

A new subspecies of Yellow-bellied Glider (Marsupialia: Petauridae) from far north Queensland, Australia.

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ABSTRACT

The taxonomy of the east Australian Yellow-bellied Glider *Petaurus australis* Shaw, 1791 has been confused, conflicting and subject to change over the past 200 years.

Several type specimens have been formally described. The nominate form is from New South Wales as are at least three other types, all formally synonymised by Bannister *et al.* (1988).

The putative subspecies *Petaurus australis reginae* Thomas, 1923 was found by Brown *et al.* (2006) to be genetically similar to the nominate form and so has been treated as synonymous ever since.

However Brown *et al.* (2006) also showed that the putative *P. australis* from the wet tropics of far north Queensland, separated from southern populations by the Biogeographic barrier of the Burdekin Gap, are sufficiently divergent both genetically and morphologically to be treated as a subspecies. This view has been agreed by others (Anonymous 2008, Department of the Environment and Resource Management 2011, 2017) and yet the taxon has until now been unnamed.

This paper corrects this situation and formally names the subspecies *P. australis adelynhoserae* subsp. nov.. With an extant population estimated at just 6,000 individuals (Anonymous 2008) and significant ongoing threats causing a long-term decline in the taxon, it is critically important that a sound conservation and captive-breeding program be commenced.

Keywords: Mammals; Marsupial; Petauridae; taxonomy; nomenclature; possum; yellow-bellied glider; wet tropics; Queensland; Australia; *Petaurus*; *australis*; new subspecies; *adelynhoserae*.

INTRODUCTION

The Yellow-bellied Glider *Petaurus australis* Shaw, 1791, an inhabitant of wet sclerophyll forests of eastern Australia, is a gliding possum with grey-brown or black fur on the upper body and a distinctive off-white to yellow or orange belly. It has a fluffy tail growing to 48 cm long and large, bare ears. Its head and body grows to 30 cm long and can weigh up to 700 g (Cronin, 1991; Strahan, 2008).

The taxonomy of *Petaurus australis* Shaw, 1791 has been confused, conflicting and subject to change over the past 200 years.

Several type specimens have been formally described. The nominate form is from New South Wales as are at least three other types, all formally synonymised by Bannister *et al.* (1988).

Some authors including for example Strahan (1988) mistakenly assigned the north Queensland population of *Petaurus australis* to the subspecies *Petaurus australis reginae* Thomas, 1923.

However that putative subspecies was in fact described from a type specimen from Gin Gin in south-east Queensland.

Brown *et al.* (2006) were aware of this fact and subjected this form from south-east Queensland and the type form of *P. australis* from New South Wales to a rigorous molecular analysis.

The putative subspecies *Petaurus australis reginae* Thomas, 1923 was found by Brown *et al.* (2006) to be genetically similar to the nominate form and so has been treated as synonymous ever since.

However Brown *et al.* (2006) also showed that the putative *P. australis* from the wet tropics of far north Queensland, separated from southern populations by the Burdekin Gap, are sufficiently divergent both genetically and morphologically to be treated as a subspecies.

This view has been agreed by others (Anonymous 2008, Department of the Environment and Resource Management 2011, 2017) and yet the taxon has until now been unnamed.

This paper corrects this situation and formally names the subspecies *P. australis adelynhoserae* subsp. nov..

With an extant population estimated at just 6,000 individuals (Anonymous 2008) and significant ongoing threats causing a long-term decline in the taxon, including an ever expanding Australian human population (Hoser, 1991), it is critically important that a sound conservation and captive-breeding program be commenced.

Hoser (1991) at page 222 also detailed further steps required to save the putative species *P. australis* across its range.

