

A New Record of the Vietnamese Five-Lined Skink, *Eumeces tamdaoensis* (Reptilia: Scincidae), from Hong Kong, China, with Special Reference to Its Sexual Dimorphism

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ABSTRACT.—An immature female specimen of *Eumeces tamdaoensis*, a scincid lizard hitherto known only from northern Vietnam, was collected from Sai Kung Peninsula, the New Territories, Hong Kong Special Administrative Region. Analysis of morphological variation using the present specimen and 17 Vietnamese specimens including two syntypes revealed that *E. tamdaoensis* has a distinct sexual dimorphism in the number of paravertebrals, as well as in relative sizes of head and body.

KEY WORDS: *Eumeces tamdaoensis*; morphological characters; sexual dimorphism; Hong Kong; Vietnam

INTRODUCTION

Bourret (1937) described *Eumeces tamdaoensis* on the basis of four syntypes from Tamdao, Vinh Phu Province, northern Vietnam (Fig. 1). Due to the unavailability of the original description, type specimens, or any additional material, this species had been one of the most poorly known members of the genus until Hikida and Darevsky (1987) redescribed it on the basis of original description and an additional specimen from Kuk-Fiong, Hasonbinh Province, northern Vietnam. Because both of the two records were made from northern Vietnam, it has been believed that the geographic range of this species is confined to this region.

Recently one female of a large *Eumeces* was collected near Lo Fu Kei Shek, Sai Kung Peninsula, New Territories Hong Kong Special Administrative Region. This locality is approximately 700 km east of northern Vietnam (Fig. 1). This specimen, while showing several diagnostic characters of *E. tamdaoensis* such as three loreals, had larger number of paravertebrals when compared with specimens of the species from northern Vietnam so far examined (44 vs. 38-40).

Fortunately, we had a chance to examine the type series of *E. tamdaoensis* and another non-type specimen deposited in Muséum National d'Histoire Naturelle in Paris. Also, we could examine additional specimens newly obtained from the type locality, and deposited in Zoological Institute, Russian Academy of Sciences, St. Petersburg. Comparison of the Hong Kong specimen with these Vietnamese specimens of *E. tamdaoensis* confirmed their

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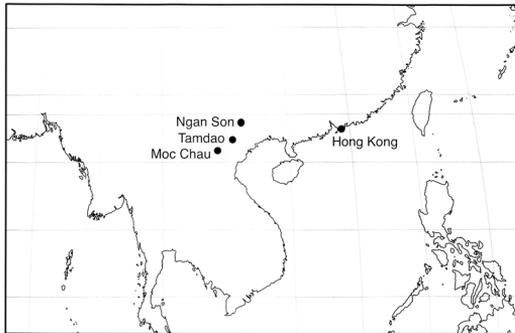


FIGURE 1. Distributional map of *Eumeces tamdaoensis*.

conspecific status. It also revealed prominent sexual dimorphism within the species which will be discussed below.

MATERIALS AND METHODS

One female *E. tamdaoensis* (Kadoorie Farm and Botanic Garden: KFBG HKR0001) was captured by D. Willott from Sai Kung, Kowloon Peninsula, Hong Kong in July, 1998 (Fig. 2, A). For comparisons, we examined 17 specimens of this skink from northern Vietnam. Two syntypes, listed in Bourret's (1937) original description as being deposited in Laboratoire des Sciences Naturelles de l'Université Indochinoise (LSNUI) in Hanoi, are now kept in Muséum National d'Histoire Naturelle (MNHN) in Paris as MNHN 1948.65 (male) and MNHN 1948.66 (female). Judging from the measurements given in the original description, it is almost certain that they correspond to LSNUI 89 and LSNUI 106, respectively. The other two syntypes may be lost. Besides those two syntypes, one nontype specimen from Ngan Son, Cao Bang Province, northern Vietnam, is also deposited in MNHN as MNHN 1948.67.

