

# ***Australasian Journal of Herpetology***

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Hoser, R. T. 2020. For the first time ever! An overdue review and reclassification of Australasian Tree Frogs (Amphibia: Anura: Pelodyadidae), including formal descriptions of 12 tribes, 11 subtribes, 34 genera, 26 subgenera, 62 species and 12 subspecies new to science. *Australasian Journal of Herpetology* 44-46:1-192.

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### ... Continued from AJH Issue 45 ...

Underside of thighs have irregular darker patches and hind isde of thigh has irregular fine creamish coloured stripes. Skin is leathery and with numerous scattered tubercles which may or not be arranged in well-defined longitudinal rows, including sometimes some of medium to large size and a prominent one on the eyelid. Belly is smooth except for some granular skin on the lower belly and thighs. Vomerine teeth present, but weakly developed and between the choanae. Fingers lack webbing but have large oval discs. Toes poorly to moderately webbed. A minute rounded outer metatarsal tubercle and a moderate-zied oval inner metatarsal tubercle. Tympanum distinct.

*Pustulatarana gen. nov.* are separated from the genus *Llewellynura* Wells and Wellington, 1985 by the large oval discs on the forelimbs and larger body size (27 mm vs 20 mm). *Pustulatarana gen. nov.* are separated from the genus *Mahoneybatrachus* Wells and Wellington, 1985, by having reduced toe webbing, versus well developed webbing on the feet.

Living specimens of *Pustulatarana longirostris* (Tyler and Davies, 1977) are depicted in Vanderduys (2012) on page 49 at bottom (2 images), as well as in Anstis (2013) on pages 234-237, including tadpoles and in Cogger (2014) on page 172 at top.

**Distribution:** Known only from McIlwraith Range, Mount Tozer and William Thomson Ranges on Cape York Peninsula in Far North Queensland, Australia.

**Etymology:** In Latin *Pustulata* means warty and *rana* means frog, so the name literally means warty frog, which sums up the morphology of the species in the genus.

**Content:** *Pustulatarana longirostris* (Tyler and Davies, 1977).

#### **PUSTULATARANA LONGIROSTRIS TOZERENSIS SUBSP. NOV.**

**LSIDurn:lsid:zoobank.org:act:6FA68D51-7733-43A7-A381-129BE1723EAD**

**Holotype:** A preserved specimen at the Queensland Museum, Brisbane, Queensland, Australia, specimen number J92480 collected from the south side of Mount Tozer, far north Queensland, Australia, Latitude -13.1 S., Longitude 143.2 E.

This facility gives access to its holdings.

**Paratypes:** Five preserved specimens at the Queensland Museum, Brisbane, Queensland, Australia, specimen numbers J92481-J92485 all collected from the south side of Mount Tozer, far north Queensland, Australia, Latitude -13.1 S., Longitude 143.2 E.

**Diagnosis:** *Pustulata longirostris tozerensis subsp. nov.* has until now been treated as a northern outlier population of nominate *P. longirostris* (Tyler and Davies, 1977), with a type locality of Rocky River (Latitude 13.46 S., Longitude 142.23 E), McIlwraith Range, Cape York Peninsula, Queensland, Australia and found generally in the rainforested tributaries of the Rocky River system.

By contrast *P. longirostris tozerensis subsp. nov.* is found in the rainforest streams running from the south side of Mount Tozer and including the Sir William Thompson Range, north of Lockhart River, far north Queensland, Australia. The two populations are separated by a dry

zone of apparently unsuitable habitat of significant geological antiquity and are therefore reproductively isolated and therefore evolving in separate directions. They are also morphologically divergent, warranting identification of the unnamed population at least to subspecies level as done herein.

The zone dividing known populations of each species is only about 30 km in a straight line.

*P. longirostris tozerensis subsp. nov.* is separated from *P. longirostris longirostris* by having a dorsum covered with numerous small pointed tubercles and some small folds of skin not obviously arranged in a longitudinal manner, versus small pointed and larger tubercles including large rounded ones on the dorsum, some of which are clearly arranged in a longitudinal manner down the dorsum. White on the upper lip, under the eye of *P. longirostris tozerensis subsp. nov.* extends beyond the eye towards the snout, but does not do so in *P. longirostris longirostris*.

The single known living species within the genus *Pustulatarana gen. nov.*, *P. longirostris* is readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following suite of characters: A smallish sized tree frog being 27 mm in body length. Brown to greenish brown or even yellow above, with obscure and irregular darker flecks and blotches. Creamy-white below, finely peppered with dark blackish-brown or shading of other lighter colour on the throat, with heavy concentrations of stippling on chin, chest and flanks of some specimens. Underside of thighs have irregular darker patches and hind isde of thigh has irregular fine creamish coloured stripes. Skin is leathery and with numerous scattered tubercles which may or not be arranged in well-defined longitudinal rows, including sometimes some of medium to large size and a prominent one on the eyelid. Belly is smooth except for some granular skin on the lower belly and thighs. Vomerine teeth present, but weakly developed and between the choanae. Fingers lack webbing but have large oval discs. Toes poorly to moderately webbed. A minute rounded outer metatarsal tubercle and a moderate-zied oval inner metatarsal tubercle. Tympanum distinct.

*Pustulatarana gen. nov.* are separated from the genus *Llewellynura* Wells and Wellington, 1985 by the large oval discs on the forelimbs and larger body size (27 mm vs 20 mm).

*Pustulatarana gen. nov.* are separated from the genus *Mahoneybatrachus* Wells and Wellington, 1985, by having reduced toe webbing, versus well developed webbing on the feet.

**Distribution:** *P. longirostris tozerensis subsp. nov.* is found in the vicinity of rainforest streams running from just south of Mount Tozer to include the Sir William Thompson Range, north of Lockhart River, far north Queensland, Australia.

**Etymology:** The subspecies name reflects the locality that most specimens of this taxon have been found to date, namely the environs of Mount Tozer.

**LLEWELLYNURA WELLS AND WELLINGTON, 1985**

**Type species:** *Hyla dorsalis microbelos* Cogger, 1966.

**Diagnosis:** The type species *Hyla dorsalis microbelos*

Cogger, 1966 is now recognized as a full species separate to the morphologically similar New Guinea taxon originally described as *Litoria dorsalis* Macleay, 1878. The putative taxon *Llewellynura microbelos* (Cogger, 1966), with a type locality of Cairns in Queensland, Australia has long been recognized as a so-called composite species (e.g. Anstis 2013). Two new forms previously included in *L. microbelos* are formally named within this paper.

Species within the genus *Llewellynura* Wells and Wellington, 1985 are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following suite of characters: they are tiny in size, being about 20 mm in body length as adults. Colour is variegated dark and brown dorsally; a row of widely spaced dorsolateral tubercles and ridges may be on each side, or alternatively just a few randomly scattered small tubercles on either side of upper flank; no pectoral fold; several conspicuous tubercles above each eye; tiny, slender and agile and with a sharply pointed snout. The dorsum may be grey, brown, yellow or red, often flecked or mottled with darker colour. There is usually a broad dark band from behind the eye to the groin and an even darker stripe along the snout, through the eye and over the base of the arm to the flank. Snout and upper surfaces of the limbs are peppered with dark brown. There is a conspicuous dark bar along the front edge of the arm. Ventral surface is white except for a fine peppering of brown on the throat, chest and limbs. Skin is smooth dorsally, with at least some small tubercles or warts or skin folds and usually several small subercles over each eye. Throat skin is smooth, but belly is granular. Finger and toe discs are moderate in size but distinct. Fingers lack webbing and toes are less than half webbed. The disc and nearly two phlanges are free on the outer side of the fourth toe. The inner metatarsal tubercle is prominent and there is no outer one. Tympanum ranges from small to indistinct. Second finger longer than first.

The Australian species within *Llewellynura* being of the nominate subgenus *Llewellynura* are separated from the New Guinea species herein placed in the subgenus *Microlitoria subgen. nov.* by lacking vomerine teeth.

**Distribution:** The three species within the nominate subgenus *Llewellynura* are found in the tropical parts of northern Australia from three main areas being:

- 1/ The north-west Kimberley Division of Western Australia, centred around the Mitchell Plateau (*L. fukker sp. nov.*), and:
- 2/ The top end of the Northern Territory, from Litchfield National Park in the west and extending east to include Groote Eylandt, and also including the Tiwi Islands (*L. yehbwudda sp. nov.*), and:
- 3/ Cape York Queensland, extending as far south as Townsville (*L. microbelos*). Records south of there are almost certainly specimens inadvertently moved in recent times by humans.

Species within the subgenus *Microlitoria subgen. nov.* are known from various locations in New Guinea.

**Content:** *Llewellynura microbelos* (Cogger, 1966) (type species); *L. dorsalis* (Macleay, 1878); *L. fukker sp. nov.*; *L. jeudii* (Werner, 1901); *L. timida* (Tyler and Parker, 1972); *L. yehbwudda sp. nov.*

#### **MICROLITORIA SUBGEN. NOV.**

**LSIDurn:lsid:zoobank.org:act:6DA3701D-5A02-4C6C-B19A-8670E0ECD0BA**

**Type species:** *Litoria dorsalis* Macleay, 1878.

**Diagnosis:** Species within the genus *Llewellynura* Wells and Wellington, 1985 are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following suite of characters: they are tiny in size, being about 20 mm in body length as adults. Colour is variegated dark and brown dorsally; a row of widely spaced dorsolateral tubercles and ridges may be on each side, or alternatively just a few randomly scattered small tubercles on either side of upper flank; no pectoral fold; several conspicuous tubercles above each eye; tiny, slender and agile and with a sharply pointed snout. The dorsum may be grey, brown, yellow or red, often flecked or mottled with darker colour. There is usually a broad dark band from behind the eye to the groin and an even darker stripe along the snout, through the eye and over the base of the arm to the flank. Snout and upper surfaces of the limbs are peppered with dark brown. There is a conspicuous dark bar along the front edge of the arm.

Ventral surface is white except for a fine peppering of brown on the throat, chest and limbs. Skin is smooth dorsally, with at least some small tubercles or warts or skin folds and usually several small subercles over each eye. Throat skin is smooth, but belly is granular. Finger and toe discs are moderate in size but distinct. Fingers lack webbing and toes are less than half webbed. The disc and nearly two phlanges are free on the outer side of the fourth toe. The inner metatarsal tubercle is prominent and there is no outer one. Tympanum ranges from small to indistinct. Second finger longer than first.

The Australian species within *Llewellynura* being of the nominate subgenus *Llewellynura* are separated from the New Guinea species herein placed in the subgenus *Microlitoria subgen. nov.* by lacking vomerine teeth. These are present in species of *Microlitoria subgen. nov.*. According to Duellman *et al.* (2016), the two subgenera diverged from one another 14.8 MYA.

**Distribution:** Species within the subgenus *Microlitoria subgen. nov.* are known from various locations in New Guinea.

The three species within the nominate subgenus *Llewellynura* are found in the tropical parts of northern Australia from three main areas being:

- 1/ The north-west Kimberley Division of Western Australia, centred around the Mitchell Plateau (*L. fukker sp. nov.*), and:
- 2/ The top end of the Northern Territory, from Litchfield National Park in the west and extending east to include Groote Eylandt, and also including the Tiwi Islands (*L. yehbwudda sp. nov.*), and:
- 3/ Cape York Queensland, extending as far south as Townsville (*L. microbelos*). Records south of there are almost certainly specimens inadvertently moved in recent times by humans.

**Etymology:** The species in the subgenus have until now been treated by most publishing authors as being within the genus "*Litoria* Tschudi, 1838". Due to them being

among the tiniest species in the putative genus, they are herein called "Micro" as in small and hence in full "Microlitoria".

**Content:** *Llewellynura (Microlitoria) dorsalis* (Macleay, 1878); *L. (Microlitoria) jeudii* (Werner, 1901); *L. (Microlitoria) timida* (Tyler and Parker, 1972).

**LLEWELLYNURA (LLEWELLYNURA) FUKKER SP. NOV.**

**LSIDurn:lsid:zoobank.org:act:DBE25DB2-10D7-4380-A5CF-40F842506D43**

**Holotype:** A preserved specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number R56470, collected 20 km south east of Mitchell Plateau Camp, Latitude -14.95 S., Longitude 125.95 E.

This government-owned facility allows access to its holdings.

**Paratypes:** Thirteen preserved specimens at the Western Australian Museum, Perth, Western Australia, Australia, specimen numbers R43337, R43361- R43370, R56470 and R62203 all collected from Mitchell Plateau, Western Australia, Australia, Latitude -14.8667 S., Longitude 125.8333 E.

**Diagnosis:** The three species within the nominate subgenus *Llewellynura* Wells and Wellington, 1985 have until 2019 been treated as a single species, namely *L. microbelos* (Cogger, 1966). However this putative taxon in fact consists of three separate and widely allopatric species.

This has been known for many years and Anstis (2013) stated a view that more than one species was within putative *L. microbelos* as described in her book.

As a trio, they are found in the tropical parts of northern Australia from three main areas being:

1/ The north-west Kimberley Division of Western Australia, centred around the Mitchell Plateau (*L. fukker sp. nov.*), and:

2/ The top end of the Northern Territory, from Litchfield National Park in the west and extending east to include Groote Eylandt and also including the Tiwi Islands (*L. yehbwudda sp. nov.*), and:

3/ Cape York Queensland, extending as far south as Townsville (*L. microbelos*). Records south of there are almost certainly specimens inadvertently moved in recent times by humans, such as when being translocated in boxes of fruit via trucks and trains.

All three species would key out as *L. microbelos* in either Anstis (2013) or Cogger (2014).

The three species can however be readily separated from one another as follows:

*L. microbelos* with a type locality of Cairns in far north Queensland, and confined to the Cape York area, has an orange iris and tubercles on the flanks are mainly, but not entirely small, blunt and widely scattered and not in any well-defined longitudinal rows. The white labial marking under the eye does extend forward beyond the nostril, but is ill-defined at this point.

*L. fukker sp. nov.* from the north-west Kimberley in Western Australia has an orange iris and very few widely scattered tubercles on the flanks. The white labial marking under the eye extends forward beyond the

nostril and is well defined at this point.

*L. yehbwudda sp. nov.* has a yellow-grey iris (rarely seen with a slight orange tinge) and a prominent well-defined row of skin folds and tubercles running in a line on either side of the back of the dorsum and a second similar well-defined row of smaller tubercles running along each side of the mid flank. The white labial marking under the eye does not extend as far forward as the nostril.

Anstis (2013) on page 247, gives detail of differences between the tadpoles and metamorphs of Queensland *L. microbelos*, and Northern Territory *L. yehbwudda sp. nov.* (which are treated by her provisionally as a separate population of *L. microbelos*).

Significantly the images of two metamorphs (one of each species) on page 247 bottom of Anstis (2013) readily shows the diagnostic differences also in the adults of both species as outlined herein.

Photos of *L. microbelos* in life can be seen in Vanderduys (2012) on page 54 in two images, Cogger (2014) on page 174 bottom left and Anstis (2013) on page 245 at top left and second from top on right.

Photos of *fukker sp. nov.* in life can be seen in Tyler and Davies (1986) in the colour plates at number 27 and in Tyler *et al.* (1994) on plate 32 at bottom.

Photos of *L. yehbwudda sp. nov.* in life can be seen in Anstis (2013) on page 245 at top right.

Species within the genus *Llewellynura* Wells and Wellington, 1985 are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following suite of characters: they are tiny in size, being about 20 mm in body length as adults. Colour is variegated dark and brown dorsally; a row of widely spaced dorsolateral tubercles and ridges may be on each side, or alternatively just a few randomly scattered small tubercles on either side of upper flank; no pectoral fold; several conspicuous tubercles above each eye; tiny, slender and agile and with a sharply pointed snout. The dorsum may be grey, brown, yellow or red, often flecked or mottled with darker colour. There is usually a broad dark band from behind the eye to the groin and an even darker stripe along the snout, through the eye and over the base of the arm to the flank. Snout and upper surfaces of the limbs are peppered with dark brown. There is a conspicuous dark bar along the front edge of the arm. Ventral surface is white except for a fine peppering of brown on the throat, chest and limbs. Skin is smooth dorsally, with at least some small tubercles or warts or skin folds and usually several small subercles over each eye. Throat skin is smooth, but belly is granular. Finger and toe discs are moderate in size but distinct. Fingers lack webbing and toes are less than half webbed. The disc and nearly two phlanges are free on the outer side of the fourth toe. The inner metatarsal tubercle is prominent and there is no outer one. Tympanum ranges from small to indistinct. Second finger longer than first.

The three Australian species within *Llewellynura* as outlined in the description above, being of the nominate subgenus *Llewellynura* are separated from the New Guinea species herein placed in the subgenus *Microlitoria subgen. nov.* by lacking vomerine teeth. These are present in species of *Microlitoria subgen. nov.*

According to Duellman *et al.* (2016), the two subgenera diverged from one another 14.8 MYA.

**Distribution:** *L. fukker sp. nov.* appears to be restricted to the north-west Kimberley Division of Western Australia, centred around the Mitchell Plateau, Western Australia.

**Etymology:** The call of this species is a series of very high-pitched rapidly repeated whirring notes at the rate of about 3 per second. These are produced in bouts lasting about 6-10 seconds and increase in speed towards the end of the series. The call is like that of a small cicada insect. Frogs call in large choruses including dozens or even hundreds of males and individual males will call between notes of nearby males, making the general sound appear as a loud ear peering din.

The local Aboriginals in the area are called the Wunambal people. As they try to sleep adjacent to the swamps these frogs start calling from, they will wake up and yell "Fukker" and hence the species name.

**LLEWELLYNURA (LLEWELLYNURA) YEHBWUDDA SP. NOV.**

**LSID**Durn:lsid:zoobank.org:act:616665B3-A265-4CA7-A606-196085938E47

**Holotype:** A preserved specimen at the Museum and Art Gallery of the Northern Territory, Darwin, Northern Territory, Australia, specimen number R22599 collected from Howard Springs, an outer Darwin suburb, Darwin, Australia, Latitude -12.45 S., Longitude 131.05 E. This government-owned facility allows access to its holdings.

**Paratypes:** Eleven preserved specimens at the Museum and Art Gallery of the Northern Territory, Darwin, Northern Territory, Australia, specimen numbers R00129-R00135, R12063, R22600, R27707 and R27714 all collected from Howard Springs, an outer Darwin suburb, Darwin, Australia, Latitude -12.45 S., Longitude 131.05 E.

**Diagnosis:** The three species within the nominate subgenus *Llewellynura* Wells and Wellington, 1985 have until 2019 been treated as a single species, namely *L. microbelos* (Cogger, 1966). However this putative taxon in fact consists of three separate and widely allopatric species.

This has been known for many years and Anstis (2013) stated a view that more than one species was within putative *L. microbelos* as described in her book.

As a trio, they are found in the tropical parts of northern Australia from three main areas being:

1/ The north-west Kimberley Division of Western Australia, centred around the Mitchell Plateau (*L. fukker sp. nov.*), and:

2/ The top end of the Northern Territory, from Litchfield National Park in the west and extending east to include Groote Eylandt and also including the Tiwi Islands (*L. yehbwudda sp. nov.*), and:

3/ Cape York Queensland, extending as far south as Townsville (*L. microbelos*). Records south of there are almost certainly specimens inadvertently moved in recent times by humans, such as when being translocated in boxes of fruit via trucks and trains.

All three species would key out as *L. microbelos* in either Anstis (2013) or Cogger (2014).

The three species can however be readily separated from one another as follows:

*L. microbelos* with a type locality of Cairns in far north Queensland, and confined to the Cape York area, has an orange iris and tubercles on the flanks are mainly, but not entirely small, blunt and widely scattered and not in any well-defined longitudinal rows. The white labial marking under the eye does extend forward beyond the nostril, but is ill-defined at this point.

*L. fukker sp. nov.* from the north-west Kimberley in Western Australia has an orange iris and very few widely scattered tubercles on the flanks. The white labial marking under the eye extends forward beyond the nostril and is well defined at this point.

*L. yehbwudda sp. nov.* has a yellow-grey iris (rarely seen with a slight orange tinge) and a prominent well-defined row of skin folds and tubercles running in a line on either side of the back of the dorsum and a second similar well-defined row of smaller tubercles running along each side of the mid flank. The white labial marking under the eye does not extend as far forward as the nostril.

Anstis (2013) on page 247, gives detail of differences between the tadpoles and metamorphs of Queensland *L. microbelos*, and Northern Territory *L. yehbwudda sp. nov.* (which are treated by her provisionally as a separate population of *L. microbelos*).

Significantly the images of two metamorphs (one of each species) on page 247 bottom of Anstis (2013) readily shows the diagnostic differences also in the adults of both species as outlined herein.

Photos of *L. microbelos* in life can be seen in Vanderduys (2012) on page 54 in two images, Cogger (2014) on page 174 bottom left and Anstis (2013) on page 245 at top left and second from top on right.

Photos of *fukker sp. nov.* in life can be seen in Tyler and Davies (1986) in the colour plates at number 27 and in Tyler *et al.* (1994) on plate 32 at bottom.

Photos of *L. yehbwudda sp. nov.* in life can be seen in Anstis (2013) on page 245 at top right.

Species within the genus *Llewellynura* Wells and Wellington, 1985 are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following suite of characters: they are tiny in size, being about 20 mm in body length as adults. Colour is variegated dark and brown dorsally; a row of widely spaced dorsolateral tubercles and ridges may be on each side, or alternatively just a few randomly scattered small tubercles on either side of upper flank; no pectoral fold; several conspicuous tubercles above each eye; tiny, slender and agile and with a sharply pointed snout. The dorsum may be grey, brown, yellow or red, often flecked or mottled with darker colour. There is usually a broad dark band from behind the eye to the groin and an even darker stripe along the snout, through the eye and over the base of the arm to the flank. Snout and upper surfaces of the limbs are peppered with dark brown. There is a conspicuous dark bar along the front edge of the arm. Ventral surface is white except for a fine peppering of brown on the throat, chest and limbs. Skin is smooth dorsally, with at least some small tubercles or warts or skin folds and usually several small subercles over each eye. Throat skin is smooth, but belly is

granular. Finger and toe discs are moderate in size but distinct. Fingers lack webbing and toes are less than half webbed. The disc and nearly two phlanges are free on the outer side of the fourth toe. The inner metatarsal tubercle is prominent and there is no outer one.

Tympanum ranges from small to indistinct. Second finger longer than first.

The three Australian species within *Llewellynura* as outlined in the description above, being of the nominate subgenus *Llewellynura* are separated from the New Guinea species herein placed in the subgenus *Microlitoria subgen. nov.* by lacking vomerine teeth. These are present in species of *Microlitoria subgen. nov.*. According to Duellman *et al.* (2016), the two subgenera diverged from one another 14.8 MYA.

**Distribution:** *L. yehbwudda sp. nov.* occurs in the top end of the Northern Territory, from Litchfield National Park in the west, extending east to include Groote Eylandt and also including the Tiwi Islands near Darwin.

**Etymology:** These frogs are common on the outskirts of Darwin in the Northern Territory, including the type locality of Howard Springs. In the 1980's surviving native Australian Aboriginals, in this region known as the Larrakia people, were eking out a miserable existence after the British Empire stole their land and exterminated most of the population. Bored women and children would scour the vegetation of the local swamp at Howard Springs looking for the small frogs to cook on the campfire, which they then ate whole.

When a Larrakia child would grab a frog he'd scream to his mates "yehbwudda" and hence the species name for this taxon.

#### **MAHONABATRACHUS WELLS AND WELLINGTON, 1985**

**Type species:** *Hyla meiriana* Tyler, 1969.

**Diagnosis:** Known as the "Rock Hole Frogs", living frogs in the genus *Mahonabatrachus* Wells and Wellington, 1985 are all readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: In colour they are usually irregularly mottled above with metallic fawn, brown or reddish brown and dark brown, the small low tubercles on the back sometimes tending to be light-centered and/or dark edged. Sometimes these frogs are dominantly dark brown but with a gold-orange dorsolateral stripe from snout to eye and continuing above the eye above the tympanum along the body almost to the groin. Limbs of all specimens are always coloured with irregular dark brown cross bands and all frogs have barred or spotted lips to some degree and lower surfaces are whitish. The skin is leathery to finely granular above with numerous low, rounded or sometimes slightly pointed tubercles, that are fairly evenly spaced. No pectoral fold. Moderate sized but conspicuous diss on fingers and toes. Fingers free and toes with moderately developed webbing, including reaching the disc of the fifth toe. Adults average 20 mm in length.

According to Duellman *et al.* (2016), the species in this genus diverged from their nearest living relatives 20.9 MYA.

Until recently this genus as defined by Wells and Wellington (1985) and as defined herein (with a modified

diagnosis) comprised just one species as in the type species. A morphologically similar species *M. aurifera* (Anstis, Tyler, Roberts, Price and Doughty, 2010) is clearly within this genus, as outlined by the authors in their description.

Anstis (2013) stated of *M. meiriana* "may include two species", but gave no indication as to which populations they referred to.

However in line with other biogeographical splits in northern Australia, the obvious presumption would be she was referring to the morphologically distinct Kimberley (West Australia) specimens as being the putative new species.

Investigations showed a split within Kimberley animals into two distinctive groups as well as another distinctive form south of the Gulf of Carpentaria. Yet another distinctive and geographically isolated population occurs in the Victoria River area of the north-west Northern Territory. All four are formally named within this paper as new species on the basis of morphological differences and separation by well-known biogeographical barriers of known antiquity.

Hence the genus *Mahonabatrachus* now includes six species.

**Distribution:** Rock escarpment country of the top end of the Northern Territory and nearby Western Australia, including the Kimberley District of Western Australia and the southern edge of the Gulf of Carpentaria.

**Content:** *Mahonabatrachus meiriana* (Tyler, 1969) (type species); *M. aurifera* (Anstis, Tyler, Roberts, Price and Doughty, 2010); *M. chriswilliamsi sp. nov.*; *M. marionanstisae sp. nov.*; *M. pailsae sp. nov.*; *M. roypailsi sp. nov.*

#### **MAHONABATRACHUS CHRISWILLIAMSII SP. NOV.** **LSIDurn:lsid:zoobank.org:act:D5398E68-EDB4-4F32-9EC8-86369DDFEEC3**

**Holotype:** A preserved specimen at the South Australian Museum, Adelaide, South Australia, Australia, specimen number R15638 collected from the Admiralty Gulf area, North-west Kimberley Division, Western Australia, Australia. Latitude -14.50 S., Longitude 125.83 E. This government-owned facility allows access to its holdings.

**Paratype:** A preserved specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number R44319, collected from Crystal Creek at Crystal Head, from the Admiralty Gulf area in the North-west Kimberley Division of Western Australia, Australia, Latitude -14.5167 S., Longitude 125.7833 E.

**Diagnosis:** *Mahonabatrachus chriswilliamsi sp. nov.*, *M. marionanstisae sp. nov.*, *M. pailsae sp. nov.* and *M. roypailsi sp. nov.* have all been treated as populations of a widespread putative taxon *M. meiriana* (Tyler, 1969), originally described as "*Hyla meriana*", with a type locality of 98 miles north of Mainoru, Northern Territory (NT), Australia.

The five morphologically similar and obviously closely related species can be readily separated on the basis of differences in morphology and colour.

Nominate *M. meiriana* is herein confined to the Arnhemland Escarpment of the Northern Territory and immediately adjacent outliers in a region bound by the

type locality in Arnhemland (98 miles north of Mainoru, Northern Territory, Australia), west to Litchfield National Park, NT.

*M. pailsae* sp. nov. is the taxon in this species group found in the region generally bound by the Daly River in the north and West Baines/Victoria River in the south-west, including escarpment country within this zone.

*M. marionanstisae* sp. nov. is found generally around the Ord River region of the Kimberley District of Western Australia including immediately adjacent parts of North-west Northern Territory, including areas bounded by the West Baines/Victoria River in the east and Durack River in the West.

*M. chriswilliamsi* sp. nov. is confined to the north-west Kimberley division from Durack River in the east and generally north of the Mitchell Plateau. Specimens in the southern Kimberley are tentatively assigned to this species.

*M. roypailsi* sp. nov. is restricted to low escarpments south of the Gulf of Carpentaria in the Northern Territory. All five species would be identified as *M. meiriana* by the diagnosis in Tyler (1969) or that of Cogger (2014).

All five species and a sixth species in this genus *M. aurifera* (Anstis, Tyler, Roberts, Price and Doughty, 2010) are separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: They are an extremely small species with a maximum snout to vent length of 22.5 mm, characterised by an extremely high E-N/IN ratio (1.286-1.600), short and unwebbed fingers with prominent, transversely oval discs and extensively webbed toes (the webbing reaching the base of the discs of all toes except the fourth); vomerine teeth and outer metatarsal tubercles are present. In life there are striking post-femoral markings; the snout is evenly rounded and not particularly prominent or projecting.

I can report for the first time that *M. aurifera* (Anstis, Tyler, Roberts, Price and Doughty, 2010) is most simply separated from the other five species by having no more than five rounded tubercles in a row between front and hind leg on the flank (counted in a line and ignoring stray tubercles above or below the line), versus six or more in the other five species and the relevant tubercles are largeish, rounded and blunt in form in *M. aurifera*, versus smaller and tending towards being more pointed in the other five species. It also readily separated from the other five species by having an iris that is orange above and dull orange below with distinctive strips/patches of black pigment on each of the north-south-east-west axis.

*M. aurifera* is further separated from the other five species (all treated by the relevant authors as *M. meiriana*) by the suite of characters outlined in the original description of Anstis *et al.* (2010), including a slightly more pointed snout and tadpoles having a unique black, gold and red pigment pattern as well as a continuous papillary border around the oral disc (neither of which are seen in the other five species).

*M. meiriana* is readily separated from the other four species by the following suite of characters: The dorsum is generally dark reddish-brown with light grey blotches and marks occupying 15 to 40 percent of the dorsum. There is an average of 11 moderately enlarged tubercles

with spikey edge of same colour as pigment below (either reddish-brown or grey). There are two well-defined white labial bars beneath the eye and at least one on the snout anterior to this (on each side).

Hind limbs have semi-distinct grey and brown bands and the forelimbs are of grey background colour with a strong light brown overlay. The front limbs also have a small number of well defined irregular shaped, dark brown spots or blotches. The iris is brilliant red/orange on the upper half and light grey below, with demarcation between both being well defined by a black midline.

In *M. meiriana* and the other species except for *M. pailsae* sp. nov., the interdigital webbing reaches the base of the terminal discs of all toes except the fourth where it extends as far as the subarticular tubercle at the base of the penultimate phalanx and is united to the disc by a narrow lateral fringe.

*M. pailsae* sp. nov. is readily separated from the other four species by the following suite of characters: This species has more extensive webbing of the feet than all other species, in this taxon being unique among the five in reaching mid-way up the penultimate phalanx of the fourth toe.

In colour the dorsum is generally a dark brown, accentuated by the dark grey (rather than light grey) interspaces and blotches on the dorsum. The dorsal surface of the thigh is similar to the colour of the head and back (the light markings on the posterior face do not extend upon it). The ventral surfaces are much more heavily and extensively marked; the throat is usually a uniform dark brown and only infrequently stippled with brown and the ventral surface of the thighs is suffused with brown in most specimens. The iris is a dull orange colour above and grey with an orange tinge below and there is either no border between upper and lower parts of the iris, or if present it is greyish, not black and peppered and indistinct. Dark labial bars or markings are prominent anterior to the eye.

