornments can be found in Alexander Dalrymple's description of Commander Alvaro's Second Voyage (Dalrymple 1786: 69). The list given here is limited to the earliest mentions of shell tools. Records from the 1920s onwards are not taken into account. A comprehensive review of all studies carried out on shell adzes from Oceania since the 1930s can be found in

the publication 'Revising shell adze analysis in Oceania: a multifaceted approach to the study of a Solomon Islands collection' by Radclyffe (Radclyffe 2021).

15 Nevertheless, the scientific research of Douglas Osborne on Palau is worth mentioning with his comprehensive work 'The archaeology of the Palau Islands: An intensive survey' published in 1966 (Osborne 1966).

16 Reports from Otto Finsch end of the 19th (Finsch 1893) and beginning of the 20th century (Finsch 1914) states that: "*The most indispensable tool of the of the Stone Age, the axe, is nowhere missing and has on all atolls, due to the lack of other material, a shell blade (mostly from Tridacna, more rarely Terebra and mitre)...*" and further: „*It is remarkable, however, that even the high islands of Micronesia, despite excellent stone material (basalt), almost without exception only use shell blades, which are among the heaviest and clumsiest. The hafting shows, apart from certain local differences, quite the same basic type as in Melanesia and Océania in general*" (translation after Finsch 1893: 7)[4]. Illustrated examples for hafted shell adzes from the Bismarck-Archipelago can be found in the Publication 'Ethnologische Erfahrungen und Belegstücke aus der Südsee' (Finsch 1893: Taf. IV, 4). A hafted *Terebra* shell adze is illustrated in this publication as well (Finsch 1893: 342, Fig. 59).

17 From the Carolines (today: Federated States of Micronesia) illustrations of hafted shell tools can be found in the publication 'Südseearbeiten – Gewerbe und Kunstfleiß, Tauschmittel und "Geld" der Eingeborenen' (Finsch 1914: Taf. V. 148, 152, 153, 155).

18 Hafted shell adzes, so called Ebakl, from Palau and Yap are described and illustrated in the publication 'Die Palau-Inseln in der Südsee' of Kubary (Kubary 1873) and in the translated comprehensive compilation of Kubary's publications 1873–1895 'Ethnographic Contributions to Knowledge of the Carolinian Archipelago' (Belau National Museum, the Etpison Museum, 2021).

19 Parkinson (Parkinson 1897: 143 f.) mentions adze blades made of *Tridacna* and *Terebra* shell from 'Ongtong Java' and the 'Tasman Islands', which have since been replaced by iron tools.[5] Parkinson writes: „*The implements used today are iron tools that have been imported from ships. They have completely replaced the old implements and tools and it takes a long time to make the natives understand that one wishes to collect their tools that have been thrown aside for years. It is therefore not impossible that some old instruments are now completely forgotten*".[6]

20 From the island of Rotuma (Dependency Fiji) shell implements made of *Tridacna* and a larger spider shell (*Pterosceras bryonea*) and there use were reported by Gardiner (Gardiner 1898: 459–60) as he states: "*The smaller axes are nearly all made from shells, the principal ones used being the clam (Tridacna sp. ?) and a large spider shell (Pterosceras bryonea). I have five shell (implements) and one stone implement used for scraping the pandanus leaves for mats (p. 419). The shell ones are all of Tridacna*".

21 Records of *Tridacna* shell-adzes from Ponape (today: Pohnpei, Federated States of Micronesia) were also made in the early publication of Christian (Christian 1899a: 85, 398f.). Christian even uses the term 'shell age' in another context, which aptly

4 „Das unentbehrlichste Geräth der Steinzeit, die Axt, fehlt nirgends und hat auf allen Atollen, wegen Mangel an anderem Material, eine Muschelklinge (meist aus *Tridacna*, seltener *Terebra*). Es ist aber bemerkenswerth, dass auch die hohen Inseln Mikronesiens, trotz trefflichem Steinmaterial (Basalt), fast ausnahmslos nur Muschelklingen gebrauchen, die mit zu den schwersten und plumpsten gehören" (Finsch 1893: 7).