Zoological Institute, Russian Academy of Sciences, St. Petersburg (ZISP), keeps seven males and six females newly obtained from Tamdao, Vinh Phu Province (ZISP uncatalogued, ROM Filed Nos. 21090, 25817, 26606, 26746, 26948, 26963, 26996, 27020, 27021, 27030, 27031 and 27047, and one without a tag). The other specimen of *E. tamdaoensis* possessed by ZISP (male juvenile:

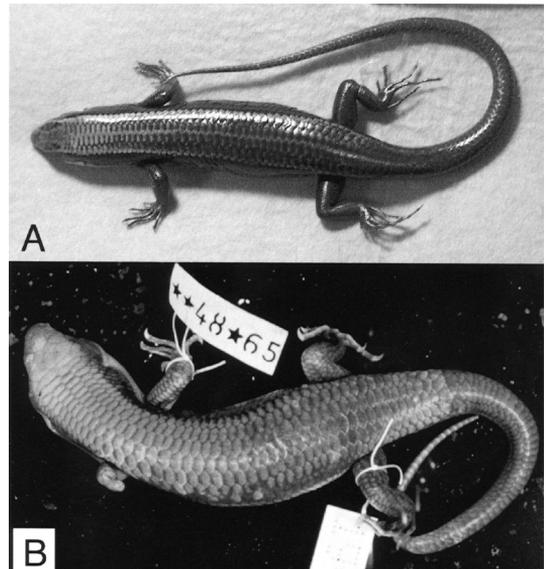


FIGURE 2. Dorsal views of *Eumeces tamdaoensis*. (A) the female from Sai Kung, Kowloon Peninsula, Hong Kong (KFBG HKR0001). (B) a male syntype from Tamdao, northern Vietnam (MNHN 1948.65).

ZISP 19806) was referred to by Hikida and Darevsky (1987) as being from Kuk-Fiong, Hasonbinh Province. However, its locality should be corrected as Moc Chau, Son La Province (Fig. 1: see Darevsky et al., 1986).

Except for the two syntypes, all the specimens were sexed by abdominal dissection. Snout to vent length (SVL), axilla to groin length (AGL), head length (HL: snout to posterior margin of parietals), and head width (HW) were measured by a dial caliper to nearest 0.1 mm. The following scale characters showing intraspecific variations in other congeneric species (Taylor, 1935; Hikida, 1993) were also examined: the numbers of mid-body scale rows, paravertebrals, nuchals, preorbital supralabials, and subdigitals on the fourth toe.

We combined data for specimens from northern Vietnam (i.e. Tamdao, Moc Chau, and Ngan Son), and examined differences between these Vietnamese and Hong Kong specimens. Also we investigated intersexual variation in those characters within the Vietnamese sample.

RESULTS

The Hong Kong specimen

The female of *E. tamdaoensis* from Sai Kung Peninsula, Hong Kong, measured 95.2 mm in SVL, 47.4 mm in AGL, 16.8 mm in HL, and 14.8 mm in HW. In life, the dorsum is coppery in color, most intense on the head. There are two thin pale dorso-lateral stripes. There is a thick black stripe on each side starting from the eye. Beneath the black stripe is a thinner, less well-marked pale stripe. The tail is bright blue in color. After preservation, it retained slightly faded five-lined and blue-tailed coloration (Fig. 2). Despite its large body size as compared to sympatric congeneric species, *E. elegans* and *E. quadrilineatus* (Taylor, 1935), this female had undeveloped ovaries and oviducts that negate its sexual maturity. This specimen possessed smooth body scales, three loreals, two postmentals, one supranasal, one postnasal, one lower secondary temporal in triangle shape, no irregular femoral scale patch, no keeled postanal scale, five preorbital supralabials, 24 mid-body scale rows, 44 paravertebrals, 17 subdigitals on the fourth toe, and one nuchal on right side and no nuchal on left.

