

A long overdue taxonomic rearrangement of the New Guinea Crowned Snakes, currently referred to the genus *Aspidomorphus* Fitzinger, 1843 (Serpentes:Elapidae).

RAYMOND T. HOSER

488 Park Road, Park Orchards, Victoria, 3114, Australia.

Phone: +61 3 9812 3322 Fax: 9812 3355 E-mail: snakeman (at) snakeman.com.au

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ABSTRACT

As generally recognized at present, the principally New Guinea genus *Aspidomorphus* Fitzinger, 1843 consists of three morphologically similar species, all found in the New Guinea region. Morphological studies, notably that of McDowell and Cogger (1967) have shown the three nominate forms to be divergent in terms of conservative traits such as hemipene morphology. Regional forms of these are also sufficiently differentiated to warrant taxonomic recognition.

Recent molecular studies, including that of Metzger *et al.* (2010) have further shown each of the three widely recognized species of *Aspidomorphus* to be composite along the same lines as indicated by the morphological data published by McDowell (1967). Metzger *et al.* (2010) also showed that the three widely recognized species of the present time, each consist of widely divergent lineages, warranting individual taxonomic recognition at the genus level.

Following on from these past studies and merging the results, this paper takes a conservative position and splits *Aspidomorphus* into three genera, two being named and defined for the first time in accordance with the Zoological Code (Ride *et al.* 1999).

Furthermore, *Aspidomorphus muelleri* (Schlegel, 1837) as presently recognized is divided into four species, two formally named for the first time; as well as two new subspecies, both formally named for the first time; *Aspidomorphus schlegeli* (Günther, 1872) is divided into two species, one formally named for the first time and *Aspidomorphus lineaticollis* (Werner, 1903) is divided into six species, with four formally named for the first time.

The subtribe Aspidomorphina Hoser, 2012, is herein elevated to full tribe status, thereby becoming Aspidomorphini *tribe nov.*

Keywords: Taxonomy; Australasia; New Guinea; Indonesia; Papua; Irian Jaya; Milne Bay; Elapidae; Micropechiini; Aspidomorphini; Aspidomorphina; genus; *Aspidomorphus*; species; *muelleri*; *schlegeli*; *lineaticollis*; *lineatus*; *interruptus*; new genera; *Walmsleyus*; *Pilgerus*; new species; *coggeri*; *keneficki*; *anstisae*; *assangei*; *nardellai*; *macki*; *mooreae*; new subspecies; *macdowellii*; *tamisi*.

INTRODUCTION

As generally recognized at present, the principally New Guinea genus *Aspidomorphus* Fitzinger, 1843 consists of three morphologically similar species, all found in the New Guinea region. Morphological studies, notably that of McDowell and Cogger (1967) have shown the three nominate forms to be divergent in terms of conservative traits such as hemipene morphology and scalation.

Regional forms of these are also sufficiently differentiated to warrant taxonomic recognition.

History has shown McDowell to have failed to realize the taxonomic significance of differences in morphology of snakes as first identified in his landmark taxonomic studies of the latter twentieth century.

However, recent molecular studies, including that of Metzger *et al.* (2010) have also shown each of the three widely recognized species of *Aspidomorphus* to be composite and along the same lines as indicated by the morphological data published by McDowell and Cogger in 1967. Metzger *et al.* (2010) also showed that the three widely recognized species of the present time, each consist of widely divergent lineages, warranting individual taxonomic recognition at the genus level.

Following on from these past studies of both McDowell and Cogger (1967) and Metzger *et al.* (2010) as well as other lesser studies of these snakes, including my own, as well as relevant studies of other New Guinea taxa (e.g. Zug 2004) and merging the results, this paper takes a conservative position and splits

Aspidomorphus into three genera, two being named and defined for the first time in accordance with the Zoological Code (Ride *et al.* 1999).

It should be noted that in terms of divergence, these newly named genera are considerably more divergent than other well recognized Australasian elapid genera such as the genera *Tropidechis* Günther, 1863, *Notechis* Boulenger, 1896 and *Austrelaps* Worrell 1963, with all three as a group being far less divergent.

Furthermore, *Aspidomorphus muelleri* (Schlegel, 1837) as presently recognized is divided into four species, two formally named for the first time; as well as two new subspecies, both formally named for the first time; *Aspidomorphus schlegeli* (Günther, 1872) is divided into two species, one formally named for the first time and *Aspidomorphus lineaticollis* (Werner, 1903) is divided into six species, with four formally named for the first time.

McDowall and Cogger (1967) did an excellent job of defining differences between the various taxa identified within this paper with little need to add further diagnostic material in order to differentiate the relevant taxa. As it happens, there is strong merit in publishing a species diagnosis that is both relatively simple, brief and easy to understand, including by lay people. This is because it is important that species be easily recognized by as many people as possible, including government regulators and others who may play an important role in managing the species at a later date.

The same applies for those working with the relevant taxa in the field.

The geological history of the New Guinea region that underpins a lot of the phylogeny of the relevant species has been well documented elsewhere (e.g. Dow, 1977 and Cloos *et al.* 2005 and sources cited therein) and is not repeated in this preamble. The history of the main features relevant to the distributions and phylogenies of the snakes are well known. These include the obvious ocean barriers, some of them being dry land during glacial maxima, as well as the land area known as the Solomons Arc, accreting to the main part of New Guinea as a region of northern ranges, and of course the main central cordillera, splitting the north from the south in terms of the main New Guinea land mass.

The molecular phylogeny of the various taxa formally described herein has been documented in detail by Metzger *et al.* (2010) and is not repeated herein.

Suffice to say that in terms of each of the species described herein, each are morphologically distinct from one another, are not known to cross-breed, all have strong divergence from one another in terms of their molecular phylogenies (that is ancient divergences measured in the millions of years) and each have allopatric distributions in terms of similar taxa with which they have been confused in the recent past, this being species they were included with by Sam McDowall in 1967.

