

Museum specimens and citizen science photographs clarify species and distribution limits of maroon oriole *Oriolus traillii*

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Abstract. The maroon oriole *Oriolus traillii* (Vigors, 1832) is a polytypic songbird found in South and Southeast Asia. It has traditionally comprised four subspecies (*traillii*, *robinsoni*, *ardens*, *nigellicauda*), but recent molecular data have found some of these to be paraphyletic with respect to the silver oriole *O. mellianus* Stresemann, 1922. Here, I review the morphological differences between the four taxa, and their respective distributions, using 66 museum specimens and 745 photographs. Significant plumage and mensural differences are congruent with molecular data and suggest that the maroon oriole should be considered three species: (i) maroon oriole *O. traillii* (Vigors, 1832), (ii) Dalat oriole *O. robinsoni* Delacour, 1927, and (iii) red oriole *O. ardens* (Swinhoe, 1862); in the absence of any consistent phenotypic differences, subspecies *nigellicauda* should be synonymised with *ardens*. Although previously considered to be more widespread in South-East Asia, *O. robinsoni* is found here to be restricted to the Dalat Plateau of Vietnam and adjacent south-east Cambodia. *Oriolus ardens* is common in Taiwan and nearly extinct on Hainan, but its status in continental Asia remains somewhat uncertain. Although other authors have suggested that *O. ardens* may be of conservation concern, I find no evidence that any of the three species are threatened.

Key words. taxonomy, songbird, citizen science, Indochina, morphology, conservation

INTRODUCTION

The maroon oriole *Oriolus traillii* (Vigors, 1832) is endemic to South and Southeast Asia, where most sources accept it to comprise four subspecies: (1) *traillii* from the Himalaya to northern Southeast Asia; (2) *robinsoni* on the Dalat Plateau and neighbouring southern Laos and southeast Cambodia; (3) *nigellicauda* on Hainan; and (4) *ardens* on Taiwan (del Hoyo & Collar, 2016; Walther & Jones, 2020a; AviList Core Team, 2025; BirdLife International, 2025). A distinctive fifth taxon—*mellianus*—was originally described as a subspecies of *O. traillii* (Stresemann, 1922) but is now universally recognised as an independent species, the silver oriole *O. mellianus*, which breeds in southeast China and winters more widely in Southeast Asia (Walther & Jones, 2020b). This creates a curious distribution, with the breeding range of *O. mellianus* interposed between that of *O. t. traillii* and *O. t. ardens*.

Recent genetic data have challenged the present taxonomic arrangement and suggest that the maroon oriole, as currently circumscribed, is paraphyletic with respect to the silver oriole.

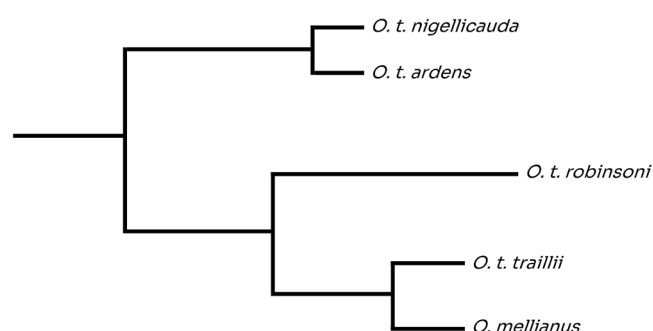


Fig. 1. Simplified phylogenetic tree, summarising the findings of whole genome sequencing by Ernst et al., (2022).

This was first reported by Jønsson et al. (2019) who found a deep genetic divergence between island maroon oriole taxa (*nigellicauda* + *ardens*) and continental taxa (*traillii* + *robinsoni*), and that the silver oriole was nested within the clade of continental taxa. However, their data investigated only a few genetic markers and contained only a single sample of the silver oriole. Reinvestigating the issue using whole-genome sequencing and a larger series of specimens, Ernst et al. (2022) confirmed these findings (Fig. 1): their phylogeny found a close relationship between *ardens* and *nigellicauda* ($n = 1$ for each), this clade being deeply divergent from all continental taxa including the silver oriole. They also uncovered that their sample of six silver orioles was sister to *traillii*, to the exclusion of *robinsoni* (Fig. 1).

Plumage and mensural differences in the *O. traillii* complex have been noted previously (e.g., Swinhoe, 1871; Delacour & Jabouille, 1940; Dickinson, 2004) but never formally

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reviewed. In their molecular review, Ernst et al. (2022) concluded that “an integrative taxonomic approach, which our study is one part of, is urgently needed and may lead to a significant reassessment of the conservation status of several (sub-)species.” In this paper I expand this and place the genetic data from Ernst et al. (2022) in a phenotypic context with a view to proposing a taxonomic revision. I also clarify the distributional limits of the taxa involved due to inconsistencies in available literature and re-assess their conservation status considering the warning posed by Ernst et al. (2022) that *ardens* may be of conservation concern.

MATERIAL AND METHODS

Museum specimens. A large series of *Oriolus traillii* specimens at the Natural History Museum, Tring, UK (NHMUK) was inspected, including all available adult specimens of *robinsoni*, *nigellicauda*, and *ardens* for which the sex was labelled or could easily be inferred; this included the type material of these three taxa. The sample of *ardens* was supplemented by a single specimen housed at the University Museum of Zoology, Cambridge (UMZC). For *traillii*, an initial inspection of specimens from across the subspecies’ range found no obvious morphological variation; I therefore concentrated my sample of *traillii* on available specimens procured in Southeast Asia, where *traillii* approaches the ranges of other taxa.

Four specimens (two adults of each sex) at NHMUK from Lao PDR labelled as *robinsoni* were reidentified as *traillii*. This was done based on bill length and—in the females—underpart pattern, which fell outside the range of true *robinsoni* (from the type locality on the Dalat Plateau, Vietnam) but were no different from *traillii* (see Results and Supplementary Table S1).

The total number of adult specimens ($n = 60$) measured comprised 18 *traillii* ($n = 8$ males, 10 females), 16 *robinsoni* ($n = 11$ males, 5 females), two *nigellicauda* ($n = 1$ male, 1 female), and 24 *ardens* ($n = 12$ males, 12 females). The sample of *ardens* was parsed further into birds collected in Taiwan ($n = 5$ males, 6 females) and those in mainland China and Indochina ($n = 7$ males, 6 females)—this separation was deemed necessary because birds from continental Asia (chiefly mainland China and northern Indochina) labelled as “*ardens*” could feasibly refer to either *ardens* or *nigellicauda* (which are morphologically undifferentiated; see Results). My final sample therefore comprised five groups: (i) *traillii*, (ii) *robinsoni*, (iii) Taiwan *ardens*, (iv) Hainan *nigellicauda*, and (v) mainland *ardens* / *nigellicauda* (Supplementary Table S1).

