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Small and overlooked … six new species of Pygmy Possum, Genus *Cercartetus* Gloger, 1841 *sensu lato* from the Australasian bioregion.

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ABSTRACT

Cercartetus Gloger, 1841, better known as the iconic Pygmy Possums are a commonly seen and familiar element of the native Australasian mammal fauna to biologists and lay people alike.

While numerous forms have been described as species, as listed by Bannister *et al.* (1988), the taxonomy in recent years has been stable, with just four species being widely recognized.

A molecular phylogeny published by Osborne and Christidis (2002) indicated that based on molecular divergences there were at least six species in the genus, five of which had available names.

However as of 2019 no change to the current taxonomy or nomenclature had been formally proposed or widely adopted since at least 1934.

Before formally naming the newly identified species of Osborne and Christidis (2002), all specimens of all putative species within the genus from across the known ranges of each, were examined in terms of their identification, taxonomy and nomenclature.

The result was five species for which names were available and already being used (one being treated as a subspecies) and six others for which no names were available.

Therefore these are formally named herein in accordance with the rules of *the International Code of Zoological Nomenclature* (Ride *et al.* 1999).

Each of the six identified species (five for the first time) are morphologically divergent from their nearest congeners, reproductively isolated and geographically allopatric and separated by biogeographical barriers of known antiquity, forming a body of evidence giving a sound scientific basis for the decision to name each.

With the so-called *C. caudatus* linage (Long-tailed Pygmy Possum) having a16-27 MYA divergence from other members of the genus (Osborne and Christidis, 2002), and morphological divergence, a strong case is made for the creation of a separate genus or subgenus for this lineage.

The name *Eudromicia* Mjöberg, 1916 is available and therefore used.

Eudromicia has been recognized in the past as a genus by Iredale and Troughton (1934).

The newly named species are *Cercartetus hoserae sp. nov.,* from north-west Victoria and nearby parts of South Australia, previously identified as a population of *C. lepidus* Thomas, 1888; and four others, being *Eudromicia adelynhoserae sp. nov*. from North Queensland, *E. jackyhoserae sp. nov.* from south-east Papua New Guinea (PNG), *E. richardwellsi sp. nov*. from the central Highlands of PNG, *E. rosswellingtoni sp. nov*. from the western highlands of West Papua (Irian Jaya) Indonesia and *E. doriskuenae sp. nov*. from high altitude areas of the Finisterre Range in Madang and Morobe Provinces, PNG, all formerly identified as populations of *C. caudatus* (Milne-Edwards, 1877).

This paper effectively doubles the number of known extant species within the genus *Cercartetus.*

Keywords: Mammals; Marsupial; taxonomy; nomenclature; Pygmy Possum; *Cercartetus*; *Eudromicia*; Victoria; Australia; Queensland; Irian Jaya; New Guinea; Papua; *lepidus*; *caudatus*; *nanus*; *concinnus*; *macrurus*; new species; *hoserae*; *richardwellsi*; *adelynhoserae*; *rosswellingtoni*; *jackyhoserae*; *doriskuenae.*

INTRODUCTION

The iconic Pygmy Possums of the family Burramyidae Broom, 1896 are a familiar element of the native Australasian mammal fauna to biologists and many lay people as well.

Cercartetus Gloger, 1841, as is widely recognized in 2019, is the most speciose, widely distributed, abundant and best known genus within the family.

It occurs throughout the inhabited regions of southern and eastern Australia, including Tasmania and into New Guinea.

Where they occur, they are often abundant and are a regular encounter in faunal field surveys and other wildlife encounters.

While numerous forms have been described as listed by Bannister *et al.* (1988), the taxonomy in recent years has been stable, with just four species being widely recognized.

A molecular phylogeny published by Osborne and Christidis (2002) indicated that based on molecular divergences there were at least six species in the genus.

Five of of these had available names.

Their phylogeny also provided support for the contention that the divergent taxon, currently known as *C. caudatus* (Milne-Edwards, 1877) with a divergence estimated at a16-27 MYA from other members of the genus (Osborne and Christidis, 2002) could or should be placed in a separate genus.

On the basis of this evidence and morphological divergence of this form and noting that it has a geographically disjunct centre of distribution (New Guinea, versus southern Australia), the available name *Eudromicia* Mjöberg, 1916 is applied by myself to the relevant species within this paper for the first time since done so by Iredale and Troughton (1934).

In spite of the preceding, I note that as recently as of 2019, the date this paper was prepared, that no change to the current taxonomy or nomenclature of the putative genus *Cercartetus* had been formally proposed or was being mooted by anyone.

Before formally naming the newly identified species of Osborne and Christidis (2002), all specimens of all putative species within the genus from across the known ranges of each, were examined in terms of their identification, taxonomy and nomenclature including the putative new species identified by Osborne and Christidis (2002).

As mentioned in the abstract, the final result was six species for which names were available and already being used (one presently being treated as a subspecies) and five others for which no names were available.

Therefore these are formally named herein in accordance with the rules of *the International Code of Zoological Nomenclature* (Ride *et al.* 1999).

Each of the six identified species (five for the first time) are morphologically divergent from their nearest congeners, reproductively isolated and geographically allopatric and separated by biogeographical barriers of known antiquity, forming a body of evidence giving a sound scientific basis for the decision to name each.
The newly named species are *Cercartetus hoserae sp. nov.,* from north-west Victoria and nearby parts of South Australia, previously identified as a population of *C. lepidus* Thomas, 1888; and five others, being *Eudromicia adelynhoserae sp. nov*. from North Queensland, *E. jackyhoserae sp. nov.* from south-east Papua New Guinea (PNG), *E. richardwellsi sp. nov*. from the central Highlands of PNG, *E. rosswellingtoni sp. nov*. from the western highlands of West Papua (Irian Jaya) Indonesia and *E. doriskuenae sp. nov*. from high altitude areas of the Finisterre Range in Madang and Morobe Provinces, PNG, all formerly identified as populations of *E. caudatus* (Milne-Edwards, 1877).

This paper effectively doubles the number of known extant species within the genus *Cercartetus sensu lato.*

Within the *C. caudatus* species group, there may be further undescribed forms.

MATERIALS, METHODS AND RESULTS

Before a decision is made to name any new taxon, reasonable steps must be taken to ensure that it is justified on all relevant grounds, including that it is morphologically, genetically and reproductively isolated from their nearest relative and to a sufficient degree to be of taxonomic significance.

A further relevant question to ask is should the reproductively isolated and morphologically divergent entities be labelled as subspecies, full species, or potentially higher level again.

Key literature relevant to the taxonomic and nomenclatural conclusions within this paper include Anonymous (2007), Aplin *et al.* (2016), Bannister *et al.* (1988), Bell (1828), Brammell and Archer (1997), Brongersma (1953), Broom (1895, 1896a, 1896b), Bryant and Krosch (2016), Collins (1973), Desmarest (1818, 1820), Dwyer (1977), Eldridge *et al.* (2018), Flannery (1995), Gloger (1841), Gould (1845), Groves *et al.* (2005), Harris (2006, 2010), Hoser (1989), Hoser (2019c), Iredale and Troughton (1934), Jones (1925), Krefft (1863), Lawlor (1979), Maxwell *et al.* (1996), Menkhorst (2016), Menzies (1991), Milne-Edwards (1877), Mjöberg (1916), Osborne and Christidis (2002), Pestell *et al.* (2008), Rawlings and Donnellan (2003), Ride (1956, 1970), Ride *et al.* (1999), Schäuble *et al.* (2000), Smith (1986), Strahan (1988), Thomas (1888, 1922), Wakefield (1963), van Ufford and Cloos (2005), Vaughan (1986) and sources cited therein (duplicitous references not necessarily included).

Live and dead specimens as well as available bone specimens, were examined as was other relevant material, including past climate data for the relevant regions, sea level depths, and other relevant information.

In summary, as inferred already, the genetic, geological, historical and morphological evidence clearly showed that there were no less than six unnamed species in the genus.

SUMMARY OF THE RESULTS

All putative recognized species of *Cercartetus* Gloger, 1841 were inspected and matched with original descriptions or synonymised specimens as listed by Bannister *et al.* (1988). For the relevant species the following findings are noted, along with the taxonomic implications.

