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***Bavayia validiclavis* and *Bavayia septuiclavis*, two new species of gekkonid lizard from New Caledonia**

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ABSTRACT. Two new species of gekkonid lizard, *Bavayia validiclavis* and *Bavayia septuiclavis*, are here described from New Caledonia. Both are small but distinctively coloured, ground sheltering species. *Bavayia validiclavis* occurs on the north-east ranges of the main island, while *B. septuiclavis* occurs in the south of the main island below 22°09'S.

With the addition of the two new taxa described here a total of seven species of *Bavayia* (*B. cyclura*, *B. montana*, *B. crassicollis*, *B. validiclavis*, *B. septuiclavis*, *B. sauvagii*, *B. ornata*) is now known. A key to these species is provided.

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Roux (1913) in a monograph of the New Caledonian reptiles proposed the generic name *Bavayia* for the species *Peripia cyclura* Günther, 1872, and *Lepidodactylus sauvagii* Boulenger, 1883, described several new taxa (*Bavayia cyclura montana*, *Bavayia cyclura crassicollis* and *Bavayia sauvagii ornata*), and identified members of the genus as endemic to New Caledonia and the Loyalty Islands.

I have examined specimens of *Bavayia* in the AM, QM, BM, NHMB, CAS and MNHP, all extant types, and during the course of extensive field work in New Caledonia and the Loyalty Islands have collected all of the species here recognised. In the field most species of *Bavayia* were readily distinguished by certain features of gross morphology (size, colour and pattern) and habit (whether the specimens were collected sheltering under ground debris or bark of trees by day). Subsequent examination of preserved material revealed several scalation characters (see key) which in combination with features of size and colouration allowed most specimens to be readily allocated to those taxa recognised by Roux (1913) (which I here treat as distinct species); however two taxa could not be allocated to any named species. In this paper I describe these species and diagnose the currently recognised taxa via a phenetic key.

Materials and Methods

Specimens of *Bavayia* were examined from the collections in the Australian Museum Sydney (AM), Queensland Museum (QM), Naturhistorisches Museum Basel (NHMB), British Museum of Natural History (BM), Museum National d'Histoire Naturelle Paris (MNHP), and California Academy of Sciences (CAS).

Measurements and scalation were assessed from whole alcoholic specimens. These features of morphology and the corresponding abbreviations are defined as follows.

Measurements: snout to vent length (SVL), distance from snout to margin of vent; tail length (TL), distance from tail tip to margin of vent; head length (HDL), distance from anterior margin of external ear opening to tip of snout; head width (HDW), distance across head at subocular upper labials; snout length (SNL), distance from anterior margin of eye to tip of snout.

Scalation (follows Kluge 1965): supralabials, scales bordering lip margin of upper jaw posterior of rostral to below centre of eye; rostral, enlarged scale at tip of snout; supranasal, enlarged scale bordering nostril and contacting rostral anteriorly; postnasal, scales bordering nostril and contacting supranasal

