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Taxonomic implications of the original illustrations of *Prosobonia* from Tahiti and Moorea made during the second and third Cook expeditions

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SUMMARY.—Two extinct taxa, Moorea Sandpiper *Prosobonia ellisi* and Tahiti Sandpiper *P. leucoptera*, once occurred on Moorea and Tahiti, respectively. Four illustrations of *Prosobonia* from the second and third Cook expeditions (1772–75 and 1776–80) exist, of which one was the model for *P. ellisi*, whilst two others depict *P. leucoptera* and one Kiritimati Sandpiper *P. cancellata*. Considerable confusion exists as to whether *P. ellisi* is a valid species or an intraspecific variant of *P. leucoptera*. We examined the Tahiti / Moorea illustrations and original notes by crew of the Cook expeditions. We conclude that *P. ellisi* should be regarded as a junior synonym of *P. leucoptera*, as the differences between them may represent age-related, sexual, seasonal or even inter-island variation.

Four illustrations made by artists on the second (1772–75) and third (1776–80) Cook circumnavigations depict shorebirds referred to the genus *Prosobonia* (Scolopacidae), which is currently considered to comprise five species of very rare or extinct Polynesian endemics. The first was drawn by Johann Georg Adam Forster (1754–94) during Cook's second voyage, in either August 1773 or April–May 1774, when Tahiti was visited. It illustrates what is considered the type of Tahiti Sandpiper *P. leucoptera* (J. F. Gmelin 1789) (Sharpe 1906b, Hume 2017: 150–151). The second and third illustrations were made by William Wade Ellis and John Webber during Cook's third voyage. Both were made at Moorea (visited between 30 September and 11 October 1777) (*cf.* Walters 1991: 224, Hume 2017: 151), and much later the bird depicted in the Ellis drawing was described as Moorea Sandpiper *P. ellisi* (Sharpe 1906b). The fourth illustration was made at Kiritimati, during the third circumnavigation, and shows Kiritimati Sandpiper *P. cancellata* (J. F. Gmelin 1789) (Latham 1785: 274, Walters 1993, Jansen & Cibois 2020). The other two species were discovered after Cook's expeditions: Tuamotu *P. parvirostris* (Peale 1849) and Henderson Sandpipers *P. sauli* (De Pietri *et al.* 2020).

In addition to these illustrations, there are descriptions by Johann Reinhold Forster (Lichtenstein 1844: 174–176) and a brief description made by William Anderson (Anderson *c.*1780). As part of a wider study of the history of Naturalis specimen of *P. leucoptera* (Jansen *et al.* 2021), we examined these original illustrations and descriptions.

Material and Methods

JFJJ studied the following material at the Natural History Museum, London, UK (NHMUK) and British Museum, London (BM): Forster's illustration (now held in the R. B. R. Forster collection, Banksian MSS. 6–7, pl. 117), Ellis's illustration (in the collection of William Wade Ellis, 1751–85, Banksian MS. 33, pl. 65) and Webber's illustration (among the John Webber prints, British Museum, Prints and Drawings Dept.), as well as the Solander catalogue (Solander *c.*1780), at NHMUK, Tring. This catalogue documents the illustrations in the library of Joseph Banks at the time (Whitehead 1978, Medway 1979), and a list

TABLE 1

Variation in original artwork executed during the second (1772–75) and third (1776–80) expeditions commanded by James Cook, and the description made during the second Cook circumnavigation by J. R. Forster. Only the relevant parts from the Forster description are noted (for the full description see Lichtenstein 1844).

