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The inevitable reassessment of the Australasian frog genera *Mixophyes* Günther, 1864 and *Taudactylus* Straughan and Lee, 1966, resulting in the formal descriptions of two new families, new subfamilies and tribes, three new genera, 2 new subgenera, 1 new species and 2 new subspecies.

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ABSTRACT

The higher classification of frogs at the familial level by Bossuyt and Roelants (2009) has been generally accepted by a majority of publishing herpetologists, including in the Australian context, Cogger (2014).

Notwithstanding this, the published phylogeny of Bossuyt and Roelants (2009) and more recently that of Pyron and Weins (2011) have shown some inconsistencies within this classification.

Bossuyt and Roelants (2009) indicated families within the superfamily Myobatrachoidea as defined by them diverging in the Cretaceous (Paleogene) whereas virtually all families within the more speciose Nobleobatrachia diverged in the more recent Neogene.

To rectify this anomaly, two divergent genera within their putative Myobatrachidae have been assessed as being sufficiently divergent as to warrant being placed in separate families, both on the basis of divergence and morphology.

These genera, *Mixophyes* Günther, 1864 and *Taudactylus* Straughan and Lee, 1966 are also split into divergent lineages and new genera formally erected. A well known, but hitherto unnamed species previously confused with *Mixophyes balbus* Straughan, 1968 is also formally named for the first time.

Two endangered or recently extinct subspecies within newly two named genera are also formally named.

In total this paper formally names two new families including new subfamilies and tribes with the same diagnostic characters, three new genera, 2 new subgenera, 1 new species and 2 new subspecies.

A previously named subgenus *Paramixophyes* Hoser, 2016 is formally elevated to a full genus.

Keywords: Taxonomy; nomenclature; Anura; frogs; Australia; New Guinea; Australasia; Australia; Queensland; New South Wales; Myobatrachidae; Limnodynastidae; Rheobatrachidae; Cycloranidae; *Mixophyes*; *Taudactylus*; *Rheobatrachus*; *Paramixophyes*; New Genus; *Oxyslop*; *Hoserranae*; *Scottyjamesus*; new subgenus *Feremixophyes*; *Quasimixophyes*; new species; *hoserae*; New subspecies; *shaunwhitei*; *scottyjamesi*; New family; Oxyslopidae; Hoserranidae; New subfamily; Oxyslopinae; Hoserraninae; New tribe; Oxyslopini; Hoserranini; Scottyjamesini; *acutirostris*; *liemi*, *pleione*; *rheophilus*; *diurnis*; *eungellaensis*; *balbus*; *iteratus*; *fleayi*; *fasciolatus*; *schevilli*; *coggeri*; *carbinensis*; *hihihorlo*; *couperi*; *shireenae*.

INTRODUCTION

As part of an audit of the classification of Australian frogs, the two divergent putative genera *Mixophyes* Günther, 1864 and *Taudactylus* Straughan and Lee, 1966 were assessed.

Hoser (2016) named two previously unnamed species in the *M. fasciolatus* Günther, 1864 group and also erected a subgenus for the most divergent Australian species, *M. iteratus* Straughan, 1968.

Evidence suggested further unnamed forms, but due to severe population declines in the period from 1970 to present, access to living specimens has been difficult and compounded by a general lack of museum specimens.

Not withstanding this an audit of available literature and specimens yielded further candidate taxa with the best known of these unnamed forms being formally named herein.

This is the so-called southern population of putative *Mixophyes balbus* Straughan, 1968.

While the higher classification of frogs at the familial level by Bossuyt and Roelants (2009) has been generally accepted by a majority of publishing herpetologists, including in the Australian

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context, Cogger (2014), this audit also found conflict with regards to this taxonomy.

The published phylogeny of Bossuyt and Roelants (2009) and more recently that of Pyron and Weins (2011) have shown some inconsistencies within this classification.

Bossuyt and Roelants (2009) indicated families within the superfamily Myobatrachoidea as defined by them diverging in the Cretaceous (Paleogene) whereas virtually all families within the more speciose Nobleobatrachia diverged in the more recent Neogene.

Three genera within their putative Myobatrachidae were shown by both Bossuyt and Roelants (2009) Pyron and Weins (2011) to be sufficiently divergent to warrant being separated at the family level of classification.

These putative genera were *Rheobatrachus* Liem, 1973, *Mixophyes* Günther, 1864 and *Taudactylus* Straughan and Lee, 1966.

Rheobatrachus Liem, 1973 (including as defined by Hoser 1991) was placed in a separate family Rheobatrachidae by Bossuyt and Roelants (2009), after earlier being placed in the subfamily Rheobatrachinae Heyer and Liem, 1976 and for the purposes of this paper the relevant genus is herein ignored.

However neither genus *Mixophyes* Günther, 1864 and *Taudactylus* Straughan and Lee, 1966 have available family names and so both genera are formally placed within newly erected families along with other genera created resulting from divisions of these ancient genera.

These divisions are based on divergence and morphological differences and the subgenus *Paramixophyes* Hoser, 2016 is also formally elevated to full genus status.

A well known, but hitherto unnamed species previously confused with *Mixophyes balbus* Straughan, 1968 is also formally named for the first time.

A northern regional population of the endangered or extinct species *T. acutirostris* (Andersson, 1916), herein placed in a newly erected genus *Hoserranae gen. nov.* is formally described as a new subspecies *H. acutirostris shaunwhitei subsp. nov.*.

Also a southern regional population of the endangered or extinct species *T. rheophilus* Liem and Hosmer, 1973, placed in a newly erected genus *Scottyjamesus gen. nov.* is formally described as a new subspecies *S. rheophilus scottyjamesi subsp. nov.*.

In total this paper formally names two new families, as well as new subfamilies and tribes, 3 new genera, 2 new subgenera, 1 new species and 2 new subspecies.

MATERIALS AND METHODS

While this is self evident from both abstract and introduction, I mention that inspection of specimens of relevant species has been over a 30 year period and included specimens in the field, captivity, museums, photos with good locality data and a review of all relevant and available literature.

Relevant references relevant to the taxonomy and nomenclature of species within the putative genera

Mixophyes Günther, 1864 and *Taudactylus* Straughan and Lee, 1966 and the taxonomy and nomenclature presented in this paper include the following: Andersson (1916), Anstis (2013), Barker *et al.* (1995), Berger (2001), Berger *et al.* (1999), Bossuyt and Roelants (2009), Cogger (2014), Cogger *et al.* (1983), Corben and Ingram (1987), Czechura (1986), Czechura and Ingram (1990), Donnellan *et al.* (1990), Eipper and Rowland (2018), Gillespie and Hines (1999), Günther (1864), Heyer and Liem (1976), Hoser (1989, 1991), Ingram (1980), Johnson (1971), Liem (1973), Liem and Hosmer (1973), Loveridge (1933), Lynch (1971), Mahony *et al.* (2006), McDonald (1992), Pyron and Wiens (2011), Ride *et al.* (1999), Schloegel *et al.* (2006), Straughan (1968), Straughan and Lee (1966), Vanderduys (2012), Wells and Wellington (1985), Tyler (1997), Tyler and Davies (1985) and sources cited therein.

An illegal armed raid and theft of materials on 17 Aug 2011 effectively stopped the publication of a variant of this paper being published back then and a significant amount of materials taken in that raid was not returned. This was in spite of court orders telling the relevant State Wildlife officers to do so (Court of Appeal 2014, Victorian Civil and Administrative Tribunal 2015).

Rather than run the risk of taxa becoming threatened or extinct due to non-recognition of them as shown in Hoser (2019a, 2019b), I have instead opted to publish this paper in its current form, even though a significant amount of further data was intended to be published and is not.

Naming of taxa is perhaps the most important step in their ultimate preservation and it is with this motivation in mind (protection of biodiversity) that I have chosen to publish this paper.

RESULTS

As already stated, based on morphological and molecular divergences as cited in the literature above the final taxonomic changes resulting from this audit are as follows;

The genus *Mixophyes* Günther, 1864 is split three ways, with the subgenus *Paramixophyes* Hoser, 2016 being elevated to full genus status.

The divergent New Guinea taxon, known currently as *Mixophyes hihihorlo* Donnellan, Mahony and Davies, 1990 is made type species for the newly named genus *Oxyslop gen. nov.*, with the same genus being used to form the family, subfamily and tribe containing all species placed to date in *Mixophyes*, *Paramixophyes* and *Oxyslop gen. nov.*, including the newly named species within this paper.

In terms of the frog known currently as *Mixophyes hihihorlo* Donnellan, Mahony and Davies, 1990, the original description of that taxon spells out sufficient basis for its placement in a separate genus to all other *Mixophyes.*

Mixophyes (as defined herein) is also divided into three well defined subgenera, two being formally named for the first time.

