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A previously unrecognized species of sea snake (Squamata: Serpentes: Elapidae: Hydrophiinae).

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ABSTRACT

The sea snakes are perhaps one of the most over-classified groups of snakes in terms of major reviews of their species level and genus level taxonomy that have led to new taxonomic and nomenclatural configurations.

Numerous authors have conducted wide-ranging audits of the genus-level taxonomy of the Hydrophiinae over the last century. The Hydrophiinae includes the majority of marine elapids.

In the post 2000 period, among the quite divergent genus level taxonomies that have been proposed, are major splits as seen in the proposals of Kharin (2004) and Wells (2007).

However, Hoser (2013) and this paper broadly follow the taxonomy of Sanders *et al.* (2012) and Ukuwela *et al.* (2012a, 2012b), who have merged many previously recognized genus groupings based on newly obtained molecular phylogenies.

At the species level, numerous authors have applied names to any potentially different sea snakes in a bid to assert name authority on any potentially unnamed taxon (e.g. Kharin 2004 and earlier works by the same author cited therein).

As a result of this, when more recent studies using advanced techniques (such as molecular methods) to accurately identify cryptic species are concluded, the newly identified species invariably already have available names as coined by earlier authors.

A global audit of the Hydrophiinae by this author found a number of generally unrecognized taxa, that based on any reasonable assessment constituted valid species-level taxa. One example is three species previously lumped within a single "*Enhydrina schistosa* Daudin, 1803" (now *Hydrophis schistosus*).

Most of the unrecognized Hydrophiinae species had available names for them (including the *Enhydrina* species), which will have to be used when the relevant taxa became widely recognized.

However one Hydrophiinae population worthy of taxonomic recognition did not have an available name.

These it is named herein according to the provisions of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

This is a species of *Emydocephalus* Krefft, 1869 from the Western Australia region, until now treated as *Emydocephalus annulatus* Krefft, 1869.

The nominate species is herein confined to eastern Queensland and immediately adjacent areas.

Keywords: Taxonomy; nomenclature; sea snakes, new species; *Emydocephalus; annulatus*; *ijimae*; *szczerbaki*; *teesi; Enhydrina*; *werneri*; *schistosa*; *zweifeli.*

INTRODUCTION

As mentioned in the abstract, the sea snakes are perhaps one of the most over-classified groups of snakes in terms of major reviews of their species level and genus level taxonomy.

Numerous authors have conducted wide-ranging audits of the genus-level taxonomy of the Hydrophiinae being a group which includes the majority of marine elapids. There have been numerous configurations proposed.

Notwithstanding the advent of new molecular methods of analysis and many of the relationships between species being accurately resolved, the taxonomy and nomenclature of the group has remained in heated dispute based on differing interpretations of these same results, by very competent scientists..

In the wake of this, at one extreme has been the erection of new genera and even families to accommodate morphologically divergent forms (Wells 2007).

Ukuwela *et al.* (2012) have taken an opposing position of merging many previously recognized genera, based principally

on relatively recent divergences of the species involved.

In the post 2000 period, quite divergent genus level taxonomies have been proposed, including major splits as seen in the proposals of Kharin (2004) and Wells (2007).

Hoser (2013) and this paper broadly follow that of Sanders *et al.* (2012a, 2012b) and Ukuwela *et al.* (2012).

As of 2015, the backlash against division of larger genera (not the sea snakes I might add) has at times become irrational, even when the molecular evidence supports such splits. One small group of self-appointed so-called herpetologists have even seen fit to step outside the *International Code of Zoological Nomenclature*, sometimes referred to as the "Zoological Code" or "Rules of Zoology", (cited here as Ride *et al.* 1999) and demanded a mass-boycott of valid names (Kaiser 2012a, 2012b, edited slightly to become Kaiser *et al.* 2013).

The claims of Kaiser (2012a, 2012b) and Kaiser *et al.* (2013) were thoroughly discredited by Hoser (2012a).

Seeking consistency of taxonomy and nomenclature, the majority of herpetologists have reclassified the sea snakes in the past decade along phylogenetic lines as per Ukuwela *et al.* (2012a, 2012b). The result is the merging several genera, most notably a broad group consisting most species into the single genus *Hydrophis* Latreille, 1801.

At the species level, numerous authors have applied names to any potentially different sea snakes in a bid to assert name authority on any potentially unnamed taxon (e.g. Kharin 2004 and earlier works by the same author cited therein).

Significantly, Wells (2007) did not apply names to any local variants of wide-ranging species, thereby effectively refuting the claims by Kaiser *et al.* (2013) that he was actively engaging in taxonomic vandalism by placing names on regional populations in examples of evidence-free taxonomy.

However as a result of acts of taxonomic vandalism (involving authors cited below), when more recent studies using better methods (such as molecular methods) to accurately identify cryptic species are concluded, the newly identified species invariably already have available names as coined by earlier authors.

A global audit of the Hydrophiinae by this author found a number of generally unrecognized taxa, that based on any reasonable assessment constituted valid species-level taxa. One example was three species previously lumped within a single "*Enhydrina schistosa* Daudin, 1803" (now *Hydrophis schistosus*).

Most of the unrecognized Hydrophiinae species had available names for them, which will have to be used when the relevant taxa became widely recognized.

However one species level taxon was not named.

It is therefore named herein according to the provisions of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

This is a species of *Emydocephalus* Krefft, 1869 from the Western Australia region, until now treated as *Emydocephalus annulatus* Krefft, 1869.

The nominate species is herein confined to eastern Queensland and immediately adjacent areas.

MATERIALS AND METHODS

The audit of the Hydrophiinae was straight forward, methodical and simple, although very time consuming.

All relevant literature was assessed and specimens of most relevant taxa had been inspected over a 30 year period, in the wild and in institutional collections, including at several Australian Museums.

Recognized species were assessed in the context of potential cryptic species and when they were suspected, tests were applied to see if they did in fact exist.

When found, the new taxa were checked against the literature to see if they had an available name (later made a synonym) which could be applied to the new species based on holotype details.

In most cases this was found to be the case. One exception, as mentioned in the abstract was a species of *Emydocephalus* Krefft, 1869 from the Western Australia region, most closely associated with *Emydocephalus annulatus* Krefft, 1869.

In terms of finding potentially hidden species, reviews were done for each taxon in terms of regional or other morphs, variants, distributional gaps and the like. Publicly available molecular data, as published in papers cited below and available from Genbank was checked to see where unnamed taxa may be identified.

Checks of suspected species were made against other factors such as geographical barriers, including when reconciled with ice-age sea level maxima and minima and the resulting land masses and ocean currents.

When all factors indicated potentially unrecognized or unnamed species, the specimens of each relevant taxon was inspected to see if they displayed obvious species level differences.

This review cannot claim to be the last word on new species within the Hydrophiinae. Not all museum specimens on the planet were examined and any number may be misidentified in one way or other.

