

Notes on early illustrations and the juvenile plumage of the extinct Hawaii Mamo *Drepanis pacifica* (Drepanidini)

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SUMMARY.—The earliest published illustrations of the extinct Hawaii Mamo *Drepanis pacifica* are probably all based on one or two adult specimens originating during Cook's third voyage and the variation between them does not reflect variation in plumage. Two unremarked specimens of Hawaii Mamo in the Paris Museum are in a transitional plumage showing that this species had a previously unknown juvenile plumage in which the black feathers of the adult were dark brown. This fact has further implications for the plumage sequence of other species of the black-and-red clade of Drepanidini.

The brilliant black-and-yellow Hawaii Mamo *Drepanis pacifica* was of cultural significance to native Hawaiians for making their feather artefacts (Brigham 1899), but the species is now extinct and is among the rarest of Hawaiian birds in museum collections. Only 11 specimens survive (Banko 1979), from four known sources: Cook's third voyage in 1779 (Medway 1981, Olson 1989), the private collector James Mills of Hilo who flourished in the 1860s (Manning 1978), Théodore Bailleu about 1876 (see below) and Henry Palmer for whom the last specimen was obtained in 1892 (Rothschild 1893–1900). Until now, only adult specimens were thought to exist and no sex or age differences were known (Pratt 2002, 2005). Here we supply overlooked evidence for a distinct brown juvenile plumage of the Hawaii Mamo.

The earliest specimens and their illustrations

Our discovery of the juvenile plumage of *Drepanis pacifica* led us to examine the earliest published illustrations of the species because we were aware that one of the two individuals illustrated by Reichenbach (1853: pl. DLXI, figs. 3828–3829) was shown with a distinctly brownish throat and belly, and a line of brownish along the dorsum (Fig. 1C), as opposed to the other specimen in which the dark parts of the plumage were entirely black.

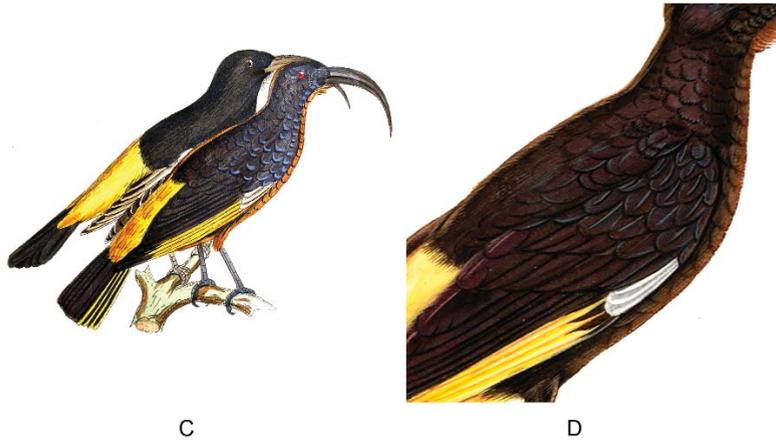
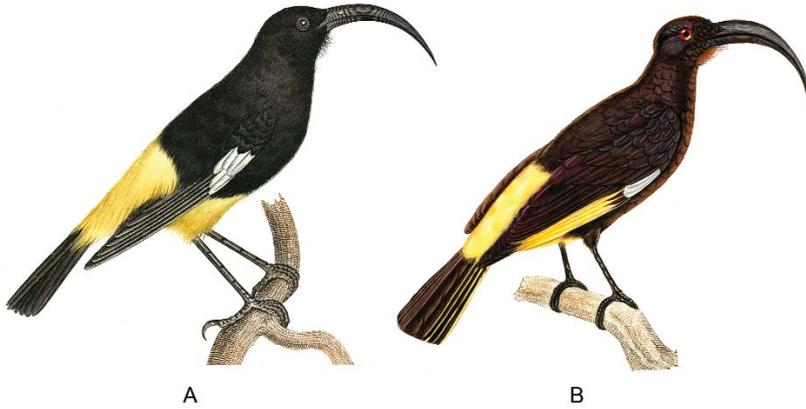
The Hawaii Mamo was first obtained on Cook's third voyage in 1779 (Medway 1981). Cook voyage artists William Ellis and John Webber each depicted the species and their paintings still survive at The Natural History Museum, London (Lysaght 1959). Whether these were made from live birds or extant specimens is unknown. The species was first described (but not illustrated, *contra* Jackson 1998) by Latham (1782) who called it the 'Great Hook-billed Creeper' and attributed it to the 'Friendly Islands' (Tonga). Latham's description was the basis for Gmelin's (1788) binomial *Certhia pacifica*, which eventually became the type species of Temminck's (1820) generic name *Drepanis*. Latham (1787) later corrected the locality to 'Owhyhee' (Hawaii) and stated that its local name was 'hoohoo'. The specimens that Latham saw were then in the collection of Sir Ashton Lever and while still in his possession one of them was illustrated by Sarah Stone (Walters 2004). That painting, now also in The Natural History Museum, was reproduced in Jackson (1998).