These subgenera are as follows: The nominate subgenus includes the so-called *M. fasciolatus* Günther, 1864 species group, including *M. fasciolatus* Günther, 1864, *M. shireenae* Hoser, 2016 and *M. couperi* Hoser, 2016.

The subgenus *Feremixophyes subgen. nov.* includes the north Queensland clade of species being *M. coggeri* Mahony, Donnellan, Richards and McDonald, 2016 (type species), *M. carbinensis* Mahony, Donnellan, Richards and McDonald, 2016 and *M. schevelli*, Loveridge, 1933.

The subgenus *Quasimixophyes subgen. nov.* includes members of the so-called *M. balbus* Straughan, 1968 group of species, including *M. hoserae sp. nov.* (type species), *M. balbus* and *M. fleayi* Corben and Ingram, 1987.

Species in each of the three subgenera also have significantly different reproductive biologies, further supporting the subgenus level split.

The species *M. hoserae sp. nov.* was previously regarded as the southern population of *M. balbus*. It has been known as a separate species-level taxon for some time (Anstis 2013) and in line with the recommendations of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999) it is formally named.

The putative genus *Taudactylus* Straughan and Lee, 1966 has long been known to contain various species groups and due to the ancient divergence of each, two new genera are formally erected.

These are *Hoserranae* gen. nov. for the putative species *Crinia acutirostris* Andresson, 1916 from the wet tropics of North Queensland. This genus is also used as the basis to erect a new family, and subfamily for all relevant living species.

At the tribe level, relevant species and genera are split two ways.

The genus *Scottyjamesus gen. nov.* is erected to accommodate a well-defined clade including other north Queensland species, namely *Taudactylus liemi* Ingram, 1980, *Taudactylus pleione*

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Czechura, 1986 and *Taudactylus rheophilus* Liem and Hosmer, 1973.

A northern regional population of the endangered or extinct species *T. acutirostris* (Andersson, 1916), herein placed in a newly erected genus *Hoserranae gen. nov.* is formally described as a new subspecies *H. acutirostris shaunwhitei subsp. nov.*.

Also a southern regional population of the endangered or extinct species *T. rheophilus* Liem and Hosmer, 1973, placed in a newly erected genus *Scottyjamesus gen. nov.* is formally described as a new subspecies *S. rheophilus scottyjamesi subsp. nov.*.

The genus *Taudactylus* with the type species of *T. diurnis* Straughan and Lee, 1966 only includes that species and the similar *T. eungellensis* Liem and Hosmer, 1973.

The antiquity of divergence of the three groups makes the argument for creation of three separate genera compelling.

Of these three genera, they are also split into two tribes that are easily defined and separated.

The tribe Hoserranini tribe nov. includes the genus *Hoserranae gen. nov.* only from the wet tropics of far north Queensland, while the new tribe Scottyjamesini tribe nov. includes the two genera *Taudactylus* Straughan and Lee, 1966 and *Scottyjamesus gen. nov.*.

The genus *Mixophyes* has in the recent past been placed in various families or subfamilies, including Myobatrachidae as seen in Cogger *et al.* (1983) or Cogger (2014) or Cycloraninae Parker, 1940, by Lynch (1971), with the molecular results of Pyron and Weins (2011) suggesting a relationship with the Limnodynastidae.

None of these placements actually suit the genus which has a divergence from all nominal groups extending to the Cretaceous. Hence in this paper, I formally erect a new family for the three genera

Oxyslop gen. nov., *Mixophyes* and *Paramixophyes*, with *Oxyslop gen. nov.* as the type genus.

A similar situation occurs for the divergent genus *Taudactylus* Straughan and Lee, 1966, including newly named genera *Hoserranae gen. nov.* and *Scottyjamesus* gen. nov.. Hence in this paper, I formally erect a new family for the three genera, with *Hoserranae gen. nov.* as the type genus.

In the case of the new families Oxyslopidae fam. nov. and Hoserranidae fam. nov., new subfamilies and tribes are formally erected and defined to allow for addition of fossil member species if and when they are found.

INFORMATION RELEVANT TO THE FORMAL DESCRIPTIONS THAT FOLLOW

There is no conflict of interest in terms of this paper or the conclusions arrived at herein.

Several people including anonymous peer reviewers who revised the manuscript prior to publication are also thanked as a relevant staff at museums who made specimens and records available in line with international obligations.

In terms of the following formal descriptions, spellings should not be altered in any way for any purpose unless expressly and exclusively called for by the rules governing Zoological Nomenclature as administered by the International Commission of Zoological Nomenclature.

In the unlikely event two newly named taxa are deemed conspecific by a first reviser, then the name to be used and retained is that which first appears in this paper by way of page priority and as listed in the abstract keywords.

Some material in descriptions for taxa may be repeated for other taxa in this paper and this is necessary to ensure each fully complies with the provisions of the *International Code of Zoological Nomenclature* (Fourth edition) (Ride *et al.* 1999) as amended online since.

Material downloaded from the internet and cited anywhere in this paper was downloaded and checked most recently as of 20 February 2020, unless otherwise stated and were accurate in terms of the context cited herein as of that date.

Unless otherwise stated explicitly, colour descriptions apply to living adult specimens of generally good health and not under any form of stress by means such as excessive cool, heat, dehydration or abnormal skin reaction to chemical or other input.

While numerous texts and references were consulted prior to publication of this paper, the criteria used to separate the relevant species has already been spelt out and/or is done so within each formal description and does not rely on material within publications not cited herein.

Each newly named taxon is readily and consistently separable from their nearest related taxon and that which until now it has been previously treated as.

Delays in recognition of these taxa could jeopardise the long-term survival of these taxa as outlined by Hoser (2019a, 2019b) and sources cited therein, especially noting the devastating effects of fungus and other potential pathogens in terms of declines in all relevant taxa since the 1970's as noted in the references cited above.

Therefore attempts by taxonomic vandals like the Wolfgang Wüster gang (Kaiser *et al.* 2013 as amended frequently) to unlawfully suppress the recognition of these taxa on the basis they have a personal dislike for the person who formally named it should be resisted (Dubois *et al.* 2019).

Claims by the Wüster gang against this paper and the descriptions herein will no doubt be no different to those the gang have made previously.

See the complete discrediting of the Wüster gang claims, cited as Kaiser *et al.* (2013) and Kaiser (2012a, 2012b, 2013. 2014a, 2014b) in the publications of Dubois *et al.* (2019), Hoser (1989, 1991, 2007, 2009, 2012a, 2012b, 2013, 2015a-f, 2019a-b) and sources cited therein.

In terms of conservation prospects, all relevant genera are regarded as being in serious decline and at risk of extinction, with primary blame being placed in the Australian government and State governments, in particular via the actions of the State wildlife departments and their steadfast refusal to enact proper captive breeding programs for the relevant taxa in any meaningful way.

The long term overpopulation of the continent with feral humans (Saunders, 2019) does not auger well for the long term survival of any of the relevant species!

In line with the Australian Federal Government's "Big Australia" policy, that being to increase the human population of 25 million (2020), from 13 million in around 1970, to over 100 million within 100 years "so that we can tell China what to do", as stated by the former Prime Minister, Kevin Rudd in 2019 (Zaczek 2019), the human pressure on the relevant ecosystems has increased in line with the human populations nearby and will clearly continue to do so.

GENUS *MIXOPHYES* GUNTHER, 1864

Type species: *Mixophyes fasciolatus* Günther 1864.

Diagnosis: The genus *Mixophyes* (*sensu lato*) are the so-called Barred Frogs from riverine and rainforest habitats and nearby areas in Eastern Australia. Of Gondawanan origins, they are large muscular frogs with powerful hind limbs, strongly webbed feet and banded legs capable of long jumps. Maxillary teeth are present. Prominent vomerine teeth are in front of the choanae. Pupil is vertical. Tympanum distinct. There is typically a large narrow dark brown or black stripe from the snout to the eye, but interrupted by the nostril and extending behind the eye and over and behind the tympanum, where it tends to broaden, either imperceptibly or significantly, depending mainly on the species.

Females are the larger sex and reproduction is somewhat unusual among frogs in that amplexing pairs produce eggs in water and then using her hind limbs, the female projects newly laid eggs up onto the stream bank where they stick to rocks or vegetation, where they remain until hatching in rain, causing the tadpoles to wash down and return into the stream.

These frogs are separated from all other Australian species by the following characters: having a broadly oval and large tongue

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that does not adhere to the floor of the mouth at the rear and the prevomer is well-developed with prominent vomerine teeth (adapted from Cogger, 2014).

The preceding diagnosis also applies to the new genus *Oxyslop gen. nov.*, the single species of which was until now included in this genus.