By any reasonable definition they each consist of proper species and so I have no hesitation in describing each as such within this paper.

In the event a later author seeks to merge one or more genera or species described within this paper, the order of priority should be by page priority in terms of this paper. Gender, spellings and the like of names should not be altered in any way unless mandated by the Zoological Code, even if apparently wrong in the original descriptions herein.

Relevant published literature in terms of the taxonomy of the snakes referred until now to the genus *Aspidomorphus* includes the following: Boulenger (1895, 1896), Brongersma (1934, 1952a, 1952b, 1957), Burt and Burt (1932), de Rooij (1917), Duméril *et al.* (1854), Fitzinger (1843), Focart (1953), Günther (1872), Haas (1930), Haas (1950), Hoser (2012), Iskandar and Erdelen (2006), Klemmer (1963), Kraus (2013), Loveridge (1946, 1948), McDowall and Cogger (1967), Metzger *et al.*

(2010), O'Shea (1996), Parker (1936), Pyron *et al.* (2013), Ruiters (1960), Schlegel (1837), Tiedemann and Grillitsch (1999), Werner (1899, 1903, 1925), Williams and Parker (1964), Worrell (1961, 1963a, 1963b) and sources cited therein.

In view of the findings of Metzger *et al.* (2010) and Pyron *et al.* (2013), the subtribe Aspidomorphina Hoser, 2012, as defined by Hoser (2012), is herein elevated to full tribe status, thereby becoming Aspidomorphini *tribe nov.* by effectively adopting the same diagnosis. The subtribe Aspidomorphina should be also maintained to allow for the inevitable need for use when dealing with fossil material.

TRIBE ASPIDOMORPHINI TRIBE NOV.

(Terminal Taxon: *Aspidomorphus muelleri*)

Diagnosis: Separated from all other Australasian and Melanesian land dwelling (non-sea snake) elapids and others in the tribe Micropechiini by the following suite of characters:

Snakes of moderate to slender build, usually around 400 mm in total length as adults and never more than 650 mm as adults; head flattened and slightly distinct from the neck which is noticeably narrower but not unduly narrow; shortish tail, small to medium sized eye with a vertically elliptical pupil, although this is hard to determine in specimens by day, colouration is highly variable, but always includes a white bar running from the snout, below (but joining) the eye and posterior to the neck, where it fuses to the dorsal ventral colour change; dorsally colouration is usually a ground colour and the lighter venter is usually one colour, scalation is smooth and shiny with 15 midbody rows, 138-182 ventrals, divided anal plate, 19-41 subcaudals, no loreal, 6 supralabials, with the third and fourth in contact with the eye, a single preocular in contact with the nasal and second supralabial, 1-2 postoculars and 7 infralabials; known as "Crowned snakes", this is because many individuals have a distinct lighter coloured crown on the top of the head and near neck region, often broken with darker pigment with a wide dark band running on either side of the head broadly in line with the eye and widening posteriorly; when a crown is not present there is usually a change in colour intensity in the scales in the same regions of the head. Known to inhabit forests to an elevation of at least 1,500 metres.

The above is adapted from Hoser, 2012, with the tribe diagnosis being as for the subtribe Aspidomorphina Hoser, 2012, but with the genus *Aspidomorphus* Fitzinger 1843 divided three ways as per this paper.

Content: *Aspidomorphus* Fitzinger, 1843; *Pilgerus gen. nov.* (this paper); *Assangeus gen. nov.* (this paper).

GENUS ASPIDOMORPHUS FITZINGER, 1843.

Type species: *Elaps muelleri* Schlegel, 1837.

Diagnosis: Separated from all other members of the tribe Aspidomorphini *tribe nov.* by the following suite of characters: Tip of anterior medial (palatine) process of maxilla separated from tip of anteromedial

process of ectopterygoid by a (ligament-filled) gap shorter than the basal diameter of the fang; one solid maxillary tooth anterior to posterior medial (ectopterygoid) process of maxilla; longest anterior dentary tooth followed by a series of rather widely spaced teeth of progressively diminishing length; hemipenis proximally with two transverse tiers of conspicuously enlarged spines; distal end of hemipenis papillose. Sulcus spermaticus divided longitudinally by a membrane proximal to the divergence of the distal branches of the sulcus; proximal two tiers of enlarged hemipenial spines followed abruptly by much shorter spines; pupil almost circular; black pigment on parietal forming ocelli.

In common with other members of the tribe Aspidomorphini *tribe nov.* this genus is diagnosed and characterized as follows: Snakes of moderate to slender build, usually around 400 mm in total length as adults and never more than 650 mm as adults; head flattened and slightly distinct from the neck which is noticeably narrower but not unduly narrow; shortish tail, small to

medium sized eye with a vertically elliptical pupil, although this is hard to determine in specimens by day, colouration is highly variable, but always includes a white bar running from the snout, below (but joining) the eye and posterior to the neck, where it fuses to the dorsal ventral colour change; dorsally colouration is usually a ground colour and the lighter venter is usually one colour, scalation is smooth and shiny with 15 midbody rows, 138-182 ventrals, divided anal plate, 19-41 subcaudals, no loreal, 6 supralabials, with the third and fourth in contact with the eye, a single preocular in contact with the nasal and second supralabial, 1-2 postoculars and 7 infralabials; known as "Crowned snakes", this is because many individuals have a distinct lighter coloured crown on the top of the head and near neck region, often broken with darker pigment with a wide dark band running on either side of the head broadly in line with the eye and widening posteriorly; when a crown is not present there is usually a change in colour intensity in the scales in the same regions of the head. These snakes are known to inhabit forests to an elevation of at least 1,500 metres.

Distribution: New Guinea and adjacent islands including the Bismark Archipelago and Seram.

Content: *Aspidomorphus muelleri* (Schlegel, 1837); *A. interruptus* Brongersma, 1934; *A. keneficki* sp. nov. (this paper); *A. coggeri* sp. nov. (this paper).

