

Four new species of *Crinia* Tschudi, 1838, subgenus *Ranidella* Girard, 1853 from south-east, Australia.

LSIDURN:LSID:ZOOBANK.ORG:PUB:7335004C-A8D7-4085-8EE1-64B4AA55C24F

RAYMOND T. HOSER

LSID urn:lsid:zoobank.org:author:F9D74EB5-CFB5-49A0-8C7C-9F993B8504AE

488 Park Road, Park Orchards, Victoria, 3134, Australia.

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

Received 12 November 2022, Accepted 9 December 2022, Published 16 June 2023.

ABSTRACT

Following on from extensive herpetological fieldwork across south-east Australia over many decades, putative *Crinia signifera* Girard, 1853 from parts of south-east Australia were seen to be morphologically divergent from other populations of the same putative species.

This has also been confirmed by the genetic evidence of Symula *et al.* (2008) and Williams (2015) showing divergences of populations in the millions of years.

Names are available for three obviously divergent species in the complex, being the type form of *C. signifera* from most parts of eastern New South Wales, *C. varius* (Peters, 1863) from South Australia in the general region of Adelaide and *C. englishi* (Parker, 1940) from Tasmania, while four other obvious species, with divergences estimated at more than 5 MYA from their nearest relatives remain unnamed.

This paper relies on morphological and molecular evidence to formally name the four new species in the putative *C. signifera* complex.

These are *C. roypailsei* *sp. nov.* from north-east Victoria, being (an estimated) more than 8 MYA divergent from its nearest relative, *C. aagh* *sp. nov.* from south-west Victoria, being more than 5 MYA divergent from its nearest relative, *C. lynnepailsei* *sp. nov.* known from the area between Wagga Wagga and Albury in New South Wales and *C. fiacummingae* *sp. nov.* from Melbourne, nearby areas to the north and west to Hamilton in Victoria. Two divergent subspecies are also formally named for the first time.

All relevant taxa are clearly at risk of extinction or dilution from putative *C. signifera* translocated from other parts of Victoria, South Australia, New South Wales or Tasmania in the course of routine activity by humans and research into this risk should be funded as a matter of urgency.

Keywords: Taxonomy; Amphibia; nomenclature; Frog; Australia; Victoria; Bairnsdale; Cann River; *Crinia*; *Ranidella*; *signifera*; *englishi*; *varius*; *halmaturina*; new species; *roypailsei*; *aagh*; *lynnepailsae*; *fiacummingae*; new subspecies; *aberrans*; *kroombitensis*.

INTRODUCTION

In recent years, as a result of an audit of most of Australia's frogs, I, Raymond Hoser published descriptions of dozens of new frog genera and species, including in the papers of Hoser (2016, 2019a, 2020a-f).

These papers effectively audited all Australasian frogs except for the microhylids; that group being subject of an ongoing audit.

A very small number of candidate species were not formally named at the time the preceding papers were published, pending inspection of further specimens.

One of these taxa was putative *Crinia signifera* Girard, 1853.

Initially, I was most interested in those from north-east Victoria in the region between Bairnsdale in the south-west and Cann River in the East which had previously been seen to be morphologically divergent from other populations of the same

putative species.

I was fortunate enough to be able to examine further specimens on 20 January 2022 and again on 5 November 2022, both dates coinciding with Snakebusters Hands on Reptiles displays conducted in the relevant areas on the same days, which I did.

Combined with a review of the relevant literature, including for example Cogger *et al.* (1983), Hoser (2020f) and sources cited therein as well as Symula *et al.* (2008) and Williams (2015), I was able to confirm the following three important facts.

1/ The population was sufficiently genetically divergent from all other putative *C. signifera* to warrant recognition as a full species.

2/ There were no available synonym names for the relevant population of frogs.

3/ I was able to consistently separate the relevant frogs from

other putative *C. signifera* on the basis of morphological divergence.

On the basis of the preceding, I have decided to formally name this taxon as a new species, *Crinia (Ranidella) roypailsei* sp. nov. being more than 8 MYA divergent from its nearest relative as the critically important first step for the long-term conservation of this until now overlooked taxon.

In the course of examination of specimens from other parts of Victoria and nearby parts of New South Wales and South Australia, including northern New South Wales, and also Tasmania, in effect encompassing specimens from virtually the entire known range of the putative species, I found that there were regional variations between other populations of putative *C. signifera* also warranting species level recognition.

These were inspected in detail to ascertain whether or not any warranted naming as species or subspecies and in the final analysis I found that three more of these did.

One is formally named as *C. signifera aagh* and occurs in far south-west Victoria and nearby south-east South Australia, but not including the Adelaide Hills area or Kangaroo Island, those populations being assigned to the subspecies *C. signifera varius* Peters, 1863.

C. lynnepailsei sp. nov. is known from the area between Wagga Wagga and Albury in New South Wales and *C. fiacummingae* sp. nov. is from Melbourne, Victoria, nearby areas to the north and west, extending to Hamilton, in western Victoria. The latter three newly named species and the other two named species resurrected from synonymy (*C. varius* and *C. englishi*) all diverged from their next nearest relatives more than 5 MYA based on the findings of Symula *et al.* (2008).

MATERIALS AND METHODS

Live specimens of putative *C. signifera* from all parts of their range (wetter parts of NSW, Victoria, South Australia and Tasmania) were inspected, with an initial focus on differences between the relevant populations and the specimens from the area between Bairnsdale in the west and Cann River in the east, both places being in coastal east Victoria.

Photos of specimens with good location data from all parts of the range of putative *C. signifera* were also inspected and reviewed. A review of relevant literature was undertaken, to confirm prior genetic studies implying the said population (between Bairnsdale in the west and Cann River in the east) was in fact a different and divergent allopatric population and species.

This review included to check synonyms lists and recent literature to confirm that the relevant population had been given taxonomic recognition of any form, in which case the available name could be used.

Literature relevant to the nomenclatural and taxonomic decisions that formed the basis of this paper, the formal recognition of the species of *Crinia* from between Bairnsdale in the west and Cann River in the east (being for the first time ever) included, Anstis (2013), Barker *et al.* (1995), Clulow and Swan (2018), Clyne (1969), Cogger (2014), Cogger *et al.* (1983), Condon (1941), Dubois *et al.* (2019), Eipper and Rowland (2018), Girard (1853), Hero *et al.* (1991), Hoser, (1989, 2016, 2019a, 2020a-f), ICZN (2012), Lütken (1864), Parker (1940), Peters (1863), Pyron and Weins (2021), Ride *et al.* (1999), Roberts and Maxon (1986), Schäuble *et al.* (2000), Schäuble and Moritz (2001), Steindachner (1867), Symula *et al.* (2008), Tschudi (1838), Vanderduys (2012), Wells and Wellington (1985), Williams (2015) and sources cited therein.

The review also included subspecies-level classification in terms of regional populations and checking whether synonym names could be applied to any given populations.

RESULTS

That the relevant population of *C. signifera* from north-east Victoria (north-east of Wilson's Promontory and including Bairnsdale, north-east to roughly the NSW/Victorian border) warranted species-level recognition was obvious.

What was uncertain was what factor or factors caused the relevant population to separate from other putative *C. signifera* populations and to remain so for so long.

It is however noted that north-east Victoria is a zone of endemism in frogs and that the new species named within this paper is not the only one apparently confined to this region.

See for example *Philocryphus hoserae* Hoser, 2019 (Hoser, 2019a) or *Mixophyes (Quasimixophyes) hoserae jackyae* Hoser, 2020 (Hoser 2020f), as defined in the relevant formal descriptions, with both the preceding species-level taxa confirmed as morphologically and genetically divergent from other nearest related populations further north.

See also Hoser (2020e) in relation to another frog taxon and in terms of reptiles in Victoria and the divergences between similar species, see Hoser (2022a, 2022c) and sources cited therein.

Note that in terms of *Philocryphus hoserae* Hoser, 2019, the same species was unlawfully given a junior synonym name of *Heleioporus australiacus flavopunctatus* in 2021 by Mahony *et al.* (2021) who merely bootlegged the earlier Hoser material (and without proper attribution).

