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Audit finds dozens of unnamed turtle taxa. A body of evidence results in newly named genera, subgenera, species and subspecies based on historical and morphological divergence.

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ABSTRACT

An ongoing audit of the taxonomy and nomenclature of the world's turtles has revealed that a number of generally recognized genera have species that are sufficiently divergent from the type form to warrant being placed in new genera or subgenera.

The audit also revealed a number of undescribed forms at the species and subspecies level.

With a sizeable percentage of the world's turtles under real threat of extinction, the urgency of the need to formally identify and manage relevant taxa has never been greater.

This monograph takes the significant first step of naming the relevant forms in accordance with the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

In summary a number of genera are split, including *Cryptochelys* Iverson, Le, and Ingram 2013 (until recently the species were grouped in *Kinosternum* Spix, 1824), *Rhinoclemmys* Fitzinger, 1835, *Acanthochelys* Gray, 1873, *Manouria* Gray, 1854, *Homopus* Duméril and Bibron, 1834, *Sternotherus* Bell 1825, *Lissemys* Smith, 1931, *Pelodiscus* Fitzinger, 1835, *Geoemyda* Gray, 1834 and *Chelonoidis* Fitzinger 1835 with new genera or subgenera formally named for the first time.

New species and/or subspecies within various genera are formally named for the first time, including taxa within *Chelydra* Schweigger, 1812, *Oxychelys* *gen. nov.*, *Pelomedusa* Wagler, 1830, *Pelusios* Wagler, 1830, *Geoemyda* Gray, 1834, *Manouria* Gray, 1854, *Chelonoidis* Fitzinger, 1835, *Cyclemys* Bell, 1834, *Cuora* Gray, 1856, *Chersina* Gray, 1830, *Homopus* Duméril and Bibron, 1834, *Funkichelys* *gen. nov.*, *Kinosternum* Spix, 1824, *Graptemys* Agassiz, 1857, *Clemmys* Ritgen, 1828, *Actinemys* Agassiz, 1857, *Heosemys* Stejneger, 1902, *Hieremys* Smith, 1916, *Vijayachelys* Prashchag, Schmidt, Fritzsich, Müller, Gemel and Fritz, 2006, *Chitra* Gray, 1844, *Kinixys* Bell, 1827, *Rhinoclemmys* Fitzinger, 1835 (*sensu lato*), *Emys* Duméril, 1805, *Amyda* Schweigger in Geoffroy Saint-Hilaire, 1809, *Cyclanorbis* Gray, 1854, *Cycloderma* Peters, 1854, *Heptathyra* Cope, 1960, *Orlitia* Gray, 1873, *Emydura* Bonaparte, 1836; *Wollumbinia* Wells, 2007 and *Hydromedusa* Wagler, 1830.

Keywords: taxonomy; nomenclature; turtle; terrapin; tortoise; *Macrochelys*; *Chelydra*; *Kinosternum*; *Cryptochelys*; *Rhinoclemmys*; *Acanthochelys*; *Manouria*; *Sternotherus*; *Geoemyda*; *Chelonoidis*; *Hieremys*; *Vijayachelys*; *Chitra*; *Cyclemys*; *Pelusios*; *Platythyra*; *Graptemys*; *Clemmys*; *Cuora*; *Chersina*; *Homopus*; *Chersobius*; *Amyda*; *Cyclanorbis*; *Heptathyra*; *Cycloderma*; *Lissemys*; *Pelodiscus*; *Pelomedusa*; *Emydura*; *Tropicochelymys*; *Elseya*; *Wollumbinia*; *Supremechelys*; *Chelodina*; *Macrochelodina*; new genus; *Martinekchelys*; *Crottychelys*; *Oxychelys*; *Sloppchelys*; *Freudchelys*; *Funkichelys*; *Piersonchelys*; *Wittchelys*; *Lovelinaychelys*; Synonyms; *Myuchelys*; *Macrodiremys*; *Chelydera*; new subgenus; *Parasternotherus*; *Parageoemyda*; *Parachelonoidis*; *Keillerchelys*; *Parapelodiscus*; new species; *haydnmcpheii*; *oxyi*; *daranini*; *freudi*; *maxinehoserae*; *turneri*; *hoserae*; *woolfi*; *fiacummingae*; *mcdermottorum*; *adelynhoserae*; *jackyhoserae*; *oxyslopp*; *boxboyi*; *elfakariorum*; *richardwellsi*; *rosswellingtoni*; *swileorum*; *mandela*; *funki*; *trevorhawkeswoodi*; *tismorum*; *marcdorsei*; *ashphillipsi*; *darrenkeilleri*; *alexstaszewskii*; *dannygoodwini*; *shannonmcgrathi*; *lynnrawi*; *wellingtoni*; *wellsi*; *hawkeswoodi*; *georgefloydi*; *darnellafrazierae*; *meyeyouchelys*; new subspecies; *ipsumtenebris*; *divergens*; *grantturneri*; *malayensis*; *mekongensis*; *whittoni*; *indusensis*; *maximus*; *praetortus*; *varians*; *flavooculus*; *brunneisoculus*; *aurantiacoculus*; *repens*; *knysaensis*; *bloemfonteinensis*; *nileensis*; *occultatum*; *magnapapulae*; *divergentens*; *perakensis*; *wittorum*.

INTRODUCTION

An ongoing audit of the taxonomy and nomenclature of the world's turtles (treated herein as including tortoises and terrapins, with all terms deemed and used as interchangeable herein), has been ongoing for some years.

As the audit has continued, it has emerged that a number of generally recognized genera have species that are sufficiently divergent from the type form to warrant being placed in new genera or subgenera.

This revelation has come about with the publication of numerous molecular studies on the relevant species groups.

These studies have revealed ancient divergences in morphologically similar forms.

In most cases where this has happened there have been available names for the relevant divergent forms.

However in some cases this has not been the case and those groups flagged as being divergent were subjected to further scrutiny with a view to confirming the need for them to be formally identified and named in terms of taxonomy and associated nomenclature.

The audit also revealed a number of apparently undescribed forms at the species level, which will surprise a lot of herpetologists as the turtles in particular have been heavily scrutinized by taxonomists over the past 2 centuries and are in many respects regarded as an "over-split" order within the reptiles.

With a sizeable percentage of the world's turtles under threat of extinction, the urgency of the need to formally identify and manage relevant taxa has never been greater.

Engstrom *et al.* (2004) correctly wrote:

"The documentation of this diversity must be seen as an activity that is done not just for posterity but for immediate action and protection."

Therefore this paper summarizes the relevant findings and as needed, it takes the significant first step of naming the relevant forms in accordance with the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

MATERIALS AND METHODS

Relevant literature on the flagged species groups or potentially composite species was scrutinized to confirm the likelihood of potentially unnamed taxa at the genus or species level.

In the first instance there were numerous genera and species flagged as unrecognized in most recent taxonomic treatments, including that of Rhodin *et al.* (2017).

That online paper is cited here because it is freely available online, claims to represent a consensus view within Turtle experts, although it does not, but does fortuitously have a relatively complete listing of synonymies for the relevant genera and species. Another online publication known as "The Reptile Database", also on the internet and with a near complete synonymy list for extant turtles has flaws similar to Rhodin *et al.* (2017), but is a useful means by

which to find available names for divergent forms that are not necessarily recognized by the authors of the said publications.

Flagged genera for which there appeared to be unnamed genus-level divergent species or species-level divergent species were numerous, but on crude audit, was quickly culled to reveal a relatively small number of unnamed taxa.

These were dealt with in terms of the exercise herein.

Other taxa were excluded from further scrutiny on the basis I was aware of people working on the said forms and I had no desire to intrude on the ongoing works of others, including persons who claim to be working on relevant forms, but may in fact not be.

For all relevant taxa, each were also compared with the available literature, any available molecular data and/or sequences publicly available, specimens, photos, known synonymies and all other relevant and available means of checking.

In summary a number of genera were flagged that appeared to have divergent and unnamed genus or subgenus-level splits.

This audit did however include every known species of living turtle on the planet and while explicitly not including fossil forms, some of these were audited in the context of the audit of living forms.

Rather than listing all genera as being flagged, I shall here list those genera for which genus or species level splits were identified and found not have available names that could be resurrected from synonymy.

In summary the splittable genera included *Cryptochelys* Iverson, Le, and Ingram 2013 (until recently the species were grouped in *Kinosternum* Spix, 1824), *Rhinoclemmys* Fitzinger, 1835, *Acanthochelys* Gray, 1873, *Manouria* Gray, 1854, *Homopus* Duméril and Bibron, 1834, *Sternotherus* Bell 1825, *Lissemys* Smith, 1931, *Pelodiscus* Fitzinger, 1835, *Geoemyda* Gray, 1834 and *Chelonoidis* Fitzinger 1835 all without appropriate names available.

New species and/or subspecies within various genera formally named and identified for the first time, (as in previously unnamed) included taxa within *Chelydra* Schweigger, 1812, *Oxychelys* gen. nov., *Pelomedusa* Wagler, 1830, *Pelusios* Wagler, 1830, *Geoemyda* Gray, 1834, *Manouria* Gray, 1854, *Chelonoidis* Fitzinger, 1835, *Cyclemys* Bell, 1834, *Cuora* Gray, 1856, *Chersina* Gray, 1830, *Homopus* Duméril and Bibron, 1834, *Funkichelys* gen. nov., *Kinosternum* Spix, 1824, *Graptemys* Agassiz, 1857, *Clemmys* Ritgen, 1828, *Actinemys* Agassiz, 1857, *Heosemys* Stejneger, 1902, *Hieremys* Smith, 1916, *Vijayachelys* Praschag, Schmidt, Fritzsche, Müller, Gemel and Fritz, 2006, *Chitra* Gray, 1844, *Kinixys* Bell, 1827, *Rhinoclemmys* Fitzinger, 1835 (*sensu lato*), *Emys* Duméril, 1805, *Amyda* Schweigger in Geoffroy Saint-Hilaire, 1809, *Cyclanorbis* Gray, 1854, *Cycloderma* Peters, 1854, *Heptathyra* Cope, 1960, *Orlitia* Gray, 1873, *Emydura* Bonaparte, 1836; *Wollumbinia* Wells, 2007 and *Hydromedusa* Wagler, 1830.

All were flagged and inspected with a view to see if they needed to be formally named for the first time according

to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

In terms of each taxon, all available publications relevant to them were inspected.

If the taxa checked out as appearing to be unnamed, specimens of each were inspected to see if they appeared to fit the relevant criteria for division at the relevant taxonomic level.

As stated already, this was also matched with all available information, be it genetic studies, morphological studies, effects of known biogeographic barriers, climate changes in the past and any other factors deemed worthy of consideration.

In terms of the taxa identified within this paper, the auditing process took some years and the taxonomic acts taken herein were made only on the basis of overwhelming scientific evidence and an abundance of caution.

This was however coupled with the important need to identify unnamed taxa in a timely manner, knowing full well that as a group, the world's tortoises are among the most threatened by ongoing human overpopulation and related activities including usage of species for food, introduced competing species, diseases and so on.

The papers and other published material relevant to the decision to name various forms at any level are cited in the results section of this paper. Material not relied upon in any way is generally excluded from citation unless relevant in some way to the decisions made herein.

While I note that by strict definition, turtles have flippers, tortoises have feet and terrapins have webbed feet, the three terms are used interchangeably and to define any shelled living reptile in this paper.

RESULTS

MACROCHELYS GRAY, 1856

The literature cited in Hoser (2013b) and sources cited within these, remains the basis of the taxonomic conclusions of Hoser (2013b).

The taxonomy and nomenclature of Hoser (2013b) formally naming two taxa is formally confirmed as valid on all relevant criteria.

I note the fact that the names for Alligator Snapping Turtle species and subspecies formally allocated by myself (Raymond Hoser) in Hoser (2013b) are valid under the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999) and were confirmed as such by ICZN (2021).

This means that the name *Macrochelys suwanniensis* Thomas, Granatosky, Bourque, Krysko, Moler, Gamble, Suarez, Leone, Enge, and Roman, 2014 is a junior synonym of *Macrochelys maxhoseri* Hoser, 2013.

The other coined name of the same authors, *Macrochelys apalachicola* Thomas, Granatosky, Bourque, Krysko, Moler, Gamble, Suarez, Leone, Enge, and Roman, 2014 is a junior synonym of *Macrochelys temminckii muscati* Hoser, 2013.

Rhodin *et al.* (2017) in their catalogue of Turtle species of the world, in using the improperly coined junior synonym *Macrochelys suwanniensis* wrote in their

synonyms account:

"*Macrochelys maxhoseri* Hoser 2013:56 (unavailable name pending ICZN decision; Rhodin *et al.* 2015)".

Rhodin *et al.* (2015) was a (now) discredited submission by the Wolfgang Wüster gang of thieves petitioning the ICZN to strike all my (Hoser) works from the official scientific record in order to allow their cohort to rename many hundreds of taxa (see Hoser 2015a-f), including both *M. maxhoseri* and *M. temminckii muscati*.

In any event the petition of Rhodin *et al.* (2015) was voted on by the ICZN in 2020 and formally rejected in 2021 (ICZN 2021), meaning that the correct names for the relevant taxa are *Macrochelys maxhoseri* Hoser, 2013 and *Macrochelys temminckii muscati* Hoser, 2013 and the later coined names should not be used.

The holotype for *M. maxhoseri* was cited in Hoser (2013b) as:

"A specimen in the Florida Museum of Natural History (FM) at the University of Florida, specimen number: 165801, from Alachua, Florida, USA.",

the details of which was taken from the various online databases for the facility.

For the other taxon *Macrochelys temminckii muscati* Hoser, 2013 it was:

"A specimen in the Florida Museum of Natural History (FM) at the University of Florida, specimen number: 155266, from Liberty, Florida, USA."

Prior to the publication of Thomas *et al.* (2014) this cohort, most of whom worked at the University of Florida, altered the online database to have the record changed to a sighting record only.

The paper Thomas *et al.* (2014) was published in a notorious online, PRINO (peer reviewed in name only) "journal" called *Zootaxa* in order to justify their attempt at "name theft".

In doing so they wrote:

"Hoser (2013) attempted to describe a new species, *Macrochelys maxhoseri*, and subspecies, *M. temminckii* (sic) *muscati*, in his self-published, non peer-reviewed "journal," but he erred in his methods. In designating holotypes using an online database in lieu of actually examining specimens, Hoser declared "specimens" UF 155266 and UF 165801 as primary types. However, the curator of herpetology at the FLMNH indicated that physical specimens bearing either of these numbers have never existed among their holdings; the corresponding records in the FLMNH database refer to unvouchered field sightings of *Macrochelys* (*M. A. Nickerson, Pers. Comm. 2013*). Hoser's holotypes are therefore designated in violation of ICZN Code Article 16.4 (they are not based on specimens; ICZN, 1999), and his names for *Macrochelys* are rendered unavailable."

The plot thickened when the online databases showed

the alterations of the records to show that they still existed, but as sighting records only.

As the specimens actually existed (albeit allegedly "sighted" swimming in a river or similar), Article 16.4 of the ICZN Code (Ride *et al.* 1999) did not apply and the earlier Hoser names were still valid.

Screen shots of these altered records were taken to confirm that the type specimens actually existed in one form or other (making the 2013 names valid) and at the same time it was noted that Mr. Paul Moler was listed as the person who had caught the said specimens.

Moler was also listed as an author in the paper of Thomas *et al.* (2014), although if truth were known, Thomas probably wrote the entire paper and merely tacked his mates names on at the end.

In order to attempt to get to the bottom of the fiasco caused by the alteration of museum records by the Thomas *et al.* cohort, I sent an email to Moler and got a reply.

It is reproduced in full below:

"From: Paul.Moler@MyFWC.com

To: viper007@live.com.au

CC: s.nikolaeva@nhm.ac.uk;
rwrossco@gmail.com; tthomas46@live.com;
envirodata@hotmail.com;
studiomartinek@bigpond.com;
richard.funk@vcahospitals.com;
scott_eipper@hotmail.com;
drtjhawkeswood@calodema.com;
h.cogger@bigpond.com; dyanega@ucr.edu;
dewanandmakhan@yahoo.co.uk

Date: Fri, 11 Apr 2014 16:42:27 -0400

Subject: RE: Macrochelys

Good Sir,

Your paper provides only museum numbers without any collection data or type locality. Since I don't have the Museum data at hand, I don't know what specimens you might be referencing. Over the last 40 years, I have deposited hundreds of reptile and amphibian specimens in the Florida Museum, but I don't recall having deposited even a single specimen of *Macrochelys*. Beginning in the early 90s, I trapped *Macrochelys* extensively throughout the Florida range, and I deposited dozens of photographs in the Florida Museum collection to document locality records. However, after being measured, weighed, marked, and photographed, all of those turtles were released where caught. If indeed you examined any physical specimens in the Florida collection, they were not specimens that I collected.

Paul"

The reply as written, while maintaining that there were no bodies in the University of Florida collection that matched the numbers I had given for the holotypes, the letter did confirm that they did in fact exist and had been measured, weighed, marked, and photographed before being released, meaning that in terms of both *Macrochelys maxhoseri* and *M. temmincki muscati*

holotypes did exist and were probably still swimming around in Florida, blissfully unaware of the commotion being caused in their name!

The correspondence was posted in the ICZN list server (an online email list) and confirmed emphatically that the names *Macrochelys maxhoseri* and *M. temmincki muscati* were in fact valid under the ICZN Code (Ride *et al.* 1999) and had priority over the later coined names.

The holotypes themselves were merely "lost" which is not uncommon in science and has never invalidated a scientific name under the rules of the ICZN.

Moler when replying to my email had clearly been unaware of the fact that a specimen in a museum is not mandatory in order to make a name "available" under the Code.

It merely has to exist!

In spite of this knowledge, within days of the publication of Thomas *et al.* (2014), the Wolfgang Wüster gang of thieves had continued to peddle their names coined in one of many acts of taxonomic vandalism.

One hopes that with the ICZN voting against the taxonomic vandalism of the Wolfgang Wüster gang of thieves and publishing their formal rejection of their actions (ICZN 2021), that the correct ICZN names of *Macrochelys maxhoseri* and *M. temmincki muscati* will now be used instead of the illegally coined names.

Because there is no doubt that the Wolfgang Wüster gang of thieves will continue beyond 2021 to claim that their illegally coined name names *Macrochelys suwanniensis* and *M. apalachicola* should be used instead of the correct ICZN names, I have reproduced below some emails from 2014 as posted on the ICZN list exposing the Wolfgang Wüster gang's acts of fraud for the world to see.

Now just to make it clear that Thomas *et al.* had engaged in a deliberate act of theft and sabotage of the rules of the ICZN, one needs look no further than a thread started by another thief and taxonomic vandal, Bill Branch, on Facebook on 9 January 2014. Branch wrote:

"2014 has started well !

I know he's delusional - but I almost feel I've made it as a herpetologist when Hoser calls me an intellectual thief ! Note also how peer review is now "a pay wall" to hide it from the masses !

From Hoser's website in response to the recent *Gerrhosaurus* phylogeny (Zootaxa 2013) that ignored his 'work' !

"Well, well, well, it turns out that Bill Branch and the other thieves have misquoted the Zoological rules to falsely claim I have acted outside them.

They do this is part of a bogus justification for renaming the lizard genera *Funkisaurus* a...nd *Swilesaurus* after their own mates (i.e. *Broadleysaurus* are you kidding!!!!).

They hid their paper behind a pay wall so most people wouldn't see their disgraceful act of taxonomic vandalism, but I was sent a copy today by a very concerned herpetologist, who

was absolutely outraged at the misconduct of Bates, Branch and the other taxonomic vandals and intellectual thieves.

It will be interesting to see how the ICZN commissioners feel when they realise that their written rules are being deliberately misquoted by thieves to engage in acts of taxonomic vandalism and recklessly cause immense instability of nomenclature.

By the way, for those who don't know exactly what taxonomic vandalism is, it is "the deliberate renaming of taxa (species and genera) in the full knowledge that there are already available names for the said species and in doing so, knowingly breaching the rules of zoological nomenclature".

The Wuster gang, including Bill Branch and Don Broadley have now engaged in reckless taxonomic vandalism several times, as has that other taxonomic vandal in the gang, Wulf Schleich."

Wolfgang Wüster offered his own encouragement by writing:

"Tattoos are so yesterday. Overwriting taxonomic vandalism is just so much more fun as an initiation rite."

This in turn was responded to by Paul Moler who wrote:

"Bill, I will soon be joining the gang as well, but I'm not too keen on tattoos. Might we instead (or in addition) develop a gang handshake."

The paper, Thomas *et al.* (2014) claimed a publication date of 9 April 2014 and was in fact published at about that date (3 months after the above online thread). This needs to be mentioned explicitly herein as Hoser (2015a-f) gives examples of the Wolfgang Wüster gang of thieves backdating the publication dates of a lot of their papers in order to claim "priority" for naming in terms of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999)..

The ICZN did show their displeasure at the acts of taxonomic vandalism by the Wolfgang Wüster gang of thieves, including Wolfgang Wüster, Bill Branch and Thomas *et al.* (including Moler), by voting against their attempt to usurp the legitimate ICZN (Hoser 2013a) names with their own illegally coined collection, via ICZN (2021).

ICZN AND TAXACOM LIST EMAILS RELATING TO THOMAS ET AL'S ATTEMPT TO ERASE THE HOSER-NAMED MACROCHELYS GRAY, 1856 TAXA FROM THE SCIENTIFIC RECORD.

[Taxacom] [iczn-list] provisions to the Code
Neal Evenhuis neale@bishopmuseum.org
Sun Apr 13 18:09:04 CDT 2014

I unfortunately have to agree with Stephen here. I've again read the relevant Articles dealing with holotype and "type series" and Hoser has met the conditions required, although, granted, merely on a technicality because there are no restrictions in the current Code to what he has done, and this

type of methodology of selecting a holotype will definitely not make it to the examples in the "Best practices in taxonomy" handbook (although he probably had no choice since I doubt anyone will ever loan him specimens).

The critical thing is he gave a specimen number for a holotype, which was based on an actual specimen. There is nothing in the FLMNH database to indicate that the specimen number he gave was NOT based on a specimen - it even specifies that there was 1 specimen, not 0. The Herpnet database gives no numbers of specimens for those specimen numbers, but lists the word "Occurrence" for those same numbers (and some on this list have said they all refer to observations). Yet Herpnet also gives the word "Occurrence" for the specimen numbers in the appendix in the Thomas *et al.* paper that they say is "Material examined!" (how could they have examined an observation?). Again there is nothing in either database to indicate that a "Specimen number" would be associated with anything other than a specimen. Unvouchered or not, if these pertain to observations, why then give them specimen numbers? If each observation by those people listed as collector(s) for those entries was NOT based on a specimen, then what were they based on? A ghost? A hallucination?