Oxyslop gen. nov. with a type species of *Mixophyes hihihorlo* Donnellan, Mahony and Davies, 1990 from New Guinea is readily separated from all (other) species in *Mixophyes* (all from Australia), including all species or subspecies of *Paramixophyes* Hoser, 2016 by possessing an uninterrupted narrow vertebral stripe extending from between the eyes to just above the vent and by the absence of a dark triangular patch on the upper lip in front of the nostril with its base along upper lip and apex at nostril. It is further readily separated from all other species in *Mixophyes* (all from Australia) by having longer legs and distinctively smaller eyes and extensive toe webbing.

Additionally *Oxyslop gen. nov.* is distinguished by details of its karyotype and osteology as detailed by Donnellan *et al.* (1990).

Paramixophyes Hoser, 2016, type species *M. iteratus* Straughan, 1968, herein elevated to full genus status, is found along the east coast and ranges of New South Wales from west of Sydney to south-east Queensland and are separated from all (other) species within *Mixophyes* by the fact that the length of the inner metatarsal tubercle is only about half the length of the first toe (versus being nearly of equal length in the other species), and that only two joints of the fourth toe are free of web (versus three joints of the toe being free of web in the other species).

Physically *Paramixophyes* presents as being of different shape to the other species by being more triangular in overall shape and with proportionately larger hind limbs. *M. iteratus* is also of a different size class to the other members of the genus, it attaining up to 115 mm in body length, versus no more than 100 mm (usually 80 mm) in the other species. Straughan (1968) provides detail of other differences between *P. iteratus* and other species in the genus *Mixophyes*.

Distribution: With the formal transfer of *Mixophyes hihihorlo* Donnellan, Mahony and Davies, 1990 to the genus *Oxyslop gen. nov.* all species of *Mixophyes* are now restricted to Australia from Cape York, Queensland, in wetter habitats along the coast south through New South Wales to just into Victoria in the far north-east of the state. Populations in many areas have declined sharply or become extinct since the 1970's, while apparently remaining stable in other areas.

Oxyslop gen. nov. is effectively only known from the type locality of Namosado at an elevation of 900 metres in the Southern Highlands Province of Papua New Guinea.

Content: *Mixophyes fasciolatus* Günther 1864 (type species); *M. balbus* Straughan, 1968; *M. carbinensis* Mahony, Donnellan, Richards and McDonald, 2006; *M. coggeri* Mahony, Donnellan, Richards and McDonald, 2006; *M. couperi* Hoser, 2016; *M. hoserae sp. nov.* (this paper); *M. shireenae* Hoser, 2016; *M. fleayi* Corben and Ingram, 1987; *M. schevelli* Loveridge, 1933.

NEW GENUS *OXYSLOP GEN. NOV.*

LSIDurn:lsid:zoobank.org:act:D763BF5E-63DB-4855-A6F3-BBD46BEBAAF3

Type species: *Mixophyes hihihorlo* Donnellan, Mahony and Davies, 1990.

Diagnosis: The genus *Mixophyes* (*sensu lato*) are the so-called Barred Frogs from riverine and rainforest habitats and nearby areas in Eastern Australia. Of Gondawanan origins, they are large muscular frogs with powerful hind limbs, strongly webbed feet and banded legs capable of long jumps. Maxillary teeth are present. Prominent vomerine teeth are in front of the choanae. Pupil is vertical. Tympanum distinct. There is typically a large narrow dark brown or black stripe from the snout to the eye, but interrupted by the nostril and extending behind the eye and over and behind the tympanum, where it tends to broaden, either imperceptibly or significantly, depending mainly on the species. Females are the larger sex and reproduction is somewhat unusual among frogs in that amplexing pairs produce eggs in water and then using her hind limbs, the female projects newly laid eggs up onto the stream bank where they stick to rocks or vegetation, where they remain until hatching in rain, causing the tadpoles to wash down and return into the stream.

These frogs are separated from all other Australian species by the following characters: having a broadly oval and large tongue that does not adhere to the floor of the mouth at the rear and the prevomer is well-developed with prominent vomerine teeth (adapted from Cogger, 2014). The preceding diagnosis also applies to the new genus *Oxyslop gen. nov.*, the single species of which was until now included in this genus.

Oxyslop gen. nov. with a type species of *Mixophyes hihihorlo* Donnellan, Mahony and Davies, 1990 from New Guinea is readily separated from all (other) species in *Mixophyes* (all from Australia), including all species or subspecies of *Paramixophyes* Hoser, 2016 by possessing an uninterrupted narrow vertebral stripe extending from between the eyes to just above the vent and by the absence of a dark triangular patch on the upper lip in front of the nostril with its base along upper lip and apex at nostril. It is further readily separated from all other species in *Mixophyes* (all from Australia) by having longer legs and distinctively smaller eyes and extensive toe webbing.

Additionally *Oxyslop gen. nov.* is distinguished by details of its karyotype and osteology as detailed by Donnellan *et al.* (1990).

Paramixophyes Hoser, 2016, type species *M. iteratus* Straughan, 1968, herein elevated to full genus status, is found along the east coast and ranges of New South Wales from west of Sydney to south-east Queensland and are separated from all (other) species within *Mixophyes* by the fact that the length of the inner metatarsal tubercle is only about half the length of the first toe (versus being nearly of equal length in the other species), and that only two joints of the fourth toe are free of web (versus three joints of the toe being free of web in the other species).

Physically *Paramixophyes* presents as being of different shape to the other species by being more triangular in overall shape and with proportionately larger hind limbs. *M. iteratus* is also of a different size class to the other members of the genus, it attaining up to 115 mm in body length, versus no more than 100 mm (usually 80 mm) in the other species. Straughan (1968) provides detail of other differences between *M.iteratus* and others in the genus.

Distribution: *Oxyslop gen. nov.* is effectively only known from the type locality of Namosado at an elevation of 900 metres in the Southern Highlands Province of Papua New Guinea.

With the formal transfer of *Mixophyes hihihorlo* Donnellan, Mahony and Davies, 1990 to the genus *Oxyslop gen. nov.* all species of *Mixophyes* are now restricted to Australia from Cape York, Queensland, in wetter habitats along the coast south to just into Victoria in the far north-east of the state. Populations in many areas have declined sharply or become extinct since the 1970's, while apparently remaining stable in other areas.

Etymology: Named in honour of two pet Great Danes the Hoser family and Snakebusters: Australia's best reptiles shows have owned over two dog lifetime's. Both dogs, named Slop and Oxy (short for *Oxyuranus*) guarded the research facility and home for nearly 2 decades and successfully protected all from potential attacks by thieves.

Content: *Oxyslop hihihorlo* (Donnellan, Mahony and Davies, 1990) (monotypic).

SUBGENUS *FEREMIXOPHYES SUBGEN. NOV.*

LSID urn:lsid:zoobank.org:act:6384D119-AB90-4AE5-8F3D-D577D6157285

Type species: *Mixophyes coggeri* Mahony, Donnellan, Richards and McDonald, 2016.

Diagnosis: The subgenus *Feremixophyes subgen. nov.* is readily separated from the other two subgenera within

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Mixophyes Günther, 1864 by the following two characters: The length of the inner metatarsal tubercule is approximately half the length of the first toe versus nearly equal to the length in the other two subgenera and the webbing between the toes extends to the second most distal joint of the fourth toe. The web extends to the third most distal joint of the fourth toe in the other two subgenera and to the terminal disc of the fourth toe in *Oxyslop gen. nov.*.

Feremixophyes subgen. nov. can be separated from *Paramixophyes* Hoser, 2016 by having a few or no scattered dark spots on the side versus a broad zone of numerous dark spots on the side.

Feremixophyes subgen. nov. can also be distinguished from *Oxyslop gen. nov.* by the absence of an uninterrupted narrow vertebral stripe extending from between the eyes to just above the vent.

Frogs within the subgenus *Quasimixophyes subgen. nov.* are separated from the nominate subgenus of *Mixophyes* by having a grey (not whitish) upper lip and areas of darker pigment being prominent on the upper lip, versus a pale creamy-white upper lip without obvious darker blotches in *Mixophyes*.

The nominate subgenus of *Mixophyes* includes the so-called *M. fasciolatus* Günther, 1864 species group, including *M. fasciolatus* Günther, 1864, *M. shireenae* Hoser, 2016 and *M. couperi* Hoser, 2016 from wetter forested riverine habitats south of the wet tropics in Queensland along the coast and nearby ranges to southern New South Wales.

The subgenus *Feremixophyes subgen. nov.* includes the north Queensland clade of species being *M. coggeri* Mahony, Donnellan, Richards and McDonald, 2016 (type species), *M. carbinensis* Mahony, Donnellan, Richards and McDonald, 2016 and *M. schevelli*, Loveridge, 1933 and is confined to the wet tropics region of far north Queensland.

The subgenus *Quasimixophyes subgen. nov.* includes members of the so-called *M. balbus* Straughan, 1968 group of species, including *M. hoserae sp. nov.* (type species), *M. balbus* and *M. fleayi* Corben and Ingram, 1987 are found from south-east Queensland south along the coast and nearby ranges to north-east Victoria. Species in each of the three subgenera also have significantly different reproductive biology's further supporting the subgenus level split.