This act of egregious taxonomic vandalism was in breach of the *International Code of Zoological Nomenclature*, Article 23, Principle of Priority (Ride *et al.* 1999).

They did this invoking the so called "Kaiser *et al.* (2013)" edict allowing ICZN scientific names to be overwritten at whim, especially if the publishing author is not a member of your own "cohort". It is not ICZN supported or allowed (ICZN 2021) and is illegal under copyright laws including for example by being in breach of the Australian Copyright Act 1968, Moral Rights Provisions, the relevant parts being within Sections 36, 115, 189-190, 193-195, in particular Sections 195AI (2) and 195AJ (a-b) and 195AQ(2)).

The ICZN made a scathing ruling against Kaiser *et al.* (2013) and their later incarnation of that manifesto, known as "Rhodin *et al.* 2015" in 2021 (ICZN 2021).

Hence the name *Heleioporus australiacus flavopunctatus* in 2021 should not be used for the relevant taxon in any way, shape or form, other than as being listed as a junior synonym of either *Philocryphus hoserae* Hoser, 2019 or within the genus *Heleioporus* Gray, 1841 as a synonym of *Heleioporus hoserae*.

In terms of habitats and habits of the relevant newly named species, *Crinia roypailsei* sp. nov., they are best described as being "as for the genus" in that they breed in semi-permanent and permanent water, with a preference for dams and soaks near billabongs, roadsides and the like.

Interestingly, this habitat choice probably means their numbers have sharply increased in the last 200 years in line with the European settlement of Australia.

It may also mean that populations of this species and putative *C. signifera* may expand and merge, with specimens either competing or hybridising at some stage in the future, if not already.

In terms of other populations of putative *C. signifera* from across the known range of the species, there were several main morphological groupings, for which three or four previously coined names were available.

Firstly was the population from New South Wales generally, being found in all the coast, nearby highlands and slopes, including the ACT, but excluding the south-western slopes and plains near Wagga Wagga, and nearby north Victoria. The name *C. signifera* is available for these frogs at both species and subspecies-level.

Specimens from north of Coffs Harbour were sufficiently divergent both morphologically and by divergence (estimated at over 3 MYA) to be treated as a subspecies and so are formally named for this first time in this paper as *C. signifera aberrans* subsp. nov.

That taxon is believed to extend along the south Queensland coast and hinterland to about Bundaberg in the North.

The isolated population from Kroombit Tops, being about 150 km in a straight line north-west of Bundaberg, in Queensland is morphologically and geographically divergent and so is also herein formally named as a new subspecies, *C. signifera kroombitensis* subsp. nov..

Another main group is from the Adelaide Hills, nearby areas and Kangaroo Island, for which the name *Crinia varius* (Peters, 1863), type locality from Loos, 4.5 km west of Gawler, South Australia is available.

Crinia halmaturina (Condon, 1941), type locality of Kangaroo Island is a junior synonym of *C. varius*, although with a divergence of about 4 MYA from the mainland animals according to Symula *et al.* (2008), Kangaroo Island specimens are worthy of subspecies-level recognition and are treated as such herein. There are thus properly known as *Crinia varius halmaturina* (Condon, 1941).

Another group, closely related to and morphologically similar to the preceding group are those from Tasmania, for which the name *Crinia englishi* (Parker, 1840), (syntypes from northern Tasmania) is available. This taxon appeared to have diverged from the other species about 5 MYA according to Symula *et al.* (2008).

Another group, divergent from those groups listed immediately above, and more so from the type subspecies of *C. signifera* is found in far south-west Victoria and nearby south-east South Australia and has no available name, so is formally named for the first time as *C. aagh* sp. nov..

Specimens from the region between Wagga Wagga and Albury and including other parts of the Murray catchment in northern Victoria further west are morphologically similar to *C. aagh* sp. nov. but sufficiently divergent (over 5 MYA according to Symula *et al.* 2008) to warrant being treated as a separate species and so are formally named as *C. lynnepailsae* sp. nov..

Specimens from Melbourne and nearby areas to the north, at least as far north as Seymour and extending across through Ballarat and Hamilton in the west are formally described as a new species *Crinia fiacummingae* sp. nov..

In case it has been overlooked, all the newly named species were found by Symula *et al.* (2008) to have diverged from one another (next nearest relatives) at least 5 MYA.

The preceding taxonomy also conforms to the more recent molecular results of Williams (2015).

I note in passing that Symula *et al.* (2008) wrote in their summing up:

“High levels of genetic divergence were recovered among samples of C. signifera (Table 3). Several pairwise comparisons in this 16S rRNA dataset are above 5%, suggesting three cryptic species might be recognized. However, studies of reproductive isolation suggest that C. signifera represents

a single species. Experimental crosses have been performed among populations from clades B and C (Moore, 1954; Straughan and Main, 1966; Main, 1968). All crosses resulted in normal development and therefore suggest no post-zygotic isolation exists among them.” This argument against splitting the putative taxon *C. signifera* is ridiculous in the extreme.

If that were the case, species as divergent as the Queensland Black Headed Python *Aspidites melanocephalus* (Krefft, 1864) and the coastal Queensland Carpet Python *Morelia macdowelli* Wells and Wellington, 1984, (Brisbane form) would be treated as one and the same on the basis that in a captive situation they cross breed with healthy young and no obvious “post-zygotic isolation” (as detailed in summary form by Hoser (2022b)).

Same applies with other cross genus breedings of pythons as detailed by Hoser (1989). Two divergent subspecies are also formally named herein.

INFORMATION RELEVANT TO THE FORMAL DESCRIPTIONS THAT FOLLOWS

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, spelling should not be altered in any way for any purpose unless expressly and exclusively called for by the rules governing Zoological Nomenclature, being the *International Code of Zoological Nomenclature* as administered by the International Commission on Zoological Nomenclature.

The spelling of the species as *Crinia roypailsei* sp. nov. is intentional, as Roy Pails, the person whom this species is named in honour of, is often referred to as “Pailse”.

In terms of the subspecies *C. aagh* sp. nov. the spelling is also intentional and should not be changed.

Same applies for the other names formally proposed herein.

Material downloaded from the internet and cited anywhere in this paper was downloaded and checked most recently as of 6 December 2022, 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 explicitly cited herein.

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

Delays in recognition of these species and subspecies could jeopardise the long-term survival of these taxa as outlined by Hoser (2019a, 2019b) and sources cited therein.

This is especially with respect of these newly named taxa as they are at risk of hybridisation with translocated individuals of putative *C. signifera* from elsewhere, which regularly get transported by people in pot plants and the like, overlooked due to their tiny size and cryptic colours.

Therefore attempts by taxonomic vandals like the Wolfgang Wüster gang via Kaiser (2012a, 2012b, 2013, 2014a, 2014b) and Kaiser *et al.* (2013) (as frequently amended) 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, all of which were discredited long ago as outlined by Cogger (2014), Cotton (2014), Dubois *et al.* (2019), Hawkeswood (2021), Hoser, (2007, 2009, 2012a, 2012b, 2013a, 2015a-f, 2019a, 2019b), ICZN (1991, 2001, 2021), Wellington (2015) and sources cited therein.

CRINIA (RANIDELLA) ROYPAILSEI SP. NOV.

LSIDurn:lsid:zoobank.org:act:F6907726-8CF8-4999-BEC8-60FCE71655DB

Holotype: A preserved specimen at the National Museum of Victoria, Melbourne, Victoria, Australia, specimen number D68313 collected from 15 km east of Lakes Entrance, Victoria, Australia, Latitude -37.806 S., Longitude 148.056 E. This government-owned facility allows access to its holdings.

Paratypes: Six preserved specimens at the National Museum of Victoria, Melbourne, Victoria, Australia, specimen numbers D68314-D68317 with same collection data as the holotype and D51166- D51167 collected from 4 km south of Nowa Nowa on Rules Road, in Victoria, Australia, Latitude -37.77 S., Longitude 148.1 E.