Furthermore, and in spite of the large human population in south-east Asia and northern Australia, many areas remain uncollected by scientists and may hold as yet undescribed species.

So-called variation within some wide-ranging species (e.g. *Hydrophis elegans* Gray, 1842) may in fact be more than one currently unrecognized species.

However the formal naming of a new species of Hydrophiinae is significant and should not be delayed indefinitely pending the potential discovery of yet more species.

WHEN AUDITING OTHER PEOPLE'S WORKS FINDS ERRORS OR UNNAMED SPECIES

Rhodin *et al.* (2015), following on from Kaiser *et al.* (2013) have accused me of "data mining" the works of others to find and name new species.

I make no apologies for this.

I find it bizarre that so-called scientists can do excellent scientific work that brings them to the cusp of finding and naming new subspecies, species, subgenera or genera and then failing to do the relatively simple last steps before abandoning their work. These last steps may involve doing things outside the area of expertise of the authors (such as a morphological assessment of the potentially new species, as opposed to number crunching with a BEAST program or similar, as well as a literature audit), but in my view are too often overlooked in the haste to publish, the end result being a defective paper.

Surely if one scientist is unable to logically complete a research project or paper, they could collaborate with another who can!

It is commonly said that one scientist's error is another's thesis and this has been the case in many of the papers I have published.

Often in the recent past new species have been defined and then named on the basis of molecular phylogenies produced between populations. I make no apologies for taking such studies and transposing the results on to other species (as recognized) affected by the same geographical barriers and factors, to determine if other accepted wide-ranging species are in fact composite.

This has enabled me to identify and name dozens of reptile species to date, including to a large extent the one named herein, although I note in this case there is already supporting molecular and morphological data published and publicly available.

Invariably once a candidate un-named species is identified by the factors indicated above, inspection of relevant specimens

always leads to the identification of obvious differences between the nominate and unnamed forms.

Again this is the case in terms of the single species defined for the first time ever within this paper.

Even when there is no "prize" in the form of a new species-level taxon being named for the first time, it is in my view incumbent on authors to do the final legwork in terms of potentially new taxa identified, in order to avoid confusion by later authors and also to save other scientists wasting their time looking for new species in places there are not any species awaiting to be named.

I commonly see in papers, evidence of a new and unnamed species, only to check the literature to find that it does in fact already have an available name, but this significant information is omitted from the paper, either deliberately or due to failure of the authors to look. In most cases if the original authors were to do this simple act of publishing any available names and the fact that there were or were not names available, later scientists would be saved considerable effort.

Also if an unnamed clade, normally worthy of taxonomic identification and naming is identified in a paper and not named, the authors should give a reason for not doing so, if this is in fact what happens.

This is because non-taxonomists who publish on species that may be potentially misidentified have their works significantly devalued once it becomes apparent that either the "wrong" species was the subject of a given paper or data from what was thought to be one species may have included more than one.

In other words, as per the recommendations of the *International Code of Zoological Nomenclature*, newly identified species should be named as soon as possible.

One such example I can refer to is the paper of Ukuwela *et al.* (2012b) (published in hard copy in 2013), which correctly shows that Asian "*Enhydrina schistosa* Daudin, 1803" (now *Hydrophis schistosus*) are of a widely separated lineage to the Australian ones and that the Australian ones should be recognized as a different species.

They also correctly identify consistent differences between the forms to allow people to identify specimens when in the field.

At page 268, they correctly assign Australian specimens to the species *zweifeli* Kharin, 1985. I note that although the original description by Kharin was defective in many ways, it was code compliant and that Ukuwela *et al.* (2012b) correctly used the name.

Significantly, they did not engage in the taxonomic and nomenclatural act of theft as advocated by Kaiser *et al.* (2013) to coin their own name for this species-level taxon.

However, where I take issue with Ukuwela *et al.* (2012b) and herein make it known for the purpose of constructive criticism of their paper so that others may learn from their "mistake" is that the authors failed to properly assess some of the other evidence they obtained.

Their molecular results for the Asian "*Enhydrina schistosa* Daudin, 1803" (now *Hydrophis schistosus*) showed clearly that there were two species-level taxa identified there as well.

Based on their molecular results, the nominate form from Sri Lanka differed significantly by way of divergence, from those from south-east Asia. In fact the differences were greater than between other recognized species (e.g. *Hydrophis coggeri* (Kharin, 1984) and *Hydrophis pacificus* Boulenger, 1896 as shown in the same set of results). Notwithstanding this clear evidence of two species being labelled "*Enhydrina schistosa* Daudin, 1803", the authors did not take the matter further to either confirm the inference or reject it.

This failure to complete this final step to their study led to potential confusion by others who could easily ignore their results and assume both were of the same taxon.

I did an audit of the relevant taxon as identified by Ukuwela *et al.* (2012b) as "*Enhydrina schistosa* Daudin, 1803" and found that there were in fact two species, not one.

I also audited the literature and found an "available name" for the second taxon (the south-east Asian one) and used that name, rather than invoking the so-called "*Kaiser veto"* (Eipper 2013) to coin my own name in breach of the *International Code of Zoological Nomenclature.*

Of course multiple species can only diverge from a common ancestor if there is a barrier of some form and in the case of snakes this is invariably physical.

While there is no apparent physical barrier between those specimens from the Indian subcontinent and south-east Asia at the present time, there clearly was at the time of the Ice-age maxima, where sea levels were estimated at 120 metres lower than present (Molengraaff 1921a, 1921b, Voris 2000).

The two populations clearly correspond to the separated ocean basins of the Bay of Bengal and South China Sea respectively, a situation commonly seen in other marine and semi-marine species (e.g. *Acrochordus* as documented by Hoser 2014).

For the record, the second species from south-east Asia was originally described as *Thalossophis werneri* by Schmidt in 1852 and hence should now be known as *Hydrophis werneri* (Schmidt, 1852).

Inspection of relevant specimens currently identified as *Hydrophis schistosus* (Daudin, 1803) and *Hydrophis werneri* (Schmidt, 1852) readily showed consistent differences between the two putative species.

As there has been no paper ever published separating the two taxa since they were synonymised many years ago I identify the most obvious difference between them here.

Hydrophis schistosus is readily separated from both *Hydrophis zweifeli* and *Hydrophis werneri* by the shape of the supralabial immediately behind the middle eye. It is wider than high, or rarely as wide as high, versus narrower than high in the others. Furthermore the same scale is distinctly rhomboidal in shape versus crescent-shaped in the other two taxa.

Of course bearing in mind that there will no doubt be other differences between the three taxa, it is important that they be properly recognized sooner, rather than later and that is regardless of who the name authority is!

