Further wet-taro evidence from Polynesia’s southernmost Neolithic production margins

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For Prebble et al. (1), the cultivation of introduced semiaquatic tropical taro (Colocasia esculenta) on cooler southern Pacific islands during the Polynesian “initial colonization period” (ICP) (1200 to 1500 CE) represents a “striking” Neolithic example of nonoptimal, marginal crop production. In that respect, ICP taro pollen from Ahuahu, a warm-temperate, northern New Zealand (NZ) offshore island, is especially notable (1). However, the suggestion that NZ wet-taro cultivation “may have been confined” to such offshore islands (ref. 1, p. 8828) overlooks important mainland archaeological evidence (Fig. 1).

Prebble et al. (1) cite the report of microscopic C. esculenta starch granules from a Māori ditch system of northern North Island’s Aupouri Peninsula (a tombolo) with records of “tentatively identified” ICP crops (ref. 1, p. 8824). Yet this taro evidence from former interdune swamp site N3/638, Motutangi, is far more substantive in context. Although reserve C. esculenta starch granules that are generally <8 μm can be difficult to characterize alone, taro corm granules are “most easily” identified in the size range <1 to 3 μm when aggregated in masses (refs. 2, p. 113, and 3–5). From N3/638, multiple ditch-base and interdrain peaty samples present just such discrete, dense taro-like aggregations of hundreds of small reserve starch granules, mostly <4 μm, along with native NZ pollens and spores only as one would expect in pre-19th century “Neolithic” contexts (2, 3). Reserve starch granules of other Polynesian and native NZ plants, including widespread semiaquatic Typha orientalis, are always predominantly >3 μm in any concentration (2–5).

Ditch networks provide further archaeological evidence. Contiguous Motutangi ditch systems integrated irrigation, reticulation, and drainage functions to create >50 ha of bordered, raised, and possibly flooded fields (ref. 2, pp. 106–107), comparable to Polynesian production systems of record for wet taro (1, 6). This engineering feat is mirrored in ditch networks that extended wet cultivation over lacustrine and floodplain lands at the Aupouri Peninsula base (Fig. 1), where soils from site O4/237 also incorporate taro-like starch granule aggregations (3). In Māori oral history, these extensive systems predate the 19th century (ref. 2, p. 106).

Radiocarbon dates by SHCal13 (7) on plant detritus from peaty samples of an uncomplicated Motutangi system (western N3/639) include terminus ante quem age NZ5626 on basal ditch fill at cal AD 1460 to 1670 (95% probability). Age NZ6358 from the native anthropic section of a soil profile 50 m away is identical at 94% probability, while lower NZ6388 around the palynological marker of wetland management beginnings is cal AD 1320 to 1480 (95% probability) (Fig. 1).

Collectively these data identify the Aupouri region as Neolithic NZ’s wet-field production hub. The identification of perennial wet taro from pre-1500 Ahuahu (1) is important nevertheless and may elucidate abandonment of ancient Polynesia’s southernmost wet fields. Marginal wet agronomy disappeared from the Aupouri region and Ahuahu by or during the Little Ice Age (LIA) NZ duration, ~1450 to 1850 CE (8). Cooler LIA temperatures might have influenced the later northern Māori production shift to more resilient dryland taro varieties and sweet potato/kūmara Ipomoea batatas (1).

Acknowledgments
I acknowledge Royal Society of New Zealand Marsden Award UOO1415. Les O’Neill completed Fig. 1.

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Author contributions: I.G.B. designed research, analyzed data, and wrote the paper.

The author declares no competing interest.

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First published January 14, 2020.
Fig. 1. (Upper) Map of Aupouri Peninsula and lands at the tombolo base ("Aupouri region" in text), northern North Island, New Zealand, showing archaeological ditch systems that once extended wet production for tens of hectares. The relative location of Ahuahu (1) is shown in Inset map. (Lower) Radiocarbon (¹⁴C) calibration ranges (95% probability) by laboratory number for atmospheric plant detritus from the western area of ditch system site N3/639, Motutangi. Calibrations are by SHCal13 in OxCal v.4.3.2 (7) on conventional ¹⁴C ages (in citations in ref. 2, p. 107). Base data are sourced from ref. 2 which is licensed under CC BY 4.0.