



## Rediscovery of the Sri Lankan ‘house gecko’ *Hemidactylus pieresii* Kelaart (Reptilia: Gekkonidae) with a redescription of *Hemidactylus depressus* Gray

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### Abstract

*Hemidactylus pieresii* Kelaart, a species first described from Kandy, Sri Lanka, in 1852 but not recorded since, is redescribed from two recently-discovered populations, one at the type locality and another in the rainforests of the island’s south-western lowlands. It is shown to be similar to *H. depressus* (in the synonymy of which it has been since 1935), from which it is distinguished by the possession of 53–58 (vs. 35–41) paravertebral tubercles, 17–19 (vs. 13–16) longitudinal rows of middorsal tubercles, possessing relatively small (vs. large) and closely (vs. widely) spaced middorsal tubercles, 1–3 (vs. no) postcloacal spurs, chocolate-brown (vs. light brown) coloration in life, and nape with distinct black longitudinal stripes (vs. without black stripes). *Hemidactylus pieresii*, a member of the *H. brooki* group, is distinguished from all species of *Hemidactylus* in Sri Lanka and peninsular India by the combination of the following additional characters: maximum snout-vent length 79.2 mm; ventral scales across midbody, 32–39; dorsal scales heterogeneous; ventral scales smooth, with 3 serrae; precloacal-femoral pores 17–20 on each side, separated mesially by 1–3 poreless scales; subcaudals smooth, the median row enlarged; supralabials to angle of jaws, 11 or 12; subdigital lamellae on digit IV of pes, 10 or 11; general body colour chocolate-brown; nape with distinct black longitudinal stripes. The identity of *H. pieresii* is stabilized through the designation of a neotype. Unlike most other species of *Hemidactylus*, *H. pieresii* appears to be restricted to rainforests. *Hemidactylus depressus* is also redescribed from freshly collected material from Sri Lanka and its syntype BMNH RR1962.190 (65.6 mm SVL) is designated lectotype.

**Key words:** biodiversity, cryptic species, *Hemidactylus argentii*, taxonomy, Sri Lanka

### Introduction

In the first general work on the natural history of Sri Lanka (then Ceylon), Kelaart (1853) recorded five species of geckoes of the genus *Hemidactylus*, now often referred to as ‘house geckos’ because many species are synanthropic. He described a single new species, *H. pieresii*, which has, since Smith (1935), lain in the synonymy of *H. depressus* Gray. In addition to these, the genus in Sri Lanka is presently known from seven species: *H. frenatus* Schlegel, *H. hunae* Deraniyagala, *H. lankae* Deraniyagala, *H. leschenaultii* Duméril & Bibron, *H. platyurus* (Schneider), *H. parvimaculatus* Deraniyagala and *H. scabriceps* (Annandale). In the course of a survey of Sri Lankan Sauria (1998–2005) by the Wildlife Heritage Trust of Sri Lanka, several specimens of a gecko not referable to the seven species until then known from the island were collected from rainforests in the south-western lowlands and the Gannoruwa Forest near Kandy, which we infer from the common name given by Kelaart (1853), ‘The Kandyan Gecko’, to have been the type locality of *H. pieresii*. These specimens are consistent with the (albeit brief) description of *H. pieresii* provided by Kelaart (1853: 159–160) and present the first record of that species in the 160 years that have elapsed since its discovery (no types survive: see Pethiyagoda & Manamendra-Arachchi, 1997). In this paper we clarify the identity of *H. depressus* and *H. pieresii* by redescribing them; it appears that the latter species has remained cryptic for so long because it is restricted to rainforests, unlike the majority of its congeners, which occur mainly in anthropogenic habitats and secondary forest.

## Material and methods

Specimens for this study were collected in Sri Lanka as part of a survey of the island's Sauria commissioned by the Department of Wildlife Conservation in 1998. Specimens were fixed in 10% formalin and preserved in 70% ethanol. The new material collected in this survey was initially deposited in the collection of the Wildlife Heritage Trust of Sri Lanka, since transferred to the National Museum of Sri Lanka.

The following measurements were taken with dial Vernier calipers (to the nearest 0.1 mm): snout length (distance between anteriormost point of orbit and tip of snout); naris-eye distance (from anterior-most point of orbit and posterior border of nostril); internarial distance (least distance between inner margins of nostril); eye diameter (greatest diameter of orbit); head length (distance between posterior edge of mandible and tip of snout); head width (maximum width of head); head depth (maximum depth of head); interorbital width (narrowest width of frontal bone); eye to ear distance (distance between anteriormost margin of ear and posteriormost margin of eye); ear length (greatest width of ear opening); snout-vent length (SVL, distance between tip of snout and anterior margin of vent); trunk length (distance between axilla and groin); tail length (distance between anterior margin of vent and tail tip); tail base width (maximum width of tail base); forearm length (distance from elbow to wrist with both upper arm and palm flexed); and tibia length (distance between knee and heel, with both tibia and tarsus flexed).

Scale counts and morphological measurements were made using an Olympus SZ40 dissecting microscope. Meristic characters were taken as follows. Supralabials and infralabials: first labial scale to last labial scale, which is distinctly larger than the granular scales at the angle of gape; subdigital lamellae, from first proximal enlarged scensor greater than twice the width of the largest palm scale, to the distal-most undivided enlarged lamellae at the tip of the digit. Sex was determined by the presence of hemipenial bulges and precloacal-femoral pores. Tail lepidosis is given only for unregenerated tails.

Colour photographs were taken with a Cannon IXUS 50 digital camera. Altitudes are given in metres above mean sea level; geographic co-ordinates were taken using topographic maps (1 inch: 1 mile, Survey Department, Colombo).

Abbreviations: BMNH, The Natural History Museum, London; NMSL, The National Museum of Sri Lanka; WHT, The Wildlife Heritage Trust of Sri Lanka; ZSI, The Zoological Survey of India, Kolkata.

### *Hemidactylus pieresii* Kelaart, 1853

(Figs. 1A, 1B, 2A–F, Table 1)

*Hemidactylus pieresii* Kelaart, 1853 ('1852'): 159.

**Material examined.** NMSL WHT 7573, neotype (here designated), male, Gannoruwa proposed forest reserve, Peradeniya, 07°17'N, 80°53'E, 700 m asl, coll. 2 November 2002, S. Batuwita, A. Silva & K. P. Maduwage; NMSL WHT 196, male, Yattapatha, near Sinharaja World Heritage Site (WHS), 06°23'N, 80°17'E, 150 m asl, coll. 24 November 1999, K. Manamendra-Arachchi; NMSL WHT 7570, male, Pitadeniya, near Sinharaja WHS, 06°22'N, 80°28'E, 320 m asl, coll. 1 September 1999, S. Batuwita & A. Alagiyawadu; NMSL WHT 7571, female, Kalugala near Baduraliya, 06°30'46"N, 80°14'45"E, 60 m asl, coll. 3 February 2000, K. Manamendra-Arachchi & S. V. Nanayakkara; NMSL WHT 7572, male, Haycock Mountain, near Hiniduma, 06°20'N, 80°18'E, 660 m asl, coll. 15 September 1999, K. Manamendra-Arachchi.