Morphometric analysis. Measurements of all specimens were taken with digital callipers as: (1) wing length from carpal joint to tip, while applying gentle pressure to the primary-coverts; (2) tail length from point of insertion to the tip; (3) bill length from the tip of the maxilla to the skull. Differences in wing, bill, and tail length among four groups (*traillii*, *robinsoni*, Taiwan *ardens*, and mainland *ardens* / *nigellicauda*) were assessed using Kruskal-Wallis rank-

sum tests applied independently to each variable. Where a significant overall effect was detected ($\alpha = 0.05$), pairwise comparisons were conducted using Dunn’s post hoc tests with a Bonferroni correction for multiple comparisons. The two *nigellicauda* specimens were excluded from this analysis due to the insufficient sample size (only one of each sex) and were instead assessed qualitatively against the four group distributions. Specimens with missing measurements (e.g., those with a broken bill) were excluded on a per-variable basis.

A linear discriminant analysis (LDA) was also performed on the mensural data to visualise separation of all groups, and to assess the diagnosability of the two *nigellicauda* specimens. The LDA was trained on the four other groups and the two *nigellicauda* specimens were withheld and projected post hoc into discriminant space.

Plumage comparison. Plumage differences were directly compared across all five groups, particularly concentrating on (i) the colour and shade of the upperparts; (ii) the colour, shade and pattern of the underparts; and (iii) the extent of gloss in the head and wings of males.

Distributional analysis. There exists considerable uncertainty and incongruence in published literature regarding the distributions of maroon oriole taxa in Southeast Asia, particularly the northern limit of *robinsoni* (and hence the southern limit of *traillii*) and the status of *ardens* / *nigellicauda* away from Taiwan / Hainan (see Discussion). To help elucidate this, confirmed records of all taxa from Thailand, Lao PDR, Cambodia, Vietnam, and mainland China were georeferenced and mapped.

All locations from specimen labels were georeferenced according to published gazetteers and other sources (details of which are given in Supplementary Table S2). This included six specimens from other museums not personally inspected but for which photographs were provided so their identity could be confirmed (listed in Supplementary Table S1). These data were combined with those from 745 photographs of *Oriolus traillii* published on the Macaulay Library (<https://www.macaulaylibrary.org/>; to 30 April 2026). Where identification could be confirmed, photographs were assigned to either (i) *traillii*, (ii) *robinsoni*, or (iii) *ardens* / *nigellicauda*, based on the plumage differences outlined in the Results. All geolocated observations (specimens and photographs) were plotted to infer distributional limits of each taxon.

RESULTS

Morphometric analysis. All three measurements differ significantly across the four groups: wing length ($H = 27.53$, $p < 0.001$), bill length ($H = 35.30$, $p < 0.001$), and tail length ($H = 27.04$, $p < 0.001$). Dunn’s post hoc comparisons identified several significant differences (full results in Supplementary Table S3). The bill length of *traillii* (sexes combined mean

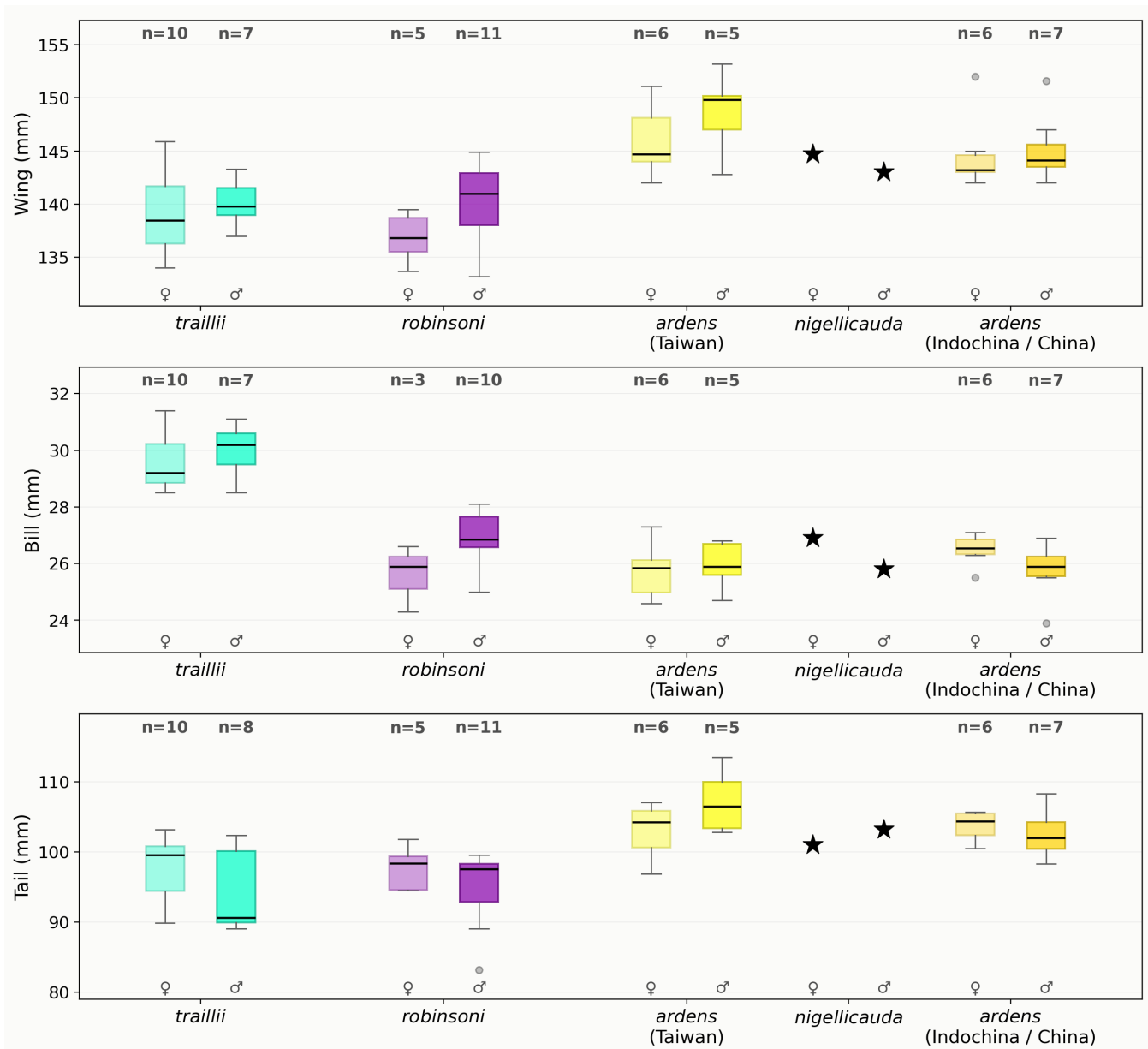


Fig. 2. Morphometric comparison of maroon oriole (*Oriolus traillii*) taxa (see Methods for measurement details); raw measurement data are given in Supplementary Table S1.

29.7 mm) is significantly greater than all three other groups: *robinsoni* (26.6 mm; $p = 0.001$), Taiwan *ardens* (25.8 mm; $p < 0.001$), and mainland *ardens* / *nigellicauda* (26.1 mm; $p < 0.001$) (Table 1, Fig. 2)—the bill length in these last three groups showed no significant difference (all $p > 0.8$).