Limbs are generally light brown with indistinct darker markings.

*M. marionanstisae* sp. nov. is readily separated from the other four species by the following suite of characters: A generally faded and indistinct colouration of the dorsum, which is a combination of indistinct dark brown and light brown markings (versus for example reddish-brown and light grey in *M. meiriana*). The demarcation between upper iris and lower iris by way of black border is either indistinct or absent. The upper eye is a dull orange-brown and extends well below half-way with only the very lower part of the eye either dark grey or greyish in colour, although in many specimens the entire eye is a dull orange-brown. Labial bars of any colour (dark or light) are generally indistinct. Forelimbs are yellowish-brown and generally unmarked, except for some scattered patches of darker peppering. Hindlimbs are light brown with heavy dark peppering giving them a marbled appearance.

The hind legs are relatively shorter in this species than in the other four. In this species there is a TL/S-V range of 0.476-0.556 with a mean of 0.515, versus TL/S-V range of 0.541-0.640 and the mean 0.554 in the other four species (derived from Tyler, 1969).

*M. chriswilliamsi* sp. nov. is readily separated from the other four species by the following suite of characters: A dorsum that is dark brown in colour with semi-distinct black spots and blotches of irregular shape, but generally scattered across the dorsum and limbs. On the limbs the black markings tend to form bars. Many of the tubercles on the body are white tipped.

In common with *M. marionanstisae* sp. nov. the pale light brown patch encompassing the upper heel of the upper back foot is well defined and prominent.

The upper iris is bright red, lower iris is grey and the black line demarcating the two halves of the eye is well defined.

In this species at the top of the iris is a large patch of dark pigment in the form of black peppering, forming a reasonably large blotch. In all other species there is either a tiny black dot or nothing at all at the same place in the eye.

*M. chriswilliamsi* sp. nov. is also unusual in that the tubercles on the upper surface of the back leg are large, pointed and white-tipped, numbering 6-9. Labial markings are distinct, but the white is either in the form of small spots or alternatively as very narrow bars. Between these white bits are areas of brown, the brown being the dominant colour of the labials and snout.

The upper surface of the head is brown with black spots and blotches (versus for example reddish-brown and light grey in *M. meiriana*).

*M. roypailsi* sp. nov. is similar in most respects to *M. meiriana* as described above, but the upper iris is dull orange in colour, labial markings and those on the limbs are indistinct; the anterior of the snout is brownish as opposed to purplish in colour and the dorsum has beige as opposed to light grey interspaces.

*M. meiriana* in life is depicted on page 173 of Cogger (2014) and Anstis (2013) on page 242 at top right and right middle and online at:

<https://www.flickr.com/photos/stephenmahony/36225998011/>

and:

<https://www.flickr.com/photos/mattsummerville/40940670621/>

and:

<https://www.flickr.com/photos/ryanfrancis/26315692613/>

and:

<https://www.flickr.com/photos/euprepiosaur/7240116716/>  
*M. chriswilliamsi* sp. nov. in life is depicted online at:  
<https://www.flickr.com/photos/54876436@N08/19647295261/>

*M. marionanstisae* sp. nov. is depicted on page 242 of Anstis (2013) at top left and online at:

<https://www.flickr.com/photos/23031163@N03/8519050483/>

and:

<https://www.flickr.com/photos/14807473@N08/49397917677/>

*M. pailsae* sp. nov. in life is depicted online at:

<https://www.flickr.com/photos/68921296@N06/14697052000/>

**Distribution:** *Mahonabatrachus chriswilliamsi* sp. nov. is found in the north Kimberley division of Western

Australia, Australia, generally west of the Durack River and north of the Mitchell Plateau. Populations from the south-west Kimberley are tentatively referred to this taxon.

**Etymology:** Named in honour of Chris Williams, of New South Wales, Australia, a former president of the Australian Herpetological Society in Sydney, New South Wales, ex employee of Tarango Zoo in Sydney (poor thing) and John Weigel's Reptile Park business (same) in recognition of his many contributions to herpetology in Australia in often difficult circumstances.

**MAHONABATRACHUS MARIONANSTISAE SP. NOV.**  
**LSIDurn:lsid:zoobank.org:act:C0D5E065-F72F-45BD-96A8-1DEC01B4EA86**

**Holotype:** A preserved specimen at the South Australian Museum, Adelaide, South Australia, Australia, specimen number R14513 collected in the Lake Argyle area, Kimberley Division of Western Australia, Australia, Latitude -16.22 S., Longitude 128.90 E. This government-owned facility allows access to its holdings.

**Paratypes:** Four preserved specimens at the Western Australian Museum, Perth, Western Australia, Australia, specimen numbers R162530-33 from Kununurra, Kimberley Division of Western Australia, Australia, Latitude 15.6049 S., Longitude 128.7655 E.

**Diagnosis:** *Mahonabatrachus chriswilliamsi* sp. nov., *M. marionanstisae* sp. nov., *M. pailsae* sp. nov. and *M. roypailsi* sp. nov. have all been treated as populations of a widespread putative taxon *M. meiriana* (Tyler, 1969), originally described as "*Hyla meriana*", with a type locality of 98 miles north of Mainoru, Northern Territory (NT), Australia.

The five morphologically similar and obviously closely related species can be readily separated on the basis of differences in morphology and colour.

Nominate *M. meiriana* is herein confined to the Arnhemland Escarpment of the Northern Territory and immediately adjacent outliers in a region bound by the type locality in Arnhemland (98 miles north of Mainoru, Northern Territory, Australia), west to Litchfield National Park, NT.

*M. pailsae* sp. nov. is the taxon in this species group found in the region generally bound by the Daly River in the north and West Baines/Victoria River in the south-west, including escarpment country within this zone.

*M. marionanstisae* sp. nov. is found generally around the Ord River region of the Kimberley District of Western Australia including immediately adjacent parts of North-west Northern Territory, including areas bounded by the West Baines/Victoria River in the east and Durack River in the West.

*M. chriswilliamsi* sp. nov. is confined to the north-west Kimberley division from Durack River in the east and generally north of the Mitchell Plateau. Specimens in the southern Kimberley are tentatively assigned to this species.

*M. roypailsi* sp. nov. is restricted to low escarpments south of the Gulf of Carpentaria in the Northern Territory. All five species would be identified as *M. meiriana* by the diagnosis in Tyler (1969) or that of Cogger (2014).

All five species and a sixth species in this genus *M.*



*aurifera* (Anstis, Tyler, Roberts, Price and Doughty, 2010) are separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: They are an extremely small species with a maximum snout to vent length of 22.5 mm, characterised by an extremely high E-N/IN ratio (1.286-1.600), short and unwebbed fingers with prominent, transversely oval discs, and extensively webbed toes (the webbing reaching the base of the discs of all toes except the fourth); vomerine teeth and outer metatarsal tubercles are present. In life there are striking post-femoral markings; the snout is evenly rounded and not particularly prominent or projecting.

I can report for the first time that *M. aurifera* (Anstis, Tyler, Roberts, Price and Doughty, 2010) is most simply separated from the other five species by having no more than five rounded tubercles in a row between front and hind leg on the flank (counted in a line and ignoring stray tubercles above or below the line), versus six or more in the other five species and the relevant tubercles are largeish, rounded and blunt in form in *M. aurifera*, versus smaller and tending towards being more pointed in the other five species. It also readily separated from the other five species by having an iris that is orange above and dull orange below with distinctive strips/patches of black pigment on each of the north-south-east-west axis.

*M. aurifera* is further separated from the other five species (all treated by the relevant authors as *M. meiriana*) by the suite of characters outlined in the original description of Anstis *et al.* (2010), including a slightly more pointed snout and tadpoles having a unique black, gold and red pigment pattern as well as a continuous papillary border around the oral disc (neither of which are seen in the other five species).

*M. meiriana* is readily separated from the other four species by the following suite of characters: The dorsum is generally dark reddish-brown with light grey blotches and marks occupying 15 to 40 percent of the dorsum. There is an average of 11 moderately enlarged tubercles with spikey edge of same colour as pigment below (either reddish-brown or grey). There are two well-defined white labial bars beneath the eye and at least one on the snout anterior to this (on each side).

Hind limbs have semi-distinct grey and brown bands and the forelimbs are of grey background with a strong light brown overlay. The front limbs also have a small number of well defined irregular shaped, dark brown spots or blotches. The iris is brilliant red/orange on the upper half and light grey below, with demarcation between both being well defined by a black midline.

In *M. meiriana* and the other species except for *M. pailsae sp. nov.*, the interdigital webbing reaches the base of the terminal discs of all toes except the fourth where it extends as far as the subarticular tubercle at the base of the penultimate phalanx and is united to the disc by a narrow lateral fringe.

*M. pailsae sp. nov.* is readily separated from the other four species by the following suite of characters: This species has more extensive webbing of the feet than all other species, in this taxon being unique among the five in reaching mid-way up the penultimate phalanx of the fourth toe.

In colour the dorsum is generally a dark brown, accentuated by the dark grey (rather than light grey) interspaces and blotches on the dorsum. The dorsal surface of the thigh is similar to the colour of the head and back (the light markings on the posterior face do not extend upon it). The ventral surfaces are much more heavily and extensively marked; the throat is usually a uniform dark brown and only infrequently stippled with brown and the ventral surface of the thighs is suffused with brown in most specimens. The iris is a dull orange colour above and grey with an orange tinge below and there is either no border between upper and lower parts of the iris, or if present it is greyish, not black and peppered and indistinct. Dark labial bars or markings are prominent anterior to the eye.

Limbs are generally light brown with indistinct darker markings.

*M. marionanstisae sp. nov.* is readily separated from the other four species by the following suite of characters: A generally faded and indistinct colouration of the dorsum, which is a combination of indistinct dark brown and light brown markings (versus for example reddish-brown and light grey in *M. meiriana*). The demarcation between upper iris and lower iris by way of black border is either indistinct or absent. The upper eye is a dull orange-brown and extends well below half-way with only the very lower part of the eye either dark grey or greyish in colour, although in many specimens the entire eye is a dull orange-brown. Labial bars of any colour (dark or light) are generally indistinct. Forelimbs are yellowish-brown and generally unmarked, except for some scattered patches of darker peppering. Hindlimbs are light brown with heavy dark peppering giving them a marbled appearance.

The hind legs are relatively shorter in this species than in the other four. In this species there is a TL/S-V range of 0.476-0.556 with a mean of 0.515, versus TL/S-V range of 0.541-0.640 and the mean 0.554 in the other four species (derived from Tyler, 1969).

*M. chriswilliamsi sp. nov.* is readily separated from the other four species by the following suite of characters: A dorsum that is dark brown in colour with semi-distinct black spots and blotches of irregular shape, but generally scattered across the dorsum and limbs. On the limbs the black markings tend to form bars. Many of the tubercles on the body are white tipped.

In common with *M. marionanstisae sp. nov.* the pale light brown patch encompassing the upper heel of the upper back foot is well defined and prominent.

The upper iris is bright red, lower iris is grey and the black line demarcating the two halves of the eye is well defined.

In this species at the top of the iris is a large patch of dark pigment in the form of black peppering, forming a reasonably large blotch. In all other species there is either a tiny black dot or nothing at all at the same place in the eye.

*M. chriswilliamsi sp. nov.* is also unusual in that the tubercles on the upper surface of the back leg are large, pointed and white-tipped, numbering 6-9. Labial markings are distinct, but the white is either in the form of small spots or alternatively as very narrow bars. Between these

white bits are areas of brown, the brown being the dominant colour of the labials and snout.

The upper surface of the head is brown with black spots and blotches (versus for example reddish-brown and light grey in *M. meiriana*).

*M. roypailsi* sp. nov. is similar in most respects to *M. meiriana* as described above, but the upper iris is dull orange in colour, labial markings and those on the limbs are indistinct; the anterior of the snout is brownish as opposed to purplish in colour and the dorsum has beige as opposed to light grey interspaces.

*M. meiriana* in life is depicted on page 173 of Cogger (2014) and Anstis (2013) on page 242 at top right and right middle and online at:

<https://www.flickr.com/photos/stephenmahony/36225998011/>

and:

<https://www.flickr.com/photos/mattsummerville/40940670621/>

and:

<https://www.flickr.com/photos/ryanfrancis/26315692613/>  
and:

<https://www.flickr.com/photos/euprepiosaur/7240116716/>

*M. chriswilliamsi* sp. nov. in life is depicted online at:

<https://www.flickr.com/photos/54876436@N08/19647295261/>

*M. marionanstisae* sp. nov. is depicted on page 242 of Anstis (2013) at top left and online at:

<https://www.flickr.com/photos/23031163@N03/8519050483/>

and:

<https://www.flickr.com/photos/14807473@N08/49397917677/>

*M. pailsae* sp. nov. in life is depicted online at:

<https://www.flickr.com/photos/68921296@N06/14697052000/>

**Distribution:** *M. marionanstisae* sp. nov. is found generally around the Ord River region of the Kimberley District of Western Australia including immediately adjacent parts of North-west Northern Territory. It is found in the area bounded by the West Baines/Victoria River in the east and Durack River in the West.

**Etymology:** Named in honour of Marion Anstis of New South Wales, Australia, author of numerous books and papers on frogs and a past president of the Sydney-based Australian Herpetological Society, in recognition of her wide contributions to herpetology over more than 40 years.

**MAHONABATRACHUS PAILSAE SP. NOV.**

**LSIDurn:** [lsid:zoobank.org:act:28C5D12E-F360-4C85-961E-ACF32EE5882E](https://zoobank.org/act:28C5D12E-F360-4C85-961E-ACF32EE5882E)

**Holotype:** A preserved specimen in the National Museum of Victoria, Melbourne, Victoria, Australia, specimen number D10811, collected at Japser Gorge, Northern Territory, Australia, Latitude -16.03 S., Longitude 130.68 E.

This government-owned facility allows access to its holdings.

**Paratypes:** 16 preserved specimens at the National Museum of Victoria, Melbourne, Victoria, Australia, specimen numbers D10773-74, D10812-16 and D10818-

26, also collected from the type locality (above).

**Diagnosis:** *Mahonabatrachus chriswilliamsi* sp. nov., *M. marionanstisae* sp. nov., *M. pailsae* sp. nov. and *M. roypailsi* sp. nov. have all been treated as populations of a widespread putative taxon *M. meiriana* (Tyler, 1969), originally described as "*Hyla meriana*", with a type locality of 98 miles north of Mainoru, Northern Territory (NT), Australia.

The five morphologically similar and obviously closely related species can be readily separated on the basis of differences in morphology and colour.

Nominate *M. meiriana* is herein confined to the Arnhemland Escarpment of the Northern Territory and immediately adjacent outliers in a region bound by the type locality in Arnhemland (98 miles north of Mainoru, Northern Territory, Australia), west to Litchfield National Park, NT.

*M. pailsae* sp. nov. is the taxon in this species group found in the region generally bound by the Daly River in the north and West Baines/Victoria River in the south-west, including escarpment country within this zone.

*M. marionanstisae* sp. nov. is found generally around the Ord River region of the Kimberley District of Western Australia including immediately adjacent parts of North-west Northern Territory, including areas bounded by the West Baines/Victoria River in the east and Durack River in the West.

*M. chriswilliamsi* sp. nov. is confined to the north-west Kimberley division from Durack River in the east and generally north of the Mitchell Plateau. Specimens in the southern Kimberley are tentatively assigned to this species.

*M. roypailsi* sp. nov. is restricted to low escarpments south of the Gulf of Carpentaria in the Northern Territory. All five species would be identified as *M. meiriana* by the diagnosis in Tyler (1969) or that of Cogger (2014).

All five species and a sixth species in this genus *M. aurifera* (Anstis, Tyler, Roberts, Price and Doughty, 2010) are separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: They are an extremely small species with a maximum snout to

vent length of 22.5 mm, characterised by an extremely high E-N/IN ratio (1.286-1.600), short and unwebbed fingers with prominent, transversely oval discs and extensively webbed toes (the webbing reaching the base of the discs of all toes except the fourth); vomerine teeth and outer metatarsal tubercles are present. In life there are striking post-femoral markings; the snout is evenly rounded and not particularly prominent or projecting.

I can report for the first time that *M. aurifera* (Anstis, Tyler, Roberts, Price and Doughty, 2010) is most simply separated from the other five species by having no more than five rounded tubercles in a row between front and hind leg on the flank (counted in a line and ignoring stray tubercles above or below the line), versus six or more in the other five species and the relevant tubercles are largeish, rounded and blunt in form in *M. aurifera*, versus smaller and tending towards being more pointed in the other five species. It also readily separated from the other five species by having an iris that is orange above and dull orange below with distinctive strips/patches of black

pigment on each of the north-south-east-west axis.

*M. aurifera* is further separated from the other five species (all treated by the relevant authors as *M. meiriana*) by the suite of characters outlined in the original description of Anstis *et al.* (2010), including a slightly more pointed snout and tadpoles having a unique black, gold and red pigment pattern as well as a continuous papillary border around the oral disc (neither of which are seen in the other five species).

*M. meiriana* is readily separated from the other four species by the following suite of characters: The dorsum is generally dark reddish-brown with light grey blotches and marks occupying 15 to 40 percent of the dorsum. There is an average of 11 moderately enlarged tubercles with spikey edge of same colour as pigment below (either reddish-brown or grey). There are two well-defined white labial bars beneath the eye and at least one on the snout anterior to this (on each side).

Hind limbs have semi-distinct grey and brown bands and the forelimbs are of grey background with a strong light brown overlay. The front limbs also have a small number of well defined irregular shaped, dark brown spots or blotches. The iris is brilliant red/orange on the upper half and light grey below, with demarcation between both being well defined by a black midline.

In *M. meiriana* and the other species except for *M. pailsae sp. nov.*, the interdigital webbing reaches the base of the terminal discs of all toes except the fourth where it extends as far as the subarticular tubercle at the base of the penultimate phalanx and is united to the disc by a narrow lateral fringe.

*M. pailsae sp. nov.* is readily separated from the other four species by the following suite of characters: This species has more extensive webbing of the feet than all other species, in this taxon being unique among the five in reaching mid-way up the penultimate phalanx of the fourth toe.

In colour the dorsum is generally a dark brown, accentuated by the dark grey (rather than light grey) interspaces and blotches on the dorsum. The dorsal surface of the thigh is similar to the colour of the head and back (the light markings on the posterior face do not extend upon it). The ventral surfaces are much more heavily and extensively marked; the throat is usually a uniform dark brown and only infrequently stippled with brown, and the ventral surface of the thighs is suffused with brown in most specimens. The iris is a dull orange colour above and grey with an orange tinge below and there is either no border between upper and lower parts of the iris, or if present it is greyish, not black and peppered and indistinct. Dark labial bars or markings are prominent anterior to the eye.

Limbs are generally light brown with indistinct darker markings.

*M. marionanstisae sp. nov.* is readily separated from the other four species by the following suite of characters: A generally faded and indistinct colouration of the dorsum, which is a combination of indistinct dark brown and light brown markings (versus for example reddish-brown and light grey in *M. meiriana*). The demarkation between upper iris and lower iris by way of black border is either

indistinct or absent. The upper eye is a dull orange-brown and extends well below half-way with only the very lower part of the eye either dark grey or greyish in colour, although in many specimens the entire eye is a dull orange-brown. Labial bars of any colour (dark or light) are generally indistinct. Forelimbs are yellowish-brown and generally unmarked, except for some scattered patches of darker peppering. Hindlimbs are light brown with heavy dark peppering giving them a marbled appearance.

The hind legs are relatively shorter in this species than in the other four. In this species there is a TL/S-V range of 0.476-0.556 with a mean of 0.515, versus TL/S-V range of 0.541-0.640 and the mean 0.554 in the other four species (derived from Tyler, 1969).

*M. chriswilliamsi sp. nov.* is readily separated from the other four species by the following suite of characters: A dorsum that is dark brown in colour with semi-distinct black spots and blotches of irregular shape, but generally scattered across the dorsum and limbs. On the limbs the black markings tend to form bars. Many of the tubercles on the body are white tipped.

In common with *M. marionanstisae sp. nov.* the pale light brown patch encompassing the upper heel of the upper back foot is well defined and prominent.

The upper iris is bright red, lower iris is grey and the black line demarcating the two halves of the eye is well defined.

In this species at the top of the iris is a large patch of dark pigment in the form of black peppering, forming a reasonably large blotch. In all other species there is either a tiny black dot or nothing at all at the same place in the eye.

*M. chriswilliamsi sp. nov.* is also unusual in that the tubercles on the upper surface of the back leg are large, pointed and white-tipped, numbering 6-9. Labial markings are distinct, but the white is either in the form of small spots or alternatively as very narrow bars. Between these white bits are areas of brown, the brown being the dominant colour of the labials and snout.

The upper surface of the head is brown with black spots and blotches (versus for example reddish-brown and light grey in *M. meiriana*).

*M. roypailsi sp. nov.* is similar in most respects to *M. meiriana* as described above, but the upper iris is dull orange in colour, labial markings and those on the limbs are indistinct; the anterior of the snout is brownish as opposed to purplish in colour and the dorsum has beige as opposed to light grey interspaces.

*M. meiriana* in life is depicted on page 173 of Cogger (2014) and Anstis (2013) on page 242 at top right and right middle and online at:

<https://www.flickr.com/photos/stephenmahony/36225998011/>

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<https://www.flickr.com/photos/ryanfrancis/26315692613/>

and:

<https://www.flickr.com/photos/euprepiosaur/7240116716/>

*M. chriswilliamsi sp. nov.* in life is depicted online at:

<https://www.flickr.com/photos/54876436@N08/19647295261/>

*M. marionanstisae* sp. nov. is depicted on page 242 of Anstis (2013) at top left and online at:

<https://www.flickr.com/photos/23031163@N03/8519050483/>

and:

<https://www.flickr.com/photos/14807473@N08/49397917677/>

*M. pailsae* sp. nov. in life is depicted online at:

<https://www.flickr.com/photos/68921296@N06/14697052000/>

**Distribution:** *M. pailsae* sp. nov. is found in the region generally bound by the Daly River in the north and West Baines/Victoria River in the south-west, including escarpment country within this zone.

**Etymology:** Named in honour of Lyn Pails, wife of Roy Pails, a well-known herpetologist from Ballarat, Victoria, Australia, who along with her husband has made a valuable contribution to herpetology spanning many decades.

**MAHONABATRACHUS ROYPAILSI SP. NOV.**

**LSIDurn:lsid:zoobank.org:act:AAF1E11E-E5B2-49E0-AE67-592D37998585**

**Holotype:** A preserved specimen at the Australian Museum, Sydney, New South Wales, Australia, specimen number R.55405 collected at Glyde River, being about 10 km east of the McArthur River Camp, in the Northern Territory, Australia, Latitude -16.433 S., Longitude 136.150 E.

This government-owned facility allows access to its holdings.

**Paratypes:** Six preserved specimens at the Australian Museum, Sydney, New South Wales, Australia, specimen numbers R.55414, R.55377, R.55387, R.55396, R.55406 and R.55429 all from the type locality (above).

**Diagnosis:** *Mahonabatrachus chriswilliamsi* sp. nov., *M. marionanstisae* sp. nov., *M. pailsae* sp. nov. and *M. roypailsi* sp. nov. have all been treated as populations of a widespread putative taxon *M. meiriana* (Tyler, 1969), originally described as "*Hyla meriana*", with a type locality of 98 miles north of Mainoru, Northern Territory (NT), Australia.

The five morphologically similar and obviously closely related species can be readily separated on the basis of differences in morphology and colour.

Nominate *M. meiriana* is herein confined to the Arnhemland Escarpment of the Northern Territory and immediately adjacent outliers in a region bound by the type locality in Arnhemland (98 miles north of Mainoru, Northern Territory, Australia), west to Litchfield National Park, NT.

*M. pailsae* sp. nov. is the taxon in this species group found in the region generally bound by the Daly River in the north and West Baines/Victoria River in the south-west, including escarpment country within this zone.

*M. marionanstisae* sp. nov. is found generally around the Ord River region of the Kimberley District of Western Australia including immediately adjacent parts of North-west Northern Territory, including areas bounded by the West Baines/Victoria River in the east and Durack River

in the West.

*M. chriswilliamsi* sp. nov. is confined to the north-west Kimberley division from Durack River in the east and generally north of the Mitchell Plateau. Specimens in the southern Kimberley are tentatively assigned to this species.

*M. roypailsi* sp. nov. is restricted to low escarpments south of the Gulf of Carpentaria in the Northern Territory.

All five species would be identified as *M. meiriana* by the diagnosis in Tyler (1969) or that of Cogger (2014).

All five species and a sixth species in this genus *M. aurifera* (Anstis, Tyler, Roberts, Price and Doughty, 2010) are separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: They are an extremely small species with a maximum snout to vent length of 22.5 mm, characterised by an extremely high E-N/IN ratio (1.286-1.600), short and unwebbed fingers with prominent, transversely oval discs and extensively webbed toes (the webbing reaching the base of the discs of all toes except the fourth); vomerine teeth and outer metatarsal tubercles are present. In life there are striking post-femoral markings; the snout is evenly rounded and not particularly prominent or projecting.

I can report for the first time that *M. aurifera* (Anstis, Tyler, Roberts, Price and Doughty, 2010) is most simply separated from the other five species by having no more than five rounded tubercles in a row between front and hind leg on the flank (counted in a line and ignoring stray tubercles above or below the line), versus six or more in the other five species and the relevant tubercles are largeish, rounded and blunt in form in *M. aurifera*, versus smaller and tending towards being more pointed in the other five species. It also readily separated from the other five species by having an iris that is orange above and dull orange below with distinctive strips/patches of black pigment on each of the north-south-east-west axis.

*M. aurifera* is further separated from the other five species (all treated by the relevant authors as *M. meiriana*) by the suite of characters outlined in the original description of Anstis *et al.* (2010), including a slightly more pointed snout and tadpoles having a unique black, gold and red pigment pattern as well as a continuous papillary border around the oral disc (neither of which are seen in the other five species).

*M. meiriana* is readily separated from the other four species by the following suite of characters: The dorsum is generally dark reddish-brown with light grey blotches and marks occupying 15 to 40 percent of the dorsum. There is an average of 11 moderately enlarged tubercles with spikey edge of same colour as pigment below (either reddish-brown or grey). There are two well-defined white labial bars beneath the eye and at least one on the snout anterior to this (on each side).

Hind limbs have semi-distinct grey and brown bands and the forelimbs are of grey background with a strong light brown overlay. The front limbs also have a small number of well defined irregular shaped, dark brown spots or blotches. The iris is brilliant red/orange on the upper half and light grey below, with demarcation between both being well defined by a black midline.

In *M. meiriana* and the other species except for *M.*

*pailsae* sp. nov., the interdigital webbing reaches the base of the terminal discs of all toes except the fourth where it extends as far as the subarticular tubercle at the base of the penultimate phalanx and is united to the disc by a narrow lateral fringe.

*M. pailsae* sp. nov. is readily separated from the other four species by the following suite of characters: This species has more extensive webbing of the feet than all other species, in this taxon being unique among the five in reaching mid-way up the penultimate phalanx of the fourth toe.

In colour the dorsum is generally a dark brown, accentuated by the dark grey (rather than light grey) interspaces and blotches on the dorsum. The dorsal surface of the thigh is similar to the colour of the head and back (the light markings on the posterior face do not extend upon it). The ventral surfaces are much more heavily and extensively marked; the throat is usually a uniform dark brown and only infrequently stippled with brown and the ventral surface of the thighs is suffused with brown in most specimens. The iris is a dull orange colour above and grey with an orange tinge below and there is either no border between upper and lower parts of the iris, or if present it is greyish, not black and peppered and indistinct. Dark labial bars or markings are prominent anterior to the eye.

Limbs are generally light brown with indistinct darker markings.

*M. marionanstisae* sp. nov. is readily separated from the other four species by the following suite of characters: A generally faded and indistinct colouration of the dorsum, which is a combination of indistinct dark brown and light brown markings (versus for example reddish-brown and light grey in *M. meiriana*). The demarcation between upper iris and lower iris by way of black border is either indistinct or absent. The upper eye is a dull orange-brown and extends well below half-way with only the very lower part of the eye either dark grey or greyish in colour, although in many specimens the entire eye is a dull orange-brown. Labial bars of any colour (dark or light) are generally indistinct. Forelimbs are yellowish-brown and generally unmarked, except for some scattered patches of darker peppering. Hindlimbs are light brown with heavy dark peppering giving them a marbled appearance.

The hind legs are relatively shorter in this species than in the other four. In this species there is a TL/S-V range of 0.476-0.556 with a mean of 0.515, versus TL/S-V range of 0.541-0.640 and the mean 0.554 in the other four species (derived from Tyler, 1969).

*M. chriswilliamsi* sp. nov. is readily separated from the other four species by the following suite of characters: A dorsum that is dark brown in colour with semi-distinct black spots and blotches of irregular shape, but generally scattered across the dorsum and limbs. On the limbs the black markings tend to form bars. Many of the tubercles on the body are white tipped.

In common with *M. marionanstisae* sp. nov. the pale light brown patch encompassing the upper heel of the upper back foot is well defined and prominent.

The upper iris is bright red, lower iris is grey and the black line demarcating the two halves of the eye is well

defined.

In this species at the top of the iris is a large patch of dark pigment in the form of black peppering, forming a reasonably large blotch. In all other species there is either a tiny black dot or nothing at all at the same place in the eye.

*M. chriswilliamsi* sp. nov. is also unusual in that the tubercles on the upper surface of the back leg are large, pointed and white-tipped, numbering 6-9. Labial markings are distinct, but the white is either in the form of small spots or alternatively as very narrow bars. Between these white bits are areas of brown, the brown being the dominant colour of the labials and snout.

The upper surface of the head is brown with black spots and blotches (versus for example reddish-brown and light grey in *M. meiriana*).

*M. roypailsi* sp. nov. is similar in most respects to *M. meiriana* as described above, but the upper iris is dull orange in colour, labial markings and those on the limbs are indistinct; the anterior of the snout is brownish as opposed to purplish in colour and the dorsum has beige as opposed to light grey interspaces.

*M. meiriana* in life is depicted on page 173 of Cogger (2014) and Anstis (2013) on page 242 at top right and right middle and online at:

<https://www.flickr.com/photos/stephenmahony/36225998011/>

and:

<https://www.flickr.com/photos/mattsummerville/40940670621/>

and:

<https://www.flickr.com/photos/ryanfrancis/26315692613/>

and:

<https://www.flickr.com/photos/euprepiosaur/7240116716/>

*M. chriswilliamsi* sp. nov. in life is depicted online at:

<https://www.flickr.com/photos/54876436@N08/19647295261/>

*M. marionanstisae* sp. nov. is depicted on page 242 of Anstis (2013) at top left and online at:

<https://www.flickr.com/photos/23031163@N03/8519050483/>

and:

<https://www.flickr.com/photos/14807473@N08/49397917677/>

*M. pailsae* sp. nov. in life is depicted online at:

<https://www.flickr.com/photos/68921296@N06/14697052000/>

**Distribution:** *M. roypailsi* sp. nov. is restricted to low escarpments south of the Gulf of Carpentaria in the Northern Territory.