Citing both Latham and Gmelin, abbreviating the name to 'Hoho' and giving the locality as 'Owhihee', Audebert & Vieillot (1802: 124, pl. 63) published the first illustration of the species (Fig. 1A) from an 'individu nous a été communiqué par M. Parkinson' that formed

part of Parkinson's collection and that had been drawn by 'Syd.[enham] Edwards.' Their description could have been taken from Latham and from Edward's drawing, although it is possible that Vieillot once had the actual specimen in hand. Edwards was a well-known draughtsman of natural history, particularly botany (DNB 1921–22, vol. 6). James Parkinson was a museum proprietor who won the collection of Sir Ashton Lever in a lottery in 1784. Parkinson's collection was then auctioned in 1806 (DNB 1921–22, vol. 15, King 1996). The museum in Vienna bought two specimens of *Drepanis pacifica* at that time (Medway 1981), one of which (MCZ 236875), lacking the upper half of the bill, was later exchanged with the American Museum of Natural History and thence went to the Museum of Comparative Zoology at Harvard University (Bangs 1930, Olson 1989). The intact specimen remaining in Vienna (NMW 50735) had probably served as model for Audebert & Vieillot's plate. They described the underparts as being blackish brown ('brun noirâtre'). We examined the specimen and found it to be an adult with typically blackish underparts, perhaps slightly brownish but definitely not brown such as in the juvenile plumage we describe here.

The species was next illustrated (Fig. 1B) five years later by Levaillant (1807: 45, pl. 19) under the name 'Mérups jaunoir', of which he said: 'I have seen only a single individual of this species, which is part of my collection. Vieillot [*sic*] has described one, of which he received a sketch from London, under the name of Hâho [*sic*], which we can retain as it likely has some connection with its cry or singing. This bird lives in New Holland [=Australia]' (our translation). A label annotation (probably from the early 19th century) on the Vienna specimen of *Drepanis pacifica* states that the only other specimen of the species was in the Leiden museum, possibly received from Levaillant. Levaillant was closely associated with C. J. Temminck of the Leiden museum (Stresemann 1975) and Temminck's father was already exchanging material with Levaillant prior to 1820. Those specimens became part of the son's private collection, which was subsequently donated to Leiden (Hoek Ostende *et al.* 1997). Regardless, the Leiden specimen of *Drepanis* (RMNH 110.030) was not acquired until 1819 at the sale of William Bullock's museum (Medway 1981), long after Levaillant's publication. Although Medway (1979: 126) originally believed that specimen to have come from Cook's third voyage, he later stated that there was no evidence to support his earlier proposition given that Bullock's specimens 'could have been obtained on any one of the voyages (at least of English ships) which visited the Hawaiian Islands after Cook but before Bullock's sale in 1819.' Whereas that statement might be true for the Hawaiian Islands as a group, most vessels called only at Honolulu on Oahu and very few troubled to preserve specimens of birds. No records exist of anyone who returned with specimens of birds from the island of Hawaii between Cook's voyage and 1825 (Olson & James 1994). Thus Cook's voyage is as yet the only known source for any specimen of Hawaii Island endemic such as *Drepanis pacifica*, the Hawaii 'O'o *Moho nobilis* or the Akialoa *Hemignathus obscurus* (s.s.) that were documented as being in collections prior to 1819 or even somewhat later. The Leiden *Drepanis* is mummified, as are the two specimens known to be from Cook's voyage, and as were many, but apparently not all, Cook voyage specimens (Rothschild 1893–1900, Steinheimer 2006).