Distribution: *Feremixophyes subgen. nov* is confined to the wet tropics region of far north Queensland.

Etymology: "Fere" in Latin means nearly or not quite, in reflection of the fact that species in this subgenus are not quite the same as nominate *Mixophyes*.

Content: *M.* (*Feremixophyes*) *coggeri* Mahony, Donnellan, Richards and McDonald, 2016 (type species); *M.* (*Feremixophyes*) *carbinensis* Mahony, Donnellan, Richards and McDonald, 2016; *M.* (*Feremixophyes*) *schevelli* Loveridge, 1933.

SUBGENUS *QUASIMIXOPHYES SUBGEN. NOV.*

LSID urn:lsid:zoobank.org:act:8D705124-C4AC-4084-A62C-17EBCF69BE72

Type species: *Mixophyes* (*Quasimixophyes*) *hoserae sp. nov.* (this paper).

Diagnosis: Frogs within the subgenus *Quasimixophyes subgen. nov.* are separated from the nominate subgenus of *Mixophyes* by having a grey (not whitish) upper lip and areas of darker pigment being prominent on the upper lip, versus a pale creamy-white upper lip without obvious darker blotches in *Mixophyes*.

The subgenus *Feremixophyes subgen. nov.* is readily separated from the other two subgenera within *Mixophyes* Günther, 1864 by the following two characters: The length of the inner metatarsal tubercule is approximately half the length of the first toe versus nearly equal to the length in the other two subgenera and the webbing between the toes extends to the second most distal joint of the fourth toe. The web extends to the third most distal joint of the fourth toe in the other two subgenera and to the terminal disc of the fourth toe in *Oxyslop gen. nov.*.

Feremixophyes subgen. nov. can be separated from *Paramixophyes* Hoser, 2016 by having a few or no scattered dark spots on the side versus a broad zone of numerous dark spots on the side.

Feremixophyes subgen. nov. can also be distinguished from *Oxyslop gen. nov.* by the absence of an uninterrupted narrow vertebral stripe extending from between the eyes to just above the vent.

The nominate subgenus of *Mixophyes* includes the so-called *M. fasciolatus* Günther, 1864 species group, including *M. fasciolatus* Günther, 1864, *M. shireenae* Hoser, 2016 and *M. couperi* Hoser, 2016 from wetter forested riverine habitats south of the wet tropics in Queensland along the coast and nearby ranges to southern New South Wales.

The subgenus *Feremixophyes subgen. nov.* includes the north Queensland clade of species being *M. schevelli*, Loveridge, 1933 (type species), *M. coggeri* Mahony, Donnellan, Richards and McDonald, 2016 and *M. carbinensis* Mahony, Donnellan, Richards and McDonald, 2016 and is confined to the wet tropics region of far north Queensland.

The subgenus *Quasimixophyes subgen. nov.* includes members of the so-called *M. balbus* Straughan, 1968 group of species, including *M. hoserae sp. nov.* (type species), *M. balbus* and *M. fleayi* Corben and Ingram, 1987 are found from south-east Queensland south along the coast and nearby ranges to north-east Victoria. Species in each of the three subgenera also have significantly different reproductive biology's further supporting the subgenus level split.

Distribution: *Quasimixophyes subgen. nov* are found from south-east Queensland south along the coast and nearby ranges to north-east Victoria.

Etymology: "Quasi" in Latin means like or similar to, in reflection of the fact that species in this subgenus are similar to those in the nominate subgenus *Mixophyes*.

Content: *Mixophyes* (*Quasimixophyes*). *hoserae sp. nov.* (type species); *M.* (*Quasimixophyes*) *balbus* Straughan, 1968; *M.* (*Quasimixophyes*) *fleayi* Corben and Ingram, 1987.

NEW SPECIES *MIXOPHYES* (*QUASIMIXOPHYES*) *HOSERAE SP. NOV.*

LSIDurn:lsid:zoobank.org:act:78261296-B441-4A75-B17F-0CC0EC76DAFA

Holotype: A preserved specimen in the Australian Museum Herpetology Collection, Sydney, NSW, Australia, specimen number R.118312, collected by Marion Anstis in the Wattagan Ranges, New South Wales, Australia, Latitude -33.0 S., Longitude 151.4 E. This government-owned facility allows access to its holdings.

Paratype: A preserved specimen in the Australian Museum Herpetology Collection, Sydney, NSW, Australia, specimen number R.118306, collected by Marion Anstis in the Wattagan Ranges, New South Wales, Australia, Latitude -33.0 S., Longitude 151.4 E.

Diagnosis: Until now *Mixophyes* (*Quasimixophyes*). *hoserae sp. nov.* has been treated as a southern population of the well-known species *M.* (*Quasimixophyes*) *balbus* Straughan, 1968.

All three species in the subgenus *Quasimixophyes subgen. nov.* are separated from the nominate subgenus of *Mixophyes* by having a grey (not whitish) upper lip and areas of darker pigment being prominent on the upper lip, versus a pale creamy-white upper lip without obvious darker blotches in *Mixophyes*.

The subgenus *Feremixophyes subgen. nov.* is readily separated from the other two subgenera within *Mixophyes* Günther, 1864, namely *Mixophyes* and *Quasimixophyes subgen. nov.* by the following two characters: The length of the inner metatarsal tubercule is approximately half the length of the first toe versus nearly equal to the length in the other two subgenera and the webbing between the toes extends to the second most distal joint of the fourth toe. The web extends to the third most distal joint of the fourth toe in the other two subgenera and to the

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terminal disc of the fourth toe in *Oxyslop gen. nov.*.

Feremixophyes subgen. nov. can be separated from *Paramixophyes* Hoser, 2016 by having a few or no scattered dark spots on the side versus a broad zone of numerous dark spots on the side. *Feremixophyes subgen. nov.* can also be distinguished from *Oxyslop gen. nov.* by the absence of an uninterrupted narrow vertebral stripe extending from between the eyes to just above the vent.

Within *Quasimixophyes subgen. nov.* the species *M.* (*Quasimixophyes*) *fleayi* Corben and Ingram, 1987 is separated from the other two species *M.* (*Quasimixophyes*) *balbus* Straughan, 1968 and *M.* (*Quasimixophyes*) *hoserae sp. nov.* by having well-defined dark cross bands on the limbs, which also widen posteriorly to form dark triangles that are visible from below, as well as an evenly spaced series of conspicuous black spots or blotches on the side, versus ill-defined cross bands on the forelimbs and only moderately well-defined on the upper hind limbs in the other two species and dark spots or blotches on the side being either infrequent and irregular (in *M. balbus*) or absent (in *M. hoserae sp. nov.*).

M. balbus is further separated from *M. hoserae sp. nov.* by having a broad, irregular, or broken band or patches forming a band, running down the middle of the back. This is not the case for *M. hoserae sp. nov.*.

Both *M. fleayi* and *M. balbus* have a prominent silvery white to blue crescent on top of the iris, whereas this is either indistinct or absent in *M. hoserae sp. nov.*.

An image of living *M. hoserae sp. nov.* can be found on page 29 of Hoser (1989) in the top image or alternatively in Anstis (2013) on page 425 at top right in amplexus.

An image of living *M. balbus* can be seen in Anstis (2013) on page 425 in the top left image and bottom right image.

Images of living *M. fleayi* in life can be found in Anstis (2013) at page 440 (top three images).

Distribution: *M.* (*Quasimixophyes*) *balbus* Straughan, 1968 is found from Mount Royal Range, west of Barrington Tops, New South Wales, and further north to about the Queensland, New South Wales border. *M.* (*Quasimixophyes*) *hoserae sp. nov.* is found from Barrington Tops south to the far north-east of Victoria. *M. fleayi* Corben and Ingram, 1987 if found in wetter ranges of south-east Queensland from the Conondale Range, south to far north-east New South Wales.

NEW GENUS *HOSERRANAE GEN. NOV.*

LSID urn:lsid:zoobank.org:act:6A621156-B7B3-4A3F-842C-6CBF92858EBA

Type species: *Crinia acutirostris* Andersson, 1916.