ASPIDOMORPHUS MUELLERI (SCHLEGEL, 1837).

Diagnosis: As for genus (above). The diagnosis for the separation of the subspecies and species formerly identified as being within this species is given in the accounts that follow.

Distribution: North-west island New Guinea, including both north and south coastal areas and adjacent outlier islands.

ASPIDOMORPHUS MUELLERI TAMISI SUBSP. NOV.

Holotype: Specimen number AMNH 57528 from the Upper Fly River, Western Province, Papua New Guinea, held at the American Museum of Natural History, New York, USA. The American Museum of Natural History is a public facility that allows researchers access to specimens.

Paratype: Specimen number AMNH 57531 from the Upper Fly River, Western Province, Papua New Guinea, held at the American Museum of Natural History, New York, USA. The American Museum of Natural History is a public facility that allows researchers access to specimens.

Diagnosis: *A. muelleri tamisi* subsp. nov. is separated from all others in the *A. muelleri* species complex by the following suite of characters: An absence of a distinctive collar on the back of the neck; no ocelli of any sort on the top of the head; no stripes on the mental or rostral; the throat and lower neck are merely clouded with gray, rather than being dark brown, dark grey or nearly black.

Distribution: Known only from Western Province, PNG.

Etymology: Named in honour of Paul Tamis of Moolap, Geelong, Victoria, Australia, in recognition of his valuable and largely unrecognized contributions to herpetology in Australia, including in his role as a long-time committee member of the Victorian Association of Amateur Herpetologists (VAAH).

ASPIDOMORPHUS INTERRUPTUS BRONGERSMA, 1934.

Diagnosis: This species is redefined herein as two geographically separated subspecies. *A. interruptus interruptus* is separated from all other snakes formerly referred to *A. muelleri* (Schlegel, 1837), including the new species and subspecies described herein by the following suite of characters: A distinctive whitish collar on the neck, not seen in *A. muelleri*, *A. macdowellii* subsp. nov. or *A. keneficki* sp. nov.. *A. interruptus* differs from *A. coggeri* sp. nov. from the mainland of PNG in having brown, rather than black ocelli on the head and in having the brown of the back extending well down onto the tips of the ventrals. *A. interruptus* has a faint rostral stripe, but the mental stripe is distinct.

A. interruptus macdowellii subsp. nov. formally described below is

separated from the other species formerly referred to *A. muelleri* including the new species and subspecies described herein from the *A. muelleri* complex by its concolour phase that is brown above with pale upper lip (broken into three parts anterior to the eye, broken under the eye and then continuous beyond the eye onto the neck), with large dark flecks within the pale marking on the upper lip, the posterior section not extending more than the length of the head beyond the head; pale below (except anteriorly, where the colouration is dark) and with an absence of a highly distinct whitish nape across the back of the neck.

While *A. interruptus macdowellii* subsp. nov. is quite distinct from nominate *A. interruptus* in appearance and not likely to be confused with it, molecular evidence published by Metzger *et al.* (2010), shows only a 2.5% divergence and so I have taken a conservative position and accorded the new taxon subspecies status.

Distribution: *A. interruptus interruptus* is known from the Bismarck Archipelago. *A. interruptus macdowellii* subsp. nov. is known from Northern New Guinea west of the Huon Peninsula.

ASPIDOMORPHUS INTERRUPTUS MACDOWELLI SUBSP. NOV.

Holotype: Specimen number: AMNH 62029, at the American Museum of Natural History, New York, USA from Hollandia, (Jayapura), West New Guinea. The American Museum of Natural History is a public facility that allows researchers access to specimens.

Paratype: Specimen number: AMNH 75239, at the American Museum of Natural History, New York, USA, from Wewak, East Sepik Province, Papua New Guinea. The American Museum of Natural History is a public facility that allows researchers access to specimens.

Diagnosis: *A. interruptus macdowellii* subsp. nov. is separated from the other species formerly referred to *A. muelleri* including the new species and subspecies described herein from the *A. muelleri* complex by its concolour phase that is brown above with pale upper lip (broken into three parts anterior to the eye, broken under the eye and then continuous beyond the eye onto the neck), with large dark flecks within the pale marking on the upper lip, the posterior section not extending more than the length of the head beyond the head; pale below (except anteriorly, where the colouration is dark) and with an absence of a highly distinct whitish nape across the back of the neck.

While *A. interruptus macdowellii* subsp. nov. is quite distinct from nominate *A. interruptus*, molecular evidence published by Metzger *et al.* (2010), shows only a 2.5% divergence and so I have accorded the new taxon subspecies status.

Distribution: Northern island New Guinea in the region west of the Sepik Valley and into Indonesian Papua in the region of the north coast and nearby areas, north of the central cordillera.

Etymology: Named in honour of USA-based herpetologist Samuel B. McDowell, in recognition of his major works on New Guinea snakes.

ASPIDOMORPHUS KENEFICKI SP. NOV.

Holotype: A specimen at the British Museum of Natural History, London, (now known as the Natural History Museum) UK, specimen number: BM 1963:2.28.27 from North Seram, Indonesia. The Natural History Museum in the UK is a government funded facility that allows scientists access to their specimens.

Diagnosis: *A. keneficki* sp. nov. is separated from *A. muelleri* including the new species and subspecies described herein from the *A. muelleri* complex by the following suite of characters: An absence of three distinct whitish blotches on the upper lip anterior to the eye, sometimes merged in other species, but remaining distinct, instead this region being of similar colour to the rest of the snout, only lightening slightly on the supralabial beneath the front of the eye.

Furthermore, in common with other species within the *A.*

muelleri complex there is a dark patch immediately beneath the eye, followed by a white bar extending posteriorly along the back of the head and onto the neck. Unlike in the other species, in the *A. muelleri* complex the thick white bar extends more than a full head length beyond the rear of the head, running along the neck in a line slightly below the mid-lateral section of the snake, before breaking up at the lower flank.