In the midst of all this, no one has pointed out the irony here: Hoser has been consistently labeled a taxonomic "vandal" for producing questionable new taxa and people want to suppress or synonymize his names. Well, here is one case where the Thomas *et al.* team actually agree that Hoser was correct! But rather than alert Hoser to a potential problem that could be rectified by Hoser or a co-authored article — because he is so despised, they took it upon themselves to name the creatures themselves.

You *herp* guys are indeed an amusing bunch. .. and to follow on with what others have said: YES! The next edition of the Code needs to be more clear on what does and does not fulfill the requirements of a type "specimen". But whatever changes are made, it cannot be done retroactively.

-Neal

And:

From: taxacom-bounces at mailman.nhm.ku.edu [taxacom-bounces at mailman.nhm.ku.edu] On Behalf Of Stephen Thorpe [stephen_thorpe at yahoo.co.nz]

Sent: Sunday, April 13, 2014 11:05 AM

To: Doug Yanega; Raymond Hoser - The Snakeman; iczn-list; taxacom at mailman.nhm.ku.edu; rrossco at gmail.com; envirodata at hotmail.com; drtjshaweswood at calodema.com

Subject: Re: [Taxacom] [iczn-list] provisions to

the Code

None of this is relevant! Observational records or not, there is nothing in the Code which clearly invalidates Hoser's holotype designations!

People are reading into the Code what suits their agenda, and not what is actually written!

Specifically, the Code states (basically) that a holotype specimen must be designated. That means that a particular specimen must be specified, but it doesn't say in what ways it may be specified. Therefore, specifying a specimen by way of an observational record of that specimen is OK. The Code makes it clear that an author doesn't actually have to have seen or examined the holotype itself.

There is NO problem, Houston!

Stephen

And;

From: taxacom-bounces at mailman.nhm.ku.edu
taxacom-bounces at mailman.nhm.ku.edu on
behalf of Michael A. Ivie <
mivie at montana.edu>

Sent: 16 April 2014 19:06

To: taxacom at mailman.nhm.ku.edu

Subject: Re: [Taxacom] [iczn-list] provisions to
the Code

OK, everyone step back and breath. This is not that simple. How much worse is AJH than *Calodema*? How much worse is *Calodema* than *Mélanges Exotico-Entomologiques*? Than *L'Échange*? Those last 2 journals, privately published by the author of tens of thousands of poorly documented species were proposed for suppression decades ago, and that

was voted down. What about the allegedly back-dated "Cicindelidae: Bulletin of Worldwide Research"? If I remember correctly, some Scandinavian acarologist who published a large number of very poor descriptions ordered his types all destroyed upon his death.

Herpetologists have probably never heard of these other journals/cases and don't care about them, but the the same applies by non-herpetologists about AJH. Once you decide that AJH is so bad it has to be placed on the list of rejected works in its entirety, what about the next-worst? And, the next worst? Every sub-discipline has a journal or person that they think is the worst. This proposal will never pass, with good, practical reasons.

Today, declaring an entire journal with a living editor to be placed on the list of rejected publications will do nothing. Next week a newly named journal will appear and revalidate all the names. Rejecting the names one by one would be a better solution, although I do not see anything to keep them from being repeated next week as well. As forextending the ban into the future, to invalidate works not yet published is

indeed censorship. We call it a gag rule. I am wondering if anywork by a living author has ever been placed on the rejected list

contrary to their wishes? Has it ever been done that names proposed by a certain person are placed on the rejected list for simply being named by that person, both those already published and those that may be

published in the future? When a work is placed on the rejected list, a reason is given, Geoffroy for not being consistently binomial, etc.

What reason will be given for AJH? "Unpopular Editor" would be pretty weak in a 100 years.

If coleopterists can survive 38,000 Pic names, herpetologists can survive a mere 600 Hoser names. And yes, the *Macrochelys* is valid. Live with it.

Mike (who swore he was not getting into this)

CHELYDRA SCHWEIGGER, 1812

The taxonomy and nomenclature of the Common Snapping Turtle genus has been fairly stable since the publication of Phillips *et al.* (1996), which resulted in there being three recognized species, being *Chelydra serpentina* (Linnaeus, 1758) from North America, *Chelydra acutirostris* (Peters, 1862) from south and southern central America as far north as Honduras and *Chelydra rossignonii* (Bocourt 1868), from Mexico to Honduras on the Pacific draining side.

Further inspection of specimens of *C. acutirostris* (type locality of Guayaquil, Equador) across the range of the putative taxon has shown the presence of two clearly allopatric, morphologically divergent forms worthy of species-level division. With no available name, the form from the Pacific drainages on the Panama Isthmus is herein formally named as a new species, *Chelydra haydnmcphiei* sp. nov..

Physical evidence showing the Panama Isthmus closed around 2-3 MYA (O'Dea *et al.* 2016) would imply that the two relevant populations of *Chelydra* from northern South America would have been separated from one another for a similar time frame, which is more than enough to allow each form to allopatrically speciate.

Publications relevant to the genus *Chelydra* Schweigger, 1812, with specific reference to the species *C. acutirostris* (Peters, 1862) and the taxonomic acts within this paper, include Avise *et al.* (1992), Boulenger (1902a), Campbell and Howell (1965), Carr (1952), Carvajal-Cogollo *et al.* (2020), Castro-Herrera and Vargas-Salinas (2008), Cope (1872), Dunn (1945), Ernst and Barbour (1972, 1989), Feuer (1966, 1971), Gibbons *et al.* (1988), Jungnickel (1987), McCranie (2015, 2018), Medem (1977), Moll and Dodd Jnr (1985), O'Dea *et al.* (2016), Peters (1862), Phillips *et al.* (1996), Richmond (1958), Rhodin *et al.* (2017), Schmidt (1946), Smith and Smith (1980), Wermuth and Mertens (1977) and sources cited therein.

There is also an extensive bibliography of all things *Chelydra* online at:

http://www.repfocus.dk/Chelydra_bibliography.html

CRYPTOCHELYS IVERSON, LE AND INGRAM, 2013

The Mud Turtle genus *Cryptochelys* Iverson, Le and Ingram 2013 (Type species: *Cinosternon leucostomum* Duméril, Bibron and Duméril, 1851) has been known to contain two sharply divergent lineages for some years (e.g. Iverson, Le, and Ingram 2013 and Loc-Barragan *et al.* 2020), with Iverson *et al.* 2013, giving an estimate of an 18 MYA divergence for the two clades.

With such a significant timeline of divergence, coupled with significant morphological differentiation, it is appropriate that the unnamed assemblage be given recognition as a new genus called *Martinekchelys gen. nov.*. The relevant species in this divergent clade are *Cryptochelys* (AKA *Kinosternon*) *acutum* (Gray, 1831), *C. creaseri* (Hartweg, 1934) and *C. herrerae* Stejneger, 1925.

Publications relevant to the genus *Kinosternon sensu lato*, including, *Rhinoclemmys* Fitzinger, 1835, *Sternotherus* Bell, 1825 and the recently named genus *Cryptochelys* Iverson, Le and Ingram, 2013 relevant to the taxonomic acts within this paper include Agassiz (1857), Akeret (2009), Allen (1932), Atkinson (2012, 2013), Barley *et al.* (2010), Bartlett and Bartlett (1999), Becker (1992, 1995), Becker and Müller (1997), Bell (1825a, 1825b, 1827), Bennett *et al.* (2015), Berry and Iverson (1980), Bidmon (2015), Bocourt (1876), Bonin *et al.* (2016), Boulenger (1889, 1913), Bour (2008b), Campbell (1998), Castañeda and Mora (2015), Conant and Berry (1978), Conant and Collins (1991), Cope (1870), Dixon (2000), Duméril and Bibron (1835, 1851), Duméril and Duméril (1935, 1851), Dundee and Rossman (1989), Ernst and Barbour (1989), Ernst and Lovich (2009), Fitzinger (1835), Gad (1987, 1989, 1993), Gray (1825, 1831a, 1831b, 1844, 1856a, 1860a), Günther (1885), Hallowell (1856), Hartweg (1934, 1938, 1939), Hennig (2003, 2004, 2015), Hibbitts and Hibbitts (2016), Iverson (1977a, 1977b, 1978, 1983, 1988, 1998), Iverson and Berry (1979), Iverson *et al.* (2013), Jensen *et al.* (2008), Joyce and Bourque (2016), Köhler (2000, 2008), Latrielle (1802), Lee (2000), Legler and Vogt (2013), Lemos-Espinal and Dixon (2013), Lemos-Espinal and Smith (2015), Lemos-Espinal *et al.* (2018), Lehmann (1984), Loc-Barragan *et al.* (2020), Lourenço *et al.* (2011), Mata-Silva *et al.* (2002), Moll and Williams (1963), Palmer and Braswell (1995), Pereira *et al.* (2017), Rau (2010), Reynolds and Seidel (1982, 1983), Seidel and Lucchino (1981), Rhoads (1895), Rhodin *et al.* (2017), Scott *et al.* (2017), Schilde (2001, 2003a, 2004a), Schmidt (1941, 1947), Scott *et al.* (2017), Seidel *et al.* (1981, 1986), Smith and Brandon (1968), Smith and Glass (1947), Smith and Taylor (1950), Spinks *et al.* (2014), Spix (1824), Stejneger (1902, 1923, 1925), Thomson *et al.* (2008), Tinkle (1958), Tinkle and Webb (1955), Walker *et al.* (1995, 1997), Wermouth and Mertens (1996), Wiens *et al.* (2010), Woolrich-Piña *et al.* (2017), Zug (1986) and sources cited therein

STERNOTHERUS BELL, 1825

The genus *Sternotherus* Bell, 1825, type species Type species: *Sternotherus odoratus* (= *Testudo odorata* Latreille in Sonnini and Latreille 1802), by subsequent designation by Stejneger (1902:237), splits into two well-

defined clades.

These are *Sternotherus odoratus* (Latrielle, 1802) and *S. carinatus* (Gray, 1856), which remains the type genus and subgenus.

The second grouping, which according to Iverson *et al.* (2013) diverged from the main group about 14 MYA include the species *Sternotherus minor* (Agassiz, 1857), *S. peltifer* (Smith and Glass, 1947), *S. depressus* Tinkle and Webb, 1955 and *S. intermedius* Scott, Glenn and Rissler, 2017.

They are herein placed into a new subgenus *Parasternotherus subgen. nov.*

For relevant references, see the preceding citations under the heading, *Cryptochelys* Iverson, Le and Ingram 2013.

RHINOCLEMMYS FITZINGER, 1835

The genus *Rhinoclemmys* Fitzinger, 1835, type species: *Geoemyda* (*Rhinoclemmys*) *dorsata* (= *Testudo dorsata* Schoepff, 1801 = subjective synonym of *Testudo punctularia* Daudin, 1801), by subsequent designation as *Emys dorsata sensu* Schweigger 1812 by Lindholm (1929), is herein split four ways on the basis of deep divergences between four phyletic groups combined with obvious morphological divergences.

The species retained in *Rhinoclemmys* are *Rhinoclemmys punctularia* (Daudin, 1801) (type species), *R. areolata* (Duméril and Bibron, 1851), *R. diademata* (Mertens, 1954), *R. flammigera* (Paolillo, 1985), *R. funerea* (Cope, 1876), and *R. melanosterna* (Gray, 1861).

Parageoemyda subgen. nov. is created by splitting a divergent group from the genus *Geoemyda* Gray, 1834.

The newly named species *Geoemyda daranini sp. nov.* from Vietnam has until now been treated as a southern population of *Geoemyda spengleri* (Gmelin, 1789), from southern China, but is clearly a species-level divergent form.

The name *Callopsis* Gray, 1863 is available for the group of species including the type species *Rhinoclemmys* (*Callopsis*) *annulata* (= *Geoclemmys annulata* Gray, 1860), by original monotypy.

Hence the species in this genus are *Callopsis annulata* (Gray, 1860), *C. incisa* (Bocourt, 1868), *C. manni* (Dunn, 1930), *C. pulcherrima* (Gray, 1856) and *C. rogerbarbouri* (Ernst, 1978).

The remaining two genera are as follows:

1/ *Crottychelys gen. nov.*, type species *Chelopus rubidus* Cope, 1870, better known as *Rhinoclemmys rubida* (Cope, 1870), is a new genus which also includes *Geoemyda rubida perixantha* Mosimann and Rabb 1953, more recently treated as being a subspecies of "*Rhinoclemmys rubida* (Cope, 1870)", but herein treated as a full species.

These two species have a divergence of about 20 MYA from nearest living relatives according to Pereira *et al.* (2017).

A subspecies of the taxon "*Rhinoclemmys rubida* (Cope, 1870)" is also formally named herein for the first time as *C. perixantha ipsumentenebris subsp. nov.*

2/ *Oxychelys* gen. nov., type species *Oxychelys oxyi* sp. nov. from Colombia, is the genus which also includes the species *Nicoria nasuta* Boulenger, 1902 (Boulenger, 1902b), better known as *Rhinoclemmys nasuta* (Boulenger, 1902). Together they form a divergent clade which had a divergence of nearly 20 MYA from nearest living relatives according to Pereira *et al.* (2017).

For relevant references, see the preceding citations under the heading, *Cryptochelys* Iverson, Le and Ingram 2013.

KINOSTERNUM BAURII (GARMAN, 1891)

The well-known south-east USA species *Kinosternon baurii* (Garman, 1891) is divided two ways with the northern populations with reduced or no markings on the carapace formally named for the first time as *Kinosternon baurii grantturneri* subsp. nov..

Besides morphological divergence from the central and south Florida animals as found by Lamb and Lovich (1990), genetic divergence was also found by Wilson and Karl (2001).

For relevant references, see the preceding citations under the heading, *Cryptochelys* Iverson, Le and Ingram 2013.

ACANTHOCHELYS GRAY, 1873

The genus *Acanthochelys* Gray, 1873 is split two ways. The species group associated with *Emys radiolata* Mikan, 1820 is sufficiently divergent from the other species in the genus to warrant being transferred to a new genus. As there is no pre-existing name for the group of species (at least two, with only one currently named), the genus *Sloppchelys* gen. nov. is formally erected to accommodate the species.

Publications relevant to the genus *Acanthochelys* Gray, 1873 *sensu lato* and the taxonomic decision made herein include Alderton (1998), Artner (2007), Ávila *et al.* (2006), Bonin *et al.* (2006), Boulenger (1886), Bour (2009), Brandao *et al.* (2002), Cabrera and Böhm (2015), Castro and Teixeira (2007), Duméril and Bibron (1935), Ernst (1983a, 1983b, 1983c, 1987), Ernst and Barbour (1989), Freiberg (1945, 1967), Freitas *et al.* (2018, 2019), Fritz and Pauler (1992a, 1992b, 1999), Garbin *et al.* (2016), Garcia-Passos *et al.* (2018), Gemel *et al.* (2019), Giraudo (1996), Gustafson (2006), Hoogmoed and Gruber (1983), Huebinger *et al.* (2013), Iverson (1986), Kacoliris *et al.* (2006), Mikan (1820), Oliveira *et al.* (2020), Pereira *et al.* (2017), Rhodin *et al.* (1984, 1984b, 1990, 2017), Rocha *et al.* (2004), Schnee (1900), Siebenrock (1902b), Silva-Soares (2011), Souza (2004, 2019), Souza *et al.* (2019), Spix (1824), Valenzuela (2009), Valverde (2009), Varela (1999), Vinke and Vinke (2001, 2006, 2010), Wied-Neuwied (1824), Winkler (2006), Zocca *et al.* (2019) and sources cited therein.

MANOURIA GRAY, 1854

Manouria Gray, 1854 is split two ways, with a new genus being formally named.

A new species in the new genus *Freudchelys* gen. nov. is also formally named for the first time as *Freudchelys freudi* sp. nov..

Publications relevant to the genus *Manouria* Gray, 1854

sensu lato and the taxonomic decisions made herein include Alderton (1988), Blyth (1854), Bonin *et al.* (2006), Boulenger (1903), Bour (1998), Choudhury (1996, 2001), Cox *et al.* (1998), Das and Das (2017), Ernst and Barbour (1989), Eggenschwiler (2003, 2005), Ernst and Barbour (1989), Fritz and Havaš (2014), Gray (1841, 1855, 1861c, 1871a, 1872c), Grossmann (1994), Günther (1882), Kundu *et al.* (2013, 2016, 2017), Le *et al.* (2006), Lourenço *et al.* (2011), Manthey and Grossmann (1997), Mell (1938), Mo (2020), Moll (1989), Murthy (2010), Nguyen *et al.* (2009), Nutaphand (1979), Pereira *et al.* (2017), Platt *et al.* (2002), Rhodin *et al.* (2017), Schaffer and Morgan (2002), Schlegel and Müller (1845), Stanford *et al.* (2015), Stoliczka (1871), Theobald (1868b), Valverde (2004), Velo-Antón *et al.* (2011), Zug and Mulcahy (2019) and sources cited therein.

CLEMMYS GUTTATA (SCHNEIDER, 1792)

The North American Spotted Turtle *Clemmys guttata* (Schneider, 1792), is familiar to most American herpetologists in the north east of the USA and is a species I have had cause to inspect when visiting the USA. Hence I was astounded that distributionally disjunct, morphologically divergent populations had not been afforded taxonomic recognition.

As a species, putative *C. guttata* are not a particularly mobile species and so it would make sense that morphologically divergent, allopatric populations are not just divergent at the subspecies level, but also potentially to the species level.

The nominate forms of both *C. guttata* and *Geoclemmys sebae* Gray, 1869 are both from Philadelphia, Pennsylvania, USA according to Rhodin *et al.* (2017) and sources cited therein and therefore only apply to that form of the species at the subspecies level. In the absence of molecular data for the various divergent populations and an abundance of caution, the physically larger (on average) Great Lakes form is formally named for the first time as is the southern, east cost population with smaller and less distinct spots on the carapace, both as new subspecies.

The form from the Great Lakes drainages is formally named *C. guttata maximus* subsp. nov., while the South Carolina Population is formally named *C. guttata praetortus* subsp. nov..

Publications relevant to the the putative species *Clemmys guttata* (Schneider, 1792) and the taxonomic concusions within this paper relevant to it include Allerstorfer (2017), Angielczyk and Feldman (2013), Anthonysamy *et al.* (2014), Barnwell *et al.* (1997), Beaudry *et al.* (2009), Belmore (2004), Bentley and Knight (1993), Bickham *et al.* (1996), Bour (2008), Buchanan *et al.* (2017), Burke *et al.* (1996), Bury and Ernst (1997), Camper (2019), Chandler *et al.* (2020), Conant (1938), Conant and Collins (1991), Cordero (2017), Cross and Becker (2017, 2018), Ernst (1967, 1968, 1970a, 1970b, 1972, 1976, 1982, 2001), Ernst and Barbour (1989), Ernst and Lovich (2009), Ernst and Zug (1994), Feldman and Parham (2002), Feng *et al.* (2019), Folkerts and Skorepa (1967), Froom (1976), Gray (1869), Graziano (2019), Green and Pauley

(1987), Haxton and Berrill (2001), Holman and Fritz (2001), Howell and Seigel (2018, 2019), Howell *et al.* (2016, 2019), Jensen *et al.* (2008), King *et al.* (1997), Krolak and Bidnon (2016), Krolak and Krolak (2015), Lambertz and Lambertz (2002), Litzgus (2006), Litzgus and Brooks (1998a, 1998b, 2000), Litgus and Mousseau (2003, 2004, 2006), Litgus *et al.* (2008), Lovich (1998), Lovich and Jaworski (1988), Lovich *et al.* (2014), Manns (1969), Mehrtens (1949), Milam and Merlvin (2001), Mitchell (1994), Mitchell and Reay (1999), Moski (1957), Netting (1940), Niederberger and Seidel (1997), Oxenrider *et al.* (2018, 2019), Palmer and Braswell (1995), Parker and Whiteman (1993), Pereira *et al.* (2017), Perry (2018), Phillips (2016), Rasmussen and Litzgus (2010), Ritgen (1828), Roe and Nacy (2017), Rowe *et al.* (2012), Ruther *et al.* (2017), Schaefer (1994), Schneider (1792), Schoepff (1792), Seburn (2012), Seidel and Ernst (2017), Sowerby and Lear (1872), Spinks and Bradley Shaffer (2009), Steen (2013), Steiner (1977), Stevenson *et al.* (2018), Ultsch and Carroll (2020), Ward *et al.* (1976), Wilson (2000), Wright (1918), Yagi and Litzgus (2012) and sources cited therein.

ACTINEMYS AGASSIZ, 1857

Until recently, species within the genus *Actinemys* Agassiz, 1857 was subsumed within *Emys* Duméril, 1805, although molecular phylogenies, including that of Pereira *et al.* (2017) have confirmed that species within putative *Actinemys* are not closely related to the type form of *Emys* and so the genus *Actinemys* is recognized herein.

All tortoises within *Actinemys* were all treated as being of the single species *Emys marmorata* Baird and Girard, 1852 by original designation until recently.

Following the paper of Seeliger (1945) and later works, such as Spinks *et al.* (2014), that putative species has been treated as two, being *E. marmorata* (Baird and Girard, 1852) from generally north of San Francisco, California, USA along the coast and ranges to British Columbia, Canada, where it is either now rare or extinct and *E. pallida* (Seeliger, 1945) from south of this range, through southern California and into Baja Mexico.

Seeliger (1945), Spinks *et al.* (2014), and others have recognized the Baja, Mexico population as being both morphologically and genetically divergent from the others and it is on this basis that it is formally named herein as a new species.

Seeliger (1945) wrote of the southern form from Baja North Mexico the following:

"Since the few specimens from Lower California are not similar to either the southern or northern forms herein defined, no attempt will be made to assign them to either subspecies."

After a time gap of more than half a century, it is wholly appropriate that this unnamed form be formally named and it is herein identified and named as *Actinemys maxinehoserae* sp. nov..