**Diagnosis.** *Hemidactylus pieresii* differs from its peninsular-Indian and Sri Lankan congeners by the combination of the following characters. Maximum SVL 79.2 mm; paired postmentals, anterior pair broadly in contact with each other; 53–58 tubercles in paravertebral row; 17–19 longitudinal rows of middorsal tubercles; ventral scales across midbody, 32–39; dorsal scales heterogeneous; ventral scales smooth, with 3 serrae; precloacal-femoral pores 17–20 on each side, separated mesially by 1–3 poreless scales; subcaudals smooth, the median row enlarged; supralabials to angle of jaws, 11 or 12; subdigital lamellae on digit IV of pes 10 or 11; postcloacal spurs, 1–3; coloration in life chocolate-brown, nape with distinct black longitudinal stripes, back with indistinct irregular black bands; venter dusky white, a yellow lateral band from snout to back of head.

*Hemidactylus pieresii* resembles *H. depressus*, but differs from the latter species by the combination of following characters: presence of greater number of paravertebral tubercles (53–58, vs. 35–41); a greater number of lon-

gitudinal rows of middorsal tubercles (17–19, vs. 13–16); possessing relatively small and closely spaced middorsal tubercles (vs. large and widely spaced); postcloacal spurs 1–3 (vs. absent); coloration in life chocolate-brown (vs. light brown); and nape with distinct black longitudinal stripes (vs. without stripes).

**TABLE 1.** Measurements (in mm) of neotype (WHT 7573) and recently-collected material of *Hemidactylus pieresii*. Specimens with broken tails are indicated by an asterisk.

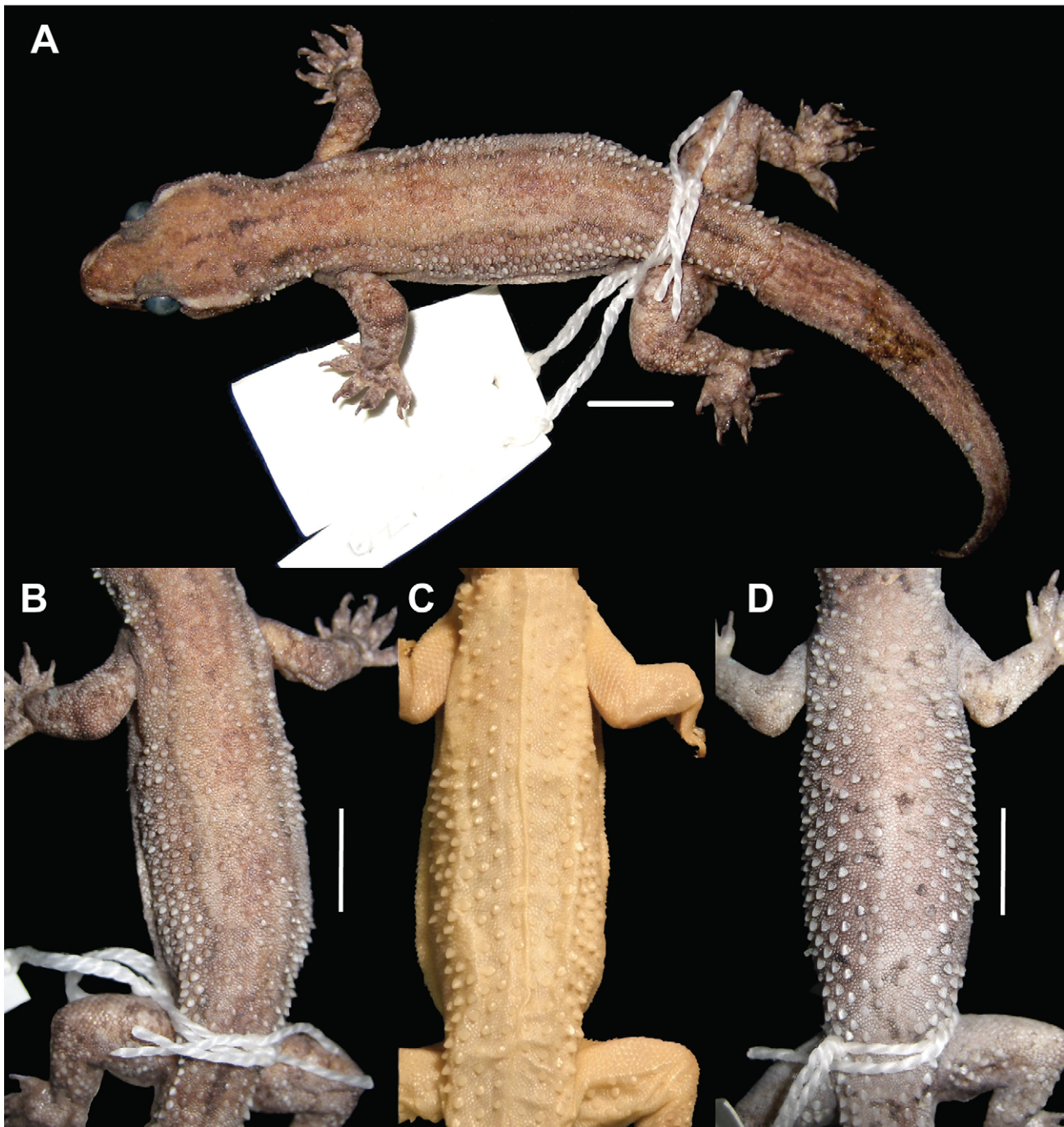
	WHT 7573 (neotype)	WHT 196	WHT 7570*	WHT 7571*	WHT 7572
Snout-vent length	75.3	70.9	65.3	66.1	79.2
Forearm length	8.8	9.3	7.3	7.0	8.2
Tibia length	10.1	11.3	10.4	11.0	10.3
Tail length	61.1	78.8	7.1	7.5	68.0
Tail width	8.2	7.2	6.4	7.0	6.5
Trunk length	42.2	40.6	36.8	38.5	41.0
Head length	20.0	19.9	17.6	18.4	19.8
Head width	14.0	14.3	11.8	12.4	13.0
Head depth	7.3	6.5	6.9	7.2	7.1
Eye diameter	4.7	4.5	4.2	4.0	4.6
Eye to ear distance	4.8	4.6	5.5	5.1	5.0
Snout length	7.1	7.6	6.9	7.4	7.5
Naris-eye distance	5.5	5.5	5.1	5.2	5.5
Interorbital width	7.3	6.9	6.3	8.2	5.4
Ear length	1.6	1.5	1.6	0.8	1.3
Internarial distance	2.4	2.1	1.8	2.0	1.8

**Description of neotype** (data for other recent material given in brackets; for measurements, see Table 1). Head relatively short (head length 27.2 [25.0–28.1]% SVL), wide (head width 70.0 [65.7–71.9]% head length), depressed (head height 36.5 [35.9–39.2]% head length), distinct from neck. Canthus rostralis indistinct. Snout relatively long (snout length 35.5 [37.9–40.2]% HL), longer than eye diameter (eye diameter 66.2 [54.1–66.2]% snout length). Eye to ear distance 67.6 [60.5–79.7]% snout length, greater than eye diameter (eye diameter 97.9 [76.4–97.8]% eye to ear distance). Eye to ear distance 87.3 [83.6–108]% nostril to eye distance. Interorbital width 36.5 [27.3–44.6]% head length. Scales on snout and forehead granular, much larger than those on occipital region. Eye relatively large (eye diameter 23.5 [21.7–23.9]% head length), pupil vertical. Supraciliaries short, obtuse. Ear opening oval, small (ear length 8.0 [4.3–9.1]% head length). Rostral wider (3.4 [2.6–3.4] mm) than deep (2.0 [1.5–1.8] mm) (Fig. 2A), incompletely divided dorsally by a weakly-developed rostral groove. Two enlarged supranasals, separated by two longitudinally-orientated internasal scales (Fig. 2A). Rostral in contact with first supralabial, supranasals and anterior internasal (Fig. 2A). Nostrils oval, dorsolaterally orientated, each in broad contact with rostral, supranasal, and three subequal postnasals (Fig. 2A). Mental subpentagonal, wider than or as wide as (3.8 [2.3–3.4] mm) deep (2.9 [2.0–2.7] mm) (Fig. 2B). Two pairs of enlarged postmentals, the first as long as broad, in narrow medial contact, with no intervening granules or scales, bordered laterally by and narrowly in contact with first and second infralabials and broadly in contact with secondary postmental (Fig. 2B). Throat scales small, granular. Supralabials to angle of jaws, 11 [11–12]; infralabials to angle of jaws, 8 [9–11]. Interorbital scale rows across narrowest point of frontal, 15 [12–15].

