Zootaxa 5881 (3): 327–349
https://www.mapress.com/zt/
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Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.5881.3.2
http://zoobank.org/urn:lsid:zoobank.org:pub:062BA8D8-B19B-4A21-B6BD-263411636E8F

A new species of *Lepidodactylus* (Squamata: Gekkonidae) from North Borneo, with additional morphological data for *L. ranauensis* Ota & Hikida, 1988

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Abstract

A new species of *Lepidodactylus* is described from Gunung Alab in the Crocker Range in Sabah, East Malaysian Borneo. It is the sister species of *Lepidodactylus ranauensis* which occurs on Mount Kinabalu. Apart from its allopatric distribution, the new species, *Lepidodactylus crockerensis* **sp. nov.** is genetically distinct from its closest congeners and can be further distinguished based on statistically different aspects of its morphological measurements and digital scalation. The new species can be further separated from other species of *Lepidodactylus* by having the unique combination morphological characters: 10–14 subdigital lamellae on fourth toe; slight webbing between toes III and IV; 32–40 contiguous, pore-bearing, femoro-precloacal pores in males; tail subcylindrical without a lateral fringe of enlarged scales; dorsum in life varies from brownish-grey in its light phase with lighter grey mottling and chevron markings or spots in vertebral region to dark brown in its dark phase with markings in light brown or cream; pair of sacral spots present in some specimens; top of tail banded, venter beige to cream with mottling; underside of limbs and cloacal region yellowish, and underside of tail cream to salmon coloured. We also provide additional morphological measurements for *L. ranauensis* that was previously described based on a single specimen. *Lepidodactylus crockerensis* **sp. nov.** is the third species of the genus recorded from Borneo and highlights the importance of the Crocker Range in Sabah as a site for herpetological discoveries and insular and montane endemism.

Key words: East Malaysia, biodiversity, endemic, herpetology, herpetofauna, Mourning gecko, reptile, Sabah, conservation, upland

Introduction

Lizards of the gecko genus *Lepidodactylus* Fitzinger, 1843 are sometimes referred to as mourning or scaly-toed geckos (Grismer 2011; Das 2025). It is a modest radiation of 47 species of which the majority are endemic to Southeast Asia, Indo-Australia, and Oceania (Malkmus *et al*. 2002; Grismer 2011; Uetz *et al*. 2026). These are generally small, slender, nondescript geckos often associated with anthropogenic habitats, and some have become almost strict human commensals (Grismer 2011). Some species are parthenogenetic and females usually lay a pair of hard-shelled eggs (Malkmus *et al*. 2002; Grismer 2011). Prey consist of insects and other small invertebrates as well as nectar and plant juices (Malkmus *et al*. 2002; Das 2004, 2006a, 2025).

Accepted by A. Bauer: 25 Aug. 2026; published: 22 Sept. 2026

In Borneo, two species are known, the widespread, parthenogenetic species *Lepidodactylus lugubris* (Duméril & Bibron 1836) and the sexually reproducing upland species *L. ranauensis* Ota & Hikida 1988. The latter is endemic to Borneo and restricted to the vicinity of Mount Kinabalu in Sabah (Tan 1993; Malkmus *et al*. 2002; Das 2004, 2006a, 2025; Bauer & Das 2024). During recent fieldwork, a new upland population of geckos was discovered from a different mountain range in Sabah and were identified as belonging to the genus *Lepidodactylus*, in lacking eyelids; having pupils vertical-oval; finger and toes occasionally webbed at bases; transversely expanded, usually undivided and sometimes divided subdigital lamellae, V-shaped distally; a well-developed, clawless, inner digit I on the hands and feet; distal portions of the digits fused to the lamellar pad, not being free; males with precloacal and femoral or femoro-precloacal pores; and lacking flaps of skin along the ventrolateral margins of the body and tail (Malkmus *et al*. 2002; Grismer 2011; Das 2025). However, it could not be assigned to any known species and is therefore described as a new species herein. In addition, morphological characters are provided for additional specimens of *L. ranauensis* to expand its description as it was previously described based on a single male specimen.

Material and methods

Fieldwork and sampling.—Specimens were collected by hand, photographed, euthanised with Tricaine (Ethyl 3-aminobenzoate methanesulfonate), fixed in 10% formalin before transferred to 70% ethanol solution for storage (Simmons 2015). Prior to fixation, samples of liver tissue were extracted and stored in 100% nondenatured ethanol for later molecular analyses. The newly collected specimens were deposited at the Institute for Tropical Biology and Conservation Zoological Collection (BORNEENSIS), Universiti Malaysia Sabah (Ng *et al*. 2026). The study was conducted under applicable permits from the Sabah Biodiversity Centre (SaBC) [JKM/MBS.1000-2/2 JLD.20 (103–106) and JKM/MBS.1000/ALR/2026/0005–0007] and the Board of Trustees of Sabah Parks (TTS 100-6/2 Jld. 34 and TTS 100-6/2 Jld. 43). Comparative material was loaned from Sabah Parks, while measurements of the holotype of *L. ranauensis* were extracted from the original description (Ota & Hikida 1988). A second specimen is known and illustrated in Das (2004, 2025) and currently deposited at the Lee Kong Chian Natural History Museum, Singapore (ZRC 2.5300) (Das *in litt*. 2026) but was not available to us for comparison in the present study.

Museum abbreviations are: **BORNEENSIS** (**BOR**) **HEP** (Institute for Tropical Biology and Conservation (ITBC) Zoological Collection [Herpetology], Universiti Malaysia Sabah (UMS)); **OMNH** (Osaka Museum of Natural History, Osaka); and **SP** (Sabah Parks Collection, Sabah, Malaysia) (Sabaj 2020).

Molecular data and genetic analyses.—***DNA extraction and amplification.*** All extractions were performed using the Qiagen DNeasy Blood & Tisuue DNA Kit following manufacturer's protocol. Genomic DNA was extracted from liver samples of two *Lepidodactylus* specimens from Gunung Alab, Sabah (BOR HEP 3431 & 3432). All extracted DNA was stored at -20°C in the ITBC, UMS. The mitochondrial genome coding for the NADH dehydrogenase 2 (ND2) protein served for all samples and amplified via polymerase chain reaction (PCR) using the primer pair ND2-metF6 5'-AAGCTTTCGGGCCCATACC-3' and ND2-co1R1 5'-AGRGTGCCAATGTCTTTGTGRTT-3' (Macey *et al*. 1999). The 25 µL PCR mixture consisted of 12.5 µL EconoTaq PLUS 2X mastermix, 0.5 µL 10 mM each primer, 9.5 µL distilled water, and 2 µL extracted genomic DNA solution. Gene AMP PCR program was used to amplify gene regions on a Bio Rad T100 Thermal Cycler. PCR cycling parameters followed Welton *et al*. (2010): 4 min at 94°C, followed by 35 cycles of 30 s at 94°C, 30 s at 52°C, and 1 min 30 s at 72°C, with a final elongation at 72°C for 7 min. For electrophoresis, a mixture of 1% agarose was used. Successful PCR products were sent to Apical Scientific sequencing laboratory (Selangor, Malaysia) for PCR purification and sequencing process to obtain sequencing results.

Phylogenetic analyses. A total of 21 samples of *Lepidodactylus* ND2 sequences were obtained from GenBank and the sequences of two specimens from Gunung Alab (PZ788732 & PZ788733) were added to the matrix for the phylogenetic analyses (Table 1). *Luperosaurus macgregori* (JQ437905) and *Luperosaurus cumingii* (JX515623) were used as outgroups based on (Oliver *et al*. 2018). All 26 sequences were trimmed to the same 1022-bp length and aligned using default parameters in MUSCLE. Maximum Likelihood (ML) phylogenetic trees were generated using the CIPRES Science Gateway using RAxML-HPC BlackBox, with the GTR+G substitution model and bootstrap replicates to assess nodal support. Bayesian inference (BI) was conducted in CIPRES using MrBayes (v3.2.7a), with two independent runs of four chains each, a chain temperature of 0.2, and 30 million generations sampled every 3000 generations. Convergence and effective sample sizes (ESS) of parameters were assessed in

Tracer v1.7.2 (Rambaut *et al*., 2018), ensuring ESS values exceeded 200 after discarding the first 25% of samples as burn-in. Resulting trees with their posterior probabilities and bootstrap values were visualized in FigTree 1.4.4 and edited for presentation in Inkscape 1.3.2. We considered Bayesian posterior probabilities (BPP) of 0.95 and above and ML bootstrap support values (BS) of 70 and above as strong nodal support (Douady *et al*. 2003; Huelsenbeck & Rannala 2004). *p*-distances were calculated in MEGA 12.1.2 using the pairwise deletion option (Kumar *et al*. 2024). The number of base substitutions per site between sequences is shown Table 2.

TABLE 1. Information for the specimens used for phylogenetic analyses in this study. Refer to the original sources for abbreviations of the voucher numbers.

Taxa	Voucher_no	Origin	Genbank_No.	Source
L. aureolineatus	ABTC 50554	Philippines	MG780702	Oliver *et al*. 2018
L. aureolineatus	ACD 6368	Philippines	MG780701	Oliver *et al*. 2018
L. bakingibut	KU 330065	Philippines	MG780782	Oliver *et al*. 2018
L. bakingibut	PNM 9875	Philippines	MW234409	Eliades *et al*. 2021
L. balioburius	KU 314000	Philippines	MG780703	Oliver *et al*. 2018
L. balioburius	KU 314002	Philippines	MG780705	Oliver *et al*. 2018
L. bisakol	PNM 9874	Philippines	MW234407	Eliades *et al*. 2021
L. bisakol	OMNH 46003	Philippines	MW234408	Eliades *et al*. 2021
L. christiani	ABTC 32655	Philippines	MG780711	Oliver *et al*. 2018
***L. crockerensis* sp. nov.**	**BOR HEP 03431**	**Malaysia**	**PZ788732**	**this study**
***L. crockerensis* sp. nov.**	**BOR HEP 03432**	**Malaysia**	**PZ788733**	**this study**
L. guppyi	MNHN 2004.94	Solomon Island	JX515612	Heinicke *et al*. 2012
L. guppyi	ABTC 50473	Solomon Island	MG780717	Oliver *et al*. 2018
L. herrei	PNM 9688	Philippines	MG780720	Oliver *et al*. 2018
L. herrei	RMB 4331	Philippines	JQ173540	Siler *et al*. 2012
L. lugubris	ABTC 136591	Oceania	MG780727	Oliver *et al*. 2018
L. lugubris	ABTC 50415	Oceania	MG780728	Oliver *et al*. 2018
L. nakahiwalay	KU 327768	Philippines	MG780786	Oliver *et al*. 2018
L. planicauda	ACD 1606	Philippines	MG780773	Oliver *et al*. 2018
L. ranauensis	ID7174	Malaysia	MG780776	Oliver *et al*. 2018
Lepidodactylus sp.	TNHC 59447	Indonesia	MG780802	Oliver *et al*. 2018
Lepidodactylus sp.	ABTC 50544	French Polynesia	MG780812	Oliver *et al*. 2018
Lepidodactylus sp.	ABTC 50545	French Polynesia	MG780813	Oliver *et al*. 2018
Luperosaurus cumingii	RMB 3546	Outgroup	JX515623	Heinicke *et al*. 2012
Luperosaurus macgregori	KU 314021	Outgroup	JQ437905	Brown *et al*. 2012