In wing length, both *ardens* groups (mean Taiwan 147.1 mm, mainland 144.9 mm) are significantly longer winged than *traillii* (139.4 mm) and *robinsoni* (139.2 mm) (Table 1, Fig. 2; Supplementary Table S1). An identical pattern is recovered for tail length, where both *ardens* populations (Taiwan 105.0 mm, mainland 103.1 mm) have significantly longer tails than *traillii* (96.1 mm) and *robinsoni* (95.8 mm) ($p < 0.05$ for all pairwise comparisons after Bonferroni corrections) (Table 1, Fig. 2). However, there is no difference in wing or tail length between *traillii* and *robinsoni*, or between the two *ardens* groups (all $p > 0.9$).

Measurements for the two adult *nigellicauda* fit within the range of both *ardens* groups (Table 1, Fig. 2). Linear discriminant analysis recovers three canonical axes, of which the first two account for 99.9% of between-group variance (LD1: 85.0%; LD2: 14.9%; Fig. 3). LD1 separates *traillii* from all other groups, driven primarily by bill length, while LD2 distinguishes the two *ardens* groups from *robinsoni* on wing and tail length (Fig. 3). The 95% confidence ellipse of *traillii* shows little overlap with any other group, whereas the ellipses of Taiwan *ardens* and mainland *ardens* / *nigellicauda* are almost entirely overlapping, consistent with the lack of significant differentiation recovered in pairwise tests (see above). The two *nigellicauda* specimens, projected post hoc into discriminant space, fall within the ellipses of both *ardens* groups.

Plumage comparison of males. Adult male nominate maroon oriole specimens from South-East Asia ($n = 8$)

Table 1. Morphometric summary data of wing, bill and tail length in maroon oriole (*Oriolus traillii*) subspecies. Values in bold represent the mean $\pm$ standard deviation. Sample sizes given are maxima. Superscript ¹, ², ³ denote variables for which the sample size is, respectively, one, two and three less than the number given in the second column. Raw measurement data are available in Supplementary Table S1.

Taxon	Sex	Wing length (mm)	Bill length (mm)	Tail length (mm)
<i>traillii</i>	Males (n = 8)	140.1 $\pm$ 2.1¹ (137–143)	30.0 $\pm$ 0.9¹ (28–31)	94.2 $\pm$ 5.7 (89–102)
	Females (n = 10)	138.9 $\pm$ 3.8 (134–146)	29.6 $\pm$ 1.0 (28–31)	97.6 $\pm$ 4.7 (90–103)
	Combined (n = 18)	139.4 $\pm$ 3.2¹ (134–146)	29.7 $\pm$ 1.0¹ (28–31)	96.1 $\pm$ 5.3 (89–103)
<i>robinsoni</i>	Males (n = 11)	140.2 $\pm$ 3.8 (133–145)	27.0 $\pm$ 0.9¹ (25–28)	94.8 $\pm$ 5.1 (83–100)
	Females (n = 5)	136.8 $\pm$ 2.4 (134–140)	25.6 $\pm$ 1.2² (24–27)	97.7 $\pm$ 3.2 (94–102)
	Combined (n = 16)	139.2 $\pm$ 3.7 (133–145)	26.6 $\pm$ 1.1³ (24–28)	95.8 $\pm$ 4.7 (83–102)
<i>ardens</i> (Taiwan)	Males (n = 5)	148.6 $\pm$ 3.9 (143–153)	25.9 $\pm$ 0.9 (25–27)	107.2 $\pm$ 4.5 (103–114)
	Females (n = 6)	145.9 $\pm$ 3.4 (142–151)	25.8 $\pm$ 1.0 (25–27)	103.1 $\pm$ 4.0 (97–107)
	Combined (n = 11)	147.1 $\pm$ 3.7 (142–153)	25.8 $\pm$ 0.9 (25–27)	105.0 $\pm$ 4.6 (97–114)
<i>nigellicauda</i> (Hainan)	Male (n = 1)	143 (NA)	25.8 (NA)	103.2 (NA)
	Female (n = 1)	144.7 (NA)	26.9 (NA)	101.0 (NA)
	Combined (n = 2)	143.8 $\pm$ 1.2 (143–145)	25.8 $\pm$ 0.9 (25–27)	102.1 $\pm$ 1.6 (101–103)
<i>ardens</i> / <i>nigellicauda</i> (Indochina / China)	Males (n = 7)	145.1 $\pm$ 3.2 (142–152)	25.8 $\pm$ 1.0 (24–27)	102.6 $\pm$ 3.4 (98–108)
	Females (n = 6)	144.7 $\pm$ 3.7 (142–152)	26.5 $\pm$ 0.6 (26–27)	103.8 $\pm$ 2.2 (100–106)
	Combined (n = 13)	144.9 $\pm$ 3.3 (142–152)	26.1 $\pm$ 0.9 (24–27)	103.1 $\pm$ 2.9 (98–108)

have their head and wings black with a strong bluish gloss, and the body feathers are otherwise uniform deep maroon. The tail is also maroon, sometimes with dark blackish or greyish markings, particularly on the central rectrices. The following descriptions of other taxa are made in relation to the nominate:

O. t. robinsoni (n = 11). There is no obvious difference separating the male plumage of *robinsoni* from *traillii* (Fig. 4).

In his diagnosis, Delacour (1927) suggested that the male of *robinsoni* is “lighter and more crimson” and this point was repeated in Delacour & Jabouille (1931). However, this is true of none of the adult male *robinsoni* at NHMUK (almost all of which were collected by Delacour). The male syntype of *robinsoni* (NHMUK 1927.6.5.21) appears to be an atypically dull and faded specimen when compared to the rest of the series, but could not reasonably be described as “lighter” than *traillii*.