Type specimens

For future taxonomic studies, here we provide more detailed measurements for the two syntypes deposited in MNHN. Measurements in the original description (Bourret, 1937) were added in parentheses. Absences of parenthesized values in some measurements indicate that these values were not given in the original description.

One of the syntypes (MNHN 1948.65 = LSNU 89) was an adult male from Tamdao, with 122.5 (120) mm in SVL, 142.0 (148) mm in tail length (122.5 mm of which was regenerated), 44.2 (47) mm in snout to forelimb length, 56.6 (62) mm in AGL, 24.5 (37) mm in HL, 24.3 (25.5) mm in HW, 16.4 mm in head depth, 6.5 (7) mm in eye length, 3.2 mm (3) in ear-opening length, 12.5 mm in snout to eye length, 12.0 mm in eye to ear-opening length,

30.0 mm in snout to ear-opening length, 39.0 mm in forelimb length, 53.6 (53) mm in hindlimb length, and 16.4 mm in the fourth toe length. Scale counts for the specimen were as follows: three loreals, five preorbital supralabials, seven infralabials, two (2) nuchals, two postmentals, 18-17 (17) subdigitals on the fourth toe, 23 (22) mid-body scale rows, and 39 paravertebrals.

The other syntype (MNHN 1948.66 = LSNU 106) was an adult female from Tamdao, with 129.0 (115) mm in SVL, 209.9 (205) mm in tail length (36.5 mm of which was regenerated), 47.8 (48) mm in snout to forelimb length, 70.1 mm in AGL (9 mm in original description, but this value is obviously in error), 23.3 (32.5) mm in HL, 21.6 (22.5) mm in HW, 15.1 mm in head depth, 6.5 (6) mm in eye length, 2.6 (2.5) mm in ear-opening length, 11.0 mm in snout to eye length, 10.7 mm in eye to ear-opening length, 26.5 mm in snout to ear-opening length, 40.9 mm in forelimb length, 52.9 (55) mm in hindlimb length and 17.7 mm in the fourth toe length. This specimen had three loreals, five preorbital supralabials, seven infralabials, three (2) nuchals, two postmentals, 18 (18) subdigitals on the fourth toe, 24 (24) mid-body scale rows, and 44 paravertebrals.

Values for HL taken by us were much smaller than those given in the original description for corresponding syntypes. The head length might have been defined in a different way by Bourret (1937).

Sexual dimorphism within the Vietnamese sample

The AGL and HW of nine males (four juveniles and five adults) and eight females (four juveniles and four adults) from northern Vietnam (Tamdao, Moc Chau, and Ngan Son) were plotted against SVL in Fig. 3. In both sexes adults with developed gonads were larger than 110 mm in SVL. Adult males had shorter body and larger head than adult females. Analyses of covariance using SVL as the covariate showed significant differences between adult males and females in elevation for HL and HW ($P < 0.05$). By contrast, AGL

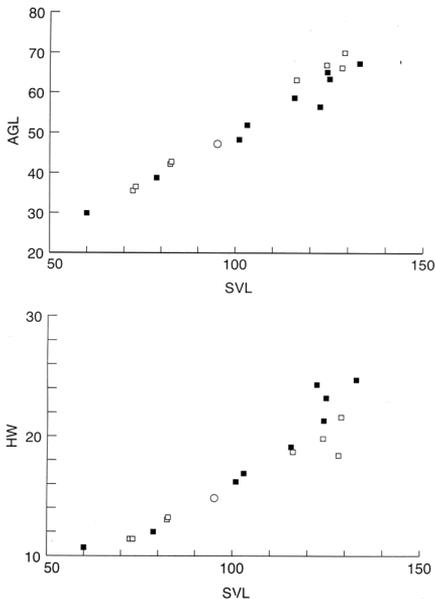


FIGURE 3. Sexual dimorphism in morphometric characters of *Eumeces tamdaoensis*. (A) AGL-SVL plots. (B) HW-SVL plots. Open rectangles indicate Vietnamese females, close rectangles Vietnamese males, and an open circle the Hong Kong female.

did not show statistically significant intersexual difference in adults ($P=0.056$), probably due to the small sample size. In immature individuals, we found no significant intersexual differences either in AGL or HW in relation to SVL. For relative HL, however, difference between immature males and females was statistically significant ($P<0.05$).