Cercartetus nanus (Desmarest, 1818), with a type locality of Tasmania, and occurring throughout south-east Australia, including Tasmania has 3 available synonyms.
Phalangista gliriformis Bell, 1828 with a type locality of Tasmania has been treated as synonymous with *C. nanus* and no change is required.

Dromicia unicolour Krefft, 1863 from St. Leonards (Sydney), New South Wales, has been regarded as a subspecies of *C. nanus*.

Since at least 1988, all specimens from mainland Australia have been referred to this subspecies Bannister *et al.* (1988).
Osborne and Christidis (2002) only did a molecular analysis of Victorian specimens, without comparison with specimens from any parts of New South Wales, southern Queensland or Tasmania and so whether or not there are taxonomically significant divergences is not fully established.
However there is no evidence of obvious morphological divergence between mainland and Tasmanian specimens, or for that matter specimens across the range on mainland Australia and so I hereby treat *Dromicia unicolour* Krefft, 1863 as wholly synonymous and not a subspecies and obviously suggest everyone else does so, unless and until compelling evidence to the contrary emerges.

I note also that *C. nanus* remains abundant on even smaller Bass Strait Islands and these have not been formally assigned to either subspecies, nor do they appear to differ morphologically from those on either side of the water body. Noting that in the recent geological past (within the last 20K years), there was a wide land bridge between Tasmania and Victoria, it is reasonable to expect *C. nanus* from either side to have mixed and without impediment, thereby maintaining

species unity.
The same biogeograpical barrier of Bass Strait has not had any impact on most other trans-Victorian-Tasmanian species with low habitat specificity (as is the case for *C. nanus*) and divergence between them on either side of the now extant Bass Strait, which is well known to have been a land bridge for most of the recent geological past.

This includes for example Lowland Copperheads *Austrelaps superbus* (Günther, 1858) as detailed in Hoser (1989), or the frog *Limnodynastes dumerilii* Peters, 1863, including the subspecies *Limnodynastes dumerilii insularis* Parker, 1940 as detailed by Schäuble *et al.* (2000) who found no significant divergence between specimens from Tasmania or nearby southern Victoria based on their molecular phylogeny published at page 386.

I note that quite significantly, the Bass Strait barrier has been conquered by *C. nanus* on both east and west sides, being found (as of now) on both King Island (west side) and Flinders island (east side) and is common in all habitats on the proximal Victorian and Tasmanian sides of the water barrier.

On the basis of the preceding, the taxon *Dromicia britta* Jones, 1925 with a type locality of Millicent, South Australia is also herein treated as a synonym of *C. nanus* and not putative *C. nanus unicolour*.

The species *Cercartetus concinnus* (Gould, 1845), type locality Swan River (Perth) Western Australia, was redescribed by Waterhouse in 1846 as *Phalangista* (*Dromica*) *neillii* based on another specimen from nearby King George Sound in Western Australia.
Wakefield (1963) named a specimen from Natimuk in Victoria as a subspecies *Cercartetus concinnus minor.* However Osborne and Christidis (2002) Wrote:

"Flannery (1994) recognised two subspecies of *C. concinnus*, *C. c. concinnus* in southwest Western Australia, and *C. c. minor* in South Australia, western Victoria and western New South Wales. Conversely, Strahan (1995) did not recognise any subspecies. The low level of divergence that was recorded between individuals of *C. concinnus* from western Australia and south-western New South Wales supports the latter view. There was less than 1% divergence between the two disjunct populations, which was only slightly higher than that which was identified between two individuals from the same locality (Toodyay, Western Australia).

On the basis of the preceding I agree that there is no point in recognising the eastern population of *C. concinnus* as a subspecies.

The taxonomic situation with respect to the other two putative species of *Cercartetus* is however very different and needs to be elaborated upon to explain the scientific basis for the taxonomic judgements in this paper.

The putative species *Cercertatus lepidus* (Thomas, 1888) with a type locality of Tasmania is known from most parts of Tasmania as well as region in Western Victoria, bounded by the Little Desert in the South, the Murray River in the north and nearby drier parts of south-east South Australia although there is recent (aged) fossil material from nearby on the north (NSW) side of Murray River (Strachan 1988).

In the wild, this species appears not to be found in areas where *C. nanus* occurs, this especially being the case on the mainland of Australia, including far southern Victoria, where *C. nanus* is strong and there are no putative *C. lepidus* at all.
On the mainland of south-east Australia where both *C. nanus* and putative *C. lepidus* occur, *C. nanus* is found in wetter regions (such as southern Victoria) and *C. lepidus* in drier areas further north. This in effect separates the populations of *C. lepidus* in Tasmania and putative *C. lepidus* from mainland Australia, even without consideration of the trans-Victorian-Tasmanian barrier.

On its own this implies that the two populations of putative *C. lepidus* have had a long term isolation.

Confirming this is the molecular results of Osborne and Christidis (2002) who found species-level divergence between the two populations based on samples from each.

They wrote:

> "A similarly high level of DNA sequence divergence (c. 7%) was recorded between the mainland and Tasmanian populations of *C. lepidus*. Although the two disjunct populations are not currently recognised as separate subspecies, they clearly could be on the basis of DNA divergence."

A sequence divergence of 7% actually implies a 3 MYA divergence, as in well prior to the removal of the trans-Victorian-Tasmanian land bridge within the last 25K years and is sufficient, not just for subspecies-level recognition, but also is species level divergence.

A review of the extant distributions of both putative *C. lepidus* and *C. nanus* also yields further corroborative results beyond what I have already mentioned.

Based on Museum specimen records of all relevant Australian State Museums, downloaded via the "Atlas of Living Australia" (ALA) at "https://www.ala.org.au/" (last downloaded on 10 March 2020), one finds that *C. nanus* remains common on both Flinders and King Islands in Bass Strait, implying that at the time of glacial maxima, this was the taxon that inhabited this region (Bass Strait) and noting that it tends to live exclusive of putative *C. lepidus,* this in effect confirms the long historical gap between the two populations of this putative species.

By contrast (and based on ALA records), putative *C. lepidus* is not found on King Island, being the western and logical land bridge to its nearest point on the mainland side of the Bass Strait. Putative *C. lepidus* is found on Flinders Island on the east side of Bass Strait, but the nearest mainland point to here Wilsons Promontory, is a stronghold for *C. nanus*, as are all areas anywhere within 1,000 km of here (as measured along the extant Victorian coastline), in effect preventing the Tasmanian putative *C. lepidus* from having any contact with the mainland population.

Coupled with the fact that the mainland specimens of *C. lepidus* have significantly divergent morphology and biology, the case for formally recognizing them as a new species is compelling.

They are herein identified as *C. hoserae sp. nov.*.
It is also worth noting that there is a similar divergence to the above *Cercartetus* species seen between the agamid species *Rankinia diemensis* (Gray, 1841) from Tasmania and *R. neildaviei* Hoser, 2015 also restricted to a region in western Victoria (Hoser, 2015) and that both diverged well prior to the presence of a land bridge across the Bass Strait, indicating a non-marine barrier between the two evolving species.

The putative species *C. caudatus* (Milne-Edwards, 1877) was described from a specimen in the Arfak Mountains in Irian Jaya, which is particularly significant in light of what follows.

Another putative taxon, "*Eudromicia macrura* Mjöberg, 1916", based on a specimen from Cedar Creek, Atherton, Queensland, Australia (see comments on *Eudromicia* below) has since been synonymised with *C. caudatus* as seen for example in Osborne and Christidis (2002) at fig. 5.
Other authors, including Strahan (1988) at page 166 refer to the more recently described form as a subspecies, namely *C. caudatus macrurus*, but fail to give any morphological basis of separation.

Significantly Osborne and Christidis (2002) tested samples of the putative species from both New Guinea and Australia and found significant divergence between the two.
They wrote:

> "significant genetic differentiation was observed within some species. Most diverged (8%) were *C. caudatus macrurus* and *C. caudatus caudatus* from Australia and New Guinea respectively. … The mainland and Tasmanian

populations of *C. lepidus* and the Australian and New Guinean populations of *C. caudatus* are estimated to have diverged c. 3-4 million years ago"

On face value these results indicated that elevation of the putative subspecies *C. caudatus macrurus* to full species was an obvious decision to make.

However inspection of specimens used for analysis and the paper of Osborne and Christidis (2002) raised further important issues.