Papers relevant to this genus and in particular the newly named species, relevant to the taxonomic decisions herein, include Agassiz (1857), Baird and Girard (1852), Barela and Olson (2014), Bettelheim (2005a, 2005b),

Bondi and Marks (2013), Boulenger (1889), Bour (2008), Bury (1970), Bury and Ernst (1977), Bury *et al.* (2010), Buskirk (2002), Crother (2012, 2017), Duméril (1805), Ernst (2001), Ernst and Barbour (1989), Ernst and Lovich (2009), Feldman and Parham (2002), Fitch (1936), Fritz (2001, 2001b), Germano (2000, 2015), Germano and Bury (1998, 2001, 2009), Germano and Rathbun (2008), Germano and Riedle (2015), Gray (1870, 1872b), Hallowell (1854), Haman *et al.* (2019), Holland (1992), Holman and Fritz (2001), Janzen *et al.* (1997), Kittleson *et al.* (2020), Lambert *et al.* (2013, 2019), Legler and Vogt (2013), Leidy *et al.* (2016), Lovich and Meyer (2002), Lovich *et al.* (2005, 2007), Lubcke and Wilson (2006), Obst (2003), Pereira *et al.* (2017), Reynolds *et al.* (2007), Rhodin *et al.* (2017), Rosenberg and Swift (2012), Ruso *et al.* (2017), Scott *et al.* (2008), Seeliger (1945), Seidel and Ernst (2007), Spinks and Shaffer (2005, 2009), Spinks *et al.* (2003, 2014, 2016), Stebbins (1985), Stejneger (1893), Storer (1930), Thomson *et al.* (2008), Valdez-Villavicencio *et al.* (2016a, 2016b), Van Denburgh (1922), Welsh (1988), Werning (2012), Wilcox (2019), Zaragoza *et al.* (2015) and sources cited therein.

HEOSEMYS STEJNEGER, 1902

The genus *Heosemys* Stejneger, 1902 has been shown by Pereira *et al.* (2017) and others to be divided into two main clades. One clade containing the type species only, namely *Emys spinosa* Gray, 1831, currently recognized in herpetology as being of a single species only, the other clade having all other species in the genus as currently recognized (e.g. Rhodin *et al.* 2017). The name *Hieremys* Smith, 1916, type species being *Hieremys annandalii* (= *Cyclemys annandalii* Boulenger, 1903), by original monotypy is available for those species, which according to Pereira *et al.* (2017) diverged from *Emys spinosa* more than 20 MYA.

Therefore I resurrect from synonymy and recognize the name *Hieremys* Smith, 1916 as the appropriate genus name for *H. annandalii* (Boulenger, 1903) and the other two taxa recently placed in *Heosemys*, being *Geoemyda depressa* Anderson, 1875 and *Geoemyda grandis* Gray, 1860.

The putative species *Emys spinosa* Gray, 1831 is clearly composite, but a thorough inspection of specimens from across the known range of the species only showed two very distinct forms. These were the nominate form from Peninsula Malaysia and a very different form from Borneo and immediately offshore islands.

The specimens from Sumatra appeared most like those from Peninsula Malaysia (same eye colour and plastron scute configuration), as opposed to the Borneo animals and so has been assigned to that species.

There is no available name for the Borneo specimens and in light of the molecular results of Spinks *et al.* (2012), I have no hesitation in formally describing the Borneo form as a new species, *H. turneri* sp. nov..

Hieremys grandis (Gray, 1860), originally described as *Geoemyda grandis* Gray, 1860 has a type locality of Cambodia and that form of the putative species occurs in zone generally near the coast running from Vietnam, Cambodia, Laos, Thailand and into Peninsula Malaysia.

The population from the west flowing watercourses on Peninsula Malaysia in the states of Perak and Kedah are morphologically divergent from the others further north, appear to be allopatric in distribution, with an apparent break on the Isthmus of Kra and are therefore formally named as a new subspecies.

While taxonomy should not be used improperly as a means to draw attention to a taxon, I do note that putative *H. grandis* are under extreme existential threat across their range and with it being noted here that there are divergent populations, the relative threat to each is even greater.

A similar situation exists with respect of the species *Hieremys annandalii* (Boulenger, 1903), originally named as *Cyclemys annandalii* Boulenger, 1903 and most recently placed in the genus *Heosemys* Stejneger, 1902 (Rhodin *et al.* 2017).

The form from the Chao Phraya River basin in Thailand and including specimens on the east side of Peninsula Malaysia, being the type form (Type locality Yala Province, south Thailand), differ from specimens from the Mekong basin in Vietnam and Laos.

The unnamed form from the Mekong basin is formally identified as the new subspecies *Hieremys annandalii mekongensis* *subsp. nov.*

Literature relevant to the putative species *Heosemys spinosa* (Gray, 1831), *Hieremys grandis* (Gray, 1860) and *Hieremys annandalii* (Boulenger, 1903) including the taxonomic and nomenclatural conclusions herein include Ahmad *et al.* (2019), Auer (2011), Auliya (2006), Becker, (1994), Bell (1836), Beolens *et al.* (2011), Bong Heang (1987), Boulenger (1903), Chan-ard *et al.* (2011, 2015), Cox *et al.* (1998), Das (1996), Diesmos *et al.* (2005, 2008), Duméril and Bibron (1835), Duong *et al.* (2014), Ernst and Barbour (1989), Fritz (1997), Fritz and Freitag (2008), Gaulke and Fritz (1998), Goode and Ewert (2006), Gray (1830, 1831a, 1834a, 1834b, 1860c, 1873c), Grismer *et al.* (2008, 2010), Grossmann and Tillack (2001), Hartmann *et al.* (2013), Herman (1993), Iverson and McCord (2016), Joyce *et al.* (2013), Kasper *et al.* (2013), Kowalski *et al.* (2011), Lee *et al.* (2009), Lehr and Holloway (2003), Lorenz (1984), Malkmus *et al.* (2002), Manthey and Grossmann (1997), Mertens (1971), Molengraaff and Weber (1921), Nguyen *et al.* (2009), Nur-Amalina *et al.* (2017), Onn *et al.* (2009), Pauwels *et al.* (2000, 2003), Pereira *et al.* (2017), Platt *et al.* (2014), Rhodin *et al.* (2017), Rooijen *et al.* (2001), Rudolphi and Weser (2000), Schilde (2004b), Sowerby and Lear (1872), Spinks *et al.* (2012), Stejneger (1902), Sumarli *et al.* (2015), Teo and Rajathurai (1997), Teynié *et al.* (2010), Theobald (1868b), Voris (2000), Ziegler *et al.* (2006), Zug and Mulcahy (2019) and sources cited therein.

VIJAYACHELYS SILVATICA (HENDERSON, 1912)

The species *Vijayachelys silvatica* (Henderson, 1912), monotypic for the genus *Vijayachelys* Praschag, Schmidt, Frittsch, Müller, Gemel and Fritz, 2006 was for many years only known from the southern Western Ghats of south-west India, although for more than 30 years now, populations from north of the Paighat gap (AKA Palakkad gap) have been known.

The Paighat gap is a 30 km lowland divide between the otherwise uninterrupted hill ranges of the Western Ghats and a known biogeographical barrier in terms of local herpetofauna.

Inspection of numerous specimens of *V. silvatica* by myself from either side of the Paighat gap showed consistent morphological differences between specimens, I have deemed worthy of taxonomic recognition.

In the absence of molecular data and an abundance of caution, I have taken the conservative step and formally described the hitherto unnamed northern population as a new subspecies *V. silvatica whittoni* *subsp. nov.*

Publications relevant to the genus *Vijayachelys* Praschag, Schmidt, Frittsch, Müller, Gemel and Fritz, 2006, *V. silvatica* and the taxonomic decision within this paper include Appukuttan (1991), Daniels (2001), Das (1995), Deepak and Vasudevan (2010, 2013), Deepak *et al.* (2019, 2014), Ernst and Barbour (1989), Groombridge *et al.* (1983), Henderson (1912), Jose *et al.* (2007), Kanagavel and Raghavan (2012), Moll *et al.* (1986), Murthy (2010), Praschag, Schmidt, Frittsch, Müller, Gemel and Fritz, 2006, Rhodin *et al.* (2017), Schaefer (2005), Schilde (2004), Sharath (1990), Smart (2008), Smart *et al.* (2014), Smith (1931), Vasudevan and Deepak (2008, 2010), Vasudevan *et al.* (2010), Vijaya (1982, 1983), Whitaker and Vijaya (2009) and sources cited therein.

CHITRA INDICA (GRAY, 1830)

The species *Chitra indica* (Gray, 1830) is formally divided into two subspecies. The nominate form is from the Ganges drainage, while the Indus form is formally named as *Chitra indica indusensis* *subsp. nov.* Braulik *et al.* (2015, 2021) are some of a number of recently published papers which have found that riverine species from the Ganges and Indus systems last apparently mixed about 550K years ago.

Publications relevant to the genus *Chitra* Gray, 1844, the species *Chitra indica* (Gray, 1830) and the taxonomic decisions made herein include Adil *et al.* (2020), Ali *et al.* (2018), Bonin *et al.* (2006), Boulenger (1889), Bour (2008), Braulik *et al.* (2015, 2021), Cantor (1847), Cox *et al.* (1998), Das and Das (2017), Das and Singh (2009), Duméril and Bibron (1835), Engstrom *et al.* (2002), Ernst and Barbour (1989), Gemel and Haring (2011), Gray (1830, 1831a, 1831c, 1844, 1864a), Ka"stle *et al.* (2013), Khan (2006), Lenz (2012), Li *et al.* (2017), Manthey and Grossmann (1997), Martens (1876), McCord and Pritchard (2003), Murthy (2010), Rhodin *et al.* (2017), Smith (1931), Swan and Leviton (1962), Taylor (1970) and sources cited therein.

CHELONOIDIS FITZINGER, 1835

Vargas-Ramírez and Fritz (2010) found that various regional forms of the widespread (putative) South American species *Chelonoidis carbonaria* (Spix, 1824) diverged from one another between 2 and 4 MYA.

The three available names all refer to specimens of the form from north-east or eastern Brazil, being, *Testudo carbonaria* Spix, 1824, *Testudo boiei* Wagler, 1830 and *Testudo hercules truncata* Gray, 1830. The three

morphologically distinctive and divergent forms from the south of the range of the putative species (mainly Paraguay) and the north east (2 forms from Colombia and Panama) are formally named within this paper as *Chelonoidis hoserae* sp. nov., *C. woolfi* sp. nov. and *C. fiacummingae* sp. nov..

The morphologically similar and sometimes sympatric species, *Chelonoidis denticulatus* (Linnaeus 1766) was found by Vargas-Ramírez and Fritz (2010) to have diverged from the *Chelonoidis carbonaria* (Spix, 1824) species group about 13 MYA and by more than 20 MYA by Pereira *et al.* (2017). Due to the morphological and biological divergence of this taxon, it is formally placed in a new subgenus *Parachelonoidis* subgen. nov..

Publications relevant to the genus *Chelonoidis* Fitzinger, 1835, the putative species *Chelonoidis carbonaria* (Spix, 1824) and *Chelonoidis denticulatus* (Linnaeus 1766) as well as the taxonomic decisions made herein, include Andersson (1900), Bell (1836), Bonin *et al.* (2006), Castaño-Mora and Lugo Rugeles (1981), Catenazzi *et al.* (2013), Censky (1988), Duméril and Bibron (1835), Duméril *et al.* (1854), Ernst and Barbour (1989), Ferreira (2021), Ferronato *et al.* (2011), Gaffney (1979), Hoogmoed and Gruber (1983), Humair (2013a, 2013b), Le *et al.* (2006), Legler (1963), Lehr (2001, 2002), Linnaeus (1766), Loftin (1965), Merchán *et al.* (1988), Methner (1989), Olson and David (2014), O'Malley (2010), Pereira *et al.* (2017), Pritchard and Terebbau (1984), Rodriguez-Bayona and Rylander (1984), Rhodin *et al.* (2017), Schneider (1792), Valverde (2004, 2009), Vargas-Ramírez and Fritz (2010), Vinke *et al.* (2008), Vlachos and Rabi (2018), Williams (1960) and sources cited therein.

KINIXYS BELL, 1827

Morphologically divergent Central African forms of the species *Kinixys homeana* Bell, 1827 and *Kinixys erosa* (Schweigger, 1812) are formally identified and named as subspecies for the first time.

The divergence of these forms was across the well-known and well defined biogeographical barrier of the Dahomey Gap (Togo and Benin) on the south coast of West Africa.

Publications relevant to the taxonomy and nomenclature of the two newly named subspecies and associated species include Barnett and Emms (2005), Bell (1827), Boelens *et al.* (2011), Bonin *et al.* (2006), Boulenger (1889), Broadley (1997), Carlino (2010), Chirio and Ineich (2006), Chirio and Lebreton (2007), Duméril and Bibron (1835), Duméril *et al.* (1854), Ernst and Barbour (1989), Gramentz (2001b), Gray (1864c, 1873c), Harvan (2007), Hoinsoude-Segniagbeto *et al.* (2014), Hoser (2013a), Jackson and Blackburn (2007), Kindler *et al.* (2012), Lawson (2006), Lenglet and Colyn (1989), Loveridge and Ernst (1957), Luiselli (2006), Mifsud (2014), Nowak-Kemp (2009), Pauwels and Vande Weghe (2008), Schmidt (1919), Schweigger (1812), Shah (1960), Siebenrock (1916), Spawls *et al.* (2002, 2018), Trape *et al.* (2012), Valverde (2005a, 2005b), Vlachos and Rabi (2018), Zessin (2004) and sources cited therein.

CYCLEMYS BELL, 1834

A well-known undescribed species within the genus *Cyclemys* Bell, 1834 from north-west Cambodia is formally named for the first time.

Publications relevant to the taxonomy and nomenclature of the newly named taxon and associated species include Auliya (2006), Boelens (2011), Bour (2008), Chan-ard *et al.* (2015), Fritz *et al.* (1997, 2008), Geissler *et al.* (2019), Gray (1863c, 1864b), Guicking *et al.* (2002), Iverson and McCord (1997), Kařtle and Schleich (2013), Kim (2011), Lourenço *et al.* (2011), Nguyen *et al.* (1997), Nguyen *et al.* (2009), Rai (2004), Schilde (2003b, 2004b), Schilde *et al.* (2004), Smith (1931), Stuart and Fritz (2008), Teynié *et al.* (2010), Vamberger *et al.* (2017) and sources cited therein.

GRAPTEMYS AGASSIZ, 1857

The species *Graptemys caglei* Haynes and McKown, 1974 has long been known to have a divergent population from the upper reaches of the Guadalupe River, Texas, upstream of Seguin, Texas, USA. See for example Ward *et al.* (2013). Reflecting this reality, this hitherto unnamed form is formally described as *Graptemys caglei flavooculus* subsp. nov..

The nominate subspecies *G. caglei caglei* is found downstream from Seguin, Texas, USA and also in the nearby San Marcos River drainage also in Texas.

A distinctive dark-eyed subspecies of *Graptemys pseudogeographica* (Gray, 1831) from the Calcasieu River drainage of Louisiana, USA is formally named for the first time.

The wide-ranging species, *Graptemys geographica* (Lesueur, 1817) is herein split into two allopatric subspecies based on consistent differences in morphology and reproductive isolation.

Graptemys geographica aurantiacooculus subsp. nov. has until now been treated as a population of *Graptemys geographica* (Lesueur, 1817) with a type locality of "marsh, on the borders of Lake Erie", USA. The newly named *G. geographica aurantiacooculus* subsp. nov. occurs in the Susquehanna River drainage and other nearby Atlantic drainages.

Emys megacephala Holbrook, 1836, with a type locality of Cumberland River, near Nashville, Tennessee, is of the same form as type *Graptemys geographica geographica*.

Publications relevant to the taxonomy and nomenclature of putative *Graptemys caglei* Haynes and McKown, 1974, *Graptemys geographica* (Lesueur, 1817) and *Graptemys pseudogeographica* (Gray, 1831) and the taxonomic acts within this paper include Angley and Buhlmann (2017), Bartlett and Bartlett (1999), Bishop (1921), Cagle (1954), Baur (1890), Bour (2008), Bour and Dubois (1983), Braun and Phelps (2016), Cagle (1953, 1954), Carrière *et al.* (2009), Conant (1938), Conant and Collins (1991), Conant *et al.* (1964), Crother (2012), Dixon (2000), Duméril and Bibron (1835), Duméril *et al.* (1854), Dundee (1974), Ernst and Lovich (2009), Ernst and Barbour (2009), Garman (1890), Gray (1831a, 1831b), Green and Pauley (1987), Haynes and McKown (1974), Hibbits and Hibbits (2016), Holbrook

(1836), Jensen *et al.* (2008), Joyce *et al.* (2013), Kirkpatrick (1993), Lechowicz (2008), Lesueur (1817), Lindeman (2003, 2009, 2019), Lindeman *et al.* (2015), Mitchell (1994), Mitchell and Reay (1999), Ouellette and Cardille (2011), Patch (1925), Pluto and Bellis (1986, 1988), Praschag *et al.* (2017), Rhodin *et al.* (2017), Say (1924), Seidel and Ernst (2017), Selman and Lindeman (2020), Spinks and Bradley Schaffer (2009), Stephens and Wiens (2003), Thomson *et al.* (2008, 2018), Vogt (1993), Ward *et al.* (2013), Wilson (1966) and sources cited therein.

EMYS ORBICULARIS (LINNAEUS, 1758)

A long known, yet undescribed subspecies of *Emys orbicularis* (Linnaeus, 1758) from Tunisia and nearby parts of north-east Algeria is formally named for the first time as *Emys orbicularis repens subsp. nov.*

Publications relevant to the taxonomy and nomenclature of *Emys orbicularis* (Linnaeus, 1758) including the north African forms and the decision made to formally name the form from Tunisia and nearby parts of north-east Algeria include Bons and Geniez (1996), Bour (2008), Fahd *et al.* (2009), Fritz (1989, 1993a, 1993b, 1994a, 1994b, 1995a, 1995b, 1995c, 1996, 1998, 2001a, 2003), Fritz and Havaš (2007), Fritz and Obst (1995), Fritz *et al.* (1995, 1996, 1998b, 2005a, 2005b, 2006, 2007, 2009), Gray (1870), Joger *et al.* (2007), Kwet (2010), Kwet and Trapp (2014a, 2014b), Lenk *et al.* (1999), Linnaeus (1758), Malkmus (1982, 1995), Pedall *et al.* (2009, 2011), Pereira *et al.* (2017), Rhodin *et al.* (2017), Schleich *et al.* (1996), Seidel and Ernst (2017), Sommer *et al.* (2007), Spadola and Insacco (2009), Spinks and Bradley Shaffer (2009), Stuckas *et al.* (2014), Velo-Antón *et al.* (2018) and sources cited therein.

CUORA GRAY, 1856

Putative *Cuora mouhotii* (Gray, 1862), with a type locality of "Lao Mountains, in Siam" more recently restricted to "Luang Prabang, Laos, Latitude 19.54 N., Longitude 102.08 E., by lectotype designation of Fritz *et al.* (1998)" (see Fritz 1998a), has long been known to consist of two divergent populations, one being found in a region centred on Vietnam and adjacent China, including nearby Laos, and another population centred on the Assam region of eastern India, including immediately adjacent parts of adjoining countries..

The Indian population is herein formally named as *Cuora adelynhoserae sp. nov.*

As of 2021, putative *C. amboinensis* (Riche in Daudin, 1801), is a species broken up by most herpetologists into up to four subspecies, occupying the range from Ambon, across the East Indies to south-east Asia and across to Eastern India and adjoining countries.

The molecular data of Protiva *et al.* (2016) indicated at least five species in the complex (see Fig. 5 and their accounts of divergences between measured clades in the text of the paper).

The Indian form of the putative taxon *C. amboinensis* is the only unnamed one in their phylogeny and so is formally identified and named as *C. jackyhoserae sp. nov.* herein.

The four previously recognized subspecies, *Cuora amboinensis amboinensis* (Riche in Daudin, 1801), *Cuora amboinensis couro* (Lechenault in Schweigger 1812), type locality of Java, Indonesia, *Cuora amboinensis kamaroma* Rummier and Fritz, 1991, type locality about 50 km north of Bangkok, Thailand and *Cuora amboinensis lineata* McCord and Philippen, 1998, with a type locality of Myitkyina, Kachin Province, Myanmar (Burma), are all herein recognized as full species, each occupying ranges close to their type localities.

It is for example noted that Protiva *et al.* (2016), found species-level divergence between specimens of putative *C. amboinensis* from Borneo and Sumatra. Unnamed forms of putative *C. amboinensis* formally named for the first time in this paper and not necessarily included in the phylogenetic study of Protiva *et al.* (2016) are as follows:

C. jackyhoserae sp. nov. from eastern India and nearby parts of Bangladesh, Bhutan and Myanmar (Burma);

C. oxylopp sp. nov. from the Philippines;

C. boxboyi sp. nov. from Sulawesi;

C. elfakiorum sp. nov. from Borneo;

C. richardwellsi sp. nov. from Enganno Island;

C. rosswellingtoni sp. nov. from Halmahera Island.

All are clearly divergent from one another and can be differentiated morphologically and this is why I had no hesitation in recognizing each as full species, rather than as subspecies.

I note this is also a position counter to that of Ernst *et al.* (2016), who cited the discredited blog rant of Kaiser *et al.* (2013) as a basis to ignore the earlier work of McCord and Philippen (1998).