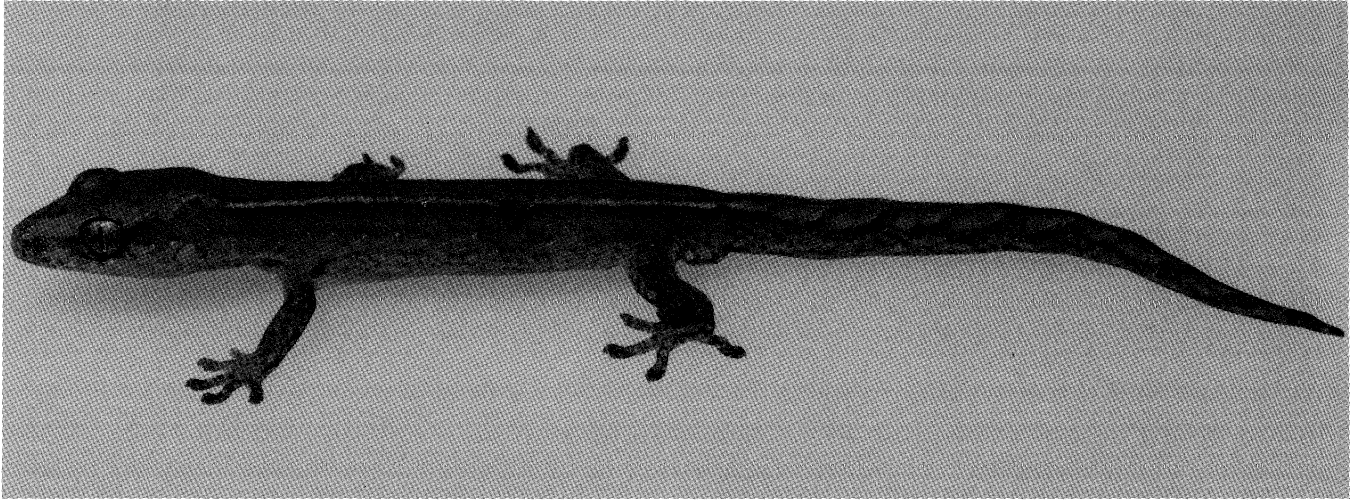


Fig.1. *Bavayia validiclavis* from Mount Panie (500m), New Caledonia.

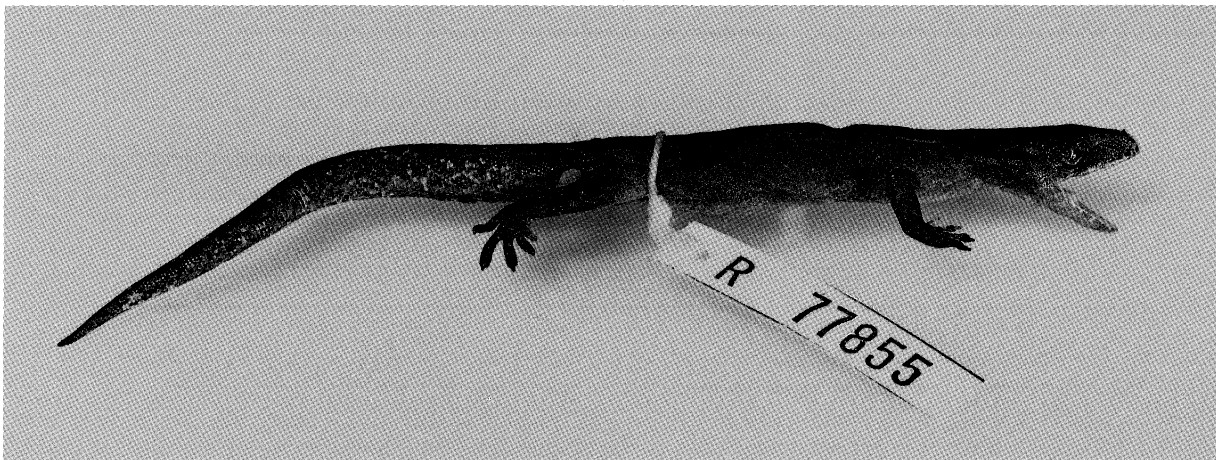


Fig.2. Holotype of *Bavayia validiclavis* AM R77855.