**Etymology:** *M. roypailsi* sp. nov. is named in honour of Roy Pails, a well-known herpetologist from Ballarat, Victoria, Australia in recognition for his many services to herpetology spanning many decades. He has been a world leader in breeding numerous species of reptile over many decades. His website at: <http://www.pailsforscales.com.au/about/> describes himself as follows:

"There comes a time in your life when you meet a bloke and you're convinced he's lost his marbles. The man behind Pails For Scales!"

This is how Roy comes across to many people. He is thoroughly obsessed with reptiles and literally lives and breathes them every waking hour of his life. The man is a living legend!

His current enterprise "Pails for scales conservation" is fighting an immensely difficult campaign for wildlife conservation. Competing for funds against government-owned zoos and predatory property enterprises like the Terri Irwin business means that on the ground and "hands on" wildlife conservation enterprises like those of Pails are being literally starved of funds.

This is happening in 2020, while the government-owned and government backed fake conservation business enterprises masquerading as charities, squander cash in the form of donations from misguided donors and taxpayer funded hand outs in the name of wildlife conservation and literally do nothing significantly useful to save threatened species.

#### **SALMOCULARANINA SUBTRIBE NOV.**

#### **SALMOCULARANA GEN. NOV.**

**LSIDurn:lsid:zoobank.org:act:44A0AE6A-A67A-48D8-9286-CDF304C066A4**

**Type species:** *Litoria personata* Tyler, Davies and Martin, 1978.

**Diagnosis:** The three species in the genus *Salmocularana gen. nov.* are small species that breed in escarpment rock hills in Arnhemland, Northern Territory and also the Kimberley Ranges of north-west Australia. The three known living species within the genus *Salmocularana gen. nov.* (one formally described within this paper) are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters:

Pale grey-brown, fawn, reddish, orange or pink above, with dorsal markings ranging from nothing more than slight peppering at the anterior part of the dorsum as seen in *Salmocularana personata* (Tyler, Davies and Martin, 1978), indistinct marbling and blotches as seen in *S. staccato* (Doughty and Anstis, 2007) or an intense randomised configuration of dark brown pigment on a light beige to grey background in *S. saxacola sp. nov.*; specimens have a distinct or semi-distinct dark brownish or purple head stripe from just in front of the nostril, through the eye and ear to upper flank just behind the forelimbs. Lips are whitish to some extent, ranging from a distinct yellow bar, to merely light and peppered brown. Ventral surfaces whitish. Skin may be smooth, with extremely tiny scattered tubercles above as in *S. personata*, or with a very limited number of scattered small tubercles above the arm and on the upper flank and nearby dorsum in *S. staccato* to scattered medium sized tubercles above the arm and on the upper flank and nearby dorsum in *S. saxacola sp. nov.* Underneath the skin is coarsely granular, except on the throat, where it is smooth. Vomerine teeth are in two short clumps between the choanae. Finger and toe discs are moderate, wider than the digits. Fingers lack webbing, toes being about half webbed, including not reaching the disc of the fifth toe but extending no more than half way along the penultimate phalanx. Second finger is longer than the first. There is a small oval inner metatarsal tubercle and a smaller outer metatarsal tubercle.

Tympanum distinct.

Duellman *et al.* (2016) found that the three species in this genus grouping diverged from their nearest living relatives 20.8 MYA, which alone strongly supports the contention that these species should be placed in a separate genus. Morphological divergence of the said taxa further vindicates this contention.

**Distribution:** The three species are confined to escarpments of Arnhemland, Northern Territory, Australia *Salmocularana personata* (Tyler, Davies and Martin, 1978); the east Kimberley District of Western Australia *S. staccato* (Doughty and Anstis, 2007) and the north-west Kimberley District of Western Australia *S. saxacola sp. nov.*

**Etymology:** In Latin *Salmocularana* is an abbreviation of the words "Salmon eyed frog" in reflection of the usual colour of the upper iris in these species.

**Content:** *Salmocularana personata* (Tyler, Davies and Martin, 1978) (type species); *S. saxacola sp. nov.*; *S. staccato* (Doughty and Anstis, 2007).

#### **SALMOCULARANA SAXACOLA SP. NOV.**

**LSIDurn:lsid:zoobank.org:act:27E63C72-487A-4563-8FA9-96790A7F1193**

**Holotype:** A preserved adult female specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number R167737 collected at Little Mertens Falls, Mitchell Plateau, West Kimberley District, Western Australia, Australia, Latitude -14.8222 S., Longitude 125.7108 E. This government-owned facility allows access to its holdings.

**Paratypes:** Three preserved specimens at the Western Australian Museum, Perth, Western Australia, Australia, specimen numbers R167738, R167739 and R167740 collected from Little Mertens Falls, Mitchell Plateau, West Kimberley District, Western Australia, Australia, Latitude -14.8222 S., Longitude 125.7108 E.

**Diagnosis:** Until now, *S. saxacola sp. nov.* would have been diagnosed and treated as a population of *S. staccato* (Doughty and Anstis, 2007) as defined by Anstis (2013) or Cogger (2014), under the name "*Litoria staccato*".

The two geographically disjunct species and the closely related and morphologically similar species *S. personata* (Tyler, Davies and Martin, 1978) are however readily separated as follows: By colour they are separated as follows: All may be pale grey-brown, fawn, reddish, orange or pink above.

Each species has dorsal markings as follows:

- 1/ Nothing more than slight peppering at the anterior part of the dorsum as seen in *S. personata*.
- 2/ Indistinct marbling and blotches as seen in *S. staccato*.
- 3/ An intense randomised configuration of dark brown pigment on a light beige to grey background in *S. saxacola sp. nov.*

The three species are further separated by one or other of the following dorsal skin configurations:

- 1/ Skin may be smooth, with extremely tiny scattered tubercles above as in *S. personata*.
- 2/ Skin is smooth with a very limited number of scattered small tubercles above the arm and on the upper flank and nearby dorsum in *S. staccato*.

3/ Skin is smooth with scattered medium sized tubercles above the arm and on the upper flank and nearby dorsum in *S. saxacola sp. nov.*

*S. personata* has a well-defined, thick dark brown stripe running from snout, through eye, the entire tympanum and along the entire flank, although it tends to fade posteriorly to become a greyish purple colour.

By contrast the same stripe is indistinct in *S. staccato* and never goes midway along the flank.

In *S. saxacola sp. nov.* the same stripe is broken along the entire length, but the contrast between dark and light is sharp and the blotches of the line do run along the entire length of the flank of the body. The dark colour is usually purple to brown and the light of the dorsum is usually beige to light grey. There is a well-defined thin dark crescent running along the upper ridge of the tympanum in this species that is not seen in either other species.

Fingers and toes of *S. personata* and *S. staccato* are whitish and without obvious markings, at most having indistinct tinges in parts, versus whitish with obvious and well-defined purplish spots, bars, flecks or blotches.

The three species can also be differentiated by their tadpole stages. *S. personata* has large pre-metamorphosis tadpoles that are blackish grey in dorsal colour with two distinct yellow lines running down the dorsum on either side of the medial line and continuing down the upper sides of each side of most of the tail. By contrast the tadpoles of the other two species at the same stage of development are yellowish brown in colour.

In tadpoles of *S. staccato* the two distinct yellow lines running down the dorsum on either side of the medial line are effectively absent.

In *S. saxacola sp. nov.* the two distinct yellow lines running down the dorsum on either side of the medial line are present on the body, but not on the tail. They are nowhere near as brilliant in colour or contrast as those seen in *S. personata*.

Anstis (2013) provides comparative images of all of *S. personata*, *S. saxacola sp. nov.* and *S. staccato*, including images of tadpoles and metamorphosed frogs of each species, all of which clearly show the diagnostic differences between each species detailed herein.

In terms of *S. saxacola sp. nov.*, Anstis (2013) has images of this species in life on pages 315 (top right), 316, tadpoles at top and two images below on right, and page 317 at bottom left (young frog).

The three known living species within the genus *Pustulatarana gen. nov.* (one formally described within this paper) are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters:

Pale grey-brown, fawn, reddish, orange or pink above, with dorsal markings ranging from nothing more than slight peppering at the anterior part of the dorsum as seen in *Salmocularana personata* (Tyler, Davies and Martin, 1978), indistinct marbling and blotches as seen in *S. staccato* (Doughty and Anstis, 2007) or an intense randomised configuration of dark brown pigment on a light beige to grey background in *S. saxacola sp. nov.*; specimens have a distinct or semi-distinct dark brownish

or purple head stripe from just in front of the nostril, through the eye and ear to upper flank just behind the forelimbs. Lips are whitish to some extent, ranging from a distinct yellow bar, to merely light and peppered brown. Ventral surfaces whitish. Skin may be smooth, with

extremely tiny scattered tubercles above as in *S. personata*, or with a very limited number of scattered small tubercles above the arm and on the upper flank and nearby dorsum in *S. staccato* to scattered medium sized tubercles above the arm and on the upper flank and nearby dorsum in *S. saxacola sp. nov.* Underneath the skin is coarsely granular, except on the throat, where it is smooth. Vomerine teeth are in two short clumps between the choanae. Finger and toe discs are moderate, wider than the digits. Fingers lack webbing, toes being about half webbed, including not reaching the disc of the fifth toe but extending no more than half way along the penultimate phalanx. Second finger is longer than the first. There is a small oval inner metatarsal tubercle and a smaller outer metatarsal tubercle. Tympanum distinct.

Duellman *et al.* (2016) found that the three species in this genus grouping diverged from their nearest living relatives 20.8 MYA, which alone strongly supports the contention that these species should be placed in a separate genus. Morphological divergence of the said taxa further vindicates this contention.

**Distribution:** *S. saxacola sp. nov.* is known only from the escarpment country of the north-west Kimberley Division of Western Australia. More specifically the known range of this species is bound by Spring Creek, Latitude - 15.1997 S., Longitude 126.0881 E. in the east, Katers Island, Latitude - 4.4666 S., Longitude 125.5333 E. in the north and Harding Range, Latitude -16.3231 S., Longitude 124.7589 E. in the south. The ocean to the west otherwise constrains the species.

**Etymology:** The species name derives from the rock-dwelling habits of these frogs, being confined to extremely rocky escarpment country.

#### GENUS *LITORIA* TSCHUDI, 1838

**Type species:** *Litoria freycineti* Tschudi, 1838.

**Diagnosis:** The genus *Litoria*, with type species *L. freycineti* Tschudi, 1838 is herein restricted to the type species and the closely related *L. latopalmata* Günther, 1867, which as a pair diverged from their nearest common ancestor 13.3 MYA according to Duellman *et al.* (2016).

This divergence and morphological differences are exactly why the species previously included in *Litoria* have been assigned to other genera.

*Litoria* as defined herein, are readily separated from all other Australasian Tree frogs (Pelodyadidae) by the following suite of characters: Species are a frog that is fawn to dark above, being either immaculate or with markings on the back, with or without a warty exterior, the warts if present being small and flattish, the markings if present typically being a series of darker blotches or variegations in either an irregular or regular pattern. There is a broad dark, canthal stripe, almost completely interrupted in front of the eye and continues behind the eye to effectively overwrite the tympanum and extend to the flanks where it invariably breaks up into a series of

black spots or blotches extending to the groin. There is a pale glandular stripe from below the eye to the base of the forelimb. Limbs are variegated darker but usually with an irregular pattern of spots, blotches or bars. Lower jaw is variegated with yellow and dark brown, often forming a reticulum, often with a barred appearance. The venter is whitish. Ventral surface and flanks are granular. There is no dorsolateral skin fold. Finger and toe discs are small and project slightly but noticeably, beyond the lateral edges of the penultimate phalanges. Fingers are free, without webbing. Toes have well developed webbing, the webbing not reaching the disc of the fifth toe and extending no more than half way along the penultimate phalanx. There is a small inner and minute outer metatarsal tubercle. Vomerine teeth are in two clusters between the choanae. The tympanum is distinct and adults average 40-45 mm snout to rear.

**Distribution:** Most of the eastern third of Australia.

**Content:** *L. freycineti* Tschudi, 1838 (type species); *L. latopalmata* Günther, 1867.

**PARALITORIA GEN. NOV.**

**LSIDurn:lsid:zoobank.org:act:65126912-F61A-4380-9CD2-05592C940390**

**Type species:** *Hyla nigrofrenata* Günther, 1867.

**Diagnosis:** The genus *Paralitoria gen. nov.* diverged from its nearest common ancestor, being that of the genera *Litoria* and *Quasilitoria gen. nov.* being the most closely related genera, some 15.5 MYA according to Duellman *et al.* (2016).

*Paralitoria gen. nov.* is separated from all other Australasian tree frogs (Pelodyadidae) by the following suite of characters, being one or other of the following:  
1/ Fawn, grey or brown above, being immaculate; a conspicuous black stripe from the snout, through the nostril to the eye, where it is almost entirely broken by a pale vertical bar in front of the eye as a band continuing below the tympanum and extending back to the forearm with minimal loss of width along the length, where after a break, it continues obliquely along the mid flank. There is a pale glandular stripe from below the eye to the forearm. There is a conspicuous dark brown stripe along the front edge of the tibial region. Lips are not spotted or barred. The groin and hind side of thighs are pale yellow, spotted and variegated with dark brown. Venter is whitish. Dorsal surface is smooth and leathery, throat is smooth and the venter granular. Vomerine teeth are between the choanae. Finger discs are small and distinct, while toe discs are smaller and indistinct. Fingers are unwebbed and toes have moderate webbing between them. There is a small inner and tiny outer metatarsal tubercle. Tympanum is distinct and second finger is slightly shorter than the first. Body length averages 50 mm (subgenus *Paralitoria subgen. nov.*), or:

2/ Fawn, grey or brown above, with limited flecks or other markings, often as a peppering; a conspicuous narrow black stripe from the snout, through the nostril to the eye, continuing through the tympanum (effectively over-writing it) and extending past the forearm with minimal loss of width along the length to the anterior flank. There is a pale glandular stripe from below the eye to the forearm. There is a conspicuous dark brown stripe along the front edge of the tibial region. The lower lips are faintly or

partially barred. The groin and hind side of thighs are pale yellow, spotted and variegated with dark brown. Venter is whitish. Dorsal surface is smooth and leathery, throat is smooth and the venter granular. Vomerine teeth are between the choanae. Finger discs are small and barely distinct, while toe discs are of similar size. Fingers are unwebbed and toes extensive webbing between them, with the webbing reaching the disc of the fifth toe. There is a small inner and tiny outer metatarsal tubercle. Tympanum is distinct and second finger is slightly shorter than the first. Body length averages 75 mm (subgenus *Ferelitoria subgen. nov.*).

**Distribution:** The subgenus *Paralitoria subgen. nov.* is found on the eastern third of Cape York Peninsula, Torres Strait islands and southern New Guinea. Subgenus *Ferelitoria subgen. nov.* is found in the dry tropics of northern Australia, being the top end of the Northern Territory and Western Australia.

**Etymology:** Para in Latin means "not quite" and hence the name "Paralitoria" meaning not quite Litoria.

**Content:** *Paralitoria nigrofrenata* (Günther, 1867) (type species); *P. spaldingi* (Hosmer, 1964); *P. watjulumensis* (Copland, 1957).

**FERELITORIA SUBGEN. NOV.**

**LSIDurn:lsid:zoobank.org:act:45B26663-ECD5-46D7-B907-49C08FF6C5B8**

**Type species:** *Hyla latopalmata watjulumensis* Copland, 1957.

**Diagnosis:** The genus *Paralitoria gen. nov.* diverged from its nearest common ancestor, being that also of the genera *Litoria* and *Quasilitoria gen. nov.* some 15.5 MYA according to Duellman *et al.* (2016).

*Paralitoria gen. nov.* is separated from all other Australasian tree frogs (Pelodyadidae) by the following suite of characters, being one or other of the following:  
1/ Fawn, grey or brown above, with limited flecks or other markings, often as a peppering; a conspicuous narrow black stripe from the snout, through the nostril to the eye, continuing through the tympanum (effectively over-writing it) and extending past the forearm with minimal loss of width along the length to the anterior flank. There is a pale glandular stripe from below the eye to the forearm. There is a conspicuous dark brown stripe along the front edge of the tibial region. The lower lips are faintly or partially barred. The groin and hind side of thighs are pale yellow, spotted and variegated with dark brown. Venter is whitish. Dorsal surface is smooth and leathery, throat is smooth and the venter granular. Vomerine teeth are between the choanae. Finger discs are small and barely distinct, while toe discs are of similar size. Fingers are unwebbed and toes extensive webbing between them, with the webbing reaching the disc of the fifth toe. There is a small inner and tiny outer metatarsal tubercle. Tympanum is distinct and second finger is slightly shorter than the first. Body length averages 75 mm (subgenus *Ferelitoria subgen. nov.*), or:

2/ Fawn, grey or brown above, being immaculate; a conspicuous black stripe from the snout, through the nostril to the eye, where it is almost entirely broken by a pale vertical bar in front of the eye as a band continuing below the tympanum and extending back to the forearm with minimal loss of width along the length, where after a



break, it continues obliquely along the mid flank. There is a pale glandular stripe from below the eye to the forearm. There is a conspicuous dark brown stripe along the front edge of the tibial region. Lips are not spotted or barred. The groin and hind side of thighs are pale yellow, spotted and variegated with dark brown. Venter is whitish. Dorsal surface is smooth and leathery, throat is smooth and the venter granular. Vomerine teeth are between the choanae. Finger discs are small and distinct, while toe discs are smaller and indistinct. Fingers are unwebbed and toes have moderate webbing between them. There is a small inner and tiny outer metatarsal tubercle. Tympanum is distinct and second finger is slightly shorter than the first. Body length averages 50 mm (subgenus *Paralitoria subgen. nov.*).

**Distribution:** Subgenus *Ferelitoria subgen. nov.* is found in the dry tropics of northern Australia, being the top end of the Northern Territory and Western Australia.

**Etymology:** Fere in Latin means "Like", which is accurate as these frogs are "like" *Litoria* frogs.

**Content:** *Paralitoria (Ferelitoria) watjulumensis* (Copland, 1957) (type species); *P. (Ferelitoria) spaldingi* (Hosmer, 1964).

#### **PARALITORIA SUBGEN. NOV.**

**Type species:** *Hyla nigrofrenata* Günther, 1867.

**Diagnosis:** As identified within the genus diagnosis within *Paralitoria gen. nov.* within this paper.

**Distribution:** The subgenus *Paralitoria subgen. nov.* is found on the eastern third of Cape York Peninsula, Torres Strait islands and southern New Guinea.

**Content:** *Paralitoria nigrofrenata* (Günther, 1867) (monotypic).

**Etymology:** As for the genus.

#### **QUASILITORIA GEN. NOV.**

**LSIDurn:lsid:zoobank.org:act:535D6B63-119D-414C-98F7-F83196290D9D**

**Type species:** *Chiroleptes inermis* Peters, 1867.

**Diagnosis:** The genus *Quasilitoria gen. nov.* as defined herein, diverged from its nearest common ancestor with genus *Litoria* Tschudi, 1838, (as defined in this paper), being the next most closely related genus, some 13.3 MYA according to Duellman *et al.* (2016).

Species of *Quasilitoria gen. nov.* are separated from all other Australasian tree frogs (Pelodyadidae) by the following suite of characters:

The dorsum is smooth or with some scattered low round tubercles; front toe discs are no wider than the penultimate phalanx and toe discs only slightly wider, but otherwise also small.

Front edge of thigh has either a continuous black stripe or alternatively an arrangement of broken black spots or blotches.

Lower surfaces white, throat with or without some mottling, smooth on the throat and chest and slightly granular on the belly.

Dorsolateral folds are either absent or very indistinct. Inner metatarsal tubercle is small and outer one is tiny. Prominent vomerine teeth.

Fingers unwebbed, while toes are half to three quarters webbed. Furthermore, one or other of the following character suites:

1/ Back is without darker markings or mottling, at most there being a slight peppering on the upper surfaces; anterior black head stripe when present is interrupted at least in part by a slight vertical bar in front of the eye; posterior dark head stripe is as wide as and overwriting the tympanum or not quite so and if not, then the lower part of the tympanum is not blackened and snout is only moderately pointed, (*Q. axillaris*, *Q. coplandi*, *Q. inermis*, *Q. pallida*, *Q. tornieri*) (subgenus *Quasilitoria subgen. nov.*), or alternatively:

2/ With darker markings and/or stripes on the dorsal surface, with some longitudinal folds on the back, a strongly pointed snout and a well defined yellow bar in front of the eye, breaking the black line from snout past eye, the yellow bar being blocked at the top by a small and well-defined area of black.

Forefingers light yellowish or white, peppering on the light surfaces of the snout. Tympanum has a distinctive pale rim (*Q. nasuta*, *Q. peninsulae*) (subgenus *Vultusamolitoria subgen. nov.*).

**Distribution:** Northern third of Australia, extending south along the east coast of Australia, to the New South Wales North coast.

**Etymology:** "Quasi" in Latin means "like" which sums up the species in the genus, as they are "like" *Litoria*.

**Content:** *Quasilitoria inermis* (Peters, 1867) (type species); *Q. pallida* (Davies, Martin and Watson 1983); *Q. coplandi* (Tyler, 1968); *Q. mickpughi sp. nov.*; *Q. mippughae sp. nov.*; *Q. nasuta* (Gray, 1842); *Q. peninsulae* (De Vis, 1884); *Q. tornieri* (Neiden, 1923); *Q. axillaris* (Doughty, 2011).

#### **VULTUSAMOLITORIA SUBGEN. NOV.**

**LSIDurn:lsid:zoobank.org:act:26361CC4-C5D6-428C-A4B6-7BCC8F897A37**

**Type species:** *Pelodytes nasutus* Gray, 1842.

**Diagnosis:** Frogs in the subgenus *Vultusamolitoria subgen. nov.* are separated from frogs in the nominate subgenus of *Quasilitoria subgen. nov.* by the following suite of characters: having darker markings and/or stripes on the dorsal surface, with some longitudinal folds on the back, a strongly pointed snout and a well defined yellow bar in front of the eye, breaking the black line from snout past eye, the yellow bar being blocked at the top by a small and well-defined area of black. Forefingers light yellowish or white, peppering on the light surfaces of the snout. Tympanum has a distinctive pale rim (*Q. nasuta*, *Q. peninsulae*) (subgenus *Vultusamolitoria subgen. nov.*).

In turn frogs of the nominate subgenus are separated from *Vultusamolitoria subgen. nov.* by the following suite of characters: Back is without darker markings or mottling, at most there being a slight peppering on the upper surfaces; anterior black head stripe when present is interrupted at least in part by a slight vertical bar in front of the eye; posterior dark head stripe is as wide as and overwriting the tympanum or not quite so and if not, then the lower part of the tympanum is not blackened, and snout is only moderately pointed, (*Q. axillaris*, *Q. coplandi*, *Q. inermis*, *Q. pallida*, *Q. tornieri*) (subgenus *Quasilitoria subgen. nov.*).

Common to both subgenera and when combined with the relevant characters above, species in this genus (*Quasilitoria gen. nov.*) are separated from all other

Australasian Tree Frogs (Pelodyadidae) by the following additional characters:

The dorsum is smooth or with some scattered low round tubercles; front toe discs are no wider than the penultimate phalanx and toe discs only slightly wider, but otherwise also small. Front edge of thigh has either a continuous black stripe or alternatively an arrangement of broken black spots or blotches. Lower surfaces white, throat with or without some mottling, smooth on the throat and chest and slightly granular on the belly. Dorsolateral folds are either absent or very indistinct. Inner metatarsal tubercle is small and outer one is tiny. Prominent vomerine teeth. Fingers unwebbed, while toes are half to three quarters webbed.

According to Duellman *et al.* (2016) this subgenus diverged from the other 9.3 MYA.

**Distribution:** Northern third of Australia, extending south along the east coast of Australia, to the New South Wales North coast.

**Etymology:** "Vultusamo" in Latin means "looks like" which sums up the species in the genus, as they "look like" *Litoria*.

**Content:** *Quasilitoria (Vultusamolitoria) nasuta* (Gray, 1842) (type species); *Q. (Vultusamolitoria) peninsulae* (De Vis, 1884).

#### **QUASILITORIA SUBGEN. NOV.**

**Type species:** *Chiroleptes inermis* Peters, 1867.

**Diagnosis:** As identified within the genus diagnosis within *Paralitoria gen. nov.* within this paper.

**Distribution:** Northern tropics of Australia, mainly in the Northern Territory and Western Australia.

**Etymology:** As for the genus.

**Content:** *Quasilitoria (Quasilitoria) inermis* (Peters, 1867) (type species); *Q. (Quasilitoria) pallida* (Davies, Martin and Watson 1983); *Q. (Quasilitoria) coplandi* (Tyler, 1968); *Q. mickpughi sp. nov.*; *Q. mippughae sp. nov.*; *Q. (Quasilitoria) tornieri* (Neiden, 1923); *Q. (Quasilitoria) axillaris* (Doughty, 2011).

#### **QUASILITORIA INERMIS DAVIDTRIBEI SUBSP. NOV.**

**LSIDurn:lsid:zoobank.org:act:FC0A19BD-2B20-405E-A449-D56B6A0C1C68**

**Holotype:** A preserved specimen at the South Australian Museum, Adelaide, South Australia, Australia, specimen number R23285, collected from the Jabiru Airstrip, Northern Territory, Australia, Latitude -12.6667 S., Longitude 132.8333 E.

This government-owned facility allows access to its holdings.

**Paratypes:** Preserved specimens at the South Australian Museum, Adelaide, South Australia, Australia, specimen numbers R23286-300, R23343-52, R23312-25, R23352 and R23284 all collected from the Jabiru Airstrip, Northern Territory, Australia, Latitude -12.6667 S., Longitude 132.8333 E.

**Diagnosis:** The subspecies *Quasilitoria (Quasilitoria) inermis davidtribei subsp. nov.* and *Quasilitoria (Quasilitoria) inermis dunphyi subsp. nov.* have both until now been treated as regional populations of the species *Quasilitoria (Quasilitoria) inermis* (Peters, 1867), with a type locality of Rockhampton in coastal Queensland, Australia. Both relevant subspecies are highly divergent

from the type form and would be almost certainly worthy of recognition as full species, but in the absence of molecular data for each form, I have conservatively named each as subspecies.

All three forms would identify as *Quasilitoria inermis*, identified as "*Litoria inermis*", using the key in Cogger (2014) as a basis to separate them from all other species of Australasian tree frog (Pelodyadidae).

All *Q. inermis* are further separated from morphologically similar species within Pelodyadidae where they occur by having noticeable warts or tubercles on the dorsum, poorly defined lateral headstripe and finely reticulated thigh markings.

*Q. inermis dunphyi subsp. nov.* restricted to the Kimberley District of Western Australia is readily separated from both other subspecies by having a generally dark purplish-brown dorsum, versus grey brown in *Q. inermis davidtribei subsp. nov.* and yellow-brown in *Q. inermis inermis*.

*Q. inermis dunphyi subsp. nov.* is further separated from both other subspecies by having a limited number of relatively small warts or tubercles on the dorsum and upper flanks, these being roundish in shape, versus numerous well-defined warts or tubercles, often squarish or rectangular in shape in both *Q. inermis inermis* and *Q. inermis davidtribei subsp. nov.*

Adult male *Q. inermis dunphyi subsp. nov.* have strong lightening of the upper lip, versus not so in *Q. inermis davidtribei subsp. nov.* and slight in *Q. inermis inermis*.

*Q. inermis davidtribei subsp. nov.* from the top end of the Northern Territory, is separated from both *Q. inermis inermis* and *Q. inermis dunphyi subsp. nov.* by having a limited amount of black pigment intruding on the upper tympanum, versus not so in the other two subspecies (none intrudes).

*Q. inermis davidtribei subsp. nov.* has significant dark barring or patches on the dorsum of the hind limbs, as well as patches of dark pigment bordering the upper lip, which is not seen in the other two subspecies.

*Q. inermis inermis* in life is depicted in Anstis (2013) on page 212 at top right and page 214 at top.

*Q. inermis davidtribei subsp. nov.* in life is depicted in Cogger (2014) on page 167 at bottom.

*Q. inermis dunphyi subsp. nov.* is depicted in Anstis (2013) on page 212 at top left.

**Distribution:** The subspecies *Q. inermis davidtribei subsp. nov.* appears to be confined to the top end of the Northern Territory, Australia.

**Etymology:** The subspecies *Q. inermis davidtribei subsp. nov.* is named in honour of David Tribe, program director at the New South Wales Gould League, a well-known wildlife conservation organisation.

In the 1990's this organisation had its income stream virtually annihilated by the predatory "donation stealing" practices of the Steve Irwin business.

Irwin took the business model of marketing his property empire to conservation-minded people to a low never previously seen in Australian history. The net result was that dozens of long-established grass-roots wildlife conservation organisations in Australia were effectively starved of funds and forced to shut down, with

enormously negative consequences for wildlife conservation in Australia.

The Irwin business also militarized State Wildlife departments and police forces to raid wildlife conservation organisations they saw as rivals to their own business.

**QUASILITORIA INERMIS DUNPHYI SUBSP. NOV.**

**LSIDurn:lsid:zoobank.org:act:A67D73DE-9699-46AA-ACE5-654618116D3F**

**Holotype:** A preserved specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number R81887 collected from Kununurra, Western Australia, Australia, Latitude -15.7667 S., Longitude 128.7333 S.

This government-owned facility allows access to its holdings.

**Paratypes:** Four preserved specimens at the Western Australian Museum, Perth, Western Australia, Australia, specimen numbers R81884, R81885, R81886, R81888, collected from Kununurra, Western Australia, Australia, Latitude -15.7667 S., Longitude 128.7333 S.

**Diagnosis:** The subspecies *Quasilitoria (Quasilitoria) inermis dunphyi subsp. nov.* and *Quasilitoria (Quasilitoria) inermis davidtribei subsp. nov.* have both until now been treated as regional populations of the species *Quasilitoria (Quasilitoria) inermis* (Peters, 1867), with a type locality of Rockhampton in coastal Queensland, Australia. Both relevant subspecies are highly divergent from the type form and would be almost certainly worthy of recognition as full species, but in the absence of molecular data for each form, I have conservatively named each as subspecies.

All three forms would identify as *Quasilitoria inermis*, identified as "*Litoria inermis*", using the key in Cogger (2014) as a basis to separate them from all other species of Australasian tree frog (Pelodyadidae).

All *Q. inermis* are further separated from morphologically similar species within Pelodyadidae where they occur by having noticeable warts or tubercles on the dorsum, poorly defined lateral headstripe and finely reticulated thigh markings.

*Q. inermis dunphyi subsp. nov.* restricted to the Kimberley District of Western Australia is readily separated from both other subspecies by having a generally dark purplish-brown dorsum, versus grey brown in *Q. inermis davidtribei subsp. nov.* and yellow-brown in *Q. inermis inermis*.

*Q. inermis dunphyi subsp. nov.* is further separated from both other subspecies by having a limited number of relatively small warts or tubercles on the dorsum and upper flanks, these being roundish in shape, versus numerous well-defined warts or tubercles, often squarish or rectangular in shape in both *Q. inermis inermis* and *Q. inermis davidtribei subsp. nov.*

Adult male *Q. inermis dunphyi subsp. nov.* have strong lightening of the upper lip, versus not so in *Q. inermis davidtribei subsp. nov.* and slight in *Q. inermis inermis*.