Diagnosis: *Crinia roypailsei* sp. nov. is readily separated from all other putative *C. signifera* Girard, 1853 from Victoria (west

of east Gippsland) and those north of the Victorian/NSW border (being the most proximal populations) and other frogs referred to this species (*sensu* Anstis 2013 or Cogger 2014) by the following suite of characters:

Two well-defined and highly raised carbuncles or ridges running parallel down either side of the midline of the back. These are continuous and pronounced in adult females and broken in adult males.

These same ridges are either absent or reduced in comparison to this species in all other known putative *C. signifera* populations.

Crinia roypailsei sp. nov. invariably has some sort of well-defined dark bar or marking running from the eye down to the upper lip. This is wholly absent in *C. fiacummingae sp. nov.* from west Gippsland and further west in Victoria, where it appears as a reduced and faded triangle, slightly anterior to the eye and rarely meeting it. The same marking is usually absent in *C. signifera* from New South Wales, or if present, is either faded or reduced, often to spots or flecks.

Crinia roypailsei sp. nov. has few if any markings on the upper surfaces of the forelimbs, which is in line with west Victorian *C. fiacummingae sp. nov.* populations, but in contrast to NSW *C. signifera* populations which have significant blotches, bars or markings on the upper surfaces of the forelimbs.

Raised skin on the upper surfaces of *Crinia roypailsei sp. nov.* is mainly in the form of carbuncles, versus mainly tubercle-like in most others in the *C. signifera* complex (or more tubercle like than carbuncles in the others in the *C. signifera* complex).

The venter of adult female *Crinia roypailsei sp. nov.* is usually brownish yellow anteriorly, fading as one goes posterior, to become whitish before the hind limbs, the undersides of which are mainly pinkish-red. It is also granular in the form of large granules. Toes are generally lighter and sometimes orangeish red at the tips.

Crinia roypailsei sp. nov. is depicted in life online at: <https://www.flickr.com/photos/27026445@N06/31681631243/> and <https://www.inaturalist.org/observations/137493439> and <https://www.inaturalist.org/observations/10305308> and <https://www.inaturalist.org/observations/2442377> and

<https://www.inaturalist.org/observations/57196566>
C. signifera of the type form from New South Wales is depicted in Hoser (1989) on page 23, Anstis (2013) pages 576 (right) to 579 and Cogger 2014 on page 83, or online at: <https://www.inaturalist.org/observations/55013920>

All species within the *Crinia signifera* Girard, 1853 species group, including those formally named for the first time in this paper, and those otherwise resurrected from synonymy with that species in this paper, are separated from all other species in the genus *Crinia* Tschudi, 1838, by the following unique suite of characters:

Obviously granular belly in adults; adults have more-or-less dermal fringes on the toes; no pink or red on the hind side of the thighs; no median white line on the throat; throat of breeding male is dark with white pectoral spots; belly of female is boldly blotched with black and white; palm is tubercular; vomerine teeth absent (derived from Cogger, 2014).

Cogger (2014) on page 71, also provides a key that separates species of *Crinia* from other Myobatrachid frog species.

According to Symula *et al.* (2008) *Crinia roypailsei sp. nov.* diverged from its nearest relatives more than 8 MYA.

Distribution: To date *Crinia roypailsei sp. nov.* is only known from the region between Bairnsdale and Cann River, on and near the coast of eastern Victoria, Australia (a range encompassing not much more than 100 km in a straight line), but based on distribution records for putative *C. signifera*, specimens as far

south-west as Woodside, Victoria are probably best referred to the species *C. roypailsei sp. nov.* Morphologically, the specimens from Genoa/Mallacoota and the Victorian side of the NSW border are also most like *C. roypailsei sp. nov.* and are also referred to this species.

C. roypailsei sp. nov. is unlikely to occur much beyond this zone, with typical *C. signifera* found both just north of this area at Eden in New South Wales (about 20 km to the north) and in the suburbs of Melbourne's east (e.g. Lilydale) one finds *C. fiacummingae sp. nov.*

Etymology: The species *Crinia roypailsei sp. nov.* is named in honour of well-known Victorian herpetologist, Roy Pails, of Ballarat, Victoria, (aged 68 in 2023) in recognition of a lifetime's work with reptiles and threatened species of native mammals.

His creation of numerous fenced fauna reserves to breed threatened and endangered species of native mammals was hugely successful.

In 2021 he got a pile of favourable media publicity and accolades for his good conservation work.

The Victorian Wildlife department did not like this as it detracted from their own dysfunctional "Zoos Victoria" business trying to monopolize cash donations from members of the public and trading to capitalize on the public's adoration for saving wildlife. Therefore they decided to unilaterally cancel the license Pails operated under.

Pails joined a long line of other victims who's successful wildlife conservation business was shut down at gunpoint by the Victorian government, including people like Fritz Maaten and Andy Stephens (Monbulk Animal Kingdom) or Vicki Lowing (Crocs n Critters), improperly destroyed in a similar way.

CRINIA (RANIDELLA) AAGH SP. NOV.

LSIDDurn:lsid:zoobank.org:act:FFE8DEC0-E2FA-4779-B642-F005722400BF

Holotype: A preserved specimen at the National Museum of Victoria, Melbourne, Victoria, Australia, specimen number: D14714 collected from Kentbruck Heath, Johnstone Creek, on the Portland to Nelson Road, Victoria, Australia, Latitude -38.17 S., Longitude 141.42 E.

This government-owned facility allows access to its holdings.

Paratypes: Three preserved specimens at the National Museum of Victoria, Melbourne, Victoria, Australia, specimen numbers: D14715-D14717 collected from Kentbruck Heath, Johnstone Creek, on the Portland to Nelson Road, Victoria, Australia, Latitude -38.17 S., Longitude 141.42 E.

Diagnosis: The species *Crinia (Ranidella) aagh sp. nov.* is readily separated from all other species within the *C. (Ranidella) signifera* Girard, 1853 complex by the following unique suite of characters:

Adult females have a distinctive dark diamond shape on the head, slightly longer than wider, being more than one dark colour, surrounded by lighter beige pigment or at least a lighter outline. On the back on either side of the beige mid-dorsum and darker greyish-brown-etching are long carbuncles that turn into short ones and then tubercles as one moves in a posterior direction down the body. The flanks have a series of light brown, then dark brown then beige stripes from top to bottom, the lighter one merging with the lighter venter, which is mainly immaculate white and with limited dark markings on the belly, which are of the form of dark blackish tubercles, immediately surrounded in part with light brown.

The dark side stripe is somewhat irregular in outline as is the case in all members of the *C. signifera* complex excluding *C. roypailsei sp. nov.* in which it is mainly straight save for the narrow anterior part.

Adult males *C. aagh sp. nov.* have a well defined but irregular pattern of dark greyish-brown on a beige background, with flushes of orange or red, heavily marked forelimbs, banded hind limbs, a venter as for the females, but usually with more darker pigmentation and spots. There is a dark coloured, backward

facing triangle on the head with the base between the eyes. There is no diamond-shape as seen in the females. At the anterior of the eye is a brown triangle with the base starting at the upper lip. The body is covered with large but scattered tubercles, the only obvious carbuncles being small and on the dorsum of the body roughly above the axilla of the forelimbs. These are large and of similar size on the upper surfaces of the hind limbs, in contrast to being small in size on the upper surfaces of the hind limbs in females. There are tubercles on the upper surfaces of the large toes in males, but not in females. No other species in the *C. signifera* complex have the exact suites of characters as just described.

Crinia aagh sp. nov. is depicted in life online at:

<https://www.inaturalist.org/observations/104630719>

and

<https://www.inaturalist.org/observations/5069095>

and

<https://www.inaturalist.org/observations/94190389>

C. signifera of the type form from New South Wales is depicted in Hoser (1989) on page 23, Anstis (2013) pages 576 (right) to 579 and Cogger 2014 on page 83, or online at:

<https://www.inaturalist.org/observations/55013920>

All species within the *Crinia signifera* Girard, 1853 species group, including those formally named for the first time in this paper, and those otherwise resurrected from synonymy with that species in this paper, are separated from all other species in the genus *Crinia* Tschudi, 1838, by the following unique suite of characters:

Obviously granular belly in adults; adults have more-or-less dermal fringes on the toes; no pink or red on the hind side of the thighs; no median white line on the throat; throat of breeding male is dark with white pectoral spots; belly of female is boldly blotched with black and white; palm is tubercular; vomerine teeth absent (derived from Cogger, 2014).

