

Notes on the distributional range of the skink *Emoia ruficauda* (Reptilia: Scincidae) on Mindanao Island, the Philippines

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Abstract. *Emoia ruficauda* TAYLOR, 1915 is the only endemic species of the genus *Emoia* in the Philippines, where it is found only on Mindanao Island. Even though it is a conspicuous species because of its bright colouration, it has not been observed or collected since 1923. New observations reported in the present paper expand the known distributional range of this skink from the northeastern and the southern parts of Mindanao to the southwestern and the western parts of the island. The species is found in undisturbed and disturbed lowland habitats in the vicinity of freshwater. The first colour photograph (in life) of *E. ruficauda* is also presented here.

Key words. Reptilia, Scincidae, *Emoia ruficauda*, colouration, habitat, distribution, Mindanao Island.

Only three of the 74 known species in the genus *Emoia*, distributed from Southeast Asia through the Indo-Australian Archipelago and the islands of the South Pacific Ocean, are known from the Philippines (BROWN 1991). Two of them are widespread: *E. atrocostata atrocostata* occurs on the islands of the Marianas, western Carolines, Palaus, Bismarcks, New Guinea and East Indies, Christmas Island, the Malay Peninsula, Indochina, Borneo, Taiwan, Mijakoshima, and the Philippines; and *E. caeruleocauda*, which is known from the Marianas, Carolines, Marshalls, Palaus, Fiji, Vanuatu, Solomons, Bismarcks, New Guinea, Moluccas, Sulawesi, Borneo, and some islands in the southern and western Philippines (Comiran, Melampa, Palawan, Palmas, Zamboanga Peninsula/Mindanao). The third species, *E. ruficauda*, is endemic to Mindanao Island in the southern Philippines (BROWN 1991). So far little is known about this species. In the present paper, we provide a summary of the known data on its morphology, distribution, and habitat, including the first colour photograph of *E. ruficauda*.

TAYLOR (1915) described *E. ruficauda* based on one adult female (the type was lost in the wartime destruction of the Philippine

Bureau of Science). Several paratypes were available, but their field or catalogue numbers are not given in the original description. TAYLOR (1915: 99) just mentions "Several specimens from the type locality agree with the type in all essential details." At least some of the paratypes 'survived' World War II (CM 1803-5, FMNH 17923). TAYLOR collected the type series 1912 in the valley of the Agusan River (Agusan del Norte Province, northeastern Mindanao). In 1923, TAYLOR made a collecting trip to the Cotabato coast in southern Mindanao, concentrating on the coastal area around the small village of Saub (TAYLOR 1925). Saub belongs to Barangay Mabay, Municipality of Maitum in the province of Sarangani, a province recently carved out of the Cotabato province during the time of TAYLOR's collecting trips. *Emoia ruficauda* was not mentioned in TAYLOR (1925), which focused on descriptions of new species, but the *E. ruficauda* collections (except the paratypes) in various American and European museums (see Appendix) were made during this collecting trip, as evident from the collecting data.

TAYLOR (1915) reported that *E. ruficauda* was fairly common in the upper Agusan Valley, and the relatively large number of spec-



Fig. 1. Adult specimen of *Emoia ruficauda* from Sultan Kudarat Province, Mindanao Island, Philippines, in life.

imens that he collected in the coastal area around Saub in April 1923 indicates that the species was also fairly common there. Apparently, no further material was collected in these localities and in other areas of Mindanao after 1923.

From January 21 to January 28, 2003, the second author led a research team to Sultan Kudarat province, a province north of Sarangani province. The herpetofaunal survey was made in Kabadiangan Forest in Barangay Sangay, municipality of Kalamansig, which is a disturbed primary lowland forest (200-300 m above sea level) near Sangay River. Among the other herpetofauna collected (under a permit from the Protected Areas and Wildlife Bureau, DENR) were seven specimens of *E. ruficauda*. Many more individuals were observed but were not collected. Some specimens were photographed alive.

During a visit to Lake Wood in the municipality of Lakewood, province of Zamboanga del Sur in the Zamboanga Peninsula, western Mindanao (07°51.301 N, 123°09.065 E, 450 m a.s.l.) on 1 July 2007, the first author observed and photographed one skink closely resembling *E. ruficauda* in appearance and in its unique colouration, but the poor clarity of the photograph precluded a detailed comparison with the Sultan Kudarat specimens. It will be referred to as *E. cf. ruficauda* until material for further study becomes available.

Within the genus *Emoia*, *E. ruficauda* belongs to the *cyanura* species group (diagnosed by nasal bones not fused, form of palate; at least one of following characters: thin and bladelike subdigital lamellae and/or a pale vertebral stripe beginning on tip of snout) and the *caeruleocauda* subgroup (diagnosed by rounded or moderately thinned

subdigital lamellae, pale vertebral stripe terminates abruptly near base of tail) according to BROWN (1991). *Emoia ruficauda* is easily differentiated by the combination of its moderately thinned subdigital lamellae (55-63 beneath fourth toe) and its striking colour pattern from all other *Emoia* species (see identification keys in BROWN 1991). The seven specimens collected in Sultan Kudarat (three adults, two females and one male; one sub-adult; and three juveniles; Table 1) agree reasonably well with the type description and with later descriptions based on TAYLOR's collections (TAYLOR 1922, BROWN & ALCALA 1980, ALCALA 1986, BROWN 1991), except that the average number of vertebral scale rows and lower labials is slightly lower.