This is before one deals with the conservation aspects of the three species, all of whom inhabit a region of rapidly expanding human populations. Had Ukuwela *et al.* (2012) published head photos of the three taxa, rather than two, the correct identities of the species-level taxa could have been made more widely known sooner.

Quite often unrecognized species can be indicated or located by a judicious re-reading of relevant scientific and other populations, including often about totally unrelated taxa if and when they are affected by the same dispersal or restricting factors.

Key publications of relevance in terms of the classification of the Hydrophiinae and in particular the recognized species most relevant to this paper, this being *Emydocephalus annulatus* Krefft, 1869 and congeners, are cited here and include the following: Adler (1999a, 1999b), Alcala (1986), Alcala *et al.* (2000), Bauer and Sadlier (2000), Bauer and Vindum (1990), Bavay (1869), Berry (1986), Boulenger (1896, 1899, 1908), Burger and Natsuno (1974), Cadle and Gorman (1981), Cadle and Gorman (1981), Cogger (1975, 2000), Cogger *et al.* (1983), David and Ineich (1999), Dotsenko (2011), Golay (1985), Gopalakrishnakone and Kochva (1990), Greer (1997), Heatwole (1999), Heatwole and Cogger (1994), Hoser (2012a, 2012b, 2013), Huang (1996), Hutchinson (1990), Kharin (1985, 2004, 2008, 2009), Kharin and Czeblukov (2009), Krefft (1869), Lukoschek (2007), Lukoschek and Scott Keogh (2006), Lukoschek and Shine (2012), Lukoschek *et al.* (2007), Mao *et al.* (1983), Masanuga and Ota (1994), McCarthy (1985, 1986),

McCosker (1975), McDowell (1969, 1970, 1972, 1974), Minton (1975), Minton and da Costa (1975), Minton and Dunson (1985), Mori (1982), Nock (2001), O'Shea (1996), Rasmussen (1994-1997, 2002), Rasmussen and Ineich (2010), Rasmussen *et al.* (2001, 2011, 2014), Sanders and Lee (2008), Sanders *et al.* (2008, 2012), Schwaner *et al.* (1985), Scott Keogh (1998), Scott Keogh *et al.* (1998, 2000, 2005), Shine (1991), Slowinski and Scott Keogh (2000), Slowinski *et al.* (1997), Smith (1926), Smith *et al.* (1977), Stejneger (1898, 1907, 1910), Ukuwela (2013), Ukuwela *et al.* (2012), Voris (1966, 1972, 1977, 2000) Voris and Voris (1983), Wall (1906, 1909), Wells (2007), Wilson and Swan (2010), Zhao and Adler (1993) and sources cited therein.

Wells (2007) provides one of the best contemporary accounts and bibliography of important publications in terms of Australian hydrophiinae, notwithstanding the fact I do not agree with some of the taxonomic judgements in that paper. Because it is freely available online as a pdf, and not behind a paywall, it is an excellent point of reference for others seeking to study the relevant taxa.

***EMYDOCEPHALUS* KREFFT, 1869.**

The first species described in the genus was *E. annulatus* Krefft, 1869, who assigned the generic name at the same time he named the type species.

In terms of this genus, most specimens in the genus have been referred to the nominate form species by most herpetologists until the last decade (post year 2000).

In same year (1869), another description was published for New Caledonian specimens by Bavay, who named it "*Aipysurus chelonicephalus*". They continue to be treated as *Emydocephalus annulatus* by most herpetologists, noting the proximity of the known distribution in Queensland and (relatively) adjacent New Caledonia as well as because of morphological similarities as outlined by Rasmussen and Ineich (2014).

However in contradiction to this see below.

Emydocephalus ijimae was described by Stejneger in 1898 from Loo Chao Island in the East China Sea but in 1908 was synonymised with *E. annulatus* by Boulenger.

Only recently (in the last 2 decades), since Huang (1996) has it been widely recognized as a different species to *E. annulatus*. However much of the contemporary literature (including internet material) of 2015 still treats both taxa as being one and the same.

The population from the Philippines and nearby Vietnam has been variously treated as being one or other of *E. annulatus* or *E. ijimae*, but as far back as year 2000 it was known to be a taxon of a different species. Alcala *et al.* (2000) reported that they had been advised that Hidetoshi Ota of Japan had made it known he was physically in the process of describing this population as a new species.

In other words, it's formal naming was imminent!

They wrote:

"The third species has been identified as *E. annulatus* (Cogger, 1975), but is considered a new species by Dr. H. Ota of the University of Ryuku, who is currently describing it as new to science (H. Ota, pers comm) (Fig. 1)."

In 2010, Rasmussen and Ineich wrote:
"That new species is not yet described but its description is underway by H. Ota (pers. comm. April 2009)."

The historical record of 2015, shows that no such description was ever published. The *International Code of Zoological Nomenclature* recommends that authors publish names for obviously new and unnamed taxa as soon as practicable and within 12 months. In contempt of the Code, Ota did not do this and eventually in 2011, a Russian by the name of Dotsenko instead named the taxon for the first time (based on a single specimen from Vietnam) calling it *Emydocephalus szczerbaki.* Significant in this is that in further contempt of the Code, Ota was recruited by the Wolfgang Wüster gang to declare war on the Code via a listing as co-author of Kaiser *et al.* (2013), as detailed in Hoser (2012 and 2013b).

The idea that a person can literally hold up progress of science for more than a decade by monopolizing a taxon on the basis of publishing a description of it and then failing to do so is repulsive.

Yet this very concept of one or a few self-appointed so-called scientists monopolizing all reptile taxa, is the basis of the campaign by Kaiser *et al.* (2013).

Of course had I, Raymond Hoser published a description of the same Philippines taxon 11 years after Ota had made it known that he intended doing so, others in his gang would have quickly accused me of "stealing" his God-given naming entitlement!

Notwithstanding the conclusions of Rasmussen and Ineich (2010), I (in contradiction to their overall position) believe their data provides sufficient evidence to warrant recognition of the New Caledonia *Emydocephalus* as being taxonomically distinct from the Australian specimens (both east and west Australian ones).

They can be readily separated from Australian specimens on sight by the fact that females have 26-27 body bands (not counting the tail) versus 19-25 for Australian specimens and divided or partially divided cloacal shield versus usually single in the Australian ones.

The same authors report other differences between both populations (both sexes) as well as consistent differences from the other two taxa.

While it could be asserted that I have assigned excessive taxonomic importance to seemingly slight differences in scalation and colouration, another relatively unusual feature of all *Emydocephalus* gives further weight to the idea that the New Caledonia population is of a different species to the Australian ones. Studies have shown that individuals do not travel far from where they live, with individuals having a home range of just 50 square metres (Alcala *et al.* 2000, Lukoschek and Shine 2012), and usually being found in relatively shallow waters. They are not regarded as a migratory or open seas dwelling (pelagic) species (Alcala *et al.* 2000, Lukoschek and Shine 2012). Hence the likelihood of any gene flow between Australian and New Caledonia populations is not regarded as being likely.