Cogger (2014) on page 71, also provides a key that separates species of *Crinia* from other Myobatrachid frog species.

According to Symula *et al.* (2008) *Crinia aagh* sp. nov. diverged from its nearest relatives more than 5 MYA, the closest related species being *C. lynnepailsae* sp. nov..

Distribution: *C. aagh* sp. nov. is found in far south-west Victoria and nearby south-east South Australia. Specimens from the region between Wagga Wagga and Albury and including other parts of the Murray catchment in northern Victoria further west are morphologically similar to *C. aagh* sp. nov. and are of the species *C. lynnepailsae* sp. nov..

Etymology: The species name "*aagh*" reflects the sound many people exclaim when they see one of these frogs underneath material lifted up.

CRINIA (RANIDELLA) LYNNEPAILSÆ SP. NOV.

LSIDDurn:lsid:zoobank.org:act:E12F8A60-55AB-4A20-88D8-A0F25D41AE15

Holotype: A preserved specimen at the Australian Museum, Sydney, New South Wales, Australia, specimen number R.90455 collected from the Dora Dora State Forest, South east of Holbrook, New South Wales, Australia, Latitude -35.916 S., Longitude 147.416 E. This government-owned facility allows access to its holdings.

Paratypes: 1/ Six preserved specimens at the Australian Museum, Sydney, New South Wales, Australia, specimen numbers R.90456- R.90461 all collected from the Dora Dora State Forest, South east of Holbrook, New South Wales, Australia, Latitude -35.916 S., Longitude 147.416 E.

2/ Two preserved specimens at the National Museum of Victoria, Melbourne, Victoria, Australia, specimen number D26311 collected from 3.2 km west of Wagga Wagga, New South Wales, Australia, Latitude -35.12 S., Longitude 147.37 E and specimen number D21877 collected from Woomargama, New South Wales, Australia, Latitude -35.83 S., Longitude 147.25 E.

Diagnosis: The species *Crinia (Ranidealla) lynnepailsae* sp.

nov. is readily separated from all other species within the *C. (Ranidella) signifera* Girard, 1853 complex by the following unique suite of characters:

It is similar in most respects to *C. aagh* sp. nov., which it would otherwise be identified as, but differs from that species in the following attributes. In the female, the distinctive dark diamond on the head is broken so that the posterior part is a triangle with the base between the eyes and there is an anterior blotch of irregular shape in front of this. Between these is an area of yellow or beige.

The darker lines running down either side of the mid dorsum are etched on the outer edge with white or light yellow. In *C. signifera*, these lines are not etched dark or light on the outer edge.

On the back on either side of the mid-dorsum and elsewhere the skin is relatively smooth but similar to *C. aagh* sp. nov. in that there are the defined carbuncle ridges on either side of the mid-dorsal line (although this is slightly less pronounced in this species) with scattered small tubercles present on the upper surfaces of the body and limbs, but these are also scattered.

Adult males are quite different in that they have a generally indistinct dorsal pattern, being often greenish, greyish or brown in overall colour, rather than having the distinctive dark and light markings on the upper surfaces as seen in *C. aagh* sp. nov.. There are two rows of moderately large tubercles running down either side of the dorsum of the back, with smaller scattered tubercles on the rest of the body, in particular the upper flank and the boundary between flank and dorsum.

Above the axilla of the forelimb the tubercles are larger and blunted in shape, but not in the form of carbuncles. There are no tubercles on the upper surfaces of the toes.

There are no obvious flushes of orange or red on the dorsum or flanks, although a few specimens have a dull rust coloured hue on the border between flank and dorsum, this sometimes coinciding with a series of tubercles, a fold or low carbuncles.

In neither sex is there any obvious line running from the eye to the jawline.

C. lynnepailsae sp. nov. from far southern New South Wales is depicted in life online at:

<https://www.inaturalist.org/observations/136090160>

and

<https://www.inaturalist.org/observations/98176566>

and

<https://www.inaturalist.org/observations/93439993>

C. signifera of the type form from New South Wales is depicted in Hoser (1989) on page 23, Anstis (2013) pages 576 (right) to 579 and Cogger 2014 on page 83, or online at:

<https://www.inaturalist.org/observations/55013920>

All species within the *Crinia signifera* Girard, 1853 species group, including those formally named for the first time in this paper, and those otherwise resurrected from synonymy with that species in this paper, are separated from all other species in the genus *Crinia* Tschudi, 1838, by the following unique suite of characters:

Obviously granular belly in adults; adults have more-or-less dermal fringes on the toes; no pink or red on the hind side of the thighs; no median white line on the throat; throat of breeding male is dark with white pectoral spots; belly of female is boldly blotched with black and white; palm is tubercular; vomerine teeth absent (derived from Cogger, 2014).

Cogger (2014) on page 71, also provides a key that separates species of *Crinia* from other Myobatrachid frog species.

According to Symula *et al.* (2008) *Crinia lynnepailsae* sp. nov. diverged from its nearest relatives more than 5 MYA, the closest related species being *C. aagh* sp. nov..

Distribution: *Crinia lynnepailsae* sp. nov. is known only from a limited area between Wagga Wagga and Albury, New South Wales, but is presumed to occur further west along the Murray basin.

Etymology: The species *Crinia lynnepailsae* sp. nov. is named in honour of Lynne Pails, the long suffering wife of well-known Victorian herpetologist, Roy Pails, of Ballarat, Victoria, (aged 68 in 2023) in recognition of her putting up with Roy and his lifetime's work with reptiles and threatened species of native mammals and all the agonies that entails. Thankfully, like Roy Pails, she has a great sense of humour, which is essential in that she has had to endure regular illegal armed raids by corrupt government-employed wildlife officers, usually in company with heavily armed and violent Victorian police officers, for more than 4 decades.

CRINIA (RANIDELLA) FIACUMMINGAE SP. NOV.

LSIDurn:lsid:zoobank.org:act:7B6BC96D-C161-4BAD-A28D-0E993C5AE0AF

Holotype: A preserved specimen at the National Museum of Victoria, Melbourne, Victoria, Australia, specimen number D22380 collected from the Mount Disappointment area, 1.6 km south of Wallan East, Victoria, Australia, Latitude -37.42 S., Longitude 145.00 E. This government-owned facility allows access to its holdings.

Paratypes: Four preserved specimens at the National Museum of Victoria, Melbourne, Victoria, Australia, being 1/ Specimen number D22554 collected from 2.4 km east of Wallan, Victoria, Latitude -37.42 S., Longitude 145.00 E, and 2/ Specimen numbers D72778, D72779, D72780 all collected from the La Trobe University Nature Reserve, Bundoora, Victoria, Australia, Latitude -37.7183 S., Longitude 145.053 E.

Diagnosis: The species *Crinia (Ranidealla) fiacummingae* sp. nov. is readily separated from all other species within the *C. (Ranidella) signifera* Girard, 1853 complex by the following unique suite of characters:

In females, the outer edges of the dark lines on either side of the mid dorsum are etched with dark grey to black, these being in the form of joined fine dots or peppering. In *C. signifera*, these lines are not etched dark or light on the outer edge, while in *C. lynnepailsae* sp. nov. the darker lines running down either side of the mid dorsum are etched on the outer edge with white or light yellow.

Dark lines are generally peppered black on the edges and lighter within, as are markings on the upper limbs. Slightly anterior to the eye is a semi-distinct triangle running up from the lower jaw that either meets, or nearly meets the front of the eye. The dark band on the upper flank is so heavily peppered light as to make it only semi-distinct. Tubercles are generally small and scattered as is any carbuncles associated with the anterior outer dark stripes on either side of the mid-dorsal line.