Publications relevant to the putative species *Cuora mouhotii* (Gray, 1862) and putative *C. amboinensis* (Riche in Daudin, 1801) and the taxonomic acts within this paper, include Abdala *et al.* (2008), Auliya (2006), Becker (1999, 2012), Beolens *et al.* (2011), Bernhardt (1995), Blanck (2013), Basumatary and Sharma (2013), Beukema (2011), Bourret (1941), Brown *et al.* (1996, 2000, 2012, 2013), Chan-ard *et al.* (1999, 2015), Chao *et al.* (2011), Cox *et al.* (1998), Das *et al.* (2016), Das and Das (2017), Das and Gupta (2017), Das *et al.* (2009), Daudin (1801, 1802), Diesmos *et al.* (2008), Duméril and Bibron (1835), Duméril *et al.* (1854), Ernst (1988), Ernst *et al.* (2011, 2016), Ernst and Barbour (1989), Ferner *et al.* (2000), Filella (1997), Fong and Qiao (2010), Forth (2017), Fritz and Obst (1997, 1998), Fritz and Freitag (2008), Fritz and Mendau (2002), Fritz *et al.* (1998a, 2002), Galgon and Fritz (2002), Gaulke (1995, 2001, 2011, 2017), Gaulke and Fritz (1998), Gemel *et al.* (2009), Gojo-Cruz and Afuang (2018), Gray (1856a, 1856b, 1862, 1864b), Grychta (1988), Hennig (2004, 2012), Ives *et al.* (2008), Kaiser *et al.* (2013) (wholly discredited in numerous later publications, e.g. Cogger 2014, Hoser 2015a-f, as well as being overruled by ICZN 2021), Kocj (2012), Kunz (2013), ICZN (2021), Lourenço *et al.* (2011), Ly *et al.* (2013), Manthey and Grossmann (1997), McCord and Philippen (1998), McDowell (1964), McLaughlin and Tristan Stayton

(2016), Mertens (1930), Murthy (2010), Nguyen *et al.* (2009), Nguyen *et al.* (2020), Parham *et al.* (2001), Pauler (1990), Pauwels *et al.* (2003), Praedicow (1985), Protiva *et al.* (2016), Purkayastha *et al.* (2013), Rahman *et al.* (2015), Rummler and Fritz (1991), Sachsse (1973), Schilde (2004b), Schmidt (1927), Schweigger (1812), Singh and Singh (2012), Spinks and Bradley Shaffer (2007), Struijk and Blanck (2015, 2016), Struijk *et al.* (2016), Stuart and Parham (2004), Taylor (1970), Theobald (1868b), Tshewang and Letro (2018), Rhodin *et al.* (2017), Wagner (2018a, 2018b), Wang *et al.* (2020), Wanger *et al.* (2011), Wangyal *et al.* (2012), Wangyal *et al.* (2012), Xiao *et al.* (2017), Zhang *et al.* (2008), Ziegler (2002), Zug and Mulcahy (2019) and sources cited therein.

CHERSINA GRAY, 1830

The African Angulate Tortoise, *Chersina angulata* (Duméril in Schweigger, 1812), long suspected of comprising up to four well-defined regional forms (*sensu* Archer, 1967) remains being treated by herpetologists as a single species until now.

However, Spitzweg *et al.* (2020) presented compelling evidence for the splitting of the putative species at least two ways, this being the southern population and that from Namaqualand, in far northwest South Africa and adjacent Namibia.

While there has been expressed doubt as to the exact provenance of the type specimen for the species *C. angulata* by Spitzweg *et al.* (2020), the drawing of the type material (with reference to the colouration of the lower head) shows it is not of the north-west form.

The type locality for "*Testudo bellii* Gray, 1828" is "Cape of Good Hope" (Latitude 34.3568 S., Longitude 18.4740 E.) and again not of the northern form.

"Cape of Good Hope" is located south of Cape Town, South Africa, where the species *C. angulata* is common and the holotype of is evidently of that form.

The specimen described as *Chersina angulata pallida* Gray, 1831 is again of colouration of the southern form and not that of the north-west of the range of the putative species *Chersina angulata*.

Hence the until now unnamed form from Namaqualand, stated by Spitzweg *et al.* (2020) as having diverged from the nominate form (in pure state) some 3.8 MYA is formally named in this paper as a new species, *C. swileorum* *sp. nov.*

Publications relevant to the genus *Chersina* Gray, 1830 and the taxonomic acts within this paper, include Archer (1967, 1968), Bour (2008a), Branch (1984, 1989), Daniels *et al.* (2007), Duméril and Bibron (1835), Duméril *et al.* (1854), Ernst and Barbour (1989), Fleck and Fleck (2001), Gray (1828, 1830, 1831a, 1866), Greig and Burdett (1976), Herrmann and Branch (2013), Hewitt (1931), Hofmeyr (2004, 2009), Hofmeyr *et al.* (2014, 2016), Joshua *et al.* (2010), Loveridge and Williams (1957), Pereira *et al.* (2017), Rhodin *et al.* (2017), Schweigger (1812), Sowerby and Lear (1872), Spitzweg *et al.* (2020), Van Den Berg and Baard (1994) Van Heezik *et al.* (1994) and sources cited therein.

HOMOPUS DUMÉRIL AND BIBRON, 1834

For most of the past 50 years, most herpetologists have regarded southern African "padlopers" as being within the genus *Homopus* (Duméril and Bibron, 1834),

More recently and following from a number of molecular studies, the genus *Chersobius* Fitzinger, 1835 has been resurrected for the five-toed species (now *C. boulengeri* (Duerden, 1906), *C. signatus* (Gmelin, 1789), and *C. solus* (Branch, 2007)), which are in fact more closely related to *Chersina* Gray, 1830.

Chersobius signatus (Gmelin, 1789), long known to include at least one unnamed form from Pofadder, northern South Africa was audited and the relevant form is herein formally named as a new species, *C. mandela* *sp. nov.* based on morphological and genetic divergence as well as ongoing reproductive isolation created by a zone of nearly 150 km (straight line) of clearly unsuitable habitat.

Homopus (type species *Homopus areolatus* (*Tortue Aréolée*, Schoepff = *Testudo Areolata*, Thunberg 1787), by subsequent designation of Duméril and Bibron (1835), is however very divergent from the other single recognized four-toed species included in the genus, that being *Homopus femoralis* Boulenger, 1888, with an estimated divergence of the two taxa of over 20 MYA. Both putative species *H. areolatus* and *H. femoralis* are also considered to be species complexes as demonstrated by Hofmeyr *et al.* (2020) and sources cited therein.

Both *H. areolatus* and *H. femoralis* are therefore placed in separate genera, with *H. femoralis* placed into the newly named genus *Funkichelys* *gen. nov.*, herein considered to include at least two species, one of which is formally named for the first time as *Funkichelys funki* *sp. nov.* as type species for the new genus. The new species was until now treated as a distinctive and divergent western population of *H. femoralis*.

H. areolatus is split two ways as well at the species level, in line with well-known divergent populations in the west and east of the range. All type material for *H. areolatus* clearly refers to material from the immediate vicinity of Cape Town and Cape of Good Hope, immediately south of there and therefore is referable to the western form.

The image depicted with Thunberg's, 1787 description is clearly of a specimen with a provenance of Cape Town, South Africa, as evidenced by the colouration of the carapace (yellow outers of each scute and light reddish-range inner scutes), meaning the eastern form was until now the unnamed species.

The eastern form, herein formally named *Homopus trevorhawkeswoodi* *sp. nov.*, is also in turn subdivided into three regionally and morphologically divergent subspecies. It appears they are also allopatric.

Publications relevant to the genus *Homopus* Duméril and Bibron, 1834 *sensu lato*, excluding *Chersina* Gray, 1830 as cited above, but including *Chersobius* Fitzinger, 1835 and the taxonomic acts within this paper, include Baard (1996), Bates *et al.* (2014), Bauer and Branch (2003), Bayoff (1995), Bell (1836), Bonin *et al.* (2006),

Boulenger (1888), Bour (1980, 1988), Boycott (1987), Branch (1993), Branch and Rau (1991), Broschell (2000), Clark *et al.* (2011), Conradie *et al.* (2016), Cuvier (1831), Daudin (1901), Dobiaey (2006), Duerden (1906), Duméril and Bibron (1835), Duméril *et al.* (1854), Ernst and Barbour (1989), Fitzinger (1836), Fleck and Fleck (2001), Fritz and Bininda-Emonds (2007), Gmelin (1739), Gorseman (1980), Gray (1873b, 1873c), Greig and Burdett (1976), Hewitt (1931, 1935, 1937), Hofmeyr and Branch (2018), Hofmeyr *et al.* (2016), Hoogmoed (1980), Hughes (1986), Kooijman (2015), Kuperus and Loehr (2009), Loehr (2006, 2008, 2012a, 2012b, 2013a, 2013b, 2015, 2016, 2019), Loehr *et al.* (2004, 2006, 2011, 2015, 2019), Lacépède (1788), Loon (2018), Loveridge and Ernst (1957), Mashinini and Mahlangu (2014), Oudemans (1895), Rhodin *et al.* (2017), Schleicher (2005a, 2005b), Schoepff (1792), Stark (2013), Thunberg (1785, 1787), Valverde (2005a, 2005b) and sources cited therein.

CYCLANORBIS GRAY, 1854

The two African species in the genus, *Cyclanorbis* Gray, 1854 with *Cryptopus senegalensis* Duméril and Bibron, 1835 as the type species constitutes two divergent lineages. The other species *Baikiea elegans* Gray, 1869 treated by most authors since as being within *Cyclanorbis* is herein formally transferred back to the genus *Baikiea*. Pereira *et al.* (2017) found a divergence between the two forms of more than 30 MYA.

Within each species, there are distinctive east and west African lineages. For *Baikiea elegans* Gray, 1869, type locality "West Africa", the eastern form was named *Cyclanorbis oligotylus* Siebenrock, 1902 and is herein treated as a subspecies.

Cryptopus senegalensis Duméril and Bibron, 1835 with a type locality of Senegal is the only named form of this species. John Edward Gray coined no less than five other names for the West African form. Then there was a name coined by Rochebrune (1884), namely *Tetrathyra vaillantii* Rochebrune, 1884, also for the West African form.

However the morphologically divergent form from the Nile River system remains unnamed and due to increasing human population in the region as well as invasive species in the same ecosystems, are under a very real threat of extinction.

It is therefore formally named as a new subspecies *Cyclanorbis senegalensis nileensis* *subsp. nov.*

The divergent and apparently isolated population from Lake Chad is also formally named for the first time as *Cyclanorbis senegalensis occultatum* *subsp. nov.*

Publications relevant to the genera *Cyclanorbis* Gray, 1854 and *Baikiea* Gray, 1869 and the taxonomic actions within this paper include Baker *et al.* (2015), Batista *et al.* (2018), Boulenger (1889), Branch (2008), Duméril (1856, 1861), Duméril and Bibron, (1835), Engstrom *et al.* (2004), Gramentz (2008), Gray (1854, 1856a, 1865a, 1865b, 1869), Harrison (1991), Hughes (1979), Largen and Spawls (2010), Le *et al.* (2014), Loveridge and Williams (1967), Mazuch *et al.* (2016), Meylan (1987), Meylan *et al.* (1990), Pereira *et al.* (2017), Praschag *et*

al. (2011), Rhodin *et al.* (2017), Rochebrune (1884), Segniagbeto *et al.* (2014), Siebenrock (1902a, 1909), Webb (1975), Werner (1908, 1924) and sources cited therein.

CYCLODERMA PETERS, 1854

The genus *Cycloderma* Peters, 1854 has for decades been regarded as containing just two species, being the type species, *Cycloderma frenatum* Peters, 1854, by original monotypy as well as *Heptathyra aubryi* (= *Cryptopodus aubryi* Duméril, 1856), by original monotypy of Cope, 1960.

While *Heptathyra* has been treated as a synonym of *Cycloderma* by virtually all herpetologists since the name was coined, the molecular evidence of Pereira *et al.* (2017) found the two (putative) species diverged from one another in the Oligocene, at a time of some 30 MYA, making separate genus-level placement of each species the most sensible option.

Therefore I formally resurrect the available name *Heptathyra* Cope, 1960 for *Cryptopodus aubryi* Duméril, 1856, more recently known as *Cycloderma aubryi* (Duméril, 1856).

Putative *Cycloderma frenatum* Peters, 1854 of East Africa occurs in two major river systems, being the Zambezi and the Rovuma, bordering Mozambique and Tanzania.

Inspection of specimens in each system revealed consistent differences between specimens. With each river system being effectively separated from one another, including during times of ice-age maxima and sea level minimum, it is reasonable to conclude that each population is evolving separately and divergent. The name *Aspidochelys livingstonii* Gray, 1860, with a type locality of "Mozambique in tributaries of River Zambesi" is not available for the Rovuma River system animals.

Therefore the relevant soft-shelled turtles are herein formally named *Cycloderma tismorum* *sp. nov.*

In terms of the putative species *Heptathyra aubryi* (Duméril, 1856) a similar situation exists.

The type locality is Gabon and the type form is from the Ogooue River, which drains virtually the whole country.

However most specimens of putative *H. aubryi* are divergent from the type form and are found in the far more extensive Congo River system to the south and east that drains a sizeable chunk of central Africa. There is no available name for this population and so it is formally named for the first time as *Heptathyra marcdorsei* *sp. nov.*

Literature relevant to the species within the genera *Cycloderma* Peters, 1854 (including the synonym name *Aspidochelys* Gray, 1860) and *Heptathyra* Cope, 1860 and the taxonomic conclusions herein include Beolens (2011), Bonin *et al.* (2006), Bour (2008b, 2008c), Branch (1993), Branch *et al.* (2005), Broadley (1962), Broadley and Howell (1991), Broadley and Sachsse (2011), Chirio and Ineich (2006), Cope (1860), Duméril (1856), Ernst and Barbour (1989), Fritz *et al.* (1994), Gramentz (1998, 1999, 2001), Gray (1860b, 1860d), Günther (1896), Haagner and Morgan (1991), Marques *et al.* (2018),

Meylan (1987), Nieden (1910), Pauwels and Vande Weghe (2008), Pereira *et al.* (2017), Peters (1854), Rhodin *et al.* (2017), Siebenrock (1902a), Spawls *et al.* (2002, 2018), Sweeney (1960), Thomson *et al.* (2008), Tornier (1902), Valverde (2007), Wermuth and Mertens (1977) and sources cited therein.

LISSEMYS SMITH, 1931.

Pereira *et al.* (2017) found that the genus *Lissemys* Smith, 1931, type species: *Emyda punctata* (= *Testudo punctata* Lacepède, 1788) (= *Testudo punctata* Bonnaterre, 1789), by original monotypy has significant divergence between component species as currently recognized.

Praschag *et al.* (2011) found likewise. It appears that the morphologically distinctive species *Lissemys scutata* (Peters, 1868), originally described as *Emyda scutata* Peters, 1868 diverged from the other species in the genus 30 MYA based on the results of Pereira *et al.* (2017).

Therefore it should be transferred to new genus and there is no available name.

Hence the erection of *Piersonchelys* *gen. nov.* to accommodate this taxon.

Publications relevant to the taxonomic conclusions with respect of the genus *Lissemys sensu lato*, including in particular all aspects of the species *Emyda scutata* Peters, 1868 include Bonin *et al.* (2006), Boulenger (1898), Bour (2008b), Cordero (2017), Gray (1873b), Kuchling (1995),

Lacépède (1788), Li *et al.* (2017), Peters (1868), Platt *et al.* (2018, 2019), Praschag *et al.* (2011), Prokop and Hojay (2007), Rhodin *et al.* (2017), Webb (1982), Zug and Mulcahy (2019), Zug *et al.* (1998) and sources cited therein.

PELODISCUS FITZINGER, 1835

The oriental genus *Pelodiscus* Fitzinger, 1835, type species: *Aspidonectes (Pelodiscus) sinensis* (= *Trionyx (Aspidonectes) sinensis* Wiegmann 1834), by subsequent designation by Fitzinger (1843) as generally recognized in 2021, while monophyletic, (see for example Pereira *et al.* (2017), has one very divergent member, being *Trionyx axenaria* Zhou, Zhang, and Fang 1991, since transferred to *Pelodiscus* by Zhou and Li (2007) and most herpetologists since.

Pereira *et al.* (2017) indicated a divergence of *Pelodiscus axenaria* of about 20 MYA from the other members of the genus (as a group) and so it is appropriate for subgenus-level recognition of this putative taxon.

Hence the erection of *Parapelodiscus* *gen. nov.* to accommodate this species.

Publications relevant to this taxonomic conclusion and the relevant affected species include Bain and Hurlay (2011), Boulenger (1898), Bour (2008b), Brandt (1857), Chkhikvadze (1987), Ernst and Barbour (1989), Farkas and McCormack (2010), Farkas *et al.* (2019), Fitzinger (1843), Fritz and Obst (1999), Fritz *et al.* (2010), Gong *et al.* (2018), Meylan (1987), Nguyen *et al.* (2009), Pereira *et al.* (2017), Pope (1935), Pritchard (1979), Rhodin *et al.* (2017), Wang *et al.* (2020), Yang *et al.*

(2011), Zhao (1997), Zhao and Adler (1993), Zhou *et al.* (1991), Zhou and Li (2007), Ziegler (2002) and sources cited therein.

AMYDA SCHWEIGGER IN GEOFFROY SAINT-HILLAIRE, 1809

Fritz *et al.* (2014) reviewed the *Amyda cartilaginea* (Boddaert, 1770) species complex, which at the time was being treated as the entirety of the monotypic genus *Amyda* Schweigger in Geoffroy Saint-Hilaire, 1809. Fritz *et al.* (2014) split the putative species into two, resurrecting the name *Amyda ornata* (Gray, 1861) for the mainland south-east Asian taxa. *Amyda cartilaginea* was therein confined to the Sunda shelf region.

They formally named a subspecies *Amyda cartilaginea maculosa* Fritz, Gemel, Kehlmaier, Vamberger and Praschag 2014 for a divergent form from south-west Borneo, Java and Sulawesi.

The taxon *Trionyx phayrei* Theobald, 1868 was resurrected as a subspecies of *A. ornata*.

However unnamed forms within the genus *Amyda* are well-known and have been awaiting formal description as their habitats and numbers decline.

Two of these are formally named in this paper, being the taxon from the north of Borneo, formally named *A. ashphillipsi* *sp. nov.* and the taxon from Bangladesh, formally named as a subspecies of *A. ornata*, being *A. ornata magnapapulae* *sp. nov.*

Fritz *et al.* (2014) have in effect confirmed that both forms need taxonomic recognition and any further delay in such recognition may imperil their long term survival. Publications relevant to the genus *Amyda* Schweigger in Geoffroy Saint-Hilaire, 1809 and the taxonomic actions within this paper include Anderson (1871, 1872), Auliya *et al.* (2016), Baur (1893a, 1893b, 1893c), Blumenbach (1779), Boddaert (1770), Boulenger (1889), Bour (2007), Das *et al.* (2016), de Bruyn *et al.* (2013), de Rooij (1915), Duméril and Bibron (1834), Fitzinger (1843), Fritz *et al.* (2014), Gemel *et al.* (2019), Geoffroy Saint-Hilaire (1809a, 1809b), Gray (1856b, 1861a, 1861b, 1864a, 1869a, 1873), Hmar *et al.* (2020), Jaekel (1911), Kabir *et al.* (2015), Khan (2012), Li *et al.* (2017), Manthey and Grossmann (1997), McCord and Pritchard (2003), Nath *et al.* (2018), Nutaphand (1979, 1990), Pawar and Choudhury (2000), Pereira *et al.* (2017), Rhodin *et al.* (2017), Schneider (1787), Suckow (1798), Theobald (1868a, 1868b, 1874, 1875), Van Dijk (1992), Voris (2000) and sources cited therein.

PELOMEDUSA WAGLER, 1830

Species in the genus *Pelomedusa* Wagler, 1830 have been scrutinized in a number of recent studies, including Vargas-Ramírez *et al.* (2010), Wong *et al.* (2010), Petzold *et al.* (2014), Nagy *et al.* (2015) and Fritz *et al.* (2015a, 2015b), with the result that ten species are currently recognized, with five “unnamed” forms still ostensibly undescribed as of 2021.

One of these unnamed forms in fact matches the previously synonymised form *Pelomedusa nigra* Gray, 1863 from Natal, South Africa.

That is a so-called variant of *Pelomedusa galeata*

(Schoepff 1792), type locality “near Cape Town” (South Africa).

Based on the phylogenetic results published, *Pelomedusa nigra* is clearly a separate species to *P. galeata* and therefore recognized herein as a valid species. It is formally resurrected from synonymy in this paper.

The other four previously identified and unnamed species in the *Pelomedusa* complex are formally named for the first time in this paper.

These are one from Cameroon, herein named *P. darrenkeileri* sp. nov., another from Sudan formally named *P. alexstaszewskii* sp. nov., a divergent taxon from Ethiopia and Somalia is formally named *P. dannygoodwini* sp. nov., while yet one more divergent taxon from DR Congo is formally named *P. shannonmcgrathi* sp. nov..

The two divergent clades in the genus are also split, with the northern clade being formally named as a divergent subgenus *Keillerchelys* subgen. nov., based on likely divergence of more than 10 MYA, a timeline derived from the molecular results cited above.

Publications relevant to the genus *Pelomedusa* Wagler, 1830 and the taxonomic actions within this paper include Boulenger (1889), Boycott and Bourquin (2008), Bour (2008b), Branch (2008), Branch *et al.* (1990), Duméril and Bibron (1935), Fritz *et al.* (2015a, 2015b), Gasperetti *et al.* (1993), Gray (1863a, 1863b), Hewitt (1935), Lacépède (1788), Mazuch (2013), McCord *et al.* (2014a), Meek and Cory (1910), Mertens (1937), Nagy *et al.* (2015), Petzold *et al.* (2014), Rhodin *et al.* (2017), Vargas-Ramírez *et al.* (2010), Wong *et al.* (2010) and sources cited therein.

PELUSIOS RHODESIANUS HEWITT, 1927

The species *Pelusios rhodesianus* Hewitt, 1927, is formally divided. The new species is formally named as *P. lynnrawi* sp. nov. being from Angola.

A subspecies in this genus, being a subspecies of *Pelusios rhodesianus* Hewitt, 1927 from Tanzania, Malawi, DR Congo and Zambia is also formally named for the first time.

Publications relevant to *Pelusios rhodesianus* Hewitt, 1927 as previously defined and the taxonomic actions within this paper include Alderton (1988), Auerbach (1987), Bour (1983), Broadley and Howell (1991), Broadley (1981), Ernst and Barbour (1989), Hewitt (1927, 1933), Kindler *et al.* (2015), Marques *et al.* (2018), McCord *et al.* (2014b), Raw (1978), Spawls *et al.* (2002, 2018), Wermuth and Mertens (1977), Witte and Laurent (1943) and sources cited therein.

ORLITIA BORNEENSIS GRAY, 1873

The species *Orlitia borneensis* Gray, 1873, monotypic for the genus *Orlitia* Gray, 1873 was investigated by Palupcikova *et al.* (2012).

They analyzed mitochondrial (cyt b) and nuclear (R35) sequences, as well as shell and scute morphometrics among *Orlitia borneensis* specimens in European zoo collections.

Most specimens lacked precise locality data because they originated from a single confiscation

in 2001, but three “known-locality” specimens from Borneo and “Sumatra” were added to the sample series. They had no known West Malaysian specimens.