Morphological data and analyses.—***Morphometric characters.*** For comparability, character coding and data acquisition for all morphological characters were adapted from Ota & Hikida (1988). Measurements were taken on the right side of the body whenever possible to the nearest 0.1 mm using Mitutoyo digimatic callipers under a binocular Olympus S761 dissecting microscope. The following measurements were taken: snout-vent length (**SVL**), taken from the tip of the snout to the vent; tail length (**TaL**), taken from the vent to the tip of the tail; head length (**HL**), the distance from the posterior margin of the retroarticular process to the tip of the snout; head width (**HW**), measured at the angle of the jaws; head depth (**HD**), the maximum height of head measured from the occiput to base of the lower jaws; snout to eye length (**SNE**), measured from anteriormost margin of the bony orbit to the tip of snout; eye diameter (**ED**), the greatest horizontal diameter of the eye-ball; eye to ear distance (**EE**), measured from the anterior edge of the ear opening to the posterior edge of the bony orbit; internasal distance (**IND**), measured between the nares across the rostrum; snout to base of forelimb length (**SN-FL**), measured from tip of snout to the anterior margin of the forelimb at its insertion point on the body; forelimb length (**FLL**), taken on the ventral surface

from middle of upper arm at its insertion point to the body to the tip of the fourth finger; axilla to groin length (**AG**), taken from the posterior margin of the forelimb at its insertion point on the body to the anterior margin of the hind limb at its insertion point on the body; hind limb length (**HLL**), taken on the ventral surface at its insertion point on the body to the tip of the fourth toe (Table 3).

***Meristic characters* (Table 3).** Scale counts recorded were supralabial scales (**SupL**), counted from the largest scale immediately posterior to the dorsal inflection of the posterior portion of the upper jaw to the rostral scale; supralabials contacting eye (**SupL-Eye**), the number supralabial scales in contact with bony orbit; infralabial scales (**InfL**), counted from the largest scale immediately posterior to the dorsal inflection of the posterior portion of the upper jaw to the mental scale; inter-orbital scales (**IOB**), counted between the midpoint of orbits across the head; mid-body scale rows (**MB**), counted in a straight line across the dorsum and venter midway between limb insertions; number of femoro-precloacal pores in males (**FPP**), total number of a contiguous series of pore-bearing scales in precloacal and femoral regions; the number of expanded subdigital lamellae on fingers I–V (**1FL–5FL**); the number of expanded subdigital lamellae on toes I–V (**1TL–5TL**); condition of webbing between toes III and IV; and the number of cloacal spurs in both sexes.

Statistical analyses—All statistical analyses were conducted using GroupStruct2 (Chan & Grismer 2026), a Shiny R-based application with a full graphical user interface. The GroupStruct2 package automatically tests for normality and homogeneity of variance in all numerical data and selects the appropriate statistical tests, ANOVA or Kruskal-Wallis, followed by the appropriate ad hoc tests, TukeyHSD or Dunn, respectively. Summary statistics were generated to compare the three new specimens from Gunung Alab with five specimens of *L. ranauensis*.

Multiple factor analysis (MFA) (Husson *et al*. 2017, Kassambara & Mundt 2017) was used to compare differences and similarities in morphospace of the individuals of *L. ranauensis* and the specimens from Gunung Alab. The MFA utilised a concatenated data set comprised of 12 size-corrected morphometric (SVL, HL, HW, HD, SNE, ED, EE, IND, SN-FL, FLL, AG, and HLL) and 14 meristic (SupL, InfL, IOB, MB, 1FL, 2FL, 3FL, 4FL, 5FL, 1TL, 2TL, 3TL, 4TL, and 5TL) characters for a nearly total evidence morphological dataset (Table 3). MFA is a global, unsupervised, multivariate analysis that incorporates qualitative and quantitative data simultaneously, making it possible to include different data types. All data types are standardized, preventing one from overleveraging the output (Grismer 2025). Means were used for characters with paired metrics. The morphometric characters were size-corrected (Chan & Grismer 2022) to remove potential effects of allometry.

Results

The ML and BI analyses recovered strongly supported trees with identical topologies (Fig. 2) and indicate that the new population from Gunung Alab forms its own strongly supported monophyletic group (BS 100/BPP 1.00) The analyses also strongly support (100/1.00) the Gunung Alab population's sister species relationship to *L. ranauensis*. The Gunung Alab specimens further differ from *L. ranauensis* by an uncorrected pairwise sequence divergence of 2.9%, and 25.3–30.1 % from all other species (Table 2).

The MFA recovered the Gunung Alab population as being widely separated from its closest relative *L. ranauensis* along the first dimension (Dim 1) which accounted for 50.6% of the variation in the dataset. Dim 2 accounted for an additional 18.3%, totaling 68.9% (Fig. 3). The morphometric and meristic data contributed nearly equally to the variation in the dataset in Dim 1, while the meristic data contributed to the majority of variation along Dim 2 (Fig. 4A). 2FL and 5FL contributed most to the variation in Dim 1 and IOB, MB, and 2TL were the leading contributors of variation along Dim 2 (Fig. 4B). The PERMANOVA analysis recovered significant differences between *L. ranauensis* and the Gunung Alab population (R^2 =0.47; F=5.3203; p=0.0179). The ANOVA recovered significantly different mean values for HL (p-adjusted=0.0326), HW (p-adjusted=0.04387), HD (p-adjusted=0.006629), SNE (p-adjusted=0.0005839), EE (p-adjusted=0.01214), IND (p-adjusted=0.04407), SN-FL (p-adjusted=0.0009964), AG (p-adjusted=0.0003946), and 2FL (p-adjusted=0.01354) (Table 4). These differences are illustrated in Figure 5.

The genetic and significantly different morphospatial and morphological differences between the upland populations of *L. ranauensis* and that of Gunung Alab, concomitant with their allopatric separation of approximately 36 km air distance, in two different mountain ranges (Mount Kinabalu and the Crocker Range, respectively) across uninhabitable lowlands is taken as sufficient evidence to hypothesize that the Gunung Alab population represents an undescribed species, and as such, describe it below.

TABLE 2. Uncorrected pairwise sequence divergences (%) of the ND2 gene among the examined species of *Lepidodactylus*.

	1	2	3	4	5	6	7	8	9	10	11	12	13
MG780701—*Lepidodactylus aureolineatus*													
MG780702—*Lepidodactylus aureolineatus*	0.121												
JQ173540—*Lepidodactylus herrei*	0.198	0.183											
MG780720—*Lepidodactylus herrei*	0.197	0.183	0.003										
MG780773—*Lepidodactylus planicauda*	0.224	0.216	0.213	0.213									
MG780727—*Lepidodactylus lugubris*	0.211	0.204	0.180	0.180	0.165								
MG780728—*Lepidodactylus lugubris*	0.209	0.203	0.177	0.177	0.164	0.001							
MG780711—*Lepidodactylus christiani*	0.261	0.235	0.237	0.236	0.259	0.232	0.235						
MG780703—*Lepidodactylus balioburius*	0.233	0.235	0.243	0.243	0.248	0.257	0.255	0.202					
MG780705—*Lepidodactylus balioburius*	0.234	0.237	0.242	0.242	0.249	0.258	0.257	0.201	0.001				
MG780786—*Lepidodactylus nakahiwalay*	0.244	0.238	0.249	0.249	0.247	0.258	0.257	0.208	0.125	0.124			
MG780782—*Lepidodactylus bakingibut*	0.238	0.238	0.252	0.252	0.253	0.252	0.250	0.186	0.124	0.123	0.121		
MW234409—*Lepidodactylus bakingibut*	0.242	0.241	0.255	0.255	0.259	0.235	0.239	0.188	0.123	0.122	0.123	0.001	
MW234407—*Lepidodactylus bisakol*	0.252	0.249	0.254	0.255	0.253	0.233	0.235	0.196	0.133	0.131	0.136	0.101	0.102
MW234408—*Lepidodactylus bisakol*	0.247	0.246	0.256	0.257	0.253	0.233	0.236	0.197	0.132	0.130	0.134	0.101	0.102
MG780802—*Lepidodactylus* sp. Indonesia	0.253	0.255	0.261	0.261	0.261	0.250	0.252	0.206	0.209	0.211	0.186	0.202	0.196
MG780812—*Lepidodactylus* sp. French Polynesia	0.260	0.259	0.257	0.257	0.265	0.247	0.252	0.219	0.204	0.203	0.207	0.201	0.195
MG780813—*Lepidodactylus* sp. French Polynesia	0.260	0.259	0.257	0.257	0.265	0.247	0.252	0.219	0.204	0.203	0.207	0.201	0.195
BOR HEP 03432—*Lepidodactylus crockerensis* **sp. nov.**	0.294	0.292	0.271	0.271	0.287	0.273	0.278	0.276	0.297	0.296	0.292	0.301	0.290
BOR HEP 03431- *Lepidodactylus crockerensis* **sp. nov.**	0.294	0.292	0.271	0.271	0.287	0.273	0.278	0.276	0.297	0.296	0.292	0.301	0.290
MG780776—*Lepidodactylus ranauensis*	0.306	0.301	0.275	0.274	0.294	0.276	0.283	0.284	0.312	0.311	0.297	0.310	0.296
JX515612—*Lepidodactylus guppyi*	0.279	0.273	0.271	0.270	0.301	0.283	0.287	0.260	0.286	0.285	0.280	0.273	0.264
MG780717—*Lepidodactylus guppyi*	0.294	0.294	0.280	0.279	0.300	0.292	0.294	0.265	0.289	0.287	0.287	0.286	0.278
JQ437905—*Luperosaurus macgregori*	0.320	0.325	0.315	0.314	0.331	0.317	0.324	0.298	0.327	0.328	0.315	0.321	0.317
JX515623—*Luperosaurus cumingii*	0.304	0.311	0.300	0.300	0.298	0.300	0.302	0.296	0.311	0.310	0.318	0.313	0.312

.....continued on the next page

TABLE 2. (Continued)

	14	15	16	17	18	19	20	21	22	23	24	25
MG780701—*Lepidodactylus aureolineatus*												
MG780702—*Lepidodactylus aureolineatus*												
JQ173540—*Lepidodactylus herrei*												
MG780720—*Lepidodactylus herrei*												
MG780773—*Lepidodactylus planicauda*												
MG780727—*Lepidodactylus lugubris*												
MG780728—*Lepidodactylus lugubris*												
MG780711—*Lepidodactylus christiani*												
MG780703—*Lepidodactylus balioburius*												
MG780705—*Lepidodactylus balioburius*												
MG780786—*Lepidodactylus nakahiwalay*												
MG780782—*Lepidodactylus bakingibut*												
MW234409—*Lepidodactylus bakingibut*												
MW234407—*Lepidodactylus bisakol*												
MW234408—*Lepidodactylus bisakol*	0.004											
MG780802—*Lepidodactylus* sp. Indonesia	0.186	0.185										
MG780812—*Lepidodactylus* sp. French Polynesia	0.183	0.182	0.164									
MG780813—*Lepidodactylus* sp. French Polynesia	0.183	0.182	0.164	0.000								
BOR HEP 03432—*Lepidodactylus crockerensis* **sp. nov.**	0.278	0.279	0.284	0.266	0.266							
BOR HEP 03431- *Lepidodactylus crockerensis* **sp. nov.**	0.278	0.279	0.284	0.266	0.266	0.000						
MG780776—*Lepidodactylus ranauensis*	0.289	0.289	0.287	0.277	0.277	0.029	0.029					
JX515612—*Lepidodactylus guppyi*	0.264	0.263	0.275	0.275	0.275	0.253	0.253	0.272				
MG780717—*Lepidodactylus guppyi*	0.268	0.267	0.276	0.280	0.280	0.258	0.258	0.272	0.054			
JQ437905—*Luperosaurus macgregori*	0.307	0.309	0.315	0.320	0.320	0.266	0.266	0.275	0.241	0.237		
JX515623—*Luperosaurus cumingii*	0.311	0.313	0.300	0.326	0.326	0.281	0.281	0.285	0.251	0.242	0.154	

TABLE 3. Scale counts and selected measurements (mm) for the type series of *Lepidodactylus crockerensis* **sp. nov.** and the examined *L. ranauensis* specimens. Paired characters are given in left/right order. + = presence, - = absence, NA = no data available. *data obtained from Ota & Hikida 1988.