In males, the dorsal colour ranges from light grey to greenish grey or brown, usually with two pairs of irregularly shaped dark brownish-grey blotches on either side of the mid dorsum. These are usually associated with a concentration of tubercles or tiny carbuncles. Upper surfaces of the limbs and the dorsum and flanks have numerous closely spaced small unblunted tubercles. Upper surfaces of hind limbs have well defined markings in the form of bands or elongated spots.

Crinia fiacummingae sp. nov. in life is depicted online at:

<https://www.inaturalist.org/observations/19349545>

and

<https://www.inaturalist.org/observations/90629130>

and

<https://www.inaturalist.org/observations/110820279>

C. signifera of the type form from New South Wales is depicted in Hoser (1989) on page 23, Anstis (2013) pages 576 (right) to 579 and Cogger 2014 on page 83, or online at:

<https://www.inaturalist.org/observations/55013920>

All species within the *Crinia signifera* Girard, 1853 species group, including those formally named for the first time in this paper, and those otherwise resurrected from synonymy with that species in this paper, are separated from all other species in the genus *Crinia* Tschudi, 1838, by the following unique suite of characters:

Obviously granular belly in adults; adults have more-or-less dermal fringes on the toes; no pink or red on the hind side of the thighs; no median white line on the throat; throat of breeding male is dark with white pectoral spots; belly of female is boldly blotched with black and white; palm is tubercular; vomerine teeth absent (derived from Cogger, 2014).

Cogger (2014) on page 71, also provides a key that separates species of *Crinia* from other Myobatrachid frog species.

According to Symula *et al.* (2008) *Crinia fiacummingae* sp. nov. diverged from its nearest relatives more than 5 MYA, the closest related species being *C. varius* (Peters, 1863).

Distribution: *Crinia fiacummingae* sp. nov. is found around Melbourne, Victoria and environs, including north to at least Seymour and extending across though Ballarat and Hamilton in the west.

Etymology: *C. fiacummingae* sp. nov. is named in honour of one of the best investigative journalists in Australian history, Fia Cumming, originally of Chatswood, New South Wales and in more recent decades of Lyons in the ACT, Australia.

In the 1993, she played a pivotal role in exposing corruption in the NSW National Parks and Wildlife Service (NPWS/NSW) and getting the ban on the book, *Smuggled: The Underground Trade in Australia's Wildlife* (Hoser, 1993) lifted.

This she did in her role as a journalist at Rupert Murdoch's News Corporation.

Not surprisingly, pressure was brought to bear and she was sacked by the company.

She sued through her union and got a payout.

Smuggled: The Underground Trade in Australia's Wildlife went on to become a best seller and as a result of the content of the book and the media it generated, draconian wildlife laws were re-written in every state of Australia.

Had the ban on the book not been lifted, private ownership of any kind of wildlife would remain outlawed across Australia as it was for the previous 2 decades.

Wildlife departments in Australia remain endemically corrupt and laws governing wildlife are far from perfect. However the Nazi style reign of terror meted out on wildlife lovers from the 1970's to the 1990's by militaristic wildlife officers is now a thing of the past.

Illegal armed raids continue, but nothing compared to the scale in decades past.

For most Australians keeping a pet snake or a wallaby is now a simple process and they do not live in fear of an armed raid or jail for doing so.

Without Fia Cumming, this would not be the case.

For further detail see Hoser (1996).

I also note that News Corporation have also been running an undeclared war against myself since 1993, regularly publishing false and defamatory fake news stories about me and sabotaging our wildlife display business by backlinking to trademark infringing thieves as a means to exact further damage against me.

News Corporation staff have also actively petitioned police and wildlife departments to mount illegal raids on our family on the basis of false claims they have made to them.

CRINIA (RANIDELLA) SIGNIFERA ABERRANS SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:F67A7EA5-95C8-4E4F-8941-D80E5CD9E51E

Holotype: A preserved specimen at the Australian Museum, Sydney, New South Wales, Australia, specimen number R.165451, collected from the Wooli Road, 100 metres east of the Skinners Road intersection, Pillar Valley, New South Wales, Australia, Latitude -29.7786 S., Longitude 153.15861 E. This government-owned facility allows access to its holdings.

Paratypes: Three preserved specimens at the Australian Museum, Sydney, New South Wales, Australia, specimen numbers R.165453, R.165535 and R.165537 all collected

from the Wooli Road, 100 metres east of the Skinners Road intersection, Pillar Valley, New South Wales, Australia, Latitude -29.7786 S., Longitude 153.15861 E.

Diagnosis: The species *Crinia (Ranidealla) signifera* Girard, 1853 is readily separated from all other species and subspecies within the *C. (Ranidella) signifera* Girard, 1853 complex by the following unique suite of characters:

Dark markings or stripes on the dorsum are invariably a combination of black and brown, black and yellow or all three colours. This is typically with light centres or reversed or one dark colour, with spotting or blotches of the other in the markings, (separate from the lighter areas between, that are typically light brown, grey or beige). Tubercles on the dorsum, when present are small to medium and more-or less triangular and pointed in shape. They are usually widely scattered and in a more-or-less random pattern on the upper surfaces. On the upper snout, there are distinct (usually) or sometimes semi-distinct markings that are dark brown to black on the upper lip generally below the eye, but not meeting it. These are bordered by white or yellow, with the areas above this, anterior to the eye and above it (at the top of the head) a grey or brown colour, but darker than the etching of the darker labial markings. Venter is usually heavily peppered black (in a pattern of some sort) on a white or whitish background. Darker markings on the upper flanks in males is semi-distinct or in the form of broken darker markings in the configuration of an upper lateral stripe. In females it is usually a dark line without breaks, but the dark line has obvious lighter flecks or blotches within it (that are a darker colour than the areas outside the line).

Markings on the upper surfaces of the limbs are either absent or at best only semi-distinct. The upper surface of the proximal parts of the forelimbs is very light or with an obvious light flush (usually beige or yellowish), this feature being more prominent in *C. signifera* than in the other species in the complex, although in *C. lypnailsae* sp. nov. there is an obvious brown section of the upper areas of the proximal forelimb that contrasts with the dark grey or dark brown distal part of the limb.

The subspecies *Crinia (Ranidealla) signifera aberrans* subsp. nov. is readily separated from the nominate form of *C. signifera* as defined above and *C. signifera kroombitensis* subsp. nov. as defined below, by the following characters: Males have well defined ridges of carbuncles on the upper surface of the dorsum, these running on both sides of the midline in a wavy manner and the scattered tubercles on the dorsum are of moderate density. The whitish tubercles on the belly also make it up the lower flanks.

On the female, the dark line of the upper flank extends and merges with the white of the lower parts of the flank, with white tubercles also being visible on the far lower parts of the lower flank.

In both sexes there are no obvious markings below the eye or on the upper lip, this general area being of the same general colour of the dorsum and with a limited amount of whitish peppering.

C. signifera of the type form from New South Wales is depicted in life in Hoser (1989) on page 23, Anstis (2013) pages 576 (right) to 579 and Cogger 2014 on page 83 and online at: <https://www.inaturalist.org/observations/55013920>

Crinia (Ranidealla) signifera aberrans subsp. nov. is depicted in life online at:

<https://www.inaturalist.org/observations/68265254>

C. signifera kroombitensis subsp. nov. is depicted in life online at: <https://dl.id.au/1/set.php?s=14&p=35>

All species within the *Crinia signifera* Girard, 1853 species group, including those formally named for the first time in this paper, and those otherwise resurrected from synonymy with that species in this paper, are separated from all other species in the genus *Crinia* Tschudi, 1838, by the following unique suite of characters: Obviously granular belly in adults; adults have more-or-less dermal fringes on the toes; no pink or red on the hind side of

the thighs; no median white line on the throat; throat of breeding male is dark with white pectoral spots; belly of female is boldly blotched with black and white; palm is tubercular; vomerine teeth absent (derived from Cogger, 2014).

Cogger (2014) on page 71, also provides a key that separates species of *Crinia* from other Myobatrachid frog species.

