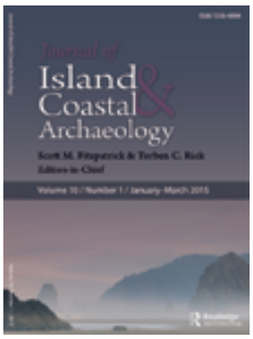

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Evidence of lithic blade technology in southwest Madagascar

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ABSTRACT

This rapid communication describes a lithic blade that was recently recovered during excavations in the Velondriake Marine Protected Area in southwest Madagascar. This represents the only recorded archaeological lithic blade recovered from southwest Madagascar. The blade was recovered *in situ* at a depth of 1.66 m, a deposit dating to between 750 and 1200 BP at site G134, adjacent to the modern village of Antsaragnasoa. While similar in material choice (translucent-brown chert) and morphology (parallel-sided blade) to other lithics recovered at the northern sites of Ambohiposa and Lakaton'i Anja, it is significantly larger than other recorded lithics on Madagascar. More research is required but this finding suggests that lithic technology may have been more widespread on the island, particularly among coastal communities, than previously thought.

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Over the past several years the Morombe Archaeological Project (MAP) has been involved in a landscape-scale analysis of the settlement history of the Velondriake Marine Protected Area (VMPA) in Southwest Madagascar (Figure 1). The VMPA consists of a total area of approximately 800 km^2 and is home to Vezo fishers, communities whose livelihoods revolve primarily around marine resource exploitation (Astuti 1995), as well as Mikea and Masikoro communities, whose livelihoods depend on forest resources, agriculture, and pastoralism (Yount, Tsiazonera, and Tucker 2001).

Using a mix of remote sensing and ground-based survey strategies, over 1000 km^2 were systematically investigated for archaeological materials and several hundred new sites were recorded (Davis et al. 2020). During excavations conducted in 2020 at one of these sites, G134 (Figure 1), a single lithic blade was recovered, representing one of a small number of archaeological stone tools recovered from Madagascar and the only known lithic blade find from southwest Madagascar. This short report describes this finding within the context of Madagascar archaeological research.