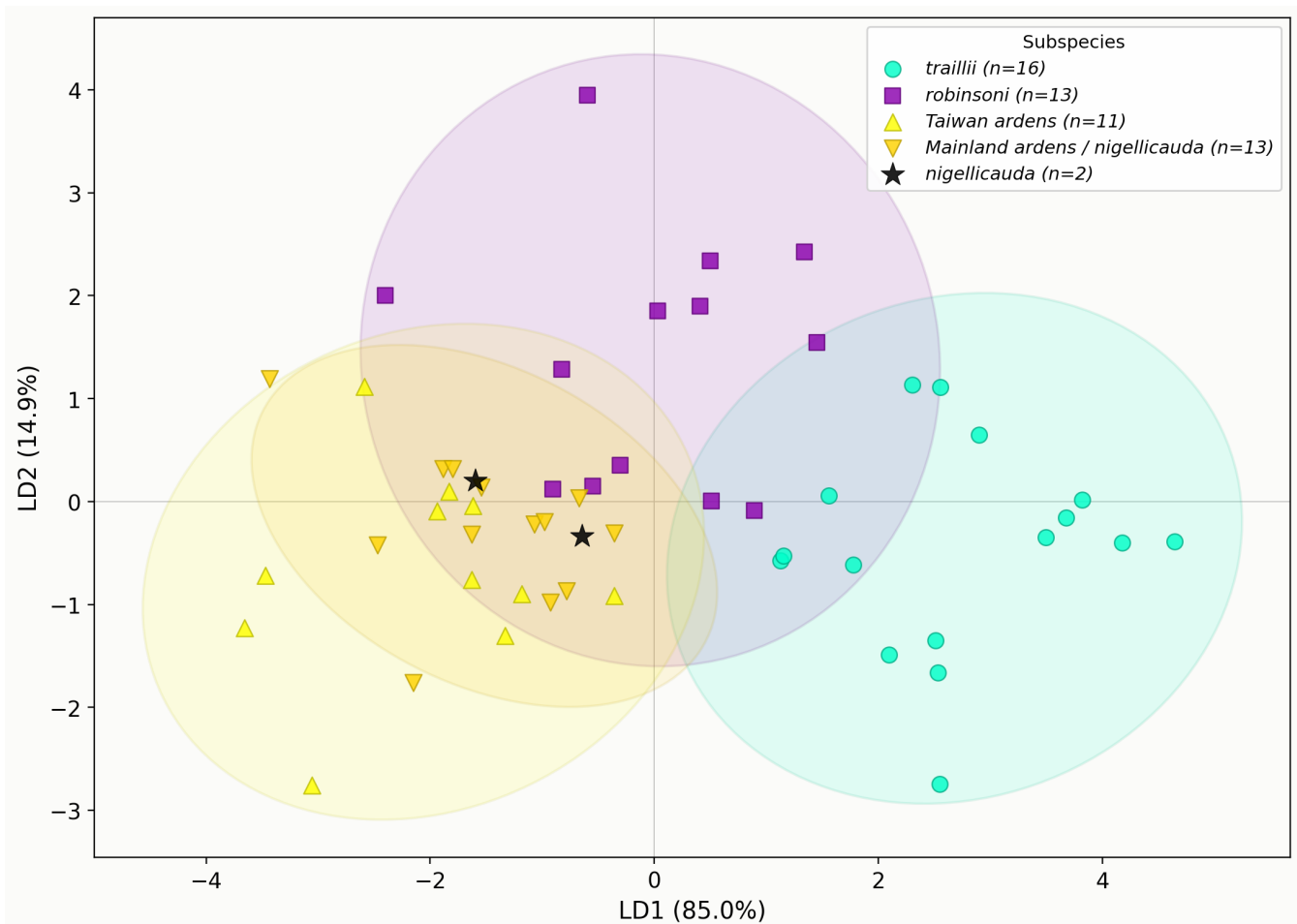


Fig. 3. Linear discriminant analysis of wing, bill, and tail length for four subspecific groups of *Oriolus traillii* ($n = 53$ after removal of specimens with incomplete data). LD1 (85.0%) separates *traillii* from all other groups based on bill length, while LD2 (14.9%) differentiates the two *ardens* populations and *robinsoni* primarily on wing and tail length. Ellipses represent 95% confidence intervals around group centroids. The two *nigellicauda* specimens (black stars) were excluded from the training set and projected post hoc into discriminant space.

Taiwan *O. t. ardens* ($n = 5$). All adult male *ardens* from Taiwan differ consistently and considerably from the nominate, being a pale, bright shade of crimson on the underparts, upperparts and tail (vs. the dark maroon of nominate; Fig. 4). All birds also lack any bluish gloss to the head, throat and wings (which are instead dull black; Fig. 5).

Mainland *O. t. ardens* / *O. t. nigellicauda* ($n = 7$). No apparent differences from the above.

Hainan *O. t. nigellicauda* ($n = 1$). Only one adult male *nigellicauda* (NHMUK 1897.6.1.482; one of the two syntypes) was available for comparison, but this specimen was no different in plumage from the series of male *ardens* from Taiwan (Fig. 4). In his generous diagnosis, Swinhoe (1870) set out that this specimen differs from adult male *ardens* by virtue of “its black shafts to the [tail] feathers”. More precisely, NHMUK 1897.6.1.482 has extensively dark outer webs on the outer three rectrices and almost uniformly dark grey innermost rectrices. However, an identical pattern is found in two adult male *ardens* in the NHMUK collection and is a condition apparent in some specimens of nominate *traillii*, particularly those that show traits of immaturity. Moreover, in the American Museum of

Natural History (AMNH) several specimens of *nigellicauda* collected on Hainan show negligible black in the tail (pers. obs.). It therefore seems likely that the extent of black in the tail is individually variable in all taxa—as suggested by Collar (2004)—and may be linked to age (see Discussion). Swinhoe’s (1870) further suggestion that “the black of the neck [of *nigellicauda*] appears to extend less far down the breast” is difficult to evaluate on this specimen because of how it has been prepared, but there is no obvious difference in this regard compared to specimens of *ardens* available to me. The second syntype of *nigellicauda* (NHMUK 1897.6.1.483), a young male, is indistinguishable from immature male *ardens*, as also noted by Collar (2004).

Plumage comparison of females. Nominate females differ from males in having dull brown upperparts, sometimes with a few scattered, dull crimson feathers. The wings are dull brown and the tail is dull crimson with extensive dark outerwebs on the outer rectrices, and almost wholly dark grey inner rectrices. The upper breast feathers are brown with narrow faint tips while the lower breast and belly feathers are more broadly fringed and tipped pale. This gives the pattern of almost mottled upper breast-sides but otherwise heavily streaked underparts.