Diagnosis: The genera *Hoserranae gen. nov.* and *Scottyjamesus gen. nov.* both include species formerly included within the genus *Taudactylus* Straughan and Lee, 1996 and as a trio can be separated from all other Australian frogs by the following suite of characters:

Tongue small and narrowly oval and does not adhere to the rear of the mouth; maxillary teeth present; prevomer reduced or absent; vomerine teeth absent. No dermal brood pouches on the flanks; Terminal phlanges T-shaped; tips of fingers and toes all normal and with small but distinct discs; toes with at most only having basal webbing or fringes. Outer metatarsal tubercle, if present is much smaller than the inner metatarsal tubercle,

Frogs in the genus *Hoserranae gen. nov.* are readily separated from those in the genera *Taudactylus* as defined herein and *Scottyjamesus gen. nov.* by having a distinct dorsolateral skin fold present; a pointed and overslung snout and nostrils are much nearer the mouth than the tip of the snout, versus no dorsolateral skin fold; rounded snout; normal nostril being about equidistant from the mouth and the tip of the snout in both *Taudactylus* as defined herein and *Scottyjamesus gen. nov.*. The genus *Scottyjamesus gen. nov.* is in turn separated from the genus *Taudactylus* by having disks on fingers and toes only slightly wider than the penultimate phalanx, versus noticeably wider than the penultimate phalanx in *Taudactylus.*

The only species remaining within *Taudactylus* are the type species, *Taudactylus diurnis* Straughan and Lee, 1966 and the morphologically similar *T. eungellensis* Liem and Hosmer, 1973.

Distribution: *Hoserranae gen. nov.* are generally confined to the wet tropics region of Queensland, Australia in high altitude areas of high rainfall, generally near the coast, between the Cardwell Ranges in the South and Big Tableland in the North. There is a gap in the distribution of the genus in a relatively low-lying area north of Cairns and south of Port Douglas, in a zone sometimes called the Black Mountain Corridor. Most if not all known populations may as of 2020 be extinct.

Etymology: *Hoserranae gen. nov.* is named in honour of my wife, Shireen Hoser, for her numerous sacrifices for wildlife conservation spanning more than 20 years.

Content: *Hoserranae acutirostris* (Andersson, 1916) (including two subspecies).

NEW GENUS *SCOTTYJAMESUS GEN. NOV.*
LSID urn:lsid:zoobank.org:act:745A4F0F-016F-4D05-AA17-E9FF880DF455

Type species: *Taudactylus rheophilus* Liem and Hosmer, 1973.

Diagnosis: The genera *Scottyjamesus gen. nov.* and *Hoserranae gen. nov.* both include species formerly included within the genus *Taudactylus* Straughan and Lee, 1996 and as a trio can be separated from all other Australian frogs by the following suite of characters:

Tongue small and narrowly oval and does not adhere to the rear of the mouth; maxillary teeth present; prevomer reduced or absent; vomerine teeth absent. No dermal brood pouches on the flanks; Terminal phlanges T-shaped; tips of fingers and toes all normal and with small but distinct discs; toes with at most only having basal webbing or fringes. Outer metatarsal tubercle, if present is much smaller than the inner metatarsal tubercle,

Frogs in the genus *Hoserranae gen. nov.* are readily separated from those in the genera *Taudactylus* as defined herein and *Scottyjamesus gen. nov.* by having a distinct dorsolateral skin fold present; a pointed and overslung snout and nostrils are much nearer the mouth than the tip of the snout, versus no dorsolateral skin fold; rounded snout; normal nostril being about equidistant from the mouth and the tip of the snout in both *Taudactylus* as defined herein and *Scottyjamesus gen. nov.*. The genus *Scottyjamesus gen. nov.* is in turn separated from the genus *Taudactylus* by having disks on fingers and toes only slightly wider than the penultimate phalanx, versus noticeably wider than the penultimate phalanx in *Taudactylus.*

The only species remaining within *Taudactylus* are the type species, *Taudactylus diurnis* Straughan and Lee, 1966 and the morphologically similar *T. eungellensis* Liem and Hosmer, 1973.

Distribution: *Scottyjamesus gen. nov.* species are found from the northern wet tropics region of Queensland, Australia in high altitude areas of high rainfall, generally south of Cape Tribulation and North of Babinda, with a gap in the relatively low dry area north of Cairns and south of Port Douglas (this area sometimes called the Black Mountain Corridor) as well as near Eungella, west of Mackay and Kroombit Tops, all in Queensland, Australia.

Etymology: *Scottyjamesus gen. nov.* is named in honour of world snowboarding champion, Scotty James, of Warrandyte, Victoria, Australia, in recognition of his services to outdoor sports worldwide. He was the flag bearer for Australia at the 2018 Winter Olympics, where he won a bronze medal in halfpipe and has won many snowboarding titles in the two years since.

Content: *Scottyjamesus rheophilus* (Liem and Hosmer, 1973) (type species); *S. liemi* (Ingram, 1980); *S. pleione* (Czechura, 1986).

NEW SUBSPECIES *HOSERRANAE ACUTIROSTRIS SHAUNWHITEI SUBSP. NOV.*

LSID urn:lsid:zoobank.org:act:BCCFC11F-F31D-47B6-B2DE-C76B1FC6D8AB

Holotype: A preserved specimen at the Queensland Museum,

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Brisbane, Queensland, Australia, specimen number J27270, collected at Mount Finnigan, Queensland, Australia, Latitude -15.8333 S., Longitude 145.2667 E. This government-owned facility allows access to its holdings.

Paratype: A preserved specimen at the Queensland Museum, Brisbane, Queensland, Australia, specimen number J54163 collected at Thornton Peak National Park, Queensland, Australia, Latitude -16.1667 S., Longitude 145.3667 S.

Diagnosis: The diagnosis for the species *Hoserranae acutirostris* (Andersson, 1916) is the same as for the genus *Hoserranae gen. nov.*. *Hoserranae acutirostris shaunwhitei subsp. nov.* is separated from the type subspecies *Hoserranae acutirostris acutirostris* (Andersson, 1916) by having whiteish, reddish, yellow or orange front feet invariably with some distinct markings on them, versus greyish and generally unmarked in nominate *H. acutirostris acutirostris*.

H. acutirostris shaunwhitei subsp. nov. is further separated from the type subspecies *H. acutirostris acutirostris* by having numerous obvious but tiny white spots or flecks on the mid flanks versus none or very few in *H. acutirostris acutirostris*.

H. acutirostris shaunwhitei subsp. nov. have well banded back legs and feet, versus indistinctly banded in *H. acutirostris acutirostris.*

Frogs in the genus *Hoserranae gen. nov.* (as in the two subspecies *H. acutirostris acutirostris* and *H. acutirostris shaunwhitei subsp. nov.*) are readily separated from those in the genera *Taudactylus* as defined herein and *Scottyjamesus gen. nov.* by having a distinct dorsolateral skin fold present; a pointed and overslung snout and nostrils are much nearer the mouth than the tip of the snout, versus no dorsolateral skin fold; rounded snout; normal nostril being about equidistant from the mouth and the tip of the snout in both *Taudactylus* as defined herein and *Scottyjamesus gen. nov.*.

The genus *Scottyjamesus gen. nov.* is in turn separated from the genus *Taudactylus* by having disks on fingers and toes only slightly wider than the penultimate phalanx, versus noticeably wider than the penultimate phalanx in *Taudactylus.*

The geological and climate history for the wet tropics strongly suggests that the two subspecies *H. acutirostris acutirostris* and *H. acutirostris shaunwhitei subsp. nov.* are sufficiently divergent to be regarded as full species, but this taxonomic designation is deferred pending molecular evidence becoming available.

Due to the fact that one or both species are potentially extinct, or very close to it, the scientific recognition of the two geographically separated populations that are (or were) evolving separately is done herein as a matter of urgency.

H. acutirostris acutirostris in life is depicted in Cogger (2014) on page 144, at top left, with the same image in Eipper and Rowland (2018) on page 89 at top (photo reversed).

H. acutirostris shaunwhitei subsp. nov. in life is depicted in Anstis (2013), in the two top images and Vanderduys (2012) on page160 (bottom).

Distribution: *H. acutirostris shaunwhitei subsp. nov.* is found in a region bounded by Mount Molloy in the south and Big Tableland in the north, north Queensland, Australia.

H. acutirostris acutirostris is found in a region bounded by Cardwell Ranges in the south and Cairns in the north, north Queensland, Australia.

Etymology: Named in honour of Shaun Roger White of the United States of America for services to outdoor sports in his achievements as a world champion at his sport. Shaun White, born September 3, 1986, is an American professional snowboarder, skateboarder and musician. He is a three-time Olympic gold medalist. As of 2020, he held the record for the most X-Games gold medals and most Olympic gold medals by a snowboarder and had won 10 ESPY Awards.

NEW SUBSPECIES *SCOTTYJAMESUS RHEOPHILUS SCOTTYJAMESI SUBSP. NOV.*

LSID urn:lsid:zoobank.org:act:7E5ABBE7-F050-4014-9B20-093C0AC2F455

Holotype: A preserved specimen at the Queensland Museum, Brisbane, Queensland, Australia, specimen number J81652 collected at Bellenden Ker Range, Queensland, Australia, Latitude -17.3 S., Longitude 145.9 E. This government-owned facility allows access to its holdings.

Paratype: A preserved specimen at the Queensland Museum, Brisbane, Queensland, Australia, specimen number J71284 collected at Lamb Range State Forest, Queensland, Australia, Latitude -17.1 S., Longitude 145.6 E.