*Q. inermis davidtribei subsp. nov.* from the top end of the Northern Territory, is separated from both *Q. inermis inermis* and *Q. inermis dunphyi subsp. nov.* by having a limited amount of black pigment intruding on the upper

tympanum, versus not so in the other two subspecies.

*Q. inermis davidtribei subsp. nov.* has significant dark barring or patches on the dorsum of the hind limbs, as well as patches of dark pigment bordering the upper lip, which is not seen in the other two subspecies.

*Q. inermis inermis* in life is depicted in Anstis (2013) on page 212 at top right and page 214 at top.

*Q. inermis davidtribei subsp. nov.* in life is depicted in Cogger (2014) on page 167 at bottom.

*Q. inermis dunphyi subsp. nov.* is depicted in Anstis (2013) on page 212 at top left.

**Distribution:** The subspecies *Q. inermis dunphyi subsp. nov.* appears to be confined to the Kimberley District of North-western Australia.

**Etymology:** The subspecies is named in honour of Milo Dunphy, 1928-1996, the son of Myles Dunphy, in recognition for his political activism to preserve wilderness areas in New South Wales, Australia.

**QUASILITORIA (QUASILITORIA) MICKPUGHI SP. NOV.**

**LSIDurn:lsid:zoobank.org:act:961A988F-9086-4AF2-9530-F1989D44D356**

**Holotype:** A preserved specimen at the South Australian Museum, Adelaide, South Australia, Australia, specimen number R.43642 collected at Jabiluka, Northern Territory, Australia, Latitude -12.52 S., Longitude 132.88 E.

This government-owned facility allows access to its holdings.

**Paratypes:** 1/ A preserved specimen at the Australian Museum, Sydney, New South Wales, Australia, specimen number R.88556 collected at Jabiluka, Northern Territory, Australia, Latitude -12.52 S., Longitude 132.88 E.

2/ A preserved specimen at the Northern Territory Art Gallery and Museum, specimen number R.02503 collected from 6.5 km south west of Oenpelli, Northern Territory, Australia, Latitude -12.367 S., Longitude 133.033 E.

**Diagnosis:** The two species *Quasilitoria mickpughi sp. nov.* and *Quasilitoria mippughae sp. nov.* were both until now treated as populations of *Q. coplandi* (Tyler, 1968), although at the time Tyler described *Q. coplandi* he did not inspect any specimens of either of these newly named putative species.

His relevant sample of frogs was confined to south-west Northern Territory and the nearby Kimberley Division of Western Australia animals (Tyler 1969).

All three species would be identified and diagnosed as *Q. coplandi* in both Cogger (2014) and Anstis (2013).

All three species are separated from all other similar species of tree frog (Pelodyadidae) in northern Australia by the following suite of characters: Webbing reaches the base of the terminal disc on the fifth toe.

The finger and toe discs are distinctly dilated and approximately twice the width of the penultimate phalanges. Lateral head stripe is absent. Snout-vent length is under 45 mm.

All of *Quasilitoria mickpughi sp. nov.*, *Q. mippughae sp. nov.* and *Q. coplandi* can be readily separated from one another on the basis of colouration.

*Q. coplandi* (Tyler, 1968) with a type locality of Inverway Station, Northern Territory, Australia, part of the Victoria River district, in the far north-west of the State, near the

Western Australian border, and including all populations from this general area and west into the Kimberley District of Western Australia, is a light fawn to beige colour on top without obvious or distinct markings. There are blotches, flecks or peppering on the back, but all are faded and generally merge with the overall dorsal colouration.

By contrast *Q. mickpughi sp. nov.* from the top end of the Northern Territory, with a centre of distribution on the Arnhemland Escarpment and including areas south-east of there including the southern shores of the Gulf of Carpentaria, has a well-defined dorsal colouration consisting of a light yellow to pinkish orange-background overlaid with numerous dark purple blotches and marks occupying about half the surface area, giving the frog a distinctly darker colour. The contrast between dark and light remains intense on the snout, versus only indistinct markings on *Q. coplandi*.

The species *Q. mippughae sp. nov.* with a centre of distribution on the Selwyn Ranges of North-west Queensland and nearby hilly areas, extending as far north as about Lawn Hill (still in Queensland), is characterised by having a yellow to beige coloured dorsum and well scattered irregular, but well defined blackish spots and blotches, with the region anterior to the eyes having either no darker pigment or only a very limited amount (in contrast to both other species).

All three species are generally light in a well-defined zone between the eyes, but have darker pigment both anterior and posterior to this, except in the case of *Q. mippughae sp. nov.* where there is generally no darker pigment anterior, or very little.

Anstis (2013) reports on differences in the jaw structure of tadpoles within the species herein defined as *Q. mickpughi sp. nov.* and *Q. coplandi*.

*Q. coplandi* in life is depicted in Anstis (2013) on page 175 at top right.

*Q. mickpughi sp. nov.* in life is depicted in Anstis (2013) on page 177 at top right and as a tadpole below that. The specimen depicted on page 159 of Cogger (2014) top right, is also referred to this taxon.

*Q. mippughae sp. nov.* in life is depicted on page 32 of Vanderduys (2012) in both photos.

Numerous photos of all three species can be found online at:

<http://www.flickr.com>

when doing a search for "Litoria coplandi".

**Distribution:** *Q. mickpughi sp. nov.* is believed to be restricted to the Arnhemland region of the top-end of the Northern Territory, although specimens from the east of the Northern Territory, including those south of the Gulf of Carpentaria are also tentatively referred to this taxon on the basis of obvious morphological similarity.

**Etymology:** Named in honour of Mick Pugh of Geelong, Victoria, Australia, a former president of the Victorian Association of Amateur Herpetologists Incorporated, in recognition of his many decades of service to herpetology and wildlife conservation in general.

Mick Pugh was hounded out of herpetology by a corrupt and dysfunctional State wildlife department that saw his expertise and reputation as a "threat" to their own lesser "experts" employed at their business "Zoos Victoria".

**QUASILITORIA (QUASILITORIA) MIPPUGHAE SP. NOV.**

**LSIDurn:lsid:zoobank.org:act:5AB69DE5-107A-46E1-8A55-3C57580F1089**

**Holotype:** A preserved specimen at the Museum and Art Gallery of the Northern Territory, Darwin, Northern Territory, Australia, specimen number R25754 collected at Chinaman's Waterhole, 35 km east of Mount Isa, Queensland, Australia, Latitude -20.725 S., Longitude 139.779 E.

This government-owned facility allows access to its holdings.

**Paratypes:** Preserved specimens at the Museum and Art Gallery of the Northern Territory, Darwin, Northern Territory, Australia, specimen numbers R25755, R25756, R21713 and R21714 and specimens at the South Australian Museum, Adelaide, South Australia, Australia, specimen numbers R54356 and R54358, all collected at Chinaman's Waterhole, 35 km east of Mount Isa, Queensland, Australia, Latitude -20.725 S., Longitude 139.779 E.

**Diagnosis:** The two species *Quasilitoria mippughae sp. nov.* and *Quasilitoria mickpughi sp. nov.* were both until now treated as populations of *Q. coplandi* (Tyler, 1968), although at the time Tyler described *Q. coplandi* he did not inspect any specimens of either of these newly named putative species. His relevant sample of frogs was confined to south-west Northern Territory and Kimberley Division of Western Australia animals (Tyler 1969).

All three species would be identified and diagnosed as *Q. coplandi* in both Cogger (2014) and Anstis (2013).

All three species are separated from all other similar species of tree frog (Pelodyadidae) in northern Australia by the following suite of characters: Webbing reaches the base of the terminal disc on the fifth toe. The finger and toe discs are distinctly dilated and approximately twice the width of the penultimate phalanges. Lateral head stripe is absent. Snout-vent length is under 45 mm.

All of *Quasilitoria mickpughi sp. nov.*, *Q. mippughae sp. nov.* and *Q. coplandi* can be readily separated from one another on the basis of colouration.

*Q. coplandi* (Tyler, 1968) with a type locality of Inverway Station, Northern Territory, Australia, part of the Victoria River district, in the far north-west of the State, near the Western Australian border, and including all populations from this general area and west into the Kimberley District of Western Australia, is a light fawn to beige colour on top without obvious or distinct markings. There are blotches, flecks or peppering on the back, but all are faded and generally merge with the overall dorsal colouration.

By contrast *Q. mickpughi sp. nov.* from the top end of the Northern Territory, with a centre of distribution on the Arnhemland Escarpment and including areas south-east of there including the southern shores of the Gulf of Carpentaria, has a well-defined dorsal colouration consisting of a light yellow to pinkish orange-background overlaid with numerous dark purple blotches and marks occupying about half the surface area, giving the frog a distinctly darker colour. The contrast between dark and light remains intense on the snout, versus only indistinct

markings on *Q. coplandi*.

The species *Q. mippughae* sp. nov. with a centre of distribution on the Selwyn Ranges of North-west Queensland and nearby hilly areas, extending as far north as about Lawn Hill (still in Queensland), is characterised by having a yellow to beige coloured dorsum and well scattered irregular, but well defined blackish spots and blotches, with the region anterior to the eyes having either no darker pigment or only a very limited amount (in contrast to both other species).

All three species are generally light in a well-defined zone between the eyes, but have darker pigment both anterior and posterior to this, except in the case of *Q. mippughae* sp. nov. where there is generally no darker pigment anterior, or very little.

Anstis (2013) reports on differences in the jaw structure of tadpoles within the species herein defined as *Q. mickpughi* sp. nov. and *Q. coplandi*.

*Q. coplandi* in life is depicted in Anstis (2013) on page 175 at top right.

*Q. mickpughi* sp. nov. in life is depicted in Anstis (2013) on page 177 at top right and as a tadpole below that. The specimen depicted on page 159 of Cogger (2014) top right, is also referred to this taxon.

*Q. mippughae* sp. nov. in life is depicted on page 32 of Vanderduys (2012) in both photos.

Numerous photos of all three species can be found online at:

<http://www.flickr.com>

when doing a search for "Litoria coplandi".

**Distribution:** *Q. mippughae* sp. nov. is believed to be restricted to the Selwyn and nearby ranges in north-west Queensland, being a distribution centred on the town of Mount Isa, Queensland, Australia.

**Etymology:** Named in honour of Mip Pugh of Geelong, Victoria, Australia, in recognition of her services to herpetology in Australia, especially with regards to the captive breeding of Australian agamid lizards and educating many others in terms of her expertise developed over many years.

**QUASILITORIA TORNIERI SERVENTYI SUBSP. NOV.**  
**LSIDurn:lsid:zoobank.org:act:361FEC86-D280-46F6-B781-77F012216C06**

**Holotype:** A preserved specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number R50671 collected from Drysdale River National Park, Kimberley District, Western Australia, Australia, Latitude -14.73 S., Longitude 126.93 E.

This facility allows access to its holdings.

**Paratypes:** 1/ A preserved specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number R50670 collected from Drysdale River National Park, Kimberley District, Western Australia, Australia, Latitude -14.73 S., Longitude 126.93 E.

2/ A preserved male specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number R99065 collected from 6 km north of Lake Gilbert, near Beverley Springs, West Kimberley District, Western Australia, Australia (in leaf litter around rocks), Latitude -16.5042 S., Longitude 125.275 E.

3/ A preserved specimen at the Western Australian

Museum, Perth, Western Australia, Australia, specimen number R115931, collected from about 14 km north north-west of the junction of the Calder River and Bachsten Creek, West Kimberley District, Western Australia, Australia, Latitude-15.9833 S., Longitude 125.3167 E.

**Diagnosis:** Until now the subspecies *Quasilitoria tornieri serventyi* subsp. nov. has been treated as nominate *Quasilitoria tornieri tornieri* (Nieden, 1923) as defined and separated from other relevant species by Cogger (2014). Both subspecies are separated from all other congeners by the fact the dorsum is usually smooth, the lateral head stripe is well defined, particularly before the eye, thigh markings are strongly reticulated and the stripe along the edge of tarsus is uninterrupted.

However *Q. tornieri serventyi* subsp. nov. is readily separated from that taxon (type locality of Port Essington, NT), by the following suite of characters:

Breeding adult males have a slight yellowish tinge on the whitish lips and groin, versus strong deep yellow in *Q. tornieri tornieri*. In both sexes of adult *Q. tornieri serventyi* subsp. nov. the upper hind limb are strongly peppered with grey or with faint darker markings or blotches, versus not so in *Q. tornieri tornieri*.

The (hind) toe pads of *Q. tornieri tornieri* are slightly larger than the lateral edges of the penultimate phalanges, versus not so in *Q. tornieri serventyi* subsp. nov..

The tadpoles of both subspecies also differ.

Metamorphosing tadpoles of *Q. tornieri tornieri* have a large amount of blackish pigment in blotches on the outer edges and inner areas of the fins, versus only small amounts on the edges and inner areas in *Q. tornieri serventyi* subsp. nov..

Images of both *Q. tornieri serventyi* subsp. nov. and *Q. tornieri tornieri* in life and their tadpoles can be seen on pages 321-324 of Anstis 2013.

**Distribution:** *Q. tornieri serventyi* subsp. nov. is found in the Kimberley District of Western Australia, extending to the Daly River region of the Northern Territory. *Q. tornieri tornieri* is found throughout the rest of the range of the species, this being the top end of the Northern Territory and the Gulf of Carpentaria into far north-west Queensland.

**Etymology:** The subspecies is named in honour of Vincent Serventy, born 6 January 1916, and died 8 September 2007, who authored many popular books about Australian wildlife and who was regarded as an avid conservationist in his active years. He lived in Western Australia and New South Wales.

**SAGUNURINI TRIBE NOV.**

**SAGANURA WELLS AND WELLINGTON, 1985**

**Type species:** *Hyla burrowsae* Scott, 1942.

**Diagnosis:** Living frogs in the genus *Saganura* Wells and Wellington, 1985 are all readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: It is a uniform light green above, commonly with scattered light fawn spots, or dark brown with irregular bright green patches and light brown flecks.

There is a narrow, black canthal streak, widening behind the eye to form a dark broad band extending almost to the groin; this dark band often broken up by groups of

irregular white blotches and/or spots. There is an obscure, narrow light green zone along the supratympanic ridge. There is no pale line along the posterior edge of the upper jaw. Venter is pinkish-white, throat darker with a greyish tinge. Groin and hind side of thighs is a uniform pale brown. Dorsal surface smooth or with scattered small tubercles. Chin smooth and other lower surfaces are granular. Vomerine teeth are between or behind the choanae, with hind edge of vomerine teeth always further back than the choanae. Prepectoral fold present. Finger and toe discs large. Fingers with conspicuous basal webbing, being nearly a third webbed, toes are about three quarters webbed. There is a large inner and small outer metatarsal tubercle. Tympanum is distinct. Second finger is much longer than first; when pressed together, the tip of the first finger reaches no further than the base of the disc of the second finger. Heel of adpressed hindlimb reaches to the eye or beyond. Adults attain about 55 mm in total length (adapted and modified from Cogger 2014).

According to Duellman *et al.* (2016), the species in this genus diverged from their nearest living relatives 27.6 MYA.

**Distribution:** South-west Tasmania, including highlands and coast.

**Content:** *Sagunura burrowsae* (Scott, 1942) (monotypic).

#### WOWRANAINI TRIBE NOV.

#### WOWRANA GEN. NOV.

**LSIDurn:lsid:zoobank.org:act:9F436614-24BC-49DE-8AFB-FDFB8D8B5671**

**Type species:** *Litoria dux* Richards and Oliver, 2006.

**Diagnosis:** Frogs in the genus *Wowrana gen. nov.* in the nominate subgenus are readily separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following unique suite of characters:

Large size (adult males over 60 mm); uniform bright green dorsal colouration in life (blue in preservative). Fully webbed hands. No prominent and enlarged parotoid glands, no white labial stripe, SVL not over 85 mm and a call consisting of a single, relatively short (0.206-0.379 second) grunt with an unusual clumped pattern of pulses. The single species within the subgenus *Parawowrana subgen. nov.* is defined as above, except that it instead is slightly smaller than the preceding species (adult males 50-55 mm), has a white labial stripe (in common with the much larger species in *Sandyrana* Wells and Wellington, 1985, that grow to in excess of 100 mm in body length) and has a characteristically longer call than those in the nominate subgenus (0.69-0.9 second) (Richards *et al.* 2006).

Duellman *et al.* (2016) found that the species in the genus *Wowrana gen. nov.* diverged from their nearest living relatives 26.5 MYA, being species within *Sandyrana* Wells and Wellington, 1985. The type form of *Nyctimystes* Stejneger, 1916, namely *Nyctimantis papua* Boulenger, 1897 diverged from this genus 36.1 MYA, making genus level assignment of *Wowrana gen. nov.* an obvious choice.

**Distribution:** All species within *Wowrana gen. nov.* are confined to forested locations on the island of New Guinea and in general most species are currently known

from relatively few specimens.

**Etymology:** The frogs in this genus are absolutely spectacular. They are big, bold and bright and herpetologists who set eyes on them invariably exclaim "Wow!". Hence the simple and easy to remember genus name "Wowrana".

**Content:** *Wowrana dux* (Richards and Oliver, 2006) (type species); *W. graminea* (Boulenger, 1905); *W. hunti* (Richards, Oliver, Dahl and Tjaturadi. 2006); *W. pallidofemora* (Kraus, 2018); *W. pterodactyla* (Oliver, Richards and Donnellan, 2018); *W. nullicedens* (Kraus, 2018); *W. sauroni* (Richards and Oliver, 2006).

#### PARAWOWRANA SUBGEN. NOV.

**LSIDurn:lsid:zoobank.org:act:D130450F-D9D5-471B-B7A1-212F2774E134**

**Type species:** *Litoria hunti* Richards, Oliver, Dahl, and Tjaturadi, 2006.

**Diagnosis:** Frogs in the genus *Wowrana gen. nov.* in the nominate subgenus are readily separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following unique suite of characters:

Large size (adult males over 60 mm); uniform bright green dorsal colouration in life (blue in preservative). Fully webbed hands. No prominent and enlarged parotoid glands, no white labial stripe, SVL not over 85 mm and a call consisting of a single, relatively short (0.206-0.379 second) grunt with an unusual clumped pattern of pulses. The single species within the subgenus *Parawowrana subgen. nov.* is defined as above, except that it instead is slightly smaller than the preceding species (adult males 50-55 mm), has a white labial stripe (in common with the much larger species in *Sandyrana* Wells and Wellington, 1985, that grow to in excess of 100 mm in body length) and has a characteristically longer call than those in the nominate subgenus (0.69-0.9 second) (Richards *et al.* 2006).

Duellman *et al.* (2016) found that the species in the genus *Wowrana gen. nov.* diverged from their nearest living relatives 26.5 MYA, being species within *Sandyrana* Wells and Wellington, 1985. The type form of *Nyctimystes* Stejneger, 1916, namely *Nyctimantis papua* Boulenger, 1897 diverged from this genus 36.1 MYA, making genus level assignment of *Wowrana gen. nov.* an obvious choice.

**Distribution:** The sole species currently placed within the subgenus *Parawowrana subgen. nov.* is known only from the type locality (Utai, Sanduan Province, northern Papua New Guinea).

**Etymology:** "Para" in Latin, means "not quite" or "almost" and as this frog is not quite the same as nominate *Wowrana gen. nov.* the subgenus name makes sense.

**Content:** *Wowrana (Parawowrana) hunti* (Richards, Oliver, Dahl and Tjaturadi. 2006) (monotypic).

#### SANDYRANINA SUBTRIBE NOV.

#### SANDYRANA WELLS AND WELLINGTON, 1985

**Type species:** *Hyla infrafrenata* Günther, 1867.

**Diagnosis:** Frogs in the genus *Sandyrana* Wells and Wellington, 1985 are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: Large frogs, which as adults

can grow to in excess of 100 mm. Dorsal colour of adults in life is usually uniform green above in normal circumstances, but may otherwise range from fawn, through green, purplish or even blue. Fingers with conspicuous webbing, reaching at least as far as the base of the penultimate phalanx of the fourth finger. Hind edge of forearm is smooth, or with at most a few low, discontinuous tubercles. Hind edge of feet is smooth. Hind side of thighs is more or less uniform, without black and yellow marbling, spots or blotches. Webbing reaching no further than the base of the penultimate phalanx of the fourth finger. A distinctive white or pink stripe along the edge of the lower jaw, extending back to the level of the forelimb and not in a configuration of blobs, spots or random markings otherwise tending to be in a linear manner. Vomerine teeth present.

Duellman *et al.* (2016) found that the species within the genus *Sandyrana* diverged from their nearest living relatives 26.5 MYA.

**Distribution:** Throughout New Guinea and west as far as Halmahera Island as well as New Britain, New Ireland, Aru Islands and north-east Queensland, Australia.

**Content:** *Sandyrana infrafnata* (Günther, 1867) (type species); *S. militarius* (Ramsay, 1878); *S. multicolor* (Günther, 2004); *S. purpureolatus* (Oliver, Richards, Tjaturadi, and Iskandar, 2007); *S. sanguinolenta* (Van Kampen, 1909).

#### TRIBE AND SUBTRIBE DESCRIPTIONS

##### ADELYNHOSERHYLEINI TRIBE NOV.

LSIDurn:lsid:zoobank.org:act:D4FD8FB3-7C85-423F-8ACB-3017A21AAE90

**Type genus:** *Adelynhoserhylea gen. nov.*

**Diagnosis:** The tribe Adelynhoserhyleini tribe nov. is best defined and diagnosed by defining the four component genera separately.

Species of tree frogs within the genus *Adelynhoserhylea gen. nov.* are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: Vomerine teeth present. Fingers with conspicuous webbing, reaching at least as far as the base of the penultimate phalanx of the fourth finger. A conspicuous serrated ridge along the forearm and another along the hind edge of the foot.

The morphologically similar genus *Jackyhoserhylea gen. nov.* with species confined to the New Guinea subregion is readily separated from *Adelynhoserhylea gen. nov.* as defined above, by having dermal fringes on limbs poorly defined, fingers only part-webbed and they do not have a well-developed crenulated fold along the outer edge of the fore and hind-limbs, this always being either reduced or absent.

The monotypic species comprising the entirety of the genus *Leucodigirana gen. nov.* is readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: Brown to golden brown across most of the dorsum, the body and limbs with numerous scattered dark or light brown spots and blotches, among which are usually smaller pale brown or cream spots and blotches. Venter is white and lower

flanks greyish-white, often with brown under the throat. Axilla and groin are flesh coloured. Hind side of thighs is mottled with pale and dark brown. Skin is smooth to leathery above, and granular on the venter. Vomerine teeth are present and between the choanae. There is no pectoral fold.

There is no enlarged tubercle or crenulated ridge along the hind edge of the forearm; Finger and toe discs are large. Fingers lack webbing and toes are nearly completely webbed, with webbing reaching the base of the penultimate phalanx of the fourth toe.

There is a prominent inner metatarsal tubercle and no outer one. Heel of adpressed hind limb goes well beyond the eye. Tympanum is large and obvious, with a well-developed supratympanic fold. Above this, there is a semidistinct beige coloured stripe, extending to form broken blotches along a line running along the margin of the upper flank. This is not however in the form of a distinct, well marked whitish stripe.

There is also no pale line along the posterior edge of the upper jaw, although this region of the head is usually a light bluey, purplish grey in colour. Second finger is much longer than the first, the tip of the first finger goes no further than the base of the disc of the second finger when they are pressed together.

Males get to 80 mm in body length and females 100 mm. The genus *Euscelis* Fitzinger, 1843 is separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: Colouration is a pale fawn to dark brown above, usually immaculate, or with darker markings, ranging from flecks to blotches and including one that forms a transverse bar between the eyes; the tympanum has a pale rim; dorsal surface generally smooth or sometimes leathery, with one species having slight warts; webbing may reach the disc of the fifth toe, but usually not, and generally extending no more than halfway along the penultimate phalanx; discs on fingers and toes are small and inconspicuous and barely wider than digits; fingers unwebbed; second finger slightly longer than first; anterior head stripe is present, usually narrow but always continuous, but sometimes ill-defined, not interrupted by a vertical bar in front of the eye; posterior head stripe is narrow, no more than half as wide as and not enclosing the tympanum; there is a moderate inner metatarsal tubercle and a small outer metatarsal tubercle is present; vomerine teeth present; groin is yellow and heavily blotched with black. Whitish ventrally with granular skin. No dorsolateral skin fold.

**Distribution:** Most species are confined to New Guinea and Cape York, Australia, but one genus *Euscelis* Fitzinger, 1843 occurs in the wetter parts of the east coast of south-east Australia, extending, from Victoria, through New South Wales and south east Queensland and then to the wet tropics of north-east Queensland.

**Content:** *Adelynhoserhylea gen. nov.* (type genus); *Euscelis* Fitzinger, 1843; *Jackyhoserhylea gen. nov.*; *Leucodigirana gen. nov.*

**LEUCODIGIRANINA SUBTRIBE NOV.**

**LSIDurn:lsid:zoobank.org:act:41D58607-4C02-45E2-897E-9D87851B9004**

**Type genus:** *Leucodigirana gen. nov.*

**Diagnosis:** The subtribe *Leucodigirana* subtribe nov. is best defined and diagnosed by defining the two component genera separately.

The monotypic species comprising the entirety of the genus *Leucodigirana gen. nov.* is readily separated from all other Australasian Tree Frogs (*Pelodyadidae*) by the following unique suite of characters: Brown to golden brown across most of the dorsum, the body and limbs with numerous scattered dark or light brown spots and blotches, among which are usually smaller pale brown or cream spots and blotches. Venter is white and lower flanks greyish-white, often with brown under the throat. Axilla and groin are flesh coloured. Hind side of thighs is mottled with pale and dark brown. Skin is smooth to leathery above, and granular on the venter. Vomerine teeth are present and between the choanae. There is no pectoral fold. There is no enlarged tubercle or crenulated ridge along the hind edge of the forearm; Finger and toe discs are large. Fingers lack webbing and toes are nearly completely webbed, with webbing reaching the base of the penultimate phalanx of the fourth toe. There is a prominent inner metatarsal tubercle and no outer one. Heel of adpressed hind limb goes well beyond the eye. Tympanum is large and obvious, with a well-developed supratympanic fold. Above this, there is a semidistinct beige coloured stripe, extending to form broken blotches along a line running along the margin of the upper flank. This is not however in the form of a distinct, well marked whitish stripe. There is also no pale line along the posterior edge of the upper jaw, although this region of the head is usually a light bluey, purplish grey in colour. Second finger is much longer than the first, the tip of the first finger goes no further than the base of the disc of the second finger when they are pressed together. Males get to 80 mm in body length and females 100 mm.

The genus *Euscelis* Fitzinger, 1843 is separated from all other Australasian Tree Frogs (*Pelodyadidae*) by the following unique suite of characters: Colouration is a pale fawn to dark brown above, usually immaculate, or with darker markings, ranging from flecks to blotches and including one that forms a transverse bar between the eyes; the tympanum has a pale rim; dorsal surface generally smooth or sometimes leathery, with one species having slight warts; webbing may reach the disc of the fifth toe, but usually not, and generally extending no more than halfway along the penultimate phalanx; discs on fingers and toes are small and inconspicuous and barely wider than digits; fingers unwebbed; second finger slightly longer than first; anterior head stripe is present, usually narrow but always continuous, but sometimes ill-defined, not interrupted by a vertical bar in front of the eye; posterior head stripe is narrow, no more than half as wide as and not enclosing the tympanum; there is a moderate inner metatarsal tubercle and a small outer metatarsal tubercle is present; vomerine teeth present; groin is yellow and heavily blotched with black. Whitish ventrally with granular skin. No dorsolateral skin fold.

**Distribution:** All species are confined to Australia or potentially southern New Guinea with the genus occurring in the wetter parts of the east coast of south-east Australia, extending, from Victoria, through New South Wales and south east Queensland and then to the wet tropics of north-east Queensland.

**Content:** *Leucodigirana gen. nov.* (type genus); *Euscelis* Fitzinger, 1843.

**COGGERDONIANI TRIBE NOV.**

**LSIDurn:lsid:zoobank.org:act:342B883B-E1C6-4D69-8019-3096C62A9FEE**

**Type genus:** *Coggerdonia* Wells and Wellington, 1985.

**Diagnosis:** The tribe *Coggerdoniini* tribe nov. is monotypic for the genus *Coggerdonia* Wells and Wellington, 1985. Living frogs in the genus *Coggerdonia* Wells and Wellington, 1985 are all readily separated from all other Australasian Tree Frogs (*Pelodyadidae*) by the following unique suite of characters: A slender frog being light brown, fawn or light green above, with dark brown patches or flecks arranged in distinct longitudinal lines. There is a dark brown to black stripe running from the tip of the snout below the canthus to the eye, somewhat triangular in shape as it widens towards the eye and then remaining broad as it extends across the tympanum and beyond along the flank to the rear of the body.

This dark coloured stripe is bordered on the lower edge with a well-defined line of white, also running from the upper lip. Sometimes this stripe will break up into a series of adjacent spots. The hind parts of the thighs are dark brown with orange or reddish spots. Belly is whitish to light brown. Skin is smooth above and coarsely granular below, except under the throat, which is also smooth. Vomerine teeth are prominent between and behind the choanae. There is a distinct pectoral fold. Finger and toe discs are small and not much wider than the digits. Fingers have basal webbing only and toes are about three quarters webbed. Inner metatarsal tubercle is large and there is no outer one. Tympanum is large and distinct and the second finger is longer than the first. Adult size 50 60 mm (derived from Cogger, 2014).

According to Duellman *et al.* (2016), the single living member of this genus diverged from its nearest living relatives 30.8 MYA, supporting tribe level classification for this (currently) monotypic genus.

**Distribution:** Wetter parts of south-western Western Australia, Australia.

**Content:** *Coggerdonia* Wells and Wellington, 1985 (monotypic).

**CYCLORANININI TRIBE NOV.**

**LSIDurn:lsid:zoobank.org:act:2A17B806-9DFA-4BC0-B4BA-7E2231EC4756**

**Type genus:** *Cyclorana* Steindachner, 1867.

**Diagnosis:** The tribe *Cycloraninini* tribe nov. is best defined by separately diagnosing each of the eight component genera.

Species within the genera *Cyclorana*, *Mitrololysis* and *Neophractops* are all readily separated from all other Australasian Tree Frogs (*Pelodyadidae*) by the following unique suite of characters:

They are heavily built, often rotund, frogs; Inner metatarsal tubercle is shovel-shaped; no fronto-parietal



foramen in adults; vomerine teeth are present and largely between the choanae; tongue large and oval-shaped; Pupil horizontal; tympanum distinct in all but one species group (*Invisibiliaauris subgen. nov.*); phlanges are simple and tips with tiny discs or none at all; first finger opposed to remainder and toes are webbed.

The genus *Cyclorana* is readily separated from the genera *Mitrolysis* and *Neophractops* by having a marked, straight dorsolateral skin fold and a very stout build; toes one third webbed; hind side of thighs lacking white spots.

The genus *Neophractops* is readily separated from the genera *Mitrolysis* and *Cyclorana* by having no definite straight dorsolateral skin fold and toes that are three quarters webbed.