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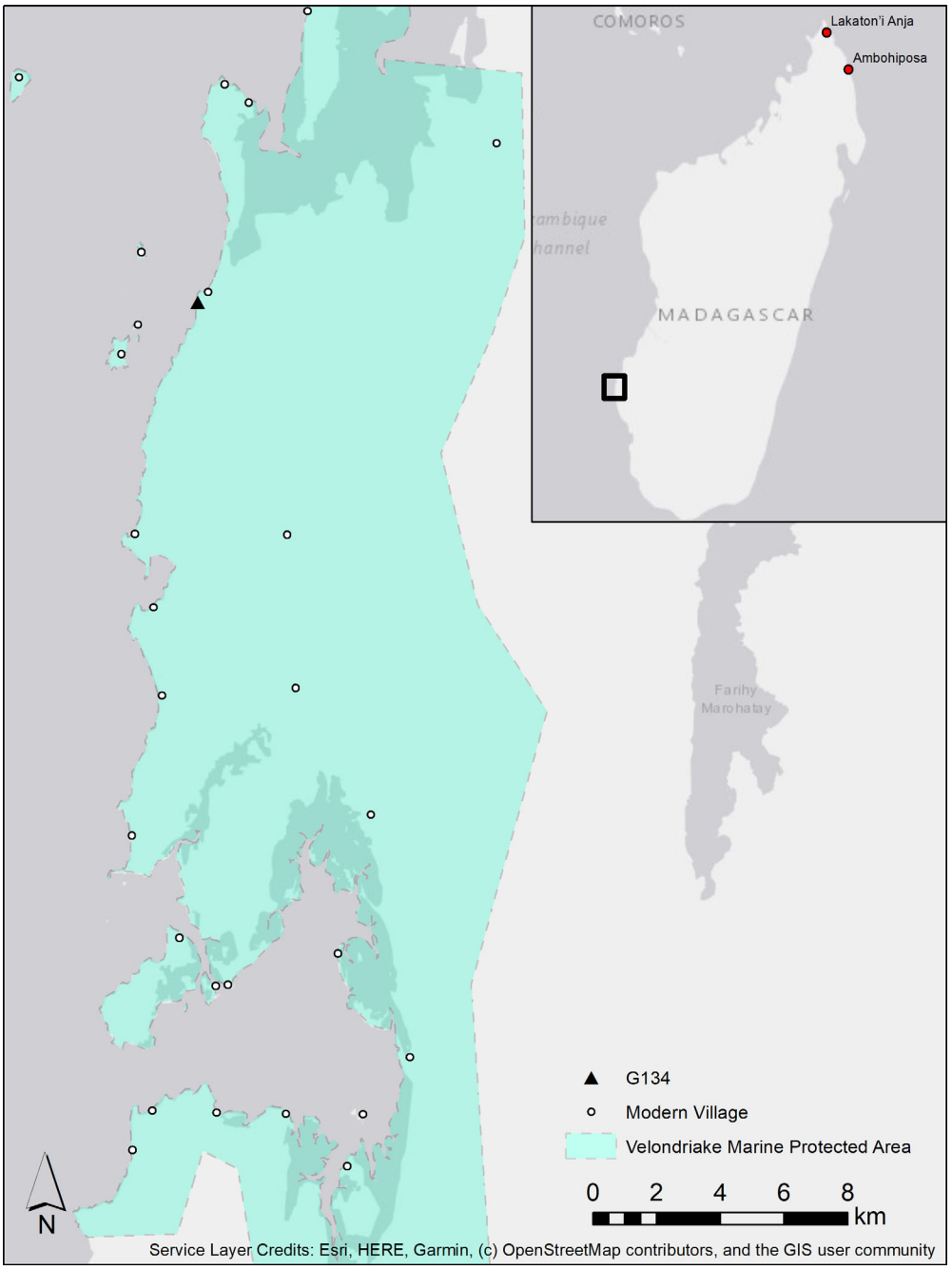

Figure 1. Location of site G134 in the Velondriake Marine Protected Area. Inset map shows locations of two other archaeological sites where lithic blades have been recovered on Madagascar.

Systematic investigations of the archaeology of the Velondriake region of Madagascar began in 2011 with the establishment of the MAP by Douglass (2016). The inhabitants of the Velondriake region have exploited a range of habitats, including coral reefs, mangroves, and intertidal zones, among others, for at least two millennia (Douglass 2016,