Body moderately elongate, relatively robust (trunk length 57.4 [51.8–58.2]% SVL) (Fig. 1A), with well-developed denticulate ventrolateral folds. Dorsal scales heterogeneous, intermixed with keeled, subtriangular (Fig. 2C), relatively large tubercles extending from parietal region on to back and base of tail. Tubercles most prominent on dorsolateral surfaces, somewhat smaller and more conical on nape; keeled tubercles in 17 [17–19] longitudinal rows at midbody (Fig. 1B); sagittal fold absent, parasagittal row of tubercles present; 58 [53–56] tubercles on paravertebral row from parietal region to midsacrum. Ventral scales much larger than dorsal scales, cycloid, each with three serrae (Fig. 2D), imbricate to subimbricate, largest under thighs and between precloacal-femoral pores and vent, somewhat larger on abdomen than on pectoral; somewhat enlarged scales anterior to precloacal-femoral pores. Midbody scale rows across belly between ventrolateral folds, 32 [32–39]. Scales on throat minute, granular,



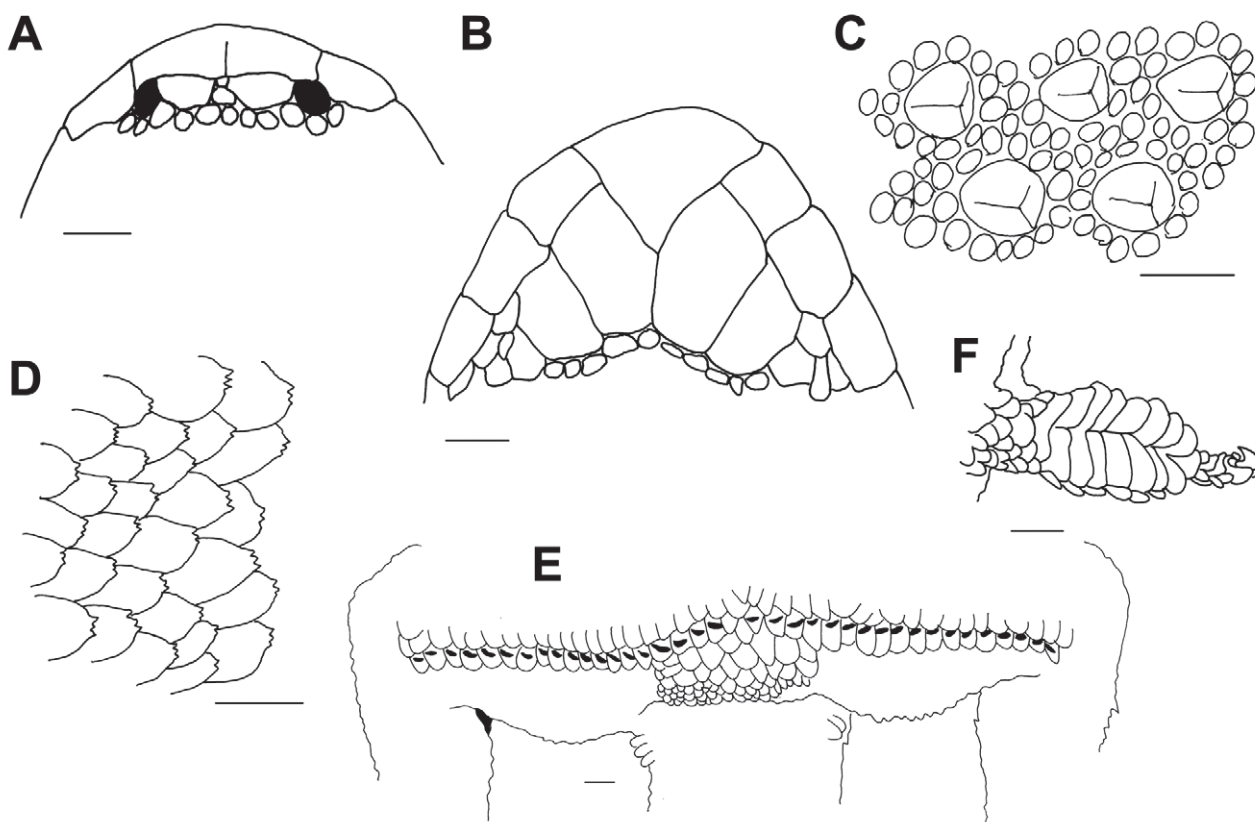
grading into larger scales in gular region. Interrupted series of 19 [17–20] (on left side) and 18 [17–19] (on right side) precloacal-femoral pores separated medially by two [1–3] poreless scales in males (Fig. 2E).



**FIGURE 1.** A. Neotype of *Hemidactylus pieresii* (WHT 7573); dorsal views of trunk, B. Neotype of *Hemidactylus pieresii* (WHT 7573); C. lectotype of *Hemidactylus depressus* (BMNH RR1962.190); D. topotype of *Hemidactylus depressus* (WHT 7577). Scale bar 10 mm.

Fore and hind limbs relatively short, stout. Forearm short (forearm length 12.0 [10.4–13.1]% SVL) (Fig. 1A). Tibia relatively short (tibia length 13.7 [13.0–16.6]% SVL). Dorsal and ventral scales of upper arm granular, lateral ones imbricate, similar to ventral scales; lower arm dorsally with smooth, imbricate scales intermixed with conical tubercles, ventrally and laterally with smooth, imbricate scales. Thigh scales heterogeneous, dorsally covered by granules intermixed with tubercles; ventral and lateral scales of thigh smooth, imbricate. Dorsal and lateral surfaces of shank with smooth imbricate scales and conical tubercles; ventral surface of shank scaly, scales similar to pectoral and abdominal scales. A rudimentary web at angle between thigh and shank (Fig. 2E). Palm and sole scales

granular. Digits relatively short, all bearing claws; the most proximal and distal subdigital lamellae entire, notched, the rest divided (Fig. 2F); lamellae on finger I, 7 [7 or 8], finger II, 10 [9 or 10], finger III, 10 [9 or 10], finger IV, 10 [10], finger V, 10 [9 or 10]; toe I, 8 [7 or 8], toe II, 11 [10 or 11], toe III, 11 [10 or 11], toe IV, 11 [11], toe V, 10 [9–12]; interdigital webbing, rudimentary; relative length of digits of manus  $IV > III > II > V > I$ ; pes  $IV > III > V > II > I$ .