Haplotype diversity in cyt b was found to be relatively high, with three main haplotype groups identified; nucleotide diversity was low and phylogenetic structure was poorly supported. The three known-origin animals clustered within one of the main haplotype groups, suggesting that the confiscated animals covered much of the species’ genetic diversity. Only minimal variation was found in R35 sequences. Geometric morphometrics demonstrated morphological similarity of all examined specimens. These results led the authors to conclude that all examined animals represented a single conservation unit.

However the authors also found a 1.5 percent cyt B divergence within these animals, indicating up to 6 MYA divergence between at least some specimens ancestors based on their calculations.

The specimens from the western Malay Peninsula examined by myself when compared with others examined from southern Sumatra and Borneo, appear to have consistently deeper shells, slightly enlarged anterior marginals on the carapace and slightly more concave anterior marginals and so are formally identified herein as the new subspecies *O. borneensis perakensis* subsp. nov..

References relevant to the genus *Orlitia* and the taxonomic action within this paper include Auliya (2006), Boulenger (1897), Bour (2008), Chan-ard *et al.* (1999), Cox *et al.* (1998), Ernst and Barbour (1989), Gray (1873a), Jamniczky and Russell (2004), Lee *et al.* (2009), Ludwig *et al.* (2007), Manthey and Grossmann (1997), Mo (2020), Palupčíková *et al.* (2012), Peters (1874), Rhodin *et al.* 2017, Schilde (2004b), Setiyabudi (2016), Siebenrock (1902c, 1904), Werner (1900) and sources cited therein.

EMYDURA (TROPICOCHELYMYS) VICTORIAE (GRAY, 1842)

While previous studies had extensively sampled river systems from across Australia, it emerged that the Kimberley district of Western Australia had been largely unstudied with respect of species within the genus *Emydura* Bonaparte, 1836.

In terms of the Short-necked species, all were until now simply lumped within the species *Emydura australis* (Gray, 1841) or *Emydura victoriae* (Gray, 1842), *sensu* Georges and Adams (1996), Cann and Sadlier (2017) and most other authors in-between.

Cann and Sadlier (2017) provided a detailed analysis of the type material for both species, including photos, which clearly showed both to be from the Victoria or Daly River systems of the Northern Territory, with the Daly River form also formally described as *E. tanybaraga* Cann, 1997.

While Cann and Sadlier (2017) have assigned the name “*australis*” to the West Kimberley *Emydura* species, the photo of the holotype for that species in Cann and Sadlier (2017) shows quite clearly that this cannot be the case.

The carapace is too shallow and wide at the rear to be

of that form and instead conforms to specimens from the Victoria River system or the morphologically similar specimens from the Daly River system.

The West Kimberley specimens are quite different in form and so were inspected with a view to ascertaining whether or not they were sufficiently divergent to warrant taxonomic recognition.

In doing so, specimens from the major Kimberley River systems were inspected and compared with one another in terms of consistent morphological differences.

In terms of establishing divergences in the absence of molecular data, ice-age drainages were assessed to see which river systems were in fact separated at times of glacial maxima as per Shelley *et al.* (2020), which in turn were matched up with the divergent forms.

In summary, three different forms of *Emydura* (herein treated as being within the subgenus *Tropicochelymys* Wells and Wellington, 1985, an original designation being as genus), were found to be divergent morphologically from congeners in the Victoria River system in the Northern Territory and east of there. The forms also broadly matched the drainage systems as they were at the ice-age maxima as outlined by Shelley *et al.* (2019), meaning that there were three hitherto unnamed forms of *Emydura* (subgenus *Tropicochelymys*) from the West Kimberley region of Western Australia.

All three newly named species were formerly treated as western populations of *Emydura* (*Tropicochelymys*) *victoriae* (Gray, 1842) and are formally named in this paper.

Key publications relevant to the taxonomic conclusions herein with respect of the north-west Australian *Emydura*, include the following: Beolens *et al.* (2011), Bonin *et al.* (2006), Bonaparte (1836), Boulenger (1889), Bour (2008), Cann (1997a-d, 1998), Cann and Sadlier (2017), Cogger (2000, 2014), Cogger *et al.* (1983), Ernst and Barbour (1989), Georges and Adams (1996), Georges and Thomson (2010), Goode (1967), Gray (1841, 1842, 1871c), Kehlmaier *et al.* (2019), McCord *et al.* (2003), Mertens (1969), Shelley *et al.* (2020), Wells and Wellington (1983, 1985), Wermuth and Mertens (1969, 1977), Wilson and Swan (2010), Worrell (1963) and sources cited therein.

WOLLUMBINIA LATISTERNUM (GRAY, 1867)

Saw Shelled Terrapins within the *Wollumbinia latisternum* (Gray, 1867) species complex were also audited on the basis of ongoing uncertainty with respect of taxonomic status of the regional forms.

Synonymies for Australian *Emydura* and Australian *Wollumbinia* species (sometimes the latter under the generic names of *Elseya* or *Myuchelys*), have been published by Cogger *et al.* (1983) or more recently Georges and Thomson (2010) and therefore this exercise is not repeated within this paper.

In terms of the wide-ranging species complex currently treated by most authors as the single species *Wollumbinia latisternum* (Gray, 1867), the evidence of there being several species was unequivocal.

Molecular data cited by Cann and Sadlier (2017) supported the contention of there being several species in the complex and so I found it astounding that no one had gone further to investigate.

The three named forms, *W. latisternum* with a type locality believed to be northern Cape York, Queensland, *W. spinosa* (Gray, 1871), believed to be from the Burdekin River region in central Queensland and *W. dorsii* Wells, 2009 all resolve to divergent taxa and are herein recognized as separate species.

Thomson and Georges (2010) wrote:

"The south east Queensland populations of *Myuchelys* (sic) *latisternum* have been named by Wells (2009) as *Wollumbinia dorsii*, but the account appears in a privately prepared and circulated document that does not, in the opinion of the authors, meet the provisions of ICZN Articles 8 and 9 and Recommendation 8D and so is not considered a publication for the purposes of nomenclature. In any case there is no evidence to suggest that they warrant separate recognition at the level of species."

The claims of those authors are false in all regards and are therefore ignored herein for the purposes of use of ICZN nomenclature in this paper (Hawkeswood 2021). *Myuchelys* Thomson and Georges, 2009 is an invalid non-ICZN duplicate name for *Wollumbinia* Wells, 2007. It was coined in a non-peer reviewed or PRINO (peer reviewed in name only) online "journal" called *Zootaxa*, which is a notorious vehicle of publication for non-scientists and taxonomic vandals.

Zootaxa papers regularly coin names outside of the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999), with the name *Myuchelys* being one of many to have debuted in that poor excuse for a scientific journal.

Quite correctly, Cogger (2014) uses the correct name *Wollumbinia* for the said turtles, noting the invalidity of the name *Myuchelys*. Cogger's 2014 book represents the view of the majority of Australian herpetologists.

Two presently undescribed forms in the *W. latisternum* complex were identified in this audit and are formally named herein.

They are the distinctive form from the wet tropics area of north Queensland, quite separate from the type form of *W. latisternum* from further north, near the tip of Cape York, Queensland, as well as another distinctive form from the Eungella area of Queensland, west of Mackay and south of the Burdekin gap, which is also a well-defined biogeographical barrier.

Key publications relevant to the taxonomic conclusions herein with respect of the north-east Australian *Wollumbinia* species include the following: Bonin *et al.* (2006), Cann (1972), Cann and Sadlier (2017), Cogger (2000, 2014), Cogger *et al.* (1983), Dijk *et al.* (2011), Ernst and Barbour (1989), Gaffney (1977), Georges and Adams (1996), Georges and Thomson (2006), Georges *et al.* (1998), Gray (1867, 1871b-c, 1872a), Hamann *et al.* (2008), Pachmann (2009), Prokop (2010), Seddon *et al.* (1997), Swan *et al.* (2017), Thieme (1984), Thomson *et al.* (2021), Thomson and Georges (2009), Valverde

(2010), Wells (2002, 2007a-b, 2009), Wells and Wellington (1983, 1985), Wilson and Swan (2010) and sources cited therein.

HYDROMEDUSA WAGLER, 1830

The South American genus *Hydromedusa* Wagler, 1830, type species *Emys maximiliani* Mikan, 1825 has until now been treated as a genus comprising just two living species, namely, *H. maximiliani* (Mikan, 1825) and *Hydromedusa tectifera* Cope, 1870.

A third species identified as *Hydromedusa casamayorensis* De la Fuente and Bona, 2002 a fossil from the middle Eocene of Patagonia (South America) has also been placed in the genus.

Pereira *et al.* (2017) wrote:

“*Hydromedusa tectifera* and *H. maximiliani* failed to be recovered as a monophyletic group in our analysis.”

They also found a divergence between the two putative taxa in the Cretaceous period, meaning it is not tenable for the two putative taxa to be placed in a single genus.

Therefore *H. tectifera* is herein placed in a newly named genus *Wittchelys* *gen. nov.*

A new subspecies of *H. tectifera*, herein placed in *Wittchelys* *gen. nov.* is *Wittchelys tectifera wittorum* *subsp. nov.* also formally named for the first time. This is a morphologically divergent population from the Lagoa Dos Patos, being a drainage not known to have been connected with the greater Parana system in recent geological times, including at times of glacial maxima, implying no likely or significant gene-flow between each divergent group.

The divergent north-east population of putative *H. maximiliani* is also formally named as a new species, *H. meyeyouchelys* *sp. nov.*

The fossil taxon, *H. casamayorensis* while clearly in the family Hydromedusidae, is sufficiently divergent from the extant species to also be assigned to a new genus, for which the name *Lovelinaychelys* *gen. nov.* is erected.

Publications relevant to the genus *Hydromedusa* Wagler, 1830 *sensu lato* as defined by previous authors, including the taxonomic decisions within this paper include Alderton (1988), Bager and Rosado (2010), Baur (1893a), Beolens *et al.* (2011), Bonin *et al.* (2006), Boulenger (1885, 1886), Bour (2008b), Cacciali *et al.* (2016), Campinhos *et al.* (2016), Carreira *et al.* (2012), Cope (1870), Costa *et al.* (2015), Cozer *et al.* (2020), De La Fuente (2003), De La Fuente and Bona (2002), de Souza and Martins (2009), di Pietro *et al.* (2012), Dos Reis Martins *et al.* (2011), Duméril and Bibron (1835), Entiauspe-Neto *et al.* (2016), Ernst and Barbour (1989), Fabius (2010, 2016), Famelli *et al.* (2012, 2014, 2016), Freitas *et al.* (2018, 2019), Gaffney (1997), Gemel *et al.* (2019), Giebel (1866), Gray (1855, 1873b), Günther (1884), Huckembeck and Quintela (2013), Lüling (1984), Maniel *et al.* (2018), Martins and Souza (2008, 2009), Mertens (1967), Mikan (1825), Morato *et al.* (2017), Noleto *et al.* (2016), Novelli *et al.* (2013), Oliveira *et al.* (2020), Pereira *et al.* (2017), Peters (1839), Prigioni *et al.* (2011), Rhodin *et al.* (2017), Ribas

et al. (2002), Rojas-Padilla *et al.* (2020), Semeñiuk *et al.* (2017, 2019), Souza (2004, 2005, 2007), Souza and Abe (1998), Souza and Martins (2006), Souza and Novelli (2009), Souza *et al.* (2002, 2003), Valverde (2009, 2010), Wetmore (1925), Winkler (2006), Wood and Moody (1976), Wolff (2002) and sources cited therein.

CHELYDERA THOMSON AND GEORGES, 2020 IS A SUBJECTIVE SYNONYM OF SUPREMECHELYS HOSER, 2014 AND SHOULD NOT BE GENERALLY USED.

In year 2000 in an online publication, Glenn Shea, Scott Thomson and Arthur Georges published a long-winded ramble on their views about the taxonomy of Australia's long-necked terrapins of the genus *Chelodina* Fitzinger, 1826.

At the conclusion of their so-called scientific paper, they erected a new subgenus that they called:

“*Chelydera* Thomson and Georges, 2020”, with a type species of “*Chelodina parkeri* Rhodin & Mittermeier 1976.”

Their concept of the genus included the following:

“Assigned Species: *C. parkeri* Rhodin & Mittermeier 1976; *C. burrungandjii* Thomson, Kennett & Georges 2000; *C. expansa* Gray 1857; *C. kuchlingi* Cann 1997; *C. rugosa* Ogilby 1890; † *C. insculpta* De Vis 1897; † *C. alanrivi* Lapparent de Broin & Molnar 2001.”

Six years earlier, Hoser (2014), erected the subgenus *Supremechelys* Hoser, 2014, with a type species of *Chelodina expansa* Gray, 1857.

Because *Chelodina expansa* Gray, 1857 is included in the list of species assigned to the more recently erected subgenus *Chelydera* it is therefore a subjective synonym of the earlier name *Supremechelys*.

Hence if one accepts the taxonomy of Shea, Thomson and Georges, the correct name to be used is *Supremechelys* and not *Chelydera*.

INFORMATION RELEVANT TO THE FORMAL DESCRIPTIONS THAT FOLLOW

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

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

In terms of the following formal descriptions, spellings should not be altered in any way for any purpose unless expressly and exclusively called for by the rules governing Zoological Nomenclature as administered by the International Commission of Zoological Nomenclature (ICZN).

In the unlikely event two or more newly named taxa are deemed to be the same by a first revisor, then the name to be used and retained is that which first appears in this paper by way of page priority and as listed in the abstract keywords.

Some material in descriptions for taxa may be repeated

for other taxa in this paper and this is necessary to ensure each fully complies with the provisions of the *International Code of Zoological Nomenclature* (Fourth edition) (Ride *et al.* 1999) as amended online since.

Material downloaded from the internet and cited anywhere in this paper was downloaded and checked most recently as of 4 July 2021 (including if also viewed prior), unless otherwise stated and was accurate in terms of the content cited herein as of that date.

Online citations within this paper, including copied emails and the like, are not as a rule cited in the references part of this paper.

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, excessive ageing, abnormal skin or 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 genera, subgenera, 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.

CHELYDRA HAYDNMCPHIEI SP. NOV.

LSIDurn:lsid:zoobank.org:act:9221E07D-9F6F-4198-92B0-EAEE51BB21E3

Holotype: A preserved female specimen at the Natural History Museum of Utah, Utah, USA, specimen number Amphibian and reptile specimens UMNH:Herp:3961, collected from Chagres River, Juan Mina, Panama. This facility allows access to its holdings.

Paratypes: 1/ A preserved female specimen at the Natural History Museum of Utah, Utah, USA, specimen number Amphibian and reptile specimens UMNH:Herp:3948 collected from 1.5 miles north west of Almirante, Bocas del Toro, Panama. 2/ A preserved specimen at the Natural History Museum of Utah, Utah, USA, specimen number Amphibian and reptile specimens UMNH:Herp: 3959 collected from Escudo de Veraguas Island, Bocas del Toro, Panama.

Diagnosis: *Chelydra haydnmcpheii sp. nov.* has until now been treated as a northern population of *Chelydra acutirostris* Peters, 1862, with a type locality of the Atlantic Drainages of Equador.

Chelydra haydnmcpheii sp. nov. occurs in the Pacific drainages of Colombia and north, through Panama to just inside Honduras.

This taxon is in turn separated from the morphologically divergent *Chelydra rossignonii* (Bocourt, 1868) by the mountainous zone occupying most of that country, with *C. rossignonii* in turn being found further north into Mexico.

Chelydra haydnmcpheii sp. nov. is readily separated from *Chelydra acutirostris* Peters, 1862 by having a yellow iris with blurred or indistinct dark spots within, versus a light brown iris with distinct dark spots within. The upper jaw of adult *C. haydnmcpheii sp. nov.* is mostly grey, versus mainly yellow in *Chelydra acutirostris* Peters, 1862.

Both *C. haydnmcpheii sp. nov.* and *Chelydra acutirostris* are separated from *C. rossignonii* by only having a few granular scales on the head of relatively small size (or otherwise smooth), and few if any papillae on the under parts of face and neck and if present these are small in size and rounded, versus large, pointed, flattened and more numerous in *C. rossignonii*, this being the best means to distinguish between the taxa (Medem 1977).

Both *C. haydnmcpheii sp. nov.* and *C. acutirostris* are separated from *C. serpentina* (Linnaeus, 1758) by having young specimens with a light brown carapace, versus dark brown to blackish in *C. serpentina*.

Both *C. haydnmcpheii sp. nov.* and *Chelydra acutirostris* are separated from all other species and subspecies of *Chelydra* Schweigger, 1812 by having a more pointed snout than in seen in the other species.

The four species in the genus *Chelydra* Schweigger, 1812 are separated from the morphologically similar snapping turtle species in the genus *Macrochelys* Gray, 1856 by lacking supramarginal scutes, having eyes inclined toward the top of the head and no lure on the floor of the mouth.

Species in the genus *Chelydra* are also identified as follows: The carapace of this snapping turtle reaches about 41 cm, although most individuals probably have 20-30 cm carapaces (Medem, 1977). The slightly rounded carapace has sharp posterior serrations and three low keels (which may disappear with age). The anterior width of the third vertebral is less than 25 percent of the maximum carapace width. The carapace ranges in color from brown to olive, dark brown, olive gray or black and may change with age.

A few light radiations or small spots may be present on the carapace of younger individuals, old turtles are often unicolored. The plastron is yellow, tan or gray. Juveniles have a light-dark mottled plastron pattern. The bridge is 6-8 percent of the carapace length; the gular scute is subdivided into two and 3-4 inframarginals are present. The abdominal scute is usually twice as broad as long and the length of the plastral forelobe is normally longer than 40 percent of the carapace width. The large head has a narrow pointed snout and usually 4-6 chin barbels. The skin is gray to olive-black or dark brown. Males are larger than females, have longer preanal tail lengths and the vent is situated beyond the posterior carapace rim.

Physical evidence showing the Panama Isthmus closed around 2-3 MYA (O'Dea *et al.* 2016) would imply that the two relevant populations of *Chelydra* from northern South America would have been separated from one another for a similar time frame, which is more than enough time to allow each form to allopatrically speciate.

Images of *Chelydra haydnmcpheii sp. nov.* in life are online at:

<https://www.inaturalist.org/observations/10328914>
and

<https://www.inaturalist.org/observations/71674937>
and

<https://www.inaturalist.org/observations/72745645>

Images of the type form of *Chelydra acutirostris* in life are online at:

<https://www.inaturalist.org/observations/85710030>
and

<https://www.inaturalist.org/observations/36509029>
and

<https://www.inaturalist.org/observations/46718269>

Distribution: *Chelydra haydnmcphiei* sp. nov. occurs in the Pacific drainages of Colombia and north, through Panama to just inside Honduras.

Etymology: Named in honour of Haydn McPhie (note spelling of his name) from Mirboo North, Victoria, Australia, in recognition of many decades of important contributions to herpetology.

MARTINEKCHELYS GEN. NOV.

LSIDurn:lsid:zoobank.org:act:EC9A387B-E3AF-4B62-81CB-0818B8CB8FB7

Type species: *Kinosternon acutum* Gray, 1831.

Diagnosis: Species within the genus *Martinekchelys* gen. nov. are readily separated from species in the genus *Cryptochelys* Iverson, Le, and Ingram 2013 (Type species: *Cinosternon leucostomum* Duméril, Bibron and Duméril, 1851) by having gular scutes more than half the length of the anterior lobe of the plastron, versus much less than half in the genus *Cryptochelys*.

In turn the two preceding genera are separated from other Kinosternid (*sensu stricto*) turtles as follows: Lacking an entoplastron (present in *Baltemys* and *Xenochelys*), with reduced carination (basically unicarinate; usually tricarinate in *Baltemys*, *Xenochelys*, *Sternotherus*, and *Kinosternon*, though nearly acarinate in some in the latter genus), a reduced neural series (typically five bones, all posteriorly symmetric; six in *Martinekchelys creaseri*) not in contact with the nuchal bone (usually six with neural contact in other kinosternids); the presence of clasping organs on the posterior crus and thigh (except absent in *Martinekchelys acutum* and *M. creaseri*; also present in *Sternotherus*, but absent in many *Kinosternon*), the anterior end of the anterior musk duct groove reaching only to the anterior half of the third peripheral (unknown for *Cryptochelys dunni*; reaching to the second peripheral in *Sternotherus* and most *Kinosternon*) (adapted from Iverson *et al.* 2013).

Distribution: Mexico including Veracruz, Chiapas, Campeche, Quintana Roo, Yucatan, Tamaulipas, San Luis Potosi, Hidalgo, Puebla as well as north Guatemala and Belize.

Etymology: Named in honour of Maryann Martinek, of Bendigo, Victoria, Australia in recognition of her services to wildlife conservation, including in digging up “mud” on corrupt wildlife officials in Australia, being relevant when naming a genus of “Mud Turtles”.

Further details of the important works of Maryann Martinek can be found in Hoser (2010).

Content: *Martinekchelys acutum* (Gray, 1831) (type species); *M. creaseri* (Hartweg, 1934); *M. herrerae* (Stejneger, 1925).

PARASTERNOTHERUS SUBGEN. NOV.

LSIDurn:lsid:zoobank.org:act:8EB94B87-B15D-4888-B0AC-5825BB58FEEB

Type species: *Goniochelys minor* Agassiz, 1857.

Now generally known as *Sternotherus minor* (Agassiz, 1857).

Diagnosis: Musk Turtles in the nominate subgenus *Sternotherus* (Bell, 1825) are separated from species within the subgenus *Parasternotherus* subgen. nov. by having one or other of the following suites of characters: A/ Barbels on chin and neck; side of head usually with two conspicuous light stripes, or:

B/ Barbels on chin only; side of head is variously marked but lacks two conspicuous stripes. Plastron lacking a gular scute; carapace is high-keeled, being about as tall as it is wide.

By contrast species in the subgenus *Parasternotherus* subgen. nov. are separated from the nominate subgenus by having a plastron with a gular scute and a carapace that is wider than it is tall.

Turtles within the genus *Sternotherus* (Bell, 1825) are readily separated from similar genera of Turtles in North America, including *Kinosternon* Spix, 1824 and allied genera, by the presence of a square or rectangular pectoral scute and an immobile plastron (versus triangular pectoral and mobile plastron in the other genera).

Distribution: Southern United States of America.

Etymology: *Parasternotherus* literally means “resembling *Sternotherus*”.

Content: *Sternotherus* (*Parasternotherus*) *minor* (Agassiz, 1857) (type species); *S.* (*Parasternotherus*) *peltifer* (Smith and Glass, 1947); *S.* (*Parasternotherus*) *depressus* Tinkle and Webb, 1955 and *S.* (*Parasternotherus*) *intermedius* Scott, Glenn and Rissler, 2017.

