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# Distribution of Gekkonid Species Belonging to *Hemidactylus* and *Gehyra* (Lacertilia) in Taiwan

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**Abstract** Distribution of gekkonid lizards *Hemidactylus* and *Gehyra* within Taiwan is revised on the basis of observations and collections made during the recent survey. *Hemidactylus bowringii* was recorded from the eastern part for the first time. External characteristics of recently collected specimens of *G. mutilata*, a species rare in Taiwan, is presented and commented.

## INTRODUCTION

Recent studies provided several new findings concerning the taxonomy and zoogeography of gekkonid lizards in Taiwan (e.g., Ota, 1986a, 1987; Ota and Hikida, 1985; Ota et al., 1988). However, most of these works were conducted on the basis of specimens from fairly limited localities; detailed distributions of several species remain as yet unknown, or can be outlined but only by assembling brief, and sometimes unreliable information scattered in literature of various qualities.

Based on results of the recent survey, we here revise, as the first step of researches upon the natural history of Taiwanese geckos, ranges of species belonging to *Hemidactylus* and *Gehyra* within this island. External characters of *Gehyra mutilata*, a species rare in Taiwan, were investigated and described with two specimens collected in the present survey.

## METHODS

Fieldworks were made in inhabited areas around Taiwan Mainland and Lanyu Island. Exact localities surveyed are presented in Table 1, together with dates and times of the survey. Observations were made during the night by investigating not only the artificially illuminated portions, but also the shaded parts of buildings with the aid of flashlight not to overlook cryptic animals. In describing external morphology of *Gehyra mutilata*, we followed the definition and terminology of Brown and Alcala (1978).

## RESULTS

*Distribution of each species.*—Results of the present survey are given in Table 1 and Fig. 1. Not an individual belonging to *Hemidactylus* or *Gehyra* was observed in Tayulin,

**Table 1.** Localities surveyed and the numbers of animals observed and/or collected.

| Locality | Altitude (m) | Date | Time | Numbers of animals | | | |
|---|---|---|---|---|---|---|---|
| | | | | *H. f.* | *H. b.* | *H. g.-v.* | *G. m.* |
| 1. Taipei | 100 | 1986.6.30–31 | 19:30–23:30 | 0 | 18 | 0 | 0 |
| 2. Tong-ao | 150 | 1986.7.3 | 19:00–23:00 | 3 | 12 | 0 | 0 |
| 3. Tayulin | 2500 | 1986.7.30 | 20:00–23:00 | 0 | 0 | 0 | 0 |
| 4. Tienshiang | 400 | 1986.7.31 | 19:00–22:00 | 8 | 0 | 0 | 0 |
| 5. Hualien | 10 | 1984.10.21 | 22:00–0:00 | 11 | 2 | 0 | 1 |
| 6. Hongye | 100 | 1986.7.4–5 | 19:00–23:30 | 25 | 0 | 10 | 1 |
| 7. Litou | 1100 | 1986.8.2 | 21:00–23:00 | 0 | 0 | 0 | 0 |
| 8. Taitong | 10 | 1986.7.6–7 | 22:00–2:00 | 18 | 5 | 0 | 0 |
| 9. Lanyu | 50 | 1986.7.11 | 20:00–23:00 | 15 | 0 | 0 | 0 |
| 10. Kenting | 100 | 1986.7.16 | 19:00–22:00 | 12 | 0 | 0 | 0 |
| 11. Kaohsung | 50 | 1984.10.21 | 22:00–0:00 | 8 | 0 | 0 | 0 |
| 12. Tainan | 20 | 1986.7.21 | 21:00–23:00 | 24 | 4 | 0 | 0 |
| 13. Meishankou | 600 | 1986.8.3 | 19:00–21:00 | 6 | 0 | 0 | 0 |
| 14. Chiayi | 50 | 1986.8.5 | 20:00–22:00 | 12 | 0 | 0 | 0 |
| 15. Chitou | 1200 | 1986.8.12 | 19:00–21:00 | 0 | 0 | 0 | 0 |
| 16. Taichung | 160 | 1986.7.28 | 22:00–0:00 | 7 | 1 | 0 | 0 |
| 17. Puli | 300 | 1986.8.7 | 21:00–23:00 | 13 | 0 | 0 | 0 |
| 18. Lushan | 1300 | 1986.8.9. | 20:00–23:30 | 0 | 0 | 0 | 0 |
| total | | | | 162 | 42 | 10 | 2 |