The putative *C. caudatus* material from New Guinea that was tested by Osborne and Christidis (2002) was not taken from the type locality on the far west of the island, but instead came from a geographically distant region in the south-east of New Guinea at Milne Bay Province from an Australian Museum specimen number 24767.

This fact necessitated an inspection of specimens from this locality to compare them with others from the type locality of the Arfak Mountains in Irian Jaya, which is far west of the main central cordillera of the island of Papua and therefore in a region well and truly separated by unsuitable habitat, as well as specimens from intermediate locations elsewhere on the island of New Guinea to ascertain whether they fitted within one or both putative species, or alternatively were different taxa yet again.

Putative *C. caudatus* in Australia, where they have been well studied are very habitat restricted and range restricted, which also raised issues in terms of Australian specimens and whether or not more than one species is involved.

In terms of all known populations and summarizing current knowledge, Aplin *et al.* (2008) wrote of putative *C. caudatus*:

"This species is present in the highlands of the island of New Guinea (Indonesia and Papua New Guinea), and in the lowland and upland rainforests between Paluma Range and Cooktown, Queensland, Australia (Flannery 1995, Maxwell *et al.* 1996). It ranges from medium elevations to 3,450 m asl (New Guinea) and from sea level to 1,600 m in Australia. ...

In New Guinea, the species is found in montane and mid-montane primary and secondary tropical moist forests, especially where there are tree ferns. It also occurs in areas of subalpine shrubland. In Australia, it is known from rainforest (Maxwell *et al.* 1996)."

Significantly and in error, Aplin *et al.* (2008) published a distribution map for putative *C. caudatus* that showed a continuous line of distribution along the centre of the island from the birds head in the far north-west, across the low-lying area joining this part of the island to the rest and then continuously along the central cordillera to the Milne Bay area in the far south-east.

The ALA records (last downloaded on 10 March 2020), and records on Vert Net (VN) at http://vertnet.org/ (last downloaded on 10 March 2020), this being an international database of museum collections, shows the distribution of putative *C. caudatus* to in fact be restricted to a small number of isolated high altitude pockets and a complete absence in intervening areas.

Between the Arfak Mountains in Irian Jaya on the so-called "Bird's head" of the island, and the main central cordillera is a wide region of flat land or of generally low hills separating these high elevation biogeographical features effectively separating obligate highland rainforest-type species.

While periods of glacial maxima and significantly cooler global climates could be interpreted as lowering altitudinal limits and allowing species to cross these barriers and this is what many zoologists have assumed, evidence on all similarly constrained species groups has shown that in recent glacial minima this effect has not happened!

See for example the cases documented by Hoser (2016).

The overlooked reason for the apparent inability of these cool climate rainforest obligate species to be able to cross the low altitude barriers in times of glacial maxima has been due to a parallel drying of climates thereby in effect shrinking rainforest areas and in fact potentially further confining the relevant species.

Also not considered by many zoologists is the underlying fact that in times of glacial maxima, the cooling is most extreme in the polar and near polar regions and reduces towards the equatorial regions, lessening the impact of global cooling.

This means temperature drops near the equator are not sufficient to enable a significant downward elevation migration of species confined to so called sky islands.

Noting that molecular studies on similarly constrained species of reptiles (as cited by Hoser 2016), Moritz *et al.* (1993) and mammals, such as Tree Kangaroos (*Dendrolagus* Müller, 1840 species) as detailed by Eldridge *et al.* (2018) and Hoser (2019) came to the same results. That is a well-established trend of cold-climate, rainforest obligate species in north-east Queensland and New Guinea being unable to cross even relatively short distances across unsuitable lowland dry zones.

It is therefore self evident that even before a morphological study is completed, that the Milne Bay putative *C. caudatus* must be a separate taxon to those from the Arfak Mountains specimens.

Collection of putative *C. caudatus* in New Guinea has shown the putative species to be abundant where it occurs, but this abundance is heavily restricted to well-known upland areas that are in turn separated by lower altitude regions where the putative species appears absent.

The clustering of records is so significant as compared to other New Guinea vertebrates in Museum collections that one can only conclude that the absence in intervening regions is due to absence of specimens and not absence of collecting.

Hence, with at least five separate populations of putative *C. caudatus* on the island of New Guinea, clearly separated by currently unpassable altitudinal and habitat barriers (and other subpopulations that may also be taxonomically distinct), it seems self evident that each would require taxonomic recognition if each were clearly morphological divergent.

This in fact is the case and exactly why I have no hesitation in describing four obviously divergent high-altitude forms from New Guinea, separated by well known biogeographical barriers as new species.

Plotting the New Guinea distribution of putative *C. caudatus* based on ALA records, one finds a near identical distribution pattern to that of New Guinea Tree Kangaroos (*Dendrolagus*) in the so-called *D. dorianus* Ramsay, 1883 species-group as shown in Eldridge *et al.* (2018) on page 590.

Pages 593 and 594 of Eldridge *et al.* (2018) show clear species level divergences of the *Dendrolagus* species constrained by the same biogeographical factors as the putative *C. caudatus*, making species level recognition the logical outcome of this analysis.

In the Australian context, the results of Eldridge *et al.* (2018) can literally be overlain to putative *C. caudatus* as a direct pointer to the likelihood of there being two species in the Australian wet tropics as opposed to just one. Again refer to several other examples in Hoser (2016) and Moritz *et al.* (1993).

A check of the ALA shows the putative species is constrained in a similar way to the two recognized species of *Dendrolagus* across the same barrier just north of Cairns, Australia, in this case being estimated at about 2 MYA. Hence a similar divergence between the two disjunct Australian populations of putative *C. caudatus* can be readily accepted as fact and in the absence of specific DNA testing of specimens from both sides of the barrier.

The geoclimatic evidence is irrefutable.

Significantly, specimens from the north of the biogeograhical gap north of Cairns, sometimes called the "Black Mountain Gap"

(Bryant and Krosch 2016) are morphologically divergent from those to the south and hence I also have no hesitation in formally naming this taxon as a new species.

An outlier population of putative *C. caudatus* from high altitude areas of the Finisterre Range in Madang and Morobe Provinces, PNG, separated from the nearby Central Highlands of PNG by the Ramu and Markham River basins is also sufficiently divergent as to warrant full species recognition.

In summary, *C. caudatus* as currently recognized is split into a total of seven separate species. This is two from Australia and five from New Guinea.

With a divergence time estimated at 16-27 MYA for the *C. caudatus* linage versus the rest of the genus (Osborne and Christidis, 2002), a strong case is made for the creation of a separate genus or subgenus for this lineage.

Adding morphological divergence, the case for genus level recognition of the species group becomes compelling.

The name *Eudromicia* Mjöberg, 1916 is available and has been recognized in the past as a genus by Iredale and Troughton (1934) and is a contention I agree with.

Hence the relevant new species are herein placed within this genus and not *Cercartetus sensu stricto*.

The newly named Australian form is that from the highlands of the northern wet tropics, Queensland, centred on Mount Lewis and it is formally named *Eudromicia richardwellsi sp. nov.*

Within the island of New Guinea, the species *E. caudatus* is restricted to the Arfak Mountains in Irian Jaya on the so-called "Bird's Head" of the island.

The species *E. adelynhoserae sp. nov.* is the taxon from the Milne Bay region of Papua New Guinea, tentatively including the population from offshore Fergusson Island (max. elevation is 1947 m above sea level), based on proximity to adjacent mainland populations and similarity of reptile taxa between the two places (e.g. the python *Lenhoserus boeleni* (Brongersma, 1953)).

The species *E. rosswellingtoni sp. nov.* is the taxon from the central Highlands of PNG, including the nearby high altitude points in the Eastern Highlands province and Southern Highlands Province.

The species *E. jackyhoserae sp. nov.* is the taxon from the Nassau Range in Irian Jaya (West Papua).

The species *E. doriskuenae sp. nov.* is the taxon from the high altitude areas of the Finisterre Range in Madang and Morobe Provinces, PNG.

One or more further potentially unnamed species may be present from Foja Mountains north of the main cordillera in Irian Jaya (near the coast) as detailed by Anonymous (2007) (and see image at: https://www.naturepl.com/stock-photo-long-tailed-pygmy-possum-nature-image01361572.html) (Last downloaded on 10 March 2020), but I have deferred formally naming the taxon on the basis that it is morphologically similar to the specimens from the mid-central highlands and because of the recent geological age of the highlands where it occurs.