Levaillant's mention of Vieillot is clearly a reference to Audebert & Vieillot (1802), as the latter continued the work after Audebert's death in 1800. Levaillant must have known, therefore, that his 'Mérups jaunoir' did not come from Australia. No existing specimen of *Drepanis pacifica* can be identified as ever having been in the possession of Levaillant or labelled as being from Australia (most of Levaillant's collections went to Leiden and Paris). We strongly suspect that he based his illustration on Audebert & Vieillot (1802) and made up his own name and origin for the species. Levaillant was a 'fanatical defender' (Stresemann 1975: 94) of Buffonian procedure in eschewing the Linnean binomials that



were Vieillot's stock and trade. Copying the *Drepanis* and giving it his own name and history would have enhanced his reputation for depicting 'colorful and bizarre birds from all over the world, not merely from Africa' that sold the books from which he made his living (Stresemann 1975: 90).

The overall impression of Levaillant's plate (Fig. 1B) is that the dark parts of the plumage are black and only by very close inspection (Fig. 1D) can one detect a brownish tinge along the line of the underparts and dorsum. We believe the brown edge is an artefact either of the colourist's technique or of the pigment and may have been an attempt to provide highlights. It might also have been an attempt to recreate the 'brun noirâtre' underparts described by Audebert & Vieillot (1802).

The small figures in Reichenbach (Fig. 1C) were copied from Levaillant (foreground) and Audebert & Vieillot (background) and in the former the brown areas, as well as the shading in the black areas, have been greatly exaggerated. If we assume that Levaillant's figure is a copy, then it is possible that all of these figures were based on the single specimen now in Vienna, which is an adult without any of the truly brown juvenile plumage we now describe.

The juvenile plumage

Remains of what we interpret to be the juvenile plumage are preserved in two specimens of *Drepanis pacifica* in the Muséum National d'Histoire Naturelle, Paris, that apparently were never examined or described by anyone who has written about the species. They were collected by Théodore Ballieu (not Bailleu as often misspelled—see Mearns & Mearns 1992) in the vicinity of 'Dr. Trousseau's mountain-cottage in the district of Kona on Hawaii' (Wilson & Evans 1890–99: 89, footnote). Banko (1981: 167) believed they were collected c.1876 at Pulehua (*sic* = Pu'ulehua) Ranch, a well-known collecting locality on the leeward slopes of Mauna Loa (*cf.* Olson 1999). The specimens are unstuffed skins and are mangled and twisted so that colour distribution is difficult to determine. Here we provide descriptions of the plumage of both specimens (Fig. 2).

Drepanis pacifica MNHN V399 unsexed, lacking the anterior half of the mandible. Forehead to top of crown black, grading into brown on nape; brownish black on upper back grading to black on lower back. Yellow feathers of lower back pale lemon-yellow interspersed with black feathers, central and lower regions deep yellow. Upper surface of tail dark brownish black. Sides of head brown, superciliary blackish brown, cheeks brown, darker at top; throat black, sides of neck blackish brown, breast hazel-brown, sides of body blackish brown/black. Belly hazel-brown, edged laterally with black. Undertail-coverts deep yellow, undertail greyish brown. Surface of upper wing blackish brown, secondaries brown, primaries blackish grey-brown. Primary-coverts dark, one off-white; shoulder deep

Legend to figures on facing page

Figure 1 (top). The three earliest depictions of the Hawaii Mamo *Drepanis pacifica*: (A) Audebert & Vieillot (1802); (B) Levaillant (1807), possibly copied from A; (C) Reichenbach (1853), which was taken from A (in back) and B (foreground)—the figure is reversed here to facilitate comparison and in the original was much smaller than A or B; (D) detail of B showing brownish pigment along edge of breast and dorsum that was greatly exaggerated in C. It is possible that all of these figures may ultimately have been based on the adult specimen in Vienna (NMW 50735).

Figure 2 (bottom). Acrylic paintings of the two specimens of Hawaii Mamo *Drepanis pacifica* in the Paris museum that retain brown feathers from the juvenile plumage: (left and second from right) MNHN V399 unsexed, lacking the anterior half of mandible (the right leg was not figured to show more of the undertail-coverts, but is present in the specimen); (right and second from left) MNHN V398, unsexed, lacking right leg and tail (Julian P. Hume).

yellow, interspersed with black; underwing off-white, pale yellow on edge; primaries and secondaries greyish brown. Thighs off-white at base grading to deep yellow. Bill paler at base.