Species	***Lepidodactylus ranauensis***					***Lepidodactylus crockerensis* sp. nov.**		
Catalogue number	OMNH R2327* (Holotype)	SP 06865	SP 06866	SP 06867	SP 06868	BOR HEP 03431	BOR HEP 03432	BOR HEP 03509
Locality	Ranau	Kinabalu Park HQ	Kinabalu Park HQ	Kinabalu Park HQ	Kinabalu Park HQ	Gunung Alab	Gunung Alab	Gunung Alab
Sex	Male	Female (gravid)	Female	Female	Female	Male	Male	Male
SVL	45.0	43.0	47.5	46.5	46.0	49.0	38.0	34.0
TaL	NA	42.0	46.5	47.0 (broken)	47.0	43.0	45.0	33.0
HL	11.0	10.0	11.0	11.0	10.9	11.3	9.7	8.2
HW	8.5	7.6	8.4	8.7	8.1	8.5	6.7	6.9
HD	5.3	4.6	5.6	5.6	5.6	4.9	3.9	4.0
SNE	4.8	4.3	4.7	4.9	4.8	4.7	4.1	3.7
ED	2.9	2.0	2.3	2.1	2.0	2.2	1.9	1.6
EE	3.6	3.1	3.6	3.6	3.6	3.7	3.1	3.0
IND	2.0	1.7	2.2	2.0	2.2	2.0	1.6	1.7
SN-FL	15.9	15.7	16.4	16.9	16.4	17.8	14.5	13.3
FLL	13.1	10.2	11.0	12.3	10.4	11.6	9.2	9.2
AG	23.4	20.5	24.9	22.4	22.1	22.2	17.4	15.7
HLL	17.0	15.5	14.4	15.9	15.6	16.5	14.9	13.5
SupL	9/9	9/9	9/9	10/9	10/10	10/10	11/10	10/9
SupL-Eye	7 & 8/ 7 & 8	7 & 8/ 6 & 7	7 & 8/ 7 & 8	8 & 9/ 7 & 8	7 & 8/ 7 & 8	7 & 8/ 7 & 8	9 & 10/ 7 & 8	8 & 9/ 7 & 8
InfL	9–10	10/10	10/8	9/10	10/11	9/10	11/10	11/10
IOB (Inter-orbital scales)	37	23	26	29	30	29	32	30
MB (Mid-body scale rows)	108	90	97	105	94	90	101	100
FPP (Femoro-precloacal pores)	37	-	-	-	-	39	32	40
Cloacal spurs	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
Webbing of toes III & IV	Slight	Slight	Slight	Slight	Slight	Slight	Slight	Slight
1FL	8/8	7/8	7/7	7/8	8/8	7/7	7/6	6/6
2FL	9/8	8/9	9/9	9/9	9/9	8/8	7/8	7/8
3FL	11/11	10/11	11/11	11/12	11/11	11/11	9/11	9/9
4FL	12/12	13/12	12/13	13/13	13/12	12/13	10/10	10/10
5FL	10/9	9/9	10/10	9/10	9/9	9/9	7/8	8/8
1TL	8/8	7/8	7/8	8/8	7/8	8/8	7/7	7/8
2TL	8/9	10/10	8/10	8/9	9/9	10/9	8/9	8/8
3TL	12/12	12/13	13/13	13/13	12/12	12/8	12/11	11/12
4TL	15/15	16/16	16/15	12/12	16/15	10/10	12/13	14/14
5TL	10/10	10/9	9/10	10/10	9/9	8/7	10/9	8/8

TABLE 4. Statistically significant differences ($p < 0.05$) in size-corrected morphometric and meristic character means for *Lepidodactylus crockerensis* **sp. nov.** and *L. ranauensis*. * = significantly different characters. Character abbreviations are in the Materials and methods.

Morphometric			**Meristic**		
Character	*p*-adjusted	Type of test	Character	*p*-adjusted	Type of test
*AG	**0.0003946**	t-test	1FL	0.05004	Wilcoxon
ED	0.07994	t-test	*2FL	**0.01354**	Wilcoxon
*EE	**0.01214**	t-test	3FL	0.2416	Wilcoxon
FLL	0.05867	t-test	4FL	0.1685	Wilcoxon
*HD	**0.006629**	t-test	5FL	0.05834	Wilcoxon
*HL	**0.0326**	t-test	1TL	0.3017	Wilcoxon
*HW	**0.04387**	t-test	2TL	0.6242	Wilcoxon
HLL	0.1783	t-test	3TL	0.1582	Wilcoxon
*IND	**0.04407**	t-test	4TL	0.1266	Wilcoxon
*SN-FL	**0.0009964**	t-test	5TL	0.1685	Wilcoxon
*SNE	**0.0005839**	t-test	InfL	0.2899	Wilcoxon
SVL	0.3403	t-test	IOBs	0.6174	t-test
			MB	0.7261	t-test
			SupL	0.1025	Wilcoxon

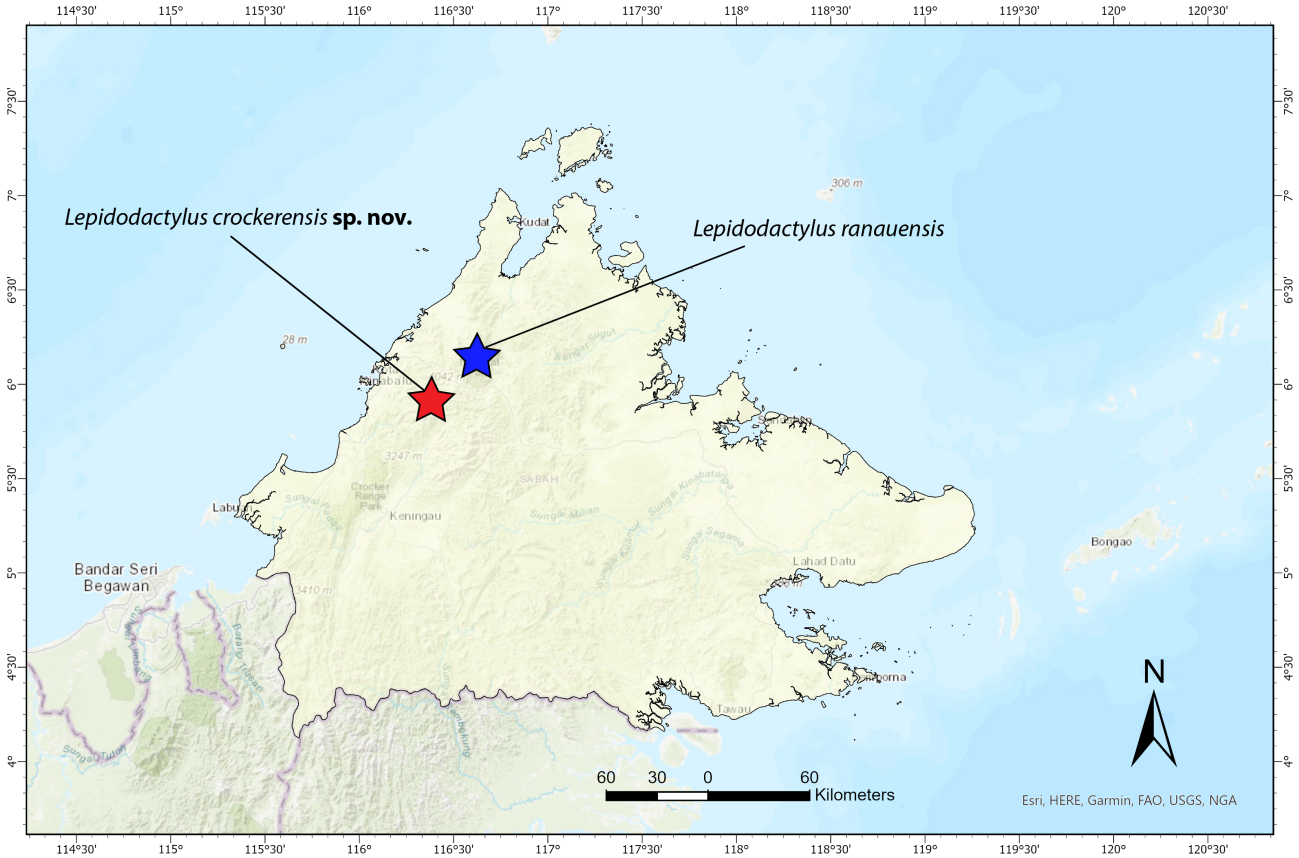


FIGURE 1. Distribution of *Lepidodactylus crockerensis* **sp. nov.** at Gunung Alab and *L. ranauensis* around the vicinity of Mount Kinabalu, Sabah.