The genus *Mitrolysis* is separated from the genera *Cyclorana* and *Neophractops* by one or other of:

1/ Having no definite straight dorsolateral skin fold and toes that are less than half webbed, or:

2/ Having a marked, straight dorsolateral skin fold and a very slender build; toes half webbed; hind side of thighs has numerous white spots.

The subgenus *Paramitrolysis subgen. nov.* with the type species of *Cyclorana verrucosa* Tyler and Martin, 1977 is readily separated from the nominate subgenus (of *Mitrolysis*) by having the following unique combination of characters: A blunt snout with nostril distinctly nearer to the tip than to the eye; a blackish stripe on the side of the head from the snout through the eye and distinct tympanum to the forelimb; a dorsum with numerous skin folds or large tubercles, with either: 1/ Many being white-tipped, highlighted by being surrounded by dark blackish pigment as well as a dorsal colouration dominated by brilliant dark lime green or large patches of brilliant dark lime green, or 2/ A dorsum with numerous skin folds or large tubercles not marked in any way and a dorsal colouration of beige, overlain with scattered and faded light olive green patches or blotches in irregular fashion.

The subgenus *Invisibiliaauris subgen. nov.* with the type species *Cyclorana cryptotis* Tyler and Martin, 1977 is readily separated from the other two subgenera by having a hidden ear, being covered by skin, in stark contrast to the other subgenera which have an obvious and exposed tympanum.

The genus *Crottyanura gen. nov.* consists of two species, namely *C. dahlia* (Boulenger, 1896), with a type locality of Daly River, Northern Territory and found in the general region of the type locality, being the western half of the top end of the Northern Territory and into immediately adjacent north-west Western Australia, as well as the newly named species *Crottyanura crottyi sp. nov.* from the eastern side of the Gulf of Carpentaria and the western side of Cape York in Queensland.

Both species are readily separated from other Australasian Tree Frogs (Pelodyadidae) by the following diagnosis.

*Ranoidea* Tschudi, 1838 as defined herein includes only the Bell Frog group of species, excluding the species associated with the *Chirodryas raniformis* Keferstein, 1867 species group, herein placed in the genus *Chirodryas* and the tropical species *Chiroleptes dahlia* Boulenger, 1896 herein placed in the new genus *Crottyanura gen. nov.*

All species within *Ranoidea*, *Chirodryas* and *Crottyanura gen. nov.* as defined herein, while morphologically similar, are sufficiently divergent from one another to warrant being treated as separate genera.

All species within the genera *Ranoidea*, *Chirodryas* and *Crottyanura gen. nov.* are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following suite of characters:

Vomerine teeth are present; fingers are free or webbed only at the base; first finger is longer than, equal to or only slightly shorter than the second finger; no outer metatarsal tubercle.

The genera *Ranoidea* and *Chirodryas* are separated from the genus *Crottyanura gen. nov.* by having flanks that are strongly granular below a distinct, glandular dorso-lateral skin fold with densely packed, large, rounded, usually pale coloured granules, contrasting with the smooth tubercular skin on the back above the skin fold.

In contrast *Crottyanura gen. nov.* has flanks that are smooth or with a few scattered granules, not contrasting with the skin on the back.

*Ranoidea* species are readily separated from species within the genus *Chirodryas* by having either a smooth dorsum with few if any rounded warts or tubercles, or if present in any number or size, are arranged in regular longitudinal rows near the vertebral line.

By contrast *Chirodryas* species have large warts on the back that are irregularly scattered and not configured in regular longitudinal rows.

The two subgenera within *Ranoidea* are separated as follows: Subgenus *Ranoidea* has a generally smooth dorsum with at most a few scattered, low tubercles. By contrast subgenus *Sandgroperanura subgen. nov.* has obvious flat warts on the back that are arranged in regular longitudinal rows near the vertebral line.

The build of *Crottyanura gen. nov.* while solid, is slender when compared to both *Ranoidea* and *Chirodryas*. The species in *Crottyanura gen. nov.* are further diagnosed by being olive green with brownish tinge above and a distinctive light mid-vertebral line (in *C. dahlia* but not often in *C. crottyi sp. nov.*); having the hind side of the thighs mottled, marbled or spotted with white (in *C. dahlia* but not in *C. crottyi sp. nov.*); a finely granular dorsum; smooth white-coloured venter; no dorsolateral skin fold; fully webbed toes; no outer metatarsal tubercle and inner metatarsal tubercle is not shovel-shaped.

All species within the genera *Ranoidea*, *Chirodryas* and *Crottyanura gen. nov.* are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following suite of characters:

Vomerine teeth are present; fingers are free or webbed only at the base; first finger is longer than, equal to or only slightly shorter than the second finger; no outer metatarsal tubercle.

The genera *Ranoidea* and *Chirodryas* are separated from the genus *Crottyanura gen. nov.* by having flanks that are strongly granular below a distinct, glandular dorso-lateral skin fold with densely packed, large, rounded, usually pale coloured granules, contrasting with the smooth tubercular skin on the back above the skin fold. In contrast *Crottyanura gen. nov.* has flanks that are smooth or with a few scattered granules, not contrasting with the

skin on the back.

*Ranoidea* species are readily separated from species within the genus *Chirodryas* by having either a smooth dorsum with few if any rounded warts or tubercles, or if present in any number or size, are arranged in regular longitudinal rows near the vertebral line.

By contrast *Chirodryas* species have large warts on the back that are irregularly scattered and not configured in regular longitudinal rows.

The two subgenera within *Ranoidea* are separated as follows: Subgenus *Ranoidea* has a generally smooth dorsum with at most a few scattered, low tubercles.

By contrast subgenus *Sandgroperanura subgen. nov.* has obvious flat warts on the back that are arranged in regular longitudinal rows near the vertebral line.

*Gedyerana gen. nov.* is readily separated from all other Australasian Tree Frogs (Pelodyadidae) by being the only Australasian Tree Frog species having a lower eyelid with a characteristic reticulatum or palpebral venation of fine, pigmented lines and a horizontally elliptical pupil.

All other species within this region with a lower eyelid with a characteristic reticulatum or palpebral venation of fine, pigmented lines have a vertically elliptical pupil, including species within *Nyctimystes* Stejneger, 1916 *sensu lato*, as defined by other authors including Cogger (2014) at page 197 under the heading "genus *Nyctimystes* Stejneger, 1916".

Both species within the genus *Gedyerana gen. nov.* would be diagnosed as either "*Litoria dayi*" in Anstis (2013) or "*Nyctimystes dayi*" in Cogger (2014).

These frogs have large protruding eyes, with a dark iris, a broad head and a slender body.

Males get to about 45 mm in body length, but females are considerably larger and get to about 60 mm in length. Their tadpoles have large sucker mouths.

Dorsal colour ranges from grey, brown, yellow, orange or red, with or without mottling, spots or flecks and with or without discrete white or cream blotches or ocelli on the upper surfaces.

Snout is moderately rounded or acuminate (tending to be pointed) and the genus occurs in rainforest stream habitats.

The genus *Mosleyia* is readily separated from all other Australasian Tree Frogs (Pelodyadidae) by one or other of the two unique suites of characters:

1/ Vomerine teeth prominent and largely between the choanae. No pectoral fold; A series of small enlarged tubercles along the hind edge of the forearm forming a low but distinct crenulated ridge; fingers with strong basal webbing; toes nearly fully webbed; a prominent inner metatarsal tubercle and a small outer one. Heel of adpressed hind limb reaches to eye or beyond; first finger much smaller and shorter than the second and when pressed together the tip of the first finger reaches no further than the base of the disc of the second finger; tympanum indistinct; no pale stripe along the supratympanic ridge or along posterior edge of upper jaw; adult snout-vent length 65 mm; dorsal pattern is mostly grey or dull green, almost blackish and consists of a series of relatively narrow dark lines and spots forming

a fine, continuous reticulum over the back, head and limbs. The flanks have a bluish metal sheen. White below, commonly with brown on the throat; axilla and groin flesh coloured; hind side of thighs are dark brown. Skin leathery, finely granular, or with numerous small scattered warts. Granular below (*M. nannotis* (Andersson, 1916), *M. cottoni sp. nov.* *M. lorica* (Davies and McDonald, 1979)) (noinate subgenus), or:

2/ Vomerine teeth conspicuous in two rows on a line with the hind edge of the choanae; with or without pectoral fold; fingers with conspicuous webbing, reaching at least as far as the base of the penultimate phalanx of the fourth finger; hind edge of forearm is smooth or with at most a few, low, discontinuous tubercles; hind edge of foot is smooth; hind side of thighs more or less uniform and without black and yellow markings or marbling; colour brown to blackish above, never green, with or without a broad, darker vertebral patch and other contrasting markings; a dark dorsal patch, if present, is inconspicuous and commencing from a line joining the centre of each eye; tympanum covered by skin (adult size is 35-50 mm body length) (*M. michaelsmythi sp. nov.*; *M. nyakalensis* (Liem, 1974); *M. pilloti sp. nov.*; *M. rheocola* (Liem, 1974)) (subgenus *Amnisrana subgen. nov.*).

**Distribution:** Most parts of continental Australia including the tropics and the arid zone.

**Content:** *Cyclorana* Steindachner, 1867 (type genus); *Chirodryas* Keferstein, 1867; *Crottyanura gen. nov.*; *Gedyerana gen. nov.*; *Mitrolysis* Cope, 1889; *Mosleyia* Wells and Wellington, 1985; *Neophractops* Wells and Wellington, 1985; *Ranoidea* Tschudi, 1838.

#### **RANOIDEINA SUBTRIBE NOV.**

**LSIDurn:lsid:zoobank.org:act:2CEAF103-5F6F-4B55-993B-7026C0498838**

**Type genus:** *Ranoidea* Tschudi, 1838.

**Diagnosis:** The subtribe Ranoideina subtribe nov. (comprising the two genera *Ranoidea* Tschudi, 1838 (type genus) and *Chirodryas* Keferstein, 1867) is best defined by diagnosing and defining the two component genera. *Ranoidea* Tschudi, 1838 as defined herein includes only the Bell Frog group of species, excluding the species associated with the *Chirodryas raniformis* Keferstein, 1867 species group, herein placed in the genus *Chirodryas* and the tropical species *Chiroleptes dahlii* Boulenger, 1896 herein placed in the new genus *Crottyanura gen. nov.*

All species within *Ranoidea*, *Chirodryas* and *Crottyanura gen. nov.* as defined herein, while morphologically similar, are sufficiently divergent from one another to warrant being treated as separate genera. *Crottyanura gen. nov.* is morphologically convergent, but is in fact placed in the nominate subtribe of Cycloranina subtribe nov. (formally defined in this paper by elimination of other subtribes) instead of the subtribe Ranoideina subtribe nov..

All species within the genera *Ranoidea*, *Chirodryas* and *Crottyanura gen. nov.* are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following suite of characters:

Vomerine teeth are present; fingers are free or webbed only at the base; first finger is longer than, equal to or only slightly shorter than the second finger; no outer metatarsal tubercle.

The genera *Ranoidea* and *Chirodryas* are separated from the genus *Crottyanura* *gen. nov.* by having flanks that are strongly granular below a distinct, glandular dorso-lateral skin fold with densely packed, large, rounded, usually pale coloured granules, contrasting with the smooth tubercular skin on the back above the skin fold.

In contrast *Crottyanura* *gen. nov.* has flanks that are smooth or with a few scattered granules, not contrasting with the skin on the back.

*Ranoidea* species are readily separated from species within the genus *Chirodryas* by having either a smooth dorsum with few if any rounded warts or tubercles, or if present in any number or size, are arranged in regular longitudinal rows near the vertebral line.

By contrast *Chirodryas* species have large warts on the back that are irregularly scattered and not configured in regular longitudinal rows.

The two subgenera within *Ranoidea* are separated as follows: Subgenus *Ranoidea* has a generally smooth dorsum with at most a few scattered, low tubercles. By contrast subgenus *Sandgroperanura* *subgen. nov.* has obvious flat warts on the back that are arranged in regular longitudinal rows near the vertebral line.

The build of *Crottyanura* *gen. nov.* while solid, is slender when compared to both *Ranoidea* and *Chirodryas*. The species in *Crottyanura* *gen. nov.* are further diagnosed by being olive green with brownish tinge above and a distinctive light mid-vertebral line (in *C. dahlii* but not often in *C. crottyi* *sp. nov.*); having the hind side of the thighs mottled, marbled or spotted with white (in *C. dahlii* but not in *C. crottyi* *sp. nov.*); a finely granular dorsum; smooth white-coloured venter; no dorsolateral skin fold; fully webbed toes; no outer metatarsal tubercle and inner metatarsal tubercle is not shovel-shaped.

**Distribution:** Wetter parts of south-east and south-west Australia.

**Content:** *Ranoidea* Tschudi, 1838 (type genus); *Chirodryas* Keferstein, 1867.

#### GEDYERANINA SUBTRIBE NOV.

**LSIDurn:lsid:zoobank.org:act:032114B1-C75A-4721-B3D0-A56EF6704859**

**Type genus:** *Gedyerana* *gen. nov.*

**Diagnosis:** The subtribe Gedyeranina subtribe nov. is best defined by diagnosing and defining the two component genera.

*Gedyerana* *gen. nov.* is readily separated from all other Australasian Tree Frogs (Pelodyadidae) by being the only Australasian Tree Frog species having a lower eyelid with a characteristic reticulatum or palpebral venation of fine, pigmented lines and a horizontally elliptical pupil.

All other species within this region with a lower eyelid with a characteristic reticulatum or palpebral venation of fine, pigmented lines have a vertically elliptical pupil, including species within *Nyctimystes* Stejneger, 1916 *sensu lato*, as defined by other authors including Cogger (2014) at page 197 under the heading "genus *Nyctimystes* Stejneger, 1916".

Both species within the genus *Gedyerana* *gen. nov.* would be diagnosed as either "*Litoria dayi*" in Anstis (2013) or "*Nyctimystes dayi*" in Cogger (2014).

These frogs have large protruding eyes, with a dark iris, a broad head and a slender body. Males get to about 45 mm in body length, but females are considerably larger and get to about 60 mm in length. Their tadpoles have large sucker mouths. Dorsal colour ranges from grey, brown, yellow, orange or red, with or without mottling, spots or flecks and with or without discrete white or cream blotches or ocelli on the upper surfaces. Snout is moderately rounded or acuminate (tending to be pointed) and the genus occurs in rainforest stream habitats.

The genus *Mosleyia* is readily separated from all other Australasian Tree Frogs (Pelodyadidae) by one or other of the two unique suites of characters:

1/ Vomerine teeth prominent and largely between the choanae. No pectoral fold; A series of small enlarged tubercles along the hind edge of the forearm forming a low but distinct crenulated ridge; fingers with strong basal webbing; toes nearly fully webbed; a prominent inner metatarsal tubercle and a small outer one. Heel of adpressed hind limb reaches to eye or beyond; first finger much smaller and shorter than the second and when pressed together the tip of the first finger reaches no further than the base of the disc of the second finger; tympanum indistinct; no pale stripe along the supratympanic ridge or along posterior edge of upper jaw; adult snout-vent length 65 mm; dorsal pattern is mostly grey or dull green, almost blackish and consists of a series of relatively narrow dark lines and spots forming a fine, continuous reticulum over the back, head and limbs. The flanks have a bluish metal sheen. White below, commonly with brown on the throat; axilla and groin flesh coloured; hind side of thighs are dark brown. Skin leathery, finely granular, or with numerous small scattered warts. Granular below (*M. nannotis* (Andersson, 1916), *M. cottoni* *sp. nov.* *M. lorica* (Davies and McDonald, 1979)) (nominated subgenus), or:

2/ Vomerine teeth conspicuous in two rows on a line with the hind edge of the choanae; with or without pectoral fold; fingers with conspicuous webbing, reaching at least as far as the base of the penultimate phalanx of the fourth finger; hind edge of forearm is smooth or with at most a few, low, discontinuous tubercles; hind edge of foot is smooth; hind side of thighs more or less uniform and without black and yellow markings or marbling; colour brown to blackish above, never green, with or without a broad, darker vertebral patch and other contrasting markings; a dark dorsal patch, if present, is inconspicuous and commencing from a line joining the centre of each eye; tympanum covered by skin (adult size is 35-50 mm body length) (*M. michaelsmythi* *sp. nov.*; *M. nyakalensis* (Liem, 1974); *M. pilloti* *sp. nov.*; *M. rheocola* (Liem, 1974)) (subgenus *Amnistrana* *subgen. nov.*).

**Distribution:** North-east Australia.

**Content:** *Gedyerana* *gen. nov.* (type genus); *Mosleyia* Wells and Wellington, 1985.

#### DARANINANURINI TRIBE NOV.

**LSIDurn:lsid:zoobank.org:act:E6C1197B-B538-443D-996F-9AA74B74A1BE**

**Type genus:** *Daraninanura* *gen. nov.*

**Diagnosis:** The tribe Daraninanurini tribe nov. is best defined by diagnosing and defining the single genus.

The genus *Daraninanura* *gen. nov.* monotypic for the type

species *D. brevipalmata* (Tyler, Martin and Watson, 1972) is readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: Rich brown to chocolate brown above, occasionally with scattered small black flecks. There is a wide canthal stripe running from snout to eye, continuing past the eye as a wide black band, almost over-writing the standard (for frogs) sized tympanum, continuing to the flank and sometimes bordered above with white or yellow. The upper lip has a narrow white or yellow stripe, narrowly edged below with brown, which continues as a glandular stripe from the angle of the mouth to the base of the forearm. The lower flanks are yellowish with scattered black spots, flecks or peppering. Groin is green or blue green. There are no red or orange spots on the hind side of the thighs. There is a dark stripe along the front edge of the hindlimb. Venter is white to light yellow. Top of iris is silver to gold in colour. Skin is smooth to slightly leathery above and coarsely granular below. Snout is rounded in shape. Vomerine teeth are prominent between the choanae. There is no pectoral fold. Finger and toe discs are of medium size, fingers are unwebbed and toes about one third webbed. There is a prominent inner metatarsal tubercle and an indistinct small outer tubercle. The second finger is longer than the first, the first finger being so short that when pressed together with the second, it reaches no further than the base of the disc of the second.

Duellman *et al.* (2016) found the type and only species in the genus *Daraninanura gen. nov.* to have diverged from its nearest living relative 35.1 MYA, necessitating the transfer of the species *D. brevipalmata* (Tyler, Martin and Watson, 1972) to a new genus and also a monotypic tribe.

Photos of *Daraninanura brevipalmata* (Tyler, Martin and Watson, 1972), can be found in Cogger (2014) on page 153 (two images), Vanderduys (2012) on page 27, Eipper and Rowland (2018) on page 119 at top and Anstis (2013) on pages 156 (right side), 157 and 158.

**Distribution:** Known only from wet sclerophyll forests of the north coast of New South Wales, north from about Gosford and into the wetter parts of south-east Queensland, Australia.

**Content:** *Daraninanura gen. nov.* (monotypic).

#### FIACUMMINGANURINI TRIBE NOV.

**LSIDurn:lsid:zoobank.org:act:846EAAAC5-5DCD-4A61-969E-AA8CC9E2C3A8**

**Type genus:** *Fiacumminganura gen. nov.*

**Diagnosis:** The tribe Fiacumminganurini tribe nov. is best defined by diagnosing the two component genera.

The three morphologically similar species within *Fiacumminganurea gen. nov.* are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters:

A colouration that is grey to green above, with irregular darker mottling, marbling or flecks, the latter often forming irregular cross-bands on the limbs. Ventral surface white or yellow, or white becoming yellow towards the rear. Lower and concealed surface of limbs are yellowish.

Skin is somewhat leathery, with a few tiny whitish tubercles on the back becoming numerous on the sides.

Skin below is granular. Small but prominent vomerine teeth are located mostly behind the choanae. A pectoral fold is indistinct. Finger and toes discs are moderate, being only a little wider than the digits. Fingers with distinct basal webbing and the toes are fully webbed. There is a small but prominent inner metatarsal tubercle, no outer one. Tympanum is indistinct. Second finger is larger than the first; adult size to 45 mm in length.

The tadpole is free-swimming, elongated and flattened, and reaches a total length of 40 mm prior to metamorphosis. The body is dark brown to black above, with fine silver chromatophores extending onto the flanks. Darker spots may be present on the dorsal surface, while the ventral surface is darkly pigmented. The tail fin and muscle are covered with fine melanophores. The tail is moderately thick and has a rounded tip. The eyes are dorso-lateral, and the mouth is ventral.

The oral disc is large relative to closely-related species, and the oral papillae have a wide anterior gap. There are two rows of anterior labial teeth and three posterior rows (Hero *et al.* 1995; Anstis 2013).

In terms of morphologically similar and potentially sympatric species the warty back of *Fiacumminganurea gen. nov.* distinguishes species in this genus from the morphologically similar species *Dryopsophus nudidigita* (Copland, 1962) and its lack of a distinct tympanum distinguishes it from *Dryopsophus citropa* (Dümeril and Bibron, 1841).

Frogs in the genus *Dryopsophus* Fitzinger, 1843 as defined herein, are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters:

Vomerine teeth present and the hind edge is behind the choanae; fingers are free or only webbed at the base; the first finger is much shorter and smaller than the second and when pressed together the tip of the first finger reaches no further than the base of the disc of the second finger; the heel of the addressed hindlimb reaches to the eye or beyond; and one or other of the following three suites of characters:

1/ There is a narrow light line along at least the posterior edge of the upper jaw, from below the eye to the glandular region behind the angle of the mouth; the tympanum is distinct; the tympanic annulus is clearly visible (subgenus *Dryopsophus*), or:

2/ There is a narrow light line along at least the posterior edge of the upper jaw, from below the eye to the glandular region behind the angle of the mouth; the tympanum is indistinct; the tympanic annulus is indistinct, (subgenus *Leucolatera*), or:

3/ There is no light line along the posterior edge of the upper jaw; there is a narrow light green, white or gold stripe, sometimes with indefinite edges, but always bordered below with dark brown or black along the supra-tympanic ridge; fingers have barely a trace of webbing and the white or gold supratympanic streak is sharp edged (subgenus *Ausverdarana subgen. nov.*)

**Distribution:** Wetter parts of the east coast of Australia, mainly near the coast.

**Content:** *Fiacumminganurea gen. nov.* (type genus); *Dryopsophus* Fitzinger, 1843.

**DRYOPSOPHINA SUBTRIBE NOV.**

**LSIDurn:lsid:zoobank.org:act:A85B6140-C767-49C9-9543-A5BD1A806823**

**Type genus:** *Fiacumminganura gen. nov.*

**Diagnosis:** The subtribe Dryopsophina subtribe nov. is best defined by diagnosing the the component generus. Frogs in the genus *Dryopsophus* Fitzinger, 1843 as defined herein, are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters:

Vomerine teeth present and the hind edge is behind the choanae; fingers are free or only webbed at the base; the first finger is much shorter and smaller than the second and when pressed together the tip of the first finger reaches no further than the base of the disc of the second finger; the heel of the adpressed hindlimb reaches to the eye or beyond; and one or other of the following three suites of characters:

1/ There is a narrow light line along at least the posterior edge of the upper jaw, from below the eye to the glandular region behind the angle of the mouth; the tympanum is distinct; the tympanic annulus is clearly visible (subgenus *Dryopsophus*), or:

2/ There is a narrow light line along at least the posterior edge of the upper jaw, from below the eye to the glandular region behind the angle of the mouth; the tympanum is indistinct; the tympanic annulus is indistinct, (subgenus *Leucolatera*), or:

3/ There is no light line along the posterior edge of the upper jaw; there is a narrow light green, white or gold stripe, sometimes with indefinite edges, but always bordered below with dark brown or black along the supratympanic ridge; fingers have barely a trace of webbing and the white or gold supratympanic streak is sharp edged (subgenus *Ausverdarana subgen. nov.*).

**Distribution:** Wetter parts of the east coast of Australia, mainly near the coast.

**Content:** *Dryopsophus* Fitzinger, 1843 (monotypic).

**KUMANJAYIWALKERINI TRIBE NOV.**

**LSIDurn:lsid:zoobank.org:act:F7FA4EDF-1AC8-47B8-B0BA-0B54DE669D22**

**Type genus:** *Kumanjayiwalkerus gen. nov.*

**Diagnosis:** The tribe *Kumanjayiwalkerini tribe nov.* is best diagnosed by way of defining each of the six component genera.

The genera *Pengilleyia* Wells and Wellington, 1985 as defined within this paper, and *Kumanjayiwalkerus gen. nov.* are as a pair, both readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters:

Vomerine teeth present; fingers with conspicuous webbing reaching at least as far as the base of the penultimate phalanx of the fourth finger; hind edge of forearm is smooth, or with at most a few low, discontinuous tubercles; hind edge of foot is smooth; hind side of thighs with contrasting black and yellow bars or marbling, at least dorsally.

The genus *Pengilleyia* Wells and Wellington, 1985 is readily separated from the genus *Kumanjayiwalkerus gen. nov.* by having a back that is either very warty or moderately warty, versus virtually smooth or with well

scattered small pointed tubercles on an otherwise smooth body in *Kumanjayiwalkerus gen. nov.*

Furthermore species within *Pengilleyia* invariably have green spots, flecks or blotches on the back versus none in *Kumanjayiwalkerus gen. nov.*

*Kumanjayiwalkerus gen. nov.* has a strongly contrasting reddish-brown upper iris, with grey below, versus either weakly contrasting reddish-brown upper iris or the iris being grey all over in *Pengilleyia*.

The genera *Colleeneremia* Wells and Wellington, 1985 and *Audaxura gen. nov.* are all readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: Grey, brown or fawn above, usually with a broad, darker vertebral band, bounded on either side by a lighter brown zone. There is a blackish stripe along the side of the head, continuing behind the eye, over the base of the forelimb and along the side of the body almost to the groin. Dorsal surface of the body and limbs is flecked with dark brown or black and sometimes small to medium sized patches of darker pigment. Hind side of thighs brown with fine white spots. Groin is usually lemon-yellow. Ventral surface white, cream or yellowish.

Dorsal surface usually smooth or with numerous tiny granules above and coarsely granular below. Vomerine teeth almost entirely behind the choanae. Pectoral fold prominent. Finger and toe discs large. Toes about two thirds webbed. Inner metatarsal tubercle moderate and elongated, outer tubercle is small and rounded.

Tympanum is large, rounded and distinct. Second finger longer than first. Average adult size 35 mm in length.

Species within the genus *Colleeneremia* are separated from the morphologically similar species within the genus *Audaxura gen. nov.*, their closest living relatives as follows: *Colleeneremia* species always exhibits a very broad, dark stripe on the side of the head and body. This is not found in species within *Audaxura gen. nov.* Furthermore *Audaxura gen. nov.* have pale regular or irregular stripes or patches on the dorsal surface of the body not exhibited in the same configuration or form in any *Colleeneremia* species. *Colleeneremia* have shorter limbs than *Audaxura gen. nov.* The TL/S-V ratios provides a means of distinguishing the genera, this being 0.335-0.432 for *Colleeneremia* and 0.477-0.520 for *Audaxura gen. nov.*

Within *Colleeneremia* the two subgenera are separated as follows:

1/ Fingers with only rudimentary webbing, being the subgenus *Colleeneremia*, or:

2/ With conspicuous webbing on the fingers, reaching at least as far as the base of the penultimate phalanx of the fourth finger being the subgenus *Balatusrana subgen. nov.*

*Brevicusyla gen. nov.* includes two species from the Indonesian side of New Guinea that are morphologically similar to species within the genera *Colleeneremia* Wells and Wellington, 1985 and *Audaxura gen. nov.* as detailed above, but are readily separated from them in that adults of *Brevicusyla gen. nov.* while having a smooth dorsum on the body like the other two genera, instead has tubercles on the head, that is not seen in the other two genera.

Tadpoles of *Brevicusyla gen. nov.* have a long muscular tail, with narrow dorsal and ventral fins, versus a relatively short tail, with broad fins in species within *Audaxura gen. nov.* and *Colleeneremia*.

The nine known living species within the genus *Rawlinsonia* Wells and Wellington, 1985 (one formally described within this paper) are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: smallish frogs usually about 35 mm in body length. Fingers are free or only webbed at the base. First finger is much shorter and smaller than the second, when pressed together the tip of the first finger reaches no further than the base of the disc of the second finger. Hind edge of vomerine teeth are between the choanae. Usually one or a pair of semidistinct mid dorsal patches, darker than the ground colour, extending from a line joining the centre of the eyes; white stripe below eye, if present does not extend beyond the anterior edge of the base of the forelimb.

**Distribution:** Most parts of continental Australia and New Guinea.

**Content:** *Kumanjayiwalkerus gen. nov.* (type genus); *Pengilleya* Wells and Wellington, 1985; *Audaxura gen. nov.*; *Brevicusyla gen. nov.*; *Colleeneremia* Wells and Wellington, 1985; *Rawlinsonia* Wells and Wellington, 1985.

#### AUDAXURINA SUBTRIBE NOV.

**LSIDurn:lsid:zoobank.org:act:CF7BDF2F-FFF5-4B08-AAB9-DE506607B437**

**Type genus:** *Audaxura gen. nov.*

**Diagnosis:** The subtribe Audaxurina subtribe nov. comprises three genera, being *Audaxura gen. nov.*, *Brevicusyla gen. nov.* and *Colleeneremia* Wells and Wellington, 1985.

All species in this subtribe are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters:

Grey, brown or fawn above, usually with a broad, darker vertebral band, bounded on either side by a lighter brown zone. There is a blackish stripe along the side of the head, continuing behind the eye, over the base of the forelimb and along the side of the body almost to the groin. Dorsal surface of the body and limbs is flecked with dark brown or black and sometimes small to medium sized patches of darker pigment. Hind side of thighs brown with fine white spots.

Groin is usually lemon-yellow. Ventral surface white, cream or yellowish. Dorsal surface usually smooth or with numerous tiny granules above and coarsely granular below. Vomerine teeth almost entirely behind the choanae. Pectoral fold prominent. Finger and toe discs large.

Toes about two thirds webbed. Inner metatarsal tubercle moderate and elongated, outer tubercle is small and rounded. Tympanum is large, rounded and distinct. Second finger longer than first. Average adult size 35 mm in length.

Species within the genus *Colleeneremia* are separated from the morphologically similar species within the genus *Audaxura gen. nov.*, their closest living relatives as follows: *Colleeneremia* species always exhibits a very broad, dark stripe on the side of the head and body. This

is not found in species within *Audaxura gen. nov.*. Furthermore *Audaxura gen. nov.* have pale regular or irregular stripes or patches on the dorsal surface of the body not exhibited in the same configuration or form in any *Colleeneremia* species. *Colleeneremia* have shorter limbs than *Audaxura gen. nov.*. The TL/S-V ratios provides a means of distinguishing the genera, this being 0.335-0.432 for *Colleeneremia* and 0.477-0.520 for *Audaxura gen. nov.*.

Within *Colleeneremia* the two subgenera are separated as follows:

1/ Fingers with only rudimentary webbing, being the subgenus *Colleeneremia*, or:

2/ With conspicuous webbing on the fingers, reaching at least as far as the base of the penultimate phalanx of the fourth finger being the subgenus *Balatusrana subgen. nov.*

*Brevicusyla gen. nov.* includes two species from the Indonesian side of New Guinea that are morphologically similar to species within the genera *Colleeneremia* Wells and Wellington, 1985 and *Audaxura gen. nov.* as detailed above, but are readily separated from them in that adults of *Brevicusyla gen. nov.* while having a smooth dorsum on the body like the other two genera, instead has tubercles on the head, that is not seen in the other two genera. Tadpoles of *Brevicusyla gen. nov.* have a long muscular tail, with narrow dorsal and ventral fins, versus a relatively short tail, with broad fins in species within *Audaxura gen. nov.* and *Colleeneremia*.