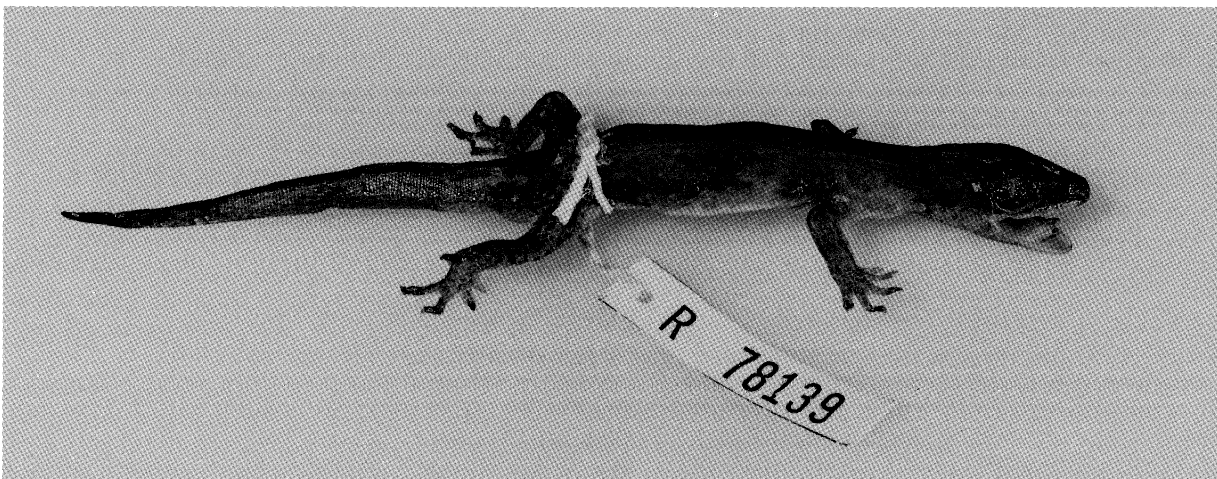


Fig.3. Holotype of *Bavayia septuiclavis* AM R78139.

anteriorly; internasal, scale bordering rostral and contacting supranasals laterally; first infralabial, scales either side of mental and bordering margin of lower jaw; preanal pores, external openings of preanal glands located within scales anterior to vent; cloacal spurs, enlarged projecting scales at lateroventral margin posterior to vent; lamellae, scales covering the underside of fourth digit from apical plate to margin separating third and fourth digits.

***Bavayia validiclavis* n.sp.**

Figs 1, 2, 4

Type material. HOLOTYPE: AM R77855 an adult male (Fig. 2) from Mount Panie (500–600 m), 20°33'S, 164°45'E, New Caledonia. Collected by R.A. Sadlier and P.R. Rankin, 17 Dec 1978. PARATYPES: QM J43980 Mandjelia near Pouebo, 20°23'S, 164°33'E; AM R77847, R77853-54, R77856-58, R77895, R77353, same locality as holotype; MNHP 1980-1067 Mount Panie.

Diagnosis. A small species of *Bavayia* (maximum SVL 45 mm) distinguished from its congeners by the following combination of features of scalation and colouration: claw of inner toe asymmetrically positioned within a groove in the apical lamella shield; 2 rows of preanal pores, 12–16 on anterior row; first pair of infralabials moderately to widely separated; supranasals separated by a large single internasal scale; dorsal colour pattern featuring a distinct, broad, pale vertebral stripe rather than variably defined dark, transverse bars.

Description. This description is based on 4 adult males (SVL 42–44 mm), 4 adult females (SVL 41–45 mm), and 1 subadult (37 mm). Only adults are included in the measurements.

Measurements: HDL 22.7–25.2% of SVL (\bar{x} = 23.5, n = 8); HDW 13.9–16.4% of SVL (\bar{x} = 15.1, n = 8); SNL 38.1–45% of HDL (\bar{x} = 42.9, n = 8); TL 109.3% of SVL (n = 1).

Scalation: supralabials 7–8 (66.6%, n = 9); nostrils each surrounded by rostral, supranasal, 1–2 (66.6%, n = 9) large upper postnasals, 1–2 (55.5%, n = 9) smaller lower postnasals, first supralabial scales; supranasals separated by large single internasal divided unevenly to form 2 scales in QM J43980; first pair of infralabials moderately to widely separated from contacting medially; preanal pores 12–16 (\bar{x} = 14.7, sd = 1.6, n = 4) on anterior row (continuity of AM R77853 broken at apex by single scale lacking a pore), 8–11 (\bar{x} = 9.7, sd = 1.1, n = 4) on posterior row; cloacal spurs 1–3, usually 2 (50%, n = 4); fourth toe lamellae 10–12 (\bar{x} = 11.1, sd = 0.6, n = 9), variably divided over length of digit.