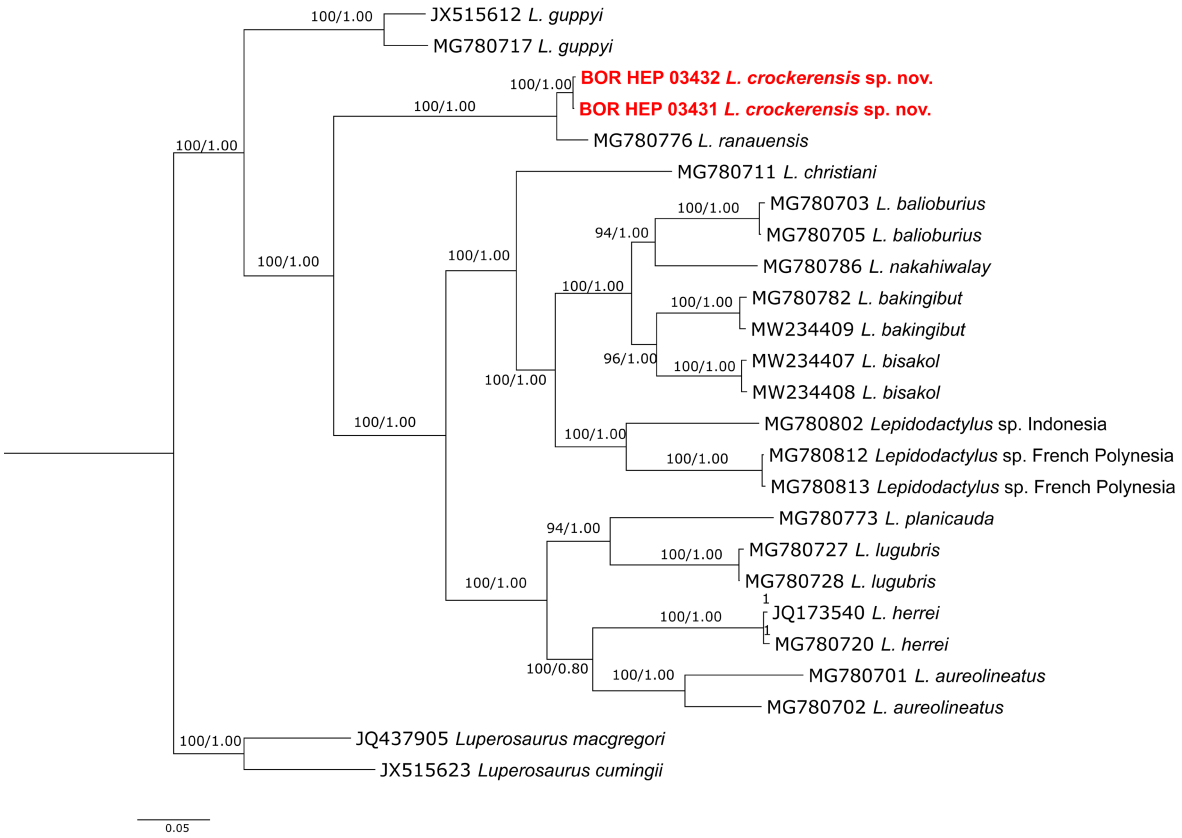


FIGURE 2. Maximum Likelihood (ML) phylogram of selected *Lepidodactylus* species highlighting the phylogenetic position of *Lepidodactylus crockerensis* **sp. nov.** Nodal support is indicated by ML bootstrap (BS) and Bayesian posterior probability (BPP) values, respectively.

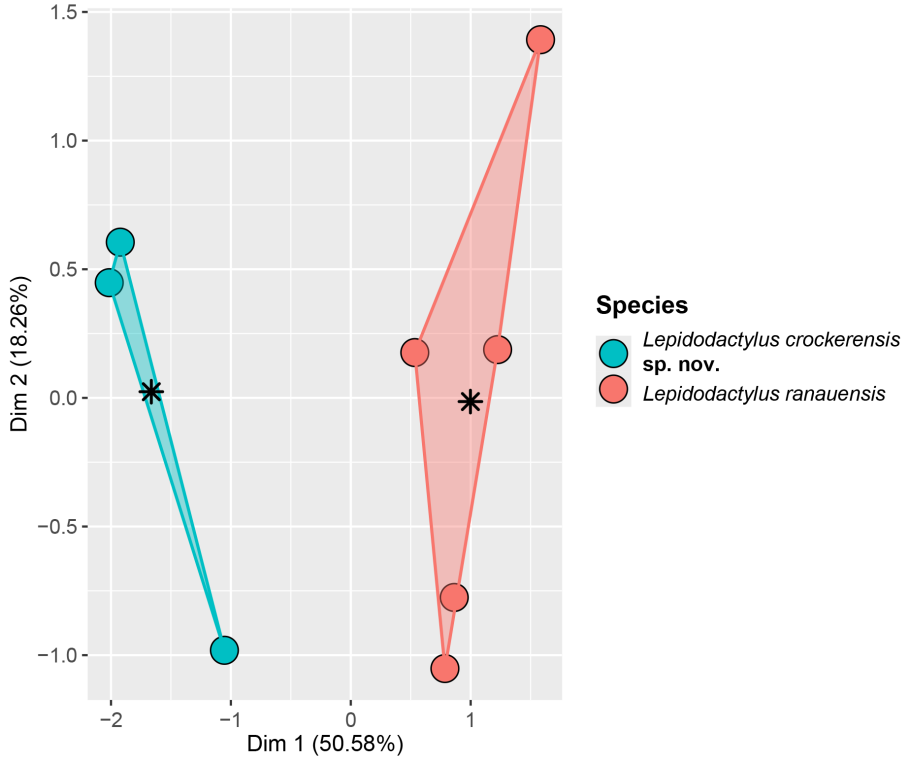


FIGURE 3. MFA illustrating the morphospatial separation of *Lepidodactylus crockerensis* **sp. nov.** and *L. ranauensis*. The asterisk denotes the location of the centroids.

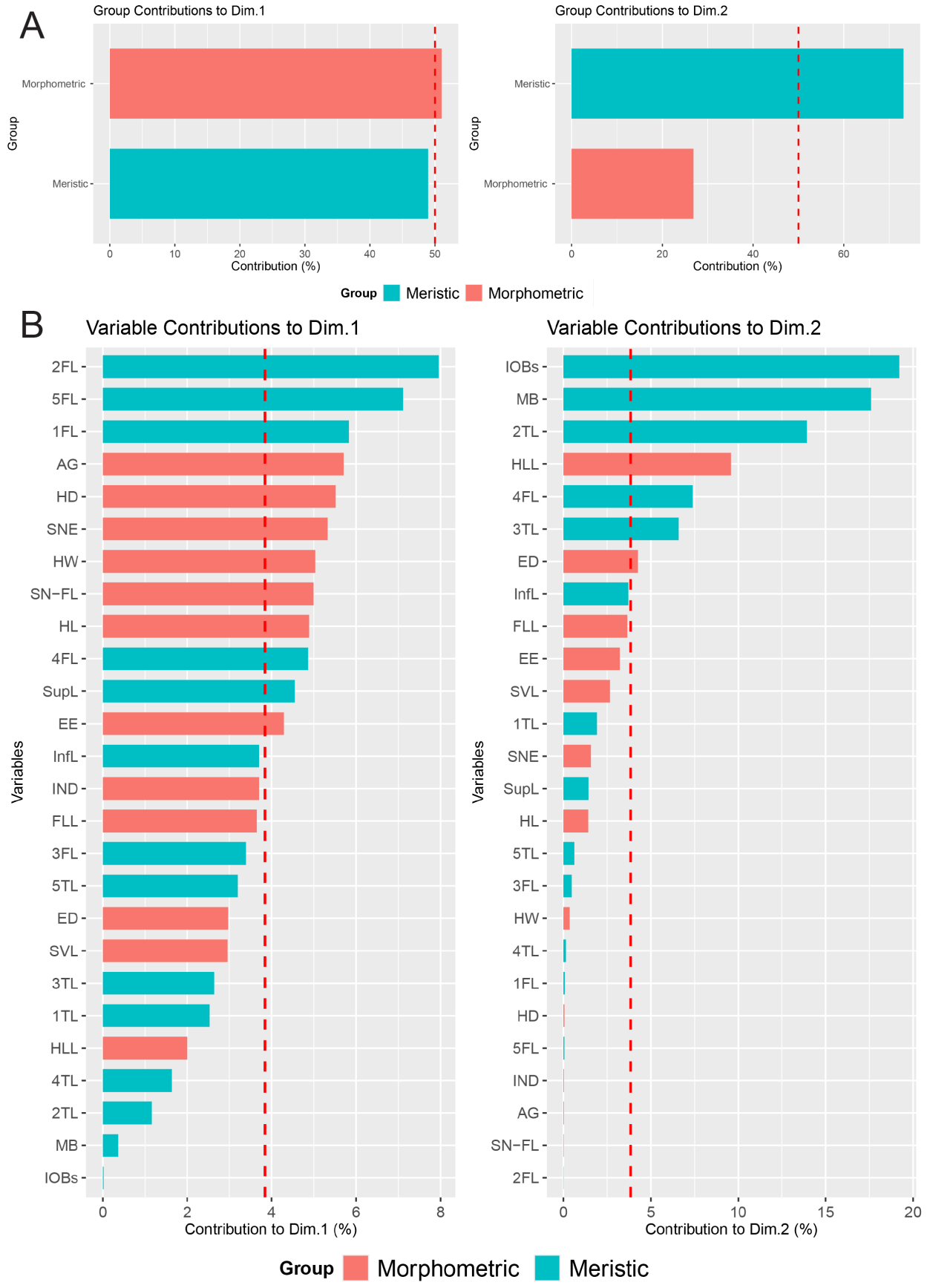


FIGURE 4. (A) Percent contribution of each data type to the first two dimensions of the MFA. (B) Percent contribution of each meristic and size-corrected morphometric character to the first two dimensions of the MFA. Red dotted lines denote the values if all the data had equal contributions.

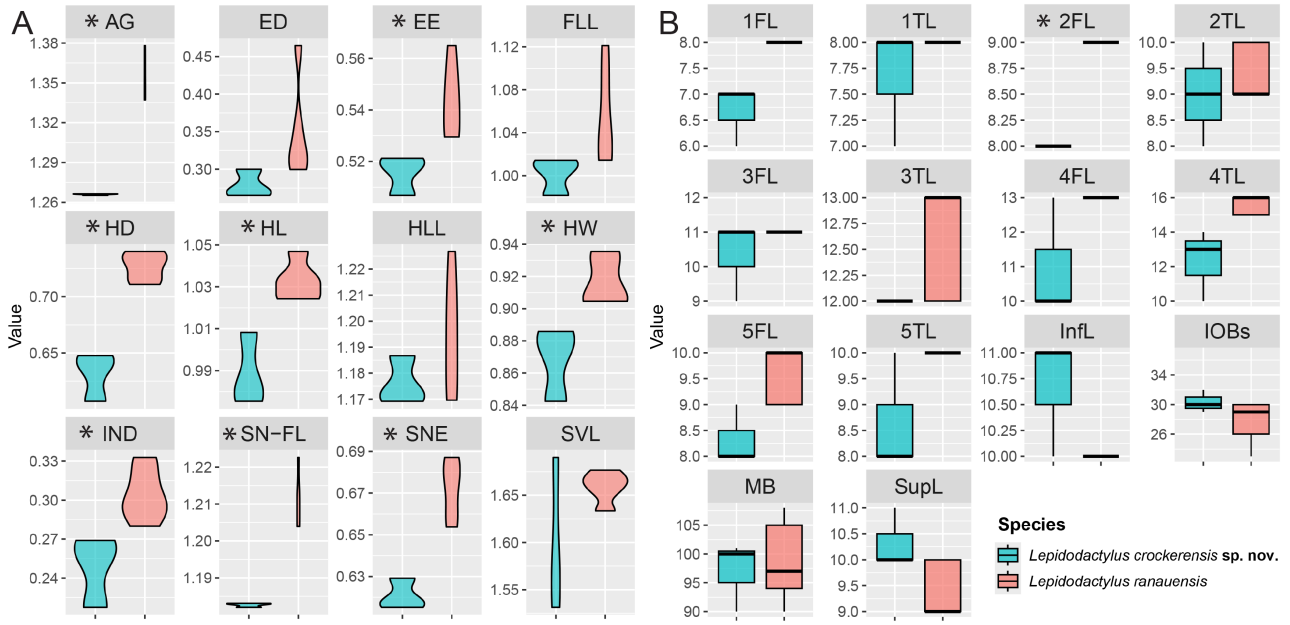


FIGURE 5. (A) Violin plots showing the differences in the size-corrected morphometric characters; and (B) box plots showing the range of variation in the meristic characters of *Lepidodactylus crockerensis* **sp. nov.** and *L. ranauensis*. * = characters with significantly different mean values.