The ocelli on the head are also relatively indistinct.

A. keneficki sp. nov. females are separated from all others in the *A. muelleri* species complex by having 178 ventrals and 34 subcaudals versus 177 or less ventrals and 32 subcaudals or less in the other taxa.

Distribution: Known only from Seram, Indonesia, but presumably on immediately adjacent outlier islands with suitable habitat.

Etymology: Named in honour of Kene Fick, an auto-electrician of great skill at Port Augusta, South Australia, Australia, who did for no charge provide essential logistical support for the Snakebusters wildlife educators and researchers while working in remote parts of Australia in 2013.

It is not just scientists who make a valuable contribution to science, but also those people who provide the resources and logistics to allow the research to continue, even if those people have no relevant scientific expertise themselves. It is fitting that etymologies for species include such people and I make no apologies for naming species in recognition of these people.

ASPIDOMORPHUS COGGERI SP. NOV.

Holotype: A specimen number: AMNH 73972 at the American Museum of Natural History, New York, USA, from the Kwagira River, Papua New Guinea. The American Museum of Natural History is a public facility that allows researchers access to specimens.

Diagnosis: *A. coggeri* sp. nov. and *A. interruptus interruptus* are separated from *A. muelleri* including the new species and subspecies described herein from the *A. muelleri* complex by the presence of a distinctive whitish collar on the neck, not seen in *A. muelleri*, *A. interruptus maddockelli* subsp. nov. or *A. keneficki* sp. nov.. *A. interruptus interruptus* from the Bismark Archipelago differs from *A. coggeri* sp. nov. from the mainland of PNG in having brown, rather than black ocelli on the head and in having the brown of the back extending well down onto the tips of the ventrals. *A. interruptus* have the rostral stripe faint, but the mental stripe distinct, a condition also occasionally seen in *A. coggeri* sp. nov.. However as a rule in *A. coggeri* sp. nov. both mental and rostral stripes are distinct. *A. coggeri* sp. nov. have 14 or less solid maxillary teeth versus more than this number in all in the other species within the *A. muelleri* complex.

Female *A. coggeri* sp. nov. have under 170 ventrals, versus over 170 in the other species within the *A. muelleri* complex.

Distribution: PNG generally in the region east of Huon Peninsula on the north side of the Island and east of the Fly River on the south side of the central cordillera.

Etymology: Named in honour of Harold G. Cogger, former deputy director of the Australian Museum of Sydney, NSW, Australia, in recognition of his several major books on Australian reptiles.

WALMSLEYUS GEN. NOV.

Type species: *Diemenia schlegelii* Günther, 1872.

Diagnosis: Separated from all other members of the tribe Aspidomorphini *tribe nov.* by the following suite of characters: Tip of palatine process of maxilla separated from the tip of anteromedial process of ectopterygoid by a (ligament-filled) gap longer than half the length of the fang; three solid maxillary teeth anterior to ectopterygoid process of the maxilla; longest anterior dentary tooth followed by a distinct diastema, in turn followed by abruptly smaller teeth similar in length to those of the middle of the dentary; hemipenis without enlarged proximal spines; apex of hemipenis with longitudinal fleshy folds.

Distribution: North-west Island New Guinea and immediately

adjacent nearby islands, only extending into Papua New Guinea in the region of the north coast and west of the Huon Peninsula.

Etymology: Named in honour of Dr. John Walmsley, in recognition of his immense, but ultimately failed attempts to ensure the survival of Australia's most endangered mammals in the period from the late 1960's to the mid 2000's (nearly four decades).

Dr John Walmsley (born 1938) was born in Ourimbah, New South Wales in 1938. His passion for Australian wildlife commenced when the seven-year-old Wamsleys family moved to a 67 hectare bushland block at Niagara Park. At age sixteen Walmsley became a trainee metallurgist with BHP. Dissatisfied with the job he became a labourer in BHP's open-hearth furnaces and worked a second job renovating run down houses. By age 23 Walmsley was a millionaire. Approximately two years later Walmsley entered the University of Newcastle, Australia. The thirty-year-old Walmsley graduated with a PhD in Mathematics from the University of Queensland and moved to Flinders University to lecture.

In June 1969 he purchased a farm at Mylor, South Australia, that was to become Walmsley's first sanctuary, Warrawong. Walmsley eradicated all feral plants and animals from the sanctuary and erected a surrounding fence to preserve the sanctuary's feral animal-free state. That is he removed, foxes, cats and rabbits.

The sanctuary was a success, not only breeding rare and endangered wildlife, but also financially as well. His stock-exchange-listed enterprise became a multi-million dollar powerhouse. As his business expanded to include similar sanctuaries in NSW and Victoria, the government-owned zoos, along with other government wildlife bureaucrats tied to the same bureaucracies ganged up on him to shut him down.

This was done by ruthless tactics, including illegal armed raids, countless false and defamatory allegations and unfair discriminatory regulation on his business in a way that eventually caused his business to shut down.

By 2005, the company was effectively wound up.

Walmsley later gave an account of the rise and fall of his conservation enterprise and detailed how government-owned zoos used ruthless tactics to destroy him and his business, so that now, Walmsley has been effectively banished to obscurity and with a personal reputation in tatters.

Part of his story read as follows:

"Warrawong Sanctuary demonstrated that Australia need not lose its wildlife, It also showed the way to go. However, one important point was that it took thirteen years to complete.

Why it took so long demonstrated the real problem.

When development of Warrawong Sanctuary commenced in 1969, there were three groups of people who's perceived job it was to save our wildlife. They were Adelaide Zoo, Adelaide Museum and the South Australian National Parks and Wildlife Service. These three groups between them consumed the available public funds for conservation. There was room for no-one else. The concept of Warrawong seemed to terrify them. This terror reached its summit in 1975 when, as I stated earlier, the then Premier of South Australia, the honourable Mr Don Dunstan, called a Special Executive Council Meeting of the South Australian Parliament and ordered the Police Commissioner to lock me up.