Colouration: usually mid brown with light brown-tan vertebral stripe, defined on either side by a narrow pale stripe (paler than vertebral stripe) innermost and an adjacent narrow dark stripe (darker than general body colour) outermost. Light and dark edging to pale vertebral stripe most obvious

in region of fore limb but tending to fade posteriorly. Otherwise body colour mid grey (QM J43980, NHMP 1980-1067) or darker brown (AM R77857, R77895) with broad, pale vertebral stripe variably defined but always discernable. Supralabials each with a white blotch on posterior edge of each scale, infralabials, chinshields and throat with fine brown spotting, remainder of ventral surface with or without fine dark spotting. Tail with pale blotches (same colour as vertebral stripe) dark edged posteriorly.

Details of holotype: HDL 10.5 mm; HDW 6 mm; SNL 4 mm; supralabials 6/6; supranasal 1, postnasals 4 (2 uppermost large, 2 lowermost small); supranasals separated by large, single internasal; first pair of infralabials moderately separated from contacting medially. SVL 43 mm; preanal pores 16 on anterior row, 10 on posterior row; TL 47 mm, original; cloacal spurs 1/1; fourth toe lamellae 12/12 from distal tip to base of webbing between third and fourth toe, anteriormost undivided, following 3–4 with a median groove, remainder except most basal undivided.

Distribution and habits. *Bavayia validiclavis* occurs in the northeast ranges of the main island of New Caledonia. It is sympatric with both *B. montana* and *B. ornata* in closed forest habitat on the mid to lower slopes of Mount Panie in the north-east of the main island. Individuals were collected by day beneath rocks and logs on the forest floor. The area was not surveyed at night.

Etymology. The name is derived from the Latin *validus* (= strong) and *clavis* (= line or bar) and alludes to the distinctive vertebral stripe on the dorsal surface of this species.

***Bavayia septuiclavis* n.sp.**

Figs 3, 4

Type material. HOLOTYPE: AM R78139 an adult male from 4 km along Mount Gouemba road from turnoff on Yate-Goro road (300–350 m), 22°09'S, 166°54'E, New Caledonia. Collected by R.A. Sadlier and P.R. Rankin, 27 Dec 1978. PARATYPES: QM J44034, J44985, AM R125291-93 Riviere Bleu Forest Reserve, ca. 22°06'S, 166°40'E; AM R78140-41; R90193, same locality as holotype; AM R78339, R125888 Mount Koghis, 22°10'S, 166°32'E; AM R78234-36, 2 km north-east of Pic du Pin, Plaine de Lacs, 22°15'S, 166°50'E; MNHP 1985-120 and 1985-121, Vallee de la Coulee, 22°11'S, 166°36'E.

Diagnosis. A small species of *Bavayia* (maximum SVL 50 mm) distinguished from its congeners by the following combination of features of scalation and colouration: claw of inner toe asymmetrically positioned within a groove in the apical lamella shield; a single row of 8–14 preanal pores, often interrupted; first pair of infralabials usually narrowly to moderately separated; internasal region fragmented, usually with 3–5 small scales bordering the rostral; dorsal colour pattern featuring a broad

