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Two new hitherto overlooked species of Dwarf Goanna, *Worrellisaurus* Wells and Wellington, 1984, subgenus *Parvavaranus* Hoser, 2013 from Australia.

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ABSTRACT

As part of a long-term taxonomic review of Australian varanid lizards by the author over a 40 year period, it has emerged that morphologically distinct and genetically divergent forms of two species of widely distributed Pygmy Monitors of the genus *Worrellisaurus* Wells and Wellington, 1984, subgenus *Parvavaranus* Hoser, 2013 remain unrecognized to science as of 2020.

The purpose of this paper is to identify and formally name these new species.

They can be readily identified and separated from the nominate form of each closely related species on the basis of morphology. Furthermore previously published studies involving the analysis of DNA has shown species-level divergences for the relevant putative taxa.

It is for this reason I have not hesitated to recognise each taxon as full species.

I have no doubt that a group of thieves known as the Wolfgang Wüster gang, will make a lot of "noise" following the publication of this paper and falsely accuse this author of "taxonomic vandalism". Then a few years down the track, when the obvious can no longer be ignored, they will attempt to steal this work and illegally rename the very same species as done by Bucklitsch *et al.* (2016) at Wüster's instigation, when they illegally renamed two varanid genera previously named by Hoser (2013).

The unlawfully coined name *Hapturosaurus* Bucklitsch, Böhme and Koch, 2016, published in (PRINO = peer reviewed in name only) online "journal" *Zootaxa* is a junior synonym of the correct legal name *Shireenhosersaurea* Hoser, 2013. *Solomonsaurus* Bucklitsch, Böhme and Koch, 2016 is a junior synonym of the correct legal name *Oxysaurus* Hoser, 2013.

The genus-level taxonomy used in this paper is that used in Hoser (2013) and not the illegally coined names of Wüster's gang of thieves including Bucklitsch *et al.* (2016). I note that as of 2020 the ICZN names of Hoser are those that are being widely accepted by scientists as the most logical for the Australian varanids (see for example Cogger 2014 and Dubois *et al.* 2019, both of whom condemned the Wüster gang of thieves). The Hoser names are the ones that are fully compliant with the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

Keywords: Taxonomy; nomenclature; Goanna; Monitor lizard; Varanidae; *Varanus*; *Worrellisaurus*; *Parvavaranus*; South Australia; Northern Territory; Western Australia, Queensland, Australia; *Shireenhosersaurea*; *Hapturosaurus*; *Oxysaurus*; *Solomonsaurus*; *eremius*; *brevicauda*; *sparnus*; new species; *apicemalba*; *ignis*; new subspecies; *pyrhus.*

INTRODUCTION

As part of a long-term taxonomic review of Australian varanid lizards by the author over a 40 year period, the genus-level classification of the Varanidae globally was reviewed and revised by Hoser (2013).

This classification has been widely accepted in the five years since then, including by regular critics of my scientific works known as the Wüster gang of thieves, who have even sought to illegally rename genera first formally named in the Hoser (2013) paper in Bucklitsch *et al.* (2016) as detailed by Hoser (2017).

Therefore the genus-level classification of Hoser (2013) is used throughout this paper.

The nefarious and often illegal activities of the Wüster gang of thieves are detailed in Hoser (2015a-f) and sources cited therein.

Post year 2000 papers naming new taxa of Australian varanid include the following: Doughty *et al.* (2014), Hoser (2013, 2014, 2015g, 2018a, 2018b, 2018c, 2018d), Maryan *et al.* (2014).

The post year 2000 varanid taxa named in Australia by these

authors (using the genus-level nomenclature of Hoser 2013) are the following 25 species and subspecies-level taxa as follows:

Worrellisaurus (*Arborhabitatiosaurus*) *bushi* (Aplin, Fitch and King, 2006);

Odatria (*Odatria*) *hoserae* Hoser, 2013;

Odatria (*Honlamus*) *honlami* Hoser, 2013;

Odatria (*Honlamus*) *mitchelli hawkeswoodi* Hoser, 2013;

Worrellisaurus (*Worrellisaurus*) *makhani* (Hoser, 2013), originally described by Hoser (2013) as a subspecies of *W. storri* (Mertens, 1966);

Odatria (*Odatria*) *tristis nini* Hoser, 2013;

Euprepiosaurus indicus wellsi Hoser, 2013;

Euprepiosaurus indicus wellingtoni Hoser, 2013;