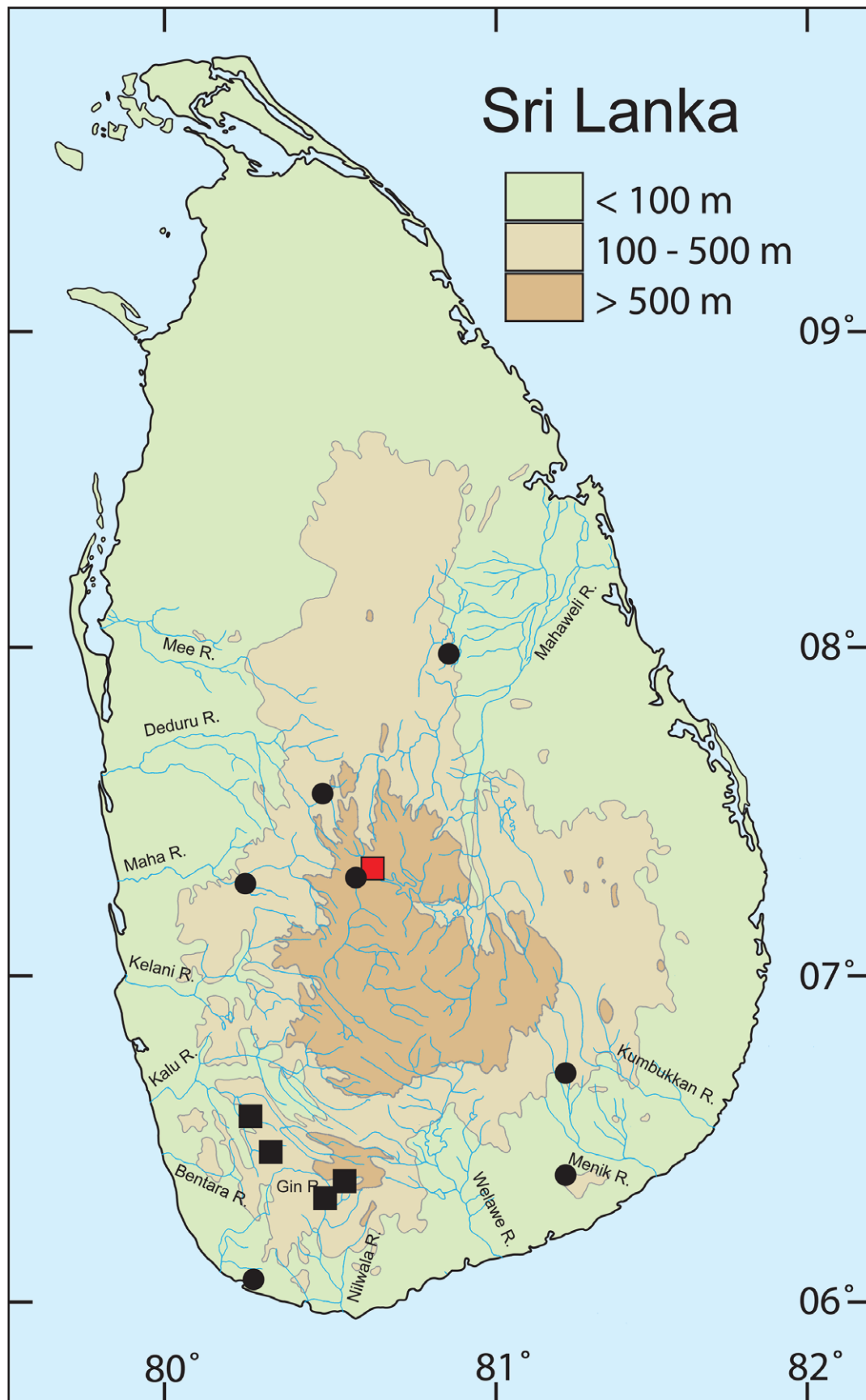
**FIGURE 2.** Neotype of *Hemidactylus pieresii* (WHT 7573), **A.** Dorsal aspect of snout; **B.** Ventral aspect of chin; **C.** Arrangement of scales on dorsal region of mid-body; **D.** Arrangement of scales on ventral region of mid-body; **E.** Preanal and hind-limb regions showing presence of precloacal-femoral pores (shaded area between thigh and shank indicates web); **F.** Ventral aspect of digit V of left pes. Scale bar 1 mm.

Tail of neotype regenerated. Tail of NMSL WHT 196 tapering, longer than SVL (tail length 111.0% SVL), flattened in cross section. Dorsal scales imbricate. Tail with enlarged conical, strongly keeled tubercles arranged in regular whorls (Fig. 1A); dorsum of tail with enlarged whorls of scales arranged in 6 [6–8] tubercles per whorl anteriorly, becoming reduced towards tail tip. Subcaudal scales half as wide as tail width, with a single median series of enlarged plates. Prominent series of keeled, acute scales along lateral sides of tail. Cloacal spurs with two [1–3] enlarged tubercles on either side of tail base.

**Coloration.** In preservative (Fig. 1A) dorsum dusky brown; venter dusky white. A colour photograph presented by Somaweera & Somaweera (2009: fig. 197D) depicts the species in life, identified as *Hemidactylus depressus*.

**Etymology.** The specific name is apparently a patronym for the “friend, to whom we are indebted for several Zoological specimens, and to whom was awarded one of the prizes of the Royal Industrial Exhibition, for specimens of natural productions of Ceylon” (Kelaart, 1853: 159), a Mr Pieres, Latinized in the genitive singular. The specific name was incorrectly spelled ‘piersii’ by Smith (1935: 91), Deraniyagala (1953: 48) and Pethiyagoda & Manamendra-Arachchi (1997: 232). Although not in use in Sri Lanka today, the surname spelling ‘Pieres’ was in use in Sri Lanka in Kelaart’s time (Attendorf, 1959).

**Natural history and distribution.** Specimens of *H. pieresii* were found under the bark of the tree *Dipterocarpus ceylonicus* (Dipterocarpaceae) and also sometimes hiding in crevices in boulders. The species is known from several locations in the south-western wet zone lowlands of Sri Lanka (Haycock, near Hiniduma; Yattapatha and



**FIGURE 3.** Distribution in Sri Lanka of *Hemidactylus pieresii* (squares; type locality, Kandy, in red) and *H. depressus* (circles).



Pitadeniya, near the Sinharaja WHS; Kalugala, near Baduraliya); and from the Gannoruwa Proposed Forest Reserve, Peradeniya, near Kandy (see Fig. 3).

**Comparisons.** (Precloacal or femoral-pore count given for each side of thigh.) Among its Sri Lankan congeners, *Hemidactylus pieresii* is distinguished from the apparently closely-related *H. depressus* by possessing a greater number of paravertebral tubercles (53–58, vs. 35–41), a greater number of longitudinal rows of middorsal tubercles (17–19, vs. 13–16), possessing relatively small and closely spaced middorsal tubercles (vs. large and widely spaced: compare Figs. 1B with 1C, D), postcloacal spurs, 1–3 (vs. no postcloacal spurs), chocolate-brown live coloration (vs. light brown), and nape with distinct black longitudinal stripes (vs. without black stripes). It is distinguished from males of *H. hunae* by possessing 17–20 precloacal-femoral pores on each side (vs. 26–28), separated by 1–3 (vs. 7–9) poreless scales; from males of *H. lankae* and *H. parvimaculatus* by possessing a greater number of precloacal-femoral pores (17–20, vs. 7–9 in *H. lankae*, 13–15 in *H. parvimaculatus*); from males of *H. frenatus* by having an interrupted (vs. continuous) row of precloacal-femoral pores; from *H. leschenaultii* by the presence of subtriangular and raised (vs. rounded, flattened) middorsal tubercles; and from *H. scabriceps* by the presence of heterogeneous, raised (vs. homogeneous, imbricate) middorsal scales. *Hemidactylus pieresii* differs from *H. platyurus* (Schneider) in possessing heterogeneous (vs. homogeneous) dorsal scalation.