Without this understanding, of the terror that a possible competitor struck to the very hearts of these honourable ladies and gentlemen, it would be easy to make the grave mistake of trusting them. It would then be easy to make the much graver mistake of co-operating with them. That is where the greatest danger lies - cooperation - the buzz word of monopolists all over the world."

Content: *Walmsleyus schlegelii* (Günther, 1872); *W. anstisae* sp. nov. (this paper).

WALMSLEYUS SCHLEGELI (GUNTHER, 1872).

Diagnosis: As for the genus as diagnosed above and also see the specific diagnosis herein:

W. anstisae sp. nov., the only other species in the genus is separated from *W. schlegeli* by being of the concolour phase and nearly uniform brown in dorsal colour although the anterior body has a dark lateral stripe down each side with a whitish ventral hue obvious on the lower flanks. In *W. anstisae* sp. nov. the white upper labial stripe while partly broken under the eye, does in fact join to make it effectively continuous.

W. anstisae sp. nov., the only other species in the genus is further separated from *W. schlegeli* by having less than 150 ventrals in females, versus more than 150 in females of *W. schlegeli*.

Distribution: *W. schlegeli* is known from the western part of island New Guinea, exclusively within Irian Jaya. *W. anstisae* sp. nov. is only known from the coastal region on the northern part of island New Guinea in the area of the PNG/Irian Jaya border.

WALMSLEYUS ANSTISAE SP. NOV.

Holotype: Specimen number BPBM 23433 at the Bernice Pauahi Bishop Museum, Hawaii, USA, collected from the Torricelli Mtns, West Sepik, Papua New Guinea. The Bernice Pauahi Bishop Museum, Hawaii, USA is a public facility that allows zoologists access to their collection.

Paratype: Specimen number BPBM 23434 at the Bernice Pauahi Bishop Museum, Hawaii, USA, collected from the Torricelli Mtns, West Sepik, Papua New Guinea. The Bernice Pauahi Bishop Museum, Hawaii, USA is a public facility that allows zoologists access to their collection.

Diagnosis: *W. anstisae* sp. nov. is separated from *W. schlegeli* the only other species in the genus by being of the concolour phase and nearly uniform brown in dorsal colour although the anterior body has a dark lateral stripe down each side with a whitish ventral hue obvious on the lower flanks. In *W. anstisae* sp. nov. the white upper labial stripe while partly broken under the eye, does in fact join to make it effectively continuous.

W. anstisae sp. nov. is further separated from *W. schlegeli* by having less than 150 ventrals in females, versus more than 150 in *W. schlegeli*.

W. anstisae sp. nov. is further diagnosed by the following characters: Tip of palatine process of maxilla separated from the tip of anteromedial process of ectopterygoid by a (ligament-filled) gap longer than half the length of the fang; three solid maxillary teeth anterior to ectopterygoid process of the maxilla; longest anterior dentary tooth followed by a distinct diastema, in turn followed by abruptly smaller teeth similar in length to those of the middle of the dentary; hemipenis without enlarged proximal spines; apex of hemipenis with longitudinal fleshy folds.

Distribution: *W. anstisae* sp. nov. is only known from the coastal region on the northern part of island New Guinea in the region near the PNG/Irian Jaya border. *W. schlegeli* is known from the western part of island New Guinea, exclusively within Irian Jaya.

Etymology: Named in honour of NSW-based school teacher Marion Anstis in recognition of a lifetime spent teaching people about Australian wildlife, in particular frogs, further recognizing her excellent published books on Australian frogs and tadpoles.

PILGERUS GEN. NOV.

Type species: *Pseudelaps muelleri* var. *lineaticollis* Werner, 1903.

Diagnosis: Tip of anterior medial (palatine) process of maxilla separated from tip of anteromedial process of ectopterygoid by a (ligament-filled) gap shorter than the basal diameter of the fang; one solid maxillary tooth anterior to posterior medial (ectopterygoid) process of maxilla; longest anterior dentary tooth followed by a series of rather widely spaced teeth of progressively diminishing length; hemipenis proximally with two transverse tiers of conspicuously enlarged spines; distal end of

hemipenis papillose; sulcus spermaticus of hemipenis not divided proximal to divergent furcation of sulcus; proximal enlarged hemipenial spines followed more distally by tiers of progressively smaller spines, so that there is a gradual transition between the enlarged proximal hooks and the small distal spines; pupil conspicuously elliptical; black pigment on parietal organized as the dark dorsal border of an upper light line.

Distribution: Endemic to Papua New Guinea and nearby offshore islands, most notably those to the south-east.

Etymology: Named in honour of well-known Australian-born, British-based documentary film maker John Pilger, in recognition of his valiant attempts to document Australian history in an accurate manner, including his details of the genocidal atrocities committed by British invaders against the indigenous inhabitants of Australia.

Content: *Pilgerus lineaticollis* (Werner, 1903); *P. lineatus* (Brongersma, 1934); *P. assangei* sp. nov. (this paper); *P. nardellai* sp. nov. (this paper); *P. macki* sp. nov. (this paper); *P. mooreae* sp. nov. (this paper).

PILGERUS LINEATICOLLIS (WERNER, 1903).

Diagnosis: As for the genus. Relevant diagnoses for species formerly regarded as being within *P. lineaticollis* are given in the following text.

P. lineaticollis are readily separated from all others in the species complex by the considerably longer hemipenis in males in which the tip of the hemipene reaches the ninth subcaudal, versus number 7 or less in all other species, except some specimens of *P. assangei* sp. nov., where the length may occasionally get to reach the eighth subcaudal.