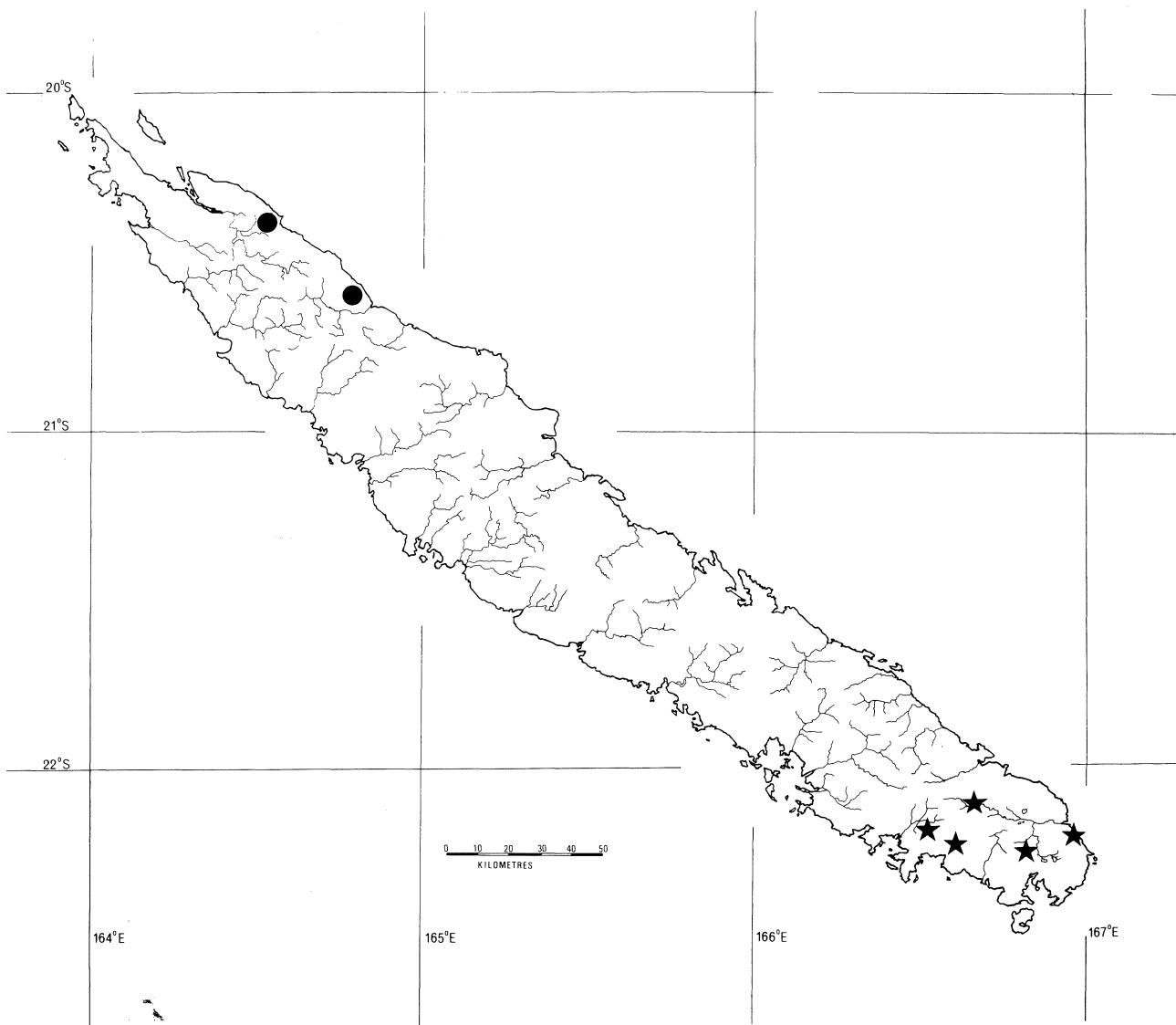


Fig.4. Distribution of *Bavayia validiclavis* (closed circle) and *Bavayia septuiclavis* (closed star).

but variably defined light vertebral stripe rather than dark transverse bars.

Description. This description is based on 5 adult males (SVL 45–49 mm), 6 adult females (SVL 44–50 mm) and 4 subadults (3 males SVL 36–42 mm and 1 female SVL 35 mm). Only adults are included in the measurements.

Measurements: HDL 22.4–25.4% of SVL (\bar{x} = 24.8, n = 11); HDW 14.4–17.8% of SVL (\bar{x} = 15.8, n = 11); SNL 40–43.8% of HDL (\bar{x} = 42.4, n = 11); TL 110.2% of SVL (n = 1).

Scalation: supralabials 7 (46.6%, n = 15), 8 (46.6%) or 9; nostrils each surrounded by rostral, supranasal, 2 (84.7, n = 15) – 3 large upper postnasals and 1 (26.7%, n = 15), 2 (66.7%) or 3 small lower postnasals, and first supralabial scales; supranasals separated by 1–5, usually 3 (66.7%, n = 15) scales in

the internasal region bordering the rostral; first pair of infralabials usually moderately to narrowly separated (80%, n = 15), rarely narrowly contacting; single row of 8–14 (\bar{x} = 10.4, sd = 1.8, n = 8) preanal pores, often interrupted by presence of 1–3 non-pore bearing scales medially, or towards end (MNHP 1985-120) of pore row; cloacal spurs 2 (62.5%, n = 8) – 3; fourth toe lamellae 11–12 (\bar{x} = 11.3, sd = 0.5, n = 15), variably divided over length of digit.