According to Symula *et al.* (2008) *Crinia signifera aberrans* subsp. nov. diverged from its nearest relative, the type form of *C. signifera* s more than 3 MYA.

Distribution: *C. signifera aberrans* subsp. nov. occur from about Coffs Harbour on the New South Wales north coast, along the coastal strip, to at least the Queensland/New South Wales border in the north and presumably nearby parts of south-east Queensland, where the distribution appears to be continuous to about Bundaberg in the north.

Further west in the New England region and south from about Port Macquarie the type form of *C. signifera* occurs.

The population isolated to Kroombit Tops, further north in Queensland (near the central Queensland coast) is of a morphologically divergent subspecies confined to that general area.

Etymology: The subspecies *C. signifera aberrans* subsp. nov. is named in reflection in that it is an aberrant form of the species *C. signifera* and the name derives exactly from that.

CRINIA (RANIDELLA) SIGNIFERA KROOMBITENSIS SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:F23C26FC-3C47-43B5-873C-1848D11BAB06

Holotype: A preserved specimen at the Queensland Museum, Brisbane, Queensland, Australia, specimen number J54865 collected from "Scientific Area 48" at Kroombit Tops, Queensland, Australia, Latitude -24.366667 S., Longitude 151.033333 E.

This government-owned facility allows access to its holdings.

Paratypes: All are preserved specimens at the Queensland Museum, Brisbane, Queensland, Australia, specimen numbers J54866 and J54867 collected from "Scientific Area 48" at Kroombit Tops, Queensland, Australia, Latitude -24.366667 S., Longitude 151.033333 E and specimen number J45558 collected from the Forestry Barracks at Kroombit Tops Queensland, Australia, Latitude -24.366667 S., Longitude 151.016667 E.

Diagnosis: The species *Crinia (Ranidealla) signifera* Girard, 1853 is readily separated from all other species and subspecies within the *C. (Ranidella) signifera* Girard, 1853 complex by the following unique suite of characters:

Dark markings or stripes on the dorsum are invariably a combination of black and brown, black and yellow or all three colours. This is typically with light centres or reversed or one dark colour, with spotting or blotches of the other in the markings, (separate from the lighter areas between, that are typically light brown, grey or beige).

Tubercles on the dorsum, when present are small to medium and more-or less triangular and pointed in shape. They are usually widely scattered and in a more-or-less random pattern on the upper surfaces. On the upper snout, there are distinct (usually) or sometimes semi-distinct markings that are dark brown to black on the upper lip generally below the eye, but not meeting it. These are bordered by white or yellow, with the areas above this, anterior to the eye and above it (at the top of the head) a grey or brown colour, but darker than the etching of the darker labial markings.

Venter is usually heavily peppered black (in a pattern of some sort) on a white or whitish background. Darker markings on the upper flanks in males is semi-distinct or in the form of broken darker markings in the configuration of an upper lateral stripe. In females it is usually a dark line without breaks, but the dark line has obvious lighter flecks or blotches within it (that are a darker colour than the areas outside the line).

Markings on the upper surfaces of the limbs are either absent or at best only semi-distinct. The upper surface of the proximal

parts of the forelimbs is very light or with an obvious light flush (usually beige or yellowish), this feature being more prominent in *C. signifera* than in the other species in the complex, although in *C. lynpailsae* sp. nov. there is an obvious brown section of the upper areas of the proximal forelimb that contrasts with the dark grey or dark brown distal part of the limb.

The morphologically divergent subspecies *C. signifera kroombitensis* subsp. nov. is separated from the nominate form of *C. signifera* as defined above, *C. signifera aberrans* subsp. nov. as defined above, and all other species in the *C. signifera* species complex, by the following characters:

In males, the dorsum is a distinctive random pattern of dark brownish-black blotches on a medium brown to dark beige background.

Overlaying all of this is a moderately dense assemblage of large, blunt and rounded tubercles, reddish-brown in colour, many of which are either elongated or otherwise joined to one another, but not forming any obvious carbuncles.

These are only present in the preceding form on the upper surface of the dorsum and the area between the eye and the axilla of the forelimb.

Anterior to the eyes are about 8-10 smaller light brown tubercles

Both males and females have an obvious thick dark stripe running from the upper lip to the bottom of the eye.

Females have two distinctive ridges formed by extended carbuncles, running down either side of the mid dorsum, being more-or-less continuous on the anterior half of the back and then being broken posteriorly.

The lines on the upper body and upper flanks are somewhat irregular and not very distinct, or well defined.

Venter in both sexes is white with black markings.

C. signifera of the type form from New South Wales is depicted in life in Hoser (1989) on page 23, Anstis (2013) pages 576 (right) to 579 and Cogger 2014 on page 83 and online at: <https://www.inaturalist.org/observations/55013920>

Crinia (Ranidealla) signifera aberrans subsp. nov. is depicted in life online at:

<https://www.inaturalist.org/observations/68265254>

C. signifera kroombitensis subsp. nov. is depicted in life online at: <https://dl.id.au/1/set.php?s=14&p=35>

The taxon described herein as *C. signifera kroombitensis* subsp. nov. is very morphologically divergent and based on this and the geographical isolation of the population, I would normally have no hesitation in treating it as a full species.

However in the absence of confirming molecular data, I have instead formally named it as a subspecies.

If and when molecular divergence of this population from type *C. signifera* is ascertained, a decision can be made as to whether or not it should be elevated to be a full species.

All species within the *Crinia signifera* Girard, 1853 species group, including those formally named for the first time in this paper, and those otherwise resurrected from synonymy with that species in this paper, are separated from all other species in the genus *Crinia* Tschudi, 1838, by the following unique suite of characters:

Obviously granular belly in adults; adults have more-or-less dermal fringes on the toes; no pink or red on the hind side of the thighs; no median white line on the throat; throat of breeding male is dark with white pectoral spots; belly of female is boldly blotched with black and white; palm is tubercular; vomerine teeth absent (derived from Cogger, 2014).

Cogger (2014) on page 71, also provides a key that separates species of *Crinia* from other Myobatrachid frog species.

Distribution: The subspecies *C. signifera kroombitensis* subsp. nov. is apparently confined to the Kroombit Tops area of central coastal Queensland, Australia.

Etymology: The subspecies *C. signifera kroombitensis* subsp. nov. is named in reflection of the fact that it is a taxon confined to the area of Kroombit Tops, Queensland.

CONSERVATION THREATS TO THE RELEVANT SPECIES

There are no known significant immediate conservation threats to any species within the genus *Crinia sensu lato* as discussed within this paper, save for the ongoing risk of translocation by people moving gardening materials around Australia and inadvertently taking the frogs with them.

This brings risk of out competition or hybridisation to one or other of the affected species.

To deal with this issue with respect of species within the genus *Crinia*, it is important that the government fund properly conducted scientific studies into the potential problem.

However, if the Australian government persists with its "Big Australia Policy", (see for example Saunders 2019 or Zaczek 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 26 million as of 2022), all sorts of unforeseen threats to the survival of these species may emerge.

Due to unforeseen potential threats I recommend further research on all aspects of the relevant species and including means to identify likely threats.

These may include direct human activities (e.g. land clearing for homes or farming activities), 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 amphibians by government-owned zoos and other government backed commercial enterprises.

Denial of the existence of the relevant taxa *sensu* Wüster *et al.* as outlined by Hoser (2019b, 2019c), could ultimately cause extinction of some of these frog taxa in the same way it caused one or more earlier extinctions as documented by Hoser (2019b, 2019c).