The preceding would mean an estimated divergence from the central highlands stock of about 1.25 MYA, which at best would usually be defined as a subspecies, rather than a full species.

Also refer to the *Dendrolagus* phylogeny published by Eldridge *et al.* (2018).

Of course there is also potential for one or more other unnamed forms on the island of New Guinea, particularly in isolated high regions of significant antiquity, but so far there is no indication as to exactly where these may occur.

It is noted that a person unfamiliar with the relevant taxa and not reading the detail of this paper and the sources cited herein, may form an initial view that the "splitting" of one putative species to seven is unjustified, while the remainder of the genus *Cercartetus sensu lato* as currently understood by most zoologists (three other long recognized species), is effectively left untouched, save for the formal naming of a well-known and divergent form, giving an effective 7/4 ratio for the number of species in the putative genus.

However the morphological and genetic evidence supports this position.

I also note that the phylogeny published by Osborne and Christidis (2002) on page 32 shows the putative taxon *C. caudatus* as basal to the rest, thereby enabling a greater potential time frame to speciate (all other factors being equal) and note that two geographically proximal samples from across the range of the putative taxon did in fact show species-level divergence for these populations in their results. This also implies a potentially even greater divergence for geographically distant samples.

It is also significant that the habitat fidelity and dispersal abilities of the species in the genus *Eudromicia* are significantly and demonstrably lower than for *Cercartetus* as demonstrated by the date of divergence of all species in the former genus across known biogeographical barriers, versus those for *Cercartetus.* Again this aids the contention that there has in fact been more speciation and over a longer time frame for the genus *Eudromicia* as opposed to *Cercartetus.*

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 are 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 or more 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 10 March 2020 (including if also viewed prior), unless otherwise stated and was accurate in terms of the content cited herein as of that date.

Unless otherwise stated explicitly, colour and other 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.

Colour descriptions of species refer to fur colour and not skin.

While numerous texts and references were consulted prior to publication of this paper, the criteria used to separate the relevant species or subspecies 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.

In terms of conservation of each population of each species as described below, the comments in Hoser (1991 and 2019a, 2019b) apply.

Wildlife laws as currently enforced in Australia, Indonesia and Papua New Guinea or not in a materially significant way enhancing the long-term survival prospects of any of the relevant species.

Over breeding of humans and the environmental problems associated with this overpopulation are by far the greatest long term threat to each and every 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.

CERCARTETUS HOSERAE SP. NOV.

LSID urn:lsid:zoobank.org:act:3AFEEC0A-8AFB-4E49-B254-9298BC427BA7

Holotype: A preserved male specimen at the National Museum of Victoria, Melbourne, Victoria, Australia, specimen number C27321 collected from 6.6 km west of Sunset Tank, Victoria, Australia, Latitude -34.95 S., Longitude 141.45 E. This government-owned facility allows access to its holdings.

Paratype: A preserved male specimen at the National Museum of Victoria, Melbourne, Victoria, Australia, specimen number C24355 collected at 23 km south of Tutye, Victoria, Australia, Latitude -35.42 S., Longitude 141.48 E.

Diagnosis: The genus *Cercartetus* Gloger, 1841 is effectively diagnosed by Thomas (1888) at pages 140-141 under the name *Dromicia* Gray, 1841.

The putative species *Cercartetus lepidus* (Thomas, 1888) including the species *C. hoserae sp. nov*. (from Victoria and South Australia) and *C. lepidus* (from Tasmania) are both separated from all other species in the genus (*sensu lato* and including the genus *Eudromicia* Mjöberg, 1916 as defined below) by the following unique suite of characters: Having slate coloured belly hairs basally and of a small size, being less than 85 mm head and body length; lower leg less than 20 mm long and hind leg less than 13 mm long as well as a fourth small molar (the final character which in particular separates this species from C. *nanus* (Desmarest, 1818) and *C. concinnus* (Gould, 1865)).

C. hoserae sp. nov. is readily separated from *C. lepidus* by having brownish yellow-fur on the upper body, versus grey with a slight brown tinge or if yellowish, with a strong grey infusion of colour in *C. lepidus. C. hoserae sp. nov*. is further separated from *C. lepidus* by having an obvious demarcation between the blackish fur around the eye and the pink of the snout, this being a line of brownish yellow-fur, whereas in *C. lepidus* blackish fur runs in some form to the snout.

A detailed morphological appraisal of the holotype of *C. lepidus*, also applicable to *C. hoserae sp. nov*. can be found on pages 142 and 143 of Thomas (1888).

The species *Cercartetus nanus* (Desmarest, 1818) is separated from all other species in the genus by having a medium tail being less than 120 mm in length; an indistinct darker eye-mark; ventral hairs tipped with white (versus completely white in *C. concinnus* (Gould, 1865)).

The species *C. concinnus* (Gould, 1865) is separated from all other species in the genus by having a small size as for *C. lepidus* and *C. hoserae sp. nov*. but is easily separated from those species by having pure white hairs on the belly and an almost obsolete (indistinct) eye mark; three molar teeth on each side, top and bottom, with the upper third premolar with a single point and the lower third premolar being tiny.

The species complex, until now regarded as putative *Eudromicia,* formerly *Cercartetus caudatus* (Milne-Edwards, 1877) (from western Papua), including *E. macrurus* (Mjöberg, 1816) (from the southern wet tropics in Queensland, Australia) and the four newly described species, all formerly treated as populations of *E. caudatus*, namely *E. richardwellsi sp. nov*. (from the northern wet tropics, Queensland Australia), *E. adelynhoserae sp. nov.* (from Milne Bay, PNG), *E. rosswellingtoni sp. nov*. (from the central ranges of New Guinea, generally near Mount Wilhelm to the Irian Jaya border) and *E. jackyhoserae sp. nov*. (from Nassau Range, Irian Jaya) are readily separated from all other members of the genus by having a large size, as in being more than 85 mm head and body length; lower leg length more than 20 mm long and hind leg more than 13 mm long. The tail is also long and more than 120 mm in length, slightly thickened and furred at the base (separating it from the superficially similar *Pogonomys* Milne-Edwards, 1877). The dark mark through the eye is obvious and there are large crinkly ears. This is also a genus-level diagnosis for all species within *Eudromicia.*

Other characteristics diagnostic of *Eudromicia* include large eyes, mouse-like ears, a pouch that opens anteriorly (as in didelphids), a well-developed and opposable hallux that does not have a claw, expanded pads at the ends of the digits, quadritubercular molars, a broad, flattened skull, and three upper incisors and one lower incisor that are enlarged and procumbent. (Lawlor 1979, Ride 1970, Strahan 1988, Vaughan 1986).

Distribution: *Cercartetus hoserae sp. nov*. is restricted to a dry zone of habitats in Western Victoria, from Little Desert in the south to the Murray River in the north and west into nearby parts of South Australia. The range is bounded by the Murray River drainage to the north and west, wetter habitats to the south, where *C. nanus* occurs and agricultural regions further east in Victoria.

C. lepidus is confined to Tasmania and is therefore an endemic to that state.

Etymology: Named in honour of my wife, Shireen Vanessa Hoser, of Park Orchards, Victoria, Australia, but born in a remote part of southern Africa called "Athlone", not far from central Cape Town in recognition of her services to herpetology and wildlife conservation over more than 20 years.

EUDROMICIA RICHARDWELLSI SP. NOV.

LSID urn:lsid:zoobank.org:act:92B808AB-709C-4FDC-89CA-4728900E986E

Holotype: A preserved female specimen in the Queensland Museum, Brisbane, Queensland, Australia, specimen number JM7011, collected from Mount Spurgeon, Queensland, Australia, Latitude -16.6 S., Longitude 145.2 E. This government-owned facility allows access to its holdings.

Paratypes: Three preserved specimens in the Queensland Museum, Brisbane, Queensland, Australia, specimen numbers JM10205, JM10206 and JM10228 (skulls), collected from Mount Lewis, Queensland, Australia, Latitude -16.58 S., Longitude 145.28 E.