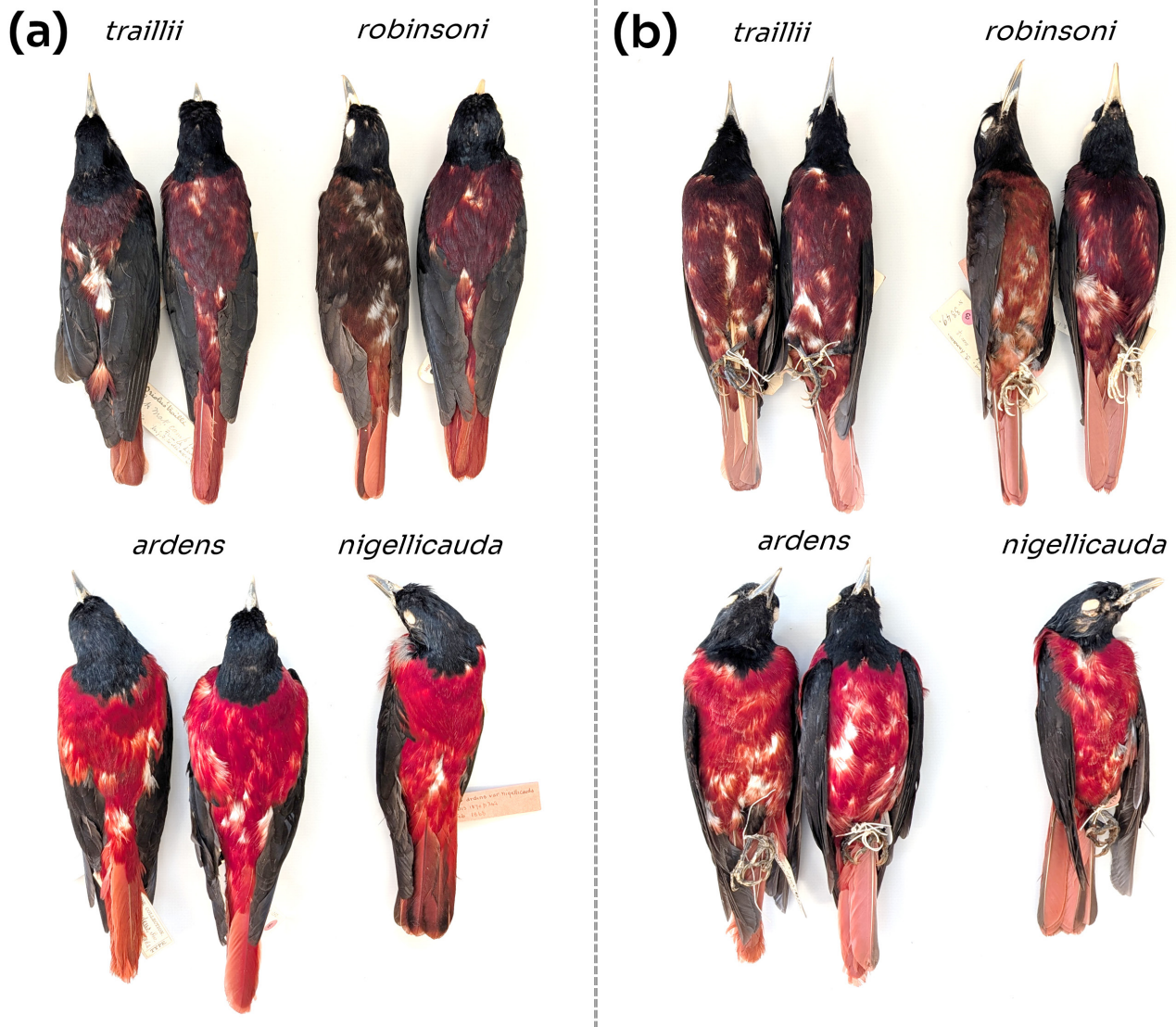


Fig. 4. Photographs of relevant and representative NHMUK material of **male** maroon oriole (*Oriolus traillii*) taxa, showing the upperparts (a) and underparts (b).



Fig. 5. Photograph showing typical male *O. t. ardens* (left) next to male *O. t. traillii* (right). In addition to the strikingly different-coloured body plumage, note the lack of blue gloss on the head and wings of *ardens* and its much shorter bill.

O. t. robinsoni (n = 5). As noted by Delacour (1927), adult female *robinsoni* are very different to female *traillii* in their showing much reduced sexual dimorphism. Female *robinsoni* lack any streaking on the underparts and instead display a muted male-like underpart pattern comprising variably mottled brown and dull crimson feathers (Figs. 6a & 7), giving a somewhat scaly appearance. The mantle consistently has more admixed maroon feathers than it does on *traillii* (Fig. 6b) and the head is glossy blue-black.

Taiwan *O. t. ardens* (n = 6). Very different to *traillii* and *robinsoni*. The upperparts are bright crimson red (Fig. 6b) while the streaking on the underparts extends all the way up to the breast, the sides of which are often crimson (Fig. 6a). Compared to males of the same taxon, the crimson on female *ardens* is slightly paler and less vivid.

Mainland *O. t. ardens* / *O. t. nigellicauda* (n = 6). No apparent differences from *ardens* collected in Taiwan.

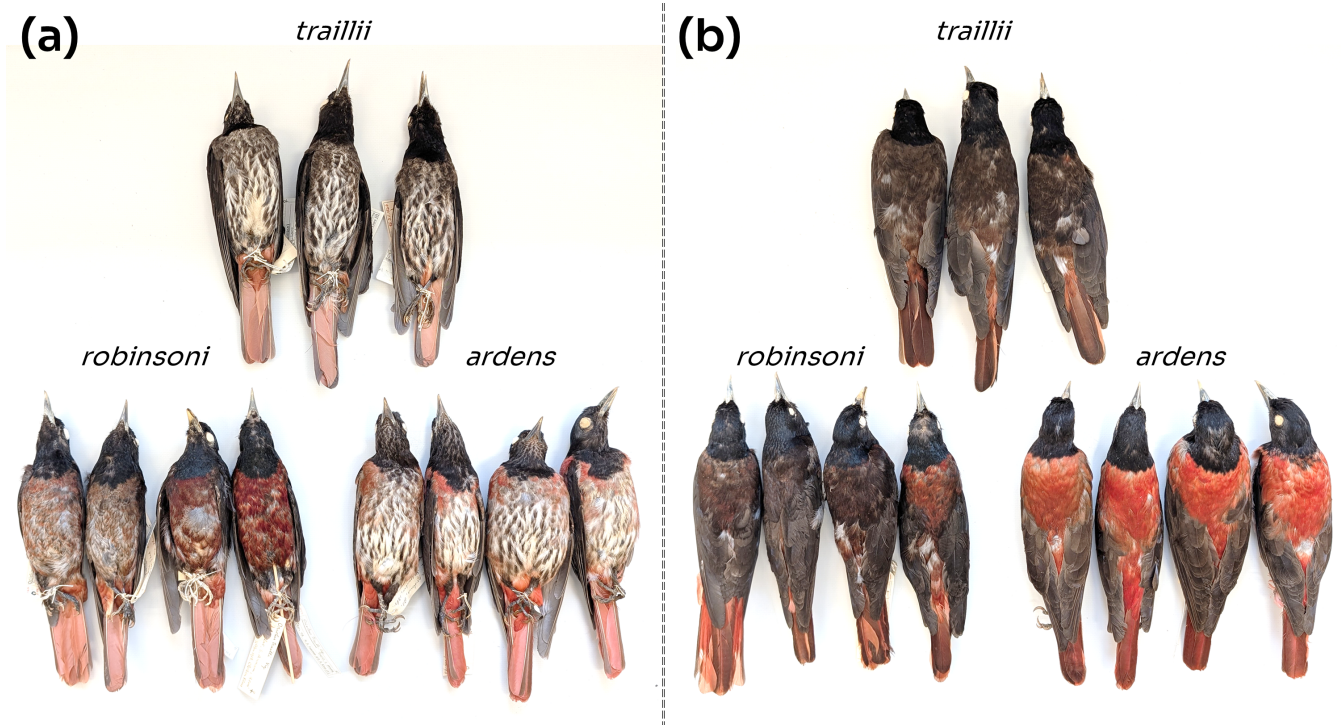


Fig. 6. Photographs of relevant and representative NHMUK material of **female** maroon oriole (*Oriolus traillii*) taxa, showing the underparts (a) and upperparts (b).



Fig. 7. Variation in the underpart pattern of female *O. t. robinsoni* from the Dalat Plateau; all adult females of this form lacked streaking on the underparts.