Odatria (*Kimberleyvaranus*) *glebopalma funki* Hoser, 2014;

Odatria (*Kimberleyvaranus*) *glebopalma maderi* Hoser, 2014;

Odatria (*Pilbaravaranus*) *hamersleyensis* (Maryan, Oliver, Fitch and O'Connell, 2014);

Worrellisaurus (*Parvavaranus*) *sparnus* (Doughty, Keally, Fitch and Donnellan, 2014);

Pantherosaurus (*Aspetosaurus*) *maxhoseri* Hoser, 2015;

Worrellisaurus (*Worrellisaurus*) *primordius dalyi* Hoser, 2015;

Pantherosaurus (*Titanzius*) *giganteus queenslandensis* Hoser, 2015;

Pantherosaurus (*Titanzius*) *giganteus bulliardi* Hoser, 2015;

Worrellisaurus (*Worrellisaurus*) *kimaniadilbodeni* Hoser, 2018;

Worrellisaurus (*Worrellisaurus*) *microocellata* Hoser, 2018;

Worrellisaurus (*Worrellisaurus*) *tyeseeipperae* Hoser, 2018;

Worrellisaurus (*Worrellisaurus*) *scotteipperi* Hoser, 2018;

Worrellisaurus (*Worrellisaurus*) *dannybrowni* Hoser, 2018;

Worrellisaurus (*Arborhabitatiosaurus*) *jenandersonae* Hoser, 2018;

Worrellisaurus (*Worrellisaurus*) *bigmoreum* Hoser, 2018;

Odatria (*Odatria*) *davidhancocki* Hoser, 2018;

Odatria (*Kimberleyvaranus*) *glebopalma jimgreenwoodi* Hoser, 2018.

Non-Australian varanid taxa have also been formally described and named by Hoser (2013) and other authors in the same post 2000 period.

In spite of this effort, it has also emerged that two more morphologically distinct and genetically divergent forms of two species of widely distributed Pygmy Monitors of the genus *Worrellisaurus* Wells and Wellington, 1984, subgenus subgenus *Paravaranus* Hoser, 2013 remain unrecognized to science.

As it happens, these would have been named many years ago were it not for a series of extremely damaging interruptions to our research effort, by money grabbing thieves, whose agenda is more along the lines of destruction for profit, rather than public benefit or science.

These illegal armed raids and other attacks are detailed by Court of Appeal, Victoria (2014), Victorian Civil and Administrative Tribunal (VCAT) (2015), Hoser (1993, 1995, 1996, 1999a and 1999b).

Events detailed by Court of Appeal, Victoria (2014), Victorian Civil and Administrative Tribunal (VCAT) (2015), Hoser (1989, 1991, 1993, 1995, 1996, 1999a and 1999b, 2000a, 2000b) included illegal armed raids and unlawful thefts of research files, which caused irreparable harm to numerous research projects by the theft of records, photos and data that took many decades of hard work to accumulate.

While it would be preferable to either retrieve the stolen material or to replicate earlier research and accumulation of data, neither are likely to happen in my lifetime.

In terms of the former, corrupt wildlife officers and police who illegally took materials have refused to return them in spite of numerous court orders to do so.

Evidence given by the offenders in court was that the relevant materials have been destroyed.

In terms of the latter, I am now aged 57 years of age, and am not likely to live another 40 years in good health to be able to go around the same parts of northern Australia collecting and recording species, as done in the previous 40 years.

As it is critically important that unnamed species be formally identified and named as the vital first step in their long-term conservation, I have absolutely no hesitation in describing the new to science forms herein, even though my available material and data is nowhere near as extensive as I would like it to be.

As stated in the abstract, the purpose of this paper is to identify and formally name these two forms from Australia.

The newly named species can be readily identified and separated from the nominate form of each closely related species on the basis of morphology. Furthermore previously published studies involving the analysis of DNA within the last decade by other authors, including as cited in Hoser (2013), including Fitch *et al.* (2006), has shown species-level divergences for the relevant forms.

In terms of the divergence by way of DNA, earlier studies including Fitch *et al.* (2006) have shown divergences for each of the two newly named forms being on par with other well-known and widely accepted taxa, such as *Worrellisaurus bushi* (Aplin, Fitch and King, 2006) versus *W. gilleni* (Lucas and Frost, 1895) (its nearest relative) or *Pantherosaurus flavirufus* (Mertens, 1958) versus *P. gouldi* (Gray, 1838) (its nearest relative).