There is a significant area of deep ocean between the Queensland Plateau and the New Caledonia Basin which would presumably form a significant barrier to movement between the regions serving only to enforce the genetic isolation of the east Australian and New Caledonian populations.

On the basis of the preceding and in the absence of molecular evidence to the contrary, it is only reasonable to continue to treat the New Caledonian snakes as being a separate species to those from Australia, and to be called *Emydocephalus chelonicephalus* (Bavay, 1869).

Alcala *et al.* (2000) further discuss the present day distribution of what is now known as *Emydocephalus szczerbaki* Dotsenko, 2011 within the context of sea levels and ocean currents during the Pleistocene ice-age regressions.

This same factor is of significant relevance in terms of the Australian populations of *Emydocephalus.*

Australian Museum records spanning nearly 200 years show that there are two distinctive populations of *Emydocephalus*, as related by Cogger (2000).

The 153 specimens held at Museums across Australia show one population being found exclusively east of Cape York and Torres Strait and the other being found in north-west Western Australia, including Ashmore Reef near Timor. However of note is that the Ashmore reef is at the outer edge of the North Australian Basin and separated from Timor by the deep sea of the Timor Trough.

They are effectively absent from the Arafura Sea.

While much of the near-coastal habitat in the Arafura Sea is different from that of the Queensland and Western Australian,

this being the most common explanation for the absence of *Emydocephalus* there, this is not on its own sufficient to explain the absence.

After all, patches of habitat within the Arafura Sea coastline is suitable for *Emydocephalus* and yet they remain absent.

No doubt this is in significant part due to the non mobile habits of *Emydocephalus* as detailed by Alcala *et al*. (2000). This non-mobility combined with the added fact that until the recent geological past, much of the Arafura Sea consisted of a landlocked plain or basin connected to New Guinea, meant that for most of the Pleistocene the eastern and western Australian populations were never physically connected and similarly unable to reconnect during the relatively brief interglacials.

In summary they have diverged to become different species.

Connections between the two populations of Australian *Emydocephalus* may well have been by movement along the northern New Guinea coastline during the Pliocene or Pleistocene as opposed to along northern Australia. In any event, this means that areas to the north side of island New Guinea may ultimately be found to have populations of *Emydocephalus* where suitable habitat occurs (e.g. Biak).

THE DIVISION OF AUSTRALIAN *EMYDOCEPHALUS*

Inspection of specimens from Western Australia and Queensland show sufficient consistent morphological differences to be recognized as separate species-level taxa.

The molecular evidence of Lukoschek and Scott Keogh (2006) is ambiguous (summarised in table 3 and fig. 3), with an estimated date of divergence for the populations matching the interglacial of about 374-324 thousand years ago.

Taken at its weakest (as outlined by Lukoschek 2007 at page 187, where she claims less than mtDNA 1% sequence divergence between populations) this data shows support for taxonomic recognition of the Western population at least at the subspecies level.

In terms of their molecular results, Lukoschek and Scott Keogh (2006), stated "*Emydocephalus annulatus* also divided into two groups, the north-west Shelf and Great Barrier Reef."

Their data in fig. 3 shows similar divergence between the east and west Australian populations of *Emydocephalus* as between the recognized species *Hydrophis pacificus* Boulenger, 1896 from Australia and *Hydrophis cyanocinctus* Daudin, 1803 from Thailand, which implies inconsistency in the treatment of the two Australian populations of *Emydocephalus* as being taxonomically indistinct.

Combined these factors form a compelling argument for the two widely separated populations to be treated as separate biological entities and therefore as different species and in the face of recent divergence.

Krefft (1869) described two species "*Emydocephalus annulatus*" and "*Emydocephalus tuberculatus*", both being allegedly from "probably the Australian seas".

However the specimens and descriptions of them both clearly match Queensland animals (one being an effectively unbanded snake and the other with body bands), which also accords with all other reptile species named by Krefft as being from the eastern half of Australia (most from the east coast).

This makes both names synonymous for the Queensland population and the Western Australian population unnamed.

In the absence of any available names for the Western Australia *Emydocephalus*, they are herein described as a new species.

EMYDOCEPHALUS TEESI SP. NOV.

Holotype: A preserved specimen number R165708, at the Western Australian Museum, Perth, Western Australia, obtained from Shark Bay, Western Australia, (shot dead) caught on 10 February 2006.

The snout-vent length is 660 mm, tail length is 132 mm and weight is 245.0 grams.

The Western Australian Museum is a government-owned facility that allows inspection of its holdings.

Paratypes: Specimen number R47852 from the Western Australian Museum, Perth, Western Australia collected from Barrow Island, Western Australia, Lat. 115°40'E Long. 20°8'S in December 1975.

Specimen number R28469 from the Western Australian Museum, Perth, Western Australia collected from Barrow Island, Western Australia, Lat. 115°25'E Long. 20°45'S on 9 September 1966.

The Western Australian Museum is a government-owned facility that allows inspection of its holdings.

Diagnosis: *Emydocephalus teesi sp. nov.* would previously have been identified as *E. annulatus*. However it is readily separated from that taxon by having 21-23 body bands in females, versus 24-25 in females of *E. annulatus.* In males there are 19-21 body bands versus 22-30 in *E. annulatus.*

These same characteristics separate *E. teesi sp. nov*. from the otherwise similar *E. chelonicephalus* and *E. szczerbaki.*
Complete melanism is known to be common in *E. annulatus* and *E. chelonicephalus*, but is effectively unknown in *Emydocephalus teesi sp. nov*. and *E. szczerbaki.*
Melanistic *E. teesi sp. nov*. seen in Ashmore Reef, WA retain remnants of cross-bands on the lower flanks as whitish or lighter flecks on the rear of the relevant scales.

Emydocephalus teesi sp. nov. commonly (but not always) has 3 postoculars, versus a standard 2 in *E. annulatus*, *E. chelonicephalus*, *E. ijimae* and *E. szczerbaki* (and some *E. teesi sp.* nov.).
The three postocular condition in *Emydocephalus teesi sp. nov.* is caused by the usual larger lower postocular (seen in other *Emydocephalus*) instead being two smaller ones.

Emydocephalus teesi sp. nov., *E. chelonicephalus* and *E. annulatus* are separated from *E. ijimae* by having 2 prefrontals versus 4 and a not enlarged posterior vertebral row or one that is only weakly so, versus a strongly enlarged posterior vertebral row. *E. ijimae* is characterised by a strongly divided anal plate, which may or may not be present in the other taxa, or in the other taxa may be partially divided.