Litou, Chitou and Lushan. In Taipei, only *H. bowringii* was ascertained, whereas *H. frenatus* was exclusively dominant in Tienshiang, Lanyu, Kenting, Kaohsung, Meishankou, Chiayi and Puli. Both of these species occurred in Tong-ao, Hualien, Taitong, Tainan and Taichung; *Hemidactylus bowringii* was more frequently observed in Tong-ao, whereas *H. frenatus* in the other localities. The gecko belonging to *H. garnotii-vietnamensis* complex was observed only in Hongye during the present survey. On the other hand, two individuals of *Gehyra mutilata* were obtained from Hualien and Hongye. These animals were found on walls shaded from artificial illuminations, whereas the other gekkonids occurring syntopically with them were chiefly observed in illuminated portions.

*Morphological characteristics of specimens of* Gehyra mutilata.—Measurements of the two specimens are presented in Table 2.

Kyoto University, Zoology (KUZ) 8153 (Fig. 2A). Collected at Hualien, Taiwan, on 21 October, 1984 by H. Ota. Female adult, snout to vent length (SVL) 47.5 mm. Habitus moderately depressed. Rostral rectangular, deeply notched posteromedially. Nostril surrounded by rostral, first supralabial, and three slightly enlarged scales. Three internasal scales. Supralabials nine, last one only slightly enlarged. Scales on snout slightly larger than those on dorsum. Forty-seven interorbital scales. Mental triangular, slightly larger than adjacent labials. Three pairs of postmentals. First pair largest, in contact with each other, mental, and first and second infralabials. Second pair separated from each other and in contact with second infralabials. Third pair separated from each other and from labial series (Fig. 2B). Dorsal scales granular, without enlarged tuber-

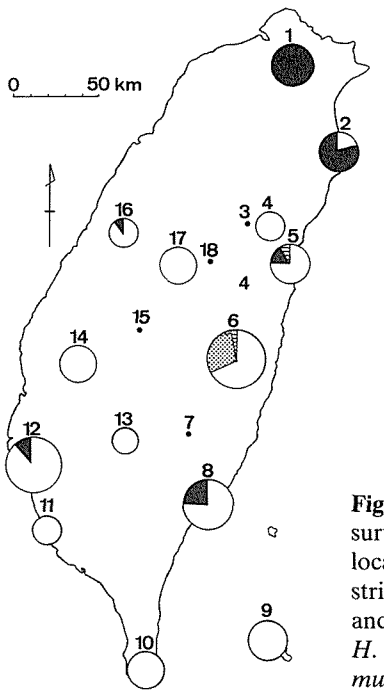


**Fig. 1.** The map showing results of the present survey. Numbers correspond those of surveyed localities in Table 1. Blank, shaded, dotted, and striped areas indicate the numbers of observed and/or collected animals of *Hemidactylus frenatus, H. bowringii, H. garnotii-vietnamensis,* and *Gehyra mutilata,* respectively.