Diagnosis: The species complex, until now regarded as putative *Eudromicia* (formerly *Cercartetus*) *caudatus* (Milne-Edwards, 1877) (herein restricted to the type region of the type locality, being the Arfak Mountains in western Papua, Indonesia), including *E. macrurus* (Mjöberg, 1816) (from the southern wet tropics in Queensland, Australia) and the four newly described species, all formerly treated as populations of *E. caudatus*, namely *E. richardwellsi sp. nov*. (from the northern wet tropics, Queensland Australia), *E. adelynhoserae sp. nov.* (from Milne Bay, PNG), *E. rosswellingtoni sp. nov*. (from the central ranges of New Guinea, generally near Mount Wilhelm to the Irian Jaya border), *E. jackyhoserae sp. nov*. (from Nassau Range, Irian Jaya) and *E. doriskuenae sp. nov.* from the high altitude areas of the Finisterre Range in Madang and Morobe Provinces, PNG, are readily separated from all other members of the genus by having a large size as in being more than 85 mm head and body length; lower leg length more than 20 mm long and hind leg more than 13 mm long. The tail is also long and more than 120 mm in length, slightly thickened and furred at the base (separating it from the superficially similar *Pogonomys* Milne-Edwards, 1877). The dark mark through the eye is obvious

and there are large crinkly ears. This is also a genus-level diagnosis for all species within *Eudromicia.*

Eudromicia caudatus (Milne-Edwards, 1877) herein restricted to the type region of the type locality, being the Arfak Mountains in western Papua, Indonesia and all other species in the complex, are easily separated from one another on colouration.

Eudromicia caudatus (Milne-Edwards, 1877) is readily separated from the other five herein recognized species by having a dull rufous colour above. The face is rufous fawn, with two broad black bands passing from the nose through the eyes, but not quite reaching the ears. Ears are rather long and narrow, evenly oval, naked. Back-hairs are slaty grey for five sixths of their length, their tips dull rufous. Chest and belly pale yellowish white, the bases of the hairs slate-coloured.

Arms and legs grey; hands and feet dull fawn.

E. macrurus (Mjöberg, 1816) from the southern wet tropics in Queensland, Australia, generally south and west of Cairns, North Queensland are readily separated from the other five herein recognized species by having a brownish-grey colour above, with a slight rufous tinge at the anterior end only. The face is rufous fawn or just yellowish brown, depending on the individual, with a square black patch across each eye and nowhere near the ears. This patch is notable for having a well defined black triangle jutting out from above the rear of the eye, the apex pointing towards the crown.

Ears are rather long and narrow, evenly oval, naked and greyish on the lobes and rich pink within. Back-hairs are slaty grey for five sixths of their length, their tips a brownish-grey colour. Chest and belly pale yellowish white, the bases of the hairs slate-coloured.

Arms and legs are brown on top, light (whitish) underneath; hands and feet a light pinkish colour.

E. richardwellsi sp. nov. from the northern wet tropics generally from north of Port Douglas and south of Cape Tribulation, with a distribution centred on the Mount Lewis area is similar in most respects to *E. macrurus*, which it would otherwise be identified as. *E. richardwellsi sp. nov.* can however be separated from *E. macrurus* by having significantly less-well defined black around the eye, being peppered in appearance and not boldly demarcated from the adjacent brownish fur as seen in *E. macrurus.* The jowls region in *E. richardwellsi sp. nov.* is yellow rather than whitish as seen in *E. macrurus.*

The species *E. adelynhoserae sp. nov.* from the Milne Bay Province, Papua New Guinea is readily separated from the other species by having a distinctly steel-greyish colour, contrasting with white undersides and jowls. The upper surface has a somewhat peppered appearance. The ears are blackish grey, the dark colour extending almost all the way into the visible ear, with inner regions a pale orangeish colour. The black patches over the eyes are elliptical in shape and extend from the snout. There is an ill defined line of blackish grey running from the mid-snout between the eyes, further back to the crown.

The species *E. rosswellingtoni sp. nov.* from the region around Mount Wilhelm and including nearby elevated parts of Eastern Highlands and Southern Highlands provinces of Papua New Guinea, west to the Irian Jaya border is readily separated from the other species by having brown hair on the upper body, ears that are brownish grey at the outer edges and becoming orange further in, feet are pink and the pink of the snout almost extends to the eyes. The belly is beige and the lower flanks have well defined demarcation between darker upper parts and lighter underparts, which do not run in an even line.

The species *E. jackyhoserae sp. nov.* from the Nassau Range in Irian Jaya (West Papua), Indonesia is similar in most respects to *E. rosswellingtoni sp. nov.* as described above, but can be separated from that species by having orange-pink feet and mottled darker patches or blotches on the sides of the face and forelimbs. The ears have greyish tips, but are otherwise yellowish in colour further in.

The belly is beige and the lower flanks have well defined demarcation between darker upper parts and lighter underparts, which do not run in an even line. The upper limbs and lower flanks are dark brown with well defined lighter edges, forming large patches and quite distinct from the brownish grey dorsal surfaces.

The species *E. doriskuenae sp. nov.* from the high altitude areas of the Finisterre Range in Madang and Morobe Provinces, PNG is similar in most respects to *E. rosswellingtoni sp. nov.* however can be differentiated from that species and in turn all others, by the fact that demarcation between darker upper parts and lighter underparts is not well defined; inner ears are orange in colour except for the very outer tips which have grey outer edges; around the eye, the black marking is dark brown rather than black with some infusions of brown into the dark brown region anterior to the eye.

Eudromicia macrurus (Mjöberg, 1816) in life are seen in Strahan (1998) on page 167 (all photos) and also online at:

https://www.flickr.com/photos/euprepiosaur/8548752100/

Eudromicia hoserae sp. nov. in life can be seen in a photo online at:

https://www.flickr.com/photos/mattsummerville/43996071634/

Distribution: *E. richardwellsi sp. nov.* occurs in the northern wet tropics of Australia from north of Port Douglas and south of Cape Tribulation, with a distribution centred on the Mount Lewis area, Queensland, Australia, being restricted to pockets of rainforest habitat.

Etymology: Named in honour of Richard W. Wells, currently of Lismore, New South Wales, Australia in recognition of his significant taxonomic works on Australian herpetology including major monographs in the 1980's (e.g. Wells and Wellington 1984, 1985) and the post year 2000 period.

EUDROMICIA ADELYNHOSERAE SP. NOV.

LSID urn:lsid:zoobank.org:act:1102DEB8-FD63-41F0-B4E1-EDF0C0C1BCAC

Holotype: A preserved specimen at the Australian Museum in Sydney, New South Wales, Australia, specimen number M.29554, collected from Param village gardens, Aguan Area, Milne Bay Province, Papua New Guinea, Latitude -9.97 S., Longitude 149.48 E. This government-owned facility allows access to its holdings.

Paratypes: Two preserved specimens at the Australian Museum in Sydney, New South Wales, Australia, specimen numbers M.29555 and M.29553 collected from Param village gardens, Aguan Area, Milne Bay Province, Papua New Guinea, Latitude -9.97 S., Longitude 149.48 E.

Diagnosis: The species complex, until now regarded as putative *Eudromicia* (formerly *Cercartetus*) *caudatus* (Milne-Edwards, 1877) (herein restricted to the type region of the type locality, being the Arfak Mountains in western Papua, Indonesia), including *E. macrurus* (Mjöberg, 1816) (from the southern wet tropics in Queensland, Australia) and the four newly described species, all formerly treated as populations of *E. caudatus*, namely *E. richardwellsi sp. nov.* (from the northern wet tropics, Queensland Australia), *E. adelynhoserae sp. nov.* (from Milne Bay, PNG), *E. rosswellingtoni sp. nov.* (from the central ranges of New Guinea, generally near Mount Wilhelm, west to near the Irian Jaya border), *E. jackyhoserae sp. nov.* (from Nassau Range, Irian Jaya) and *E. doriskuenae sp. nov.* from the high altitude areas of the Finisterre Range in Madang and Morobe Provinces, PNG, are readily separated from all other members of the genus by having a large size as in being more than 85 mm head and body length; lower leg length more than 20 mm long and hind leg more than 13 mm long. The tail is also long and more than 120 mm in length, slightly thickened and furred at the base (separating it from the superficially similar *Pogonomys* Milne-Edwards, 1877). The dark mark through the eye is obvious and there are large crinkly ears. This is also a

genus-level diagnosis for all species within *Eudromicia.*

Eudromicia caudatus (Milne-Edwards, 1877) herein restricted to the type region of the type locality, being the Arfak Mountains in western Papua, Indonesia and all other species in the complex, are easily separated from one another on colouration.