It is for this reason I have not hesitated to recognise each taxon as full species, rather than to take the conservative position of giving them taxonomic recognition at the subspecies level.

I have no doubt that a group of thieves known as the Wolfgang Wüster gang, will make a lot of "noise" following the publication of this paper and falsely accuse myself of "taxonomic vandalism".

Then a few years down the track, when the obvious can no longer be ignored, they will attempt to steal this work and illegally rename the very same species.

The same gang of thieves will allege I have no experience at all with the said taxa and that all my evidence is either "non-existent", "fabricated" or "stolen", (see for example Kaiser (2012a, 2012b, 2013, 2014a, 2014b) and Kaiser *et al.* (2013), the latter "paper" perhaps should be better known as "Wüster and others he can "add" to his authors list".

Bucklitsch *et al.* (2016) are a case in point in that as part of the Wüster gang of thieves, they engaged in taxonomic vandalism by coining names for varanid genera previously named by Hoser (2013).

Their objective junior synonyms should not be used as they are illegal under the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

Hapturosaurus Bucklitsch, Böhme and Koch, 2016 is a junior synonym of the correct legal name *Shireenhosersaurea* Hoser, 2013 and *Solomonsaurus* Bucklitsch, Böhme and Koch, 2016 is a junior synonym of the correct legal name *Oxysaurus* Hoser, 2013.

As stated already, the genus-level taxonomy used in this paper is that used in Hoser (2013), which as of 2018 was widely accepted by scientists as the most logical for the Australian varanids, remains the case in 2020 and is also fully compliant with the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

MATERIALS AND METHODS

The basis of this long-term study has been the inspection of numerous specimens, live, in jars in museums and via photos with accurate locality data, as well as a perusal of the limited published literature on putative species within the genus *Worrellisaurus* Wells and Wellington, 1984.

Obviously I should note that morphological divergence on its own is not regarded by myself as sufficient grounds to assign a new species.

However there are other important grounds. All populations of

"candidate species" are separated by zones of clearly unsuitable habitat, meaning zero collection of specimens from those places and are therefore reproductively isolated.

Having said that, for one of these newly named species, geographic species boundaries between the relevant species has not yet been fully established.

As mentioned already, both newly named species are from the genus *Worrellisaurus* Wells and Wellington, 1984, subgenus *Parvavaranus* Hoser, 2013.

All the relevant comments of Hoser (2013) and Hoser (2018a-d) apply herein.

Relevant literature applicable to the taxonomy of Australian monitor species, including the species formally in named this paper was listed in Hoser (2013) and Hoser (2018a-d) and are not necessarily cited again here, although the ones that are most relevant are below.

RESULTS

The two newly identified species are wholly new to science in that until now, no other herpetologist has suspected their existence, or published anything to suggest they exist.

Both species were identified simply by way of audit of wide-ranging generally well-known taxa through inspection of hundreds of specimens of the relevant and similar species across their known areas of distribution.

They have also been confirmed and corroborated by way of publicly available and published gene sequences, including those of Fitch *et al* (2006).

W. eremius (Lucas and Frost, 1895) as defined and diagnosed in Cogger (2014), with a type locality of Idracowra, Northern Territory was inspected across the known range for the putative species. Specimens from the Shark Bay area of Western Australia were significantly divergent and are herein identified and named as a new species. Those from the Pilbara to the north are also identified and named herein as a new subspecies of *W. eremius* due to their morphological divergence.

The differential level of classification is due to the fact that the Shark Bay population is well and truly separated from all others and therefore wholly allopatric and this fits within the definition of species by any reasonable classification.

The Pilbara population, while also significantly divergent to the type form and based on the phylogeny of Fitch *et al.* (2006) at the species level, may have gene flow with that population and is therefore conservatively named herein as a subspecies.

The species *W. brevicauda* (Boulenger, 1898), was split by Doughty, Keally, Fitch and Donnellan, (2014), with a population from the Dampier Peninsula in Western Australia formally named *W. sparnus* (Doughty, Keally, Fitch and Donnellan, 2014). They placed both their newly identified species and *W. brevicauda* in the genus *Varanus* Merrem, 1820. See Hoser (2013) for a full discussion of the genus level placements of varanid species, including that used in this paper.