	Johann Georg Adam Forster / Fig. 1	William Wade Ellis / Fig. 2	John Webber / Fig. 3	Johann Reinhold Forster's description (in Lichtenstein 1844: 174–176)
Text on plate / origin	Torowé / Torowé / Tringa pyrrhetraea / Tringa leucoptera J.N. XIII 678.	Signed in ink: 'W. Ellis'. In pencil is written 'Prosonia ellisi, Sharpe / Tete / Te Te / Tringa pyrrhetraea Forster'.	The name 'Te-te' is noted in pencil. In ink, 'Tringa pyrrhetraea G. Forster, 1844'.	'Tringa pyrrhetraea' and Georg Forster's illustration is mentioned (Fig. pict. G.). Inhabits the island of Otaheitee near small rivers; it is called Teete.
Literature	Giebel (1877: 664), Sharpe (1906a: 190–191), Sharpe (1906b), Lysaght (1959: 300, no. 120), De Pietri <i>et al.</i> (2020: fig. 2).	Latham (1785: 172), Sharpe (1906a: 205, 1906b), Lysaght (1959: 333, no. 65), De Pietri <i>et al.</i> (2020: fig. 2).	Lysaght (1959: 340, no. 116).	
Size and structure	Heavy built scolopacid, with six primaries visible beyond tertials, and wingtips reaching past tail tip.	A rallid-shaped bird, with six primaries visible beyond tertials, and wings equal to tail in length.	Anatomically incorrect (i.e. body too large, legs incorrectly positioned), five visible primaries beyond tertials, and tail extends clearly beyond wings.	Tringa [= sandpiper] body about size of Common Ringed Plover <i>Charadrius hiaticula</i> or slightly larger.
Head	Small compared to body; black with white supercilium from mid-forehead towards the nape, and longer behind eye than in front of it.	Brownish, with a paler area around eye (no marked supercilium), back of head and crown darker.	Small (compared to body) dark (brownish), paler brownish supercilium above eye, small paler area around eye, throat pale whitish, and nape and hindneck darker.	Head black, eyebrows white.
Upperparts	Uniform blackish.	Blackish or greyish, with a (paler) brownish rump. Black spot (as dark as bill) on hindneck.	Blackish or dark, with (pale) brownish rump.	Back black, rump rufous.
Underparts	Brick-red.	Throat to at least vent pale orange brownish, paler on undertail-coverts; chin whitish and the palest tract, after the white wing-coverts.	Brownish with blackish fringes, and undertail-coverts pale (whitish).	Throat, breast and belly rufous, undertail ochre-white.



Wings	Blackish, scapulars with a row of all-white feathers and a whitish lesser covert.	Part of scapulars white, rest black; lesser, median and greater coverts orange brownish, and tertials and primaries blackish.	Scapulars, primaries and tertials all dark, a few white lesser coverts; median and greater coverts show a mix of pale brownish and blackish feathers.	Wings black and reach tip of tail; shoulders, above and below, white; one or more of the central greater coverts white, and remiges and rest of wings with black shafts. In the examined specimen, the 15th and 16th flight feathers were white in the right wing, black in the left wing.
Tail	The visible feathers have a brownish background with black bars (r12–5).	Dark with brownish outer rectrices (r14–5) barred black.	Dark with brownish outer rectrices (unbarred)	Tail short, rounded, with 14 rectrices, the two central ones entirely dark brown; the next pair dark brown with rufous tips and outer webs stained rufous; the rest barred dark brown and rufous.
Bare parts	Long straight bill, broadest at base and straight. Legs look all greenish, with long toes (as long as bill). Thick long legs and long feathers covering half of tibia. Tarsus 39% longer than bill. Central toe 16.5% longer than bill. Slit-like nostrils.	Long, black, curved and tapering bill. Legs and toes greenish. Clear tibial feathering (half length of tibia), tarsus 45% longer than bill. Central toe as long as bill. Claws uncoloured. Slit-like nostrils.	Bill straight and slender. Legs and toes greenish. Short legs, unfeathered tibia. Tarsus twice as long as bill; central toe 20% longer than bill. Slit-like nostrils.	Smooth straight bill, as long as head, somewhat cylindrical, blunt and dark, with thick base. Mandibles equal; upper with slightly depressed base, broader, otherwise convex, with blunt tip; lower half-cylindrical, blunt. Nostrils linear, straight, in front close together, at base more apart, with upper border slightly prominent. Feet tetradactylous, with separated toes, slender, green, length of half the body. Thighs half-bare. Tibiae slender and compressed. Toes very slender, the middle of the three fore toes almost as long as tibia; the hind [toe] short, unarticular, with nail just reaching ground.

of specimens compiled by Jonas Carlsson Dryander (Whitehead 1978, Medway 1979).