Eudromicia caudatus (Milne-Edwards, 1877) is readily separated from the other five herein recognized species by having a dull rufous colour above. The face is rufous fawn, with two broad black bands passing from the nose through the eyes, but not quite reaching the ears. Ears are rather long and narrow, evenly oval, naked. Back-hairs are slaty grey for five sixths of their length, their tips dull rufous. Chest and belly pale yellowish white, the bases of the hairs slate-coloured.

Arms and legs grey; hands and feet dull fawn.

E. macrurus (Mjöberg, 1816) from the southern wet tropics in Queensland, Australia, generally south and west of Cairns, North Queensland are readily separated from the other five herein recognized species by having a brownish-grey colour above, with a slight rufous tinge at the anterior end only. The face is rufous fawn or just yellowish brown, depending on the individual, with a square black patch across each eye and nowhere near the ears. This patch is notable for having a well defined black triangle jutting out from above the rear of the eye, the apex pointing towards the crown.

Ears are rather long and narrow, evenly oval, naked and greyish on the lobes and rich pink within. Back-hairs are slaty grey for five sixths of their length, their tips a brownish-grey colour. Chest and belly pale yellowish white, the bases of the hairs slate-coloured.

Arms and legs brown on top, light (whitish) underneath; hands and feet a light pinkish colour.

E. richardwellsi sp. nov. from the northern wet tropics generally from north of Port Douglas and south of Cape Tribulation, with a distribution centred on the Mount Lewis area is similar in most respects to *E. macrurus*, which it would otherwise be identified as. *E. richardwellsi sp. nov.* can however be separated from *E. macrurus* by having significantly less-well defined black around the eye, being peppered in appearance and not boldly demarcated from the adjacent brownish fur as seen in *E. macrurus.* The jowls region in *E. richardwellsi sp. nov.* is yellow rather than whitish in *E. macrurus.*

The species *E. adelynhoserae sp. nov.* from the Milne Bay Province, Papua New Guinea is readily separated from the other species by having a distinctly steel-greyish colour, contrasting with white undersides and jowls. The upper surface has a somewhat peppered appearance. The ears are blackish grey, the dark colour extending almost all the way into the visible ear, with inner regions a pale orangeish colour. The black patches over the eyes are elliptical in shape and extend from the snout. There is an ill defined line of blackish grey running from the mid-snout between the eyes, further back to the crown.

The species *E. rosswellingtoni sp. nov.* from the region around Mount Wilhelm and including nearby elevated parts of Eastern Highlands and Southern Highlands provinces of Papua New Guinea and west to the Irian Jaya border is readily separated from the other species by having brown hair on the upper body, ears that are brownish grey at the outer edges and becoming orange further in, feet are pink and the pink of the snout almost extends to the eyes. The belly is beige and the lower flanks have well defined demarcation between darker upper parts and lighter underparts, which do not run in an even line.

The species *E. jackyhoserae sp. nov.* from the Nassau Range in Irian Jaya (West Papua), Indonesia is similar in most respects to *E. rosswellingtoni sp. nov.* as described above, but can be separated from that species by having orange-pink feet and mottled darker patches or blotches on the sides of the face and forelimbs. The ears have greyish tips, but are otherwise yellowish in colour further in.

The belly is beige and the lower flanks have well defined demarcation between darker upper parts and lighter underparts, which do not run in an even line. The upper limbs and lower flanks are dark brown with well defined lighter edges, forming large patches and quite distinct from the brownish grey dorsal surfaces.

The species *E. doriskuenae sp. nov.* from the high altitude areas of the Finisterre Range in Madang and Morobe Provinces, PNG is similar in most respects to *E. rosswellingtoni sp. nov.* however can be differentiated from that species and in turn all others, by the fact that demarcation between darker upper parts and lighter underparts is not well defined; inner ears are orange in colour except for the very outer tips which have grey outer edges; around the eye, the black marking is dark brown rather than black with some infusions of brown into the dark brown region anterior to the eye.

Distribution: *E. adelynhoserae sp. nov.* is known from elevated rainforest locations in the Milne Bay province of the island of New Guinea, generally near the type locality. Fergusson Island specimens of this genus are presumably of the same species.

Etymology: Named in honour of my eldest daughter, Adelyn Hoser of Park Orchards, (Melbourne), Victoria, Australia in recognition of over 20 years of significant contributions to wildlife conservation in Australia, including her work with Snakebusters: Australia's best reptiles shows, being the only hands on wildlife shows in Australia that let people hold the animals.
Adelyn Hoser also made significant contributions to several years research on the Mountain Pygmy Possums of the genus *Burramys* Broom (1896) in the snowfields of New South Wales and Victoria, Australia.

EUDROMICIA ROSSWELLINGTONI SP. NOV.

LSID urn:lsid:zoobank.org:act:186515F3-480A-4B09-9EA8-47C19A3152F5

Holotype: A preserved specimen at the Australian Museum in Sydney, New South Wales, Australia, specimen number M.9622 collected from Korn in the Upper Waghi Valley, Western Highlands Province, New Guinea, Latitude -5.83 S., Longitude 144.32 E. This facility allows access to its holdings.

Paratypes: Two preserved specimens at the Australian Museum in Sydney, New South Wales, Australia, specimen numbers M.9621 and M.9620 collected from Korn in the Upper Waghi Valley, Western Highlands Province, New Guinea, Latitude -5.83 S., Longitude 144.32 E.

Diagnosis: The species complex, until now regarded as putative *Eudromicia* (formerly *Cercartetus*) *caudatus* (Milne-Edwards, 1877) (herein restricted to the type region of the type locality, being the Arfak Mountains in western Papua, Indonesia), including *E. macrurus* (Mjöberg, 1816) (from the southern wet tropics in Queensland, Australia) and the four newly described species, all formerly treated as populations of *E. caudatus*, namely *E. richardwellsi sp. nov.* (from the northern wet tropics, Queensland Australia), *E. adelynhoserae sp. nov.* (from Milne Bay, PNG), *E. rosswellingtoni sp. nov.* (from the central ranges of New Guinea, generally near Mount Wilhelm and west to the Irian Jaya border), *E. jackyhoserae sp. nov.* (from Nassau Range, Irian Jaya) and *E. doriskuenae sp. nov.* from the high altitude areas of the Finisterre Range in Madang and Morobe Provinces, PNG, are readily separated from all other members of the genus by having a large size as in being more than 85 mm head and body length; lower leg length more than 20 mm long and hind leg more than 13 mm long. The tail is also long and more than 120 mm in length, slightly thickened and furred at the base (separating it from the superficially similar *Pogonomys* Milne-Edwards, 1877). The dark mark through the eye is obvious and there are large crinkly ears. This is also a genus-level diagnosis for all species within *Eudromicia.*

Eudromicia caudatus (Milne-Edwards, 1877) herein restricted to the type region of the type locality, being the Arfak Mountains in western Papua, Indonesia and all other species in the complex, are easily separated from one another on colouration.

Eudromicia caudatus (Milne-Edwards, 1877) is readily separated from the other five herein recognized species by having a dull rufous colour above. The face is rufous fawn, with two broad black bands passing from the nose through the eyes, but not quite reaching the ears. Ears are rather long and narrow, evenly oval, naked. Back-hairs are slaty grey for five sixths of their length, their tips dull rufous. Chest and belly pale yellowish white, the bases of the hairs slate-coloured.

Arms and legs grey; hands and feet dull fawn.

E. macrurus (Mjöberg, 1816) from the southern wet tropics in Queensland, Australia, generally south and west of Cairns, North Queensland are readily separated from the other five herein recognized species by having a brownish-grey colour above, with a slight rufous tinge at the anterior end only. The face is rufous fawn or just yellowish brown, depending on the individual, with a square black patch across each eye and nowhere near the ears. This patch is notable for having a well defined black triangle jutting out from above the rear of the eye, the apex pointing towards the crown.

Ears are rather long and narrow, evenly oval, naked and greyish on the lobes and rich pink within. Back-hairs are slaty grey for five sixths of their length, their tips a brownish-grey colour. Chest and belly pale yellowish white, the bases of the hairs slate-coloured.