However in terms of the remaining population of the putative species, *W. brevicauda* Doughty, Keally, Fitch and Donnellan (2014) left it all as a single species.
Their molecular data did however indicate a genus-level divergence between eastern and western specimens.
Inspection of specimens from across the known range also shows consistent morphological divergence and so the unnamed eastern population is formally named as a new species in this paper. The type locality for *W. brevicauda* for the holotype is Sherlock River, Nickol Bay, Pilbara region, Western Australia (Boulenger 1898; Cogger *et al.* 1983; Wells and Wellington 1985).

Notwithstanding what has been written above, references relevant to the putative species subject of this paper and the taxonomic conclusions herein include Aplin *et al.* (2006), Bennett (1998), Boulenger (1885, 1898), Brown (2012, 2014), Cogger (2014), Cogger *et al.* (1983), Doughty *et al.* (2014), Dubois *et al.* (2019), Fitch *et al.* (2016), Gray (1838, 1845), Hoser (2007, 2013, 2014, 2015a-g, 2017, 2018a-d), Lucas and Frost (1895), Maryan *et al.* (2014), Mertens (1958, 1966), Ride *et al.* (1999), Sternfeld (1919, Storr (1980), Storr *et al.* (1983), Wells and Wellington (1984, 1985), Wilson and Knowles (1988), Wilson and Swan (2017) and sources cited therein.

INFORMATION RELEVANT TO THE FORMAL DESCRIPTIONS THAT FOLLOW

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

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

In terms of the following formal descriptions, spellings should not be altered in any way for any purpose unless expressly and exclusively called for by the rules governing Zoological Nomenclature as administered by the International Commission of Zoological Nomenclature including within the *International Code of Zoological Nomenclature* (Fourth edition) (Ride *et al.* 1999) as amended online since.

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

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

While numerous texts and references were consulted prior to publication of this paper, the criteria used to separate the relevant species has already been spelt out and/or is done so within each formal description and does not rely on material within publications not explicitly cited herein.
In terms of the long term conservation and survival of these newly named species, delays in recognition of these unique species as unique species (or subspecies) could jeopardise the long-term survival of these taxa as outlined by Hoser (2019a, 2019b and 2020) and sources cited therein.

Therefore attempts by taxonomic vandals like the Wolfgang Wüster gang via Kaiser (2012a, 2012b, 2013, 2014a, 2014b) and Kaiser *et al.* (2013) (as frequently amended) to unlawfully suppress the recognition of these taxa on the basis they have a personal dislike for the person who formally named it should be resisted (Cogger 2014, Dubois *et al.* 2019).
Claims by the Wüster gang against this paper and the descriptions herein will no doubt be no different to those the gang have made previously, all of which were discredited long ago as outlined by Cogger (2014), Dubois *et al.* (2019), Hoser, (2007, 2009, 2012a, 2012b, 2013a, 2015a-f, 2019a, 2019b) and sources cited therein.

WORRELLISAURUS* (*PARVAVARANUS*) *APICEMALBA SP. NOV.

LSIDurn:lsid:zoobank.org:act:448ED65C-846C-438E-8A27-9667DB275826

Holotype: A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number R121347 collected from 38 km south, south east of Canarvon, Western Australia, Australia, Latitude -25.1314 S., Longitude 113.7681 E. This government-owned facility allows access to its holdings.

Paratype: A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number R125771 collected from Woodleigh Station, Western Australia, Australia, Latitude -26.2169 S., Longitude 114.5992 E.

Diagnosis: Until now, *Worrellisaurus apicemalba sp. nov*. from the Shark Bay area of Western Australia, has been treated as a western population of *W. eremius* Lucas and Frost, 1895 (better

known as "*Varanus eremius*"), with a type locality of Idracowra, Northern Territory, Australia.

Likewise for the Pilbara subspecies *W. eremius pryyhus subsp. nov..*

All three are readily separated from one another on the basis of their colouration as described below.

The type form of *W. eremius* is accurately depicted in the original description of Lucas and Frost (1895), Houston (1978) on page 51 top and also on page 769 of Cogger (2014).

It is readily separated from the other two forms, *W. apicemalba sp. nov*. and *W. eremius pryyhus subsp. nov.* by having an orange-red coloured dorsum punctuated by numerous semi-distinct brownish-black spots. The tail has alternating longitudinal stripes of yellowish-cream and dark brown, with the striped being sometimes broken, or marked as irregular blotching. The tail is overwhelmingly yellowish in colour, especially at the anterior end.