CROTTYCHELYS GEN. NOV.

LSIDurn:lsid:zoobank.org:act:99F65583-2151-4590-B362-F3F9166A5D0B

Type species: *Chelopus rubidus* Cope, 1870.

(better known as *Rhinoclemmys rubida* (Cope, 1870)).

Diagnosis: Species within *Crottychelys* gen. nov. are separated from other species within greater *Rhinoclemmys* Fitzinger, 1835 as previously recognized by the following unique suite of characters:

Little or no interdigital webbing; tip of the upper jaw is hooked and unnotched; dorsal head pattern consists of a pair of supratemporal stripes or no stripes present; carapace rather high, but flat on top.

Species within *Rhinoclemmys* Fitzinger, 1835 *sensu lato*, including *Callopsis* Gray, 1860, *Crottychelys* gen. nov. and *Oxychelys* gen. nov. as formally named in this paper are readily separated from all similar North, South and Central American species of turtle by the following suite of characters:

Aquatic and terrestrial Neotropical batagurine turtles with squamosals loosely attached and barely in contact with jugal, but touching postorbital; ethmoid fissures broadly triangular or oval; anterior edge of inferior

process of parietal not flexed outward, separated from jugal but touching palatine; ventral end of jugal broad; plastron large, hingeless and attached to carapace by well-ossified buttresses;

hexagonal neurals short-sided posteriorly; well-developed carapace with vertebral keel; cloacal bursae present; head and limb patterns vividly colored (derived from Ernst, 1978).

The two species within *Crottychelys gen. nov.* are separated from one another as follows:

A/ Carapacial scutes uniformly light brown; gular scute approximately twice as long as the humeral; marginal scutes a little flared; an elongated temporal spot (*C. rubidus*), and:

B/ Pleural scutes darker colored than vertebrals or marginals; gular scute only slightly longer than humeral; marginal scutes strongly outward projecting; an oval temporal spot (*C. perixantha*).

The subspecies *C. perixantha ipsumtenebris subsp. nov.* is separated from *C. perixantha perixantha* (Mosimann and Rabb, 1953) by their darker colouration as compared to the nominate subspecies.

The most anterior and posterior vertebral scutes are darker than in either *C. perixantha perixantha* or *C. rubidus*. The dark coloration of the posterior vertebral scutes also extends partly onto the marginal scutes. There is no variegated patterning on the marginal scutes.

The head patterns of specimens of this subspecies are variable but invariably bold and well defined with a distinctive white oval in the centre of the top of the head, this sometimes being divided.

Distribution: Mexico, including the lowlands of Jalisco, Colima, Michoacan, Oaxaca, Chiapas and West Guerrero.

Etymology: The genus is named in honour of a now deceased Great Dane cross Rottwieller dog (*Canis familiaris*), named “*Crotalus*”, or Crotty for short, who guarded our research facility and collection for more than a decade from 1989 to the early 2000’s.

Crotalus Linnaeus, 1758 is a well-known Rattlesnake (Pit Viper) genus, with a type species from North America.

Content: *Crottychelys rubidus* (Cope, 1870) (type species); *C. perixantha perixantha* (Mosimann and Rabb, 1953) (including subspecies).

CROTTYCHELYS PERIXANTHA IPSUMTENEBRIS SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:BAFE4225-B551-40AF-889E-292B06DCF8F8

Holotype: A preserved specimen at the Field Museum of Natural History in Chicago, Illinois, USA, specimen number FMNH Amphibians and Reptiles 39136, collected from the vicinity of La Majada, near Apatzingin, Michoacin, Mexico.

Paratype: A preserved specimen at the Field Museum of Natural History in Chicago, Illinois, USA, specimen number FMNH Amphibians and Reptiles 39137, collected from the vicinity of La Majada, near Apatzingin, Michoacin, Mexico.

Diagnosis: The subspecies *C. perixantha ipsumtenebris subsp. nov.* is separated from *C. perixantha perixantha* (Mosimann and Rabb, 1953) by their darker colouration as compared to the nominate subspecies.

The most anterior and posterior vertebral scutes are darker than in either *C. perixantha perixantha* or *C. rubidus*. The dark coloration of the posterior vertebral scutes also extends partly onto the marginal scutes. There is no variegated patterning on the marginal scutes.

The head patterns of specimens of this subspecies are variable but invariably bold and well defined with a distinctive white oval in the centre of the top of the head, this sometimes being divided.

The two species within *Crottychelys gen. nov.* are separated from one another as follows:

A/ Carapacial scutes uniformly light brown; gular scute approximately twice as long as the humeral; marginal scutes little flared; an elongated temporal spot (*C. rubidus*), and:

B/ Pleural scutes darker colored than vertebrals or marginals; gular scute only slightly longer than humeral; marginal scutes strongly outward projecting; an oval temporal spot (*C. perixantha*).

Species within *Crottychelys gen. nov.* are separated from other species within greater *Rhinoclemmys* Fitzinger, 1835 *sensu lato* as previously recognized by the following unique suite of characters:

Little or no interdigital webbing; tip of the upper jaw is hooked and unnotched; dorsal head pattern consists of a pair of supratemporal stripes or no stripes present; carapace rather high, but flat on top.

Species within *Rhinoclemmys* Fitzinger, 1835 *sensu lato*, including *Callopsis* Gray, 1860, *Crottychelys gen. nov.* and *Oxychelys gen. nov.* as formally named in this paper are readily separated from all similar North, South and Central American species of turtle by the following suite of characters:

Aquatic and terrestrial Neotropical batagurine turtles with squamosals loosely attached and barely in contact with jugal, but touching postorbital; ethmoid fissures broadly triangular or oval; anterior edge of inferior process of parietal not flexed outward, separated from jugal but touching palatine; ventral end of jugal broad; plastron large, hingeless, and attached to carapace by well-ossified buttresses;

hexagonal neurals short-sided posteriorly; well-developed carapace with vertebral keel; cloacal bursae present; head and limb patterns vividly colored (derived from Ernst, 1978).

Photos of *C. perixantha ipsumtenebris subsp. nov.* in life can be found online at:

<https://www.inaturalist.org/observations/13938590>

and

<https://www.inaturalist.org/observations/16424664>

and

<https://www.inaturalist.org/observations/47932835>

and

<https://www.inaturalist.org/observations/57398550>
 Photos of *C. perixantha perixantha* in life can be found online at:
<https://www.inaturalist.org/observations/86774700>
 and
<https://www.inaturalist.org/observations/34811645>
 and
<https://www.inaturalist.org/observations/34101749>
 and
<https://www.inaturalist.org/observations/9080324>

Distribution: *C. perixantha ipsumtenebris* subsp. nov. is known only from near the type locality being the vicinity of La Majada, near Apatzingin, Michoacin, Mexico.

C. perixantha perixantha (Mosimann and Rabb, 1953) is apparently separated by distribution via an area of elevated hills, a distance of about 50 km in a straight line.

Etymology: *Ipsumtenebris* in Latin means “very dark”, in reference to the darkening of the vertebral scutes in this taxon.

OXYCHELYS GEN. NOV.

LSIDurn:lsid:zoobank.org:act:EED90BB2-3B59-4603-B4DD-793B4213B2F4

Type species: *Oxychelys oxyi* sp. nov. (this paper).

Diagnosis: The two species within *Oxychelys* gen. nov. have until now been treated as a single species, namely *Nicoria nasuta* Boulenger, 1902, more recently better known as *Rhinoclemmys nasuta* (Boulenger, 1902).

Both species form a divergent clade which Lee and McCord (2007) showed had a divergence of nearly 20 MYA from nearest living relatives.

They are separated from other species within greater *Rhinoclemmys* Fitzinger, 1835 *sensu lato* as previously recognized by the following unique suite of characters: Inter-digital webbing is heavy; dorsal head stripes extend from the nape to level of orbits or less; no light spots present at occipital region; snout strongly pointed; shell distinctly depressed; chin and lower jaw with dark bars.

They are species well adapted to swimming in fast flowing rivers.

Species within *Rhinoclemmys* Fitzinger, 1835 *sensu lato*, including *Callopsis* Gray, 1860, *Crottychelys* gen. nov. and *Oxychelys* gen. nov. as formally named in this paper are readily separated from all similar North, South and Central American species of turtle by the following suite of characters:

Aquatic and terrestrial Neotropical batagurine turtles with squamosals loosely attached and barely in contact with jugal, but touching postorbital; ethmoid fissures broadly triangular or oval; anterior edge of inferior process of parietal not flexed outward, separated from jugal but touching palatine; ventral end of jugal broad; plastron large, hingeless, and attached to carapace by well-ossified buttresses; hexagonal neurals short-sided posteriorly; well-developed carapace with vertebral keel; cloacal bursae present; head and limb patterns vividly

coloured (derived from Ernst, 1978).

The newly named species *Oxychelys oxyi* sp. nov. type for this new genus (*Oxychelys* gen. nov.) is separated from *O. nasuta* (Boulenger, 1902) by the following suite of characters:

Dark sections at rear of lateral scutes on plastron are larger ventrally than dorsally (versus larger dorsally than ventrally in the type form); a brownish-grey iris (versus bluish-yellow iris); a generally much less flattened shell on general view than seen in *O. nasuta*.

Ernst (1978) who also examined both species, including the holotype for *Oxychelys oxyi* sp. nov. (describing the two species as the specimens from Colombia and the specimens from Ecuador), also noted significant differences between the two species.

O. nasuta had much wider marginals (mean = 24.7 mm, SD = 2.2, n = 6) than for *O. oxyi* sp. nov. (mean = 19.1 mm, SD = 2.7, n = 11). *O. nasuta* also had wider carapaces than *O. oxyi* sp. nov.

The mean CW/CL ratio for *O. nasuta* was 0.77 (SD = 0.05) and that for *O. oxyi* sp. nov. was 0.72 (SD = 0.02).

Distribution: Colombia, Ecuador. Confined to the Chococoan rainforest area in Pacific coastal drainages of northwestern Ecuador and western Colombia, and the middle and upper portion of the Caribbean-draining Río Atrato basin in northwestern Colombia (Carr and Giraldo, 2009).

Etymology: The genus is named in honour of a now deceased Great Dane, named “*Oxyuranus*”, or “*Oxy*” for short, that protected our wildlife research facility for 8 years in recognition of his loyal services. *Oxyuranus* Kinghorn, 1923 is also a genus of venomous elapid snake from Australia.

Content: *Oxychelys oxyi* sp. nov. (type species); *O. nasuta* (Boulenger, 1902).

OXYCHELYS OXYI SP. NOV.

LSIDurn:lsid:zoobank.org:act:80A2D973-D9BD-4869-96F0-5E2F28A772EA

Holotype: A preserved specimen at the California Academy of Sciences, San Francisco, California, USA, specimen number CAS HERP 80969, collected at Trunado, Department of Choco, Colombia, Latitude 7.1502 N., Longitude -77.1999 W. This facility allows access to its holdings.

Diagnosis: The newly named species *Oxychelys oxyi* sp. nov. type for this new genus (*Oxychelys* gen. nov.) is separated from *O. nasuta* (Boulenger, 1902) by the following suite of characters:

Dark sections at rear of lateral scutes on plastron are larger ventrally than dorsally (versus larger dorsally than ventrally in the type form); a brownish-grey iris (versus bluish-yellow iris); a generally much less flattened shell on general view than seen in *O. nasuta*.

Ernst (1978) who also examined both species, including the holotype for *Oxychelys oxyi* sp. nov. (describing the two species as the specimens from Colombia and the specimens from Ecuador), also noted significant differences between the two species.

O. nasuta had much wider marginals (mean = 24.7 mm,

SD = 2.2, n = 6) than for *O. oxyi* sp. nov. (mean = 19.1 mm, SD = 2.7, n = 11). *O. nasuta* also had wider carapaces than *O. oxyi* sp. nov.

The mean CW/CL ratio for *O. nasuta* was 0.77 (SD = 0.05) and that for *O. oxyi* sp. nov. was 0.72 (SD = 0.02). The two species within *Oxychelys* gen. nov. have until now been treated as a single species, namely *Nicoria nasuta* Boulenger, 1902, more recently better known as *Rhinoclemmys nasuta* (Boulenger, 1902).

Both species form a divergent clade which Lee and McCord (2007) showed had a divergence of nearly 20 MYA from nearest living relatives.

They are separated from other species within greater *Rhinoclemmys* Fitzinger, 1835 *sensu lato* as previously recognized by the following unique suite of characters:

Inter-digital webbing is heavy; dorsal head stripes extend from the nape to level of orbits or less; no light spots present at the occipital region; snout strongly pointed; shell distinctly depressed; chin and lower jaw with dark bars.

They are species well adapted to swimming in fast flowing rivers.

Species within *Rhinoclemmys* Fitzinger, 1835 *sensu lato*, including *Callopsis* Gray, 1860, *Crottychelys* gen. nov. and *Oxychelys* gen. nov. as formally named in this paper are readily separated from all similar North, South and Central American species of turtle by the following suite of characters:

Aquatic and terrestrial Neotropical batagurine turtles with squamosals loosely attached and barely in contact with jugal, but touching postorbital; ethmoid fissures broadly triangular or oval; anterior edge of inferior process of parietal not flexed outward, separated from jugal but touching palatine; ventral end of jugal broad; plastron large, hingeless and attached to carapace by well-ossified buttresses; hexagonal neurals short-sided posteriorly; well-developed carapace with vertebral keel; cloacal bursae present; head and limb patterns vividly coloured (derived from Ernst, 1978).

Distribution: This species appears to be restricted to the Caribbean-drained middle and upper Rio Atrato basin of northwestern Colombia and immediately adjacent watercourses.

Etymology: The species is named in honour of a now deceased Great Dane, named “*Oxyuranus*”, or “*Oxy*” for short, that protected our wildlife research facility for 8 years in recognition of his loyal services. *Oxyuranus* Kinghorn, 1923 is also a genus of venomous elapid snake from Australia.

KINOSTERNON (PLATYTHYRA) BAURII GRANTTURNERI SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:8932007A-5D3A-40D6-9752-364F8BF54447

Holotype: A preserved male specimen at the North Carolina Museum of Natural Sciences, Raleigh, North Carolina, USA, Herpetology Collection, specimen number NCSM-Herp 28633, collected from 1.7 air miles SSW Kill Devil Hills, Nags Head Woods, Dare County, North Carolina, USA, in a turtle trap in pond #28.4, Latitude 35.9776 N., Longitude -75.6643 W. This facility

allows access to its holdings.

Paratypes: Two more specimens at the North Carolina Museum of Natural Sciences, Raleigh, North Carolina, USA, Herpetology Collection, specimen numbers NCSM-Herp 29280 and 29281 also collected from Dare County, North Carolina, USA.

Diagnosis: The subspecies *Kinosternon baurii grantturneri* subsp. nov. occurs in Georgia, South Carolina, North Carolina, Virginia and the far north of Florida, with the nominate subspecies *Kinosternon baurii* (Garman, 1891) (including *Kinosternon baurii palmarum* (Stejneger, 1925), treated herein as synonymous with that subspecies) is herein confined to the Florida Panhandle and the keys south of there.

K. baurii grantturneri subsp. nov. is morphologically similar to *K. baurii baurii* but is separated from that taxon by a strong reduction in the head and carapace stripes typical of *K. baurii baurii*.

The three carapace stripes seen in typical specimens of *K. baurii baurii* (not including extremely old specimens) are faded or absent in *K. baurii grantturneri* subsp. nov.. The subspecies *K. baurii grantturneri* subsp. nov. is also easily confused with *K. subrubrum* (Bonnaterre 1789), also occurring on the Atlantic Coastal Plain, but is separated from that taxon by having light stripes from the eyes to the tips of their noses.

Lamb and Lovich (1990) provided a key diagnosis to separate *K. baurii grantturneri* subsp. nov. and *K. subrubrum*, which is provided below in modified form.

K. baurii grantturneri subsp. nov. is diagnosed by having carapace stripes greatly reduced, or absent. Side of head bearing a pair of stripes, usually faded, either continuous or broken. Canthal stripe typically extends anterior of eye to tip of snout. In males, ratio of PH/PL falls between 0.29-0.33 and ratio of FL/PL between 0.35-0.38. In females, PH/PL falls between 0.28-0.35 and FL/PL between 0.32-0.35

K. subrubrum is diagnosed by never having carapace stripes. Side of head variable in colour from no markings to extensive spotting or stripe-like patterning, but seldom involving a pair of stripes. If side of head is patterned, then canthal stripe, if present, does not extend anterior of eye. In males, ratio of PH/PL falls between 0.25-0.28 and ratio of PL falls between 0.24-0.28 and FL/PL between 0.36-0.39.

Besides morphological divergence from the central and south Florida animals as found by Lamb and Lovich (1990), genetic divergence was also found by Wilson and Karl (2001), confirming the sensibility of taxonomic recognition of this population unit.

The subgenus *Platythyra* Agassiz 1857 type species *Platythyra flavescens* Agassiz 1857, by original Monotypy, is recognized herein for the divergent lineage within *Kinosternon* Spix, 1824, including this newly named subspecies. See the phylogeny of Iverson *et al.* (2013) for the relative positions of the species groups in their phylogeny.

Colour photos of *Kinosternon baurii grantturneri* subsp. nov. in life can be found online at:

<https://www.inaturalist.org/observations/75429676>

and
<https://www.inaturalist.org/observations/28649997>
 and
<https://www.inaturalist.org/observations/25258178>
 Colour photos of *Kinosternon bauri baurii* (Garman, 1891) from Florida in life can be found online at:
<https://www.inaturalist.org/observations/70942174>
 and
<https://www.inaturalist.org/observations/36739252>
 and
<https://www.inaturalist.org/observations/65712416>

Distribution: The subspecies *Kinosternon baurii grantturneri* subsp. nov. occurs in Georgia, South Carolina, North Carolina, Virginia and the far north of Florida. The nominate subspecies *Kinosternon bauri baurii* (Garman, 1891) (including *Kinosternon bauri palmarum* (Stejneger 1925), treated herein as synonymous with that subspecies) is herein confined to the Florida Panhandle and the keys south of there.

Etymology: *Kinosternon baurii grantturneri* subsp. nov. is named in honour of Dr. Grant Turner of Innisfail, near Cairns, north Queensland, Australia, formerly of Bundoora, Victoria, Australia in recognition of a lifetime dedicated to herpetology, including numerous important peer reviewed scientific papers.

SLOPPCHELYS GEN. NOV.

LSIDurn:lsid:zoobank.org:act:FA6BFD18-5A50-483A-9E73-BE4FE7487F22

Type species: *Emys radiolata* Mikan, 1820.

Currently known as *Acanthochelys radiolata* (Mikan 1820).

Diagnosis: *Sloppchelys* gen. nov. are separated from all other South American turtles by the following unique suite of characters:

- (1) Oval carapace, flat;
- (2) Presence of a shallow longitudinal sulcus between 2nd and 4th vertebral scutes;
- (3) Carapace and plastron scutes with radiating striations;
- (4) Dorsal surface of the head covered with scales of irregular shape and size;
- (5) Mesodorsal region of the head with no scales;
- (6) Dorsal and lateral surfaces of the neck covered with small tubercles of irregular shape;
- (7) Posterior region of the thigh with small series of tubercles,

(derived from Ernst and Barbour 1989; Rhodin *et al.* 1984b; Rhodin *et al.* 2009; Vinke *et al.* 2011; Garbin *et al.* 2016) who all separated *Sloppchelys radiolata* (Mikan, 1820).

Alternatively, *Sloppchelys* are separated from morphologically similar species by the following suite of characters:

Neural plates present, six in number; nuchal shield present, marginal. Plastron large, with a very strong axillary and moderately strong inguinal buttresses, the latter consolidated to the fifth costal plate; a parieto-squamosal arch; parietals more or less expanded superiorly. Jaws moderately strong, without alveolar

ridges. Chin with a pair of dermal appendages, or barbels. Digits entirely webbed.

Carapace much depressed, smooth in the adult; vertebrals very broad in the young, broader than the costals, much narrower in the adult, in which the first is the broadest and the fourth the narrowest; nuchal rather large, at least twice as long as broad. Plastron large, deeply notched posteriorly, slightly concave in the male; width of the bridge contained three and a half to four times in the length of the plastron; axillary and inguinal shields very small or absent. Snout rather pointed, with the nasal region very slightly produced. Upper surface of neck with small warts. Limbs very broadly webbed, fringed on the outer side, covered anteriorly with unequal transverse scales; a prominent series of enlarged tubercular scales along the inner edge of the leg.

Carapace with a feeble vertebral keel; dorsal shields of adults with radiating striata. Front lobe of plastron is broader than the hind lobe; intergular shield at least as long as its distance from the abdominals; suture between the pectorals shorter than that between the abdominals. Skin of upper surface of head divided into irregular shields; parietal bones above as wide as the diameter of the orbit; mental barbels shorter than the diameter of the eye. Dark brown above; lower surface of marginals yellow. Plastron yellow, with a large subrhomboidal dark brown spot in the middle; tympanum, chin and throat yellowish, with small brown spots.

The preceding was largely derived from Boulenger (1889) and remains accurate more than 100 years later. While the genus is being treated monotypic here for the type species, there is at least one other species associated with the type species from north-eastern Brazil that is in fact distinct at the species level.

Distribution: Brazil including Bahia, Minas Gerais, Mato Grosso, Sao Paulo, Espirito Santo.

Etymology: The genus is named in honour of a nine year old (as of 2021) Great Dane, named "Slop" or "Slopp" who has protected our wildlife research facility for 9 years in recognition of his loyal services.

Content: *Sloppchelys radiolata* (Mikan, 1820) (type species).

CLEMMYS GUTTATA MAXIMUS SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:259E7689-7CC1-4D3F-9C2B-220648FDDD0A

Holotype: A preserved specimen at the Cornell University Museum of Vertebrates. Cornell University, Ithaca, New York, USA, in the CUMV Amphibian and Reptile Collection, specimen number R-0008964 collected from North of Auburn, Cayuga County, New York, USA, Latitude 42.94386 N., Longitude -76.56591 W. This facility allows access to its holdings.

Paratypes: 1/ A preserved specimen at the California Academy of Sciences, San Francisco, California, USA, specimen number CAS SUR 9698 collected from Bergen Swamp, Genesee County, New York, USA, Latitude 43.09924 N., Longitude -77.99082 W. 2/ A preserved specimen at the Cornell University Museum

of Vertebrates. Cornell University, Ithaca, New York, USA, in the CUMV Amphibian and Reptile Collection, specimen number R-0007881 collected from Duck Lake and Spring Lake, Cayuga County, New York, USA.