Duellman *et al.* (2016) found that the genera *Colleeneremia* and *Audaxura gen. nov.* diverged from one another 17 MYA, with a similar divergence indicated by Pyron and Weins (2011).

**Distribution:** Species in this tribe are found in most parts of Australia and New Guinea.

**Content:** *Audaxura gen. nov.* (type species); *Brevicusyla gen. nov.*; *Colleeneremia* Wells and Wellington, 1985.

#### RAWLINSONINA SUBTRIBE NOV.

**LSIDurn:lsid:zoobank.org:act:FD2468BD-A21E-4F61-BBA8-A97170185AB3**

**Type genus:** *Rawlinsonia* Wells and Wellington, 1985.

**Diagnosis:** Rawlinsonina subtribe nov. is monotypic for the genus *Rawlinsonia* Wells and Wellington, 1985 and so the genus diagnosis is the same as that for the tribe. The nine known living species within the genus *Rawlinsonia* Wells and Wellington, 1985 (one formally described within this paper) are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: smallish frogs usually about 35 mm in body length. Fingers are free or only webbed at the base.

First finger is much shorter and smaller than the second, when pressed together the tip of the first finger reaches no further than the base of the disc of the second finger. Hind edge of vomerine teeth are between the choanae. Usually one or a pair of semidistinct mid dorsal patches, darker than the ground colour, extending from a line joining the centre of the eyes; white stripe below eye, if present does not extend beyond the anterior edge of the base of the forelimb.

Duellman *et al.* (2016) found that the living species in the

genus *Rawlinsonia* diverged from their nearest living relatives 23.2 MYA, giving support to the erection of this genus by Wells and Wellington, 1985 and this is before one considers the significant morphological divergence of the species group.

**Distribution:** Wetter parts of south-east Australia, ranging from South Australia, through Victoria and Tasmania, along the New South Wales coast to south-east Queensland, with outlier populations at Eungella, west of Mackay and the Atherton Tableland and adjacent mountains in the southern wet tropics of North Queensland.

**Content:** *Rawlinsonia* Wells and Wellington, 1985 (monotypic).

**MAXINEHOSERRANINI TRIBE NOV.**

**LSIDurn:lsid:zoobank.org:act:876587D4-4B6A-4CA2-86B6-44504B5B98C7**

**Type genus:** *Maxinehoserranae gen. nov.*

**Diagnosis:** The tribe Maxinehoserranini tribe nov. is extremely speciose and contains 13 morphologically divergent, but phylogenetically close genera.

Therefore the most sensible way to define and diagnose this tribe is by way of doing so by defining and diagnosing each genus as a group.

Species within *Maxinehoserranae gen. nov.* are separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following suite of characters:

No vomerine teeth (Australian species) or in two small patches between the choanae (New Guinea species); dorsal colour is usually green, or occasionally fawn or a mixture of green and bronze; dorsal surface has a broad vertebral band of bronze bordered on either side by green; in terms of flecks or blotches, there are at most a few dark flecks on the dorsal surface; dorsal surface is smooth; at least one strong pectoral fold; no tubercles above the eye; brown head streak present; tympanum brown; internarial distance/eye-naris distance ratio is less than 1.0.

Frogs within the subgenus *Vegrandihyla subgen. nov.* are separated from the nominate subgenus *Maxinehoserranae subgen. nov.* by having concealed surfaces of the legs being bright red in colour (in life), versus blue-black, brown, yellow to orange in colour in all other species.

*Vegrandihyla subgen. nov.* are further separated from New Guinea species within *Maxinehoserranae subgen. nov.* by their non-overlapping HL/HW ratios, 1.027-1.189 versus 1.243-1.254. In terms of the Australian species in *Maxinehoserranae subgen. nov.* the magnitude of the difference is less, being a mean HL/HW for *Vegrandihyla subgen. nov.* 1.04, versus 1.10 in the Australian species in *Maxinehoserranae subgen. nov.*

The described species in the genus *Angularanta gen. nov.* are most easily separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by separation of each of the relevant subgenera.

Frogs in the nominate subgenus *Angularanta subgen. nov.* are separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by one of the two following suites of characters:

1/ Small to medium sized, stream-breeding species with

unwebbed or slightly webbed, long fingers, large finger discs and fully webbed toes. Intercalary structures are broad or elongate and ossified. Straight canthus rostralis. The hyoid plate lacks alary processes. The eggs are large and unpigmented, or alternatively:

2/ Medium to large species with long and variously webbed fingers, long hindlimbs, pigmented or unpigmented bones and very highly variable dorsal coloration. The intercalary structures are small and cartilaginous. The hyoid plate bears pedunculate alary processes. The ova are small and pigmented.

Frogs in the subgenus *Alliuma subgen. nov.* are separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following suite of characters: They are medium-sized montane tree frogs with spiniform tubercles on the hindlimbs, but no spiniform tubercles on the body, a green and brown blotched dorsum, and yellow colouration on the hidden surfaces of the thighs. The ventral surface is variegated with dark pigments. Moderate to extensive finger webbing. Vocal slits present in males; strongly curved canthus rostralis.

Frogs in the subgenus *Naveosrana subgen. nov.* are separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following suite of characters: A small (under 50 mm snout-vent in both sexes) grey or brown species of frog with broad half-webbed fingers bearing large discs and having a strongly curved canthus rostralis. The intercalary structures are elongate and cartilaginous. The hyoid plate lacks alary processes. Ova are small and unpigmented. Further diagnostic characters of this subgenus are as follows: The dorsum varies from grey to dark brown with pale markings including light pigment over the site of the cutaneous blood vessels. The snout is gently rounded and the canthus rostralis sharply curved. The fingers have broad discs and are approximately half webbed. The toes are webbed to the base of the discs. Tubercles occur commonly on the upper eyelids, below the anus, on the back of the thighs and on the heels.

The cranial elements are reduced. The nasals are small and very widely separated medially. They do not articulate with the sphenethmoid, which appears to be lobulated anteriorly in retaining a double condition, and does not extend between the nasals. The frontoparietal fontanelle is large and ovoid. The squamosal has a short zygomatic ramus and slightly longer otic ramus. The quadratojugal is not developed. The pars facialis is shallow and the short posterior process does not articulate with the maxillary process of the nasal. The alary processes of the premaxillaries are well developed, bifurcated at their extremities, widely separated medially and perpendicular to the pars dentalis. The palatine processes are well developed and do not articulate with each other medially. The prevomers are reduced. The sacral diapophyses are broadly expanded and the ilia extend one third along their length. No flange is present on the third metacarpal and the intercalary structures are long and cartilaginous. Alary processes of the hyoid plate are lacking. The adductor mandibulae externus superficialis is absent.

Frogs within the subgenus *Scelerisqueanura subgen.*

*nov.* are separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following suite of characters: Small (adult males 25.8-30.3 mm) frogs. Dorsum is chocolate brown, with or without paler patches. Short, narrow fringed, half-webbed fingers and webbed toes. The finger lengths are as follows  $3 > 4 > 2 > 1$ . The webbing between the third and fourth fingers extends to a point slightly below the paired subarticular tubercles at the base of the penultimate phalanx on the fourth toe. Broadly spaced nares (E-N/IN 0.657-0.758). No vomerine teeth. The head is slightly longer than broad (HL/HW 1.031), its length equivalent to more than one-third of the snout to vent length (HL/S-V 0.356). The snout is not prominent; abrupt and truncate when viewed from above and very slightly rounded in profile. The nostrils are lateral, their distance from the end of the snout slightly less than that from the eye. The distance between the eye and the naris is less than the internarial span (E-N/IN 0.694). The canthus rostralis is well defined and very slightly curved. The eye is large and conspicuous, its diameter greater than the eye to naris distance. The tympanum is covered with skin and very small, its diameter equivalent to one-third of the eye diameter, separated from the eye by a distance greater than its own diameter. The tongue is broadly cordiform with weakly indented posterior border.

The terminal discs are prominent. Long and slender hindlimbs with a TL/S-V ratio of 0.584.

Toe lengths  $4 > 5 = 3 > 2 > 1$ . The webbing of all toes except for the fourth reaches the base of the discs, while on the fourth toes the webbing reaches the subarticular tubercle at the base of the penultimate phalanx and continues to the disc via a narrow fringe. The dorsal and lateral surfaces of the body are finely pitted and striated. There is an inconspicuous supratympanic fold. The throat and chest are smooth. Abdomen and nearby halves of the ventral surface of the thighs are coarsely granular. There is a small pigmented nuptial pad at the base of the first finger. Vocal sac openings are exceptionally long, extending from the base of the tongue to the angles of the jaw.

Ventrally the frogs are a pale creamish colour, stippled with dark brown on the throat.

Frogs within the subgenus *Longuscrusanura subgen. nov.* are separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following suite of characters: Small size with male maximum length 23 mm, female 28 mm. Fingers are slightly fringed and slightly less than half webbed and of moderate length. The toes are fully webbed and the hindlimbs are particularly long, with a ratio of tibia length to snout-vent length of 0.59-0.68.

The dorsum is greyish (in preservative) and marked with pale, cryptic markings resembling lichens.

The snout is short and very slightly pointed.

Ovarian eggs are unpigmented.

Vomerine teeth are present in some individuals and absent in others.

The snout is prominent, slightly projecting and obtusely pointed when viewed from above and slightly projecting in profile. The nostrils are more lateral than superior, their distance from the end of the snout approximately two

thirds that from the eye. The distance from the eye and the naris is less than the internarial span. The canthus rostralis is well defined and strongly rounded. The eyes are large and prominent the eye diameter being greater than the eye to naris distance.

The tympanum is covered with skin, only the inferior half of the annulus is visible. The tympanum diameter approximates the equivalent of two fifths of the eye diameter, separated from the eye by a distance greater than its own diameter.

The tongue shape is somewhat distorted and roughly cordiform in shape with a very slightly indented posterior margin.

The two species *Angularanta impura* and *A. oxyeei sp. nov.* constitute the entirety of the subgenus *Raucus subgen. nov.* and are separated from all other species within *Angularanta gen. nov.* and all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following suite of characters: unpigmented bones; single subarticular tubercle on fourth finger; reduced toe webbing; reduced hand webbing (versus moderate to extensive in one or both in all species of *Angularanta gen. nov.*), narrow lateral fringes on fingers; dark brown to blackish chin in males; dark brown to reddish brown dorsum; dark brown canthal stripe; upper-lip may be white, with a very thin white line bordered by black or brown; concealed surfaces of thighs are brown with yellow spots; yellow to orange iris, sometimes with a green upper margin; ventrum white; slightly pointed snout when viewed from above, side on or below; a raucous call; IN/SV 0.072-0.08, TY/SV 0.067-0.075, HW/SV 0.34-0.3, HL/SV 0.34-0.3, EN/IN 1.1-1.2.

The five described species in the genus *Bellarana gen. nov.* are readily separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following suite of characters: The head is high and usually broader than long (average HL/HW 0.878-1.012), its length usually less than one-third of the snout to vent length (average HL/S-V 0.300-0.347). The snout is not prominent; when viewed from above it is evenly rounded or obtusely angular; in profile it is rounded or acutely angular. The nostrils are more lateral than superior, their distance from the end of the snout less than that from the eye. The distance between the eye and the naris is either more or less than the internarial span (average E-N/IN 0.509-0.884). The canthus rostralis may be curved, slightly defined or straight. The eye is moderate to large, its diameter greater than the distance separating it from the nostril. The tympanum is visible, its diameter equivalent to one-third to one-quarter of the eye diameter. The vomerine teeth are in two short oblique series situated between the choanae. The tongue is cordiform with a slightly indented posterior border.

The fingers are moderately long and are equipped with narrow lateral fringes; in decreasing order of length  $3 > 4 > 2 > 1$ ; the webbing is not extensive, not reaching the sub-articular tubercle at the base of the penultimate phalanx on the fourth finger. The terminal discs are moderate.

The hindlimbs are long with a moderate to high TL/S-V ratio (0.524-0.689). Toes in decreasing order of length  $4 > 3 > 0 = 5 > 2 > 1$ . The toes are webbed to the discs with



the exception of the fourth which is webbed to the sub-articular tubercle at the base of the penultimate phalanx. The skin on the dorsal surfaces is smooth or at most slightly tubercular with very small and widely scattered tubercles distributed evenly across the upper body and upper surfaces of the limbs. The throat is smooth and the chest, abdomen and lower femora granular. There is a prominent, curved supra-tympanic fold extending from the posterior corner of the eye to the shoulder. On the posterior surface of the forearm are tubercles which are widely separated from one another, in juxtaposition in a distinct row, or replaced by a continuous fold. There is a poorly defined dermal ridge on the posterior surface of the heel and tarsus.

The colouration is very highly variable, including at times, strong sexual dimorphism in many locations.

*Fluvirana gen. nov.* are a genus of stream-dwelling frogs only known from the north-west New Guinea (Indonesia) separated from all other similar species in New Guinea (including those sympatric in northern New Guinea) by having a stout build, only slightly pointed snout from above or below, also being slightly truncate; distinctive finger webbing on otherwise short, thick fingers, an absence of distinctive markings on the dorsum; brownish or grey dorsum; limited markings on upper limbs, and usually in the form of scattered flecks or indistinct bars or spots; white to whitish underparts; dorsal skin that is either smooth or only moderately granular or tuberculate; short thick limbs which are greyish in colour and spotted with white; relatively dull concealed areas of limbs; moderate tympanic fold that covers the top section of the otherwise exposed tympanum.

The species in the genus *Hopviridi gen. nov.* are readily separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following suite of characters: Small, montane species. They are uniformly green, sometimes lacking flash markings on the undersides of limbs or alternatively pink with yellow spots in *H. leucova* (Tyler, 1968) or otherwise bright orange in *H. chloronota* (Boulenger, 1911). Short, slightly fringed, half-webbed fingers, fully webbed toes and eggs unpigmented, 2 mm in diameter ova. Maximum size of females is 30 mm snout-vent. The snout is short with a low internarial span. Vomerine teeth are absent.

The genus *Incertanura gen. nov.* are separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following suite of characters: A long (up to at least 2.8 mm) erectile rostral spike in males that is circular in cross section; relatively small size (SVL up to 30.5 mm); slender build (HW/SVL 0.22-0.26); tibia approximately half length of the body (TL/SVL 0.049-0.053); moderately large eyes (EYE/SVL 0.10-0.12); moderately small tympanum (TYM/SVL 0.42-0.53); small, rounded and often green tubercles extending across the mid-dorsum in life; brown to yellowish-brown dorsal colouration with, or without, distinct green transverse bands; and orange colouration in concealed areas of the thighs and axilla.

The five species within *Incertanura gen. nov.* are further defined as follows: Body very slender and elongate, tibia approximately half length of body; head wider than body in dorsal profile, clearly distinct from neck. Snout rounded

in dorsal view and truncate in lateral view. Rostral spike in males extending from tip of upper jaw; mean spike length varies among populations and species from different localities. Canthus rostralis moderately well defined, slightly curved; loreal region concave. Nares closer to tip of snout (excluding spike) than to eye, oriented laterally. Eyes moderately large, protruding in both dorsal and lateral views; pupil horizontal. Upper jaw protruding marginally beyond lower jaw. Tympanum small with distinct to indistinct annulus, bordered dorsally by a fleshy supratympanic fold extending to the superior edge of the insertion of the upper arm. Choanae small and circular, situated close to anterior and lateral edge of palate; no vomerine teeth visible; tongue

fleshy and ovoid and usually with a slightly indented posterior edge. Vocal slits present in males. Dorsal skin tuberculate; ventral skin finely to coarsely granular on throat, abdomen and tibia; remaining ventral surfaces of limbs smooth; additional tubercles also present in clusters around the vent, and to a variable extent on sides of ankles and upper forearms.

Fingers with relative lengths  $3 > 4 > 2 > 1$ ; fleshy, whitish to translucent webbing between all digits, forming a narrow basal strip between 1 and 2, extending to disc on distal edge of 2 and proximal edge of 4 and to penultimate phalanx on both sides on 3. Terminal finger discs expanded or narrower (depending on species) and usually wider than toe discs and with distinct circum-marginal grooves. Nuptial pads dark brown, roughly tear-shaped with point of tear oriented in posteroventral direction. Indistinct unpigmented bifid subarticular tubercles usually visible at the base of penultimate phalanx on all fingers, further indistinct unpigmented subarticular tubercles in series on finger four, indistinct proximal metacarpal tubercles at base of finger one, and small distal metacarpal tubercles at base of three and four.

Toes moderately long, relative lengths  $4 > 3 > 5 > 2 > 1$ . All digits with extensive fleshy, opaque webbing, basal between 1 and 2, extending to anterior end of penultimate phalanx on distal edge of 2 and 3 and proximal edge of five, to halfway along penultimate phalanx on proximal edge of three and four, and base of penultimate tubercle on distal edge of four. Terminal discs slightly expanded to not really expanded and otherwise, narrower than finger discs and with distinct circum-marginal grooves. Indistinct unpigmented subarticular tubercles on penultimate phalanx of all toes, single on 1-3, bifid on 4 and 5. No other tubercles clearly apparent. Small, indistinct unpigmented metatarsal tubercle at base of 1.

In preservative, ground colour of all dorsal surfaces is medium brown, with extensive blueish green and darker brown flecking, maculations, vermiculations and/or blotches across all dorsal surfaces, blueish pattern elements sometimes coalesce into three indistinct transverse blotches, overall darker pigmentation elements tend to be densest on body, and less concentrated and more finely reticulated towards distal extremities of limbs.

Rostral spike is usually light brown, with extensive darker brown flecking at base, tending towards unpatterned at

tip. White or yellow patches often, but not always, present on either side of head, extending from posterolateral edge of eye, below tympanum and around axilla. Venter predominantly buff, internal organs sometimes visible, throat sometimes offwhite, and/or with two clusters of dark brown maculations laterally, tubercles around vent and sometimes those along outer edge of limbs, off-white.

Appearance in life is as follows: Dorsal base colouration is light to dark brown, with variable amounts of green and darker brown spotting, mottling or banding on the body, limbs and head. Dorsal and lateral tubercles on torso and limbs often, but not always, green and contrasting against the brown base colouration. Head brown, often with extensive green pigmentation, usually including a ring

around the eyes and more variably a green transverse band between the eyes. Dense clusters of dark-brown to almost black maculations extend to a variable degree across the limbs, lateral portions of torso and in patches across the back. Off-white patches sometimes present below tympanum and on exposed surfaces of lower hindlimbs. Iris pattern complex; base colouration is usually light brownish, with extensive darker brown vermiculations; rim of pupil orange. Hidden regions of axilla and groin orange (adapted from Oliver *et al.* 2019a).

The genus *Inlustanura gen. nov.* are separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following suite of characters: The known species are characterised by fully webbed outer fingers, a large rounded head with inconspicuous to large eyes (depending on the species), and distinctive well developed dermal folds on the posterior surface of the forearm, anus, tibia, tarsus and fifth toe. Although in at least one species the development of the fold on the tarsus may be reduced. These frogs have a distinctive dorsal colouration of green interspersed with yellow spots in life (in preservative a distinctive colouration in which blue and violet are the predominant pigments), with yellow spots absent in at least some specimens of one species. These frogs are moderately sized species. Females attain a maximum snout to vent length of 35-48 mm and males 39-42 mm.

Species within *Moechaeonura gen. nov.* are morphologically similar to those species in the genus *Variabilanura gen. nov.*, with some differences between the two detailed in this description.

*Moechaeonura gen. nov.* are separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following suite of characters: They are small to medium species (male maximum snout-vent length 34 mm, female maximum snout-vent length 38 mm with short, three webbed fingers and almost fully webbed toes.

The webbing of the fourth toe extends to a point midway between the disc and the sub-articular tubercle at the base of the penultimate phalanx, (versus reaches the sub-articular tubercle at the base of the penultimate phalanx on the fourth finger in the genus *Variabilanura gen. nov.*). The skin on the dorsal surfaces of the head, body and limbs is minutely roughened. The throat and

chest are smooth except for a few flattened tubercles. The abdomen and lower femora are coarsely granular. There is a short row of tubercles on the outer surface of the fourth finger. A more conspicuous dermal ridge extends along the outer surface of the tarsus and fifth toe. There are numerous tubercles below the anus and two extremely prominent femoral tubercles. The supra-tympanic fold is inconspicuous.

Predominantly green in life and may be marked with gold and black. The intercalary structures are elongate and ossified. The hyoid plate lacks alary processes. The ova are small and pigmented (see below).

The dorsum is green, stippled with black and occasionally marked quite extensively with gold. The fingers are short and slender, with about one third webbing; the toes are almost fully webbed. The snout is slightly rounded in profile.

The cranial elements are poorly developed. The nasals are widely separated medially and do not articulate with the sphenethmoid. The sphenethmoid remains double in the adult. The frontoparietal foramen is large and ovoid. The squamosals have short zygomatic rami and very much longer otic rami. The pars facialis of the maxillary is shallow and the posterior process does not make contact with the maxillary process of the nasal. The alary processes of the premaxillary are broad, widely separated medially, and perpendicular to the pars dentalis. The palatine processes are well developed and do not articulate with each other medially. The prevomers are very much reduced.

A phlange is present on the distal surface of the 3rd metacarpal. The sacral diapophyses are broadly dilated, and the intercalary structures are elongate and ossified. There are no alary processes on the hyoid plate. The adductor mandibulae externus superficialis is absent. The ova are small and pigmented (brown animal pole) and laid in stagnant marshes. The mean ovidiameters are 1.2-1.7 mm. Tadpoles have moderately developed fins and the labial teeth comprise 2 upper and 3 lower rows (Tyler 1963; Menzies 1972). The chromosome number is 26.

*Moechaeonura gen. nov.* is further separated from a number of morphologically similar New Guinea species within the genus *Variabilanura gen. nov.* by its very different reproductive mode. *Moechaeonura gen. nov.* species have small brown pigmented eggs (average ova size of 1.2-1.7 mm) that are deposited in water, while species in the genus *Variabilanura gen. nov.* attach a mass of large green eggs with an average ova size of 2.5 mm to vegetation overhanging slow moving streams. In *Variabilanura gen. nov.* the ova are laid in groups of from 4 to 37 (mean 14) on the leaves of trees overhanging water, and around the stems of vegetation at the edge of the water. The ova are surrounded by a very large mass of clear albumen. A period of approximately fourteen days is spent within the spawn clump, and the tadpole emerges possessing internal gills and capable of coordinated movements (Tyler 1978).

Frogs within the subgenus *Aspercotis subgen. nov.* (within *Moechaeonura gen. nov.*) conform to the above diagnosis for the genus *Moechaeonura gen. nov.*, except for their more extensive finger webbing, highly

tuberculate dorsum (versus smooth to slightly tuberculate in the nominate subgenus), distinctively crenulated ridges following the outer surfaces of the lower limbs, silvery-gold and heavily veined iris and fully truncate snout (versus normal to slightly truncate in the nominate subgenus) which as a full diagnosis separates them from all other New Guinea frogs.

Frogs within the subgenus *Telaater subgen. nov.* are separated from all other New Guinea tree frogs by having full black webbing on hands and feet, the venter with extensive areas of black, white and yellow and a transparent periphery on the tympanic membrane combined with a small adult size of less than 30 mm. the placement of these species within a subgenus within a greater *Moechaeonura gen. nov.* is tentative and elevation to full genus may be required as further evidence is obtained.

The species in the genus *Ornatanura gen. nov.* are readily separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following suites of characters: These species are characterised by their small size (males 23.4-30.0 mm, females 27.4-35.4 mm), moderate to relatively long limbs (average TL/S-V 0.522-0.604) and broadly spaced nares (average E-N/IN 0.611-0.818). The colouration is highly variable.

The dorsal surface of the head, body and limbs may range from light sandy grey, or brown to dark grey and is darkened by the presence of very dense, minute, dark brown to black stippling. The anterior portion of the head bordered laterally by the canthus rostralis, and posteriorly to a line between the anterior portions of the upper eyelids is an immaculate pale green, although in some species this may be reduced to be brown or grey with some lime green spots or markings.

The head is longer than broad (average HL/HW 1.132), its length equivalent to more than one-third of the snout to vent length (average HL/S-V 0.350). The snout is evenly rounded when viewed from above and projects slightly in profile. The nostrils are more lateral than superior, their distance from the tip of the snout less than that from the eye.

The distance between the eye and the naris is less than the internarial span (average E-N/IN 0.727). The canthus rostralis is well defined and distinctly curved.

The eye is prominent and bulges above the head, its diameter greater than the eye to naris distance and less than the internarial span. The superior one-quarter to one-third of the tympanum is hidden beneath the supra-tympanic fold. The diameter of the tympanum is equivalent to less than one third of the eye diameter to slightly more than one-third of the eye diameter. The vomerine teeth are in two small oblique series between the choanae. The tongue is almost circular and lacks a posterior indentation.

The fingers are long and lack lateral fringes; in decreasing order of length  $3 > 4 > 2 > 1$ . There is a small vestige of webbing between the third and fourth fingers. The terminal discs are not prominent, with the degree of expansion varying slightly between species.

The hind limbs are relatively long with an average TL/S-V ratio of 0.558. Toes in decreasing order of length

$4 > 5 = 3 > 2 > 1$ . On the fifth toe, the webbing extends two-thirds up the penultimate phalanx of the fifth and to the base of the penultimate phalanx on the fourth.

The skin on the dorsal surface of the head, body and limbs is either smooth with numerous small, spaced apart, scattered tubercles all over, ranging down to smooth all over but for a few small and only slightly developed tubercles on the scapular region.

The throat, abdomen and lower surface of the thighs are very weakly granular. There is a row of small tubercles extending posteriorly from the angle of the jaws and a patch of similar sized tubercles beneath the anus.

Of the tubercles at the angles of the jaws those anterior to the tympanum are green, grey or white, whilst those posterior to it are usually white.

The scapular tubercles are usually green, and the lateral surfaces of the body between the axilla and the groin are one or other of being 1/ Liberally spotted with white, 2/ Grey marks or spots on a cream background, 3/ Back marks in the form of large spots or blotches, circled by white and on an otherwise light lime green background.

The ventral surfaces are creamish with less dense stippling than appears on the dorsum and although dense stippling occurs in some specimens.

The greatest density of groups of chromatophores on the ventral surface appear on the throat and particularly towards the labial margins, with more on the upper than lower margin and greatest intensity between eye and ear, although the exact configuration varies between specimens and species.

Males vary in size from 23.4 mm to 30.0 mm and females from 27.4-35.4mm. The head length is consistently longer than broad (average HL/HW 1.028-1.155) and the head length varies from one-third to considerably more than one-third of the snout to vent length, the complete HL/S-V range

being 0.333-0.404. The E-N/IN range is 0.611-0.818 and the eye diameter is consistently smaller than the internarial span. The average TL/S-V range is 0.522-0.604.

The diploid chromosome number is 26.

The morphologically similar species *Bellarana micromembrana* (Tyler, 1963) from Madang, is most readily separated from the species within *Ornatanura gen. nov.* by its distinctive orange upper iris, versus yellowish in *Ornatanura gen. nov.* species.

Species within the genus *Nasuscuspis gen. nov.* are separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following suite of characters: They are montane species, growing to a maximum of 50 mm snout vent length in females and males to 45 mm. The dorsum is a mixture of greys, greenish greys and ochres. The fingers and toes are extensively webbed. There are highly developed dermal appendages including crenulated ridges on the posterior surfaces of the radius and tarsus, prominent dermal folds above the vent; a row of very large tubercles on the undersurface of the mandible, and an elongate rostral, dermal spike always in males and females although in some reduced form in females of some species.

*Rotundaura gen. nov.* is separated from all other

Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following suite of characters: A very high E-N/IN ratio (average 1.435), short limbs with a low TL/S-V ratio (average 0.482), wholly unwebbed fingers and incompletely webbed toes characterise this species.

The head is long and flattened and longer than broad (average HL/HW 1.073), its length more than one-third of the snout to vent length (average HL/S-V 0.355). The snout is rather prominent, gently rounded when viewed from above and strongly rounded in profile. The nostrils are more superior than lateral, their distance from the end of the snout about one-half that from the eye, and separated from each other by a distance which is equivalent to approximately two-thirds of the eye to naris distance (average E-N/IN 1.435). The canthus rostralis is straight and inconspicuous and the loreal region oblique. The eye is small, its diameter less than the eye to naris distance. The tympanum is visible, its diameter equivalent to two-thirds of the eye diameter and separated from the eye by a distance equivalent to approximately one-half its own diameter. The vomerine teeth are in two obliquely oval series in juxtaposition on the midline between the small, obliquely oval choanae. The tongue is small, triangular and very feebly indented on its posterior border. The fingers are long, slender and unwebbed. The terminal discs are large and the sub-articular tubercles prominent. The fingers in decreasing order of length  $3 > 4 > 2 > 1$ . The hind limbs are short with a TL/S-V ratio of 0.482. The toes are incompletely webbed, the webbing reaching the base of the penultimate phalanx on the fourth toe and half-way up the penultimate phalanx of the fifth. Toes in decreasing order of length  $4 > 5 = 3 > 2 > 1$ . The skin on the dorsal surfaces of the head and body is smooth but for a few flattened tubercles on the back. The throat is smooth and the chest, abdomen and back of the thighs are coarsely granular. There is an inconspicuous supratympanic fold barely obscuring any of the tympanum and a pronounced skin fold across the chest. There is neither a tarsal ridge nor a dermal appendage on the heel. Dimensions: of gravid female holotype are snout-vent 33.2 mm; tibia length 15.8 mm; head length 11.8 mm; head width 11.0 mm; eye to naris distance 3.3 mm; internarial span 2.3 mm; eye diameter 3.1 mm; tympanum diameter 2.0 mm. The dorsal surfaces of the head and body and limbs are a very pale brown with indistinct darker and lighter marbling. Marbling is present and most conspicuous on the dorsal surface of the thigh and tibia. The ventral surfaces of the body and limbs are dull cream with an irregular brown patch on the throat (modified from Tyler 1978).

Specimens of the morphologically similar *Llewellynura* Wells and Wellington, 1985 are readily separated by their much smaller adult size of less than 25 mm body length. Species of *Rotundaura* *gen. nov.* are separated from the genus *Summaviridis* *gen. nov.* (and in turn all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae)), by the tympanum being fully exposed and round, versus the upper surface being cut at the rear by a well-defined and prominent skin fold forming a straight line and a significantly blunter snout in *Rotundaura* *gen. nov.* versus pointed, when both are viewed in profile side on.