**Table 2.** Measurements (in mm) of specimens of *Gehyra mutilata* collected in the present survey.

| Specimen | Sex | Characters | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SVL | Head length | Head width | Snout to eye | Eye diameter | Eye to ear | Axilla to groin | Tibia length | Tail width | Tail depth |
| KUZ8153 | female | 47.5 | 12.0 | 8.7 | 5.9 | 3.0 | 3.8 | 23.7 | 7.6 | 6.1 | 3.5 |
| KUZ8154 | female | 55.1 | 13.8 | 11.0 | 6.1 | 3.1 | 4.1 | 25.5 | 7.6 | – | – |

cles. Ventral scales larger, flat, and cycloid. Scale rows at mid-body 124. Digits moderately dilated and webbed. Less than half of distal undersurface bearing scansors, seven on digits I, eight on fingers III and IV and toe IV, and nine on toe III. Terminal and sub-proximal scansors entire, three to five subterminal scansors divided or deeply notched, proximal one divided with one intervening scale (Fig. 2C). Distal compressed, claw bearing phalanges concealed on digits I, evident and raising within margin of dilated portion on the other digits. Three to five rows of enlarged scales in preanal and femoral regions, but lacking pores. Cutaneous expansion evident on posterior margin of hind limbs. Tail strongly depressed, possessing a row of distinctly enlarged subcaudals. Lateral flange lacking.

KUZ 8154. Collected at Hongye, Taiwan, on 4 July, 1986 by H. Ota. Female adult, 55.1 mm in SVL. Characteristics in scutellation of this individual are shared with those of KUZ 8153 except for following points: Supra- and infralabials 10 and 9, respectively. Interorbital scales 45. First pair of postmentals in contact with first infralabial, second

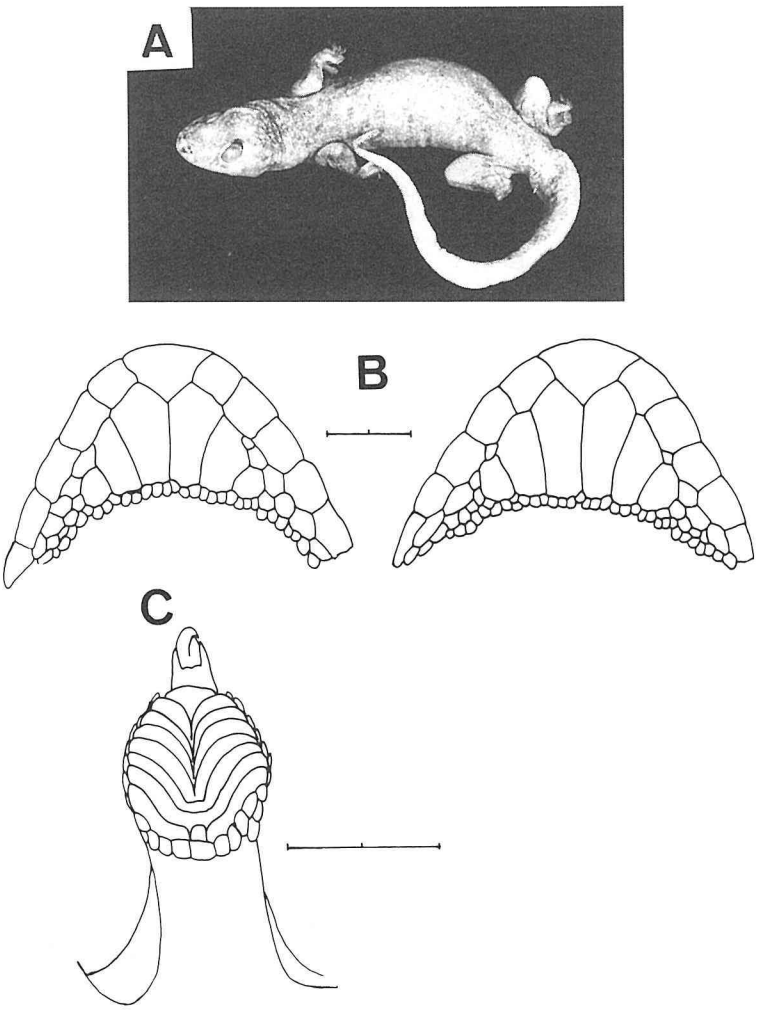


**Fig. 2.** *Gehyra mutilata* collected in the present survey. A: Dorsal view of the specimen from Hualien (KUZ 8153). B: Chin regions of KUZ 8153 (left) and KUZ 8154 (right). C: Ventral view of Toe IV of KUZ 8153. Scales in B and C represent 2 mm.

pair with first and second infralabials, and third pair in contact with third infralabial of each side (Fig. 2B). Scale rows 115 at mid-body. Subdigital scansors six on finger I, seven on finger IV and toe I, and eight on finger III, and toes III and IV.