Diagnosis: The putative species *Scottyjamesus rheophilus* (Liem and Hosmer, 1973) is separated from all other species in the genus *Scottyjamesus gen. nov.* and all species in the genus *Taudactylus* Straughan and Lee, 1966 by having a head that is broad, its width being .38 times the snout-vent length and has fingers with prominent raised subarticular tubercles. By contrast all other species in the genus *Scottyjamesus gen. nov.* and all species in the genus *Taudactylus* have a head that is normal in width being less than .38 times the snout-vent length and has fingers with at most, low rounded subarticular tubercles.

Scottyjamesus rheophilus scottyjamesi subsp. nov. is separated from *Scottyjamesus rheophilus rheophilus* (Liem and Hosmer, 1973) by having relatively indistinct round cream blotches on the belly and lower flanks, versus obvious and distinct in *S. rheophilus rheophilus. S. rheophilus rheophilus* have strongly barred forelimbs versus weak to moderately barred in *S. rheophilus scottyjamesi subsp. nov.*.

The genera *Scottyjamesus gen. nov.* and *Hoserranae gen. nov.* both include species formerly included within the genus *Taudactylus* Straughan and Lee, 1996 and as a trio can be separated from all other Australian frogs by the following suite of characters: Tongue small and narrowly oval and does not adhere to the rear of the mouth; maxillary teeth present; prevomer reduced or absent; vomerine teeth absent. No dermal brood pouches on the flanks; Terminal phlanges T-shaped; tips of fingers and toes all normal and with small but distinct discs; toes with at most only having basal webbing or fringes. Outer metatarsal tubercle, if present is much smaller than the inner metatarsal tubercle.

Frogs in the genus *Hoserranae gen. nov.* are readily separated from those in the genera *Taudactylus* as defined herein and *Scottyjamesus gen. nov.* by having a distinct dorsolateral skin fold present; a pointed and overslung snout and nostrils are much nearer the mouth than the tip of the snout, versus no dorsolateral skin fold; rounded snout; normal nostril being about equidistant from the mouth and the tip of the snout in both *Taudactylus* as defined herein and *Scottyjamesus gen. nov.*.

The genus *Scottyjamesus gen. nov.* is in turn separated from the genus *Taudactylus* by having disks on fingers and toes only slightly wider than the penultimate phalanx, versus noticeably wider than the penultimate phalanx in *Taudactylus.*

The only species remaining within *Taudactylus* are the type species, *Taudactylus diurnis* Straughan and Lee, 1966 and the morphologically similar *T. eungellensis* Liem and Hosmer, 1973.

The geological and climate history for the wet tropics strongly suggests that the two subspecies *S. rheophilus scottyjamesi subsp. nov.* and *S. rheophilus rheophilus* are sufficiently divergent to be regarded as full species, but this taxonomic designation is deferred until molecular evidence is available.

Due to the fact that one or both species are potentially extinct, or very close to it, the scientific recognition of the two geographically separated populations that are (or were) evolving separately is done herein as a matter of urgency.

Anstis (2013), citing other works, reported that no specimens of either subspecies had been found in the wild since year 2000 and that both may already be extinct.

Distribution: *S. rheophilus scottyjamesi subsp. nov.* is known only from the collection localities of the holotype and paratype, being Bellenden Ker Range, Queensland, Australia, Latitude -17.3 S., Longitude 145.9 E. in the south and Lamb Range State Forest, Queensland, Australia, Latitude -17.1 S., Longitude

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145.6 E in the north (and north-west), north Queensland, Australia. *S. rheophilus rheophilus* is known only from the northern wet tropics, North Queensland, Australia generally near the type locality of Mount Lewis, also at high altitude.

Etymology: *Scottyjamesus gen. nov.* and the subspecies *S. rheophilus scottyjamesi subsp. nov.* ar both named in honour of world snowboarding champion, Scotty James, of Warrandyte, Victoria, Australia, in recognition of his services to outdoor sports worldwide. He was the flag bearer for Australia at the 2018 Winter Olympics, where he won a bronze medal in halfpipe and has won numerous other titles in the two years since.

NEW FAMILY OXYSLOPIDAE FAM. NOV.

LSID urn:lsid:zoobank.org:act:AFB1C51B-8C4B-4ED9-A601-A64A85058246

Type genus: *Oxyslop gen. nov.* (this paper).

Diagnosis: The family Oxyslopidae fam. nov. as currently understood has the same diagnostic characters as for the genus *Mixophyes* Günther, 1864 (*sensu lato*) as understood previous to the publication of this paper.

Oxyslopidae fam. nov. are the so-called Barred Frogs from riverine and rainforest habitats and nearby areas in Eastern Australia. Being of Gondawanan origins, they are large muscular frogs with powerful hind limbs, strongly webbed feet and banded legs capable of long jumps. Maxillary teeth are present. Prominent vomerine teeth are in front of the choanae. Pupil is vertical. Tympanum distinct. There is typically a large narrow dark brown or black stripe from the snout to the eye, but interrupted by the nostril and extending behind the eye and over and behind the tympanum, where it tends to broaden, either imperceptibly or significantly, depending mainly on the species.

Females are the larger sex and reproduction is somewhat unusual among frogs in that amplexing pairs produce eggs in water and then using her hind limbs, the female projects newly laid eggs up onto the stream bank where they stick to rocks or vegetation, where they remain until hatching in rain, causing the tadpoles to wash down and return into the stream.

These frogs are separated from all other Australian species by the following characters: having a broadly oval and large tongue that does not adhere to the floor of the mouth at the rear and the prevomer is well-developed with prominent vomerine teeth (adapted from Cogger, 2014). The preceding diagnosis also applies to the new genus *Oxyslop gen. nov.*, the single species of which was until now included in the genus *Mixophyes*. *Oxyslop gen. nov.* with a type species of *Mixophyes hihihorlo* Donnellan, Mahony and Davies, 1990 from New Guinea is readily separated from all (other) species in *Mixophyes* (all from Australia), including all species or subspecies of *Paramixophyes* Hoser, 2016 by possessing an uninterrupted narrow vertebral stripe extending from between the eyes to just above the vent and by the absence of a dark triangular patch on the upper lip in front of the nostril with its base along upper lip and apex at nostril. It is further readily separated from all other species in *Mixophyes* (all from Australia) by having longer legs and distinctively smaller eyes and extensive toe webbing.

Additionally *Oxyslop gen. nov.* is distinguished by details of its karyotype and osteology as detailed by Donnellan *et al.* (1990).

Paramixophyes Hoser, 2016, type species *M. iteratus* Straughan, 1968, herein elevated to full genus status being originally described as a subgenus, is found along the east coast and ranges of New South Wales from west of Sydney to south-east Queensland.

They are separated from all (other) species within *Mixophyes* by the fact that the length of the inner metatarsal tubercle is only about half the length of the first toe (versus being nearly of equal length in the other species), and that only two joints of the fourth toe are free of web (versus three joints of the toe being free of web in the other species).

Physically *Paramixophyes* presents as being of different shape to the other species by being more triangular in overall shape and with proportionately larger hind limbs. *M. iteratus* is also of a different size class to the other members of the genus, it attaining up to 115 mm in body length, versus no more than 100 mm (usually 80 mm) in the other species. Straughan (1968) provides detail of other differences between *M.iteratus* and others in the genus.

Distribution: Wetter parts of the east coast and nearby ranges of Australia and also southern New Guinea in one or more similarly elevated and forested areas.

Content: *Oxyslop gen. nov.* (type genus); *Mixophyes* Günther, 1864; *Paramixophyes* Hoser, 2016.

Etymology: The family name is derived from the genus name *Oxyslop gen. nov.*, as outlined elsewhere in this paper.

NEW SUBFAMILY OXYSLOPINAE SUBFAM. NOV.

LSIDurn:lsid:zoobank.org:act:E8D98A10-084D-4F2B-ABC2-4EE7B2E3F281

Type genus: *Oxyslop gen. nov.* (this paper).

Diagnosis: The subfamily Oxyslopinae subfam. nov. is herein formally named to take into account the possibility of either the emergence of newly described forms including divergent fossil material necessitating the erection of another subfamily, or alternatively the relegation of Oxyslopidae fam. nov. to subfamily level, within a greater Myobatrachidae. At the present time the diagnosis for this subfamily is the same as for Oxyslopidae fam. nov., as defined above.
In summary, these frogs are separated from all other Australian species by the following characters: having a broadly oval and large tongue that does not adhere to the floor of the mouth at the rear and the prevomer is well-developed with prominent vomerine teeth (adapted from Cogger, 2014).

Distribution: Wetter parts of the east coast and nearby ranges of Australia and also southern New Guinea in one or more similarly elevated and forested areas.

Content: *Oxyslop gen. nov.* (type genus); *Mixophyes* Günther, 1864; *Paramixophyes* Hoser, 2016.