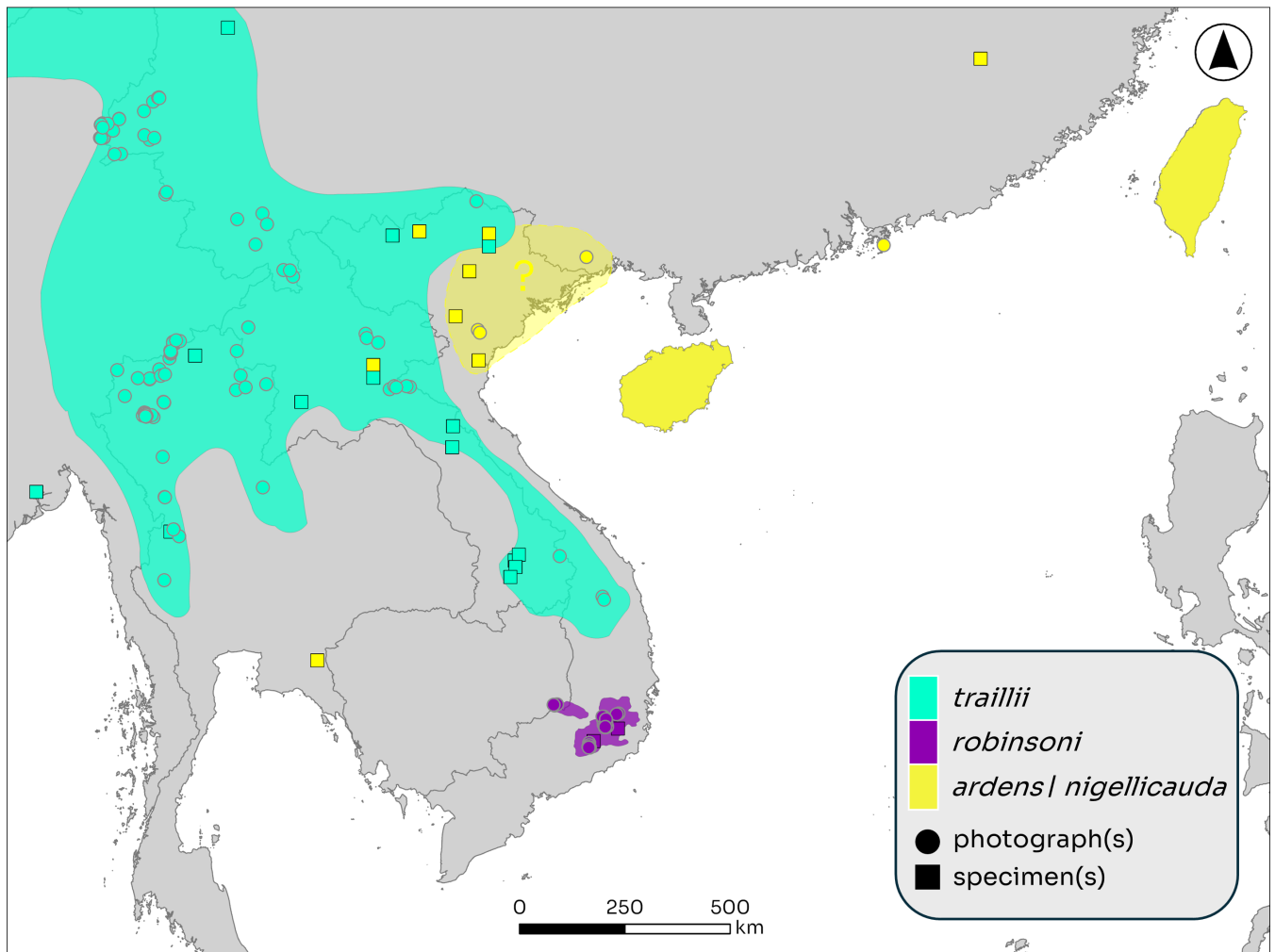


Fig. 8. Sampling of maroon oriole taxa for this study from Myanmar, Thailand, Lao PDR, Vietnam, Cambodia, mainland China (circles: photographs; squares: specimens). Shaded polygons show inferred breeding distributions of each taxon. Map as displayed does not show the full breeding range of *traillii*, which extends westward through the Himalaya to approximately just west of the Himachal Pradesh–Uttarakhand border (India).

O. t. nigellicauda ($n = 1$). The only adult female *nigellicauda* at NHMUK (1909.8.30.15) is inseparable in plumage from female *ardens* from Taiwan.

Distributional analysis. Combining geolocated specimen and photograph data, several key findings about the distribution of maroon oriole taxa emerge (Fig. 8). First, all specimens and photographs examined from Yunnan Province (China), southern Lao PDR (including the Bolaven Plateau) and adjacent Vietnam (around Mang Den) refer to nominate *traillii* (Fig. 8). Second, confirmed records of *robinsoni* all come from the Dalat Plateau of Vietnam and the neighbouring Dak Dam Plateau of south-east Cambodia (Fig. 8; see Discussion). Third, I located 23 evidenced observations (specimens or photographs) of *ardens* / *nigellicauda* made away from Hainan and Taiwan, precluding any suggestion that one or both taxa are only vagrants to continental Asia. These specimen records ($n = 18$) and photographs ($n = 5$ independent birds) span, respectively, December–early March and late November–late April. The interpretation of these data is discussed below.

DISCUSSION

The maroon orioles of Hainan. The maroon oriole is, or was, a resident species on Hainan, and 59–60 specimens were collected there—in most months of the year—between 1868 and 1960 (Hachisuka, 1939; GIEBDSYU, 1983; Lewthwaite et al., 2021; R. Lewthwaite in litt. 2026). Accordingly, the species was seemingly a once relatively common resident on the island (Hachisuka, 1939; GIEBDSYU, 1983) but which has since declined to near-extinction in recent years (Lewthwaite et al., 2021; see below). Whether this population merits recognition as an independent subspecies, however, is open to challenge. Swinhoe (1870) named *nigellicauda* with a sample size of only two birds, one of which was immature. He remarked that his two specimens were “shorter in the wing and longer in the tail [than *ardens*]” and that in the “full-plumaged bird” (i.e., the adult male syntype: NHMUK 1897.6.1.482) “the black of the neck appears to extend less far down the breast” (Swinhoe, 1870). In the next paragraph he appears to abandon this second point, commenting that the adult male plumage of *nigellicauda* differs from *ardens* only in its tail feathers, which “instead of being entirely crimson, has black shafts to the feathers,

the two middle ones being washed with black, and the rest with their outer webs for the most part black”.

I do not believe this diagnosis is dependable for several reasons. First, the wing of NHMUK 1897.6.1.482 is no shorter, and the tail no longer, than some specimens of *ardens* from Taiwan. Second, the extent of black on the throat / breast of *ardens* is variable, while the adult male syntype has been prepared in such a way that it is difficult to determine precisely how far down the breast the black extends. Third, the tail pattern that Swinhoe (1870) describes is not unique to this specimen—blackish is sometimes found in the tail of specimens of *ardens* from Taiwan and *traillii*—and I consider this trait to be individually, but not taxonomically, variable. The remark made by Swinhoe (1870) that in *ardens* “the black [of the tail] disappears, in [*nigellicauda*] it intensifies, with age” is particularly confusing given he had available to him only a single adult male *nigellicauda*. I can find no other morphometric or plumage differences between *nigellicauda* and *ardens*; the illustration of *nigellicauda* in Yang & Shuihua (2024: 311), which shows an adult male intermediate in colour between *traillii* and *ardens*, is incorrect.

Swinhoe’s (1870) diagnosis of *nigellicauda* has been doubted previously. Ogilvie-Grant (1910) questioned “whether the blackish wash on the tail-feathers...is a constant character” and noted that “in other respects, it does not differ from the adult male of [*ardens*]”—thereby seeming to challenge Swinhoe’s claim of a shorter wing. Hartert (1910: 248) remarked that “the chief difference...is in the shorter wing” while the “tail of the male is **generally** darker” (emphasis my own). Hartert (1910) also proffered that the female of *nigellicauda* has “a darker and more brownish tail...than *ardens*” but I find no evidence that this is true. Delacour (1927: 169) explicitly synonymised *nigellicauda* with *ardens*, while Collar (2004) supposed, as I do, that purported differences in tail pattern between the two forms are merely individual variation. I therefore recommend that *nigellicauda* and *ardens* are synonymised (*ardens* taking priority by eight years).