Drepanis pacifica MNHN V398, unsexed, lacking right leg and tail. Forehead and nape to back black, with a hint of blackish brown on sides. Yellow feathers of lower back almost uniform deep yellow, with lemon-yellow feathers on sides. Cheeks brown, blackish brown at top, throat black grading to blackish hazel-brown on belly, darker on sides. Upper wings blackish brown, secondaries brown with pale brown edges, primaries dark brown with pale greyish-brown edges, particularly at the tips. Primary-coverts off-white, with pale yellow centres at base; shoulder deep yellow, interspersed with black feathers; underwing off-white with deep yellow edges. Under surface of primaries and secondaries greyish brown. Thighs off-white, becoming deep yellow distally, interspersed at base with brown feathers. Bill paler at base.

Unfortunately, these specimens lack dates of collection, which would have provided some clue as to the species' breeding season. The differences between them suggest that V398 is more mature than V399. Brown feathers are much more extensive in V398, particularly on the head, neck and underparts. In both, the development of adult black feathers appears first on the back, forehead, throat and sides of body, and where black feathers appear through the brown, they are black only at the tips, and brown at the base. The yellow feathers of the lower back are almost uniform deep yellow in V398, more lemon-yellow and interspersed with dark feathers in V399. There is greater colour development on the primary-coverts in V398, and the coverts along the outer edge of the 'wrist' have deep yellow, rather than pale yellow edges. The primaries in V398 have pale greyish-brown edges, and the secondaries light brown edges, whereas in V399 they are almost uniformly blackish brown. The legs are larger in V399 and the bill and wings longer in total length, but the thighs are more extensively deep yellow in V398.

A distinct juvenile plumage was probably characteristic of all species of the black-and-red clade of Drepanidini, as recognised by Perkins (1903) and all recent phylogenies (reviewed by Pratt 2005). The juvenile plumage of 'Apapane *Himatione sanguinea* is largely brownish, and the body feathers in the first prebasic moult go directly to the red adult plumage (Fancy *et al.* 1993, Fancy & Ralph 1997). In the 'Iwi *Vestiaria coccinea*, the juvenile body feathers are greenish, fading to yellow, with black tips, but likewise change to the adult scarlet colour in the first prebasic moult (Fancy *et al.* 1993, Fancy & Ralph 1998). Both species retain the juvenile primaries and most or all of the secondaries after the first prebasic moult. Such appears to have been the case in *Drepanis pacifica* as well, as the decidedly brown secondaries in the specimens described above appear to be juvenile. We interpret the brown contour feathers in those specimens also to be remnants of juvenile plumage. The specimens are too advanced in their state of moult to know how to interpret the appearance

TABLE 1
Measurements of the two specimens of Hawaii Mamo *Drepanis pacifica* with partial juvenile plumage.

Measurement (mm)	MNHNV398	MNHNV399
Total length	140	140
Anterior edge of nostril to tip	36.6	38.6
Exposed culmen	41	43.4
Wing-length (chord)	96	97.4
Tail-length	-	53.4
Tarsus	29	33.4

of the fresh juvenile plumage, but it possibly was entirely cryptic and may have lacked the yellow rump and undertail feathers so as not to signal adult social status.

The discovery of a brown juvenile plumage in *Drepanis pacifica* provides insight into the confusing plumages of an even less well known Hawaiian honeycreeper, the extinct Ula-‘ai-hawane *Ciridops anna*. Three plumages are evident in the five existing unsexed specimens (one of which is not usable for colour comparisons—Olson 1992: 445): a scarlet, black and grey plumage, presumably adult (two specimens); a mostly green, grey and brown specimen in fresh, unworn, hard plumage with no sign of juvenile fluffiness or pointed rectrices; and a mostly red-and-black specimen with much brown intermingled (Pratt 2002, 2005). We believe this ‘transitional’ specimen shows the remnants of a brown juvenile male plumage. Thus the single green-plumaged specimen is probably the adult female and not the immature as believed by Pratt (2005). If so, the ‘Ula-‘ai-hawane would be unique amongst the red-and-black clade in being highly sexually dichromatic.

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