From among its peninsular-Indian congeners (*Hemidactylus subtriadrus* currently considered as a junior synonym of *H. triadrus*, see Mahony, 2011) *H. pieresii* is most reminiscent of *H. prashadi* Smith, from which it differs, however, by the possession of fewer rows of middorsal tubercles (17–19, vs. 21 in *H. prashadi*), a lesser maximum SVL (79.2 mm, vs. > 100.0 mm) and a dorsal pattern of irregular black bands (vs. small paler blotches). *Hemidactylus pieresii* differs from its other peninsular Indian congeners as follows: from *H. imbricatus* Bauer *et al.* by the presence of heterogeneous, raised (vs. homogeneous, imbricate) middorsal scalation; from *H. graniticulus* Agarwal, Giri & Bauer by the presence of 23–28 (vs. 17–19) precloacal-femoral pores; and from *H. flaviviridis* Rüppell and *H. garnotii* Duméril & Bibron by the presence of 17–19 middorsal tubercles (vs. dorsum with very few enlarged tubercles, often absent altogether; and dorsum with small, uniform, granular scales, respectively). It differs from *H. triadrus* (Daudin) by the absence of the latter's characteristic transverse bands; and from *H. persicus* Anderson by having 53–58 paravertebral tubercles and 17–19 midbody tubercles (vs. 32 paravertebral tubercles and 13 midbody tubercles). In having an enlarged median series of subcaudal scales *H. pieresii* differs from the following species: *H. reticulatus* Beddome and *H. albofasciatus* Grandison & Soman. *Hemidactylus pieresii* also differs from the following species in possessing heterogeneous (vs. homogeneous) dorsal scalation: *H. anamallensis* (Günther), *H. giganteus* Stoliczka and *H. aquilonius* McMahan & Zug. It differs from the following species by possessing 17–20 precloacal-femoral pores on each side in males: *H. porbandarensis* Sharma (vs. an angular series of 6 precloacal pores), *H. gracilis* Blanford (6 precloacal pores), *H. sataransensis* Giri & Bauer (pores absent), *H. brookii* Gray (12–13 femoral pores), *H. treutleri* Mahony (3–7 femoral pores) and *H. gujaratensis* Giri *et al.* (12–14 femoral pores). *Hemidactylus pieresii* is distinguished from *H. aaronbaueri* Giri by having 1–2 (vs. 6) poreless scales between the femoral pores and by its smaller size (maximum SVL 79.2 mm, vs. > 100 mm).

### ***Hemidactylus depressus* Gray, 1842**

(Figs. 1C, 1D, 4A–D, 5A–E, Table 2)

*Hemidactylus depressus* Gray, 1842

*Nubilia argentii* Gray, 1845

**Material examined.** BMNH RR1962.190, lectotype (here designated), male, locality unknown, restricted to Sri Lanka by E. H. Taylor (1953); paralectotype. BMNH XXI.22.b, male, locality unknown, restricted to Sri Lanka by E. H. Taylor (1953); BMNH XXII.32.a, female, 'Singapore'(error), type of *Nubilia argentii*; NMSL WHT 0889, female, Rumasswala, Galle, 06°01'N, 80°14'E; 5 m, collected 17 December 1994 by M. M. Bahir; NMSL WHT 7575, male, Giritala, 07°59'N, 80°55'E; 30 m, collected 25 August 1998 by S. Batuwita; NMSL WHT 7576, male, Warakawehera, Kurunegala, 07°30'N, 80°29'E; 100 m, collected 27 February 2006 by S. Batuwita; NMSL WHT 7577, male, Kariwilakotuwa, Buttala, 06°40'N, 81°15'E, 160 m, collected 12 March 2006 by S. Batuwita; NMSL WHT 7578, Sandagala, Tissamaharama, 06°20'30"N, 81°16'00"E, 100 m, collected 20 August 2005 by S. Batuwita; NMSL WHT 7579, Penideniya, Peradeniya, 07°15'N, 80°35'E, 450 m, collected 07 August 2003 by S. Batuwita; NMSL WHT 7580, Kalugala, Alauwa, 07°15'N, 80°16'E, 300 m, collected 19 April 2006 by S. Batuwita.

**Diagnosis.** *Hemidactylus depressus* differs from its peninsular-Indian and Sri Lankan congeners by the combination of the following characters. Maximum SVL 76.5 mm; paired postmentals broadly in contact each other; each postmental bounded by 3 scales including medial scale; tubercles in paravertebral row, from occipital region to midsacrum, 35–41; longitudinal rows of middorsal tubercles, 13–16; ventral scales across midbody, 28–36; dorsal scales heterogeneous; ventrals smooth; femoral pores, 15–19 on each side, separated mesially by 2–4 scales; subcaudals smooth, median row enlarged; supralabials to angle of jaws, 9–14; subdigital lamellae on digit IV of pes, 10–11; coloration in life yellowish brown; midbody (from nape to sacrum) with 5 dark markings; venter white or yellow; yellow lateral band on head.

This species is closely related to *Hemidactylus pieresii* (see diagnosis of *H. pieresii* for comparison).

**Description.** (Based on topotype, WHT 7577; data for remainder of series (7 ex.) given in brackets.) Adult male, SVL 65.6 mm (for measurements, see Table 2). Head relatively short (head length 26.8 [26.1–29.5]% SVL), wide (head width 73.3 [64.2–77.3]% head length), depressed (head height 39.8 [36.5–44.6]% head length), distinct from neck. Canthus rostralis moderate. Snout relatively long (snout length 40.3 [38.1–41.3]% head length), longer than eye diameter (eye diameter 64.8 [53.3–64.8]% snout length), longer than eye to ear distance (eye to ear distance 77.5 [66.7–77.5]% snout length). Eye to ear distance greater than diameter of eye (eye diameter 83.6 [72.7–86.7]% eye to ear distance). Nostril to eye distance subequal to eye to ear distance (eye to ear distance 100 [85.3–100]% nostril to eye distance); (interorbital width moderate (interorbital width 39.2 [27.3–39.2]% head length). Scales on snout and forehead convex, granular, much larger than those on occipital region. Eye relatively small (eye diameter 26.1 [20.6–26.1]% head length); pupil vertical. Supraciliaries short, obtuse. Ear opening oval, small (ear length 5.7 [5.7–10.9]% head length). Rostral wider (2.7 [2.7–3.2] mm) than deep (1.6 [1.5–2.1] mm) (Fig. 5A), incompletely divided dorsally by a weakly-developed rostral groove. Three [2–3] enlarged supranasals, narrowly in contact each other (Fig. 5A). Rostral in contact with first supralabial and supranasal (Fig. 5A). Nostrils oval, dorsolaterally orientated, each in broad contact with rostral and supranasal, first supralabial and three postnasals. Mental subpentagonal, wider (3.0 [2.9–3.4] mm) than deep (2.5 [2.4–2.6] mm) (Fig. 5B). Two pairs of enlarged postmentals. First pair in broad medial contact, with no intervening granules, as long as wide, bordered laterally by first and second infralabials and secondary postmental (Fig. 5B). Throat scales small, granular. Supralabials to angle of jaws, 10 [9–13]; infralabials to angle of jaws, 10 [9–11]. Interorbital scale rows across narrowest point of frontal bone, 13 [10–16].