What is the status of *ardens* in continental Asia? For simplicity of discussion hereon, “*ardens*” is used to refer to populations breeding on Taiwan and Hainan (see above). The occurrence of *ardens* in continental Asia (i.e., away from Taiwan and Hainan) has hitherto been interpreted inconsistently in the literature. In north Vietnam and north Lao PDR, *ardens* has variably been listed as a winter visitor (e.g., Duckworth et al., 1999; Robson, 2008; Walther & Jones, 2020a) or resident (Dickinson, 2004). In China, Cheng (1987) listed *ardens* as resident in Yunnan Province, while Yang & Shuihua (2024) did so for south-east Yunnan and southern Guangxi.

Mainland Asia records of *ardens* invite two hypotheses (which are not necessarily mutually exclusive): (1) *ardens* is a partial migrant, and some birds from Taiwan and/or Hainan occasionally spend the boreal winter on the continent; or (2) *ardens* is resident in continental Asia. Although most evidence of *ardens* in continental Asia comes from

observations made in the boreal winter—thereby ostensibly supporting the first hypothesis—it should be noted that historical collecting effort and contemporary birdwatching effort are both strongly biased to these months.

In mainland China, records of *ardens* include a series of five specimens (in NHMUK) procured by R. Swinhoe’s hunters in Fujian Province, China, in December 1865. I am not aware of Fujian being listed in the range (breeding or non-breeding) of the maroon oriole previously and, puzzlingly, the records were not mentioned by Swinhoe (1871). However, the proximity of the province to Taiwan is consistent with some birds breeding on Taiwan occasionally dispersing or migrating west to continental China. This suggestion is further evidenced by a photograph of *ardens* on Dongyin Island (off the coast of Fujian) on 27 April 2025 (Macaulay Library catalogue number ML635238961). Elsewhere in China, *ardens* has been photographed in suitable breeding habitat in Shiwan Mountain National Forest Park, south-west Guangxi, in late April (e.g., Macaulay Library catalogue number ML28312781) and, nearby, multiple Maroon Orioles were reported from south-west Guangxi in July 1999 (Shing et al., 2006); although the subspecies involved was not reported, their location favours them being *ardens* (or else a significant eastward range extension for *traillii*). Given the timing of these observations, it seems probable that *ardens* breeds in Guangxi (thereby agreeing with Yang & Shuihua [2024]). I find no evidence that *ardens* breeds in Yunnan Province—contra Cheng (1987) and Yang & Shuihua (2024)—with all identified specimens and photographs in this province that I could find unequivocally referring to *traillii*. An observation of *ardens* in Hong Kong on 30 March–1 April 2017 has been considered to have escaped from captivity (HKBWS 2019); however, the location, time of year, and context of an apparent rapid population increase in Taiwan (see below) would be consistent with a genuine vagrant.

In north-east Vietnam, Delacour (1929) described *ardens* as “common in the forests near Phuqui” in February–March 1928, several specimens were collected in the forested highlands of north-east Vietnam between 1924 and 1933, all December–March (Supplementary Table S1), and recent photographs have been taken at Cuc Phuong National Park (in November and December 2017–2018). It is plausible that *ardens* may breed in some of these forests; however, further surveys targeting this species in the breeding season are needed to confirm this. Single records of *ardens* in Xienkhouang (Lao PDR) in December 1938 and Khao Soi Dao Wildlife Sanctuary (Thailand) in December 1972 are almost certainly wintering migrants.

Given the apparent propensity for at least some populations of *ardens* to migrate or wander, it is reasonable to question whether the name “*nigellicauda*”, notwithstanding its validity (see above), refers to Hainan-breeding birds at all. Swinhoe collected the two syntypes of *nigellicauda* in February 1868: the adult male on 20 February, and the immature male “a few days later” (Swinhoe, 1870). That these individuals came from nests in Taiwan, Guangxi, or elsewhere cannot be ruled out.

Taxonomic conspectus. Available data provide strong phenotypic evidence—particularly in females—for the separation of the maroon oriole into three species along lines suggested by Ernst et al. (2022). These phenotypic differences are similar or greater in magnitude than those observed between other orioles usually treated as species. For example, Rheindt et al. (2022) separated the ventriloquial oriole *O. consobrinus* from the dark-throated oriole *O. xanthonotus* in part because of its female plumage pattern, which was distinctly male-like (unlike in *xanthonotus*), and several species of Wallacean orioles have been split in recent years due to differences in plumage and morphometrics (e.g., Rheindt & Hutchinson 2007; del Hoyo & Collar 2016). As well as being phenotypically defensible, the three-species taxonomy I propose for the maroon oriole also eliminates the paraphyly in the complex uncovered by Ernst et al. (2022). Below I offer a summary of the proposed three-species taxonomy of the maroon oriole complex, likely distribution limits, ecology and conservation status of each species. On the latter, I propose recommended IUCN Red List statuses following IUCN (2012, 2024).

***Oriolus traillii* (Vigors, 1832)**

Maroon oriole

Taxonomy. Monotypic species which no longer includes *robinsoni* or *ardens* (syn. *nigellicauda*) as subspecies.

Diagnosis. Adult males have their body and tail feathers deep maroon, and their head and wings glossy blue-black. Females are brownish on the mantle, lack any gloss on the wings and head, and have entirely streaked underparts apart from smudged breast-sides. Morphometrically, both sexes of *O. traillii* sensu stricto have much longer bills than any other taxon in this complex, but their wings and tail are the same length as *O. robinsoni*.

Distribution. Widespread from the Western Himalaya (just west of the Himachal Pradesh–Uttarakhand border) east to south-easternmost Tibet and south through Myanmar, and south-west Yunnan. The southeastern limit of this species is inferred to be the Bolaven Plateau (Lao PDR) and Quang Nai Province (Vietnam); see below.

Ecology and conservation status. Despite the removal of all its other subspecies, the range of *O. traillii* remains large and extends over highland areas little-affected by forest loss (e.g., the Himalaya). It is fairly common to common throughout its range (e.g., Robson, 2008; Rasmussen & Anderton, 2012; pers. obs.); I see no reason to change its conservation status from Least Concern.

***Oriolus robinsoni* Delacour, 1927**

Dalat oriole

Taxonomy. Monotypic species. To the best of my knowledge, species rank had never previously been advocated for *robinsoni* until Ernst et al. (2022) did so purely on molecular grounds. Recent descriptions of the phenotype of *robinsoni* have been rudimentary and focussed on the

(weak) distinctiveness of the male (e.g., Robson, 2008; Walther & Jones, 2008; Craik & Minh, 2025). However, I agree with the original description by Delacour (1927) that the plumage of the female is “quite different” from the nominate and, coupled with the mensural and genetic data, I believe *robinsoni* should be treated as a species. No English name has been used for this form previously, however either “Dalat oriole” or “Vietnam oriole” would be appropriate and both are congruent with vernacular names given to other bird species endemic to this region.