The colour in life based on photographs of the specimens from Sultan Kudarat (Fig. 1) is extremely bright, with five yellow-golden lines on an almost black dorsum, and orange-red tail and limbs. The vertebral line begins at the tip of the snout and terminates at the tail base, while the blackish dorsal ground colour surrounds the posterior termination of the vertebral line, ending as a thin and pointed black line on the red tail. The dorso-lateral lines begin in front of the eyes and terminate above the insertion of the hindlimbs, while the ventrolateral lines start on the upper labials and terminate at the groin. The ventral side is greyish white. While the tail is uniform orange-red, the limbs are somewhat darker, with irregular blackish pigmentation. The colouration in life corresponds well with the colouration of the holotype for all the characters ascribed to the latter (TAYLOR 1915). The Lake Wood specimen, of which only photographs are available (we had no collecting permit during the visit), appears to be closely related to *E. ruficauda* as shown by the unique and conspicuous colouration described above. However, the yellow-golden lines in this specimen are much broader than the blackish ground colour of the interspaces, while in the specimens from Sultan Kudarat and the older material, the pale lines are much narrower than the blackish parts. Further investigations should show whether

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Tab. 1. Measurements and scale counts of *Emoia ruficauda*. ACA numbers from Sultan Kudarat, data from BROWN & ALCALA (1980) based on TAYLOR's collections. SVL = snout-vent length, TL = tail length. The seven ACA specimens are deposited at the SUAKCREM.

Specimen number	ACA 40823 adult, female	ACA 40824 adult, female	ACA 40825 adult, male	ACA 40826 sub- adult	ACA 40827 juve- nile	ACA 40828 juve- nile	ACA 40829 juve- nile	BROWN & ALCALA (1980)
SVL (mm)	46.67	44.63	43.04	34.73	27.60	25.93	26.00	45.9-53.6 (12 mature males) 42.5-53.0 (12 mature females)
TL (mm)	69.53	48.56 (tip missing)	74.37	49.80	54.01	missing	46.00	
Midbody scale rows	27	29	28	27	28	26	29	26-29 (n = 29)
Vertebral scale rows (between parietals and tail base)	51	51	50	46	50	49	48	49-55 (n = 27)
Number of scale rows across nape between ear openings	10	10	10	10	9	10	10	9-10
thinned subdigital la- mellae beneath 4th toe	56/58	53/52	62/58	53/54	59/58	53/ injured	54/54	54-63 (n = 30)
Upper labials	6/6	6/6	6/6	6/7	6/6	6/6	6/6	6 or 7
Labial beneath center of eye	5	5	5	4/5	5	5	5	5
Lower labials	5/5	5/5	5/6	6/6	5/5	5/5	5/5	mainly 6

the width of the golden lines is a variable feature in the Lake Wood population, or whether this population represents a different subspecies. After preservation, the yellow-golden colour of the dorsal stripes faded to light bluish, and the orange-red colour of limbs and tail to light tan to cream, while the undersides of the fingers and toes of the Sultan Kudarat specimens are dark grey after four years of preservation. The ventral sides of the body and limbs are greyish-tan to cream (BROWN & ALCALA 1980, BROWN 1991). TAYLOR (1915) reported that there was no ontogenetic or sexual colour dimorphism in *E. ruficauda*. The specimens from Sultan Kudarat confirm this.

The type specimens were found in tall grass near the rivers and lakes of Agusan Valley (TAYLOR 1915). No habitat data are available for TAYLOR's *E. ruficauda* collection in 1923 from southern Mindanao. The speci-

mens from Sultan Kudarat were found on broad leaf blades of low shrubs and on the forest floor of a disturbed, primary lowland forest (200-300 m a.s.l.) close to the Sangay River. The specimen seen in Zamboanga del Sur was observed sunbathing at noontime on a broad leaf of a shrub at about 1.5 m height in the vegetation along the shore of the lake.

It seems surprising that no further *E. ruficauda* material has been collected for a long time, even though this brightly coloured species is very conspicuous and fairly common wherever it occurs (no comment can be made for the Lake Wood population due to the very limited time spent there). One reason for this lack of collection is the difficulty of conducting fieldwork due to the unstable law and order situation in some parts of Mindanao that severely limits research activities on this interesting island. Also, most of the field research conducted in the past

decades was concentrated on the mountainous regions in the central parts of Mindanao. *Emoia ruficauda* is a lowland species, which tends to prefer areas near freshwater. It has been found in disturbed non-forest habitats (Lake Wood) and in disturbed lowland forest (Sultan Kudarat). It would be interesting to find out whether the use of pesticides and fertilizers in the Agusan Valley, an important agricultural area of Mindanao, has had a negative impact on the *E. ruficauda* population.

To sum up, the species appears to have a disjunct distributional range on Mindanao, being found in three non-contiguous areas: Agusan Province in northeastern Mindanao, Sultan Kudarat Province in southwestern Mindanao, and Sarangani Province in southern Mindanao. The fourth area may well be Zamboanga del Sur Province in western Mindanao. But the present known range could be an artifact of collection, and further surveys might reveal a wider distribution on Mindanao Island.

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Appendix 1

List of voucher specimens of *Emoia ruficauda*

British Museum (Natural History), London: BMNH 1974.2373-75, 1929.6.1.96-99; California Academy of Sciences, San Francisco: CAS-SU 23721-23; Carnegie Museum: CM 1803-5 (paratypes); Field Museum of Natural History, Chicago: FMNH 71668-70, 106977, #179235 (paratype); Museum of Comparative Zoology, Harvard, Cambridge: MCZ 26482-500, 154704-36; Naturmuseum und Forschungsinstitut Senckenberg, Frankfurt: SMF 28034; Silliman University Angelo King Center for Research in Environmental Management (SUAKCREM); Dumaguete City: ACA 40823-29.

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