5 This refers to the present-day atolls of Ontong Java and Nukumanu, Solomon Islands.

6 „Die heutzutage gebrauchten Geräthschaften sind Eisenwerkzeuge welche von Schiffen eingeführt worden sind. Sie haben die alten Geräthschaften und Werkzeuge vollständig verdrängt und es gelingt erst nach langer Nachfrage den Eingeborenen begreiflich zu machen, dass man ihre seit Jahren beiseite geworfenen Geräthe zu sammeln wünscht. Es ist daher nicht unmöglich, dass manches alte Instrument jetzt ganz vergessen ist".

emphasizes the importance of the shell inventory (Christian 1899b: 295). The designated use of these *Tridacna* shell adzes is described as: "*… to cut down trees with these primitive instruments, with the aid of fire*" (Christian 1899b: 296).

22 At the same time, Christian emphasises the advantage of a shell tool over a basalt tool when he writes: "*In Ponape I met with no axes of blackstone, the reason probably being that the shell took a finer edge readily, and was easier to work than the basalt, which does not so readily shape into flakes with keen cutting edges*" (Christian 1899b: 297).

23 In Ponape, too, it is the steel axes introduced by traders that have ultimately led to the disappearance of the shell adzes. "*They are now getting somewhat scarces on the island – onsted from use by the introduction of steel axes, American axes and tomahawks by the ever-increasing competition of trades*" (Christian 1899b: 296).

24 The two-volume publication 'Luangiua und Nukumanu' by Sarfert and Damm (Sarfert – Damm 1929) contains a number of illustrations and descriptions of tools made from shells and snails. Two illustrations (Sarfert – Damm 1929: 157–158) show examples for the hafting of adze blades from Pélau (Ontong Java, Solomon Islands) and from the Mortlock Islands of the Caroline Islands (today: Chuuk, Federated States of Micronesia). It is worth to mention that the shown adze from Pélau is equipped with a *Terebra* shell blade. According to the references in the publications the *Terebra* shell blades seemed to be rare. This may be due to the fact that this type of tool is not necessarily recognized as an adze blade. The authors cite canoe building and tree felling as the intended uses for the adzes (Sarfert – Damm 1929: 152, 154). It is possible that the specimens with a handle are a kind of new composition, in which – in one or the other case – also an excavated antique or old adze blade may have been combined with a later "modern" or younger wooden handle.

25 Another remarkable statement found in Sarfert's and Damm's records is that the population "*knew very little about the use of adzes, especially as knowledge of adzes was based on the fact that they were found in the ground*" (Sarfert – Damm 1929: 152)[7].

26 In the Pacific cultural and archaeological contexts various species of the giant clam (*Tridacna gigas*, *Tridacna maxima*, *Tridacna squamosa*, *Tridacna derasa*, *Tridacna crocea*, *Hippopus hippopus*) were preferably used for the production of larger and rather massive shell adzes. Auger shells (*Terebridae*) were transformed for the production of chisel-like small adzes that could be used for rather delicate work. Simple sharp-edged flakes were selected for the production of knife-like cutting tools. Some shell knives are showing a well grinded edge.

An open air atelier for manufacturing of shell artefacts

27 During the survey at the north eastern part of the Ngemelis Islands Complex various flakes, a fragment of a *Terebra* adze and one flake core made of *Tridacna* shell were found at the beach area (Fig. 12, Fig. 13). The beach area shows furthermore a zone with a compacted cemented sand conglomerate where pottery sherds are baked-in.

28 Due to the fact that at this spot essential component of the production process and operational sequence such as flakes, chips, debris and a nucleus are present the place can be declared as an open air knapping atelier where shell tools were manufactured. In general artefacts made of shells are not unknown in Palau. In several publications shell adzes and knifes are mentioned and documented. A shell knapping site was so far unknown in Palau.