Diagnosis. In both sexes the wing and tail length of *O. robinsoni* are like *O. traillii* but the bill is ~11% shorter. As addressed in Round & Nadee (2001), the attribution of the name “*robinsoni*” to an illustration of a bright crimson taxon (= *ardens*) in Lekagul & Round (1991) was an error carried over from Lekagul & Cronin (1974). This confusion is the source of the incorrect identification by Duckworth & Hedges (1998) of the form they found in south-east Cambodia (which was *robinsoni*, not *ardens* as written; W. Duckworth in litt. 2026). Adult female *O. robinsoni* can be identified easily by their underparts, which lack streaking and are brownish to maroon (thus rather like a dull male) with faint scaly or mottled markings.

Distribution. The type locality, molecular data published by Ernst et al. (2022), and specimens and photographs of *robinsoni* admitted in this study, are all from the Dalat Plateau in Vietnam, an isolated highland region of known avian endemism (Eames, 1995; Hung et al., 2020). Orioles in south-east Cambodia on the Dak Dam plateau (Duckworth & Hedges, 1998) also undoubtedly refer to this taxon based on recent photographs and biogeography (Goes 2013; this study). I find no evidence to agree with recent text descriptions and maps that suggest *robinsoni* occurs further north in Vietnam and into Lao PDR (e.g., Robson, 2008; Walther & Jones, 2008, 2020a; Ernst et al., 2022; Craik & Minh, 2025). The earliest suggestion of *robinsoni* occurring in southern Lao PDR that I have traced is the listing of the Bolaven Plateau as part of its range by Delacour & Jabouille (1931), who wrote that *O. robinsoni* is (translation my own): “found only around Djiring, at Dran, at l’Arbre Broyé and at Dalat and, very recently, on the Bolaven plateau”. The Bolaven Plateau was repeated as part of the species’ range by Engelbach (1932) and Delacour & Jabouille (1940). It is puzzling that Delacour, having described *robinsoni* with an accurate diagnosis in 1927 (Delacour, 1927), would then mistake specimens from the Bolaven Plateau for this race only four years later. However, the specimens from the Bolaven Plateau inspected as part of this study, including those collected by J. Delacour and attributed to *robinsoni*, match *traillii* in measurements and female plumage, not true *robinsoni* from the Dalat Plateau. I therefore consider that *robinsoni* is very likely to be endemic to the Dalat Plateau of Vietnam and adjacent south-east Cambodia. This restriction is also biogeographically logical.

Ecology and conservation status. This species meets the definition of ‘range-restricted’ (Stattersfield et al., 1998) and almost certainly has an extent of occurrence less than 20,000

km². However, it is quite common in forests on the Dalat Plateau between approximately 800 and 1,900 m (Eames, 1995; Hill et al., 2001; Craik & Minh, 2025; pers. obs.). In Chu Yang Sin National Park, Hill et al. (2001) reported the species from a high number of survey stations and estimated a population size of 6,820 orioles in Chu Yang Sin alone. In Cambodia, its range is highly restricted and evaded detection entirely until 1997 (Duckworth & Hedges, 1998); Goes (2013) described it as a “very rare and localised resident” in the country. The species does not obviously meet any of the thresholds for listing as globally threatened on the IUCN Red List but could justifiably be listed as Near Threatened under Criterion B1 given its small range and ongoing habitat loss and degradation.

Oriolus ardens (Swinhoe, 1862)

Red oriole

Taxonomy. Monotypic (for justification of synonymising *nigellicauda*, see above). Genetically this species is highly divergent from others in the complex (Ernst et al., 2022), a result consistent with striking plumage differences in both sexes, and its large size. I therefore agree with early authors who admitted *ardens* as a species (e.g., Swinhoe, 1870, 1871; Hartert, 1910; Delacour, 1927, 1929). Although Delacour (1927) used the vernacular name “crimson oriole”, I favour the name “red oriole” to avoid confusion with *Oriolus consanguineus* (black-and-crimson oriole) and because it is the first name used by Swinhoe (1871). “Hooting oriole” (see below) would also be appropriate.

Diagnosis. Males differ from *O. traillii* and *O. robinsoni* by virtue of being bright crimson red on the underparts and upperparts. They also lack any bluish gloss on the head and wings. Females have their underparts boldly and extensively streaked, and their upperparts are extensively bright crimson, not brown. Although in this paper I have not reviewed vocal evidence (in large part because there is substantial intrasubspecific variation in maroon oriole songs), it is worth noting that *O. ardens* has a low hooting advertisement song (e.g., Macaulay Library catalogue numbers ML 634790818 and ML 631951349) unknown in other taxa. *Oriolus ardens* in Taiwan are reportedly unresponsive to playback of continental birds’ song, but respond aggressively to playback of this hooting advertisement song (M. Murphy in litt. 2026).

Distribution. Resident (or chiefly so) in Taiwan and, at least formerly, on Hainan (but latter population now probably functionally extinct). It seems likely that this species breeds in Guangxi, China, and may feasibly do so in north-east Vietnam; however, I find no evidence that it does so in Yunnan (see above). More research is needed to determine its seasonal occurrence in continental Asia (see above), but current evidence suggests that at least some individuals of this species are migratory. The range of *O. ardens* is intriguing in that presently known populations are greatly disjunct. To the best of my knowledge, no other bird species matches or even closely resembles its distribution. The lack of genomic

or morphological differences between Taiwan and Hainan birds—despite their being hundreds of kilometres apart—suggests either that one of the populations is the result of a recent colonisation, or that the species was once more widespread and intervening populations have gone extinct.

Ecology and conservation status. Any remaining population of *O. ardens* on Hainan is on the brink of extinction. GIEBDSYU (1983) described it as being a widespread resident on Hainan (except in the north) and Lewthwaite et al. (2021) documented at least 59 specimens collected between 1868 and 1960. There are, however, only three recent sight records, in April 1998, March 2008 and May 2020, with Lewthwaite et al. (2021) attributing the decline to “lowland habitat loss and hunting pressure”. Thankfully, the status of *O. ardens* in Taiwan is quite different. Although Ernst et al. (2022) concerningly suggested that *O. ardens* was in urgent need of conservation, this assessment relied on an outdated review by Fang (2005), who estimated a declining population size in Taiwan of only 200–500 pairs. However, Ernst et al. (2022) overlooked more recent, more positive data. Severinghaus et al. (2010) reported that (translation my own) “recent sightings have increased significantly, suggesting the total population could be in the thousands” and the population size in Taiwan today is conservatively estimated to be at least 5,000 mature individuals (R.-S. Lin in litt. 2026). This increase in reported numbers on Taiwan is thought to be the result of genuine population recovery. The population size is estimated to have increased by 66.8% (95% confidence intervals: +24.3% to +121.8%) between 2011 and 2021, a rebound largely attributed to the subsidence of unsustainable trapping of the species (Lin et al., 2023; R.-S. Lin in litt. 2026). Maroon Oriole is currently listed as Least Concern on the Taiwan National Red List (Lin et al., 2024) and the same global status for *O. ardens* would appear to be appropriate.

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SUPPLEMENTARY DATA

All supplementary data may be obtained at the following link: <https://doi.org/10.6084/m9.figshare.33963142>

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