E. szczerbaki, similar in most respects to *Emydocephalus teesi sp. nov.*, *E. chelonicephalus* and *E. annulatus*, which it would otherwise be identified as, is characterised by having two prefrontals and a moderately enlarged posterior vertebral row. This places this species (*E. szczerbaki*) as being morphologically intermediate to *E. annulatus* (along with *E. teesi sp. nov*. and *E. chelonicephalus*) and *E. ijimae.*

E. szczerbaki is also separated from all other *Emydocephalus* by the fact that the second supralabial ends immediately below the centre of the eye, as opposed to behind the eye in all the other species.

E. chelonicephalus from New Caledonia can be readily separated from Australian specimens on sight by the fact that females have 26-27 body bands (not counting the tail) versus 19-25 for Australian specimens and a strongly divided or partially divided cloacal shield versus usually single in the Australian ones.

Other differences are outlined by Rasmussen and Ineich (2010).

Emydocephalus are separated from all other Hydrophiinae by the following suite of characters:

Three supralabials, the second very long and distinctive; large ventrals, each three or more times as broad as the adjacent body scales; 15 scale rows around the neck; 17 or rarely 15 mid body scale rows; 125-146 ventrals; there are only rudimentary maxillary teeth behind the fangs.

Distribution: Known only from Ashmore Reef in the north (where it appears to be common), along the coast of Western Australia and nearby islands and reefs to Shark Bay, Western Australia in the South.

Conservation implications: In recent years numbers of sea snakes have dropped substantially in the Asmore Reef area without known cause (Collins 2013, Leatherdale 2012, Lukoschek *et al.* 2013a).

Although I should add that so far, this species is one of two species not apparently adversely affected by the decline in sea snakes in the area.

In an online blog about this very taxon and discussing how they tend not to travel, and why this could spell trouble for the species in the future, Lukoschek *et al.* (2013b) wrote on an online blog: ""Perhaps because they are snakes, sea snakes have a very low profile on the conservation agenda. Some populations of coral reef sea snakes have declined sharply over the past ten years, but this has gone largely unnoticed and almost no effort has been made to find out why," Dr Lukoschek says. "We need to pay more attention to these species, particularly because most of the coral reef species that have disappeared from Ashmore Reef are endemic to Australia.""

That the snakes herein described as *Emydocephalus teesi sp. nov.* represent a unique genetic unit is not in dispute. On that basis they need immediate protection from all likely threats and those that may yet need to be identified.

Protection of this (and other) relevant species will not come about by means of a raft of punitive government regulations that do nothing more than stifle research and education, but rather by a cooperative approach from government agencies.

This includes tackling the root cause of most species declines proactively, done via a reduction in the human birth rate and population growth of humans on this planet.

Until this simple problem is solved, most other conservation measures that could be employed by governments and merely akin to shuffling the deck chairs on the Titanic!

Or put another way, the Australian government should immediately stop giving money hand outs to people to breed!

Etymology: Named in honour of Bondi, New South Wales, Australia based lawyer, Alex Tees, for his valuable contributions to wildlife conservation over many decades. Little known is that he played a key role in 1996 in stopping several attempts by the NSW Government and corruptly protected criminals to have the best-selling book "*Smuggled-2: Wildlife Trafficking, Crime and Corruption in Australia*" (Hoser 2006) banned. It was a direct result of the publication of this book that the then NSW Environment Minister, Ms. Pam Allen was forced to publicly admit that wildlife laws in the state banning private ownership of reptiles were both wrong and illegal in themselves and also anti-wildlife conservation.

As a result they were rewritten to allow private ownership of reptiles in NSW for the first time in 23 years, this act physically happening in mid 1997.

The final ban on sales of *Smuggled-2* was lifted on 24 December 1996.

Everyone in NSW who keeps a snake, lizard, turtle or frog as a pet owes Mr. Tees an eternal debt of gratitude and it is fitting that he is honoured with a patronym name for a reptile taxon whose ultimate survival may in the long run be a direct result of his work.

I should also add that as a direct result of the publication of *Smuggled-2*, and what happened in NSW, Western Australia, as the last stand out state banning private ownership of reptiles was forced to fall into line and allow it (private ownership of reptiles) to happen.

This occurred around year 2000, after a 30 year ban, so it is also fitting that it is a West Australian species is named after Mr. Tees. Tees himself has spent considerable time in WA, including working as an environmental lawyer defending the environment against corrupt big government and others who put private profit above public benefit and the survival of species.

CONFLICT OF INTEREST

The author has no conflicts of interest in terms of this paper or conclusions within.

REFERENCES CITED

Adler, K. 1999a. Nikolai Nikolaevich Szczerbak. *Gekko* 1(1):36-37.

Adler, K. 1999b. Nikolai Nikolaevich Szczerbak (31 October 1927-27 January 1998). *Gecko* 1(1):36-37.

Alcala, A. C. 1986. Amphibians and Reptiles. *Guide to Philippine flora and fauna.* 10:1-195.

Alcala, A. C., Maypa, J. P. and Russ, G. R. 2000. Distribution of the turtle-headed sea snakes *Emydocephalus n. sp.* on coral reefs of the central Philippines. *UPV J. Nat. Sci.* 5:27-32.

Bauer, A. M. and Sadlier, R. A. (eds.) 2000. *The herpetofauna of New Caledonia.* Contributions to Herpetology, 17: Society for Study Amphibians and Reptiles, Ithaca, New York.

Bauer, A. M. and Vindum, J. V. 1990. A checklist and key to the herpetofauna of New Caledonia, with remarks on biogeography. *Proc. Cal. Acad. Sci.* 47(2):17-45.

Bavay, A. 1869 Catalogue des reptiles de la Nouvelle-Calédonie et description d'espèces nouvelles. *Mém. Soc. Linn. Normandie* 15: 1-37 [see p. 33 for original description of *Aipysurus duboisii*; see p. 34 for original description of *Aipysurus chelonicephalus*].

Berry, P. F. 1986. Faunal surveys of the Rowley Shoals, Scott Reef and Seringapatam Reef, north western Australia. Part 8. Insects, reptiles, birds and seagrasses. *Rec. West. Austr. Mus. Suppl.* No. 25:105-106.

Boulenger, G. A. 1896. *Catalogue of snakes of the British Museum.* British Museum of Natural History, London, UK.

Boulenger, G. A. 1899. Reptilia and Batrachia. *Zoological Record*, 36:1-31.

Boulenger, G. A. 1908. Note on the ophidian genus *Emydocephalus. Ann. Mag. Nat. Hist.* (8)1:231.

Burger, W. L. and Natsuno, T. 1974. A new genus for the Arufura smooth seasnake and redefinitions of other seasnake genera. *The Snake* 6:61-75.

Cadle, J. E. and Gorman, G. C. 1981. Albumin immunological evidence and the relationships of sea snakes. *Journal of Herpetology* 15:329-334.

Cogger H. G. 1975. Sea snakes of Australia and New Guinea. In: Dunson, W. A., ed. *The biology of sea snakes.* Baltimore, MD: University Park Press:59-140.