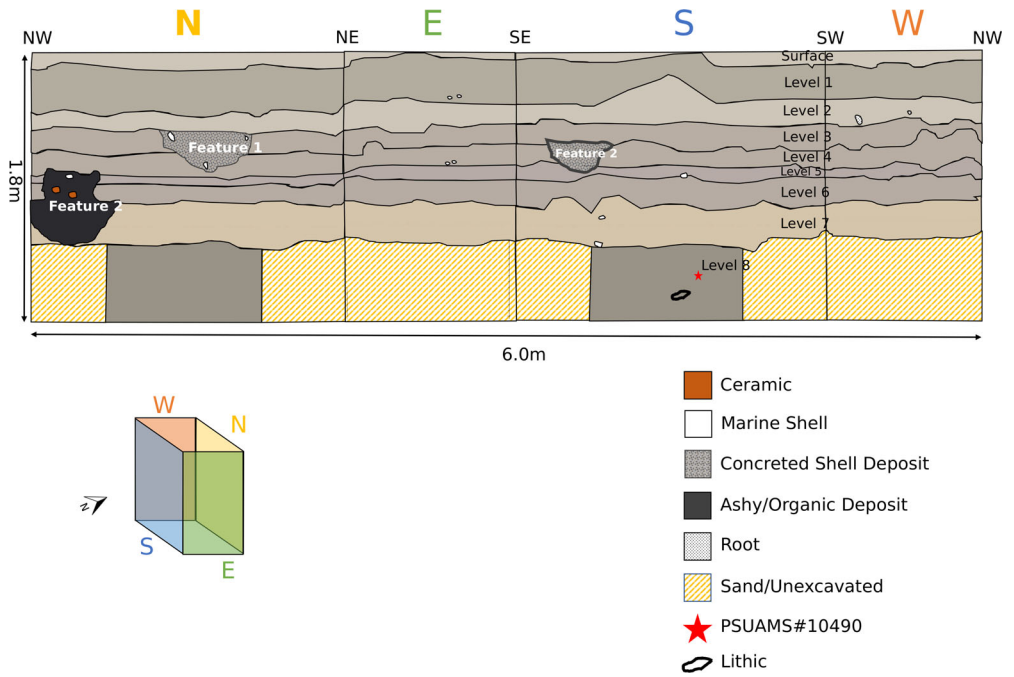

Figure 2. Profile wall drawing of G134. Colors correspond with Munsell color codes recorded during excavation (Surface = 2.5Y 8/1; Level 1 = 2.5Y 7/1; Level 2 = 2.5Y 8/1; Level 3 = 10YR 7/1; Level 4 = 10YR 7/1; Level 5 = 2.5 YR 7/1; Level 6 = 7.5YR 7/1; Level 7 = 2.5Y 8/2; Level 8 = 2.5Y 6/1). 3D box shows dimensions of excavation unit and colored directional abbreviations correspond with sections of the drawing. The lithic and associated radiocarbon dates were not recovered on the unit wall, but their stratigraphic positions are projected onto the figure in their approximate locations.

2017; Douglass et al. 2018). Recent surveys of the area reveal a settlement system driven by environmental and sociopolitical resources (Davis, DiNapoli, and Douglass 2020) and a closely connected social network of permanent and semipermanent communities (Davis 2022; Davis et al. Under Review).

In 2020, following a surface survey, the Morombe Archaeological Project team opened a 1 m × 2 m excavation unit near the village of Antsaragnasoa, in a location with an abundance of surface materials, including ceramics, worked marine shell, and charcoal (Figure 1; see Davis 2022). The site (labeled G134) was excavated following observed changes in the stratigraphy and soils were screened using a 2 mm mesh. Sediments were described using a grain size and Munsell soil color chart.

G134 yielded eight stratigraphic levels of cultural material totaling 1.8 m in depth (Figure 2). Throughout the unit, an abundance of material culture was recovered, consisting of worked marine shell, ceramics, charcoal, and faunal remains. Within the final stratigraphic layer with cultural materials (level 8), a single lithic tool was recovered at a depth of 166 cm (Figure 3). The flaked lithic is also more than two times longer than its width and contains parallel edges, thus meeting the definition of a blade (see Andrefsky and Andrefsky 1998). The object is composed of brown chert, with thinner parts of the blade becoming somewhat translucent. There are linear striations on the ventral side but not on the dorsal side, and use wear is indicated by striations that run perpendicular to the natural linear pattern of the raw material. The artifact has the appearance of a

Figure 3. Drawing (A) and photo (B) of the lithic blade recovered from site G134.

large flake but might have been used as a blade or projectile point, as it contains two notches which indicate hafting. The lithic has a clear bulb of percussion on its lower ventral surface and a small, abraded striking platform, which may be the result of flaking from a chert core to create flakes, cutting implements or other small tools. Its raw material composition appears similar to some other stone-tool assemblages recovered from the northeast coast of Madagascar (see Dewar et al. 2013).

There are several similarities and differences between the lithic flakes and microblades from Velondriake and those recovered in northern Madagascar. In northeast lithic assemblages, Dewar et al. (2013) report on obsidian and chert materials, including red, tan, brown, opaque, and translucent-brown chert objects. There is also a diverse range of tool types, including a variety of flakes, blades, and microblades, that range in size. The artifact recovered at G134 appears similar in material composition to those found at Ambohiposa (i.e., light-brown and translucent-brown chert) as well as morphology (i.e., parallel-sided blade). The Velondriake lithic also corresponds temporally (ca. 728–1235 cal BP) with Ambohiposa's lithics, which date to between 728 and 1233 cal BP. The AMS date from G134 with the closest stratigraphic context to the lithic was recovered at a depth of 144 cm (PSUAMS#10490, ^{14}C age 860 ± 20 BP) which has a calibrated age (2σ SHCAL20) of 792–722 cal BP. We estimated the age of the artifact from G134 using Bayesian Accumulation Age-Depth modeling of the site anchored by 23 Accelerator Mass Spectrometry (AMS) dates recovered throughout the excavation unit (see Supplemental Material and Davis 2022).