There is a well-defined temporal streak running from snout, through the eye and to the back of the head.

The forelimbs are orange with blackish spots.

W. eremius pryyhus subsp. nov. from the Pilbara region of Western Australia is like *W. eremius* in that the dorsum is generally orange-red coloured. It is however different from *W. eremius* in having obvious white spots on the orange forelimbs (not seen in *W. eremius eremius*) and a general lack of blackish spots and flecks on the upper surfaces of the head (in contrast to *W. eremius eremius*). *W. eremius pryyhus subsp. nov.* also has a strongly reddish anterior tail region, versus obviously yellow in *W. eremius eremius*.

Although not quantified, it appears that both *W. eremius pryyhus subsp. nov.* and *W. apicemalba sp. nov*. have slightly more pronounced ridging on the foretail than seen in *W. eremius eremius.*

W. apicemalba sp. nov. are readily separated from both *W. eremius eremius* and *W. eremius pryyhus subsp. nov.* by being a generally yellow-grey colour instead of strongly reddish-orange. Some *W. apicemalba sp. nov*. may have a dark brownish tinge on the back, but never a whole body that is bright orange red as seen in the other two forms.

W. apicemalba sp. nov. has dark brown forelimbs with white spots or small ocelli scattered on them. The tail is a brownish grey colour along the entire length, occasionally with a slight reddish hue at the posterior end. Unlike both both *W. eremius eremius* and *W. eremius pryyhus subsp. nov.*, *W. apicemalba sp. nov*. has a significant amount of white markings on the dorsal surface of the head, versus none in the other two taxa. These markings are in the form of flecks, thin lines, peppering or spots. Both *W. eremius eremius* and *W. eremius pryyhus subsp. nov.* have either an unmarked upper surface of the head, or alternatively any markings are darker coloured flecks, spots or tiny stripes.

The dorsum of *W. apicemalba sp. nov*. is characterised by being brownish-grey with scattered white peppering or flecks on the upper surfaces. On the lower flanks, there is a defined zone of grey between the dark upper surface and light (whitish) venter, this grey zone forming a wideish line on the lower flanks. This is not the case in *W. eremius eremius* and *W. eremius pryyhus subsp. nov.* where the orange-red upper surface rapidly becomes whitish on the lower flanks, effectively forming a line between these zones, the line being merely the boundary from one to other.

All of *W. eremius eremius*, *W. eremius pryyhus subsp. nov.* and *W. apicemalba sp. nov*. are separated from the morphologically similar species in the subgenus *Paravaranus* Hoser, 2013, as defined by Hoser (2013) by having keeled head scales, dark streaks on the throat and long slender claws.

The type form of *W. eremius* in life is depicted on page 316 of Wilson and Knowles (1988) at page 316 (bottom right) and on page 769 of Cogger (2014) and online at:
https://www.flickr.com/photos/reptileshots/30064010117
and:
https://www.flickr.com/photos/154630905@N06/26631863159/

W. eremius pryyhus subsp. nov. is depicted in life in Wilson and Swan (2017) at page 463 middle right and online at:
https://www.flickr.com/photos/euprepiosaur/13556044454/

W. apicemalba sp. nov. in life is depicted online at:
https://www.flickr.com/photos/ben_parkhurst_photography/38773858160/
and
https://www.flickr.com/photos/136643623@N03/45772808232

Distribution: *W. apicemalba sp. nov*. is found only in the Shark Bay region of Western Australia, in a zone generally south of Minilya, being the northern limit of a well-defined sand and spinifex zone, south to Geraldton, extending about 200 km inland from these towns.

Etymology: *Apicemalba* is Latin for white dot, in reference to the white dots on the brown forelimbs of this taxon, which also separates it from the nominate type form of *W. eremius.*

WORRELLISAURUS* (*PARVAVARANUS*) *EREMIUS PYRRHUS SP. NOV.

LSIDurn:lsid:zoobank.org:act:E50BF2B9-ADE6-4DF0-AD41-0E276F73716F

Holotype: A preserved male specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number R110851 collected 36.8 km south, south-west of Pannawonica, Western Australia, Latitude -21.9413 S., Longitude 116.4538 E. This facility allows access to its holdings.

Paratype: A preserved male specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number R157578, collected from the Robe River, Western Australia, Australia, Latitude -21.7478 S., Longitude 116.0753 E.