REFERENCES CITED

- Anstis, M. 2013. *Tadpoles and frogs of Australia*. Reed / New Holland, Sydney, Australia:829 pp.
- Barker, J., Grigg, G. C. and Tyler, M. J. 1995. *A Field Guide to Australian Frogs*. Surrey Beatty and Sons, Chipping Norton, NSW, Australia:407 pp.
- Clulow, S. and Swan, M. 2018. *A complete guide to Frogs of Australia*, Australian Geographic, Sydney, NSW, Australia:336 pp.
- Clyne, D. 1969. *Australian Frogs*. Lansdowne Press, Melbourne, Victoria, Australia:112 pp.
- Cogger, H. G. 2014. *Reptiles and Amphibians of Australia* (Seventh Edition). CSIRO Publishing, Collingwood, Victoria, Australia:1033 pp.
- Cogger, H. G., Cameron, E. E. and Cogger, H. M. 1983. *Zoological Catalogue of Australia (1) Amphibia and Reptilia*, Australian Government Publishing Service, Canberra, ACT, Australia:319 pp.
- Condon, H. T. 1941. Further records of lizards and frogs from Kangaroo Island. *Records of the South Australian Museum* 7:111-114.
- Cotton, T. 2014. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published (Case 3601; see *BZN* 70: 234-237, 71: 30-38; 133-135). *Bulletin of Zoological Nomenclature* 71(3) September 2014:181-182.
- Dubois, A., Bauer, A. M., Ceriaco, L. M. P., Dusoulier, F., Fretey, T., Lobl, I., Lorvelec, O., Ohler, A., Stopiglia, R. and Aesch, E. 2019. The Linz Zoocode project: a set of new proposals regarding the terminology, the Principles and Rules of zoological nomenclature. First report of activities (2014-2019). *Bionomina* (online), 17:1-111.
- Eipper, S. and Rowland, P. 2018. *A Naturalist's Guide to the Frogs of Australia*. John Beaufoy Publishing, Oxford, UK:176 pp.
- Girard, C. 1853. Descriptions of new species of reptiles, collected by the U.S. Exploring Expedition,

- under the command of Capt. Charles Wilkes, U.S.N. Second part: including the species of batrachians, exotic to North America. *Proceedings of the Academy of Natural Sciences of Philadelphia* 6:420-424.
- Gray, J. E. 1841. A catalogue of the species of Reptiles and Amphibia hitherto described as inhabiting Australia, with a description of some new species from Western Australia. Appendix E. pp. 422-449 in Grey, G. (ed.). *Journals of Two Expeditions of Discovery in North-west and Western Australia During the Years 1837, 38, and 39, Under the Authority of Her Majesty's Government. Describing many newly discovered, important, and fertile districts, with observations on the moral and physical condition of the aboriginal inhabitants, &c. &c.* London: T. & W. Boone Vol. 2 vii 482 pp. [Date published Nov. 1841] [447].
- Hawkeswood, T. J. 2021. Time to end taxonomic vandalism by Wolfgang Wüster *et al.*: The Snakeman, Raymond Hoser's publications are validly published and his names available according to the ICZN: Objective investigation finds Hoser's taxonomic works as scientific best practice and in every relevant case identifies valid entities. *Calodema*, 860:1-59.
- Hero, J., Littlejohn, M. and Marantelli, G. 1991. *Frogwatch field guide to Victorian Frogs*, Department of Frequent Name Changes, Victoria Parade, East Melbourne, Victoria, Australia:108 pp.
- Hoser, R. T. 1989. *Australian Reptiles and Frogs*. Pierson and Co., Sydney, NSW, Australia:238 pp.
- Hoser, R. T. 1993. *Smuggled:The Underground Trade in Australia's Wildlife*. Apollo Books, Moss Vale, NSW, Australia:160 pp.
- Hoser, R. T. 1996. *Smuggled-2: Wildlife trafficking, crime and corruption in Australia*. Kotabi Publishing, Doncaster, Victoria, Australia:280 pp.
- Hoser, R. T. 2007. Wells and Wellington - It's time to bury the hatchet. *Calodema* Supplementary Paper 1:1-9.
- Hoser, R. T. 2009. Creationism and contrived science: A review of recent python systematics papers and the resolution of issues of taxonomy and nomenclature. *Australasian Journal of Herpetology* 2:1-34. (3 February).
- Hoser, R. T. 2012a. Exposing a fraud! *Afronaja* Wallach, Wüster and Broadley 2009, is a junior synonym of *Spracklandus* Hoser 2009! *Australasian Journal of Herpetology* 9 (3 April 2012):1-64.
- Hoser, R. T. 2012b. Robust taxonomy and nomenclature based on good science escapes harsh fact-based criticism, but remains unable to escape an attack of lies and deception. *Australasian Journal of Herpetology* 14:37-64.
- Hoser, R. T. 2013a. The science of herpetology is built on evidence, ethics, quality publications and strict compliance with the rules of nomenclature. *Australasian Journal of Herpetology* 18:2-79.
- Hoser, R. T. 2013b. Monitor Lizards reclassified with some common sense (Squamata: Sauria: Varanidae). *Australasian Journal of Herpetology* 21: 41-58.
- Hoser, R. T. 2015a. Dealing with the "truth haters" ... a summary! Introduction to Issues 25 and 26 of *Australasian Journal of Herpetology*. Including "A timeline of relevant key publishing and other events relevant to Wolfgang Wüster and his gang of thieves." and a "Synonyms list". *Australasian Journal of Herpetology* 25:3-13.
- Hoser, R. T. 2015b. The Wüster gang and their proposed "Taxon Filter": How they are knowingly publishing false information, recklessly engaging in taxonomic vandalism and directly attacking the rules and stability of zoological nomenclature. *Australasian Journal of Herpetology* 25:14-38.
- Hoser, R. T. 2015c. Best Practices in herpetology: Hinrich Kaiser's claims are unsubstantiated. *Australasian Journal of Herpetology* 25:39-64.
- Hoser, R. T. 2015d. PRINO (Peer reviewed in name only) journals: When quality control in scientific publications fails. *Australasian Journal of Herpetology* 26:3-64.
- Hoser, R. T. 2015e. Rhodin *et al.* 2015, Yet more lies, misrepresentations and falsehoods by a band of thieves intent on stealing credit for the scientific works of others. *Australasian Journal of Herpetology* 27:3-36.
- Hoser, R. T. 2015f. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published (Case 3601; see *BZN* 70: 234-237; comments *BZN* 71:30-38, 133-135). *Australasian Journal of Herpetology* 27:37-54.
- Hoser, R. T. 2016. New frogs of the genus *Mixophyes* Günther, 1864 from Eastern Queensland, and New South Wales, Australia (Anura:Myobatrachidae). *Australasian Journal of Herpetology* 33:60-64.
- Hoser, R. T. 2019a. A new species of *Philocryphus* Fletcher, 1894 (Amphibia: Myobatrachidae) from north-east Victoria and south-east New South Wales. *Australasian Journal of Herpetology* 39:6-8.
- Hoser, R. T. 2019b. 11 new species, 4 new subspecies and a subgenus of Australian Dragon Lizard in the genus *Tympanocryptis* Peters, 1863, with a warning on the conservation status and long-term survival prospects of some newly named taxa. *Australasian Journal of Herpetology* 39:23-52.
- Hoser, R. T. 2019c. Richard Shine *et al.* (1987), Hinrich Kaiser *et al.* (2013), Jane Melville *et al.* (2018 and 2019): Australian Agamids and how rule breakers, liars, thieves, taxonomic vandals and law breaking copyright infringers are causing reptile species to become extinct. *Australasian Journal of Herpetology* 39:53-63.
- Hoser, R. T. 2020a. Three new species of frog in the genus *Limnodynastes* Fitzinger, 1843 from east Australia, two new *Platylepton* Peters, 1863 species from east Australia and three new species of *Ranaster* Macleay, 1878 from north Australia. *Australasian Journal of Herpetology* 43:3-14.
- Hoser, R. T. 2020b. 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. *Australasian Journal of Herpetology* 43:15-26.
- Hoser, R. T. 2020c. For the first time ever! An overdue review and reclassification of the 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.
- Hoser, R. T. 2020d. Four new species of frog in the genus *Assa* from eastern Australia. *Australasian Journal of Herpetology* 47:57-63.
- Hoser, R. T. 2020e. A new species of Tree Frog in the genus *Shireenhosierhylea* Hoser, 2020 from north Queensland, Australia. *Australasian Journal of Herpetology* 49:7-8.
- Hoser, R. T. 2020f. 3 new tribes, 3 new subtribes, 5 new genera, 3 new subgenera, 39 new species and 11 new subspecies of mainly small ground-dwelling frogs from Australia. *Australasian Journal of Herpetology* 50-51:1-128.
- Hoser, R. T. 2022a. Hiding in plain sight. A previously unrecognized biogeographical barrier in Australia formed by an event of biblical proportions. Five new species of skink lizard from south-west Victoria, three more closely related species from New South Wales and another from South Australia. *Australasian Journal of Herpetology* 56:3-21.
- Hoser, R. T. 2022b. Incubation and hatching of juvenile Marbled Gecko *Christinus marmoratus* (Gray, 1845). *Australasian Journal of Herpetology* 56:55-56.
- Hoser, R. T. 2022c. Greater diversity of skink species in south-east Australia than previously realized: *Carinascincus* Wells and Wellington, 1985 *sensu lato* is further divided. *Australasian*

Journal of Herpetology 59:48-64.