In terms of size, however, the Velondriake stone tool is much larger than struck and flaked lithics in both the Ambohiposa and Lakaton'i Anja assemblages (the latter of which are the larger of the two previously recorded lithics on Madagascar). Based on descriptions by Dewar et al. (2013), the average dimensions (length, width, and thickness) of lithics recovered from Ambohiposa ($n = 13$) are Length = 1.11 cm, Width = 0.67 cm, Thickness = 0.33 cm.[1] The average dimensions for stone tools from Lakaton'i Anja ($n = 10$) are Length = 1.53 cm, Width = 1.22 cm, Thickness = 0.25 cm. Meanwhile, the blade from G134 has dimensions of Length = 5.95 cm, Width = 2.15 cm, Thickness = 0.12 cm. The lithic from G134 is significantly larger, but thinner than those from the north. The thickness aligns most closely with a subset of identified blades from Lakaton'i Anja and Ambohiposa ($n = 7$) which have an average thickness of 0.14.

The discovery of lithic material from G134 is significant. With the exception of gunflints that likely date to the eighteenth–twentieth centuries (Douglass 2016), no other archaeological struck lithics have been recorded in southwest Madagascar. Given that no debitage was recovered (i.e., flakes, cores, etc.) and that the region is poor in high quality lithic raw material, it seems unlikely that the site represents a stone-tool production area.

Prior to this study, the struck and flaked stone tools from northern Madagascar mentioned above (Dewar et al. 2013) were the only published archaeological stone tools known from Madagascar, along with flaked stone tools recovered from Sakatova Rivermouth in southern Madagascar (Parker Pearson 2010). Age-depth modeling from southwest Madagascar lends further support to the radiocarbon dating presented by Dewar and colleagues. The northeastern lithics were recovered in contexts that indicate "intermittent occupation by small groups engaged in foraging" (Dewar et al. 2013, 12587). The blade recovered from site G134 also appears to be related to an initial, intermittent occupation of foragers and fishers ca. 750–1200 cal. BP, although the site later became a sustained settlement ca. 350 cal BP (Davis 2022). The contemporaneity of the lithic recovered at G134 and those from Ambohiposa (Dewar et al. 2013) opens several avenues for future investigation. For example, it is possible that stone-tool use may have been widespread on Madagascar by ca. 1000 BP. Specifically, age estimations for lithic assemblages need to be refined and sourcing studies are warranted to determine where the Velondriake artifact was manufactured to ascertain its relation to northern Malagasy stone-tool traditions. It is also important to investigate the relationship between evidence of stone- and iron-tool use on Madagascar around 1000 BP.

In the future, we hope to conduct mineralogical analysis to assess the geological composition of the lithic and compare this with other lithic assemblages from Madagascar to assess potential linkages between communities throughout the island's coastal regions. Additionally, follow up excavations are underway in the area adjacent to site G134 to determine if there is other evidence of lithic technology in Velondriake. For now, we can say that stone-tool use was not limited to northern Madagascar and the island's extreme south around 1000 BP.

Note

1. Where length is measured along the striking axis, width is the measurement perpendicular to length, and thickness is perpendicular to width, following Dewar et al. (2013).

Supplemental data

1. Additional information about radiocarbon dating of Lithic.
2. Supplemental Code: Bayesian Accumulation Model for G134 (coded in R v. 4.0.2).

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Disclosure statement

The authors report there are no competing interests to declare.

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Data availability statement

Materials described in this study are housed in the Olo Be Taloha Laboratory at Columbia University.

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