Etymology: The subfamily name is derived from the genus name *Oxyslop gen. nov.*, as outlined elsewhere in this paper.

NEW TRIBE OXYSLOPINI TRIBE. NOV.
LSID urn:lsid:zoobank.org:act:EFB680E2-3C01-4A34-91C2-898CBDAEB235

Type genus: *Oxyslop gen. nov.* (this paper).

Diagnosis: The tribe Oxyslopini tribe nov. is herein formally named to take into account the possibility of either the emergence of newly described forms including divergent fossil material necessitating the erection of another tribe, or alternatively the relegation of Oxyslopidae fam. nov. to subfamily level or tribe, within a greater Myobatrachidae. At the present time the diagnosis for this tribe is the same as for the subfamily Oxyslopinae subfam. nov., and the same as for the family Oxyslopidae fam. nov., as defined above.
In summary, these frogs are separated from all other Australian species by the following characters: having a broadly oval and large tongue that does not adhere to the floor of the mouth at the rear and the prevomer is well-developed with prominent vomerine teeth (adapted from Cogger, 2014).

Distribution: Wetter parts of the east coast and nearby ranges of Australia and also southern New Guinea in one or more similarly elevated and forested areas.

Content: *Oxyslop gen. nov.* (type genus); *Mixophyes* Günther, 1864; *Paramixophyes* Hoser, 2016.

Etymology: The tribe name is derived from the genus name *Oxyslop gen. nov.*, as outlined elsewhere in this paper.

NEW FAMILY HOSERRANIDAE FAM. NOV.
LSID urn:lsid:zoobank.org:act:0379A096-D081-44F7-9B17-D8D95957AD4A

Type genus: *Hoserranae gen. nov.* (this paper).

Diagnosis: The genera *Hoserranae gen. nov.* and *Scottyjamesus gen. nov.* both include species formerly included

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within the genus *Taudactylus* Straughan and Lee, 1996 and as a trio these genera form the entirety of the family Hoserranidae fam. nov. as currently understood. They can be separated from all other Australian frogs by the following suite of characters:

Tongue small and narrowly oval and does not adhere to the rear of the mouth; maxillary teeth present; prevomer reduced or absent; vomerine teeth absent. No dermal brood pouches on the flanks; Terminal phlanges T-shaped; tips of fingers and toes all normal and with small but distinct discs; toes with at most only having basal webbing or fringes. Outer metatarsal tubercle, if present is much smaller than the inner metatarsal tubercle,

Frogs in the genus *Hoserranae gen. nov.* are readily separated from those in the genera *Taudactylus* as defined herein and *Scottyjamesus gen. nov.* by having a distinct dorsolateral skin fold present; a pointed and overslung snout and nostrils are much nearer the mouth than the tip of the snout, versus no dorsolateral skin fold; rounded snout; normal nostril being about equidistant from the mouth and the tip of the snout in both *Taudactylus* as defined herein and *Scottyjamesus gen. nov.*. The genus *Scottyjamesus gen. nov.* is in turn separated from the genus *Taudactylus* by having disks on fingers and toes only slightly wider than the penultimate phalanx, versus noticeably wider than the penultimate phalanx in *Taudactylus.*

The only species remaining within the genus *Taudactylus* are the type species, *Taudactylus diurnis* Straughan and Lee, 1966 and the morphologically similar *T. eungellensis* Liem and Hosmer, 1973.

Distribution: The family is endemic to Queensland being found from the south-east to north east in hilly wet areas only and each species has a very limited distribution both geographically and within areas they occur, where they appear to inhabit fast-flowing streams. All appear to have declined sharply in number since the 1970's.

Etymology: *Hoserranae gen. nov.* as family from genus is named in honour of my wife, Shireen Hoser, for her numerous sacrifices for wildlife conservation spanning more than 20 years.

Content: *Hoserranae gen. nov.* (type genus); *Scottyjamesus gen. nov.*; *Taudactylus* Straughan and Lee, 1996.

NEW SUBFAMILY HOSERRANINAE SUBFAM. NOV.

LSID urn:lsid:zoobank.org:act:0CBF5A5F-3652-43E8-A864-C90767E5E7B9

Type genus: *Hoserranae gen. nov.* (this paper).

Diagnosis: The subfamily Hoserraninae subfam. nov. is herein formally named to take into account the possibility of either the emergence of newly described forms including divergent fossil material necessitating the erection of another subfamily, or alternatively the relegation of Hoserranidae fam. nov. to subfamily level, within a greater Myobatrachidae. At the present time the diagnosis for this subfamily is the same as for Hoserranidae fam. nov., as defined above.

The genera *Hoserranae gen. nov.* and *Scottyjamesus gen. nov.* both include species formerly included within the genus *Taudactylus* Straughan and Lee, 1996 and as a trio these genera form the entirety of the family Hoserranidae fam. nov. as currently understood. They can be separated from all other Australian frogs by the following suite of characters:

Tongue small and narrowly oval and does not adhere to the rear of the mouth; maxillary teeth present; prevomer reduced or absent; vomerine teeth absent. No dermal brood pouches on the flanks; Terminal phlanges T-shaped; tips of fingers and toes all normal and with small but distinct discs; toes with at most only having basal webbing or fringes. Outer metatarsal tubercle, if present is much smaller than the inner metatarsal tubercle,

Frogs in the genus *Hoserranae gen. nov.* are readily separated from those in the genera *Taudactylus* as defined herein and *Scottyjamesus gen. nov.* by having a distinct dorsolateral skin fold present; a pointed and overslung snout and nostrils are much nearer the mouth than the tip of the snout, versus no dorsolateral skin fold; rounded snout; normal nostril being about equidistant from the mouth and the tip of the snout in both *Taudactylus* as defined herein and *Scottyjamesus gen. nov.*. The genus *Scottyjamesus gen. nov.* is in turn separated from the genus *Taudactylus* by having disks on fingers and toes only slightly wider than the penultimate phalanx, versus noticeably wider than the penultimate phalanx in *Taudactylus.*

The only species remaining within the genus *Taudactylus* are the type species, *Taudactylus diurnis* Straughan and Lee, 1966 and the morphologically similar *T. eungellensis* Liem and Hosmer, 1973.

Distribution: The subfamily is endemic to Queensland being found from the south-east to north east in hilly wet areas only and each species has a very limited distribution both geographically and within areas they occur, where they appear to inhabit fast-flowing streams. All appear to have declined sharply in number since the 1970's.

Etymology: *Hoserranae gen. nov.* is named in honour of my wife, Shireen Hoser, for her numerous sacrifices for wildlife conservation spanning more than 20 years and the subfamily name is taken from the genus name.

Content: *Hoserranae gen. nov.* (type genus); *Scottyjamesus gen. nov.*; *Taudactylus* Straughan and Lee, 1996.

NEW TRIBE HOSERRANINI TRIBE. NOV.

LSID urn:lsid:zoobank.org:act:728FDB42-8D16-4E50-9E4B-2DC97321EE83

Type genus: *Hoserranae gen. nov*. (this paper).

Diagnosis: The tribe Hoserranini tribe. nov. includes the genus *Hoserranae gen. nov.* only.

The genera *Hoserranae gen. nov.* and *Scottyjamesus gen. nov.* both include species formerly included within the genus *Taudactylus* Straughan and Lee, 1996 and as a trio these genera form the entirety of the family Hoserranidae fam. nov. as currently understood. They can be separated from all other Australian frogs by the following suite of characters:

Tongue small and narrowly oval and does not adhere to the rear of the mouth; maxillary teeth present; prevomer reduced or absent; vomerine teeth absent. No dermal brood pouches on the flanks; Terminal phlanges T-shaped; tips of fingers and toes all normal and with small but distinct discs; toes with at most only having basal webbing or fringes. Outer metatarsal tubercle, if present is much smaller than the inner metatarsal tubercle,

Frogs in the genus *Hoserranae gen. nov.* and hence in the tribe Hoserraninae tribe. nov., are readily separated from those in the genera *Taudactylus* as defined herein and *Scottyjamesus gen. nov.*, these two genera forming the tribe Scottyjamesini tribe nov., by having a distinct dorsolateral skin fold present; a pointed and overslung snout and nostrils are much nearer the mouth than the tip of the snout, versus no dorsolateral skin fold; rounded snout; normal nostril being about equidistant from the mouth and the tip of the snout in both *Taudactylus* as defined herein and *Scottyjamesus gen. nov.*.

The genus *Scottyjamesus gen. nov.*. is in turn separated from the genus *Taudactylus* (both within the tribe Scottyjamesini tribe nov.) by having disks on fingers and toes only slightly wider than the penultimate phalanx, versus noticeably wider than the penultimate phalanx in *Taudactylus.* The only species remaining within the genus *Taudactylus* are the type species, *Taudactylus diurnis* Straughan and Lee, 1966 and the morphologically similar *T. eungellensis* Liem and Hosmer, 1973.