P. lineaticollis are separated from congeners (as described within this paper) by their higher number of solid maxillary teeth, being 14-18 in males and 17 or higher in females, versus 14 or lower in both sexes of all other species.

Distribution: Astrolobe Bay and nearby areas of northern New Guinea in the general vicinity of the Huon Peninsula.

PILGERUS LINEATUS (BRONGERSMA, 1934)

Diagnosis: *P. lineatus* are separated from all other species in the *P. lineaticollis* group by the following suite of characters:

There is a distinct reduction of the number of spots on the upper surface of the head and there are more or less distinct dark lines on the back. The head bears only a few rather large dark spots on its upper surface, especially anteriorly; these spots are symmetrically arranged. Occiput with a median dark stripe. Only a few dark spots anteriorly. A light streak on the side of head and neck, extending on to the body, interrupted below the eye by a dark oblique bar. This light streak sometimes bordered above by a dark band. The light band is most distinct behind the eye. Throat is thickly powdered with grey to be darkish in colour; belly whitish, powdered with grey anteriorly or dark-coloured over its whole length. Back light brown with dark spots on the scales; these spots forming distinct longitudinal lines. There is no vertebral stripe, but dark lines are present on the neck. Numerous small but sharply bordered ocelli are present on the snout. The upper light line is evident on fourth and fifth scale rows of younger specimens, and the lower light line is distinguishable on the side of the snout anterior to the bridle.

Compared to other species in the *P. lineaticollis* complex *P. lineatus* have mid-range ventral and subcaudal counts in both sexes and likewise in terms of hemipenial structure.

Distribution: Woodlark Island, Papua New Guinea.

PILGERUS ASSANGEI SP. NOV.

Holotype: Specimen number AMNH 41637, at the American Museum of Natural History, New York, USA, from Fergusson Island, Papua New Guinea. The American Museum of Natural History, New York, USA is a public facility that allows zoologists access to their collection.

Paratypes: Specimen numbers AMNH 76643, AMNH 76644 and AMNH 76645 at the American Museum of Natural History,

New York, USA, from Fergusson Island, Papua New Guinea. The American Museum of Natural History, New York, USA is a public facility that allows zoologists access to their collection.

Diagnosis: *Pilgerus assangei* sp. nov. is similar in most respects to *P. lineatus*. However it is separated from that species by the following: 1/ the fact that each internasal and prefrontal bears a spot, although these are missing in some specimens; 2/ the frontal has a median dark stripe; 3/ each parietal bears a dark longitudinal stripe, bending inward anteriorly and just reaching the frontal.

In common with *P. lineatus*, *Pilgerus assangei* sp. nov. are separated from all other species in the *P. lineaticollis* group by the following suite of characters: There is a distinct reduction of the number of spots on the upper surface of the head and there are more or less distinct dark lines in the form of dashes on the back. The head bears only a few rather large dark spots on its upper surface, especially anteriorly; these spots are symmetrically arranged. Occiput with a median dark stripe. Only a few dark spots anteriorly. A light streak on the side of head and neck, extending on to the body, interrupted below the eye by a dark oblique bar. This light streak sometimes bordered above by a dark band. The light band is most distinct behind the eye. Throat is thickly powdered with grey but remains lightish in colour; belly whitish, powdered with grey anteriorly or dark-coloured over its whole length. Back light brown with dark spots on the scales; these spots forming distinct longitudinal lines. There is no vertebral stripe, but dark lines are present on the neck. Numerous small but sharply bordered ocelli are present on the snout. The upper light line is evident on fourth and fifth scale rows of younger specimens, and the lower light line is distinguishable on the side of the snout anterior to the bridle.

Distribution: The type series is from Fergusson Island, New Guinea, but at the present time specimens found on the immediately adjacent Goodenough and Normanby islands are referable to this taxon.

Etymology: Named in honour of Wikileaks founder Julian Assange, in recognition of his globally patriotic work for human rights and freedom from government tyranny in exposing reckless government corruption.

PILGERUS MACKI SP. NOV.

Holotype: Specimen number BPBM 17282 from Bunisi, Papua New Guinea, held at the Bernice Pauahi Bishop Museum, Hawaii, USA. The Bernice Pauahi Bishop Museum, Hawaii, USA is a public facility that allows zoologists access to their collection.

Paratype: Specimen number BPBM 17283 from Bunisi, Papua New Guinea, held at the Bernice Pauahi Bishop Museum, Hawaii, USA. The Bernice Pauahi Bishop Museum, Hawaii, USA is a public facility that allows zoologists access to their collection.

Diagnosis: *Pilgerus macki* sp. nov. is separated from *Pilgerus lineaticollis* by the low ventral count in both sexes, being under 150 in males, versus over 160 in *Pilgerus lineaticollis* or under 150 in females, versus over 150 in *Pilgerus lineaticollis*. In male *Pilgerus macki* sp. nov. the hemipenis tip ends at subcaudal 4-6, versus 7-9 in *Pilgerus lineaticollis*.

Pilgerus macki sp. nov. is separated from all other *Pilgerus* species by the following unique suite of characters: A distinct pattern but not including a distinct mental stripe; the throat is dark; less than 150 ventrals in both sexes; 14 solid maxillary teeth in males and 11 in females; the upper light line is distinct and on the third to fifth scale rows of the neck; there is a light vertebral stripe, although it is not prominent; there are well developed ocelli, like those of *Aspidomorphus muelleri* (and other species within *Aspidomorphus* as defined within this paper), which are present on the snout.

Distribution: The far south-east of the mainland of island New Guinea in the region of the Milne Bay province as well as the adjacent provinces to the west.

Etymology: Named in honour of former NSW Member of Parliament, Ted Mack, in recognition of his attempts to shine the light of ethics on the endemically corrupt NSW government and legal system.

PILGERUS NARDELLAI SP. NOV.

Holotype: Specimen number AMNH 76682 at the American Museum of Natural History, New York, USA, from Misima Island, Papua New Guinea. The American Museum of Natural History, New York, USA is a public facility that allows zoologists access to their collection.