Cogger, H. G. 2000. *Reptiles and Amphibians of Australia.* Reed New Holland, Sydney:808 pp.

Collins, B. 2013. The mystery of Ashmore Reef's disappearing sea snakes. Post dated 8 December 2013 at: http://www.abc.net.au/local/stories/2013/12/06/3906969.htm downloaded 1 May 2015.

Greer, A. E. 1997. *The biology and evolution of Australian snakes.* Chipping Norton: Beatty and Sons Pty Ltd., Sydney, Australia.

Cogger, H. G., Cameron, E. E. and Cogger, H. M. 1983. Amphibia and Reptilia, In *Zoological Catalogue of Australia*. *Vol. 1.* Australian Government Publishing Service: Canberra, ACT, Australia.

David, P. and Ineich, I. 1999. Les serpents venimeux du monde: systematique et repartition. *Dumerilia*, (3):3-499.

Dotsenko, I. B. 2011. *Emydocephalus szczerbaki sp. n.* (Serpentes, Elapidae, Hydrophiinae) - a new species of the turtleheaded sea snake genus from Vietnam [In Russian with English abstract]. *Zbirnik prats' zoologichnogo museyu.* Kiev. 41:128-138 [2010].

Eipper, S. 2013. Post on Facebook. 16 December.

Golay, P. 1985. *Checklist and keys to the terrestrial proteroglyphs of the world.* Geneva: Elapsoidea Herpetological Data Centre.

Gopalakrishnakone, P and Kochva, E. 1990. Venom glands and some associated muscles in sea snakes. *Journal of Morphology* 205:85-96.

Greer, A. E. 1997. *The biology and evolution of Australian snakes*. Beatty and Sons Pty Ltd., Chipping Norton, NSW, Australia.

Heatwole, H. 1999. *Sea snakes.* University of New South Wales Press, Kensington, NSW, Australia.

Heatwole, H. and Cogger, H. G. 1994. Sea snakes of Australia. In: Gopalakrishnakone, P., ed. *Sea snake toxinology*. Singapore University Press, Singapore:167-205.

Hoser, R. T. 2006. *Smuggled-2: Wildlife trafficking, crime and corruption in Australia*. Kotabi Publishing, Doncaster, Victoria, Australia:280 pp.

Hoser, R. T. 2012a. Robust taxonomy and nomenclature based on good science escapes harsh fact-based criticism, but remains unable to escape an attack of lies and deception. *Australasian Journal of Herpetology* 14:37-64.

Hoser, R. T. 2012b. A review of the extant scolecophidians ("blindsnakes") including the formal naming and diagnosis of new tribes, genera, subgenera, species and subspecies for divergent taxa. *Australasian Journal of Herpetology* 15:1-64.

Hoser, R. T. 2013a. Making sense of the mess ... A new and workable sea-snake taxonomy with nomenclature to match! *Australasian Journal of Herpetology* 16:15-18.

Hoser, R. T. 2013b. The science of herpetology is built on evidence, ethics, quality publications and strict compliance with the rules of nomenclature. *Australasian Journal of Herpetology* 18:2-79.

Hoser, R. T. 2014. A break up of the genus *Acrochordus* Hornstedt, 1787, into two tribes, three genera and the description of two new species (Serpentes: Acrochordidae). *Australasian Journal of Herpetology* 22:2-8.

Huang, W. S. 1996. Sexual size dimorphism of sea snakes in Taiwan. *Bulletin of the National Museum of Natural Science* (Taichung) 7:113-120.

Hutchinson, M. N. 1990. The generic classification of the Australian terrestrial elapid snakes. *Memoirs of the Queensland Museum*:28:397-405.

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

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

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

Kharin, V. E. 1985. A new species of sea snakes of the genus *Enhydrina* (Serpentes, Hydrophiidae) from waters of New Guinea. [in Russian]. *Zoologicheskii Zhurnal* 64(5):785-787.

Kharin, V. E. 2004. Review of Sea Snakes of the genus *Hydrophis sensu stricto* (Serpentes: Hydrophiidae). *Russian Journal of Marine Biology* 30(6):387-394.

Kharin, V. E. 2008. *Biota of the Russian Waters of the Sea of Japan*. Vol. 7 - Reptilians [in English and Russian]. Vladivostok, Dalnauka:170 pp.

Kharin, V. E. 2009. Redescription of a Russian Finding of the Erabu Sea Krait *Pseudolaticauda semifasciata* (Reinwardt in Schlegel, 1837), with Remarks about Species Composition of Sea Snakes (Serpentes: Laticaudidae, Hydrophiidae) in Russian and Adjacent Waters. *Russian Journal of Marine Biology* 35(1):8-14.

Kharin, V. E. and Czeblukov, V. P. 2009. A Revision of the Sea Snakes of Subfamily Hydrophiinae. 1. Tribe Disteirini Nov. (Serpentes: Hydrophiidae). *Russian Journal of Herpetology* 16(3):83-202.

Krefft, J. L. G. 1869 The Snakes of Australia; an Illustrated and Descriptive Catalogue of All the Known Species. Thomas Richards, Government Printer, Sydney [Pp. i-xxv, 1-100; see p. 92 for original descriptions of *Emydocephalus* and *Emydocephalus annulatus*; see p. 93 for original description of *Emydocephalus tuberculatus*; Note: originally printed with Plates coloured (200 copies) and not coloured (500 copies); note also that a facsimile of the coloured version was also published by Jeanette Covacevich, Lookout Publications, Brisbane (1984)].

Leatherdale, V. 2012. Australia's disappearing sea snakes. Blog post dated 4 May at: http://sydney.edu.au/news/84.html?newsstoryid=9143 downloaded 1 May 2015.

Lukoschek, V. 2007. *Molecular ecology, evolution and conservation of hydrophiine sea snakes*. PHD Thesis, James Cook University, Townsville, Queensland, Australia:221 pp.

Lukoschek, V. and Scott Keogh, J. 2006. Molecular phylogeny of sea snakes reveals a rapidly diverged adaptive radiation. *Biological Journal of the Linnean Society* 89:523-539.

Lukoschek, V. and Shine, R. 2012. Sea snakes rarely venture far from home. *Ecology and Evolution* 2: 1113-1121.

Lukoschek, V., Heatwole, H., Grech, A., Burns, G. and Marsh, H. 2007. Distribution of two species of sea snakes, *Aipysurus laevis* and *Emydocephalus annulatus*, in the southern Great Barrier Reef: metapopulation dynamics, marine protected areas and conservation. *Coral Reefs* 26(2):291-307.

Lukoschek, V., Beger, M., Ceccarelli, D., Richards, Z. and Pratchett, M. 2013a. Enigmatic declines of Australia's sea snakes from a biodiversity hotspot. *Biological Conservation* 166:191-202.