Diagnosis: The three subspecies of *Clemmys guttata* Ritgen, 1828 are separated from one another by each of the following suites of characters:

1/ *C. guttata maximus subsp. nov.* from the Great Lakes region of the USA and nearby Canada is separated from the other two subspecies by having three or more large yellow spots on the surfaces of each of the vertebrae and costals on the carapace, (versus less and smaller in size in the other two subspecies); most of the plastron in young adults is melanistic, the remainder being orange (same in *C. guttata guttata*, but usually half or less melanistic in *C. guttata praetortus subsp. nov.*), the outer edge of the femoral and anal plates of the plastron has an obvious inwards inflection, this not being the case in the other two subspecies; the gulars are very triangular, with each edge roughly equidistant.

Type *C. guttata guttata* from the Philadelphia area in north-east USA, has one, or less often two or three small yellow spots on the surfaces of each of the vertebrae and costals on the carapace, most of the plastron in young adults is melanistic, the remainder being orange; the outer edge of the femoral and anal plates of the plastron does not have an obvious inwards inflection; the gulars are triangular, but with the posterior edges slightly elongated.

C. guttata praetortus subsp. nov. from South Carolina and south of there in coastal regions to Florida is separated from the other two subspecies by having one, or less often two or three tiny to small yellow spots on the surfaces of each of the vertebrae and costals on the carapace, half or less than half of the plastron is usually melanistic in young adults, these areas being widely separated by an orange midline region; the outer edge of the femoral and anal plates of the plastron does not have an obvious inwards inflection; the gulars are triangular, but with the posterior edges clearly elongated, almost touching the humeral.

Notwithstanding the preceding, it should be noted that aged specimens of each subspecies commonly have a wholly or nearly wholly black plastron.

Photos of *C. guttata maximus subsp. nov.* in life can be found online at:

<https://www.inaturalist.org/observations/1669540>

and

<https://www.inaturalist.org/observations/9340155>

and

<https://www.inaturalist.org/observations/30864939>

Photos of nominate *C. guttata guttata* in life can be found online at:

<https://www.inaturalist.org/observations/73033037>

and

<https://www.inaturalist.org/observations/25074107>

and

<https://www.inaturalist.org/observations/58525222>

Photos of *C. guttata praetortus subsp. nov.* in life can be

found online at:

<https://www.inaturalist.org/observations/73625293>

and

<https://www.inaturalist.org/observations/88188815>

and

<https://www.inaturalist.org/observations/72492609>

Clemmys guttata (Schneider, 1792), monotypic for the genus *Clemmys* Ritgen, 1828 as currently recognized is diagnosed and defined as follows:

Clemmys guttata is small species and has a gray to black base color on the carapace. The carapace is smooth, does not have a central ridge or keel running down the middle and grows up to 12.5 cm in straight-line carapace length.

The dark carapace is typified by numerous yellow spots, which are a defining characteristic of this taxon.

Spots can always also be found on the head, neck and limbs, where at times they may coalesce to form a line on the angle of the limb.

The plastron is yellow, orange-yellow to reddish and a black spot with somewhat ill defined boundary is usually present on each scute, which tends to expand with age and more rapidly in the northern two subspecies.

The head is blackish; the upper jaw is notched. On each side of the head is a large orange blotch. Also present are several yellow bands of some form of varying size and intensity. Skin on the upper surfaces is dark grey to black with sparse yellow or orange spots while skin on the ventral side may be brighter, being orange, pink, or red.

Distribution: *C. guttata maximus subsp. nov.* is found in the Great Lakes region of the USA and nearby southern Canada.

Etymology: The name “*maximus*” reflects both the maximal northern distribution for the species as a whole and also that adults on average are larger than seen in the other subspecies.

CLEMMYS GUTTATA PRAETORTUS SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:8658F74D-8E5B-4171-AB06-DC2A72E8F17C

Holotype: A preserved specimen at the National Museum of Natural History, Smithsonian Institution, Washington, DC, USA, specimen number USNM Amphibians and Reptiles 110490, collected from 8 miles south east of St. George, Dorchester, South Carolina, USA, Latitude 33.1521 N., Longitude -80.4461 W. This facility allows access to its holdings.

Paratype: A preserved male specimen (dry) at the National Museum of Natural History, Smithsonian Institution, Washington, DC, USA, specimen number USNM Amphibians and Reptiles 91405, collected from five miles south east of Leesville, Lexington, South Carolina, USA, Latitude 33.8591 N., Longitude -81.4641 W.

Diagnosis: The three subspecies of *Clemmys guttata* Ritgen, 1828 are separated from one another by each of the following suites of characters:

1/ *C. guttata maximus subsp. nov.* from the Great Lakes

region of the USA and nearby Canada is separated from the other two subspecies by having three or more large yellow spots on the surfaces of each of the vertebrals and costals on the carapace, (versus less and smaller in size in the other two subspecies); most of the plastron in young adults is melanistic, the remainder being orange (same in *C. guttata guttata*, but usually half or less melanistic in *C. guttata praetortus subsp. nov.*), the outer edge of the femoral and anal plates of the plastron has an obvious inwards inflection, this not being the case in the other two subspecies; the gulars are very triangular, with each edge roughly equidistant.

Type *C. guttata guttata* from the Philadelphia area in north-east USA, has one, or less often two or three small yellow spots on the surfaces of each of the vertebrals and costals on the carapace, most of the plastron in young adults is melanistic, the remainder being orange; the outer edge of the femoral and anal plates of the plastron does not have an obvious inwards inflection; the gulars are triangular, but with the posterior edges slightly elongated.

C. guttata praetortus subsp. nov. from South Carolina and south of there in coastal regions to Florida is separated from the other two subspecies by having one, or less often two or three tiny to small yellow spots on the surfaces of each of the vertebrals and costals on the carapace, half or less than half of the plastron is usually melanistic in young adults, these areas being widely separated by an orange midline region; the outer edge of the femoral and anal plates of the plastron does not have an obvious inwards inflection; the gulars are triangular, but with the posterior edges clearly elongated, almost touching the humeral.

Notwithstanding the preceding, it should be noted that aged specimens of each subspecies commonly have a wholly or nearly wholly black plastron.

Photos of *C. guttata maximus subsp. nov.* in life can be found online at:

<https://www.inaturalist.org/observations/1669540>
and

<https://www.inaturalist.org/observations/9340155>
and

<https://www.inaturalist.org/observations/30864939>
Photos of nominate *C. guttata guttata* in life can be found online at:

<https://www.inaturalist.org/observations/73033037>
and

<https://www.inaturalist.org/observations/25074107>
and

<https://www.inaturalist.org/observations/58525222>

Photos of *C. guttata praetortus subsp. nov.* in life can be found online at:

<https://www.inaturalist.org/observations/73625293>
and

<https://www.inaturalist.org/observations/88188815>
and

<https://www.inaturalist.org/observations/72492609>

Clemmys guttata (Schneider, 1792), monotypic for the

genus *Clemmys* Ritgen, 1828 as currently recognized is diagnosed and defined as follows:

Clemmys guttata is small species and has a gray to black base color on the carapace. The carapace is smooth, does not have a central ridge or keel running down the middle and grows up to 12.5 cm in straight-line carapace length.

The dark carapace is typified by numerous yellow spots, which are a defining characteristic of this taxon.

Spots can always also be found on the head, neck, and limbs, where at times they may coalesce to form a line on the angle of the limb.

The plastron is yellow, orange-yellow to reddish and a black spot with somewhat ill defined boundary is usually present on each scute, which tends to expand with age and more rapidly in the northern two subspecies.

The head is blackish; the upper jaw is notched. On each side of the head is a large orange blotch. Also present are several yellow bands of some form of varying size and intensity. Skin on the upper surfaces is dark grey to black with sparse yellow or orange spots while skin on the ventral side may be brighter, being orange, pink, or red.

Distribution: *C. guttata praetortus subsp. nov.* occurs from South Carolina and south of there in coastal regions to Florida, USA.

Etymology: The name “*praetortus*” is Latin for reduced and refers to the reduced size and frequency of spots on the carapace of this southern form.

ACTINEMYS MAXINEHOSERAE SP. NOV.

LSIDurn:lsid:zoobank.org:act:F9E3FF28-E1CC-4F9E-BAD1-440745215BB8

Holotype: A preserved specimen at the California Academy of Sciences, San Francisco, California, USA, specimen number CAS Herpetology (HERP) SUR 7759 collected from Rancho San Antonio, Baja California Norte, Mexico, Latitude 30.81534 N., Longitude -115.630453 W. This facility allows access to its holdings.

Paratypes: 1/ Two preserved specimen at the California Academy of Sciences, San Francisco, California, USA, specimen numbers CAS Herpetology (HERP) 56884 and 56885, collected from 2 miles South of La Joya, Valladares, San Pedro Martir Mountains, Baja California Norte, Mexico. 2/ A preserved specimen at the California Academy of Sciences, San Francisco, California, USA, specimen number CAS Herpetology (HERP) 138885, collected from Rancho San Juan de Dios, 30 miles East of El Rosario, Baja California Norte, Mexico, Latitude 32.133333 N., Longitude -116.166667 W. 3/ A preserved specimen at the National Museum of Natural History, Smithsonian Institution, Washington, DC, USA, specimen number USNM Amphibians and Reptiles 22052 collected from Tecate River, Baja California Norte, Mexico. 4/ A preserved specimen at the University of Arizona Museum of Natural History, Tucson, Arizona, USA, specimen number UAZ 22057, collected from a lagoon at the mouth of the Santo Tomas Canyon, Baja California Norte, Mexico.

Diagnosis: Until recently, species within the genus

Actinemys Agassiz, 1857 was subsumed within *Emys* Duméril, 1805, although molecular phylogenies, including that of Pereira *et al.* (2017) have confirmed that species within putative *Actinemys* are not closely related to the type form of *Emys* and so the genus *Actinemys* is recognized herein.

All tortoises within *Actinemys* were all treated as being of the single species *Emys marmorata* Baird and Girard, 1852 by original designation until recently.

Following the paper of Seeliger (1945) and later works, such as Spinks *et al.* (2014), that putative species has been treated as two, being *E. marmorata* (Baird and Girard, 1852) from generally north of San Francisco, California, USA along the coast and ranges to British Columbia, Canada, where it is either now rare or extinct and *E. pallida* (Seeliger, 1945) from south of this range, through southern California and into Baja Mexico.

Seeliger (1945), Spinks *et al.* (2014), and others have recognized the Baja, Mexico population as being both morphologically and genetically divergent from the others and it is on this basis that it is formally named herein as a new species.

The six specimens inspected by Seeliger (1945) form the type series herein for the new species *Actinemys maxinehoserae* sp. nov..

Known only from the localities the holotype and paratypes come from in Baja North, Mexico and more recent finds in the same general area, *A.*

maxinehoserae sp. nov. is readily separated from the other two species in the genus, namedly *A. marmorata* and *A. pallida* by having inguinal plates that are large and either rectangular or round in shape, versus none, small or large and triangular in populations of either other species.

In *C. marmorata*, the inguinal plates are generally large and triangular, save for the northernmost populations in which the inguinal plate is absent. In *C. pallida*, a species present in most parts of California, including the south, the inguinals are invariably absent or tiny only.

A. maxinehoserae sp. nov. also has a very slight upturn in the anterior carapace, not seen in either other species. *A. maxinehoserae* sp. nov. is characterised by marbling on the lower neck as opposed to distinct or semi-distinct spotting in the other two species.

The three species in the genus are all separated from morphologically similar species in other genera by the following unique suite of characters:

Straight carapace length in adults is 11-21 cm, being low, broad and usually widest just posterior to the middle. Carapace obtusely unicarinate in the young, the keel becoming almost or quite indistinct

in the adult; shields nearly smooth in the adult, with radiating striata in the young. Vertebrae 2 to 4 much broader than long, a little narrower than the second costal. Plastron large, concave in the male, openly emarginate posteriorly; the width of the bridge much less than the length of the hind lobe; pectoral and abdominal shields subequal in size; the longest median suture is that between the anals, the shortest that between the humerals; axillary and inguinal shields

absent, small or large (depending on species). Head rather large, especially in some adults; upper jaw is not hooked, notched in the middle; the width of the mandible at the symphysis nearly equals the horizontal diameter of the orbit. Digits webbed to the claws, which are long and strong.

Tail about half as long as the shell in the males and similar in females. Carapace ranges from light brown to dark olive or blackish, sometimes with yellowish dots or radiating lines, and the markings may disappear in old specimens; plastron yellow, sutures black, with or without some large black blotches. Head olive or brown above, with small black or light markings, yellow interiorly, uniform, black-dotted or marbled; limbs brown, spotted with black and yellow. Adult males have a light or pale yellow throat.

Photos of *A. maxinehoserae* sp. nov. in life can be found in the papers of Valdez-Villavicencio *et al.* (2016a, 2016b) or online at:

<https://www.inaturalist.org/observations/73887726> and

<https://www.inaturalist.org/observations/73312310> and

<https://www.inaturalist.org/observations/3760434>

Photos of *A. pallida* in life can be found online at:

<https://www.inaturalist.org/observations/78749530> and

<https://www.inaturalist.org/observations/33221> and

<https://www.inaturalist.org/observations/5063013>

Photos of *A. marmorata* in life can be found online at:

<https://www.inaturalist.org/observations/32037268> and

<https://www.inaturalist.org/observations/78917605> and

<https://www.inaturalist.org/observations/85170250>

Distribution: *A. maxinehoserae* sp. nov. is known only from Baja North, Mexico.

Conservation: Wild populations of this genus have been impacted by a shell disease (Haman *et al.* 2019) in addition to other human caused pressures. Leidy *et al.* (2016) also documented a summer die off of a species in this genus in a California watercourse.

Etymology: *A. maxinehoserae* sp. nov. is named in honour of Maxine Hoser or Margate, United Kingdom (including England, Scotland, Wales, Northern Ireland, Gibraltar and other British colonies) in recognition of her services to herpetology in the 1960's.

HOSEMYS TURNERI SP. NOV.

LSIDurn:lsid:zoobank.org:act:8F8A833E-1108-4616-B482-6C2D2C11B993

Holotype: A preserved specimen at the Field Museum of Natural History, Chicago, Illinois, USA, specimen number FMNH Amphibians and Reptiles 251487 collected from Sipitang District, Sabah, Borneo, Malaysia. This facility allows access to its holdings.

Paratypes: 1/ A preserved specimen at the Field

Museum of Natural History, Chicago, Illinois, USA, specimen number FMNH Amphibians and Reptiles 246378 collected from Lahad Datu District, Sabah, Borneo, Malaysia. 2/ A preserved female (dry) specimen at the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA, specimen number MCZ Herp R-182834 collected from Kuching, Sarawak, Borneo, Malaysia.

Diagnosis: The genus *Heosemys* Stejneger, 1902 is herein treated as including only the species

H. spinosa (Bell in Gray, 1830) and *H. turneri* sp. nov., until now treated as the eastern (Borneo) population of the same species.

Molecular evidence of Spinks *et al.* (2012) confirmed that a population of putative *H. spinosa* from Tawi Tawi Island, Philippines and others from unknown locations are of a different species-level taxon to other putative *H. spinosa*. They failed however to identify where other specimens came from.

An inspection of live and preserved specimens from across the known range and distribution of the putative species, quickly identified two allopatric taxa.

The type form of *H. spinosa* with a type locality of Penang in Peninsula Malaysia, includes yellow-eyed tortoises from peninsula Malaysia and Sumatra, while the bluish-grey eyed form from Borneo and the Philippines is of the previously unnamed taxon, herein formally named *H. turneri* sp. nov..

H. turneri sp. nov. is readily separated from *H. spinosa* by having bluish-grey iris (rarely reddish), versus a yellow to yellow-white iris in *H. spinosa*.

H. turneri sp. nov. is further separated from *H. spinosa* by having expanded anals and correspondingly reduced femorals on the plastron, the result being the that the midline suture of the anals is as long or slightly longer than that of the femorals, versus much longer for the femorals in *H. spinosa*.

Adult *H. turneri* sp. nov. have a maximum carapace length of 220 mm, versus 250 mm in *H. spinosa*, making it a significantly smaller species.

Inspection of preserved specimens at the Philippines National Museum, specimen numbers PNM 2233 (adult male) and PNM 2232 (female), from Mindanao as well as the specimen at the Zoological Museum, Natural History Museum of Denmark, specimen number ZMUC-R25236 from Tawi Tawi Island, off the north-east coast of Borneo in the Philippines appear to conform to *H. turneri* sp. nov. on the basis of size of sexually mature adults and plastron configuration and so are tentatively also referred to this species. Das (1996) provides photos and detailed measurements of the Philippines specimens.

The two (above-mentioned) species in the genus *Heosemys* are separated from the morphologically similar species in the genus *Hieremys* Smith, 1916 (previously synonymised with *Heosemys*) by having the anterior margin of the shell serrated; second vertebral shield is at least as broad as the second costal and much broader than long, versus anterior margin of the shell not serrated; second vertebral shield narrower than

the second costal and not much broader than long in the genus *Hieremys*.

The name *Hieremys* Smith, 1916, type species being *Hieremys annandalii* (= *Cyclemys annandalii* Boulenger, 1903), by original monotypy is available for those species, which according to Pereira *et al.* (2017) diverged from *Emys spinosa* more than 20 MYA.

Hieremys Smith, 1916 includes *H. annandalii* (Boulenger, 1903) and the other two taxa recently placed in *Heosemys*, being *Geoemyda depressa* Anderson, 1875 and *Geoemyda grandis* Gray, 1860.

Both genera *Heosemys* and *Hieremys* are separated from all other morphologically similar species and genera by the following suite of characters: Neural plates mostly hexagonal, short-sided behind. Plastron extensively united to the carapace by suture, with axillary and inguinal peduncles just reaching the first and fifth costals; entoplastron intersected by the humero-pectoral suture. Skull without bony temporal arch: alveolar surfaces narrow, without median ridge. Upper surface of head covered with undivided skin. Digits with a short web. Tail very short, not longer in the young than in the adult.

H. spinosa and *H. turneri* sp. nov. are both separated from other similar species by the following suite of characters: Carapace of adult much depressed, with broad flat vertebral region and an uninterrupted obtuse keel; anterior and posterior margin serrated; of young more regularly arched, with a short keel or spinose tubercle on each costal shield and the border strongly serrated all round, each marginal being produced in a spine, with or without smaller denticulation on each side; the vertebral keel stronger than in the adult. Vertebral shields (2-4) much broader than long, at least as broad as the costals; nuchal shield longer than broad. Plastron large; the width of the bridge about equal to the length of the posterior lobe, which is angularly emarginate; in respect of size, the plastral shields take the following order, commencing with the largest: abdominals, pectorals, femorals, humerals, anals, gulars; the suture between the abdominals not longer than or only slightly longer than that between the pectorals; axillary and inguinal shields present. Upper jaw bicuspid. Carapace brown above, reddish in the young and young adults, the vertebral keel lighter, sometimes yellow, white, or light orange and often well defined; each plastral shield often with yellow and dark brown radiating streaks; soft parts greyish, dark brown, or blackish. There is often a yellowish, yellowish or reddish spot on each side of the neck, near the ear. Other markings on the head are usually faded or indistinct, but generally more prominent and larger in *H. spinosa* than in *H. turneri* sp. nov. (adapted and modified from Boulenger 1889).

Photos of *H. turneri* sp. nov. in life are depicted online at: <https://www.inaturalist.org/observations/35481391> and <https://www.inaturalist.org/observations/59450068> and <https://www.inaturalist.org/observations/38528997> and

<https://www.inaturalist.org/observations/65691620>

Photos of the type form of *H. spinosa* in life from Peninsula Malaysia are depicted online at:

<https://www.inaturalist.org/observations/17986033>
and

<https://www.inaturalist.org/observations/35161014>
and

<https://www.inaturalist.org/observations/64931736>

Photos of specimens herein assigned to *H. spinosa* in life from Sumatra are depicted online at:

<https://www.inaturalist.org/observations/349133>
and

<https://www.inaturalist.org/observations/65400091>
and

<https://www.inaturalist.org/observations/4956092>

Distribution: *H. turneri sp. nov.* is restricted to Borneo (both north and south parts) as well as nearby offshore islands including Tawi Tawi (Philippines), with records from Mindanao, Philippines also attributed to this taxon.

H. spinosa appears to be confined to Peninsula Malaysia, (including Singapore), far south Burma and Thailand as well as Sumatra.

Etymology: *H. turneri sp. nov.* is named in honour of Dr. Grant Turner of Innisfail, near Cairns, north Queensland, Australia, formerly of Bundoora, Victoria, Australia in recognition of a lifetime dedicated to herpetology including a number of significant peer reviewed scientific papers on Australian snakes.

HIEREMYS GRANDIS MALAYENSIS SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:CCABC1C3-A626-4690-8144-F8B68C75E285

Holotype: A preserved male specimen (in alcohol) at the Field Museum of Natural History, Chicago, Illinois, USA, specimen number FMNH Amphibians and Reptiles 224043 collected from Perak, (Peninsula) Malaysia. This facility allows access to its holdings.

Paratypes: Six preserved specimens at the Field Museum of Natural History, Chicago, Illinois, USA, all collected from Perak, (Peninsula) Malaysia, specimen numbers FMNH Amphibians and Reptiles 224041 and 224042, both females in alcohol, 224037, 224038, 224039, 224040, all dried or skeletal parts.

Diagnosis: *Hieremys grandis* (Gray, 1860), originally described as *Geoemyda grandis* Gray, 1860 has a type locality of Cambodia and that form of the putative species occurs in zone generally near the coast running from Vietnam, Cambodia, Laos, Thailand and into Peninsula Malaysia. The population from the west flowing watercourses on Peninsula Malaysia in the states of Perak and Kedah are morphologically divergent from the others further north, appear to be allopatric in distribution, with an apparent break on the Isthmus of Kra and are therefore formally named as a new subspecies, *H. grandis malayensis subsp. nov.*

H. grandis malayensis subsp. nov. is separated from *H. grandis grandis* by having an orange-brown to dark brown coloured iris, versus yellow, bluish-yellow or yellowish with an orange tinge in *H. grandis grandis*.

Adult *H. grandis malayensis subsp. nov.* have weak and indistinct salmon coloured markings on the top of the head, less so on the sides of the head, all overlain with a whitish-grey sheen, with similarly subdued markings on the lower jaw and neck.