Paratypes: Specimen numbers AMNH 76685 and AMNH 76695 at the American Museum of Natural History, New York, USA, from Misima Island, Papua New Guinea. The American Museum of Natural History, New York, USA is a public facility that allows zoologists access to their collection.

Diagnosis: *Pilgerus nardellai* sp. nov. are separated from all other *Pilgerus* species by the following suite of characters: high ventral and subcaudal counts (166-169 ventrals in males, 167-173 ventrals in females, over 30 subcaudals in both sexes), only being matched by *P. lineaticollis*; but with a low maxillary tooth count in both sexes (12-14), in line with specimens of *P. assangei* sp. nov. from the d'Entrecasteaux Archipelago. In *Pilgerus nardellai* sp. nov. the upper light line is evident on the fourth and fifth scale rows of younger specimens, but nearly obliterated in larger specimens. There is no vertebral stripe, nor are there dark lines on the neck. The black spotting of the head is reduced to inconspicuous flecks and dashes. The throat is dark.

Distribution: Misima Island, Papua New Guinea.

Etymology: Named in honour of Don Nardella. He has been an Australian Labor Party member of the Victorian Parliament since 1992 and in recent years unsuccessfully attempted to take action to stop endemic corruption in the Victorian Government, including the Liberal Party, most notably the corrupt member for Warrandyte, Ryan Smith and also the State Wildlife Department, calling itself most recently the Department of Sustainability and Environment (DSE) or Department of Environment and Primary Industry (DEPI).

Notwithstanding this recognition of Nardella's good work, it should be remembered that corruption is also endemic within the Australian Labor Party.

PILGERUS MOOREAE SP. NOV.

Holotype: Specimen number AMNH 76653 at the American Museum of Natural History, New York, USA, from Sudest Island, Papua New Guinea. The American Museum of Natural History, New York, USA is a public facility that allows zoologists access to their collection.

Paratype: Specimen numbers AMNH 76654 and 76652 at the American Museum of Natural History, New York, USA, from Sudest Island, Papua New Guinea. The American Museum of Natural History, New York, USA is a public facility that allows zoologists access to their collection.

Diagnosis: *Pilgerus mooreae* sp. nov. are separated from all other *Pilgerus* as defined within this paper by the fact that specimens do not have a bridle present (not even a faint one); there is a total absence of head-spotting, no trace of a vertebral line or of dark neck lines, but the lower light line is present.

Pilgerus mooreae sp. nov. are superficially similar in appearance to *Walmsleyus* gen. nov., but are readily diagnosed as being within the genus *Pilgerus* by the following characters: Tip of anterior medial (palatine) process of maxilla separated from tip of anteromedial process of ectopterygoid by a (ligament-filled) gap shorter than the basal diameter of the fang; one solid maxillary tooth anterior to posterior medial (ectopterygoid) process of maxilla; longest anterior dentary tooth followed by a series of rather widely spaced teeth of progressively diminishing length; hemipenis proximally with two transverse tiers of conspicuously enlarged spines; distal end of hemipenis

papillose; sulcus spermaticus of hemipenis not divided proximal to divergent furcation of sulcus; proximal enlarged hemipenial spines followed more distally by tiers of progressively smaller spines, so that there is a gradual transition between the enlarged proximal hooks and the small distal spines; pupil conspicuously elliptical; black pigment on parietal organized as the dark dorsal border of an upper light line.

Pilgerus mooreae sp. nov. are further diagnosed by the following suite of characters: 153-157 ventrals (both sexes); 26-30 subcaudals (both sexes); 11-13 solid maxillary teeth (both sexes).

Distribution: Sudest Island, Papua New Guinea.

Etymology: Named in honour of Sydney, NSW, Australia, politician Clover Moore. She has become the Lord Mayor of the City of Sydney in 2004. She was an independent member of the New South Wales Legislative Assembly from 1988 to 2012, representing the electorates of Bligh and Sydney. She has for many decades tried her best to improve the political integrity in the NSW government at both local and State levels, but been generally thwarted by more powerful vested interests.

CONFLICT OF INTEREST

This author reports no conflict of interest in terms of any material within this paper.