Lukoschek, V. *et al.* 2013b. Call to save Australia's disappearing sea snakes. Online blog post at: http://www.coralcoe.org.au/news/call-to-save-australias-disappearing-sea-snakes downloaded on 2 April 2015.

Mao, S. H., Chen, B., Yin, F. and Guo, Y. 1983. Immunotaxonomic relationships of sea snakes and terrestrial elapids. *Comparative Biochemistry and Physiology* 74A:869-872.

Masunaga, G. and Ota, H. 1994. Natural history of the sea snake, *Emydocephalus ijimae* in the central Ryukyus. *Japanese Journal of Herpetology* 15(4):144.

McCarthy, C. J. 1985. Monophyly of the elapid snakes (Serpentes:Reptilia). An assessment of the evidence. *Zoological Journal of the Linnean Society* 83:79-93.

McCarthy, C. J. 1986. Relationships of the laticaudine sea snakes (Serpentes: Elapidae: Laticaudinae). *Bulletin of the British Museum of Natural History (Zoology)* 50:127-161.

McCosker, J. E. 1975. Feeding behaviour of Indo-Australian Hydrophiidae. In: Dunson, W. A. (ed.) *The biology of sea snakes*. University Park Press, Baltimore, MD, USA:217-232.

McDowell, S. B. 1969. Notes on the Australian sea-snake *Ephalophis greyi* M. Smith (Serpentes: Elapidae, Hydrophiinae) and the origin and classification of sea-snakes. *Zoological Journal of the Linnean Society* 48:333-349.

McDowell, S. B. 1970. On the status and relationships of the Solomon Island elapid snakes. *Journal of Zoology,* London. 161:145-190.

McDowell, S. B. 1972. The genera of sea-snakes of the *Hydrophis* group (Serpentes: Elapidae). *Transactions of the Zoological Society of London*, 32:189-247.

McDowell, S. B. 1974. Additional notes on the Rare and Primitive Sea-snake, *Ephalophis greyi*. *Journal of Herpetology* 8:123-128.

Minton, S. A. 1975. Geographic distribution of sea snakes. In: Dunson, W. A., (ed.) *The biology of sea snakes*. University Park Press, Baltimore, MD, USA:21-32.

Minton, S. A. and da Costa, M. S. 1975. Serological

relationships of sea snakes and their evolutionary implications. In: Dunson W. A. (ed.) *The biology of sea snakes*. University Park Press, Baltimore, MD, USA:33-58.

Minton, S. A. and Dunson, W. A. 1985. Sea snakes collected at Chesterfield Reefs, Coral Sea. *Atoll Research Bulletin* (2):101-108.

Molengraaff, G. A. F. 1921. Modern deep-sea research in the East Indian archipelago. *Geographical Journal*, 57:95-121.

Molengraaff, G. A. F. and Weber, M. 1921. On the relation between the Pleistocene glacial period and the origin of the Sunda Sea (Java and South China-Sea), and its influence on the distribution of coral reefs and on the land and freshwater fauna. *Proceedings of the Section of Sciences*, 23:395-439.

Mori, M. 1982. *Japans Schlangen, Vols*. 1-3 (80, 102, 123 pp.). Tokyo (Igaku-Shoin Ltd.) [bilingual edition in German and Japanese].

Nock, C. J. 2001. *Molecular Phylogenetics of the Australian Elapid Snakes*. Unpublished MSc Thesis, Southern Cross University.

O'Shea, M. 1996. *A Guide to the Snakes of Papua New Guinea*. Independent Publishing, Port Moresby, xii + 239 pp.

Pyron, R. A., *et al.* 2011. The phylogeny of advanced snakes (Colubroidea), with discovery of a new subfamily and comparison of support methods for likelihood trees. *Mol. Phylogenet. Evol.* 58:329-342.

Pyron, R. A., Burbrink, F. T. and Wiens, J. J. 2013. A phylogeny and revised classification of Squamata, including 4161 species of lizards and snakes. *BMC Evolutionary Biology* 13:93.

Rasmussen, A. R. 1994. A cladistic analysis of *Hydrophis* subgenus *Chitulia* (McDowell, 1972) (Serpentes, Hydrophiidae). *Zoological Journal of the Linnean Society* 111:161-178.

Rasmussen, A. R. 1997. Systematics of sea snakes: A critical review. *Symposia of the Zoological Society of London* 70:15-30.

Rasmussen, A. R. 2002. Phylogenetic analysis of the 'true' aquatic elapid snakes Hydrophiinae (*sensu* Smith *et al*., 1977) indicates two independent radiations into water. *Steenstrupia* 27:47-63.

Rasmussen, A. R. and Ineich, I. 2010. Species Diversity in the Genus *Emydocephalus* Krefft, 1869 (Serpentes, Elapidae, Hydrophiinae): Insight from Morphology and Anatomy. *Herpetological Review*, 41(3):285-290.

Rasmussen, A. R., Auliya, M. and Böhme, W. 2001. A new species of the snake genus *Hydrophis* (Serpentes: Elapidae) from a river in west Kalimantan (Indonesia, Borneo). *Herpetologica* 57:3-32.

Rasmussen, A. R., Elmberg, J., Gravlund, P. and Ineich, I. 2011. Sea snakes (Serpentes: subfamilies Hydrophiinae and Laticaudinae) in Vietnam: a comprehensive checklist and an updated identification key. *Zootaxa* 2894:1-20.

Rasmussen, A. R., Sanders, K. L., Guinea, M. L. and Amey, A. P. 2014. Sea snakes in Australian waters (Serpentes: subfamilies Hydrophiinae and Laticaudinae): A review with an updated identification key. *Zootaxa* 3869(4):351-371.

Rhodin, A. *et al.* (70 listed authors) 2015. Comment on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes,

ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published (Case 3601; see BZN 70: 234-237; 71: 30-38, 133-135, 181-182, 252-253). *Bulletin of Zoological Nomenclature* 72(1)65-78.

Ride, W. D. L. (ed.) *et al.* (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum - Cromwell Road, London SW7 5BD, UK (also commonly cited as "ICZN 1999").

Sanders, K. L. and Lee, M. S. Y. 2008. Molecular evidence for a rapid late-Miocene radiation of Australasian venomous snakes. *Molecular Phylogenetics and Evolution*. doi: 10.1016/j.ympev.2007.11.013.

Sanders, K. L., Lee, M. S. Y., Leys, R., Foster, R. and Scott Keogh, J. 2008. Molecular phylogeny and divergence dates for Australasian elapids and sea snakes (Hydrophiinae):evidence from seven genes for rapid evolutionary radiations. *Journal of Evolutionary Biology* 21:682-695.