**TABLE 2.** Measurements (in mm) of *Hemidactylus depressus*. Specimens with broken tails are indicated by an asterisk.

	WHT 7577*	WHT 0889	WHT 7575	WHT 7576*	WHT 7578*	WHT 7579	WHT 7580
Snout-vent length	65.6	72.8	76.5	74.2	70.3	65.7	76.2
Forearm length	9.6	8.8	10.3	10.6	10.3	10.0	11.2
Tibia length	10.3	11.4	12.0	11.2	11.2	11.0	12.4
Tail length	51.9	75.8	66.3	17.1	9.3	72.1	81.5
Tail width	6.7	6.7	7.9	7.5	7.3	7.6	7.3
Trunk length	37.1	44.5	45.1	42.7	42.4	36.7	46.7
Head length	17.6	21.5	21.0	19.4	18.4	19.4	21.9
Head width	12.9	13.8	14.9	15.0	13.9	13.1	15.2
Head depth	7.0	8.0	8.1	8.1	8.2	7.2	8.0
Eye diameter	4.6	4.6	4.9	4.0	4.2	4.2	5.2
Eye to ear distance	5.5	5.8	5.8	5.5	3.5	5.0	6.0
Snout length	7.1	8.2	8.3	7.5	7.6	7.5	8.9
Naris-eye	5.5	6.8	6.3	5.9	5.9	5.6	6.7
Interorbital width	6.9	7.1	7.4	5.8	5.8	5.3	7.6
Ear length	1.0	2.1	1.9	1.8	2.0	1.6	2.0
Internarial distance	2.0	2.1	2.5	2.0	2.2	2.1	1.9

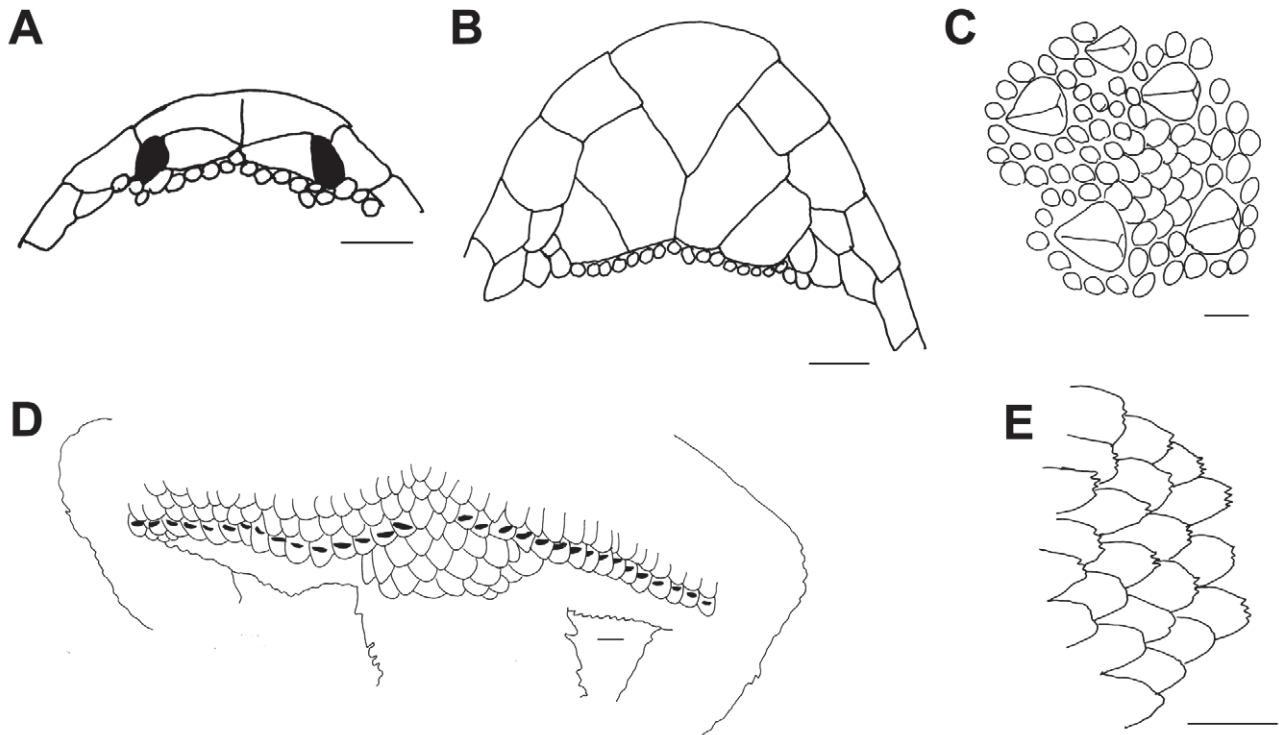




**FIGURE 4.** **A.** Dorsal view of lectotype of *Hemidactylus depressus* (BMNH RR1962.190); **B.** holotype of *Nubilia argentii* (BMNH XXII.32.a); **C.** *Hemidactylus depressus*, WHT 7578, Sandagala (Tissamaharama); **D.** *Hemidactylus depressus*, in life, not preserved, from Sandagala.

Body elongate, relatively robust (trunk length 56.6 [55.9–61.3]% SVL) (Fig. 4A–C). Dorsal scales heterogeneous, intermixed with keeled, subtriangular (Fig. 5C), relatively large tubercles extending from parietal region on to back and base of tail. Tubercles most prominent on dorsolateral surface, somewhat smaller and more conical on nape; keeled tubercles in 14 [13–16] longitudinal rows at midbody (Fig. 1C, D); sagittal fold present (Fig. 1C, 4A, B, D), parasagittal row of tubercles present (Fig. 1C, D); 39 [35–41] tubercles on paravertebral row from parietal region to midsacrum. Ventral scales much larger than dorsal, cycloid, with three serrations (Fig. 5D), imbricate to subimbricate, largest under thighs, between femoral pores, and around vent, somewhat larger on abdomen than on pectoral; somewhat enlarged scales posterior to femoral pores. Midbody scale rows across belly between ventrolat-

eral folds, 33 [28–36]. Ventrolateral folds prominent, denticulate (Fig. 3C). Scales on throat small, granular, grading into larger scales in gular region. Interrupted series of 16 [17–19] (left side) and 15 [15–18] (right side) precloacal-femoral pores separated mesially by three [2–4] poreless scales in males (Fig. 5E).



**FIGURE 5.** *Hemidactylus depressus* (WHT 7577), **A.** Dorsal aspect of snout; **B.** Ventral aspect of chin; **C.** Arrangement of scales on dorsal region of mid-body; **D.** Preanal and hind-limb regions showing presence of precloacal-femoral pores; **E.** Arrangement of scales on ventral region of mid-body. Scale bar 1 mm.

Fore and hind limbs relatively short, stout (Fig. 4A–C). Forearm short (forearm length 14.6 [12.1–15.2]% SVL). Tibia short (tibia length 15.7 [15.1–16.7]% SVL) (Fig. 4A). Dorsal scales of upper arm smooth, imbricate; ventral scales granular; some lateral scales imbricate, others granular. Lower arm with granular scales on dorsal and ventral surfaces; lateral scales imbricate. Thigh scales heterogeneous, dorsally covered by granules intermixed with conical tubercles (Fig. 4A, C); lateral surface with imbricate scales. Ventral scales of thigh imbricate. Scales on dorsal surface of shank heterogeneous, granular scales intermixed with conical tubercles; ventral and lateral surfaces with imbricate scales. No distinct web at angle between thigh and shank (Fig. 5E). Scales on palm and sole granular. Digits relatively short, all bearing claws; first, second and terminal subdigital lamellae entire, notched, rest divided; lamellae on finger I, 7 [7,8], finger II, 9 [9], finger III, 10 [9 or 10], finger IV, 10 [10], finger V, 9 [9 or 10]; toe I, 7 [6 or 7], toe II, 10 [8–10], toe III, 11 [10 or 11], toe IV, 11 [10 or 11], toe V, 11 [9–11]; interdigital webbing rudimentary; relative length of digits (manus): IV ~ II > III > V > I; (pes) IV ~ II > III > V > I.