Of the scale counts taken, MBSR, PRSL, NU, or TS4 showed no significant intersexual differences (U-test: $P>0.05$). These scale counts ranged from 22-24, 4-6, 0-3 and 16-20, respectively. As to the number of paravertebrals, however, the value in females was significantly larger than that in males (43-46 vs 39-42; U-test: $P<0.05$; Fig. 4). In all characters examined, there were no substantial differences between females from Vietnam and Hong Kong.

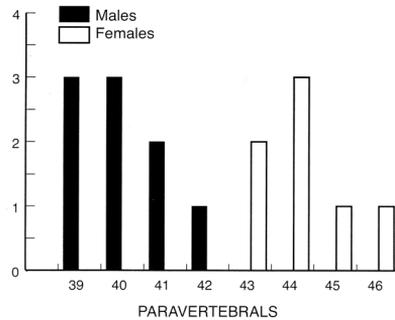


FIGURE 4. Histogram showing variation in the number of paravertebrals in the Vietnamese *Eumeces tamdaoensis*. Closed columns indicate values for males, and open columns for females.

DISCUSSION

Recent intensive surveys of the Hong Kong herpetofauna have recorded only three species of the genus *Eumeces*, *E. quadrilineatus*, *E. elegans* and *E. chinensis* (Karsen et al., 1998). The specimen collected from Sai Kung is identified as *E. tamdaoensis*, and thus represents the fourth species of the genus from Hong Kong.

This species differs from *E. quadrilineatus* in having three loreals, 24 mid-body scale rows (vs. two loreals and 20-22 midbody scale rows in the latter: Zhao et al., 1999) five-lined pattern on dorsum (vs. four-lined pattern in the latter: Karsen et al., 1998). From *E. elegans*, *E. tamdaoensis* is easily distinguished by having two postmentals, one postnasal, and one lower secondary temporal in triangle shape (vs. one postmental, no postnasal, and one upper secondary temporal in triangle shape in *E. elegans*: Hikida, 1993). It most resembles *E. chinensis* in squamation, coloration and body size, from which, however, it differs in having three loreals, relatively short body and smaller number of paravertebrals (vs. two loreals, relatively long body, and more than 46 paravertebrals in *E. chinensis*: Hikida, 1993).

The present female from Hong Kong had 44 paravertebrals, which was considerably greater than the corresponding value (39-40) in a

northern Vietnamese male reported in the previous study (Hikida and Darevsky, 1987). Present results indicate that such a difference is attributable to the sexual dimorphism in this character rather than to difference between populations of those localities (Fig. 4).

Sexual dimorphism has been known for several species of the genus *Eumeces* (Taylor, 1935; Hikida, 1978; Vitt and Cooper, 1985, 1986). In those species, adult males usually have larger head and shorter body than females. However, sexual dimorphism in the number of scales, such as paravertebrals, has not been reported for those and other congeneric species. The greater paravertebral count in female *E. tamdaoensis* may have been involved by an abdominal elongation that enables a mature individual to bear a larger clutch.

The distributional range of *E. tamdaoensis* is quite disjunct (Fig. 1), since there have been no records of this species from Guanxi and Guangdong Provinces that are situated between northern Vietnam and Hong Kong. So far only one specimen has been collected from Hong Kong, although another individual thought to be this species was spotted recently in a nearby site in Sai Kung (D. Willott, personal communication). Additional survey is thus desired to see whether this species naturally occurs in Hong Kong, or the present specimen represents a recent artificial introduction.

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