International Commission on Zoological Nomenclature (ICZN) 1991. Decision of the commission. Three works by Richard W. Wells and C. Ross Wellington: proposed suppression for nomenclatural purposes. *Bulletin of Zoological Nomenclature* 48(4):337-338.

International Commission on Zoological Nomenclature (ICZN) 2001. Opinion 1970. *Bulletin of Zoological Nomenclature* 58(1):74, (30 March 2001).

International Commission on Zoological Nomenclature (ICZN) 2012. Amendment of Articles 8, 9, 10, 21 and 78 of the International Code of Zoological Nomenclature to expand and refine methods of publication. *Zootaxa* (PRINO) (Online) 3450:1-7.

International Commission on Zoological Nomenclature (ICZN) 2021. Opinion 2468 (Case 3601) - *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, Elapidae) and *Australasian Journal of Herpetology* issues 1-24: confirmation of availability declined; Appendix A (Code of Ethics): not adopted as a formal criterion for ruling on Cases. *Bulletin of Zoological Nomenclature* 78 (30 April 2021):42-45.

Kaiser, H. 2012a. SPAM email sent out to numerous recipients on 5 June 2012.

Kaiser, H. 2012b. Point of view. Hate article sent as attachment with SPAM email sent out on 5 June 2012.

Kaiser, H. 2013. The Taxon Filter, a novel mechanism designed to facilitate the relationship between taxonomy and nomenclature, vis-à-vis the utility of the Code's Article 81 (the Commission's plenary power). *Bulletin of Zoological Nomenclature* 70(4) December 2013:293-302.

Kaiser, H. 2014a. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published. *Bulletin of Zoological Nomenclature*, 71(1):30-35.

Kaiser H. 2014b. Best Practices in Herpetological Taxonomy: Errata and Addenda. *Herpetological Review*, 45(2):257-268.

Kaiser, H., Crother, B. L., Kelly, C. M. R., Luiselli, L., O'Shea, M., Ota, H., Passos, P., Schleip, W. D. and Wüster, W. 2013. Best practices: In the 21st Century, Taxonomic Decisions in Herpetology are Acceptable Only When supported by a body of Evidence and Published via Peer-Review. *Herpetological Review* 44(1):8-23.

Krefft, G. 1864. Description of *Aspidiotes melanocephalus*, a new snake from Port Denison. *Proceedings of the Zoological Society of London* 1864:20-22.

Lütken, C. F. 1864 "1863". Nogle ny Krybyr og Padder. *Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening i Kjøbenhavn*, (2)4:292-311.

Mahony, M. J., Penman, T., Bertozzi, T., Lemckert, F. L., Bilney, R. and Donnellan, S. C. 2021. Taxonomic revision of south-eastern Australian giant burrowing frogs (Anura: Limnodynastidae: *Heleioporus* Gray). *Zootaxa* (PRINO) (online) 5016(4):451-489.

Parker, H. W. 1940. The Australian frogs of the family Leptodactylidae. *Novit. Zool.* 42:1-106.

Peters, W. C. H. 1863. Eine Übersicht der von Hrn. Richard Schomburgk an das zoologische Museum eingesandten Amphibien, aus Buchsfelde bei Adelaide in Südastralien. *Monatsberichte der Königlichen Preussische Akademie des Wissenschaften zu Berlin* 1863:228-236.

Pyron, A. and Wiens, J. J. 2011 A large-scale phylogeny of Amphibia with over 2,800 species, and a revised classification of extant frogs, salamanders, and caecilians. *Molecular Phylogenetics and Evolution* 61:543-583.

Ride, W. D. L. (ed.) et al. (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum -

Cromwell Road, London SW7 5BD, UK (also commonly cited as "The Rules", "Zoological Rules" or "ICZN 1999").

Roberts, J. D. and Maxson, L. R. 1986. Phylogenetic-Relationships in the Genus *Limnodynastes* (Anura, Myobatrachidae) - a Molecular Perspective. *Australian Journal of Zoology*, 34(4):561-573.

Schäuble, C. S., Moritz, C. and Slade, R. W. 2000. A Molecular Phylogeny for the Frog Genus *Limnodynastes* (Anura: Myobatrachidae). *Molecular Phylogenetics and Evolution*, 16(3):379-391.

Schäuble, C. S. and Moritz, C. 2001. Comparative phylogeography of two open forest frogs from eastern Australia. *Biological Journal of the Linnean Society* 74:157-170.

Steindachner, F. 1867. *Reise der österreichischen Fregatte Novara um die Erde in den Jahren 1857, 1858, 1859 unter den Befehlen des Commodore B. von Wüllerstorff-Urbair. Pt. 9, Bd. 1, Abt. 4, Zoologischer Theil. Amphibien*. Wien: K. K. Hof- und Staatsdruckerei.

Symula, R., Keogh, J. S. and Cannatella, D. C. 2008. Ancient phylogeographic divergence in southeastern Australia among populations of the widespread common froglet, *Crinia signifera*. *Molecular Phylogenetics and Evolution* 47:569-580.

Tschudi, J. J. von. 1838. *Classification der Batrachier mit Berücksichtigung der fossilen Thiere dieser Abtheilung der Reptilien*. Neuchâtel: Petitpierre.

Saunders, S. 2019. Morrison and Shorten's Big Australia: The overpopulation problem. News article published 17 April 2019 and downloaded from

<https://independentaustralia.net/politics/politics-display/morrison-and-shortens-big-australia-the-overpopulation-problem,12584>

Vanderduys, E. 2012. *Field guide to the frogs of Queensland*. CSIRO, Collingwood, Victoria, Australia:192 pp.

Wellington, C. R. 2015. Comment on the proposed confirmation of the availability of the generic name *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE) and for the nomenclatural validation of the journal in which it was published (Case 3601; see *BZN* 70: 234-237; 71: 30-38, 133-135, 181-182, 252-253; 72: 61-78). *Bulletin of Zoological Nomenclature* 72(3) September 2015:222-226.

Wells, R. W. and Wellington, C. R. 1984. A synopsis of the class Reptilia in Australia. *Australian Journal of Herpetology* 1(3-4):73-129.

Wells, R. W. and Wellington, C. R. 1985. A classification of the Amphibia and Reptilia of Australia. *Australian Journal of Herpetology Supplementary Series* 1:1-61.

Williams, R. S. 2015. Phylogeography of the Australian Common Froglet, *Crinia Signifera*. Honours Thesis: University of Mississippi, USA:30 pp.

Zaczek, Z. 2019. Former PM Kevin Rudd says Australia should drastically increase its population to 50 MILLION to make sure nation can defend itself in the face of threats from China. *Daily Mail* (Australia) (27 November), published online at: <https://www.dailymail.co.uk/news/article-7729689/Kevin-Rudd-says-Australia-increase-population-50-MILLION-defend-China.html>

CONFLICTS OF INTEREST

None.

Cite this paper as:

Hoser, R. T. 2023. Four new species of *Crinia* Tschudi, 1838, subgenus *Ranidella* Girard, 1853 from south-east, Australia. *Australasian Journal of Herpetology* 63:38-47.