The genus *Variabilanura* *gen. nov.* are separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following suite of characters: They are small montane species (males 24.3-34.1 mm; females 30.1-43 mm). In life they are green, usually with yellow spots or markings (in preservative the dorsal surface is blue, usually with darker and occasionally lighter markings). There is usually a deep violet, orange, yellow or red patch in the groin and similarly coloured markings occur on the axilla, posterior surface of the thighs, tibia and tarsus. The head is as broad as long or longer than broad (HL/HW 0.910-1.192), its length less than or greater than one-third of the snout to vent length (HL/S-V 0.328-0.384). The shape of the snout is highly variable, being from prominent to inconspicuous and strongly or only slightly rounded when viewed from above and in profile. The nostrils are lateral in specimens with prominent snouts and more lateral than superior in specimens with inconspicuous snouts. The nares are very much nearer the eye than the tip of the snout in the latter individuals and almost equidistant in the former. The distance between the eye and the naris is less than the internarial span (E-N/IN 0.667-0.965). The canthus rostralis is curved and slightly or well defined. The eye is large and prominent, its diameter greater than the distance separating it from the nostril. The tympanum is covered with skin, its diameter equivalent to from one-third to slightly less than one-half the eye diameter. Vomerine teeth are present in the majority of specimens, and confined to small circular series on slight elevations between the choanae. The tongue is broadly cordiform with a slightly indented posterior margin. The fingers are short and equipped with very slight lateral fringes; in decreasing order of length  $3 > 4 > 2 > 1$ . The webbing reaches the sub-articular tubercle at the base of the penultimate phalanx on the fourth finger. The terminal discs are prominent. The hind limbs are variable with a TL/S-V ratio of 0.485-0.587. Toes in decreasing order of length  $4 > 5 > 3 > 2 > 1$ . The webbing between the toes reaches the base of the disc of all toes, except the fourth where it reaches the tubercle at the base of the penultimate phalanx. The skin on the dorsal surface of the head, body and limbs is minutely roughened. The throat and chest are slightly granular. There are a row of tubercles on the posterior surface of the forearm, and conspicuous tubercles below the anus. Femoral tubercles are usually present. The supra-tympanic fold is inconspicuous. In preservative and in life, dull orange patches may extend on to the dorsum in the axillary region.

The lateral surfaces of the body are frequently heavily pigmented with black or deep yellow (in life, being violet in preservative), marked with large white patches. There is invariably a yellow, orange, red or violet patch in the groin (in life) and the same colouration may be present in the axilla and on the posterior surface of the tibia and tarsus. There is a white patch beneath the eye extending to the angle of the jaws or on the lateral surfaces of the body. The ventral surface of the body is cream to white (white in subgenus *Sudesanura* *subgen. nov.*), with or without sparse blue stippling on the throat near the angle of the jaws. The lower surface of the hind limbs is creamish yellow or dull yellow. These species are often

beautifully pigmented in life being marked with cream, orange, yellow, green, violet and black (Tyler, 1962). The ovum is pale green in colour and has a diameter of approximately 2.5 mm. The ova are laid in groups of from 4 to 37 (mean 14) on the leaves of trees overhanging water, and around the stems of vegetation at the edge of the water. The ova are surrounded by a very large mass of clear albumen. A period of approximately fourteen days is spent within the spawn clump and the tadpole emerges possessing internal gills, being capable of coordinated movements.

The mouth is anterior in position, and surrounded by a band of papillae on the inferior and lateral borders. There are two upper and three lower rows of labial teeth.

Species in the subgenus *Sudesanura subgen. nov.* (type species "*Litoria havina* Menzies, 1993") are separated from those in the nominate subgenus by having a red patch in the groin, versus a deep violet, orange or yellow patch in the groin in the nominate subgenus.

Species within *Sudesanura subgen. nov.* are further defined as follows: Small (SV max. 30.05 mm); head narrow (average HL/HW 1.08); Head always longer than wide (average HL/HW>1.0) except in females, which lack the rostral spike, where HL=HW; canthus rounded, concave, lores oblique, nostrils more or less lateral, widely placed (average EN/IN 0.63 in males and EN/IN 0.54 in females); snout with a prominent pointed rostral spike; vomerine teeth absent; eye large (average EY/SV 0.11); tympanum visible, upper margin covered by skin fold. Fore limb with indistinct row of raised tubercles down outer side; hind limb without heel lappets or other dermal appendages; fingers half-webbed, toes fully webbed; subarticular tubercles poorly developed. Legs always long (average TL/SV>0.54). Dorsum usually immaculate, bright pale green, yellow or fawn brown reduced to a very narrow band on the thighs and ceasing at ankle and wrist, leaving hands and feet virtually colourless; concealed thighs and axillae bright cherry-red; white band on upper lip, snout to axilla; raised tubercles on fore limb white; ventral surfaces pure white.

Frogs in the genus *Drymomantis* Peters, 1882 this single genus being the sole member of the subtribe Drymomantina subtribe nov. (being the only other subtribe in the tribe) are all readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: These are small elongated and agile frogs averaging about 25 mm in body length with moderately pointed snouts, varying somewhat between species; brown head streak present or absent; dorsal surface is uniform green or fawn, sometimes with darker flecks and with at most a paler vertebral zone; there is not a broad vertebral band of bronze bordered on either side with green; skin is smooth above; finely granular on the throat and coarsely granular below; at least one strong pectoral fold, no dorsolateral fold and no tubercles above each eye; fingers webbed at the base and toes moderately webbed. A moderate oval inner and small rounded outer metatarsal tubercle; vomerine teeth absent, or if present, the hind edge of vomerine teeth are between the choanae; first finger is much smaller than the second when pressed together, the top of the first finger reaching no further than the

base of the disc of the second finger.

**Distribution:** New Guinea and tropical parts of northern Australia.

**Content:** *Maxinehoserranae gen. nov.* (type genus); *Angularanta gen. nov.*; *Bellarana gen. nov.*; *Drymomantis Peters, 1882*; *Fluvirana gen. nov.*; *Hopviridi gen. nov.*; *Incertanura gen. nov.*; *Inlustanura gen. nov.*; *Moechaeenura gen. nov.*; *Ormatanura gen. nov.*; *Nasuscuspis gen. nov.*; *Rotundaura gen. nov.*; *Variabilanura gen. nov.*

#### DRYMONTANTINA SUBTRIBE NOV.

**LSIDurn:lsid:zoobank.org:act:14F658D7-CE72-464A-B24A-C8371BB6A549**

**Type genus:** *Drymomantis* Peters, 1882.

**Diagnosis:** The subtribe Drymomantina subtribe nov. is monotypic for the genus *Drymomantis* Peters, 1882 and therefore the subtribe diagnosis is the same as for the genus.

Frogs in the subtribe Drymomantina subtribe nov. thereby including genus *Drymomantis* Peters, 1882 are all readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters:

These are small elongated and agile frogs averaging about 25 mm in body length with moderately pointed snouts, varying somewhat between species; brown head streak present or absent; dorsal surface is uniform green or fawn, sometimes with darker flecks and with at most a paler vertebral zone; there is not a broad vertebral band of bronze bordered on either side with green; skin is smooth above; finely granular on the throat and coarsely granular below; at least one strong pectoral fold, no dorsolateral fold and no tubercles above each eye; fingers webbed at the base and toes moderately webbed. A moderate oval inner and small rounded outer metatarsal tubercle; vomerine teeth absent, or if present, the hind edge of vomerine teeth are between the choanae; first finger is much smaller than the second when pressed together, the top of the first finger reaching no further than the base of the disc of the second finger. According to Duellman *et al.* (2016), the members of this genus diverged from their nearest living relatives 21.5 MYA confirming tribe-level recognition as being appropriate.

**Content:** *Drymomantis* Peters, 1882 (monotypic).

#### NYCTIMYSTINI TRIBE NOV.

**LSIDurn:lsid:zoobank.org:act:D093F148-149A-4BB1-973B-E0C3B72AF48B**

**Type genus:** *Nyctimystes* Stejneger, 1916.

**Diagnosis:** The tribe Nyctimystini tribe nov. includes a total of six genera, until recently placed by many authors within an expanded version of the putative genus *Nyctimystes* Stejneger, 1916, *sensu* Cogger (2014), excluding Australian species previously treated as being within *Nyctimystes* but having a horizontally elliptical pupil.

However the diagnosis of *Nyctimystes* has been expanded (e.g. Duellman *et al.* 2016) and now shrunk significantly in this (2020) paper.

All genera within this tribe, namely *Nyctimystes*, *Occultatahyla gen. nov.*, *Nigreosoculus gen. nov.*,

*Magnumoculus gen. nov.*, *Badiohyla gen. nov.* and *Albogibba gen. nov.* are separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following suite of characters: Large dark eyes, which have vertically elliptical pupils and a lower eyelid with a characteristic reticulum or palpebral venation of fine pigmented lines. There is usually a distinct, crenulated skin fold along the hind edge of the forearm and the foot, the heel often having a small flap of skin. Males are usually considerably smaller than females.

In further detail, the relevant genera are separated from one another as follows:

*Nyctimystes* Stejneger, 1916 are separated from the other five genera (*Occultatahyla gen. nov.*, *Nigreosoculus gen. nov.*, *Magnumoculus gen. nov.*, *Badiohyla gen. nov.* and *Albogibba gen. nov.*) by having sparse, broken vertically-oriented palpebral venation across the nictitating membrane and in having adult males without vocal slits.

Frogs in the subgenus *Magnummanibus subgen. nov.* are separated from those in the nominate subgenus *Nyctimystes* and the subgenus *Asperohyla subgen. nov.* by their possession of very long, prominent heel lappets.

Frogs in the subgenus *Asperohyla subgen. nov.* are separated from the other two subgenera by having a completely hidden tympanum and a dorsal skin roughened by tiny, conical asperities rather than by variable sized and more rounded irregularities as seen in some other New Guinea tree frog species; iris is brown in life.

Species within *Occultatahyla gen. nov.* are separated from the other five genera (*Nyctimystes*, *Nigreosoculus gen. nov.*, *Magnumoculus gen. nov.*, *Badiohyla gen. nov.* and *Albogibba gen. nov.*) by large size (adult females 50 to 84 mm. in snout to vent length); internarial distance distinctly smaller than distance from eye to naris (E-N/IN averages 1.34 (range 1.2-1.5)); the head is broad, flattish, with depressed snout, closely spaced nares, and oblique loreal region. Palpebral venation is in oblique lines (more vertical than horizontal and with few horizontal interconnections), with a few horizontal interconnections. A dermal fold passes from the posterior corner of the eye over the upper edge of the tympanum and down to the insertion of the forelimb, sometimes becoming obscure when leaving the tympanum. The outer fingers are approximately half-webbed, the third and fifth toes webbed to the disc. A light-coloured dermal ridge or series of tubercles extends from the elbow to the disc of the fourth finger. A similar but less distinct ridge or line of tubercles occupies the outer edge of the tarsus and fifth toe. A very small heel tubercle is present. The skin of the dorsum is smooth to very slightly granular, that of the venter is always coarsely granulate. Slit-like, vocal sac openings are usually present in the floor of the mouth. A small patch of very fine horny tubercles is found on the first finger of males. The iris is dark or black in colour.

Exceptional to the preceding is the subgenus *Webpede subgen. nov.* which conforms to the above genus diagnosis, save for the following differences: The heel is without a tubercle, or in rare cases has a very small one.

The skin is smooth above, granular below. A weak, wavy fold is present on the outer surface of the forearm. The head is broader than long; the canthus rostralis is not distinct; the loreal region is oblique; Unique to this subgenus is that the palpebral venation is distinct, but is reduced to individual pigment spots and thin, meandering lines, although the lines are still mainly oriented largely in a vertical direction, with few horizontal interconnections. Species within *Nigreosoculus gen. nov.* are separated from the other five genera (*Nyctimystes*, *Occultatahyla gen. nov.*, *Magnumoculus gen. nov.*, *Badiohyla gen. nov.* and *Albogibba gen. nov.*) by the following suite of characters: Vocal slits present; a very small heel tubercle; basal webbing on the hand; exposed tympanum; vertical lines of palpebral reticulum oriented obliquely and with relatively few horizontal cross-connections; pale-tan to near black iris; rear of thighs barred/mottled with brown, caramel, or blue-gray.

Species within *Magnumoculus gen. nov.* are separated from the other five genera (*Nyctimystes*, *Nigreosoculus gen. nov.*, *Occultatahyla gen. nov.*, *Badiohyla gen. nov.* and *Albogibba gen. nov.*) by the following suite of characters: The head is broad (HL/HW <1.0), the snout high and blunt, the canthus rostralis distinct, broadly spaced nostrils (EN/IN ratio <1), and the loreal region nearly vertical. A strong, slightly curved, supratympanic fold begins at the posterior corner of the eye and disappears above the insertion of the forelimb. The tympanum is small but distinct. The hands have little webbing; the outer fingers are about one-quarter webbed. The vomerine teeth are in two patches between the internal nares, nearly on a line connecting the posterior margins of the nares. The skin is minutely granular above, coarser beneath. There is no tubercle on the heel. A nearly straight, very slightly crenulated fold of skin is present on the outer surface of the forearm. A moderate body size (40-60 mm S-V), predominantly brown colouration, an eyelid venation composed of a network with numerous horizontal connections with relatively few vertical interconnections. There is decoration on the forearm and tarsus in the form of rows of (often white-tipped) tubercles.

Species within *Badiohyla gen. nov.* are separated from the other five genera (*Nyctimystes*, *Nigreosoculus gen. nov.*, *Occultatahyla gen. nov.*, *Magnumoculus gen. nov.* and *Albogibba gen. nov.*) by having a unique "reticulated" palpebral venation, half-webbed fingers and a size in males with SVL to maximum of 50 mm to 100 mm depending on the species. They are further defined as follows: The snout is relatively short, blunt and high (E-N/IN 0.94), with distinct canthus rostralis and oblique loreal region. The vomerine teeth are in two patches between the posterior edges of the choanae.

The palpebral venation forms a heavy reticulum. The tympanum is distinct and is separated from the eye by approximately the diameter of the tympanum. A fold of skin passes from the posterior corner of the eye, over the upper edge of the tympanum and down, becoming indistinct above the insertion of the forelimb. The skin of the dorsum is minutely roughened, that of the venter coarsely granular. A row of tubercles is present along the outer edge of the forearm and there is a similar row on the tarsus. There is only a slight suggestion of a heel

tubercle. The outer fingers are approximately half-webbed, the toes, except the fourth toe, are webbed to the disc.

The body and head are light brown to purple dorsally, either with irregular dark brown blotches or markings absent. The legs have a similar ground color, with or without irregular darker spots and bands present on the tibia.

Species within *Albogibba gen. nov.* are separated from the other five genera (*Nyctimystes*, *Nigreosoculus gen. nov.*, *Occultatahyla gen. nov.*, *Magnumoculus gen. nov.* and *Badiohyla gen. nov.*) by one or other of the following unique suites of characters:

1/ Being a large species (males to 100 mm. in snout to vent length); of a uniform dorsal coloration (green in life, purple in alcohol-preserved specimens); palpebral venation is a reticulum without obvious orientation and in the nominate subgenus of this genus, the male bears a spine-like process on the anterior surface of the proximal part of the humerus (upper arm) (nominate subgenus *Albogibba subgen. nov.*), or:

2/ As above, but male SVL of up to 80 mm; not including a spine-like process on the anterior surface of the proximal part of the humerus (upper arm) in males and with a unique dorsal pattern of black vermiculations on the body and limbs, with unmarked greyish lower flanks (*Ratiobrunneis subgen. nov.*).

**Distribution:** New Guinea including nearby offshore islands on the continental shelf.

**Content:** *Nyctimystes* Stejneger, 1916 (type genus); *Albogibba gen. nov.*; *Occultatahyla gen. nov.*; *Nigreosoculus gen. nov.*; *Badiohyla gen. nov.*; *Magnumoculus gen. nov.*.

#### **BADIOHYLINA SUBTRIBE NOV.**

**LSIDurn:lsid:zoobank.org:act:97DD93A0-93D2-43A1-9776-EFF15C005132**

**Type genus:** *Badiohyla gen. nov.*

**Diagnosis:** This tribe includes two genera, namely *Badiohyla gen. nov.* and *Magnumoculus gen. nov.*.

Species of *Nyctimystes*, *Occultatahyla gen. nov.*, *Nigreosoculus gen. nov.*, *Magnumoculus gen. nov.*, *Badiohyla gen. nov.* and *Albogibba gen. nov.* are separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following suite of characters:

Large dark eyes, which have vertically elliptical pupils and a lower eyelid with a characteristic reticulum or palpebral venation of fine pigmented lines. There is usually a distinct, crenulated skin fold along the hind edge of the forearm and the foot, the heel often having a small flap of skin. Males are usually considerably smaller than females.

Species within *Badiohyla gen. nov.* are separated from the other five genera (*Nyctimystes*, *Nigreosoculus gen. nov.*, *Occultatahyla gen. nov.*, *Magnumoculus gen. nov.* and *Albogibba gen. nov.*) by having a unique "reticulated" palpebral venation, half-webbed fingers and a size in males with SVL to maximum of 50 mm to 100 mm depending on the species. They are further defined as follows: The snout is relatively short, blunt and high (E-N/IN 0.94), with distinct canthus rostralis and oblique loreal region. The vomerine teeth are in two patches between

the posterior edges of the choanae.

The palpebral venation forms a heavy reticulum. The tympanum is distinct and is separated from the eye by approximately the diameter of the tympanum. A fold of skin passes from the posterior corner of the eye, over the upper edge of the tympanum and down, becoming indistinct above the insertion of the forelimb. The skin of the dorsum is minutely roughened, that of the venter coarsely granular. A row of tubercles is present along the outer edge of the forearm and there is a similar row on the tarsus. There is only a slight suggestion of a heel tubercle. The outer fingers are approximately half-webbed, the toes, except the fourth toe, are webbed to the disc. The body and head are light brown to purple dorsally, either with irregular dark brown blotches or markings absent. The legs have a similar ground color, with or without irregular darker spots and bands present on the tibia.

Species within *Magnumoculus gen. nov.* are separated from the other five genera (*Nyctimystes*, *Nigreosoculus gen. nov.*, *Occultatahyla gen. nov.*, *Badiohyla gen. nov.* and *Albogibba gen. nov.*) by the following suite of characters: The head is broad (HL/HW <1.0), the snout high and blunt, the canthus rostralis distinct, broadly spaced nostrils (EN/IN ratio <1), and the loreal region nearly vertical. A strong, slightly curved, supratympanic fold begins at the posterior corner of the eye and disappears above the insertion of the forelimb. The tympanum is small but distinct. The hands have little webbing; the outer fingers are about one-quarter webbed. The vomerine teeth are in two patches between the internal nares, nearly on a line connecting the posterior margins of the nares. The skin is minutely granular above, coarser beneath. There is no tubercle on the heel. A nearly straight, very slightly crenulated fold of skin is present on the outer surface of the forearm. A moderate body size (40-60 mm S-V), predominantly brown colouration, an eyelid venation composed of a network with numerous horizontal connections with relatively few vertical interconnections. There is decoration on the forearm and tarsus in the form of rows of (often white-tipped) tubercles.

In terms of the nominate subtribe *Nyctimystina* subtribe nov. the four component genera are defined as stated below.

*Nyctimystes* Stejneger, 1916 as defined in this paper, are separated from the other five genera (*Occultatahyla gen. nov.*, *Nigreosoculus gen. nov.*, *Magnumoculus gen. nov.*, *Badiohyla gen. nov.* and *Albogibba gen. nov.*) by having sparse, broken vertically-oriented palpebral venation across the nictitating membrane and in having adult males without vocal slits.

Frogs in the subgenus *Magnummanibus subgen. nov.* are separated from those in the nominate subgenus *Nyctimystes* and the subgenus *Asperohyla subgen. nov.* by their possession of very long, prominent heel lappets.

Frogs in the subgenus *Asperohyla subgen. nov.* are separated from the other two subgenera by having a completely hidden tympanum and a dorsal skin roughened by tiny, conical asperities rather than by variable sized and more rounded irregularities as seen in some other New Guinea tree frog species; iris is brown in

life.

Species within *Occultatahyla gen. nov.* are separated from the other five genera (*Nyctimystes*, *Nigrosoculus gen. nov.*, *Magnumoculus gen. nov.*, *Badiohyla gen. nov.* and *Albogibba gen. nov.*) by large size (adult females 50 to 84 mm. in snout to vent length); internarial distance distinctly smaller than distance from eye to naris (E-N/IN averages 1.34 (range 1.2-1.5)); the head is broad, flattish, with depressed snout, closely spaced nares, and oblique loreal region. Palpebral venation is in oblique lines (more vertical than horizontal and with few horizontal interconnections), with a few horizontal interconnections. A dermal fold passes from the posterior corner of the eye over the upper edge of the tympanum and down to the insertion of the forelimb, sometimes becoming obscure when leaving the tympanum. The outer fingers are approximately half-webbed, the third and fifth toes webbed to the disc. A light-coloured dermal ridge or series of tubercles extends from the elbow to the disc of the fourth finger. A similar but less distinct ridge or line of tubercles occupies the outer edge of the tarsus and fifth toe. A very small heel tubercle is present. The skin of the dorsum is smooth to very slightly granular, that of the venter is always coarsely granulate. Slit-like, vocal sac openings are usually present in the floor of the mouth. A small patch of very fine horny tubercles is found on the first finger of males. The iris is dark or black in colour.

Exceptional to the preceding is the subgenus *Planusruspes subgen. nov.* which conforms to the above genus diagnosis, save for the following differences: The heel is without a tubercle, or in rare cases has a very small one. The skin is smooth above, granular below. A weak, wavy fold is present on the outer surface of the forearm. The head is broader than long; the canthus rostralis is not distinct; the loreal region is oblique; Unique to this subgenus is that the palpebral venation is distinct, but is reduced to individual pigment spots and thin, meandering lines, although the lines are still mainly oriented largely in a vertical direction, with few horizontal interconnections.

Species within *Nigrosoculus gen. nov.* are separated from the other five genera (*Nyctimystes*, *Occultatahyla gen. nov.*, *Magnumoculus gen. nov.*, *Badiohyla gen. nov.* and *Albogibba gen. nov.*) by the following suite of characters: Vocal slits present; a very small heel tubercle; basal webbing on the hand; exposed tympanum; vertical lines of palpebral reticulum oriented obliquely and with relatively few horizontal cross-connections; pale-tan to near black iris; rear of thighs barred/mottled with brown, caramel, or blue-gray.

Species within *Albogibba gen. nov.* are separated from the other five genera (*Nyctimystes*, *Nigrosoculus gen. nov.*, *Occultatahyla gen. nov.*, *Magnumoculus gen. nov.* and *Badiohyla gen. nov.*) by one or other of the following unique suites of characters:

1/ Being a large species (males to 100 mm. in snout to vent length); of a uniform dorsal coloration (green in life, purple in alcohol-preserved specimens); palpebral venation is a reticulum without obvious orientation and in the nominate subgenus of this genus, the male bears a spine-like process on the anterior surface of the proximal part of the humerus (upper arm) (nominate subgenus

*Albogibba subgen. nov.*), or:

2/ As above, but male SVL of up to 80 mm; not including a spine-like process on the anterior surface of the proximal part of the humerus (upper arm) in males and with a unique dorsal pattern of black vermiculations on the body and limbs, with unmarked greyish lower flanks (*Ratiobrunneis subgen. nov.*).

**Distribution:** New Guinea, including offshore islands on the continental shelf.

**Content:** *Badiohyla gen. nov.* (type species); *Magnumoculus gen. nov.*

#### PELODRYANINI TRIBE NOV.

**LSIDurn:lsid:zoobank.org:act:35805C8F-3448-4565-995C-D9BFA707C3CD**

**Type genus:** *Pelodryas* Günther, 1858.

**Diagnosis:** The tribe *Pelodryanini tribe nov.* is best diagnosed by way of defining each of the three component genera.

Species in the genus *Pelodryas* Günther, 1858 are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters:

Colour in life is usually a near uniform emerald-green in life, but varies from dark purplish-green to fawn or at times even blue, often with scattered white or yellow spots or dots; there is no obvious white stripe running along the edge of the lower jaw; the hind side of thighs lacks black or yellow marbling, either being plain or sometimes pinkish or orangeish; hind edge of forearm is smooth, or with at most a few, low, discontinuous tubercles; the skin on top is smooth or slightly leathery; venter is white and coarsely granular; hind edge of foot is smooth; fingers have conspicuous webbing, but reaching no further than the base of the penultimate phalanx of the fourth finger; toes are about 2/3 webbed; finger and toe discs are large and obvious; vomerine teeth present and prominent, between and behind the choanae; there is obvious thick, supratympanic gland and the tympanum is large and obvious.

Frogs in the genus *Shireenhoserhylea gen. nov.* are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: Colour in life in normal conditions is usually a uniform emerald green above, but occasionally may be fawn, green, purple-green or blue. Hind side of thighs more or less uniform and without black and yellow marbling or spots. Hind edge of forearms are smooth or with at most a few low discontinuous tubercles; hind edge of foot is smooth. Fingers with conspicuous webbing that reaches at least as far as the penultimate phalanx of the fourth finger; Vomerine teeth present.

Frogs in the the nominate subgenus *Shireenhoserhylea gen. nov.* are readily separated from those in the subgenus *Emeraldhyla subgen. nov.* by having an iris, or iris immediately above and below the pupil that is a brilliant red or bright orange in colour and whitish underneath, versus an iris that is yellow or dull orange in colour and strongly yellow to orange underneath in *Emeraldhyla subgen. nov.*

The genus *Summaviridis gen. nov.* is monotypic for a West Papuan species, *S. vagabunda* that does not appear to have close affinities to any other species or



genus. Tyler (1968) placed it in a group on its own, although Menzies (2006) associated it with his so-called “*Litoria gracielenta* complex”. However *S. vagabunda* has unwebbed hands, versus heavily webbed in the other species, which in effect scuttles any close association at the genus level.

*Summaviridis gen. nov.* is therefore only tentatively placed in the tribe Pelodyranini tribe nov. and subtribe Shireenhoserhylina subtribe nov..

*Summaviridis gen. nov.* are readily separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following unique suite of characters: A broad head, short limbs, unwebbed fingers, a prominent fold of skin across the chest and (in life) a dark green dorsal colouration.

In further detail the *Summaviridis gen. nov.* is separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) as follows: The head is broader than long (HL/HW 0.951), its length slightly less than one-third of the snout to vent length (HL/S-V 0.310). The snout is rounded when viewed from above and in profile. The nostrils are more lateral than superior, their distance from the end of the snout slightly less than that from the eye. The distance between the eye and the naris is greater than the internarial span (E-N/IN 1.154). The canthus rostralis is straight and poorly defined. The eye is large, its diameter greater than the distance separating it from the nostril. Three-quarters of the tympanum is visible, the superior rim of the tympanic annulus is hidden beneath the supra-tympanic fold. The tympanal diameter is equivalent to two-thirds of the eye diameter. The vomerine teeth are in two broadly oval series situated between the choanae. The tongue is broadly cordiform with a deeply indented posterior border. The fingers are very long and slender with narrow lateral fringes; in decreasing order of length 3>4>2>1; unwebbed. The terminal discs and sub-articular tubercles are large and prominent. The hind limbs are short and slender with a TL/S-V ratio of 0.513. Toes in decreasing order of length 4>5>3 >2>1. The webbing between the outer and fourth toe reaches half-way up the penultimate phalanx on the fifth toe, and the sub-articular tubercle at the base of the penultimate phalanx on the fourth. The skin on the dorsal surfaces is smooth with a few minute flattened tubercles. The throat and chest are slightly tubercular; the abdomen, sides of the body and lower surface of the thighs are extremely granular. There is a conspicuous curved supra-tympanic fold, and a prominent skin fold across the chest. The dorsal surfaces are in life dark green and in preservative dark blue. There is a faint trace of a narrow white line above a broader brown line on the canthus rostralis, upper eyelid and supra-tympanic fold. The backs of the thighs are pale brown and marked with small irregularly-shaped, pale yellow spots. The backs of the tarsus and forearm are pale brown. The ventral surfaces are pale yellow with leaden blue patches at the angles of the jaws, and small faint brown spots on the remainder of the mandibular border and on the throat. Adult females are about 37 mm in body length (modified from Tyler, 1978).

Specimens of the morphologically similar *Llewellynura* Wells and Wellington, 1985 are readily separated by their much smaller adult size of less than 25 mm body length.

The species within the morphologically similar genus *Rotundaura gen. nov.* are separated from this genus (*Summaviridis gen. nov.*) by the tympanum being fully exposed and round, versus the upper surface being cut at the rear by a skin fold forming a straight line and a significantly blunter snout in *Rotundaura gen. nov.*

**Distribution:** Most parts of continental Australia, except the coldest regions as well as most parts of New Guinea.

**Content:** *Pelodyras* Günther, 1858 (type genus); *Shireenhoserhylea gen. nov.*; *Summaviridis gen. nov.*

#### SHIREENHOSERHYLINA SUBTRIBE NOV.

LSIDurn:lsid:zoobank.org:act:5315C7D8-DADE-4350-BB70-8F144939DD39

**Type genus:** *Shireenhoserhylea gen. nov.*

**Diagnosis:** The subtribe Shireenhoserhylina subtribe nov. is best diagnosed by way of defining each of the two component genera.

Frogs in the genus *Shireenhoserhylea gen. nov.* are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters:

Colour in life in normal conditions is usually a uniform emerald green above, but occasionally may be fawn, green, purple-green or blue. Hind side of thighs more or less uniform and without black and yellow marbling or spots. Hind edge of forearms are smooth or with at most a few low discontinuous tubercles; hind edge of foot is smooth. Fingers with conspicuous webbing that reaches at least as far as the penultimate phalanx of the fourth finger; Vomerine teeth present.

Frogs in the the nominate subgenus *Shireenhoserhylea gen. nov.* are readily separated from those in the subgenus *Emeraldhyla subgen. nov.* by having an iris, or iris immediately above and below the pupil that is a brilliant red or bright orange in colour and whitish underneath, versus an iris that is yellow or dull orange in colour and strongly yellow to orange underneath in *Emeraldhyla subgen. nov.*

The genus *Summaviridis gen. nov.* is monotypic for a West Papuan species, *S. vagabunda* that does not appear to have close affinities to any other species or genus. Tyler (1968) placed it in a group on its own, although Menzies (2006) associated it with his so-called “*Litoria gracielenta* complex”. However *S. vagabunda* has unwebbed hands, versus heavily webbed in the other species, which in effect scuttles any close association at the genus level.

*Summaviridis gen. nov.* are readily separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following unique suite of characters: A broad head, short limbs, unwebbed fingers, a prominent fold of skin across the chest and (in life) a dark green dorsal colouration.