Tail broken in WHT 7577; tail of WHT 889, 7579, 7580 longer than SVL (tail length 104.1–107.0% SVL), oval in cross section. Dorsal scales imbricate. Enlarged tubercles arranged in regular whorls (Fig. 4A, B); dorsal with enlarged whorls of scales arranged in 6 [5–8] scales per whorl anteriorly, becoming reduced towards tail tip. Subcaudal scales one-third of width of tail, with a single median series of enlarged plates. Cloacal spurs absent.

**Coloration** (in preservative). Dorsum light yellow to light brown, with about 5 distinct, darker dorsal bands on body; tail banded; venter whitish.

**Distribution.** This species is mostly confined to the dry zone of Sri Lanka, but where it does occur within the wet zone it is most frequent in anthropogenic habitats. The range of *Hemidactylus depressus* extends northwards at least up to Mankulam (9.129°N, 80.446°E).

## Key to the Sri Lankan species of *Hemidactylus*

1. Rudimentary webbing between digits .....2  
Distinctly-developed webbing between digits ..... *H. platyurus*
2. Middorsal scales heterogeneous .....3  
Middorsal scales homogeneous, imbricate ..... *H. scabriceps*
3. Middorsal scales intermixed with subtriangular or triangular tubercles .....4  
Middorsal scales intermixed with flattened or conical, rounded tubercles .....5
4. Subdigital lamellae on 4th toe of pes, 7–9 .....6  
Subdigital lamellae on 4th toe of pes, 10–12 .....7
5. Subdigital lamellae on 4th toe of pes, 8; precloacal-femoral pores 31–40, in a continuous series ..... *H. frenatus*  
Subdigital lamellae on 4th toe of pes, 10–11; precloacal-femoral pores 17–20, separated ..... *H. leschenaultii*
6. Subdigital lamellae not dilated towards distal end; claws not recurved; femoral pores 7–9 on each side ..... *H. lankae*  
Subdigital lamellae dilated towards distal end; claws recurved; femoral pores 13–15 on each side ..... *H. parvimaculatus*
7. Arrangement of subdigital lamellae oblique to median axis; longitudinal rows of middorsal tubercles, 15–20 .....8  
Arrangement of subdigital lamellae perpendicular to median axis; longitudinal rows of middorsal tubercles, 21–24 ..... *H. hunae*
8. 38–43 tubercles in paravertebral row; longitudinal rows of middorsal tubercles, 13–16;  
no postcloacal spurs; general body colour yellowish brown to light brown; no black stripes on nape ..... *H. depressus*  
55–58 tubercles in paravertebral row; longitudinal rows of middorsal tubercles, 17–20;  
postcloacal spurs, 1–3; general body colour chocolate-brown; black stripes on nape ..... *H. pieresii*

## Discussion

Kelaart (1853) described *H. pieresii* as “Pale grey, marbled with black streak on the temples. Back with longitudinal series of rather large semiconical keeled tubercles, a few smaller tubercles on the head and outer-side of limbs. Tail flattened; upper surface with 6 series of sharply pointed keeled spines. Femoral pores in males only, in two almost continuous lines.—16—17, = 32, or 34.” Except for the mention of large dorsal tubercles, this description appears broadly consistent with the specimens we identify as *H. pieresii*. The character “tail flattened” is especially diagnostic of *H. pieresii*, the tail of *H. depressus* being oval in cross section. Our confidence that the present species is in fact *H. pieresii* is heightened by the fact that both Kelaart and we recorded the species from Kandy. The absence of type material allows the species’ identity to be stabilized through the designation of a neotype from the type locality.

Although Edward Frederic Kelaart (1819–1860) was the author of at least 39 vertebrate-species names, the lack of a museum in Sri Lanka during his lifetime and his untimely death resulted in the loss of these types (Pethiyagoda & Manamendra-Arachchi, 1997). We consider the designation of a neotype for *H. pieresii* necessary especially because the specimens we here assign to that species may in the future be shown to belong to more than a single species; the designation of a neotype from the putative type locality will stabilize the identity of the species and its type locality (Kandy), which is only implied in the original description of Kelaart (1853). Further, both *H. pieresii* and a closely related species, *H. depressus*, occur in the vicinity of Kandy and the designation of a neotype for *H. pieresii* will help clarify its taxonomic status vis-à-vis *H. depressus*.

No older names threaten *H. pieresii* except *Nubilia argentii* Gray, 1845 (Fig. 4B), the type locality of which was stated to be ‘Singapore’, from where no *Hemidactylus* resembling *H. argentii* is known. Although a “Mr Argent” and “from Mr Argent’s collection” are mentioned in numerous mid-19th century catalogues of the British Museum (Natural History) in relation to specimens of reptiles, birds, mammals and Lepidoptera from many parts of the world, at least one other species of which provenance is traced to Argent, the hump-nosed pit-viper *Hypnale zara*, is a Sri Lankan endemic despite Gray (1849) having given its type locality too, as Singapore (see Maduwage *et al.*, 2008). Taylor (1953) was therefore right to treat Sri Lanka as the true type locality of *H. argentii*, which has hitherto been in the synonymy of *H. depressus*, a Sri Lankan endemic. It is clear from examination of photographs of the lectotype (BMNH RR1962.190, here designated) of *H. depressus* and (adult female) holotype of *H. argentii* that the two are conspecific (they share the same dorsal squamation). We follow Smith (1935) and Taylor (1953) in treating Sri Lanka as the type locality of both nominal species (the erroneous mention of Kandy as the type locality of *H. depressus* by Somaweera & Somaweera (2009) appears to have been because they followed Uetz & Hallermann (2008)). Gray (1845) noted of *H. argentii*, “Tail rather depressed, flat beneath, sharp-edged, with a series of spines on the edge, and distant rings of spines with a series of broad shields beneath”. Of the eight species of *Hemidactylus* in Sri Lanka, this character matches only *H. depressus* and *H. pieresii*. The lectotype of *H. depressus* (Fig.



4A) clearly belongs to the Sri Lankan species to which we apply that name (see Fig. 4C, D). Additionally, the type of *H. argentii* is distinguished from *H. pieresii* by possessing a lower number of paravertebral tubercles (35, vs. 53–58 in *H. pieresii*), and relatively large, isolated middorsal tubercles (vs. relatively small, closely spaced in *H. pieresii*) (Figs. 4B, vs. 1B).