Arms and legs brown on top, light (whitish) underneath; hands and feet a light pinkish colour.

E. richardwellsi sp. nov. from the northern wet tropics generally from north of Port Douglas and south of Cape Tribulation, with a distribution centred on the Mount Lewis area is similar in most respects to *E. macrurus*, which it would otherwise be identified as. *E. richardwellsi sp. nov.* can however be separated from *E. macrurus* by having significantly less-well defined black around the eye, being peppered in appearance and not boldly demarcated from the adjacent brownish fur as seen in *E. macrurus.* The jowls region in *E. richardwellsi sp. nov.* is yellow rather than whitish in *E. macrurus.*

The species *E. adelynhoserae sp. nov.* from the Milne Bay Province, Papua New Guinea is readily separated from the other species by having a distinctly steel-greyish colour above, contrasting with white undersides and jowls. The upper surface has a somewhat peppered appearance. The ears are blackish grey, the dark colour extending almost all the way into the visible ear, with inner regions a pale orangeish colour. The black patches over the eyes are elliptical in shape and extend from the snout. There is an ill defined line of blackish grey running from the mid-snout between the eyes, further back to the crown.

The species *E. rosswellingtoni sp. nov.* from the region around Mount Wilhelm and including nearby elevated parts of Eastern Highlands and Southern Highlands provinces of Papua New Guinea, west to the Irian Jaya border is readily separated from the other species by having brown hair on the upper body, ears that are brownish grey at the outer edges and becoming orange further in, feet are pink and the pink of the snout almost extends to the eyes. The belly is beige and the lower flanks have well defined demarcation between darker upper parts and lighter underparts, which do not run in an even line.

The species *E. jackyhoserae sp. nov.* from the Nassau Range in Irian Jaya (West Papua), Indonesia is similar in most respects to *E. rosswellingtoni sp. nov*. as described above, but can be separated from that species by having orange-pink feet and mottled darker patches or blotches on the sides of the face and forelimbs. The ears have greyish tips, but are otherwise yellowish in colour further in.

The belly is beige and the lower flanks have well defined demarcation between darker upper parts and lighter underparts, which do not run in an even line. The upper limbs and lower flanks are dark brown with well defined lighter edges, forming large patches and quite distinct from the brownish grey dorsal surfaces.

The species *E. doriskuenae sp. nov.* from the high altitude areas of the Finisterre Range in Madang and Morobe Provinces, PNG is similar in most respects to *E. rosswellingtoni sp. nov*. however can be differentiated from that species and in turn all others, by the fact that demarcation between darker upper parts and lighter underparts is not well defined; inner ears are orange in colour except for the very outer tips which have grey outer edges; around the eye, the black marking is dark brown rather than black with some infusions of brown into the dark brown region anterior to the eye.

Distribution: *E. rosswellingtoni sp. nov*. is known from high altitude areas of the central cordillera of New Guinea, wholly within the territory of Papua New Guinea, from just inside the border with Irian Jaya (Indonesia), east through well-known high points like Mount Wilhelm and further east to at least Mount Erimbari in the Eastern Highlands Province of Papua New Guinea and south to at least Mt. Sisa, Southern Highlands Province, Papua New Guinea.

Etymology: Named in honour of Cliff Ross Wellington, better known as Ross Wellington, of New South Wales, Australia in recognition of a massive contribution to herpetology and wildlife conservation in Australia over some decades and who also publicly took a stand against taxonomic vandalism by Wolfgang Wuster and his gang of thieves, via a formal written submission to the ICZN (Wellington 2015) and other critically important works for the benefit of science.

EUDROMICIA JACKYHOSERAE SP. NOV.

LSID urn:lsid:zoobank.org:act:81DB7D79-205A-42F3-9878-8FA85727428D

Holotype: A preserved specimen at the Yale Peabody Museum. New Haven, Connecticut, United States of America, Vertebrate Zoology Division, Mammalogy, specimen number 001701, collected from Nassau Range, Irian Jaya, Indonesia, Latitude -4.20 S., Longitude 137.00 E. This facility allows access to its holdings.

Diagnosis: The species complex, until now regarded as putative *Eudromicia* (formerly *Cercartetus*) *caudatus* (Milne-Edwards, 1877) (herein restricted to the type region of the type locality, being the Arfak Mountains in western Papua, Indonesia), including *E. macrurus* (Mjöberg, 1816) (from the southern wet tropics in Queensland, Australia) and the four newly described species, all formerly treated as populations of *E. caudatus*, namely *E. richardwellsi sp. nov*. (from the northern wet tropics, Queensland Australia), *E. adelynhoserae sp. nov.* (from Milne Bay, PNG), *E. rosswellingtoni sp. nov*. (from the central ranges of New Guinea, generally near Mount Wilhelm and west to the Irian Jaya border), *E. jackyhoserae sp. nov.* (from Nassau Range, Irian Jaya) and *E. doriskuenae sp. nov.* from the high altitude areas of the Finisterre Range in Madang and Morobe Provinces, PNG, are readily separated from all other members of the genus by having a large size as in being more than 85 mm head and body length; lower leg length more than 20 mm long and hind leg more than 13 mm long. The tail is also long and more than 120 mm in length, slightly thickened and furred at the base (separating it from the superficially similar *Pogonomys* Milne-Edwards, 1877). The dark mark through the eye is obvious and there are large crinkly ears. This is also a genus-level diagnosis for all species within *Eudromicia.*

Eudromicia caudatus (Milne-Edwards, 1877) herein restricted to the type region of the type locality, being the Arfak Mountains in western Papua, Indonesia and all other species in the complex, are easily separated from one another on colouration.

Eudromicia caudatus (Milne-Edwards, 1877) is readily separated from the other five herein recognized species by having a dull rufous colour above. The face is rufous fawn, with two broad black bands passing from the nose through the eyes, but not quite reaching the ears. Ears are rather long and narrow, evenly oval, naked. Back-hairs are slaty grey for five sixths of their length, their tips dull rufous. Chest and belly pale yellowish

white, the bases of the hairs slate-coloured.

Arms and legs grey; hands and feet dull fawn.

E. macrurus (Mjöberg, 1816) from the southern wet tropics in Queensland, Australia, generally south and west of Cairns, North Queensland are readily separated from the other five herein recognized species by having a brownish-grey colour, with a slight rufous tinge at the anterior end only. The face is rufous fawn or just yellowish brown above, depending on the individual, with a square black patch across each eye and nowhere near the ears. This patch is notable for having a well defined black triangle jutting out from above the rear of the eye, the apex pointing towards the crown.

Ears are rather long and narrow, evenly oval, naked and greyish on the lobes and rich pink within. Back-hairs are slaty grey for five sixths of their length, their tips a brownish-grey colour. Chest and belly pale yellowish white, the bases of the hairs slate-coloured.

Arms and legs brown on top, light (whitish) underneath; hands and feet a light pinkish colour.

E. richardwellsi sp. nov. from the northern wet tropics generally from north of Port Douglas and south of Cape Tribulation, with a distribution centred on the Mount Lewis area is similar in most respects to *E. macrurus*, which it would otherwise be identified as. *E. richardwellsi sp. nov.* can however be separated from *E. macrurus* by having significantly less-well defined black around the eye, being peppered in appearance and not boldly demarcated from the adjacent brownish fur as seen in *E. macrurus.* The jowls region in *E. richardwellsi sp. nov.* is yellow rather than whitish in *E. macrurus.*

The species *E. adelynhoserae sp. nov.* from the Milne Bay Province, Papua New Guinea is readily separated from the other species by having a distinctly steel-greyish colour above, contrasting with white undersides and jowls. The upper surface has a somewhat peppered appearance. The ears are blackish grey, the dark colour extending almost all the way into the visible ear, with inner regions a pale orangeish colour. The black patches over the eyes are elliptical in shape and extend from the snout. There is an ill defined line of blackish grey running from the mid-snout between the eyes, further back to the crown.

The species *E. rosswellingtoni sp. nov*. from the region around Mount Wilhelm and including nearby elevated parts of Eastern Highlands and Southern Highlands provinces of Papua New Guinea, west to the Irian Jaya border is readily separated from the other species by having brown hair on the upper body, ears that are brownish grey at the outer edges and becoming orange further in, feet are pink and the pink of the snout almost extends to the eyes. The belly is beige and the lower flanks have well defined demarcation between darker upper parts and lighter underparts, which do not run in an even line.