Colouration: light-mid brown or grey usually with an obscure lighter vertebral stripe (rarely obvious, as in MNHP 1985-120), variably defined anteriorly by faint, narrow, pale and/or dark markings either side. Most individuals with some pale (as light or lighter than vertebral stripe) spotting to the body outside of the vertebral stripe. Supralabials, infralabials, chinshields and throat variably pale or dark, usually

corresponding to the body colour, remainder of ventral surface pale.

Details of holotype: HDL 11.8 mm; HDW 7.5 mm; SNL 5 mm; supralabials 7/7; supranasal 1, postnasals 3 (2 uppermost large, lowermost smaller); supranasals separated by 3 small scales in the internasal region bordering the rostral; first pair of infralabials moderately separated medially; SVL 47 mm; preanal pores 8, row discontinuous, 4 pore bearing scales either side of a single non-pore bearing scale; TL 42 mm, reproduced; cloacal spurs 2/2; fourth toe lamellae 11/12 from distal tip to base, of webbing between third and fourth toe anteriormost undivided, remainder with a strong (distally) to weak (basally) median groove.

Distribution and habits. *Bavayia septuiclavis* occurs in the south of the main island of New Caledonia. *Bavayia septuiclavis* was sympatric with *B. sauvagii* at 2 localities. In mid-altitude closed forest habitat at Mount Gouemba both *B. septuiclavis* and *B. sauvagii* were active at night on trunks and branches of roadside trees, 0.5–2 metres above ground level. At Mount Koghis *B. septuiclavis*, *B. sauvagii* and *B. crassicollis* were active at night on the trunks and branches of trees bordering a clearing in mid-altitude closed forest habitat, and *B. septuiclavis* and *B. sauvagii* were collected sheltering by day beneath stones at the edge of the forest clearing.

Etymology. The name is derived from the Latin *septuosus* (= obscure) and *clavis* (= line or bar) and alludes to the obscure vertebral stripe on the dorsal surface of this species.

Comparison with Other Species

Morphology. In general body form and external appearance *B. validiclavis* and *B. septuiclavis* are most similar to one another. The broad, pale, vertebral stripe on the dorsal surface of *B. validiclavis* (distinct) and *B. septuiclavis* (discernable - obscure) will distinguish both these taxa from other species of *Bavayia*, all of which have dorsal colour patterns featuring pale, dark edged transverse blotches. *Bavayia validiclavis* and *B. septuiclavis* differ in the condition of the preanal pores (a double vs single row), the internasal region (supranasals separated by a single large scale vs supranasals separated by several small scales bordering the rostral), and in colouration by definition of the light vertebral stripe (see above).

The claw of the inner toe of *Bavayia* species is positioned either at the inner edge of an undivided apical lamella shield (*B. sauvagii*, *B. ornata*), or within an asymmetrically positioned groove at the distal edge of the apical lamella shield (*B. cyclura*, *B. crassicollis*, *B. montana*, *B. validiclavis*, *B. septuiclavis*). In the latter case the groove in which the claw is located is positioned off centre towards the inner edge of the toe. The positioning of the claw

of the inner toe within a groove in the apical lamella shield will serve to distinguish *B. validiclavis* and *B. septuiclavis* from both *B. sauvagii* and *B. ornata*. *Bavayia validiclavis* may be further distinguished from *B. sauvagii* and *B. ornata* in having a double vs a single row of preanal pores.

Bavayia validiclavis and *B. septuiclavis* share the positioning of the claw of the inner toe (above) with *B. cyclura*, *B. crassicollis* and *B. montana*. Aside from colouration (see above) both *B. validiclavis* and *B. septuiclavis* can be further distinguished from *B. cyclura*, *B. crassicollis* and *B. montana* in having fewer, 10–12 vs 12–16, subdigital lamellae. *Bavayia septuiclavis* can be further distinguished from these taxa in having a single vs a double row of preanal pores.