Taxonomy

***Lepidodactylus crockerensis* sp. nov.**
urn:lsid:zoobank.org:act:B798DB14-6412-4912-B0AA-4920BFE55FBB
Crocker Range Mourning Gecko
(Figs. 6–8)

Holotype. Adult male BORNEENSIS (BOR) HEP 03431 collected from Rhododendron Hut, Gunung Alab substation, Crocker Range Park, Tambunan District, Sabah, Malaysia (WSG GPS coordinates N 5.821525, E 116.341547, 1909 m in elevation) collected by Evan S.H. Quah on 23 August 2025.

Paratypes. Adult male BOR HEP 03432 bears the same collection data as the holotype, and adult male BOR HEP 03509 bears the same collection data as the holotype but was collected on 18 November 2025.

Diagnosis. *Lepidodactylus crockerensis* **sp. nov.** can be separated from all other species of *Lepidodactylus* by having the unique combination of a maximum adult SVL in males of 49.0 mm; pupil vertical-oval; head, body, limbs and tail covered in granular scales; tubercles absent; no flaps of skin or ventrolateral fold on flanks; first digits of hands and feet short, not vestigial, claw absent; subdigital lamellae thin, transversely expanded, distalmost lamellae entire, usually rounded; 10–14 subdigital lamellae on fourth toe; slight webbing between toes III and IV; 32–40 contiguous, pore-bearing, femoro-precloacal scales in males; tail subcylindrical in cross-section without a lateral fringe of enlarged scales; dorsum in life varies from brownish-grey in light phase with lighter grey mottling and chevron markings or spots in vertebral region to dark brown in dark phase with light brown or cream markings; a pair of dark-coloured sacral spots sometimes present; top of tail bearing faint, irregularly shaped alternating darker and lighter bands; venter beige to cream with darker mottling; underside of limbs and cloacal region yellowish, and subcaudal region cream to salmon coloured.

Description of holotype (Table 3). Adult male of medium size (SVL = 49.0 mm, AG = 22.2 mm); incision ventrally on abdomen, liver removed. Head relatively long (HL/SVL = 0.23) and wide (HW/HL = 0.75), distinct from neck. Loreal region rounded; no distinct canthus rostralis. Top of snout between nares and posterior to nares slightly concave. Snout tapered and rounded at tip in dorsal profile, relatively long (SNE/HL = 0.42), significantly longer than eye diameter (SNE/ED = 2.14). Eye of modest size (ED/HL = 0.19, ED/EE = 0.59); pupil vertical,

constricted into series of four lobes; anterior supraciliaries slightly larger than adjacent granules, posterior ones subequal to adjacent granules. Ear opening small, compressed, oriented horizontally; distance between ear and eye larger than eye diameter (EE/ED = 1.68). Rostral approximately twice as wide as high, highest just medial to nares; supranasals separated by three internasals. Rostral in contact with first supralabials, two supranasals, and three internasals (= postrostrals). External nares circular; each bordered by rostral, two supranasals, first supralabial, and one postnasal. Mental a roughly equilateral triangle, bordered posteriorly by two enlarged postmentals in point contact with one chin shield; enlarged postmentals bordered posteriorly by subequal scales that progressively decrease in size posteriorly to join granular gular scales. First three infralabials bordered below by somewhat larger scales, subequal in size to postmentals, and decreasing in size posteriorly; remaining scales below infralabials of approximately same size as gular scales, which decrease in size medially; supralabials 10 on each side; and infralabials 11 (L) and 10 (R).

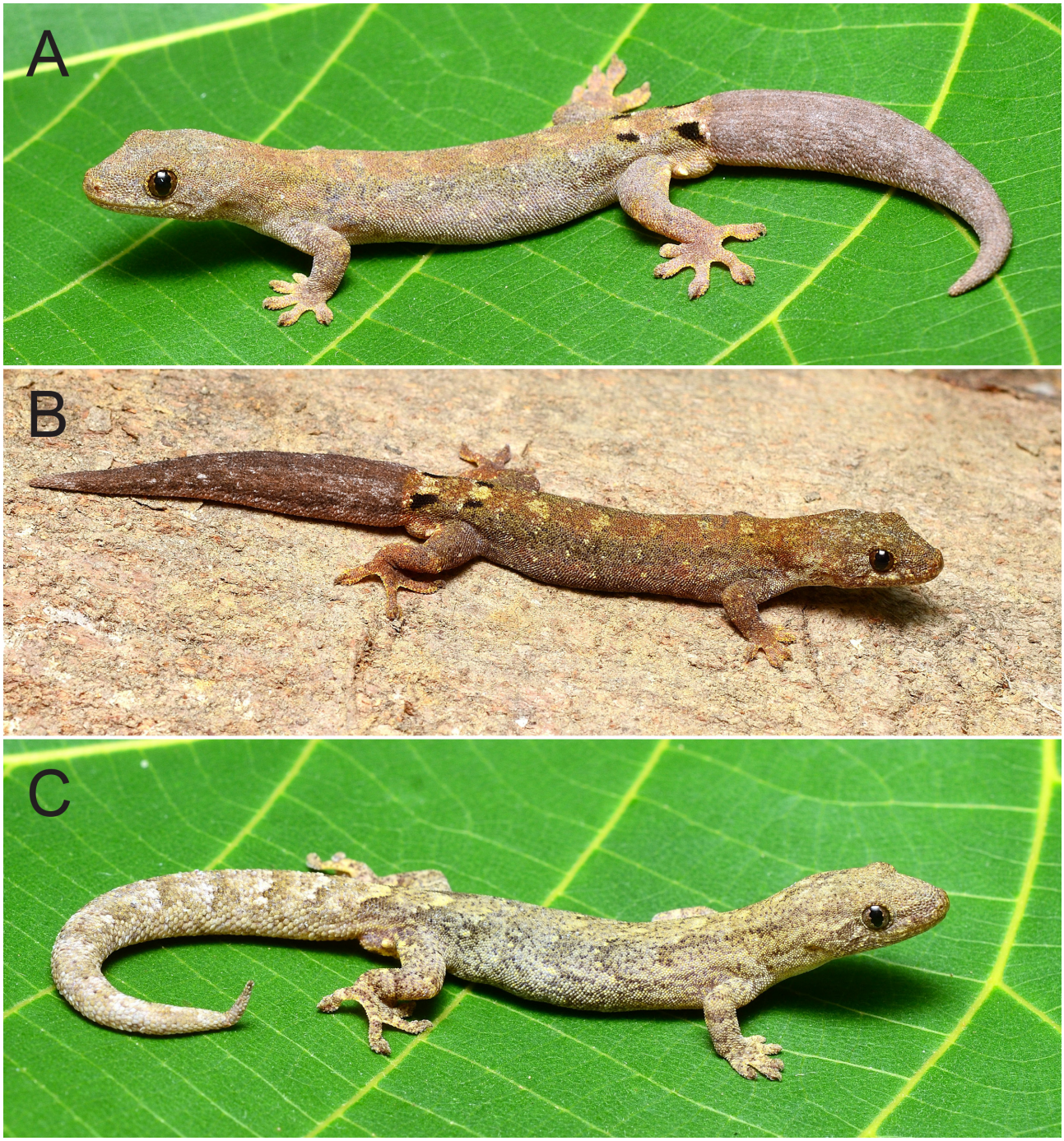


FIGURE 6. A & B. Holotype of *Lepidodactylus crockerensis* **sp. nov.** (BOR HEP 03431) in light and dark phases respectively. C. Paratype of *L. crockerensis* **sp. nov.** (BOR HEP 03432) in light phase. Photographs by Evan Quah.

Body rather narrow, somewhat elongate in habitus (AG/SVL = 0.45), slightly depressed dorsoventrally. Dorsal scales on head, body, limbs, and throat small, juxtaposed granules, larger on snout and flanks. Ventral scales larger than dorsals, flat, smooth, subimbricate, gradually decreasing in size laterally on flanks to become granular. Enlarged series of contiguous femoro-precloacal scales bearing 39 pores that extend almost to knees, forming a sharp inverted V in precloacal region; thigh scales anterior to this row larger than those posterior. Triangular patch of enlarged scales between the precloacal series and vent; seven scales between apex of enlarged precloacal series and vent. Scales on palms and soles rounded, flattened, smooth, subimbricate.

Fore- and hind limbs relatively long and well-developed (FLL/SVL = 0.24, HLL/SVL = 0.34). Digits well-developed, widely dilated throughout their length but slightly more so distally, all but first fingers and toes with recurved claws; clawed phalanges laterally compressed, free above and extending slightly beyond terminal lamellae. Subdigital lamellae narrow and smooth, all undivided except penultimate lamellae on Fingers 1–5, as well as antepenultimate lamellae on Fingers 3–5 (R), four and five (L); lamellae notched penultimate lamellae on Toes two and three (L), all lamellae undivided on other toes. Lamellae of manus 7–8–11–13–9 on right, 7–8–11–12–9 on left; of pes 8–9–8–10–7 on right, 8–10–12–10–8 on left. Relative lengths of digits on manus and pes I < II < V < III < IV. Slight webbing present between toes III and IV.

Tail regenerated but complete, subcylindrical in cross-section, slightly shorter than body (TaL/SVL = 0.88); lateral margins without folds or spines. Scales of tail larger than dorsal body scales, rounded, flat, smooth, subimbricate, approximately equal is size dorsally and ventrally. Cloacal sacs swollen, with small external orifices situated near lateral margins of vent; single enlarged, blunt postcloacal spur on each side of base of tail; and midventral scales of sac hexagonal, slightly larger than those ventrolaterally.

Colouration in life (Figs. 6–8). *Light phase*: Dorsal colouration of head, body, and limbs light greyish brown, and overlain with very fine, dark stippling; extremely faint irregularly shaped, pale spots along vertebral region starting from the nape and ending on original portion of tail above the hemipenial swelling; two pairs of dark-coloured sacral spots countershaded medially with light-colored markings, the first smaller pair, above the hind limbs, second larger pair above the hemipenial swelling; ground colour of the dorsum of the regenerated tail unicolor light grey with very fine, darker stippling; all ventral surfaces beige and suffused with grey or brown stippling, especially bordering the flanks and borders of the limbs; underside of limbs, cloacal region, and hemipenial swelling lemon-yellow; subcaudal region salmon-orange; iris brown with light-yellow speckling (Figs. 6A & 7).

Dark phase: Dorsal colouration of head, body, and limbs ashy brown, and overlain with more intense, very fine, darker stippling; irregularly shaped, light-beige spots more prominent along vertebral region from the nape and ending on original portion of the tail above the hemipenial swelling; two pairs of dark-coloured, counter shaded, sacral spots; ground colour of dorsum of regenerated tail dark brown, slightly darker than head, body, and limbs, and overlain with fine, darker stippling; ventral colouration same as in light phase, just slightly darker (Figs. 6B & 7).