7 „Über den Gebrauch der verschiedenen Arten von Äxten weiß man nur noch wenig. Die heutige Kenntnis der alten Äxte beruht lediglich darauf, dass man alte Axtklingen noch öfters in der Erde findet; so bald schwindet die Kenntnis!" (Sarfert – Damm 1929: 152).

Fig. 12: Shell knapping site RI 5-07.

Fig. 13: Shell knapping site RI 5-07.

Fig. 14: Unipolar shell Nucleus from shell knapping site RI 5-07.

Fig. 15: Detail of shell Nucleus from knapping site RI 5-07.

Fig. 16: Basalt slab from site RI 2-18.

Fig. 17: *Terebara* shell.

29 The unipolar nucleus discovered at the knapping site RI 5-07 measures 10 cm for the reduction face, 20 cm for the length and 9.5 cm for the width of the striking platform. The striking platform is plan and slightly concave. The platform or flaking angle is less than 90°. The platform edge has on the reduction face some small flake scars derived from the core preparation reduction (Fig. 14, Fig. 15). The nucleus is unipolar exploited with parallel removal negatives. Around the nucleus there were numerous flakes, tiny chips and debris as waste products from the knapping activities.

30 Several unused or unworked pieces of *Tridacna* shells seem to be brought to the site to be transformed at the spot. A hammerstone could not be found. Probably a basalt pebble or a piece of limestone or coral stone was used as such a tool. It can be assumed that the flakes were removed by a direct unipolar percussion technique. The applied striking technique is generally comparable to a lithic tool production method.

31 The conical *Terebra* shell was ground to half its diameter. A cutting edge was then produced and shaped at the thicker end by grinding. A flat basalt stone on which the shell was shaped could have served as a grinding tool (Fig. 16).

32 The tools made of the *Terebra* shell are relatively easy to overlook as they were only worked on one side. The *Terebra* adzes are often be discovered and recognised more or less by chance. If the unworked side is facing upwards, the artefact cannot be identified as such (Fig. 17). A total of two shell knives, one chisel, four shell adzes, seven *Terebra* adze blades, flakes and chippings as well as a nucleus were discovered (Fig. 17, Fig. 18, Fig. 19, Fig. 20, Fig. 21, Fig. 22, Fig. 23).

Fig. 18: a–b: Shell knives from Ngeanges. c: Shell adze from Ngeanges

Some reflections on revolving shell adze-heads, so-called '*Chesimimer*'

33 An early mention of shafted *Tridacna* adze-axe blades in a revolving wooden shaft comes from Nukuor, an island near Ponape, Micronesia during the visit of Johann Stanilaus Kubary to the island in 1873 (Kubary 1873 after Finsch 1893: 341). Parkinson describes stone axes from New Hanover (now Lavongai), an island north of New Ireland, Papua New Guinea, made of basaltic rock, whose haft head allows the inserted blade to rotate in its shafted axis so that the cutting edge can be positioned vertically or horizontally. The blade, according to Parkinson, gives the impression of being a stone imitation of common *Terebra* shell axes (Parkinson 1907: 288, 289).[8] These rotatable

8 „Die Steinäxte Neuhanovers sind von denen Neumecklenburgs sehr verschieden. Sie bestehen aus einem dichten, sehr feinkörnigen basaltartigen Gestein und haben immer dieselbe Form, wenn auch verschiedene Größe. Die ganze Klinge macht den Eindruck, als ob sie eine in Stein ausgeführte Nachahmung der mancherorts, z.B. auf Sankt Matthias, üblichen Terebramuscheläxte sei. Der Axtstiel ist von der gewöhnlichen, knieförmigen Form, jedoch ist die Klinge nicht fest mit demselben verbunden, sondern steckt

heads from the Pacific have also been referred to as ‘reversed’ shell adzes (Radclyffe 2021: 117–119). Among the first scientist who described this technical innovation was also Kennedy: “*These (adzes) were probably used in the rotating socket adze (atu pa).*” (Kennedy 1931: 291 and plate 13, Fig. 65).