Distribution. *Bavayia validiclavis* and *B. septuiclavis* are allopatrically distributed. *Bavayia validiclavis* occurs in the northern part of the island ca. 200–250 km distant from the nearest recorded *B. septuiclavis*. *Bavayia septuiclavis* is restricted to but widespread over the southern part of island, a pattern of distribution shared with the gekkonid lizard species *Rhacodactylus auriculatus* and *Rhacodactylus sarasinorum*, and the scincid lizards *Graciliscincus shonae*, *Tropidoscincus rohssii*, *Sigaloseps deplanchei* and *Nannoscincus mariei* (Sadlier 1986). The apparent absence of *B. validiclavis* or *B. septuiclavis* from the central part of the main island is unlikely to be an artifact of collection. In this region substantial collections have been made on the east coast in the vicinity of Canala (21°32'S) by Roux and Sarasin, and in the central highlands (500 m above sea level) at Mount Aoupinie (ca. 21°08'S) by Sadlier and Rankin. Based on my examination of these collections no specimens of either of the new species described here have been collected.

Bavayia validiclavis and *B. septuiclavis* have each been recorded sympatric with 1–2 other *Bavayia* species. The general distribution pattern of *Bavayia* over the main island is that at most localities a member of each inner toe type occur in sympatry, and that the species with the condition in which the claw is positioned within a groove in the apical lamella shield shelters by day in aboreal refuges and the species with the claw positioned on the inner edge of an undivided apical lamella shield shelters by day in terrestrial refuges. *Bavayia validiclavis* and *B. septuiclavis* are anomalous in not sharing the aboreal sheltering habits of the species with which they share inner toe morphology, but rather occupy similar habitats, and in some cases occur in microsympatry with those species having different inner toe morphology.

Key to the Genus *Bavayia*

1. Claw of inner digit of manus and pes positioned within a groove in the apical lamella scale, the outer part of which is larger 2
 —Claw of inner digit of manus and pes positioned on inner edge of the undivided apical lamella scale 6
2. Moderately small species with maximum SVL 50 mm; colour pattern of dorsal surface longitudinally orientated, featuring a broad, light vertebral stripe 3
 —Moderate to large sized species with maximum SVL greater than 60 mm; colour pattern of dorsal surface transversely aligned, featuring a series of large, variably defined, pale blotches each edged with a dark bar posteriorly 4
3. Preanal pores in 2 distinct rows; supranasals usually separated by a single internasal scale; from northeast ranges of main island *Bavayia validiclavis*
 —Preanal pores in a single row; internasal region fragmented, usually with 3–5 scales bordering rostral; from south of 22°09'S on main island *Bavayia septuiclavis*
4. Preanal pores (males only) usually 20 or more on anterior row; first pair of infralabials usually in moderate to broad contact medially; from central and northern highlands of main island *Bavayia montana*
 —Preanal pores (males only) usually less than 20 on anterior row; first pair of infralabials usually narrowly to moderately separated 5
5. Moderate sized species with maximum SVL 63 mm; nape variably with obscure to distinct, pale laterodorsal bars tending to converge medially towards forelimbs, dorsal surface of body posterior to forelimbs variably with obscure to distinct dark transverse edging to pale blotches; from north-east and south-west lowlands of main island, and Ouvea, Lifou and Mare Islands of the Loyalty Islands group *Bavayia cyclchura*
 —Large species with maximum SVL 80 mm; nape usually with indistinct pale laterodorsal bars, dorsal surface of body posterior to forelimbs with obscure dark edging to poorly defined pale blotches; from south-east lowlands of main island, and Lifou and Mare Islands of Loyalty Islands group *Bavayia crassicollis*
6. Cloacal spurs (males only) rounded, blunt at tips; lateral surface and hindlimbs brown with numerous pale spots contrasting boldly with dark body colour; from north-east ranges of main island *Bavayia ornata*
 —Cloacal spurs (males only) wedge-shaped, pointed at tips; lateral surface and hindlimbs without distinct pattern of pale spots, at best a few pale spots or blotches variably distinct from darker base colour; from north-east and southern lowlands of main island, and Mare Island of Loyalty Islands group *Bavayia sauvagii*

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