Colouration in preservation (Fig. 9). The colouration of the specimen faded to uniform grey with fine, dark-coloured stippling on the dorsum; the irregularly shaped, light-colored spots along the vertebral region no longer discernible; two pairs of dark-coloured sacral spots still visible; ventral colouration of body, limbs and tail faded to light grey with fine, darker stippling.

Variation. Paratype (BOR 03432) is similar to the holotype in its light phase, with base colouration grey with darker stippling; presence of a faint, dark-coloured pre- and postorbital stripe bordered dorsally and ventrally by a beige stripes; light-colored markings in the vertebral region chevron-shaped; absence of darker spots on the sacral region; and top of original tail with faint light and dark-grey bands (Figs. 6C & 7). Paratype (BOR 03509) was the most boldly marked of all the specimens. In its dark phase, dorsal colouration of head, body, and limbs chocolate to dark-brown, and overlain with very fine, darker stippling; on the side of the head, a light-beige postorbital stripes which breaks up and continues as series of spots along dorsolateral margin of body; faint light-beige, chevron-shaped markings along vertebral region starting from the nape and ending on original portion of tail; a pair of dark-coloured postsacral spots, bordering light-coloured chevron-shaped marking above the hemipenial swellings; regenerated portion of tail dark grey with very fine, dark-coloured stippling; ventral surfaces light grey and suffused with dark-grey stippling, especially under throat, belly and flanks; underside of palms and feet yellowish; and subcaudal region grey (Fig. 8). In its light phase, BOR 3509's dorsal colouration of head, body, and limbs were grey-brown, and overlain with very fine, dark-coloured stippling; irregularly shaped, light-grey streaks and markings present on top of the head; presence of a light-grey pre- and postorbital stripe which is bordered dorsally by dark-grey-brown stripes that continues to above insertion point of forelimb on the body before turning into a series of light-grey blotches along flanks; light-grey, chevron-shaped markings along vertebral region starting from nape and ending

on original portion of the tail; a pair of dark-coloured postsacral spots, bordering light-coloured chevron-shaped markings above the hemipenial swellings; regenerated portion of tail with light-grey streaks; and top of limbs with light-grey spots and markings; and ventral surfaces similar as in dark phase.

Etymology. The specific epithet "*crockerensis*" is a toponym in reference to the type locality of Gunung Alab located in the Crocker Range of Sabah, East Malaysia.

Distribution (Fig. 1). This species is so far only known from the vicinity of the Gunung Alab substation in Crocker Range Park. It undoubtably ranges more widely in its natural habitat in the park and at other nearby upper elevation sites.

Natural history. All three specimens were collected at night in the old Rhododendron Hut at Gunung Alab substation (Fig. 10). The geckos presumably feed on the insects that are attracted to the lights in the roof. Weather conditions were cool and misty with ambient temperatures between 14–16 °C. Other specimens were observed on the walls and eaves of the roof at other buildings such as the main office and staff quarters but were out of reach. Other gekkonid species sharing the walls of the buildings at Gunung Alab include *Gehyra mutilata* (Wiegmann 1834) (BOR HEP 03506), *Hemidactylus frenatus* Duméril & Bibron 1836, *H. garnotii* Duméril & Bibron 1836 (BOR HEP 03495 & 03550) and *H. platyurus* (BOR HEP 03549). This also represents a range extension for *H. garnotii* in Sabah that was previously only reported from Mount Kinabalu (Tan 1993; Malkmus *et al*. 2002; Das 2025).

Conservation status. The species is presently known from only a single location in Borneo, and very little else is known about its ecology. As such, we recommend listing the species as Data Deficient (DD) (IUCN, 2025).

Comparison. Within Borneo, *Lepidodactylus crockerensis* **sp. nov.** can be distinguished from its two congeners in Borneo by the following combination of characters. The new species can be distinguished from *L. lugubris* by its distal subdigital lamellae (entire vs. divided); shape of tail (subcylindrical vs. compressed); edge of tail (nearly smooth vs. finely denticulated); lower number of supralabials (9–11 vs. 11–14); and higher number of femoro-precloacal pores (32–40 vs. 24–30) (Das 2025).

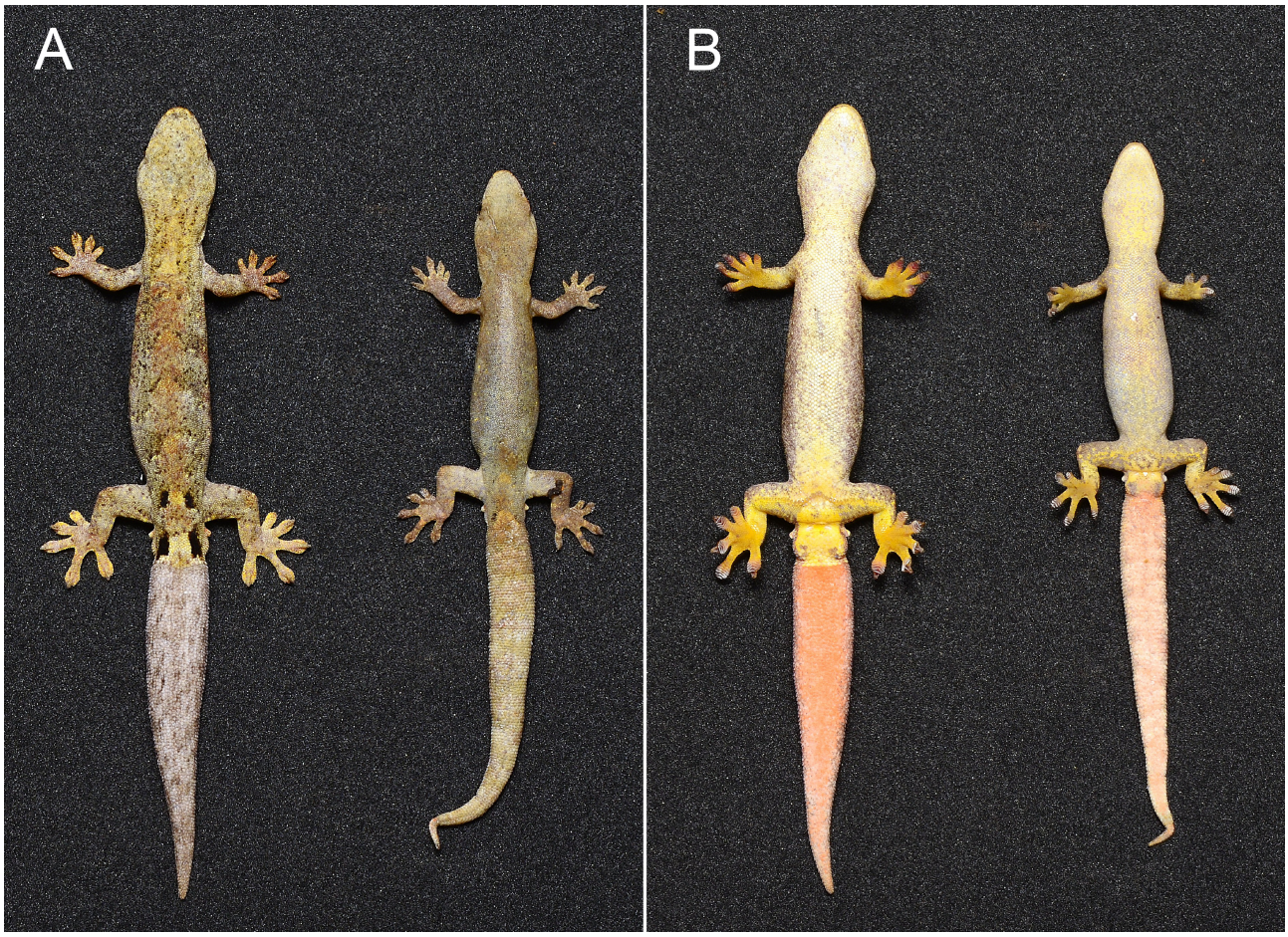


FIGURE 7. *Lepidodactylus crockerensis* **sp. nov.** Dorsum (A) and venter (B) of holotype (BOR HEP 03431) (left) and paratype (BOR HEP 03432) (right) prior to preservation. Photographs by Evan Quah.

From its sister species *L. ranauensis* (Fig. 10), *Lepidodactylus crockerensis* **sp. nov.** differs in morphometrics in having a statistically shorter head length (HL), head width (HW), head depth (HD), snout-eye distance (SNE), eye-ear distance (EE), internasal length (IND), snout-forelimb length (SN-FL), axilla-groin length (AG), and in meristics by having statistically lower numbers of expanded subdigital lamellae on finger II (2FL) (seven or eight vs eight or nine) (Fig. 5, 11 & 12).

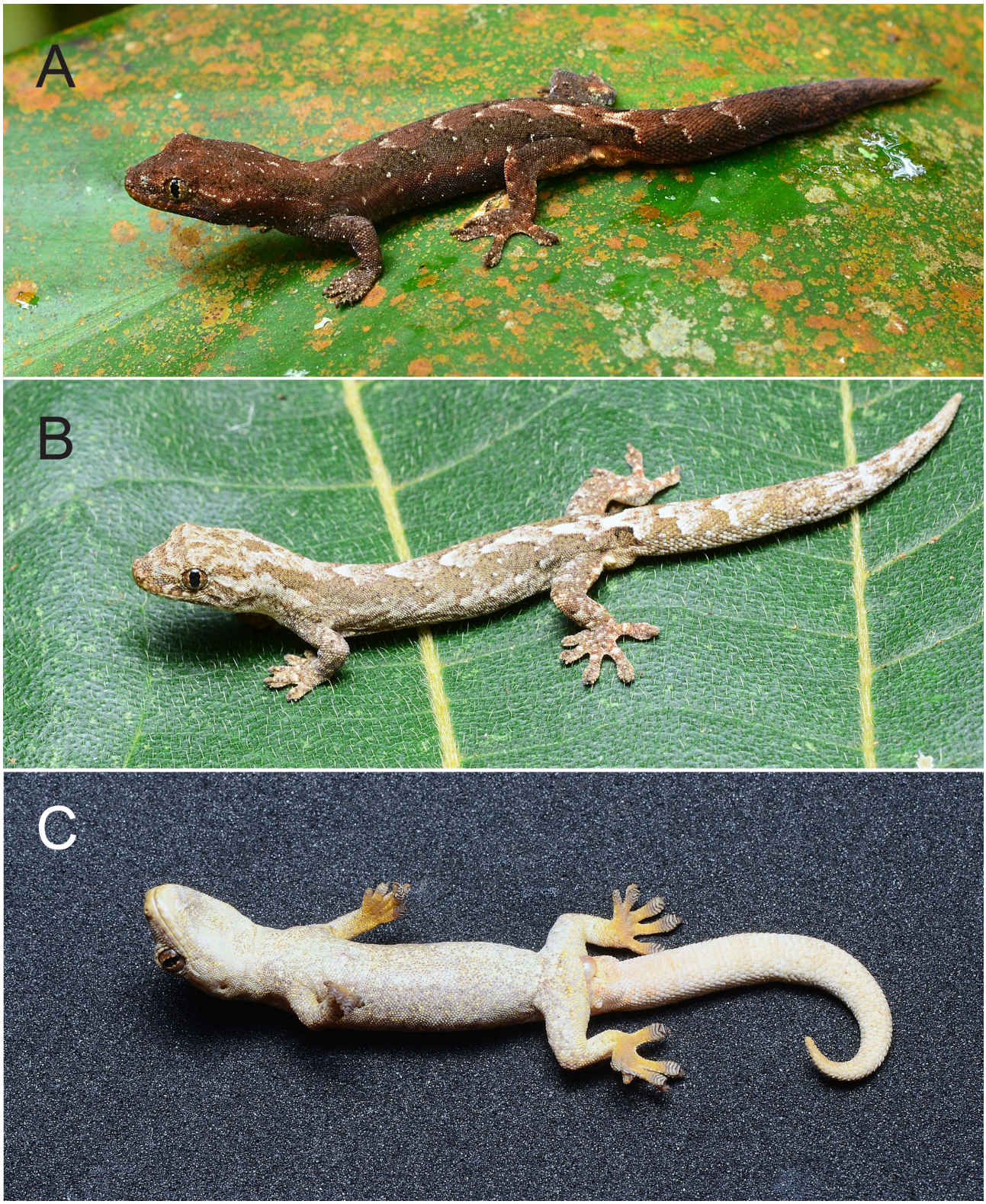


FIGURE 8. Paratype of *Lepidodactylus crockerensis* **sp. nov.** (BOR HEP 03509). A: Dark phase, B: Light phase, and C: Venter before preservation. Photographs by Evan Quah.