MATERIALS, METHODS AND RESULTS

Before a decision is made to name any new candidate 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 (2008), Bannister *et al.* (1988), Brown *et al.* (2004, 2006), Bryant and Krosch (2016), Collins (1973), Craig (1985), Goldingay (1990), Goldingay and Kavanagh (1992), Groves *et al.* (2005), Hedges (2006), Hoser (1991), Iredale and Troughton (1934), Lawlor (1979), Maxwell *et al.* (1996), Menkhorst (2001), Ride (1970), Russell (1980), Strahan (1998), Tate (1952), Thomas (1888, 1922, 1923), Vaughan (1986), Winter (1997, 2004), Winter *et al.* (1979) 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 potentially useful information.

In summary, as inferred already, the genetic, geological, historical and morphological evidence clearly showed that the north Queensland population of *P. australis* warrants recognition as a subspecies in accordance with the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

For the record, Brown *et al.* (2006) wrote: "Taking into account other behavioural and ecological data, and the disjunct distribution of NQ populations from southern populations, we propose that the NQ population represents a distinct Evolutionarily Significant Unit, a lineage showing highly restricted gene flow from the rest of the species."

INFORMATION RELEVANT TO THE FORMAL DESCRIPTION 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 are relevant staff at museums who made specimens and records available in line with international obligations.

In terms of the following formal description, spelling 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.

Material downloaded from the internet and cited anywhere in this paper as being sourced online was downloaded and checked most recently as of 10 February 2020 (including if also viewed prior), unless otherwise stated and was accurate in terms of the content (as described) 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 (pelage) 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 the population of the relevant subspecies as described below, the comments in Hoser (1991 and 2019a, 2019b) apply.

Wildlife laws as currently enforced in Australia are not in any materially significant way enhancing the long-term survival prospects of any of the relevant subspecies and are being vastly outweighed by other negative impacts of governments.

This includes the Australian National and Queensland State governments ongoing commitment to growing the human population to a level that can only put further unsustainable pressure on the survival prospects of the relevant subspecies.

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 25 million as of 2019), all sorts of unforeseen threats to the survival of this subspecies will almost certainly emerge.

PETAURUS AUSTRALIS ADELYNHOSERAE SUBSP. NOV.
LSIDurn:lsid:zoobank.org:act:2BA93A74-FB83-4AA6-A464-90A64F7980F8

Holotype: A preserved male specimen at Queensland Museum, Brisbane, Queensland, Australia, specimen number JM8746 collected from Nichaga Creek, Queensland, Australia, Latitude -17.82 S., Longitude 145.56 E. This government-owned facility allows access to its holdings.

Paratypes: Two preserved specimens at the Queensland Museum, Brisbane, Queensland, Australia, specimen number JM8747 (a male) collected from Nichaga Creek, Queensland, Australia, Latitude -17.82 S., Longitude 145.56 E. and specimen number JM8503 (a female) collected from the Nichaga Creek Catchment, Queensland, Australia, Latitude -17.83 S., Longitude 145.55 E.

Diagnosis: *Petaurus australis adelynhoserae subsp. nov.* has until now been treated (taxonomically at least) as a northern population of either *P. australis australis* Shaw, 1791 or alternatively the subspecies *P. australis reginae* Thomas, 1923, (type locality of Gin Gin, south-east Queensland), now also treated as a junior synonym of *P. australis australis*.

Petaurus australis adelynhoserae subsp. nov. from the wet tropics region of Northern Queensland, north of the Burdekin Gap (Townsville area) is the taxon erroneously previously labelled *P. australis reginae* by Strachan (1988) and as an undescribed form by others including (Anonymous 2008, Department of the Environment and Resource Management 2011, 2017).

Contrary to the statement on page 312 of Brown *et al.* (2016), the subspecies *Petaurus australis adelynhoserae subsp. nov.* is readily separated from nominate *P. australis australis* by being lighter in pelage, not darker as stated by Brown *et al.* (2016).

Petaurus australis adelynhoserae subsp. nov. is separated from *P. australis australis* by having a medium to dark brown pelage on the upper surfaces, versus blackish in *P. australis australis*. *Petaurus australis adelynhoserae subsp. nov.* is further separated from *P. australis australis* by having ill-defined darker fur on the cheeks, versus well defined in *P. australis australis*. The upper fur of the anterior of the tail in *Petaurus australis adelynhoserae subsp. nov.* is brownish in colour, versus black in *P. australis australis*, or occasionally black with a very slight brown tinge only.