Sanders, K. L., Michael, S. Y. L., Mumpuni, Bertozzi, T. and Rasmussen, A. R. 2012. Multilocus phylogeny and recent rapid radiation of the viviparous sea snakes (Elapidae: Hydrophiinae). *Molecular Phylogenetics and Evolution* 66(3):575-591.

Schmidt, P. 1852. Beiträge zur ferneren kentniss der Meerschlangen. Abh. Geb. Naturw. Hamburg 2: 69-86 [see p. 76, pl. 1 for original description of *Thalassophis anguillaeformis*; see p. 77 for original description of *Thalassophis muraeneformis*; see p. 78, pl. 2 for original description of *Thalassophis microcephala*; see p. 83, pl. 5 for original description of *Thalassophis schlegelii*; see p. 84, pl. 6 for original description of *Thalassophis werneri*].

Schwaner, T. D., Baverstock, P.R., Dessauer, H. C. and Mengden, G. A. 1985. Immunological evidence for the phylogenetic relationships of Australian elapid snakes. in: Grigg, G., Shine, R. and Ehmann, H. (eds.) *Biology of Australasian frogs and reptiles*. Surrey Beatty and Sons Pty Ltd., Chipping Norton, NSW, Australia:177-184.

Scott Keogh, J. 1998. Molecular phylogeny of elapid snakes and a consideration of their biogeographic history. *Biological Journal of the Linnean Society* 63:177-203.

Scott Keogh, J., Scott, I. A. W. and Hayes, C. 2005. Rapid and repeated origin of insular gigantism and dwarfism in Australian tiger snakes. *Evolution* 59:226-233.

Scott Keogh, J., Scott, I. A. W. and Scanlon, J. D. 2000. Molecular phylogeny of viviparous Australian elapid snakes: Affinities of '*Echiopsis*' *atriceps* (Storr, 1980) and '*Drysdalia*' *coronata* (Schlegel, 1837), with description of a new genus. *Journal of Zoology, London* 252:317-326.

Scott Keogh, J., Shine, R. and Donnellan, S. 1998. Phylogenetic relationships of terrestrial Australo-Papuan elapid snakes (Subfamily Hydrophiinae) based on cytochrome b and 16S r RNA sequences. *Molecular Phylogenetics and Evolution* 10:67-81.

Shine, R. 1991. *Australian Snakes: A Natural History.* Reed Books, Sydney, Australia.

Slowinski, J. B. and Scott Keogh, J. 2000. Phylogenetic relationships of elapid snakes based on cytochrome b mtDNA sequences. *Molecular Phylogenetics and Evolution* 15:157-164.

Slowinski, J. B., Knight, A. and Rooney, A. P. 1997. Inferring species trees from gene trees: a phylogenetic analysis of the Elapidae (Serpentes) based on the amino acid sequences of venom proteins. *Molecular Phylogenetics and Evolution* 8:349-362.

Smith, M. A. 1926. *Monograph of the sea-snakes (Hydrophidae)*. Taylor and Francis, London, UK:130 pp.

Smith, H. M., Smith, R. B. and Sawin, H. L. 1977. A summary of snake classification (Reptilia, Serpentes). *Journal of Herpetology* 11:115-121.

Stejneger, L. H. 1898. On a collection of batrachians and reptiles from Formosa and Adjacent Islands. *J. Coll. Sci. Univ. Tokyo* 12: 215-225.

Stejneger, L. H. 1907. Herpetology of Japan and adjacent territory. *Bull. US Natl. Mus.* 58: xx, 1-577.

Stejneger, L. H. 1910. The batrachians and reptiles of Formosa. *Proc. US Natl. Mus.* 38: 91-114.

Uetz, P. 2013. The reptile database at: http://reptile-database.reptarium.cz/advanced_search?taxon=Elapidae&submit=Search downloaded 4 January 2013.

Ukuwela, K. D. B. 2013. *Systematics, evolution and biogeography of Viviparous sea snakes of the Indo-Pacific.* University of Adelaide, PHD Thesis:150 pp.

Ukuwela, K. D. B., Sanders, K. L. and Fry, B. G. 2012a. *Hydrophis donaldi* (Elapidae, Hydrophiinae), a highly distinctive new species of sea snake from northern Australia. *Zootaxa* 3201:45-47.

Ukuwela, K. D. B., de Silva, A., Mumpuni, Fry, B. G., Lee, M. S. Y. and Sanders, K. L. 2012b. Molecular evidence that the deadliest sea snake *Enhydrina schistosa* (Elapidae: Hydrophiinae) consists of two convergent species. *Molecular Phylogenetics and Evolution* 66(1):262-269.

Voris, H. K. 1966. Fish eggs as the apparent sole food item for a genus of sea snake *Emydocephalus* (Kreft). *Ecology* 47:152-154.

Voris, H. K. 1972. The role of sea snakes (Hydrophiidae) in the trophic structure of coastal ocean communities. *Journal of the Marine Biology Association of India* 13:1-14.

Voris, H. K. 1977. A phylogeny of the sea snakes (Hydrophiidae). *Fieldiana: Zoology* 70:79-166.

Voris, H. K. and Voris, H. H. 1983. Feeding strategies in marine snakes: an analysis of evolutionary, morphological, behavioural and ecological relationships. *American Zoology* 23:411-425.

Voris, H. K. 2000. Maps of Pleistocene sea levels in Southeast Asia: shorelines, river systems and time durations. *Journal of Biogeography*, 27:1153-1167.

Wall, F. 1906. A descriptive list of the sea-snakes (Hydrophiidae) in the Indian Museum. *Memoirs of the Asiatic Society of Bengal*, 1: 277-299 [see p. 288, pl. 15 fig. 3 for original description of *Hydrophis alcocki*].

Wall, F. 1909. A monograph of the sea snakes. *Memoirs of the Asiatic Society of Bengal*, 2(8):169-251.

Wells, R. W. 2007. Some taxonomic and nomenclatural considerations on the class Reptilia in Australia. The sea snakes of Australia. An introduction to the members of the families Hydrophiidae and Laticaudidae in Australia, with a new familial and generic arrangement. *Australian Biodiversity Record* (8):1-124.

Wilson, S. and Swan, G. 2010. *A complete guide to reptiles of Australia*, 3rd ed. Chatswood: New Holland:558 pp.

Wüster, W. 2001a. Post on Kingsnake.com at: January 22, 2001 at 11:29:07 (same document as Wüster, W., Bush, B., Scott Keogh, J., O'Shea, M. and Shine, R. 2001. Cited below except Wüster was listed here as the sole author).

Wüster, W., Bush, B., Scott Keogh, J., O'Shea, M. and Shine, R. 2001. Taxonomic contributions in the "amateur" literature: comments on recent descriptions of new genera and species by Raymond Hoser. *Litteratura Serpentium* 21(3):67-91.

Zhao, E. and Adler, K. 1993. *Herpetology of China*. SSAR, Oxford/Ohio:1-522.