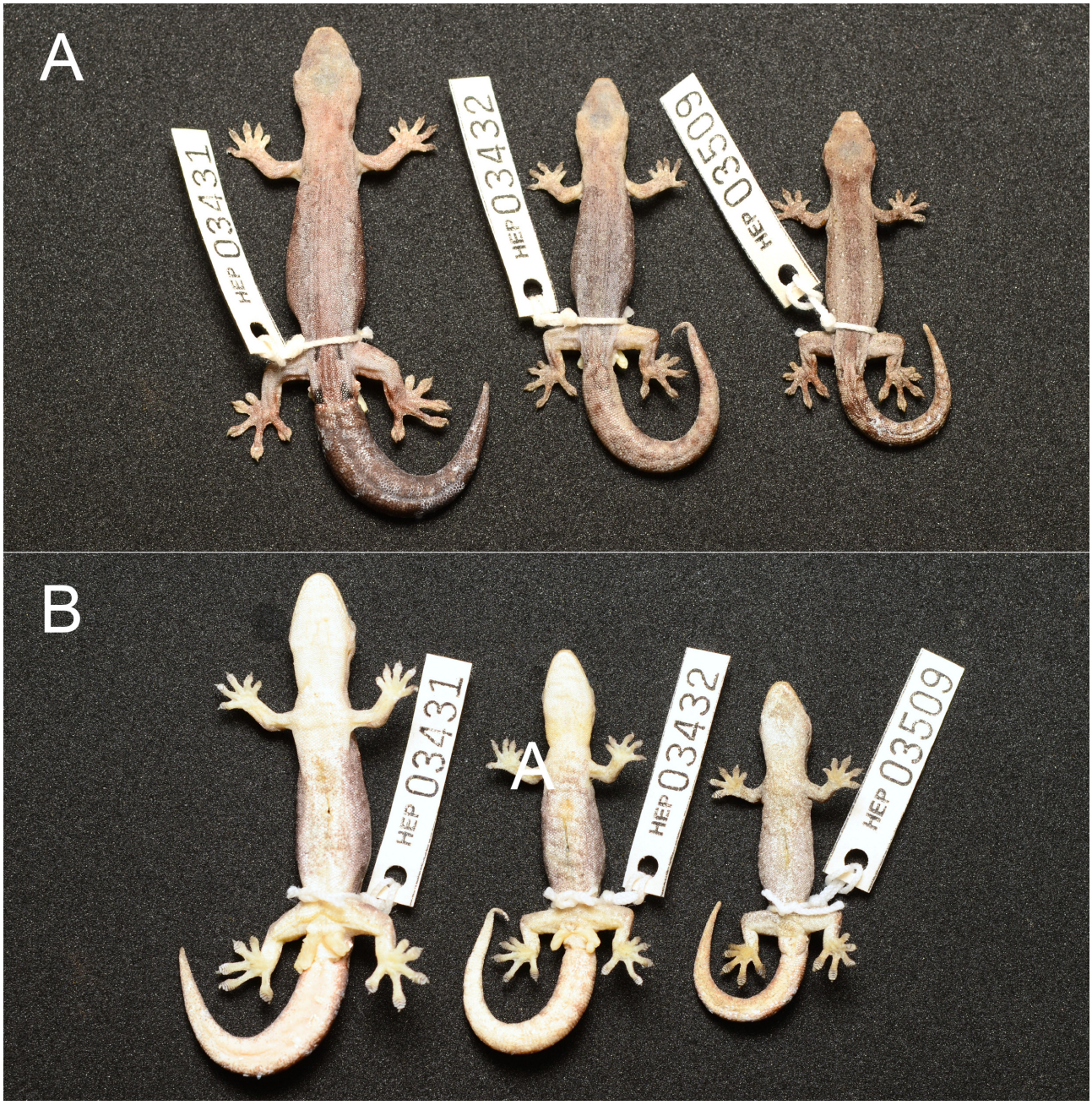


FIGURE 9. Dorsum (A) and venter (B) of preserved type series of *Lepidodactylus crockerensis* **sp. nov.** From left to right, BOR HEP 03431, 03432 and 03509. Photographs by Evan Quah.

The presence of a subcylindrical tail without lateral serrations further distinguishes *L. crockerensis* **sp. nov.** from Group III *Lepidodactylus* that have depressed tails with lateral serrations (*L. moestus* (Peters), *L. woodfordi* Boulenger, *L. yami* Ota, *L. aureolineatus* Taylor, *L. balioburius* Ota & Crombie, *L. christiani* Taylor, *L. herrei* Taylor, and *L. planicaudus* Stejneger) (Brown & Parker 1977; Stubbs *et al*. 2017) as well as *L. babuyanensis* Eliades, Brown, Huang & Siler, *L. bisakol* Eliades, Brown, Huang & Siler, *L. bakingibut* Eliades, Brown, Huang & Siler, *L. nakahiwalay* Eliades, Brown, Huang & Siler (Eliades *et al*. 2021).

Lepidodactylus crockerensis **sp. nov.** differs in possessing postcloacal spurs (present [1]) compared to them being absent in *L. aignanus* Kraus (0), *L. euaensis* Gibbons & Brown (0), *L. oligoporus* Buden (0) and *L. paurolepis* Ota, Fisher, Ineich & Case (0) (Gibbons & Brown 1988; Ota *et al*. 1995, 1998; Ineich 2008; Kraus 2019). *Lepidodactylus crockerensis* **sp. nov.** differs in having fewer postcloacal spurs (1) compared to *L. babuyaenensis* (3), *L. bisakol* (2), *L. buleli* Ineich (1 large + 2–3 smaller spurs), *L. gardineri* Boulenger (2–3), *L. guppyi* Boulenger (2–4), *L.*



FIGURE 10. Old Rhododendron Hut at Gunung Alab Substation where type series of *Lepidodactylus crockerensis* **sp. nov.** were collected. Photograph by Chris Suleiman.



FIGURE 11. Uncollected specimens of *Lepidodactylus ranauensis* photographed in the vicinity of Kinabalu Park, Sabah. Photographs by Artur Tomaszek (A & C) and Jamiun Michael (B).

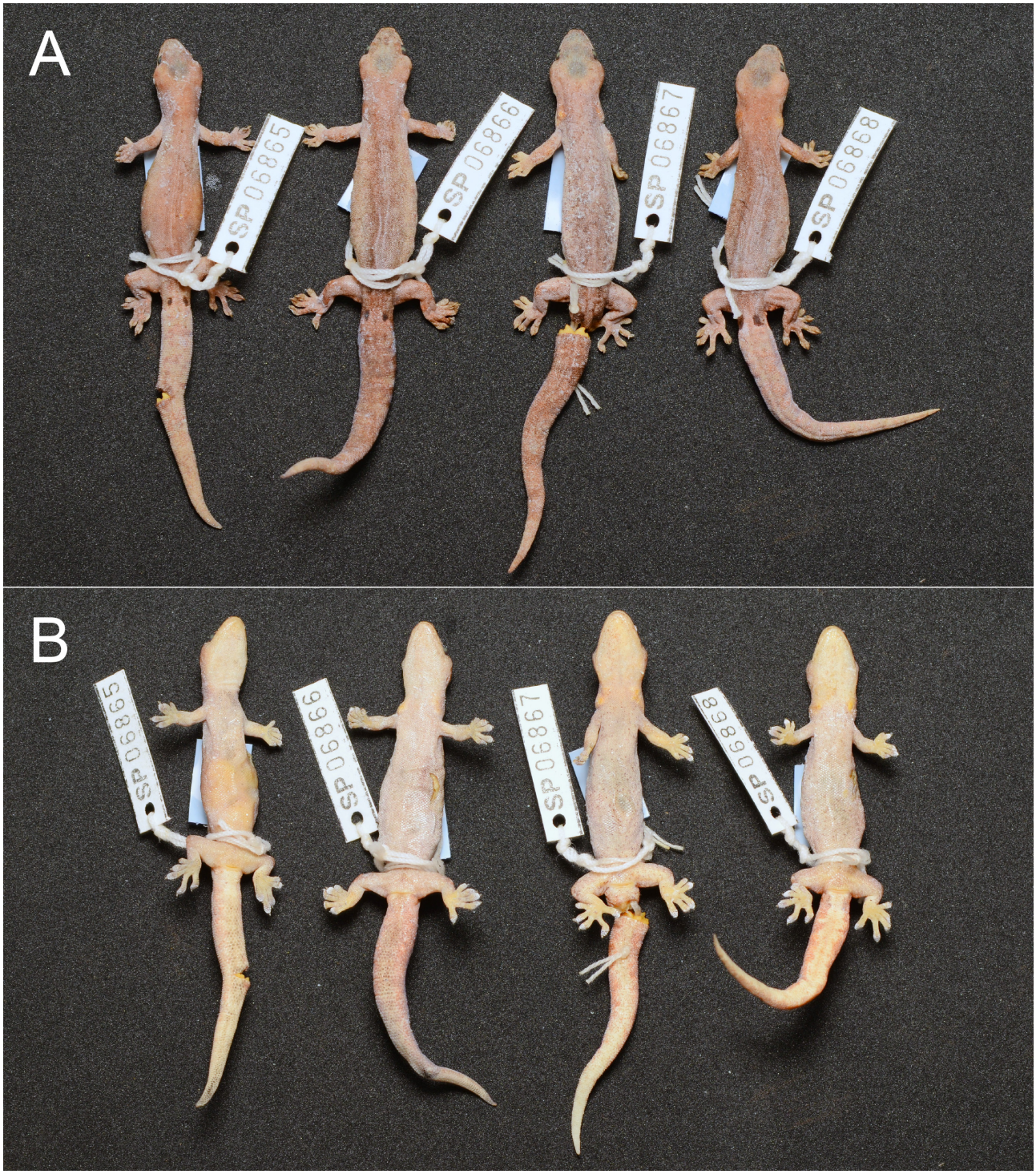


FIGURE 12. Dorsum (A) and venter (B) of preserved specimens of *Lepidodactylus ranauensis*. From left to right, SP 06865–06868. Photographs by Evan Quah.

intermedius Darevsky (2), *L. listeri* (Boulenger) (2–4), *L. mitchelli* Kraus (2), *L. mutahi* Brown & Parker (2–4), *L. nakahiwalay* (3), *L. novaeguineae* Brown & Parker (2), *L. sacrolineatus* Kraus & Oliver (2), *L. vanuatuensis* Ota, Fisher, Ineich, Case, Radtkey & Zug (2) and *L. zweifeli* Kraus (2) (Ota & Hikida 1988; Ota *et al*. 1998; Zug *et al*. 2003; Ineich 2008; Kraus 2019; Eliades *et al*. 2021).