Brown *et al.* (2006) at p. 312 describing *P. australis adelynhoserae sp. nov.* as "The NQ gliders" separated the two subspecies as follows:

"The NQ gliders are smaller, as measured by weight (NQ

males: mean 516 g (s.d. = 7.7 g, n = 17); NQ females: 479.4 g (s.d. = 7.8 g, n = 14) (Goldingay *et al.* 2001); Vit. males: 555.5 g (s.d. = 13.5 g, n = 11); Vit. females, 508.1 g (s.d. = 8.1 g, n = 9 (M. Brown and S. M. Carthew, unpublished data)), ... There also appear to be sociobehavioural and life-history differences between the NQ gliders and the southern forms.

The NQ gliders have been reported to have a polygynous mating system (Russell 1984; although see Goldingay *et al.* 2001), whilst the southern populations are predominantly monogamous (Henry and Craig 1984; Craig 1985; Goldingay and Kavanagh 1990; Goldingay 1992; M. Brown, S. M. Carthew and S.J.B. Cooper, unpublished data). NQ gliders also appear to spend longer in the pouch (100 days versus <80 days) (Russell 1983; M. Brown and S. M. Carthew, unpublished data)."

Strahan (1988) noted:

"In southern Australia, about two species of eucalypts are used as food trees but only one. Red Mahogany, in Northern Queensland."

Strahan (1988) also noted that Red Mahogany *Eucalyptus resinifera* Smith, 1790 (White 1790) is also heavily logged, putting the subspecies at increased survival risk.

Hoser (1991), on page 222 discusses conservation and survival threats to both subspecies further.

Images of *Petaurus australis adelynhoserae* subsp. nov. in life can be found online at:

<https://www.flickr.com/photos/euprepiosaur/35400425184/>
and

<https://www.flickr.com/photos/euprepiosaur/7463524210>
and

<https://www.abc.net.au/news/2017-04-12/yellow-bellied-glidens-feeding-on-tree-sap/8433310/>
and

<https://environment.des.qld.gov.au/wildlife/threatened-species/vulnerable/yellow-bellied-glider>

Images of the nominate form of *Petaurus australis* from New South Wales, south east Queensland and Victoria can be found online at:

<https://www.flickr.com/photos/kookr/4230042958/>

and
<https://www.flickr.com/photos/jono-dashper/44058260494/>

and
<https://www.flickr.com/photos/jameswhitephoto/47102618202/>

and
<https://www.flickr.com/photos/23031163@N03/35447081774/>

(all the preceding images of both subspecies were last downloaded on 10 February 2020).

Petaurus australis (of both subspecies) are separated from all other gliders in the genus *Petaurus* and other morphologically similar species by the following unique suite of characters:

Size is large, being to 715 mm total length; lower leg more than 80 mm; tail more than 400 mm.

Underside of heel thickly hairy. Posterior side of hips and legs broadly fringed with black. Belly is a deep orange.

In terms of cranial characters, *P. australis* is separated from all other species in the genus by having a large skull with; basal length of more than 46 mm. Molars 1-3 are more than 7.3 mm long. Bullae are large, the posterior projecting lower than the anterior part.

Thomas (1888) at pages 152-153 gives a more detailed description of *P. australis*, applicable to both subspecies.

Distribution: Restricted to the wet tropics bioregion of Australia from Mount Spec, north of Townsville, north Queensland in the south, along the coastal rainforests, generally at high elevation running north to the Mount Windsor Tableland in the north.

Etymology: Named in honour of my eldest daughter Adelyn

Hoser, who glides like this subspecies of possum. She does this as she does jumps on a snowboard at places like Whistler in Canada, Hakuba in Japan and also the Australian ski resorts of Thredbo, Mount Buller and Mount Hotham.

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CONFLICTS OF INTEREST

None.

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