Among its Sri Lankan congeners, *H. pieresii* appears to be most closely related to—and has hitherto probably been confused with—*H. depressus*. The syntype BMNH 1962.90 most closely matches the description given by Gray (1842), “Tail depressed, rather broad, with a broad central groove above and below, lower broadest...”. The other syntype lacks its tail and the conical shape of its middorsal tubercles is somewhat different from that of topotypes. We therefore feel that BMNH 1962.90 more closely matches the series of recent specimens of *Hemidactylus depressus* and therefore designate it as lectotype of that species. Based on the lectotype and recent material examined herein, *H. depressus* is distinguished from *H. pieresii* by several characters and character states, most notably its greater number of paravertebral tubercles (53–58, vs. 35–41); greater number of longitudinal rows of middorsal tubercles (17–20, vs. 13–16); its relatively smaller and more closely-spaced middorsal tubercles (see Figs. 1B,C,D), presence of 1–3 (vs. no) post-cloacal spurs; its chocolate-brown (vs. light brown) coloration in life; and the presence (vs. absence) on its nape of distinct black, longitudinal stripes.

The present study is part of a series of reviews of elements of the gekkonid fauna of Sri Lanka (*Cyrtodactylus*: Batuwita & Bahir, 2005; *Cnemaspis*: Manamendra-Arachchi *et al.*, 2007). These, together with Bauer *et al.*, (2007) and Wickramasinghe & Munindradasa (2007), have helped highlight a high degree of cryptic diversity within the various genera. Such diversity has been noted previously also in *Hemidactylus* (Carranza & Arnold, 2006; Bauer *et al.*, 2010a,b). Based on such studies, some geckos long considered as subspecies have also been assigned specific rank (see Bauer *et al.*, 2010a). In this background, cryptic diversity within the geckoes previously grouped with *Hemidactylus depressus* is not unexpected. Bauer *et al.* (2010a,b) showed a similar cryptic diversity to exist also among geckoes grouped with *H. frenatus* and *H. parvimaculatus*. Bauer *et al.* (2010a) sampled *H. depressus* from several locations including Matale, Dumbulayala (probably Dumbulagala mountain), Ritigala, Galle, Kuruwekota and Galkotte. All these save Galle lie within Sri Lanka’s ‘dry zone’ (rainfall < 2,000 mm/yr). Both *H. depressus* and *H. pieresii*, however, occur in the Galle District: it is possible therefore that the latter species may be represented in the Galle samples of Bauer *et al.* (2010a).

*Hemidactylus depressus* is widely distributed in Sri Lanka, in both the dry zone and the wet zone, up to an elevation of about 500 m (Fig. 3). In the wet zone it occurs in and around human settlements and on forest edges, while in the dry zone it is observed both in (secondary) forests as well as anthropogenic habitats. Up to now, however, we have observed *H. pieresii* only in relatively undisturbed rainforest habitats. Kelaart (1853) recorded five species of *Hemidactylus* from Sri Lanka. His “*H. trihedrus*” (an incorrect spelling of *H. triedrus*, a species widely distributed in South Asia, but whose type locality is unknown: Smith, 1935) was probably a misidentification of *H. lankae*, while his “*H. maculatus*?” Duméril & Bibron (type locality Bombay, now Mumbai, Maharashtra, India: Smith, 1935) appears to be *H. parvimaculatus* (type locality Colombo, Sri Lanka: Deraniyagala, 1953). He also recorded *H. coctaei* Duméril & Bibron (type locality Bengal and Bombay [the former presidency], India) from Sri Lanka, probably a misidentification of *H. leschenaultii* (type locality Sri Lanka) and the ubiquitous *H. frenatus* (type locality Java, Indonesia; Smith, 1935).

At the end of his description of “*Hemidactylus maculatus*?” Kelaart (1853: 159) stated: “... We have not received a single specimen of this species [i.e. *H. parvimaculatus*] from higher parts than Kandy, where a larger species, closely allied to this, is also abundant”. It appears from this that *H. pieresii* was formerly more frequent in the vicinity of Kandy, but owing to its intolerance of deforested habitats, is now restricted to the few remaining fragments of (albeit disturbed) near-natural forest, such as Gannoruwa, in this area. While *H. depressus* occurs in home gardens at Peradeniya (a suburb of Kandy about 2 km distant from Gannoruwa), it does not appear to be present in Gannoruwa Forest.

## Comparative material

*Hemidactylus frenatus*: WHT 0742, Woodside Group near Urugala, Theldeniya, 07°16'N, 80°50'E, 915 m, collected 25 September 1994 by R. Pethiyagoda; WHT 9000, Mihintale, 08°21'N, 80°30'E, 150 m, collected 10 October 1995 by D. Gabadage and M. M. Bahir.

*Hemidactylus gracilis*: syntype, ZSI 5190, ‘South East Berar’, Madhya Pradesh, Central India.



*Hemidactylus hunae*: topotypes, WHT 1813, 2ex, Kumaradola Group, Moneragala, 06°53'N, 81°22'E, 305 m, collected 16 October 1995 by M. M. Bahir and D. Gabadage; 1504, same location data as above, collected 25 April 1997 by D. Gabadage and M. M. Bahir.

*Hemidactylus lankae*: topotypes, WHT 0235, Palavi, Puttalam, 07°59'N, 79°50'E, 5 m, collected by 08 October 1993, K. Manamendra-Arachchi; WHT 1838, Giritale, 07°59'N, 80°55'E, 30 m, collected 28 October 1996 by D. Gabadage, K. Manamendra-Arachchi and M. M. Bahir; WHT 7581, Kandalama (Meda Villa), 07°53'N, 80°41'E, 100 m, collected 16 June 1995 by H. Molligoda; WHT 1019, Mahiyanganaya, 07°19'N, 80°59'E, 90 m, collected 22 June 1995 by D. Gabadage; WHT 6178, Puwakpitiya, Knuckles Range, 07°34'N, 80°45'E, 450 m, collected 25 September 2004 by M. M. Bahir, A. Silva and K. Maduwage.

*Hemidactylus leschenaultii*: syntypes of *H. kelaartii* Theobald, ZSI 2617, 2618, Ceylon; holotype of *H. marmoratus*, ZSI 5058, 'South East Berar', near Chanda, Madhya Pradesh, Central India; WHT 7587, India, Tamil Nadu, collected October 1995 by I. Das; following topotypes, WHT 0929, Palatupana, Yala Block I, 06°16'N, 81°24'E, 5 m, collected 27 May 1995 by K. Manamendra-Arachchi; WHT 1569, Mahiyanganaya, 07°19'N, 80°59'E, 90 m, collected 19 August 1996 by D. Gabadage and M. M. Bahir; WHT 1049, Anuradhapura, 08°20'N, 80°22'E, 90 m, collected 11 October 1995 by M. M. Bahir and D. Gabadage; WHT0887, Eluwankulam, 08°16'N, 79°52'E, 30 m, collected 26 April 1990 by D. Kandamby.

*Hemidactylus parvimaculatus*: holotype, NMSL RG 15, Colombo, collected 08 January 1953; WHT 0692, Trincomalee, 08°34'N, 81°14'E, 2 m, collected 21 May 1994 by K. Manamendra-Arachchi and D. Gabadage; WHT 0927, Palugaswewa Railway Station, 08°03'N, 80°42'E, 168 m, collected 04 October 1994 by D. Gabadage; WHT 0930, Palatupana, Yala Block I, 06°16'N, 81°24'E, 5 m, collected 27 May 1995 by K. Manamendra-Arachchi.

*Hemidactylus persicus*: holotype, ZSI 5961, Persia (Iran).

*Hemidactylus prashadi*: syntype, ZSI 201299, neighborhood of Jog, North Kanara District, Bombay Presidency (Karnataka State); WHT 7586, India, Cotigao Wildlife Sanctuary, Conacona, South Goa, collected October 1994 by I. Das.

*Hemidactylus scabriceps*: syntype, ZSI 15353, Ramanad, Tamil Nadu State, Southern India.

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