Lepidodactylus crockerensis **sp. nov.** differs in having fewer inter-orbital scales (29–32) compared to *L. buleli* (39–40), *L. euaensis* (40–48), *L. guppyi* (33–37), *L. novaeguineae* (32–39), *L. oligoporus* (34 or 35), *L. pulcher* Boulenger (39–46), *L. tepukapili* Zug, Watling, Alefaio, Alefaio & Ludescher (31–35), and *L. vanuatuensis* (31–38)

(Gibbons & Brown 1988; Zug *et al*. 2003; Ineich 2008). *Lepidodactylus crockerensis* **sp. nov.** differs in having more inter-orbital scales (29–32) compared to *L. shebae* (Brown & Tanner) (27) (Ineich 2008)

Lepidodactylus crockerensis **sp. nov.** differs in having fewer supralabials (9–11) than *L. aignanus* (12 or 13), *L. dialeukos* Kraus (13), *L. labialis* (Peters) (14) and *L. zweifeli* (14) (Peters 1867; Kraus 2019). *Lepidodactylus crockerensis* **sp. nov.** differs in having fewer infralabials (9–11) than *L. labialis* (15) (Peters 1867).

Lepidodactylus crockerensis **sp. nov.** differs in possessing enlarged femoro-precloacal pore-bearing scales (present) compared to *L. buleli* (absent) (Ineich 2008). *Lepidodactylus crockerensis* **sp. nov.** differs in having more enlarged femoro-precloacal pore-bearing scales that extend to the knee (32–40) compared to *L. babuyanensis* (18–23), L. *bakingibut* (25), *L. bisakol* (23–27), *L. dialeukos* (14), *L. exoris* Oliver & Richards (15), *L. kwasnickae* Kraus (12–15), *L. listeri* (11–14), *L. manni* Schmidt (12 or 13), *L. mitchelli* (12–14), *L. nakahiwalay* (23), *L. novaeguineae* (11–18), *L. orientalis* Brown & Parker (19–26), *L. pantai* Stubbs, Karin, Arifin, Iskandar, Arida, Reilly, Bloch, Kusnadi & McGuire (18–24), *L. pollostos* Karkkainen, Richards, Kraus, Tjaturadi, Krey & Oliver (17), *L. pulcher* (18–20), and *L. oorti* (Kopstein) (28–29) (Ota & Hikida 1988; Stubbs *et al.* 2017; Eliades *et al.* 2021; Kraus *et al.* 2023; Oliver & Richards 2025). *Lepidodactylus crockerensis* **sp. nov.** differs in having fewer enlarged femoro-precloacal pore-bearing scales (32–40) compared to *L. makira* Kraus (44 or 45) (Uetz *et al*. 2026).

Lepidodactylus crockerensis **sp. nov.** further differs in having fewer mid-body scale rows (90–101) than *L. aureolineatus* (120–140), *L. balioburius* (131–151), *L. buleli* (147), *L. christiani* (165–168), *L. gardineri* (103–118), *L. guppyi* (110–138), *L. intermedius* (121), *L. lombocensis* Mertens (110–112), *L. manni* (126–129), *L. magnus* Brown & Parker (127–142), *L. moestus* (117–141), *L. novaeguineae* (108–132), *L. oligoporus* (130–134), *L. orientalis* (114–128), *L. pantai* (113), *L. planicaudus* (135–145), *L. pulcher* (143–167), *L. pumilus* (Boulenger) (113–134), *L. shebae* (>120), *L. tepukapili* (105–118), *L. vanuatuensis* (99–118) and *L. yami* (126–151) (Ota & Hikida 1988; Ota *et al*. 1995, 1998; Zug *et al*. 2003; Ineich 2008).

Lepidodactylus crockerensis **sp. nov.** differs in having fewer expanded subdigital lamellae on the finger IV (10–13) compared to *L. tepukapili* (14–16) (Zug *et al*. 2003). *Lepidodactylus crockerensis* **sp. nov.** differs in having fewer expanded subdigital lamellae on the toe I (seven or eight) compared to *L. gardineri* (11), *L. laticinctus* Kraus, Vahtera & Weijola (8 or 9), *L. makira* (12) *L. paurolepis* (nine or ten), *L. pulcher* (10–13) and *L. sacrolineatus* (8–10) (Ota & Hikida 1988; Ota *et al*. 1995; Kraus & Oliver 2020; Kraus *et al*. 2023; Uetz *et al*. 2026). *Lepidodactylus crockerensis* **sp. nov.** differs in having fewer expanded subdigital lamellae on the toe IV (10–14) compared to *L. flaviocularis* Brown, McCoy & Rodda (15–21), *L. makira* (17–19), *L. pulcher* (17–20) and *L. oligoporus* (15–19) (Ota *et al*. 1995, 1998; Ineich 2008; Uetz *et al*. 2026). *Lepidodactylus crockerensis* **sp. nov.** differs in having more expanded subdigital lamellae on the toe IV (10–14) compared to *L. intermedius* (8) and *L. lombocensis* (8 or 9) (Ineich 2008).

Lepidodactylus crockerensis **sp. nov.** further differs in extent of webbing between toes II and IV (slight) compared to *L. laticinctus* (moderate) (Kraus *et al*. 2023). *Lepidodactylus crockerensis* **sp. nov.** further differs in its dorsal ground colouration (gray to brown) compared to *L. pollostos* and *L. shebae* (reddish brown in both species) (Kraus *et al*. 2023).

Discussion

Sabah is famous for its many mountain peaks which support a rich diversity of upland flora and fauna, and this applies to the herpetofauna as well (Inger & Tan 1996). The most famous of these peaks is Mount Kinabalu, renowned for harbouring a rich diversity of amphibians and reptiles, many of which are endemic (Malkmus *et al*. 2002). It overshadows many of the other upland areas in Sabah that do not receive as much attention.

The Crocker Range is one such example of a site of equally important herpetological research and conservation in Sabah (Inger & Stuebing 1992; Inger *et al*. 2000; Zainudin *et al*. 2001; Kueh *et al*. 2004; Das 2006b). It is the type locality for numerous reptile and amphibian species, including *Asthenodipsas stuebingi* Quah, Grismer, Lim, Shahrul & Imbun 2019, *Gekko sorok* (Das, Lakim & Kandaung 2008), *Stegonotus caligocephalus* Kaiser, Lapin, O'shea & Kaiser 2020, *Meristogenys stenocephalus* Shimada, Matsui, Imbun, and Sudin 2011, *M. stigmachilus* Shimada, Matsui, Imbun, and Sudin 2011, *M. maryatiae* Matsui, Shimada & Sudin, 2010, *Limnonectes separatus* Matsui, Nishikawa, and Shimada 2024, and *Kalophrynus minutus* Imbun, Tan, Lakim, and Majuakim 2025 (Frost 2026; Uetz *et al*. 2026). *Lepidodactylus crockerensis* **sp. nov.** is the latest addition to this list of herpetofauna species described from this portion of the Crocker Range and the third species of *Lepidodactylus* recorded for Borneo.

Both *L. crockerensis* **sp. nov.** and its sister species *L. ranauensis* are endemic to separate mountain ranges in Sabah in the Crocker Range and Mount Kinabalu massif respectively. *Lepidodactylus ranauensis* ranges from mid to upper elevations on Mount Kinabalu (see below), while *L. crockerensis* **sp. nov.** is known only from Gunung Alab thus far (Ota & Hikida 1988; iNaturalist 2026). Only *L. lugubris* occurs in the lowlands and is widespread across the island (Das 2025). This allopatric distribution of the two Sabah endemics lends credence to their recognition as distinct species despite their slightly lower genetic distances. The uncorrected pairwise sequence divergence of 2.9% between *L. crockerensis* **sp. nov.** and *L. ranauensis* still exceeds that of other formally recognized geographically isolated, montane species at 1% (Echevarría *et al*. 2026). Furthermore, it can be argued that sequence divergence says more about the length of time allopatric sister species have diverged and has little bearing on their separate specific identity. Collection of fresh material of *L. ranauensis* is needed for future comparative genomic studies into their relationships to better illustrate variance between these species.

Overall, this is a genus of generally small, nondescript geckos which are uncommon and easily overlooked. Thus, limited information is known about their natural history. In this study, we also provide the first report of the morphological characteristics (Table 1, Fig. 12) of females of *L. ranauensis* which was previously described from only a single male (Ota & Hikida 1988). Our observations also confirm that females of the species lay two eggs during the middle of the year based on the gravid specimen examined (SP 06865, date of collection 13 July 2007) examined. This study of also expands the altitudinal range of *L. ranauensis* which ranges from 436–4040m in elevation on Mount Kinabalu based on iNaturalist records (https://www.inaturalist.org/observations?subview=map&taxon_id=34340). However, this must be treated with caution as the georeferencing accuracy of some of the locations could not be verified (iNaturalist 2026). Based on the coordinates listed in the original description, the holotype was collected at approximately 591m in elevation at Ranau (Ota & Hikida 1988). Much remains to be learnt about the ecology of these and other montane species in Sabah. With further exploration and research, many new species of amphibians and reptiles are bound to be discovered in the state and may yet reveal additional novel *Lepidodactylus* species on Borneo as well.

Acknowledgements

We are grateful for the research permits from the Sabah Biodiversity Centre [JKM/MBS.1000-2/2 JLD.20 (103–106) and JKM/MBS.1000/ALR/2026/0005–0007] and the Board of Trustees of Sabah Parks (TTS 100-6/2 Jld. 34 and TTS 100-6/2 Jld. 43), as well as the Sabah Forestry Department for permission to survey at their locations (JPHTN/PSH 100-14/18/2 JLD. 24(21). This research was approved by the UMS animal ethics committee (UMS/IBTP7.2/800-2/1/17 [file no.: AEC 0003/2025]). Our team is indebted to Florina Anthony and Yek Sze Huei for their generosity in sharing resources for lab work, and we are also appreciative of Martinah Latim and other colleagues at Sabah Parks who generously shared information of the specimens under their curation. Evan Quah and Aderina Dukit are also very grateful to Erlina Liza Chin Kui Ping for all her help and companionship during fieldwork. Finally, we thank Indraneil Das and another anonymous reviewer, as well as Aaron Bauer for the constructive feedback that helped improve the quality of our paper.

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