In further detail the *Summaviridis gen. nov.* is separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) as follows: The head is broader than long (HL/HW 0.951), its length slightly less than one-third of the snout to vent length (HL/S-V 0.310). The snout is rounded when viewed from above and in profile. The nostrils are more lateral than superior, their distance from the end of the snout slightly less than that from the eye. The distance between the eye and the naris

is greater than the internarial span (E-N/IN 1.154). The canthus rostralis is straight and poorly defined. The eye is large, its diameter greater than the distance separating it from the nostril. Three-quarters of the tympanum is visible, the superior rim of the tympanic annulus is hidden beneath the supra-tympanic fold. The tympanal diameter is equivalent to two-thirds of the eye diameter. The vomerine

teeth are in two broadly oval series situated between the choanae. The tongue is broadly cordiform with a deeply indented posterior border. The fingers are very long and slender with narrow lateral fringes; in decreasing order of length  $3 > 4 > 2 > 1$ ; unwebbed. The terminal discs and sub-articular tubercles are large and prominent. The hind limbs are short and slender with a TL/S-V ratio of 0.513. Toes in decreasing order of length  $4 > 5 > 3 > 2 > 1$ . The webbing between the outer and fourth toe reaches half-way up the penultimate phalanx on the fifth toe, and the sub-articular tubercle at the base of the penultimate phalanx on the fourth. The skin on the dorsal surfaces is smooth with a few minute flattened tubercles. The throat and chest are slightly tubercular; the abdomen, sides of the body and lower surface of the thighs are extremely granular. There is a conspicuous curved supra-tympanic fold, and a prominent skin fold across the chest. The dorsal surfaces are in life dark green and in preservative dark blue. There is a faint trace of a narrow white line above a broader brown line on the canthus rostralis, upper eyelid and supra-tympanic fold. The backs of the thighs are pale brown and marked with small irregularly-shaped, pale yellow spots. The backs of the tarsus and forearm are pale brown. The ventral surfaces are pale yellow with leaden blue patches at the angles of the jaws, and small faint brown spots on the remainder of the mandibular border and on the throat. Adult females are about 37 mm in body length (modified from Tyler, 1978).

Specimens of the morphologically similar *Llewellynura* Wells and Wellington, 1985 are readily separated by their much smaller adult size of less than 25 mm body length.

The species within the morphologically similar genus *Rotundaura gen. nov.* are separated from this genus (*Summaviridis gen. nov.*) by the tympanum being fully exposed and round, versus the upper surface being cut at the rear by a skin fold forming a straight line and a significantly blunter snout in *Rotundaura gen. nov.*

**Distribution:** Wetter parts of the east coast of Australia, excluding colder parts of the far south, New Guinea and offshore islands. The nominate subspecies *Shireenhoserhylea subgen. nov.* is restricted to the East Coast of Australia, south of the northern wet tropics in Queensland.

The subspecies *Emeraldhyla subgen. nov.* occurs in New Guinea and offshore islands as well as the far north of Cape York, Queensland.

The type species for the monotypic genus *Summaviridis gen. nov.* is only known from the two types, a male and a female, being from Vogelkop Peninsula, Papua (New Guinea) (female) and Seram (= Ceram) Island, Molucca Islands, Indonesia.

**Content:** *Shireenhoserhylea gen. nov.* (type species); *Summaviridis gen. nov.*

#### PUSTULATARANINI TRIBE NOV.

LSIDurn:lsid:zoobank.org:act:C57E50A3-84EC-4921-A71A-A0F1B28D4305

**Type genus:** *Pustulatarana gen. nov.*

**Diagnosis:** The tribe Pustulataranini tribe nov. is best diagnosed by way of defining each of the seven component genera.

The single known living species within the genus *Pustulatarana gen. nov.* is readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following suite of characters:

A smallish sized tree frog being 27 mm in body length. Brown to greenish brown or even yellow above, with obscure and irregular darker flecks and blotches. Creamy-white below, finely peppered with dark blackish-brown or shading of other lighter colour on the throat, with heavy concentrations of stippling on chin, chest and flanks of some specimens. Underside of thighs have irregular darker patches and hind side of thigh has irregular fine creamish coloured stripes. Skin is leathery and with numerous scattered tubercles which may or not be arranged in well-defined longitudinal rows, including sometimes some of medium to large size and a prominent one on the eyelid. Belly is smooth except for some granular skin on the lower belly and thighs. Vomerine teeth present, but weakly developed and between the choanae. Fingers lack webbing but have large oval discs. Toes poorly to moderately webbed. A minute rounded outer metatarsal tubercle and a moderate-sized oval inner metatarsal tubercle. Tympanum distinct.

*Pustulatarana gen. nov.* are separated from the genus *Llewellynura* Wells and Wellington, 1985 by the large oval discs on the forelimbs and larger body size (27 mm vs 20 mm). *Pustulatarana gen. nov.* are from the genus *Mahoneybatrachus* Wells and Wellington, 1985, by having reduced toe webbing, versus well developed webbing on the feet.

Species within the genus *Llewellynura* Wells and Wellington, 1985 are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following suite of characters: they are tiny in size, being about 20 mm in body length as adults. Colour is variegated dark and brown dorsally; a row of widely spaced dorsolateral tubercles and ridges may be on each side, or alternatively just a few randomly scattered small tubercles on either side of upper flank; no pectoral fold; several conspicuous tubercles above each eye; tiny, slender and agile and with a sharply pointed snout. The dorsum may be grey, brown, yellow or red, often flecked or mottled with darker colour. There is usually a broad dark band from behind the eye to the groin and an even darker stripe along the snout, through the eye and over the base of the arm to the flank. Snout and upper surfaces of the limbs are peppered with dark brown. There is a conspicuous dark bar along the front edge of the arm. Ventral surface is white except for a fine peppering of brown on the throat, chest and limbs. Skin is smooth dorsally, with at least some small tubercles or warts or skin folds and usually several small subercles over each eye. Throat skin is smooth, but belly is granular. Finger and toe discs are moderate in size but

distinct. Fingers lack webbing and toes are less than half webbed. The disc and nearly two phalanges are free on the outer side of the fourth toe. The inner metatarsal tubercle is prominent and there is no outer one. Tympanum ranges from small to indistinct. Second finger longer than first.

The Australian species within *Llewellynura* being of the nominate subgenus *Llewellynura* are separated from the New Guinea species herein placed in the subgenus *Microlitoria* subgen. nov. by lacking vomerine teeth. Known as the "Rock Hole Frogs", living frogs in the genus *Mahonabatrachus* Wells and Wellington, 1985 are all readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: In colour they are usually irregularly mottled above with metallic fawn, brown or reddish brown and dark brown, the small low tubercles on the back sometimes tending to be light-centered and/or dark edged. Sometimes these frogs are dominantly dark brown but with a gold-orange dorsolateral stripe from snout to eye and continuing above the eye above the tympanum along the body almost to the groin. Limbs of all specimens are always coloured with irregular dark brown cross bands and all frogs have barred or spotted lips to some degree and lower surfaces are whitish. The skin is leathery to finely granular above with numerous low, rounded or sometimes slightly pointed tubercles, that are fairly evenly spaced. No pectoral fold. Moderate sized but conspicuous diss on fingers and toes. Fingers free and toes with moderately developed webbing, including reaching the disc of the fifth toe. Adults average 20 mm in length.

The three species in the genus *Salmocularana* gen. nov. are small species that breed in escarpment rock hills in Arnhemland, Northern Territory and also the Kimberley Ranges of north-west Australia.

The three known living species within the genus *Salmocularana* gen. nov. (one formally described within this paper) are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: Pale grey-brown, fawn, reddish, orange or pink above, with dorsal markings ranging from nothing more than slight peppering at the anterior part of the dorsum as seen in *Salmocularana personata* (Tyler, Davies and Martin, 1978), indistinct marbling and blotches as seen in *S. staccato* (Doughty and Anstis, 2007) or an intense randomised configuration of dark brown pigment on a light beige to grey background in *S. saxacola* sp. nov.; specimens have a distinct or semi-distinct dark brownish or purple head stripe from just in front of the nostril, through the eye and ear to upper flank just behind the forelimbs. Lips are whitish to some extent, ranging from a distinct yellow bar, to merely light and peppered brown. Ventral surfaces whitish. Skin may be smooth, with extremely tiny scattered tubercles above as in *S. personata*, or with a very limited number of scattered small tubercles above the arm and on the upper flank and nearby dorsum in *S. staccato* to scattered medium sized tubercles above the arm and on the upper flank and nearby dorsum in *S. saxacola* sp. nov.. Underneath the skin is coarsely granular, except on the throat, where it is smooth. Vomerine teeth are in two short clumps between the

choanae. Finger and toe discs are moderate, wider than the digits. Fingers lack webbing, toes being about half webbed, including not reaching the disc of the fifth toe but extending no more than half way along the penultimate phalanx. Second finger is longer than the first. There is a small oval inner metatarsal tubercle and a smaller outer metatarsal tubercle. Tympanum distinct. The genus *Litoria*, with type species *L. freycineti* Tschudi, 1838 is herein restricted to the type species and the closely related *L. latopalmata* Günther, 1867, which as a pair diverged from their nearest common ancestor 13.3 MYA according to Duellman *et al.* (2016).

This divergence and morphological differences are exactly why the species previously included in *Litoria* have been assigned to other genera.

*Litoria* as defined herein, are refined separated from all other Australasian Tree frogs (Pelodyadidae) by the following suite of characters: Species are a frog that is fawn to dark above, being either immaculate or with markings on the back, with or without a warty exterior, the warts if present being small and flattish, the markings if present typically being a series of darker blotches or variegations in either an irregular or regular pattern. There is a broad dark, canthal stripe, almost completely interrupted in front of the eye and continues behind the eye to effectively overwrite the tympanum and extend to the flanks where it invariably breaks up into a series of black spots or blotches extending to the groin. There is a pale glandular stripe from below the eye to the base of the forelimb. Limbs are variegated darker but usually with an irregular pattern of spots, blotches or bars. Lower jaw is variegated with yellow and dark brown, often forming a reticulum, often with a barred appearance. The venter is whitish. Ventral surface and flanks are granular. There is no dorsolateral skin fold. Finger and toe discs are small and project slightly but noticeably, beyond the lateral edges of the penultimate phalanges. Fingers are free, without webbing. Toes have well developed webbing, the webbing not reaching the disc of the fifth toe and extending no more than half way along the penultimate phalanx. There is a small inner and minute outer metatarsal tubercle. Vomerine teeth are in two clusters between the choanae. The tympanum is distinct and adults average 40-45 mm snout to rear.

The genus *Paralitoria* gen. nov. diverged from its nearest common ancestor, being that of the genera *Litoria* and *Quasilitoria* gen. nov. being the most closely related genera, some 15.5 MYA according to Duellman *et al.* (2016).

*Paralitoria* gen. nov. is separated from all other Australasian tree frogs (Pelodyadidae) by the following suite of characters, being one or other of the following: 1/ Fawn, grey or brown above, being immaculate; a conspicuous black stripe from the snout, through the nostril to the eye, where it is almost entirely broken by a pale vertical bar in front of the eye as a band continuing below the tympanum and extending back to the forearm with minimal loss of width along the length, where after a break, it continues obliquely along the mid flank. There is a pale glandular stripe from below the eye to the forearm. There is a conspicuous dark brown stripe along the front edge of the tibial region. Lips are not spotted or barred. The groin and hind side of thighs are pale yellow, spotted

and variegated with dark brown. Venter is whitish. Dorsal surface is smooth and leathery, throat is smooth and the venter granular. Vomerine teeth are between the choanae. Finger discs are small and distinct, while toe discs are smaller and indistinct. Fingers are unwebbed and toes have moderate webbing between them. There is a small inner and tiny outer metatarsal tubercle.

Tympanum is distinct and second finger is slightly shorter than the first. Body length averages 50 mm (subgenus *Paralitoria subgen. nov.*), or:

2/ Fawn, grey or brown above, with limited flecks or other markings, often as a peppering; a conspicuous narrow black stripe from the snout, through the nostril to the eye, continuing through the tympanum (effectively over-writing it) and extending past the forearm with minimal loss of width along the length to the anterior flank. There is a pale glandular stripe from below the eye to the forearm. There is a conspicuous dark brown stripe along the front edge of the tibial region. The lower lips are faintly or partially barred. The groin and hind side of thighs are pale yellow, spotted and variegated with dark brown. Venter is whitish. Dorsal surface is smooth and leathery, throat is smooth and the venter granular. Vomerine teeth are between the choanae. Finger discs are small and barely distinct, while toe discs are of similar size. Fingers are unwebbed and toes extensive webbing between them, with the webbing reaching the disc of the fifth toe. There is a small inner and tiny outer metatarsal tubercle. Tympanum is distinct and second finger is slightly shorter than the first. Body length averages 75 mm (subgenus *Ferelitoria subgen. nov.*).

Species of *Quasilitoria gen. nov.* are separated from all other Australasian tree frogs (Pelodyadidae) by the following suite of characters:

The dorsum is smooth or with some scattered low round tubercles; front toe discs are no wider than the penultimate phalanx and toe discs only slightly wider, but otherwise also small. Front edge of thigh has either a continuous black stripe or alternatively an arrangement of broken black spots or blotches. Lower surfaces white, throat with or without some mottling, smooth on the throat and chest and slightly granular on the belly. Dorsolateral folds are either absent or very indistinct. Inner metatarsal tubercle is small and outer one is tiny. Prominent vomerine teeth. Fingers unwebbed, while toes are half to three quarters webbed.

Furthermore, one or other of the following character suites:

1/ Back is without darker markings or mottling, at most there being a slight peppering on the upper surfaces; anterior black head stripe when present is interrupted at least in part by a slight vertical bar in front of the eye; posterior dark head stripe is as wide as and overwriting the tympanum or not quite so and if not, then the lower part of the tympanum is not blackened, and snout is only moderately pointed, (*Q. axillaris*, *Q. coplandi*, *Q. inermis*, *Q. pallida*, *Q. tornieri*) (subgenus *Quasilitoria subgen. nov.*), or alternatively:

2/ With darker markings and/or stripes on the dorsal surface, with some longitudinal folds on the back, a strongly pointed snout and a well defined yellow bar in front of the eye, breaking the black line from snout past

eye, the yellow bar being blocked at the top by a small and well-defined area of black. Forefingers light yellowish or white, peppering on the light surfaces of the snout. Tympanum has a distinctive pale rim (*Q. nasuta*, *Q. peninsulae*) (subgenus *Vultusamolitoria subgen. nov.*).

**Distribution:** Most parts of Australia and New Guinea, although the majority of species are in northern Australia.

**Content:** *Pustulatarana gen. nov.* (type species); *Llewellynura* Wells and Wellington, 1985; *Mahonabatrachus* Wells and Wellington, 1985; *Salmocularana gen. nov.*; *Litoria* Tschudi, 1838; *Paralitoria gen. nov.*; *Quasilitoria gen. nov.*

#### SALMOCULARANINA SUBTRIBE NOV.

**LSIDurn:lsid:zoobank.org:act:F925B9F0-D4E1-4663-A618-8FC4120624B0**

**Type genus:** *Salmocularana gen. nov.*

**Diagnosis:** The subtribe Salmocularanina subtribe nov. is best diagnosed by way of defining each of the four component genera.

The three species in the genus *Salmocularana gen. nov.* are small species that breed in escarpment rock hills in Arnhemland, Northern Territory and also the Kimberley Ranges of north-west Australia.

The three known living species within the genus *Salmocularana gen. nov.* (one formally described within this paper) are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters:

Pale grey-brown, fawn, reddish, orange or pink above, with dorsal markings ranging from nothing more than slight peppering at the anterior part of the dorsum as seen in *Salmocularana personata* (Tyler, Davies and Martin, 1978), indistinct marbling and blotches as seen in *S. staccato* (Doughty and Anstis, 2007) or an intense randomised configuration of dark brown pigment on a light beige to grey background in *S. saxacola sp. nov.*; specimens have a distinct or semi-distinct dark brownish or purple head stripe from just in front of the nostril, through the eye and ear to upper flank just behind the forelimbs. Lips are whitish to some extent, ranging from a distinct yellow bar, to merely light and peppered brown. Ventral surfaces whitish. Skin may be smooth, with extremely tiny scattered tubercles above as in *S. personata*, or with a very limited number of scattered small tubercles above the arm and on the upper flank and nearby dorsum in *S. staccato* to scattered medium sized tubercles above the arm and on the upper flank and nearby dorsum in *S. saxacola sp. nov.*. Underneath the skin is coarsely granular, except on the throat, where it is smooth. Vomerine teeth are in two short clumps between the choanae. Finger and toe discs are moderate, wider than the digits. Fingers lack webbing, toes being about half webbed, including not reaching the disc of the fifth toe but extending no more than half way along the penultimate phalanx. Second finger is longer than the first. There is a small oval inner metatarsal tubercle and a smaller outer metatarsal tubercle. Tympanum distinct.

The genus *Litoria*, with type species *L. freycineti* Tschudi, 1838 is herein restricted to the type species and the closely related *L. latopalmata* Günther, 1867, which as a pair diverged from their nearest common ancestor 13.3

MYA according to Duellman *et al.* (2016).

This divergence and morphological differences are exactly why the species previously included in *Litoria* have been assigned to other genera.

*Litoria* as defined herein, are readily separated from all other Australasian Tree frogs (Pelodyadidae) by the following suite of characters: Species are a frog that is fawn to dark above, being either immaculate or with markings on the back, with or without a warty exterior, the warts if present being small and flattish, the markings if present typically being a series of darker blotches or variegations in either an irregular or regular pattern. There is a broad dark, canthal stripe, almost completely interrupted in front of the eye and continues behind the eye to effectively overwrite the tympanum and extend to the flanks where it invariably breaks up into a series of black spots or blotches extending to the groin. There is a pale glandular stripe from below the eye to the base of the forelimb. Limbs are variegated darker but usually with an irregular pattern of spots, blotches or bars. Lower jaw is variegated with yellow and dark brown, often forming a reticulum, often with a barred appearance. The venter is whitish. Ventral surface and flanks are granular. There is no dorsolateral skin fold. Finger and toe discs are small and project slightly but noticeably, beyond the lateral edges of the penultimate phalanges. Fingers are free, without webbing. Toes have well developed webbing, the webbing not reaching the disc of the fifth toe and extending no more than half way along the penultimate phalanx. There is a small inner and minute outer metatarsal tubercle. Vomerine teeth are in two clusters between the choanae. The tympanum is distinct and adults average 40-45 mm snout to rear.

The genus *Paralitoria gen. nov.* diverged from its nearest common ancestor, being that of the genera *Litoria* and *Quasilitoria gen. nov.* being the most closely related genera, some 15.5 MYA according to Duellman *et al.* (2016).

*Paralitoria gen. nov.* is separated from all other Australasian tree frogs (Pelodyadidae) by the following suite of characters, being one or other of the following: 1/ Fawn, grey or brown above, being immaculate; a conspicuous black stripe from the snout, through the nostril to the eye, where it is almost entirely broken by a pale vertical bar in front of the eye as a band continuing below the tympanum and extending back to the forearm with minimal loss of width along the length, where after a break, it continues obliquely along the mid flank. There is a pale glandular stripe from below the eye to the forearm. There is a conspicuous dark brown stripe along the front edge of the tibial region. Lips are not spotted or barred. The groin and hind side of thighs are pale yellow, spotted and variegated with dark brown. Venter is whitish. Dorsal surface is smooth and leathery, throat is smooth and the venter granular. Vomerine teeth are between the choanae. Finger discs are small and distinct, while toe discs are smaller and indistinct. Fingers are unwebbed and toes have moderate webbing between them. There is a small inner and tiny outer metatarsal tubercle. Tympanum is distinct and second finger is slightly shorter than the first. Body length averages 50 mm (subgenus *Paralitoria subgen. nov.*), or:

2/ Fawn, grey or brown above, with limited flecks or other

markings, often as a peppering; a conspicuous narrow black stripe from the snout, through the nostril to the eye, continuing through the tympanum (effectively over-writing it) and extending past the forearm with minimal loss of width along the length to the anterior flank. There is a pale glandular stripe from below the eye to the forearm. There is a conspicuous dark brown stripe along the front edge of the tibial region. The lower lips are faintly or partially barred. The groin and hind side of thighs are pale yellow, spotted and variegated with dark brown. Venter is whitish. Dorsal surface is smooth and leathery, throat is smooth and the venter granular. Vomerine teeth are between the choanae. Finger discs are small and barely distinct, while toe discs are of similar size. Fingers are unwebbed and toes extensive webbing between them, with the webbing reaching the disc of the fifth toe. There is a small inner and tiny outer metatarsal tubercle. Tympanum is distinct and second finger is slightly shorter than the first. Body length averages 75 mm (subgenus *Ferelitoria subgen. nov.*).

Species of *Quasilitoria gen. nov.* are separated from all other Australasian tree frogs (Pelodyadidae) by the following suite of characters:

The dorsum is smooth or with some scattered low round tubercles; front toe discs are no wider than the penultimate phalanx and toe discs only slightly wider, but otherwise also small. Front edge of thigh has either a continuous black stripe or alternatively an arrangement of broken black spots or blotches. Lower surfaces white, throat with or without some mottling, smooth on the throat and chest and slightly granular on the belly. Dorsolateral folds are either absent or very indistinct. Inner metatarsal tubercle is small and outer one is tiny. Prominent vomerine teeth. Fingers unwebbed, while toes are half to three quarters webbed.

Furthermore, one or other of the following character suites:

1/ Back is without darker markings or mottling, at most there being a slight peppering on the upper surfaces; anterior black head stripe when present is interrupted at least in part by a slight vertical bar in front of the eye; posterior dark head stripe is as wide as and overwriting the tympanum or not quite so and if not, then the lower part of the tympanum is not blackened, and snout is only moderately pointed, (*Q. axillaris*, *Q. coplandi*, *Q. inermis*, *Q. pallida*, *Q. tornieri*) (subgenus *Quasilitoria subgen. nov.*), or alternatively:

2/ With darker markings and/or stripes on the dorsal surface, with some longitudinal folds on the back, a strongly pointed snout and a well defined yellow bar in front of the eye, breaking the black line from snout past eye, the yellow bar being blocked at the top by a small and well-defined area of black. Forefingers light yellowish or white, peppering on the light surfaces of the snout. Tympanum has a distinctive pale rim (*Q. nasuta*, *Q. peninsulae*) (subgenus *Vultusamolitoria subgen. nov.*).

**Distribution:** Most parts of Australia and parts of southern New Guinea, although the majority of species are in northern Australia.

**Content:** *Salmocularana gen. nov.* (type species); *Litoria* Tschudi, 1838; *Paralitoria gen. nov.*; *Quasilitoria gen. nov.*

**SAGUNURINI TRIBE NOV.**

**LSIDurn:lsid:zoobank.org:act:55665C91-6E14-4F47-AE34-E3E87D4FAC05**

**Type genus:** *Saganura* Wells and Wellington, 1985.

**Diagnosis:** The tribe Saganurini tribe nov. is monotypic for the type genus and therefore the tribe diagnosis is the same as for the genus *Saganura* Wells and Wellington, 1985.

Living frogs in the genus *Saganura* Wells and Wellington, 1985 are all readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters:

It is a uniform light green above, commonly with scattered light fawn spots, or dark brown with irregular bright green patches and light brown flecks. There is a narrow, black canthal streak, widening behind the eye to form a dark broad band extending almost to the groin; this dark band often broken up by groups of irregular white blotches and/or spots. There is an obscure, narrow light green zone along the supratympanic ridge. There is no pale line along the posterior edge of the upper jaw. Venter is pinkish-white, throat darker with a greyish tinge. Groin and hind side of thighs is a uniform pale brown. Dorsal surface smooth or with scattered small tubercles. Chin smooth and other lower surfaces are granular. Vomerine teeth are between or behind the choanae, with hind edge of vomerine teeth always further back than the choanae. Prepectoral fold present. Finger and toe discs large. Fingers with conspicuous basal webbing, being nearly a third webbed, toes are about three quarters webbed. There is a large inner and small outer metatarsal tubercle. Tympanum is distinct. Second finger is much longer than first; when pressed together, the tip of the first finger reaches no further than the base of the disc of the second finger. Heel of adpressed hindlimb reaches to the eye or beyond. Adults attain about 55 mm in total length (adapted and modified from Cogger 2014).

According to Duellman *et al.* (2016), the species in this genus diverged from their nearest living relatives 27.6 MYA being more than sufficient justification for erecting this new tribe.

**Distribution:** South-west Tasmania, including highlands and coast.

**Content:** *Saganura burrowsae* (Scott, 1942) (monotypic).

**WOWRANAINI TRIBE NOV.**

**LSIDurn:lsid:zoobank.org:act:5756C747-7B83-47E0-95CE-F3AB9E9C3341**

**Type genus:** *Wowrana gen. nov.*

**Diagnosis:** The tribe Wowranaini tribe nov. includes two genera. It is best defined by diagnosing each, noting that each genus also occupies one subtribe each.

Frogs in the genus *Wowrana gen. nov.* in the nominate subgenus are readily separated from all other Australasian (Australian and New Guinea) Tree Frogs (Pelodyadidae) by the following unique suite of characters:

Large size (adult males over 60 mm); uniform bright green dorsal colouration in life (blue in preservative). Fully webbed hands.

No prominent and enlarged parotoid glands, no white labial stripe, SVL not over 85 mm and a call consisting of

a single, relatively short (0.206-0.379 s) grunt with an unusual clumped pattern of pulses. The single species within the subgenus *Parawowrana subgen. nov.* is defined as above, except that it instead is slightly smaller than the preceding species (adult males 50-55 mm), has a white labial stripe (in common with the much larger species in *Sandyrana* Wells and Wellington, 1985, that grow to in excess of 100 mm in body length) and has a characteristically longer call than those in the nominate subgenus (0.69-0.9 second) (Richards *et al.* 2006).

Duellman *et al.* (2016) found that the species in the genus *Wowrana gen. nov.* diverged from their nearest living relatives 26.5 MYA, being species within *Sandyrana* Wells and Wellington, 1985. The type form of *Nyctimystes* Stejneger, 1916, namely *Nyctimantis papua* Boulenger, 1897 diverged from this genus 36.1 MYA, making genus level assignment of *Wowrana gen. nov.* an obvious choice.

Frogs in the genus *Sandyrana* Wells and Wellington, 1985 are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: Large frogs, which as adults can grow to in excess of 100 mm. Dorsal colour of adults in life is usually uniform green above in normal circumstances, but may otherwise range from fawn, through green, purplish or even blue. Fingers with conspicuous webbing, reaching at least as far as the base of the penultimate phalanx of the fourth finger. Hind edge of forearm is smooth, or with at most a few low, discontinuous tubercles. Hind edge of feet is smooth. Hind side of thighs is more or less uniform, without black and yellow marbling, spots or blotches.

Webbing reaching no further than the base of the penultimate phalanx of the fourth finger. A distinctive white or pink stripe along the edge of the lower jaw, extending back to the level of the forelimb and not in a configuration of blobs, spots or random markings otherwise tending to be in a linear manner. Vomerine teeth present.

**Distribution:** All species within *Wowrana gen. nov.* are confined to forested locations on the island of New Guinea and in general most species are currently known from relatively few specimens.

Species within the genus *Sandyrana* Wells and Wellington, 1985 are found throughout New Guinea and west as far as Halmahera Island as well as New Britain, New Ireland, Aru Islands and north-east Queensland, Australia.

**Content:** *Wowrana gen. nov.* (type genus); *Sandyrana* Wells and Wellington, 1985.

**SANDYRANINA SUBTRIBE NOV.**

**LSIDurn:lsid:zoobank.org:act:4B9B0AAD-FDD5-4EE7-AC3B-DFE5893944C8**

**Type genus:** *Sandyrana* Wells and Wellington, 1985.

**Diagnosis:** The subtribe Sandyranina subtribe nov. is monotypic for the type genus and therefore the tribe diagnosis is the same as for the genus *Sandyrana* Wells and Wellington, 1985.

Frogs in the genus *Sandyrana* Wells and Wellington, 1985 are readily separated from all other Australasian Tree Frogs (Pelodyadidae) by the following unique suite of characters: Large frogs, which as adults can grow to in

excess of 100 mm. Dorsal colour of adults in life is usually uniform green above in normal circumstances, but may otherwise range from fawn, through green, purplish or even blue. Fingers with conspicuous webbing, reaching at least as far as the base of the penultimate phalanx of the fourth finger. Hind edge of forearm is smooth, or with at most a few low, discontinuous tubercles. Hind edge of feet is smooth. Hind side of thighs is more or less uniform, without black and yellow marbling, spots or blotches. Webbing reaching no further than the base of the penultimate phalanx of the fourth finger. A distinctive white or pink stripe along the edge of the lower jaw, extending back to the level of the forelimb and not in a configuration of blobs, spots or random markings otherwise tending to be in a linear manner. Vomerine teeth present.

Duellman *et al.* (2016) found that the species within the genus *Sandyrana* diverged from their nearest living relatives 26.5 MYA making subtribe level classification for the group wholly appropriate.

**Distribution:** Throughout New Guinea and west as far as Halmahera Island as well as New Britain, New Ireland, Aru Islands and north-east Queensland, Australia.

**Content:** *Sandyrana* Wells and Wellington, 1985.

#### SUMMARY

For the first time ever, the Australian and New Guinean frog family Pelodyadidae have a robust classification at all levels. The classification of the group has effectively been brought up to date.

Well known but hitherto unnamed species have been formally named, which is an important first step for some which are already facing extinction.

The tribe and genus-level classification of the family is also based on simple logic and common sense, which also happen to be core principles of science. When the smoke, mirrors and lies of the Wolfgang Wüster gang of thieves clears after the death of the key members of the gang, there is little doubt that the classification within this paper will be derided as both logical and self evident. One hopes that for the sake of the frogs themselves and their ultimate long-term survival, as outlined by Hoser (2019a, 2019b), that the classification system within this paper is in fact adopted sooner, rather than later.

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## Australasian Tree Frog (Family Pelodryadidae Günther, 1858), genus and species list (incl. page numbers for descriptions).

### PELODRYADIDAE GÜNTHER, 1858

#### ADELYNHOSERHYLEINI TRIBE NOV. ... 151

##### **Adelynhoserhylea gen. nov. ... 10**

*Adelynhoserhylea adelynhoserae* sp. nov.

(type species) ... 10

*A. myola* (Hoskin, 2007)

*A. serrata* (Andersson, 1916)

*A. exophthalmia* (Tyler, Davies and Aplin, 1986)

##### **Yikesanura subgen. nov. ... 10**

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*A. eucnemis* Lönnberg, 1900

##### **Jackyhoserhylea gen. nov. ... 11**

*Jackyhoserhylea genimaculata* (Horst, 1883)

(type species)

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*Leucodigirana andiirrmalin* McDonald, 1997

(monotypic)

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*Euscelis lesueurii* (Dümeril and Bibron, 1841)

(type species)

*E. booroolongensis* (Moore, 1961)

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(*E. booroolongensis occultatum* subsp. nov.) ... 17

*E. jungguy* (Donnellan and Mahony, 2004)

*E. wilcoxi* (Günther, 1864)

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*M. cultripes* (Parker, 1940)

*M. longipes* (Tyler and Martin, 1977)

*M. maculosa* (Tyler and Martin, 1977)

*M. maini* (Tyler and Martin, 1977)

*M. manya* (van Buerden and Macdonald, 1980)

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*M. leucodorsalinae* sp. nov. ... 24

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(type species)

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Hines, Doughty and Donnellan, 2016)

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*C. dahlia* (Boulenger, 1896)

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*Ranoidea aurea* (Lesson, 1831) (type species)

##### **Sandgroperanura subgen. nov. ... 29**

*R. cyclorhyncha* (Boulenger, 1892) (type species)

*R. moorei* (Copland, 1957)

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*M. nyakalensis* (Liem, 1974)

*M. piloti* sp. nov. ... 36

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*N. intercastellus* (Kraus, 2012)

*N. kuduki* (Richards, 2007)

*N. latratus* (Menzies, 2014)

*N. montana* (Peters and Doria, 1878)

*N. obsoletus* (Lönnerberg, 1900)

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*S. elkeae* (Günther and Richards, 2000)

*S. eschata* (Kraus and Allison, 2009)

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