The species *E. jackyhoserae sp. nov.* from the Nassau Range in Irian Jaya (West Papua), Indonesia is similar in most respects to *E. rosswellingtoni sp. nov*. as described above, but can be separated from that species by having orange-pink feet and mottled darker patches or blotches on the sides of the face and forelimbs. The ears have greyish tips, but are otherwise yellowish in colour further in.

The belly is beige and the lower flanks have well defined demarcation between darker upper parts and lighter underparts, which do not run in an even line. The upper limbs and lower flanks are dark brown with well defined lighter edges, forming large patches and quite distinct from the brownish grey dorsal surfaces.

The species *E. doriskuenae sp. nov.* from the high altitude areas of the Finisterre Range in Madang and Morobe Provinces, PNG is similar in most respects to *E. rosswellingtoni sp. nov*. however can be differentiated from that species and in turn all others, by the fact that demarcation between darker upper parts and lighter underparts is not well defined; inner ears are orange in colour except for the very outer tips which have grey outer edges; around the eye, the black marking is dark brown rather than black with some infusions of brown into the dark brown region anterior to the eye.

Distribution: *E. jackyhoserae sp. nov*. is known only from the Nassau Range, Irian Jaya, Indonesia, but is probably found at other high elevation locations nearby.

Etymology: Named in honour of my eldest daughter, Jacky Hoser of Park Orchards, (Melbourne), Victoria, Australia in recognition of over 18 years of significant contributions to wildlife conservation in Australia, including her work with Snakebusters: Australia's best reptiles shows, being the only hands on wildlife shows in Australia that let people hold the animals.
Jacky Hoser also made significant contributions to several years research on the Mountain Pygmy Possums of the genus *Burramys* Broom (1896) in the snowfields of Victoria, Australia.

EUDROMICIA DORISKUENAE SP. NOV.

LSID urn:lsid:zoobank.org:act:115D1E32-E68D-48B7-88F6-8633DBA7F01B

Holotype: A preserved specimen at the Australian Museum, Sydney, New South Wales, Australia, specimen number M.21654, collected at Nokopo, Madang Province, Papua New Guinea, Latitude -5.95 S., Longitude 146.60 E. This facility allows access to its holdings.

Diagnosis: The species complex, until now regarded as putative *Eudromicia* (formerly *Cercartetus*) *caudatus* (Milne-Edwards, 1877) (herein restricted to the type region of the type locality, being the Arfak Mountains in western Papua, Indonesia), including *E. macrurus* (Mjöberg, 1816) (from the southern wet tropics in Queensland, Australia) and the four newly described species, all formerly treated as populations of *E. caudatus*, namely *E. richardwellsi sp. nov*. (from the northern wet tropics, Queensland Australia), *E. adelynhoserae sp. nov.* (from Milne Bay, PNG), *E. rosswellingtoni sp. nov*. (from the central ranges of New Guinea, generally near Mount Wilhelm and west to the Irian Jaya border), *E. jackyhoserae sp. nov.* (from Nassau Range, Irian Jaya) and *E. doriskuenae sp. nov.* from the high altitude areas of the Finisterre Range in Madang and Morobe Provinces, PNG, are readily separated from all other members of the genus by having a large size as in being more than 85 mm head and body length; lower leg length more than 20 mm long and hind leg more than 13 mm long. The tail is also long and more than 120 mm in length, slightly thickened and furred at the base (separating it from the superficially similar *Pogonomys* Milne-Edwards, 1877). The dark mark through the eye is obvious and there are large crinkly ears. This is also a genus-level diagnosis for all species within *Eudromicia.*

Eudromicia caudatus (Milne-Edwards, 1877) herein restricted to the type region of the type locality, being the Arfak Mountains in western Papua, Indonesia and all other species in the complex, are easily separated from one another on colouration.

Eudromicia caudatus (Milne-Edwards, 1877) is readily separated from the other five herein recognized species by having a dull rufous colour above. The face is rufous fawn, with two broad black bands passing from the nose through the eyes, but not quite reaching the ears. Ears are rather long and narrow, evenly oval, naked. Back-hairs are slaty grey for five sixths of their length, their tips dull rufous. Chest and belly pale yellowish white, the bases of the hairs slate-coloured.

Arms and legs grey; hands and feet dull fawn.

E. macrurus (Mjöberg, 1816) from the southern wet tropics in Queensland, Australia, generally south and west of Cairns, North Queensland are readily separated from the other five herein recognized species by having a brownish-grey colour above, with a slight rufous tinge at the anterior end only. The face is rufous fawn or just yellowish brown, depending on the individual, with a square black patch across each eye and nowhere near the ears. This patch is notable for having a well defined black triangle jutting out from above the rear of the eye, the apex pointing towards the crown.

Ears are rather long and narrow, evenly oval, naked and greyish on the lobes and rich pink within. Back-hairs are slaty grey for five sixths of their length, their tips a brownish-grey colour. Chest and belly pale yellowish white, the bases of the hairs slate-coloured. Arms and legs brown on top, light (whitish) underneath; hands and feet a light pinkish colour.

E. richardwellsi sp. nov. from the northern wet tropics generally from north of Port Douglas and south of Cape Tribulation, with a distribution centred on the Mount Lewis area is similar in most respects to *E. macrurus*, which it would otherwise be identified as. *E. richardwellsi sp. nov.* can however be separated from *E. macrurus* by having significantly less-well defined black around the eye, being peppered in appearance and not boldly demarcated from the adjacent brownish fur as seen in *E. macrurus.* The jowls region in *E. richardwellsi sp. nov.* is yellow rather than whitish in *E. macrurus.*

The species *E. adelynhoserae sp. nov.* from the Milne Bay Province, Papua New Guinea is readily separated from the other species by having a distinctly steel-greyish colour above, contrasting with white undersides and jowls. The upper surface has a somewhat peppered appearance. The ears are blackish grey, the dark colour extending almost all the way into the visible ear, with inner regions a pale orangeish colour. The black patches over the eyes are elliptical in shape and extend from the snout. There is an ill defined line of blackish grey running from the mid-snout between the eyes, further back to the crown.

The species *E. rosswellingtoni sp. nov.* from the region around Mount Wilhelm and including nearby elevated parts of Eastern Highlands and Southern Highlands provinces of Papua New Guinea, west to the Irian Jaya border is readily separated from the other species by having brown hair on the upper body, ears that are brownish grey at the outer edges and becoming orange further in, feet are pink and the pink of the snout almost extends to the eyes. The belly is beige and the lower flanks have well defined demarcation between darker upper parts and lighter underparts, which do not run in an even line.

The species *E. jackyhoserae sp. nov.* from the Nassau Range in Irian Jaya (West Papua), Indonesia is similar in most respects to *E. rosswellingtoni sp. nov*. as described above, but can be separated from that species by having orange-pink feet and mottled darker patches or blotches on the sides of the face and forelimbs. The ears have greyish tips, but are otherwise yellowish in colour further in.

The belly is beige and the lower flanks have well defined demarcation between darker upper parts and lighter underparts, which do not run in an even line. The upper limbs and lower flanks are dark brown with well defined lighter edges, forming large patches and quite distinct from the brownish grey dorsal surfaces.

The species *E. doriskuenae sp. nov.* from the high altitude areas of the Finisterre Range in Madang and Morobe Provinces, PNG is similar in most respects to *E. rosswellingtoni sp. nov*. however can be differentiated from that species and in turn all others, by the fact that demarcation between darker upper parts and lighter underparts is not well defined; inner ears are orange in colour except for the very outer tips which have grey outer edges; around the eye, the black marking is dark brown rather than black with some infusions of brown into the dark brown region anterior to the eye.

Distribution: *E. doriskuenae sp. nov.* is only known from the high altitude areas of the Finisterre Range in Madang and Morobe Provinces, Papua New Guinea in a region generally bounded by the Markham and Ramu River basins to the south and the coast to the north.

Etymology: Named in honour of Doris Kuen of Donvale, Victoria, Australia, for services to conservation, through her vitally important work in maintaining the structure, electrical fittings, plumbing, repairs to motor vehicles at urgent times and other important tasks at the Snakebusters, wildlife displays and scientific research facility in Park Orchards, Victoria, Australia.

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CONFLICTS OF INTEREST - NONE.