Diagnosis: Until now, *Worrellisaurus apicemalba sp. nov*. as described above, from the Shark Bay area of Western Australia, had been treated as a western population of *W. eremius* Lucas and Frost, 1895 (better known as "*Varanus eremius*"), with a type locality of Idracowra, Northern Territory, Australia.

Likewise for the Pilbara subspecies *W. eremius pryyhus subsp. nov.* formally described herein.

All three are readily separated from one another on the basis of their colouration as described below.

The type form of *W. eremius* is accurately depicted in the original description of Lucas and Frost (1895), Houston (1978) on page 51 top and also on page 769 of Cogger (2014).

It is readily separated from the other two forms *W. apicemalba sp. nov*. and *W. eremius pryyhus subsp. nov.* by having an orange-red coloured dorsum punctuated by numerous semi-distinct brownish-black spots. The tail has alternating longitudinal stripes of yellowish-cream and dark brown, with the striped being sometimes broken, or marked as irregular blotching. The tail is overwhelmingly yellowish in colour.

There is a well-defined temporal streak running from snout, through the eye and to the back of the head.

The forelimbs are orange with blackish spots.

W. eremius pryyhus subsp. nov. from the Pilbara region of Western Australia is like *W. eremius* in that the dorsum is generally orange-red coloured. It is however different from *W. eremius* in having obvious white spots on the orange forelimbs (not seen in *W. eremius eremius*) and a general lack of blackish spots and flecks on the upper surfaces of the head (in contrast to *W. eremius eremius*). *W. eremius pryyhus subsp. nov.* also has a strongly reddish anterior tail region, versus obviously yellow in *W. eremius eremius*.

Although not quantified, it appears that *W. eremius pryyhus subsp. nov.* and *W. apicemalba sp. nov*. have slightly more pronounced ridging on foretail than seen in *W. eremius eremius.*

W. apicemalba sp. nov. are readily separated from both *W. eremius eremius* and *W. eremius pryyhus subsp. nov.* by being a generally yellow-grey colour instead of strongly reddish-orange. Some *W. apicemalba sp. nov*. may have a dark brownish tinge on the back, but never a whole body that is bright orange red as seen in the other two forms.

W. apicemalba sp. nov. has dark brown forelimbs with white spots or small ocelli scattered on them. The tail is a brownish grey colour along the entire length, occasionally with a slight reddish hue at the posterior end. Unlike both both *W. eremius eremius* and *W. eremius pryyhus subsp. nov.*, *W. apicemalba sp. nov*. has a significant amount of white markings on the dorsal surface of the head, versus none in the other two taxa. These markings are in the form of flecks, thin lines, peppering or spots. Both *W. eremius eremius* and *W. eremius pryyhus subsp. nov.* have either an unmarked upper surface of the head, or alternatively any markings are darker coloured flecks, spots or tiny stripes.

The dorsum of *W. apicemalba sp. nov*. is characterised by being brownish-grey with scattered white peppering or flecks on the upper surfaces. On the lower flanks, there is a defined zone of grey between the dark upper surface and light (whitish) venter, this grey zone forming a wideish line on the lower flanks. This is not the case in *W. eremius eremius* and *W. eremius pryyhus subsp. nov.* where the orange-red upper surface rapidly becomes whitish on the lower flanks, effectively forming a line between these zones, the line merely being the boundary from one to other.

All of *W. eremius eremius*, *W. eremius pryyhus subsp. nov.* and *W. apicemalba sp. nov*. are separated from the morphologically similar species in the subgenus *Paravaranus* Hoser, 2013, as defined by Hoser (2013) by having keeled head scales, dark streaks on the throat and long slender claws.

The type form of *W. eremius* in life is depicted on page 316 of Wilson and Knowles (1988) at page 316 (bottom right) and on page 769 of Cogger (2014) and online at:
https://www.flickr.com/photos/reptileshots/30064010117
and:
https://www.flickr.com/photos/154630905@N06/26631863159/

W. eremius pryyhus subsp. nov. is depicted in life in Wilson and Swan (2017) at page 463 middle right and online at:
https://www.flickr.com/photos/euprepiosaur/13556044454/

W. apicemalba sp. nov. in life is depicted online at:
https://www.flickr.com/photos/ben_parkhurst_photography/38773858160/
and
https://www.flickr.com/photos/136643623@N03/45772808232

Distribution: As far as is known, *W. eremius pryyhus subsp. nov.* appears to be confined to the Pilbara of Western Australia.