Both animals were creamy yellow in head, body limbs and tail without distinct markings, when they were captured at night. However, the dorsal coloration turned to reddish tan with numerous brown dots by the next morning.

Most of the external characters of the present specimens are in good agreement with those described by previous authors (e.g., Stejneger (1907) and Liu (1970) for Taiwanese, and Brown and Alcala (1978) for Philippine specimens). On the other hand, absence of intervening scales between the third postmental and labial series in KUZ 8154 appears to be a unique condition, since the above authors noted or depicted that their

materials have the third postmentals separated from labials by several scales. None of these authors noted the coloration of alive animals.

## DISCUSSION

*Hemidactylus bowringii* has hitherto been recorded from northern, western, and southwestern Taiwan (Maki, 1923; Liang and Wang, 1975; Cheng, 1978). In the present survey, we also ascertained the occurrence of this species along the eastern coast for the first time. Liang and Wang (1975) noted that, in the western part of Taiwan, the density of this gecko gradually decreases southwardly. Present results indicate that there is a similar tendency along the eastern coast at least in the inhabited areas; this species seems to be more abundant in the northern part, whereas rare in the central and the southern regions. Ota (1986b) reported that in the Ryukyu Archipelago *H. bowringii* is abundant on islands where *H. frenatus* is rare and *vice versa.* From that observation, he pointed out the probability that interspecific relation resulted in the relative frequencies of the two species. Results of the present survey seem to be in favor of this postulation. *Hemidactylus bowringii* were recorded also from Keelung, Shulin, Hsinchu, Nantou, Kuangtzulin, and Kaohsung (VanDenburgh, 1912; Maki, 1923; Okada, 1936; Liang and Wang, 1975), as well as from Yangmei, Chunyan, Suchungchi, Ouluanpi, Chiaochi and Nanao (Lue and Chen, unpubl.).

Absence of *H. bowringii* and *H. frenatus* in localities of high altitudes may possibly be due to low air-temperature there, since previous authors provided observations indicating that these animals are not much tolerant of such condition (Liang and Wang, 1975; Toyama, 1984).

In the present survey, the occurrence of *Hemidactylus garnotii-vietnamensis* complex was ascertained only from Hongye (Ota and Hikida, 1985; Ota et al., 1986). However, several specimens apparently belonging to this form were previously obtained from central and southern montainous regions, too (Lienhuachih, Tungpu, and Shanping: Lue and Chen, unpubl.). Thus, it is probable that further surveys will add several localities to the range of distribution of this parthenogenetic gecko. Ota and Hikida (1985) regarded *Cosymbotus platyurus* in Maki (1923) as resulting from misidentification; they noted that several character states in his description were identical with those of *H. garnotii-vietnamensis* complex but were different from those of *C. platyurus* from Southeast Asia. It is therefore highly probable that that gecko also occurs in Keelung, Taoyuan, Chutong, Miaoli, Fengyuan and Lotong where Maki (1923) obtained his materials.

*Gehyra mutilata* was recorded from Taiwan by Stejneger (1907) for the first time. Several subsequent authors, however, failed to obtain the second specimen (e.g., Stejneger, 1910; VanDenburgh, 1912; Maki, 1923). Only recently, Liu (1970) collected one male from Taipei. Result of the present observation strongly suggests that this gecko prefers darker portion when compared with *Hemidactylus* species. We suppose that the rarity of the records of this species is, at least partly, due to such cryptic nature.

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