Review of original material

Two illustrations are of birds from Moorea and one from Tahiti. It is unknown if the illustration from Moorea depicts the same bird as that from Tahiti. To understand the morphological and anatomical differences in the illustrations we analysed the original Forster, Ellis and Webber illustrations, and the Forster description in Lichtenstein (1844: 174–176) (Table 1), but we excluded two c.1780 manuscripts.

Anderson.—In Anderson's (c.1780) manuscript describing animals observed on Captain Cook's second and third voyages, *Charadrius tardus* (Anderson's manuscript name) is mentioned with a short description (our translation): 'Head/body black above, with a stripe above the eyes, a wing mark, the belly and the undertail white; the breast and rump reddish or brown.' It was mentioned alongside two other species of 'Plover' (Hooded Plover *Thinornis cucullatus* from New Zealand and a 'blackish plover' from Terra del Fuego (possibly Magellanic Plover *Pluvianellus socialis*). However, from the manuscript it is impossible to determine if the '*Charadrius tardus*' was actually collected (*contra* Stresemann 1950: 76, Hume 2017: 151).

Solander.—Herein (Solander c.1780), Tahiti Sandpiper is mentioned as: '93 / 1 / *Webber Ellis* / (*Te-te*) / *Otaheite Eimeo*' (Otaheite = Tahiti, Eimeo = Moorea).

Discussion and Conclusions

The three illustrations examined all differ (Table 1), and none exactly matches the sole surviving mount, RMNH.AVES.87556. The Webber illustration (drawn at Moorea) shows a bird very similar in appearance to the *Prosobonia* specimen at Naturalis (Jansen *et al.* 2021). The Ellis illustration, which is not quite finished (i.e. the nails are uncoloured), was used to describe the Moorea taxon. Sharpe (1906b) described



Figure 1. Tahiti Sandpiper *Prosobonia leucoptera*, Tahiti, August 1774 or April/May 1774; the bird shows at least two groups of white wing feathers (Georg Forster, © Natural History Museum, London)

Ellis' illustration as differing from that by Forster in having a circling of rufous around the eye; a double patch of white on the wing-coverts, and the median and greater wing-coverts pale ferruginous, like the rump. However, the Webber illustration, also made on Moorea (Fig. 3), was not mentioned by Sharpe (1906a,b). According to Walters (1991), the Ellis (Fig. 2) and Webber (Fig. 3) depictions are of the same species. However, they differ in at least



Figure 2. Moorea Sandpiper *Prosobonia ellisi*, Moorea, August–December 1777; the claws are not coloured, indicating that the illustration was unfinished, and the annotation *Prosobonia ellisi* was added by Sawyer (Sawyer 1949) (William Wade Ellis, © Natural History Museum, London)

ten points: bill shape and thickness, ear patch colour, throat colour, tibia feathering, tail pattern, wing-coverts pattern, tail and wing lengths, and leg and underparts colorations. The Webber illustration differs in having a supercilium (absent in Ellis'), only a single patch of white on the wing-coverts (not two), and differently patterned median and greater coverts. The rump is ferruginous, but the same feature is present on the surviving specimen (Jansen *et al.* 2021).