Distribution: The tribe Hoseranini tribe nov. as far as is known is endemic to the wet tropics of Queensland, Australia.

Etymology: *Hoserranidae gen. nov.* is named after the genus named in honour of my wife, Shireen Hoser, for her numerous sacrifices for wildlife conservation spanning more than 20 years.

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

NEW TRIBE SCOTTYJAMESINI TRIBE. NOV.

LSID urn:lsid:zoobank.org:act:C1316092-6D25-4898-8B73-4FA57F86B101

Type genus: *Scottyjamesus gen. nov.* (this paper).

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Diagnosis: The tribe Hoserranini tribe. nov. includes the genus *Hoserranae gen. nov.* only.

The genera *Hoserranae gen. nov.* and *Scottyjamesus gen. nov.* both include species formerly included within the genus *Taudactylus* Straughan and Lee, 1996 and as a trio these genera form the entirety of the family Hoserranidae fam. nov. as currently understood. They can be separated from all other Australian frogs by the following suite of characters:

Tongue small and narrowly oval and does not adhere to the rear of the mouth; maxillary teeth present; prevomer reduced or absent; vomerine teeth absent. No dermal brood pouches on the flanks; Terminal phlanges T-shaped; tips of fingers and toes all normal and with small but distinct discs; toes with at most only having basal webbing or fringes. Outer metatarsal tubercle, if present is much smaller than the inner metatarsal tubercle,

Frogs in the genus *Hoserranae gen. nov.* and hence in the tribe Hoserraninae tribe. nov., are readily separated from those in the genera *Taudactylus* as defined herein and *Scottyjamesus gen. nov.*, these two genera forming the tribe Scottyjamesini tribe nov., by having a distinct dorsolateral skin fold present; a pointed and overslung snout and nostrils are much nearer the mouth than the tip of the snout, versus no dorsolateral skin fold; rounded snout; normal nostril being about equidistant from the mouth and the tip of the snout in both *Taudactylus* as defined herein and *Scottyjamesus gen. nov..*

The genus *Scottyjamesus gen. nov..* is in turn separated from the genus *Taudactylus* (both within the tribe Scottyjamesini tribe nov.) by having disks on fingers and toes only slightly wider than the penultimate phalanx, versus noticeably wider than the penultimate phalanx in *Taudactylus.* The only species remaining within the genus *Taudactylus* are the type species, *Taudactylus diurnis* Straughan and Lee, 1966 and the morphologically similar *T. eungellensis* Liem and Hosmer, 1973.

Distribution: The tribe Scottyjamesini tribe nov. as far as is known is endemic to Queensland, Australia in scattered locations from the north-east to south east in forested wet habitats, where they usually are found near fast flowing streams.

Etymology: Scottyjamesini tribe nov. is taken from the genus name *Scottyjamesus gen. nov.* (this paper).

Content: *Scottyjamesus gen. nov.* (type genus); *Taudactylus* Straughan and Lee, 1996.

CONSERVATION THREATS TO RELEVANT FROG SPECIES

There are serious ongoing conservation threats to all species discussed within this paper.

All are at serious risk of extinction and some of the cited authors in this paper have stated that some relevant species may already be extinct! That is each and every species within the families Oxyslopidae fam. nov. and Hoserranidae fam. nov. are under potential threat of extinction within a few years should a potentially unforseen threat emerge, similar to what has already cased mass die offs in several relevant species.

From the 1970's through to the 1990's there was a massive die off of frogs, including within all relevant genera in a generally south to north pathway, starting in New South Wales and southern Queensland and eventually extending north to travel throughout the wet tropics region of Cape York in Queensland.

An introduced Chytrid fungus has been blamed for this decline (Berger 2001, Berger et al. 1999) and the apparent cause was legal importation of frogs from Africa or somewhere else already infected, presumably via the same original source.

Many populations are thought to be extinct although it is possible some may persist in small numbers that have evaded the collection efforts of numerous people.

It is noteworthy that many species were abundant and easily found before the mass die offs.

Numerous papers have been published detailing the die offs and rooting out the primary causes and some are cited elsewhere in this paper, with direct reference to the relevant species within the families Oxyslopidae fam. nov. and Hoserranidae fam. nov..

"Zoos Victoria", Taronga Zoo (Sydney, New South Wales), "Zoos South Australia" and other government-owned or backed zoos have effectively used their ability to write and control laws and government wildlife laws to stifle people and NGO's operating in the wildlife space whom they see as competitors of them. This enables the government-owned businesses to gain an effective monopoly on ownership of rare and threatened species with a view to exploiting their plight to make money (see for example Skeratt *et al.* 2016).

In the case of frogs dying from Chytrid fungus, there is absolutely no doubt at all that the government-owned zoo businesses of "Zoos Victoria", Taronga (in Sydney, New South Wales) and "Zoos South Australia" has probably caused extinctions of at least some relevant frog species as can be seen from the account of (Skeratt *et al.* 2016).

The actions of the businesses "Zoos Victoria", Taronga (in Sydney, New South Wales) and "Zoos South Australia" has in effect removed all other potential people or NGO's from being able to breed threatened or endangered species in captivity, or do anything else in any practical way to try to save the threatened species, resulting in some species named in this paper already being potentially extinct.

The "benefit" to Zoos Victoria and other government-backed beneficiaries of the general prohibition on others keeping or breeding most frog species in Australia is that when these government-backed businesses do breed these species, or the few they actually take an interest in, then they can claim to have "world first" breedings and all the financial rewards that brings their business.

One recent such example was the recently touted "world first" breeding of the (listed as) endangered Pygmy Bluetongues *Lazarusus adelaidensis* (Peters, 1863), by the government-owned business "Zoos South Australia".

See for example at:

https://www.monartosafari.com.au/saving-the-pygmy-bluetongue/

(Tucker, 2020b), where the government-owned Zoos South Australia boasted about their "world first" breeding of the species marketing it as a huge conservation victory for their allegedly hard working staff.

or also see for example at:

https://www.monartosafari.com.au/future-not-so-blue-for-rare-reptile/

(Tucker, 2020a).

In an amazing piece of spin doctoring, the author wrote:

"Zoos SA has been involved in the conservation of this species since its rediscovery back in 1992 so this is an amazing success story and a resounding endorsement for our purpose built breeding facility that …"

This so-called success only came after having a 27 year monopoly on ownership of these reptiles, with the prohibition on anyone else on earth daring to keep or breed the species being enforced at gunpoint and with associated threats of jailing any competitors of the government-owned zoo.

Of course breeding Bluetongue lizards is something even a primary school child could have done in one year, but the Zoos South Australia business made a deliberate point of **not breeding** the relatively rare species for decades so as to ensure their monopoly on ownership of the species remained intact and they could milk the threatened species for all they could in terms of making money.

Purpose built breeding facility?

Well a kid can breed this species in a small wooden box!

Note: Breeding Blue-tongue lizards is not rocket science!

Others with an interest in wildlife and their welfare, were effectively criminalized for daring to want to save wildlife in any way that may potentially upset government or otherwise interfere with the government zoo monopoly on exploiting the relevant species for money, in this case the Pygmy Blue-tongue.

The same sort of cynical money making exercises are routinely

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embarked upon by government-owned and supported zoos across Australia with a severe and direct negative impact on the conservation of rare and threatened species.

"Zoos Victoria" have operated in a similar manner with *Taudactylus* (*sensu lato*) species as seen in the publications of Gillespie *et al.* (2007) and Skerratt *et al.* (2016), with the same government-owned business failing to save a lizard species found within walking distance of the zoo front gate!
That species was *Tympanocryptis pinguicola* (Mitchell, 1948), as detailed by Hoser (2019a, 2019b) and sources cited therein.

In other words the future prognosis for the Chytrid fungus susceptible frogs of the two families subject of this paper (Oxyslopidae fam. nov. and Hoserranidae fam. nov.) is not good at all!

Added to the preceding negativity in terms of long-term survival of the relevant frog species, I note that if the Australian government persists with its "Big Australia Policy", (see for example Saunders 2019), that being a long-term aim to increase the human population in Australia to over 100 million people by year 2150 (from the present 25 million as of 2019), all sorts of unforseen threats to the survival of these species may emerge.

Due to unforseen potential threats I recommend further research on the relevant species and including means to identify likely potential threats.

These may include direct human activities (e.g. land clearing for homes), as well as potential threats caused by changed vegetation regimes, introduced pests and potential pathogens, including those introduced via the legal importation of foreign reptiles and frogs by government-owned zoos and associated entities.

Laws should be changed with urgency to allow other stakeholders to participate in the actions required to save the relevant species, even if it means the government-owned and backed zoos lose their financially lucrative monopoly on exploiting vulnerable species for their own money-making ulterior motives.

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CONFLICT OF INTEREST - NONE

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