Etymology: "Pyrrhus" sometimes refers to fire in Latin and so the name reflects the fire colouration of the dorsum of adults.

WORRELLISAURUS* (*PARVAVARANUS*) *IGNIS SP. NOV.

LSIDurn:lsid:zoobank.org:act:6E0AE27B-7C70-4960-8451-E0848D87A5A4

Holotype: A preserved specimen in the Queensland Museum, Brisbane, Queensland, Australia, specimen number J45037, collected from 8km north of Mirrica Boren at Ethabuka Station, north-west of Bedourie, Queensland, Australia, Latitude -23.75 S., Longitude 138.5 E. This government-owned facility allows access to its holdings.

Paratpes: Two preserved specimens at the Queensland Museum, Brisbane, Queensland, Australia, specimen numbers J73991 and J73992 collected at Naibar Station, Queensland, Australia, Latitude -23.6456 S., Longitude 138.4478 E, and a preserved specimen at the Australian Museum, Sydney, New South Wales, Australia, specimen number R.110614 collected at 8km north of Mirrica Bore at Ethabuka Station, north-west of Bedourie, Queensland, Australia, Latitude -23.75 S., Longitude 138.5 E.

Diagnosis: Until now, *Worrellisaurus ignis sp. nov*. has been treated as the eastern population of *W. brevicauda* (Boulenger, 1898), type locality of Sherlock River, Nickol Bay, Pilbara region, Western Australia (Boulenger 1898; Cogger *et al.* 1983; Wells and Wellington 1985).

W. brevicauda is herein restricted to Western Australia, while *W. ignis sp. nov*. accounts for those specimens referred to *W. brevicauda* from Queensland, South Australia and the Northern Territory. The ranges of both species appear to be separated by a series of salt lakes running north-south near the Northern Territory / Western Australian border.

W. brevicauda is readily separated from *W. ignis sp. nov*. by having a reddish-brown dorsum and a dorsum which has numerous scattered white spots of size large enough to appear as distinctive small ocelli and a red iris. The white spots fade in aged specimens.
By contrast *W. ignis sp. nov*. has no such white spots or ocelli on the dorsum, has an orange dorsum, which is only broken by numerous indistinct and dull lighter and dull darker flecks, giving it a more uniform appearance, as well as having an orange iris.
In *W. brevicauda* the lower surface of the dark temporal streak is well defined by a whitish border, versus ill-defined in *W. ignis sp. nov.*.

The top of the head of *W. ignis sp. nov*. is heavily peppered with white, versus a brownish-red unicoloured upper surface of the head in *W. brevicauda.*
W. ignis sp. nov. and *W. brevicauda* are separated from all other species of living varanid by having a tail that is the same length as or shorter than the head as well as body and forearms with large scales encircled by granules.

The morphologically similar species *V. sparnus* (Doughty *et al.*, 2014) is separated from both *W. ignis sp. nov*. and *W. brevicauda* by having a plain reddish-brown dorsum with widely scattered small black spots; a more elongate body than *W. ignis sp. nov*. and *W. brevicauda*, shorter limbs, less robust head, body and tail, and importantly having the presence of enlarged squarish scales not encircled by granules on front of the arms.

W. sparnus in life is depicted in Wilson and Swan (2017) on page 473 at top right and Doughty *et al.* (2014) at page 134.

W. brevicauda in life is depicted in Wilson and Swan (2017) on page 461 at bottom.

W. ignis sp. nov. in life is depicted in Wilson (2014) on page 210 bottom right.

Distribution: *W. ignis sp. nov*. occurs in south-west Queensland, northern South Australia and the Northern Territory, Australia.

Etymology: "Ignis" in Latin means fire, and this is the colouration of the dorsal surface of adults and so is an appropriate species name.

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The trio, and the dozens of others they employed in their so-called "Operation Bassett" (as detailed in Victorian Civil and Administrative Tribunal 2015) all worked for the Victorian Government Wildlife Department (at the time called "DSE").

Their destructive armed raid, in which they also illegally killed numerous live reptiles held by the author, was found to be illegal by several courts of law after the fact, including by the Victorian Court of Appeal in 2014 and Victorian Civil and Administrative Appeals Tribunal (VCAT) in 2015.

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CONFLICT OF INTEREST

There are no conflicts of interest in terms of this paper and the author.