Fig. 19: a: Shell adze from site B:OR-17:09. b: Shell adze from Ngemelis Dmasech.

in einem Holzfutter, welches es ermöglicht, die Klinge zu drehen, so dass die Schneide nach Bedarf senkrecht oder waagerecht zum Stiel gestellt werden kann“ (Parkinson 1907: 288, 289).

Fig. 20: *Terebra* adze from site B:OR-16:04.

Fig. 21: a–b: *Terebra* adzes from site RI 4-03.

Fig. 22: *Terebra* adze.

34 Shell adzes or axes with a rotating shaft head, so-called '*Chesimimer*', are known from Palau from more or less historical times (Fig. 24, Fig. 25).

35 This composite tool allows the artefact to be used as an adze or axe. This fact, i.e. that such tools with a dual function exist, stimulates the intellectual debate about their transferability of such an invention back to prehistoric times. Due to the perishable nature of organic tool parts such as wooden heads, shafts or handles, reliable evidence of such dual shafts remains unclear.

36 In this context, serious microwear analyses traces of micro-use on the shafts of the adze/axe blades could be helpful. In this way, traces of use wear caused by the rotary movements of the head or on the edges of the shell blade could possibly be detected.

Conclusion

37 The aim of this paper on 'a handful' of shell tools from the Rock Islands was to present the shell tools discovered during the field survey Documentation of monuments threatened by climate change in Palau in November and December 2023. More in-depth studies of the shell tools as well as an analysis and comparative typological studies had – due to the limited time and the restricted research permit – not been possible.

38 Special attention was paid to various sites in the Ngemelis complex, which could be interpreted as knapping sites for the production of shell tools. The presence of scattered flakes and fragments of *Terebra* shells around an unipolar exploited nucleus

Fig. 23: So-called Cassis-adze from site B:OR-15:04 Ngeremdiu F1.

gives ‘striking evidence’ of an open air workshop. The discovery of a core is so far unique for Palau.

39 As another shell tool category worth to be mentioned and focusing on are the so called *Terebra adzes*, which are unremarkable and difficult to recognize and to find. This could be the reason why *Terebra* adzes are cited in some relevant publications as a rare type of artefact. These small polished chisel-like adzes were most probably used for finer work.

40 An additional aspect had been some reflections on shell adzes-axes with revolving shafts. In Palau such adze-axe types are referred to as ‘*Chesimimer*’ and are documented from historical times. The dual function of these ‘*Chesimimer*’ with rotating shell blades allows interesting thought-provoking impulses with regard to its transferability to prehistoric times.

41 Finally, it should be noted that a more comprehensive study, including functional and micro-wear analysis, of the shell tool inventory is needed to answer outstanding and diverse questions such as use, technology, distribution, classification and typology as well as timeframe.

Fig. 24: Replica of a so-called ‚Chesimimer' with revolving shell adze-head.

Fig. 25: Detail of revolving shell adze-head.

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42 The author thanks Julita Tellei M.A. from the Palau Resource Institute, Dora Benhart from The Department of Conservation and Law Enforcement (DCLE). The author is grateful to Honorable Governor Franco Gibbons and Honorable Governor Eyos Rudimch from the Koror state office and to Director Kiblas Soaladaob and Chief Sunny Ngirmang from the Bureau of Cultural and Historical Preservation for signing the research permits. Special thanks go to Captain John Sylvester for safe driving the boat and to Tyler Ncherkemur from the Conservation office for his guidance during several trips to the Rock Islands. Many thanks also to the Honorary Consul for the Federal Republic of Germany Koror Thomas Schubert for his advice and assistance. Last but not least many thanks to the team members of the research project *Documentation of monuments threatened by climate change in Palau* Dr. Annette Kühlem and Christian Hartl-Reiter.

43 Christian Hartl-Reiter has kindly modified the maps provided by PALARIS and added the find sites, as well as graphically generating various scenarios of sea level rise and the resulting consequences for the find sites near the coast.

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