At that time illustrators were less accurate, especially in details, than now; for example, virtually all depictions of Dodo *Raphus cucullatus* differ in some respects (Fuller 2002) as

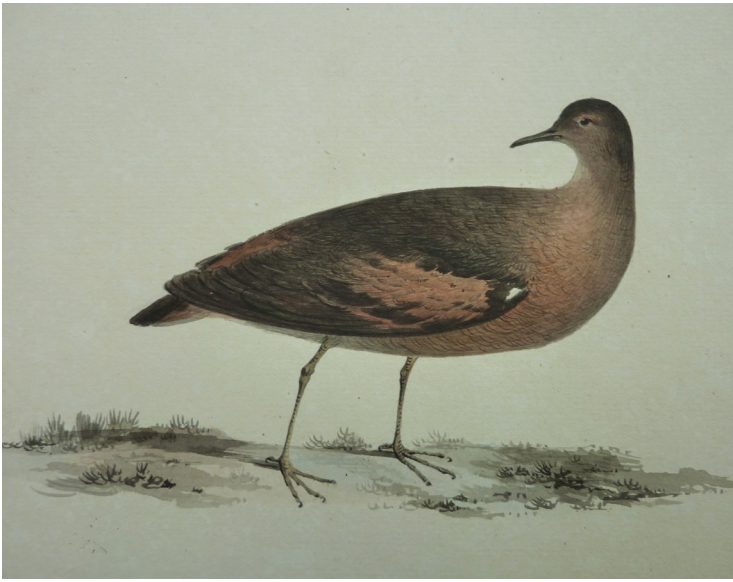


Figure 3. Moorea Sandpiper *Prosobonia ellisi*, Moorea, August–December 1777; anatomically incorrect (John Webber © British Museum, London)



Figure 4. Tahiti Sandpiper *Prosobonia leucoptera*, from Latham (1785); note the pale undertail-coverts and rufous supercilium (© Smithsonian Institution, Washington DC)



Figure 5. Tahiti Sandpiper *Prosobonia leucoptera*, from Latham (1824); note the white supercilium, rufous wing-coverts, and pale belly and undertail-coverts (© University Library, Univ. of Illinois). Latham added a plate to his first publication (Latham 1785: 172–173, pl. LXXXII) and reused it in 1824 (Latham 1824: 296, pl. CLII). The plates differ notably in, for example, the supercilium, breast and undertail colorations (see Figs. 4–5) (both volumes on the Biodiversity Library are held in the Smithsonian Library). These differences may be attributable to the colourists who worked on the relevant copies during the publication process.

do known illustrations of the sole Tahiti Sandpiper specimen in Joseph Banks' collection (Figs. 4–6). It is very unlikely that birds from Moorea were morphologically distinct from those on Tahiti (as these islands are separated by just 18 km). Also, there is evidence of individuals exhibiting patchy white feathers in several Polynesian *Acrocephalus* warblers (Thibault & Cibois 2017), which could be evidence of a limited gene pool and explain the minor variation in the meagre sample of sandpipers.



Figure 6. Tahiti Sandpiper *Prosobonia leucoptera*, from the Latham MS collection; note the all-rufous tail (Justin J. F. J. Jansen, © Natural History Museum, London). The plate is unsigned and by an unknown artist; it is annotated with a cross-reference to the description in Latham (1824: 296) and appears to be a copy of Forster's plate (Fig. 1), albeit with some differences, e.g., tail length, posture, bill length and leg colour. Latham's 888 original illustrations of birds in six volumes were acquired by the British Museum from Mrs E. Wickham on 24 November 1920 and are now at the Natural History Museum (NHMUK) (Latham n.d., Sawyer 1949, Jackson 1999, Jackson *et al.* 2013).

We consider the differences between Moorea and Tahiti birds to represent age, sex, season or inter-island variation, rather than evidence of a separate taxon. It is possible that future work testing ancient DNA of archaeological remains on Moorea may resolve this issue, but until then we conclude that *Prosobonia ellisi* Sharpe, 1906b, is a junior synonym of *Tringa leucoptera* J. F. Gmelin, 1789.

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