REFERENCES CITED

- Boulenger, G. A. 1895. On a collection of reptiles and batrachians from Ferguson Island, D'Entrecasteaux group British New Guinea. *Ann. Mag. Nat. Hist.* (6)16:28-32.
- Boulenger, G. A. 1896. *Catalogue of the snakes in the British Museum (Natural History)*. 3:1-727. London:
- Brass, L. J. 1959. Results of the Archbold Expeditions. No. 79. Summary of the Fifth Archbold Expedition to New Guinea (1956-1957). *Bull. Am. Mus. nat. Hist.* 118:1-69.
- Brongersma, L. D. 1934. Contributions to Indo-Australian herpetology. *Zool. Med.* 17:161-251.
- Brongersma, L. D. 1952a. Zoologisch onderzoek met de M. L. D. in Nieuw-Guinea. *Alle Hens* 6(5):4-5.
- Brongersma, L. D. 1952b. Zoologisch onderzoek in Nieuw-Guinea door Dr L. D. Brongersma. *Med. civ. Acad., Leiden* No. 2:25-28.
- Brongersma, L. D. 1957. Notes on the trachea, the lungs, and the pulmonary artery in snakes. 1-11. *Proc. K. ned. Akad. Wet.* 60C:299-313.
- Burt, C. E. and Burt, M. D. 1932. Herpetological results of the Whitney South Sea Expedition. VI. *Bull. Am. Mus. nat. Hist.* 63:461-597.
- Cloos, M. et al. 2005. *Collisional delamination in New Guinea : the geotectonics of subducting slab breakoff*. Special paper 400. Geological Society of America:51 pp.
- de Rooij, N.1917. *The reptiles of the Indo-Australian Archipelago*. 2. Leiden: Brill.
- Dow, D. B. 1977. *A Geological Synthesis of Papua New Guinea*. Bulletin 201, Australian Government Publishing Service, Canberra, ACT, Australia:41 pp.
- Duméril, A. M. C., Bibron, G. and Duméril, A. H. A. 1854. *Erpétologie générale ou histoire naturelle complète des reptiles. Tome septième. Deuxième partie, comprenant l'histoire des serpents venimeux*. Paris, Librairie Encyclopédique de Roret: i-xii + 781-1536.
- Fitzinger, L. J. 1843. *Systema Reptilium. Fasciculus Primus. Amblyglossae. Vindobonae, Braumüller et Seidel Bibliopolas*. Wien, Germany.
- Forcart, L. 1953. Amphibien und Reptilien von Neuguinea, mit der Beschreibung eines neuen Laubfrosches, *Nyctimystes fivomaculata* n. sp. *Verh. naturf. Ges. Basel* 64:58-68.
- Günther, A. 1872. Seventh account of new species of snakes in the collection of the British Museum. *Ann. Mag. Nat. Hist.* (4)9:13-37.
- Haas, G. 1930. Über die Schadelmechanik und die kieferniuskulatur einige Proteroglypha. *2001Jb . (anat.)* 52:347-404.
- Haas, C. P. J. de 1950. Checklist of the snakes of the Indo-Australian Archipelago (Reptiles, Ophidia). *Treubia* 20:511-625.
- Hoser, 2012. A reassessment of the higher taxonomy of the elapidae. *Australasian Journal of Herpetology* 10:49-63.
- Iskandar, D. T. and Erdelen, W. R. 2006. Conservation of amphibians and reptiles in Indonesia: issues and problems. *Amphibian and Reptile Conservation* 4(1):60-87.
- Klenuner, K. 1963. Liste der rezenten Giftschlangen. In *Die Giftschlangen a' er Erde*: 255-464. Marburg an der Lahn: N. G. Elwert Universitäts und Verlags Buchhandlung.
- Kraus, F. 2013. Further range extensions for reptiles and amphibians from Papua New Guinea. *Herpetological Review* 44(2):277-280.
- Loveridge, A. 1946. *Reptiles of the Pacific world*. New York: Macmillan.
- Loveridge, A. 1948. New Guinean reptiles and amphibians in the Museum of Comparative Zoology and United States National Museum. *Bull. Mus. comp. Zool. Harv.* 101:305-430.
- McDowell, S. B. and Cogger, H. G. 1967. *Aspidomorphus*, a genus of New Guinea snakes of the family Elapidae, with notes on related genera. *Journal of Zoology*, London 151:497-543.
- Metzger, G. A., Kraus, F., Allison, A. and Parkinson, C. L. 2010. Uncovering cryptic diversity in *Aspidomorphus* (Serpentes: Elapidae): evidence from mitochondrial and nuclear markers. *Mol Phylogenet Evol.* 2 Feb:54(2):405-16. doi: 10.1016/j.ympev.2009.07.027. Epub 2009 Jul 30.
- O'Shea, M. 1996. *A Guide to the Snakes of Papua New Guinea*. Independent Publishing, Port Moresby, xii + 239 pp.
- Parker, H. W. 1936. A collection of reptiles and amphibians from the mountains of British New Guinea. *Ann. Mag. nat. Hist.* (10) 17:66-93.
- Pyron, R. A., Burbrink, F. T. and Weins, J. J. 2013. A phylogeny and revised classification of Squamata, including 4161 species of lizards and snakes. Published online at: <http://www.biomedcentral.com/1471-2148/13/93>.
- Ride, W. D. L. (ed.) et al. (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum, Cromwell Road - London SW7 5BD, UK.
- Ruiter, L. C. de 1960. Ein geval van dodelijke Slangenbeet in Nieuw-Guinea. *Lacerta* 19:22-24.
- Schlegel, H. 1837. *Essai sur la physionomie des serpens*. Partie Générale: xxviii +251 S. + Partie Descriptive: 606 S. + xvi. La Haye (J. Kips, J. HZ. et W. P. van Stockum).
- Tiedemann, F. and Grillitsch, H. 1999. Ergänzungen zu den Katalogen der Typusexemplare der Herpetologischen Sammlung des Naturhistorischen Museums in Wien. *Herpetozoa* 12(3/4):147-156.
- Werner, F. 1899. Ueber Reptilien und Batrachier aus Togoland, Kamerun und Deutsch-Neu-Guinea grösstentheils aus dem k. Museum für Naturkunde in Berlin. *Verhandlungen der Kaiserlich-Königlichen Zoologisch-Botanischen Gesellschaft in Wien* 49:132-157.
- Werner, F. 1903. Neue Reptilien und Batrachier aus dem naturhistorischen Museum in Brüssel. *Zool. Anz.* 26:246-253.
- Werner, F. 1925. Neue oder wenig bekannte Schlangen aus dem naturhistorischen Staatsmuseum in Wien. II. Teil. *Sitzungsb. Ber. Akad. Wiss., Wien, Abt. I*, 134:45-66.
- Williams, E. E. and Parker, F. 1964. The snake genus *Parapistocalamus* Roux (Serpentes, Elapidae) in Bougainville Solomon Islands. *Senckenberg. biol.* 45:543-552.
- Worrell, E. 1961. Herpetological name changes. *Western Australian Naturalist* 8:18-27.
- Worrell, E. 1963a *Reptiles of Australia*. Angus and Robertson, Sydney:169 pp.
- Worrell, E. 1963b. A new elapine generic name. *Australian Reptile Park Records* 1:2-7.
- Zug, G. R. 2004. Systematics of the *Carlia* "fusca" lizards (Squamata: Scincidae) of New Guinea and nearby islands. *Bishop Museum Bulletin Zoology* 5. I-viii+1-83.