By contrast *H. grandis grandis* have strong contrasting orange markings in the form of reticulations or areas of orange interspersed with brown and likewise on the lower jaw and neck.

H. grandis (both subspecies) is separated from other species in the genus *Hieremys* Smith, 1916 by having the carapace arched or raised in the centre in a transverse section, versus the carapace being much depressed and flattened in the vertebral region.

H. grandis is further defined as follows:

Carapace has a strong but obtuse vertebral keel; only the posterior margin serrated. Vertebral shields (1-3) not or but slightly broader than long and narrower than the costals; nuchal longer than broad. On the plastron, the length of the suture between the pectoral shields is at least two thirds that of the abdominals. Carapace is dark brown, dark grey or blackish above; plastron and lower surface of marginals with black and yellow rays, either the black or the yellow predominating.

Species in the genus *Hieremys* Smith, 1916 (previously synonymised with *Heosemys* Stejneger, 1902) are separated from the morphologically similar species in the genus *Heosemys* by having the anterior margin of the shell not serrated; second vertebral shield narrower than the second costal and not much broader than long versus having the anterior margin of the shell serrated; second vertebral shield is at least as broad as the second costal and much broader than long in *Heosemys*.

The name *Hieremys* Smith, 1916, type species being *Hieremys annandalii* (= *Cyclemys annandalii* Boulenger, 1903), by original monotypy is available for those species, which according to Pereira *et al.* (2017) diverged from *Emys spinosa* (type species for *Heosemys* Stejneger, 1902) more than 20 MYA.

Hieremys Smith, 1916 includes *H. annandalii* (Boulenger, 1903), and the other two taxa recently placed in *Heosemys* as additional species, being *Geoemyda depressa* Anderson, 1875 and *Geoemyda grandis* Gray, 1860.

Both genera *Heosemys* and *Hieremys* are separated from all other morphologically similar species and genera by the following suite of characters: Neural plates mostly hexagonal, short-sided behind. Plastron extensively united to the carapace by suture, with axillary and inguinal peduncles just reaching the first and fifth costals; entoplastron intersected by the humero-pectoral suture. Skull without bony temporal arch; alveolar surfaces narrow, without median ridge. Upper surface of the head covered with undivided skin. Digits with a short web. Tail very short, not longer in the young than in the adult.

Photos of *H. grandis malayensis subsp. nov.* in life can be found online at:

<https://www.inaturalist.org/observations/49854455>

and

<https://www.flickr.com/photos/zulbaning/7984269247/>

Photos of the nominate subspecies of *H. grandis grandis* in life can be found online at:

<https://www.inaturalist.org/observations/32330180>

and

<https://www.flickr.com/photos/lagart0/6129891097>

Distribution: *H. grandis malayensis* subsp. nov. is known from Peninsula Malaysia and presumably also occurs in nearby parts of southern Burma and possibly also southern Thailand. *H. grandis* with a type locality of Cambodia, occurs in Cambodia, Vietnam, Laos, Thailand and Myanmar as far south as the Isthmus of Kra.

Etymology: Named in reflection of where the taxon originates, being the Malay Peninsula.

HIEREMYS ANNANDALII MEKONGENSIS SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:1785131B-559F-46B5-9BBE-666A6C763B3D

Holotype: A preserved specimen at the Field Museum of Natural History, Chicago, Illinois, USA, specimen number FMNH Amphibians and Reptiles 259074 collected from the An Minh district, Kien Giang District, Vietnam. This facility allows access to its holdings.

Paratypes: Two preserved specimens (Carapaces) at the Field Museum of Natural History, Chicago, Illinois, USA, specimen numbers FMNH Amphibians and Reptiles 263052 and 259398 collected from Siem Reap Province, Cambodia.

Diagnosis: *Hieremys annandalii* (Boulenger, 1903), was originally named as *Cyclemys annandalii* Boulenger, 1903 and most recently placed in the genus *Heosemys* Stejneger, 1902 (Rhodin *et al.* 2017).

The form from the Chao Phraya River basin in Thailand and including specimens on the east side of Peninsula Malaysia, being the type form (Type locality Yala Province, south Thailand), differ from specimens from the Mekong basin in Vietnam and Laos.

The unnamed form from the Mekong basin is formally identified as the new subspecies *Hieremys annandalii mekongensis* subsp. nov..

Hieremys annandalii mekongensis subsp. nov. is most readily separated from the nominate form by the possession of a well defined, well demarcated, sometimes broken, yellow stripe (often with an orange tinge) running from the tip of the snout, on each side of the head, through the upper eye and onto the front of the neck, coupled with a mainly dark grey top of the head, versus mainly yellow, yellowish brown or light grey on the top of the head, especially towards the front (anteriorly) and with yellow markings behind the eye usually being ill defined or even absent in *Hieremys annandalii annandalii*, or usually only present in younger specimens.

Hieremys annandalii of both subspecies are separated from other species in the genera *Hieremys* Smith, 1916 and *Heosemys* Stejneger, 1902 by the following suite of characters: Some form of yellow markings on the top of

the head and to the rear of the eye; the plastron is mostly black in adults and lacks obvious radiating lines; the vertebral keel is flattened; there are no bright orange speckles on the head.

The name *Hieremys* Smith, 1916, type species being *Hieremys annandalii* (= *Cyclemys annandalii* Boulenger, 1903), by original monotypy is available for those species, which according to Pereira *et al.* (2017) diverged from *Emys spinosa* (type species for *Heosemys* Stejneger, 1902) more than 20 MYA.

Hieremys Smith, 1916 includes *H. annandalii* (Boulenger, 1903), and the other two taxa recently placed in *Heosemys* as additional species, being *Geoemyda depressa* Anderson, 1875 and *Geoemyda grandis* Gray, 1860.

Both genera *Heosemys* and *Hieremys* are separated from all other morphologically similar species and genera by the following suite of characters: Neural plates mostly hexagonal, short-sided behind. Plastron extensively united to the carapace by suture, with axillary and inguinal peduncles just reaching the first and fifth costals; entoplastron intersected by the humero-pectoral suture. Skull without bony temporal arch; alveolar surfaces narrow, without median ridge. Upper surface of the head covered with undivided skin. Digits with a short web. Tail very short, not longer in the young than in the adult.

Hieremys annandalii mekongensis subsp. nov. in life is depicted in Rhodin *et al.* (2017) on page 98 at top left, or online at:

<https://www.inaturalist.org/observations/63151153>

Hieremys annandalii annandalii in life is depicted in life online at:

<https://www.inaturalist.org/observations/66606947>

and

<https://www.inaturalist.org/observations/34113147>

and

<https://www.inaturalist.org/observations/74007853>

Distribution: *Hieremys annandalii mekongensis* subsp. nov. is apparently confined to the Mekong basin of Vietnam and Laos, including the delta region. It may also occur in east flowing drainages to the north.

The nominate subspecies *H. annandalii annandalii* is found generally in the rest of Thailand, possibly nearby parts of Burma and northern Peninsula Malaysia.

Etymology: *Hieremys annandalii mekongensis* subsp. nov. is named in reflection of its centre of distribution.

VIJAYACHELYS SILVATICA WHITTONI SP. NOV.

LSIDurn:lsid:zoobank.org:act:842E9E13-2793-4BFD-80AD-2E6A090EDE93

Holotype: A preserved specimen at the Florida Museum of Natural History, University of Florida, Gainesville, Florida, USA, specimen number herpetology, UF Herp 52515, collected from Calicut Hills, Kerala, India. This facility allows access to their holdings.

Diagnosis: *Vijayachelys silvatica whittoni* subsp. nov. from north of the Paighat gap, Western Ghats, India is separated from *Vijayachelys silvatica silvatica*

(Henderson, 1912) from south of the Paighat gap, Western Ghats, India as follows:

Adult female *V. silvatica whittoni* subsp. nov. are separated from adult female *V. silvatica silvatica* by having whitish skin on the upper and lower surfaces of the neck, with prominent thickened blunt brown tubercles, versus fine and indistinct such tuberculation in *V. silvatica silvatica*; the beak (external upper jaw) is squarish in profile when viewed side on, versus more dagger-shaped (tending triangular) in *V. silvatica silvatica*. The iris of female *V. silvatica whittoni* subsp. nov. is brownish in colour, versus orangeish in female *V. silvatica silvatica*. There is only a little orange on the head and neck of female *Vijayachelys silvatica whittoni* subsp. nov. versus a lot in *V. silvatica silvatica*.

Adult male *V. silvatica whittoni* subsp. nov. are separated from adult male *V. silvatica silvatica* by having prominent thickened blunt tubercles, versus fine and indistinct or medium such tuberculation in *V. silvatica silvatica*.

Comparative photos of *V. silvatica whittoni* subsp. nov. and *V. silvatica silvatica* (adult females) can be seen in Deepak *et al.* (2014) in Fig. 4.

V. silvatica whittoni subsp. nov. in life (female) is depicted online at:

<https://www.inaturalist.org/observations/54824715>

V. silvatica silvatica in life (female) is depicted online at:

<https://www.inaturalist.org/observations/27113118>

Adult *V. silvatica* are separated from other morphologically similar tortosies as follows:

It is the smallest turtle species in India, with carapace length in females up to 139 mm and males up to 126 mm. They have a low carapace with three prominent keels. The keels on the carapace are prominent in all but the oldest individuals but the central one is widest and most pronounced. The carapace color in females varies from cinnamon to tawny or raw umber with a dark brown stripe along the central keel; males have a much darker carapace than females, varying from burnt umber to dusky brown. The plastron color varies from buff to buff yellow in females and straw to sulfur yellow in males (Moll *et al.* 1986). The maxillae form a distinct median upper jaw hook, the labial ridge is slightly serrated irregularly. The nuchal scute is well developed. The forelimbs are heavily armored anteriorly, with enlarged, imbricate and squarish to pentagonal-shaped scales extending on to the toes and soles of the feet. On the hind limbs enlarged scales are confined to the posterior medial surface except for the feet where they cover the entire surface. A large pointed scale is present on each heel (Henderson 1912; Smith 1931; Moll *et al.* 1986; Praschag *et al.* 2006; Deepak *et al.* 2014).

Distribution: *V. silvatica whittoni* subsp. nov. occurs in the Western Ghats of India, north of the Paighat gap (Kerala) as far north as the state of Karnataka. *V. silvatica silvatica* is found south of the Paighat gap in the states of Kerala and adjacent Tamil Nadu.

Etymology: *V. silvatica whittoni* subsp. nov. is named in honour of Evan Whitton of Sydney, New South Wales, Australia. Born on 5 March 1928 at Muswellbrook, New

South Wales, Australia and died on 16 July 2018. He is recognized for his significant contributions to the exposure of organised crime in Australia, with particular reference to the legal system and a corrupt judiciary including through his many definitive best-selling books.

CHITRA INDICA INDUSENSIS SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:AC82794C-CB0D-426B-B755-8E521A11C0E9

Holotype: A preserved specimen at the California Academy of Sciences, San Francisco, California, USA, specimen number CAS HERP 120754, collected from the Indus River, 5 miles north of Sukkur, Sindh Province, Pakistan, Latitude 27.7777 N., Longitude 68.8573 E. This facility allows access to their holdings.

Paratypes: 1/ A preserved specimen at the California Academy of Sciences, San Francisco, California, USA, specimen number CAS HERP 120755, collected from the Indus River, 5 miles north of Sukkur, Sindh Province, Pakistan, Latitude 27.7777 N., Longitude 68.8573 E. 2/ A preserved juvenile specimen at the California Academy of Sciences, San Francisco, California, USA, specimen number CAS HERP 120753, collected from the Indus River, at Tappu (Alauifkacha), Pakistan.

Diagnosis: *Chitra indica indusensis* subsp. nov. of the Indus river system is similar in most respects to *C. indica indica* (Gray, 1830) of the Ganges river system, which is why until now, no one has thought to separate the taxa. However studies on Cetaceans in the two river systems indicate a most recent mix of riverine species between the two systems to have been about 550K years ago, warranting subspecies level distinction between the populations.

Braulik *et al.* (2021), is one of a number of recently published papers which have found that riverine species from the Ganges and Indus systems last apparently mixed about 550K years ago.

C. indica indusensis subsp. nov. like *C. indica indica* has significant changes in morphology and colour with age, making differentiation between the two subspecies problematic.

However *C. indica indusensis* subsp. nov. is best separated from *C. indica indica* by a generally brownish hue to the colour in larger specimens, versus more yellowish in *C. indica indica*, as well as significantly less prominent head and face markings in specimens of similar age.

The neck markings of *C. indica indusensis* subsp. nov. are also more curved than those of *C. indica indica*.

Distribution: *Chitra indica indusensis* subsp. nov. appears to be restricted to the Indus river system, within Pakistan and India, where it inhabits muddy and sand bottomed areas.

Etymology: The taxon is named in reflection of the river system it is known to occur.

PARAGEOEMYDA SUBGEN. NOV.

LSIDURN:LSID:ZOOBANK.ORG:ACT:D2A5208C-B984-4080-9AA9-917964D77738

Type species: *Geoemyda japonica* Fan, 1931.

Diagnosis: *Parageoemyda* subgen. nov. are separated from other species within the genus *Geoemyda* Gray,

1834 by the following unique suite of characters: Neurals reaching the first suprapygal; posterior neurals with short sides posterolaterally; carapace tricarinate, with median keel stronger and wider than lateral keels; forelobe of plastron emarginate anteriorly; strong serrations in anterolateral and posterolateral margins of carapace; entoplastron intersected by gulohumeral; small concavity at the anterior corner of posterior vertebrals and laterally rounded forelobe of the plastron. Specimens in the nominate subgenus *Geoemyda* Gray, 1834 are further separated by having a yellow iris, with slight bluish tinge and also a darkening on the lateral edges (especially posterior) to the pupil, which is either absent or indistinct in *Parageoemyda* subgen. nov..

Geoemyda Gray, 1834 species (both subgenera), are separated from morphologically similar genera and species by the following unique character combination: Serration in the anterolateral margin of the carapace and the presence of a distinct and a wide medial keel on the carapace.

Distribution: Ryukyu Archipelago, Japan (see Takahashi *et al.* (2007) for details).

Etymology: Formally named *Parageoemyda* subgen. nov. as these animals are not quite *Geoemyda* Gray, 1834.

Content: *G. (Parageoemyda) japonica* (Fan, 1931) (type species); *G. (Parageoemyda) amamiensis* (Takahashi, Kata and Ota, 2007) (believed to be extinct).

GEOEMYDA DARANINI SP. NOV.

LSIDurn:lsid:zoobank.org:act:25BBBB4D-FEAC-4B78-94B8-DDD5DBF16C0E

Holotype: A preserved female specimen at the Museum of Vertebrate Zoology, University of California, Berkeley, California, USA, specimen number MVZ:Herp:208234, collected from Vietnam, probably North Vietnam. This facility allows access to their holdings.

Diagnosis: *Geoemyda daranini* sp. nov. from Vietnam has until now been treated as a southern population of *Geoemyda spengleri* (Gmelin, 1879), a species in fact from southern China. Adult *G. daranini* sp. nov. are separated from *G. spengleri* by having a generally dark brownish grey carapace, versus one that is generally light yellowish-brown in *G. spengleri*. The spines on the forelimbs of *G. daranini* sp. nov. are large and entirely yellow, sometimes tipped with red or orange, versus smaller and not entirely yellow in *G. spengleri*. The original descriptions of *G. spengleri* clearly refer to Chinese specimens, however the problem is that there are two similar forms in China, one being from Guangdong, Hong Kong and Macau and another from Guangxi and Hainan Island and it is unclear as to which form the type description fits.

The form from Guangdong, Hong Kong and Macau has a slightly reddish iris, which the other form does not. They are sufficiently divergent to warrant taxonomic separation at either subspecies or species level.

Geoemyda daranini sp. nov. and *G. spengleri* (both Chinese forms) are separated from all other similar species by the following suite of characters: Carapace

much depressed, strongly tricarinate; anterior border serrated, posterior border expanded and very strongly serrated, each marginal being acutely pointed. Vertebral shields broader than long, about as broad as the costals; nuchal moderate, trapezoid, broadest and emarginate posteriorly. Plastron large; the width of the bridge about equals the length of the posterior lobe, which is broadly notched; front lobe openly emarginate anteriorly. As regards size, the plastral shields take the following order, commencing with the largest: abdominals, femorals, pectorals, humerals, anals, gulars; no axillary or inguinal shields. Beak is strongly hooked in males, not notched; the width of the mandible at the symphysis is less than the diameter of the orbit. Tail in males is a little longer than the head. Dorsally the general colour is yellowish brown (Chinese species) to darker brown and greyish black (the Vietnamese species), often speckled with brown and with invariably with traces of black lines following the dorsal keels; plastron blackish brown, with a yellowish band on each side, which separates the blackish colour of the bridge from that of the rest of the plastron.

Distribution: Known only from the northern half of Vietnam and nearby Laos. The species is most common in hilly forested areas and appears to be confined to such areas.

Etymology: Named in honour of Dara Nin, of Ringwood, Victoria, Australia, who spent many years working as a part of the team at Snakebusters, Australia's best Reptiles, wildlife education and displays, in Melbourne, Victoria, Australia.

FREUDCHELYS GEN. NOV.

LSIDurn:lsid:zoobank.org:act:FE78F33A-29D4-415B-A5FA-5A86418F83D5

Type species: *Freudchelys freudi* sp. nov. (this paper).

Diagnosis: Until now, the species within *Freudchelys* gen. nov. have been treated as being within the genus *Manouria* Gray 1854, with the type species: *Manouria fusca* Gray, 1854 being a subjective synonym of *Testudo emys* Schlegel and Müller, 1840 by original monotypy.

Freudchelys gen. nov. are separated from *Manouria* Gray 1854 by the following suite of characters: A smaller adult size with a carapace not exceeding 31 cm in maximum length; the carapace is evidently somewhat flattened in shape, not seen in *Manouria* and also with characteristically very concave carapace scutes; there are strongly serrated marginal scutes and contiguous pectoral plates which always meet at the midline. There is also a single, large conical spur on each thigh, in contrast to the cluster of such spurs in *Manouria*.

In contrast to most contemporary authors, I regard *Manouria emys* (Schlegel and Müller 1840) as a complex of two species, meaning that the genus *Manouria* as recognized herein is not monotypic. The two genera, *Freudchelys* gen. nov. and *Manouria* Gray 1854 are believed to have diverged more than 20 MYA, which along with their morphological divergence is good reason to divide the relevant taxa into two separate genera.

Both genera are characterised by having paired

supracaudal scutes, a posteriorly expanded nuchal scute and utilization of mesic, rather than xeric, habitats.

Distribution: Cambodia, China (Yunnan), Laos, Malaysia (Peninsular), Myanmar, Thailand and Vietnam.

Etymology: Named in honour of a Dachshund cross Dobermann named Freud, that was a family pet when I was aged 7-16 years of age, who became an expert at locating snakes and lizards as detailed in Hoser (1989), for services to herpetology. He travelled with me across Australia many times and located numerous valuable specimens.

Content: *Freudchelys freudi* sp. nov. (type species); *F. impressa* (Günther, 1882); *F. latinuchalis* (Vaillant, 1894); *F. pseudemys* (Boulenger, 1903).

FREUDCHELYS FREUDI SP. NOV.

LSIDurn:lsid:zoobank.org:act:6B3D6F46-4D0D-48A4-8328-E7F275916648

Holotype: A preserved specimen (carapace and plastron (dry) only) at the Museum of Comparative Zoology at Harvard University, Cambridge, Massachusetts, USA, specimen number MCZ Herp R-43051, collected from Mount Angka (now called Doi Inthanon), Thailand, Latitude 18.3515 N., Longitude 98.2912 E. This facility allows access to its holdings.

Diagnosis: *Freudchelys freudi* sp. nov. is readily separated from all other species in the genus *Freudchelys* gen. nov. by the following suite of characters: An absence of pink on the snout and other parts of the head (this being most prominent in *F. pseudemys*); yellow iris (versus with a blue tinge in *F. impressa* and *F. latinuchalis*); lumpy scales on the upper forelimbs are of moderate size, versus large on the other species in the genus.

Until now, the species within *Freudchelys* gen. nov. have been treated as being within the genus *Manouria* Gray 1854, with the type species: *Manouria fusca* Gray, 1854 being a subjective synonym of *Testudo emys* Schlegel and Müller, 1840 by original monotypy.

Freudchelys gen. nov. are separated from *Manouria* Gray 1854 by the following suite of characters: A smaller adult size with a carapace not exceeding 31 cm in maximum length; the carapace is evidently somewhat flattened in shape, not seen in *Manouria* and also with characteristically very concave carapace scutes; there are strongly serrated marginal scutes and contiguous pectoral plates which always meet at the midline. There is also a single, large conical spur on each thigh, in contrast to the cluster of such spurs in *Manouria*.

In contrast to most contemporary authors, I regard *Manouria emys* (Schlegel and Müller 1840) as a complex of two species, meaning that the genus *Manouria* as recognized herein is not monotypic.

The two genera, *Freudchelys* gen. nov. and *Manouria* Gray 1854 are believed to have diverged more than 20 MYA, which along with their morphological divergence is good reason to divide the relevant taxa into two separate genera.

Both genera are characterised by having paired supracaudal scutes, a posteriorly expanded nuchal scute and utilization of mesic, rather than xeric, habitats.

Distribution: *Freudchelys freudi* sp. nov. appears to be confined to the Shan Hills region of northern Thailand and adjacent eastern Myanmar.

Etymology: As for the genus. Named in honour of a Dachshund cross Dobermann named Freud, that was a family pet when I was aged 7-16 years of age (1960's-1970's), who became an expert at locating snakes and lizards as detailed in Hoser (1989), for services to herpetology. He travelled with me across Australia many times and located numerous valuable specimens.

CHELONOIDIS HOSERAE SP. NOV.

LSIDurn:lsid:zoobank.org:act:CB7B4C43-8EDB-4431-9931-4E532A2E038B

Holotype: A preserved specimen at The Field Museum of Natural History, Chicago, Illinois, USA, specimen number FMNH Amphibians and Reptiles 9499, collected from Paraguay. This facility allows access to its holdings.

Paratypes: 1/ A preserved specimen at The Field Museum of Natural History, Chicago, Illinois, USA, specimen number FMNH Amphibians and Reptiles 9500, collected from Paraguay.

2/ A preserved specimen (shell only), at the Museum of Zoology, Dresden, Germany specimen number MTD D 43485, collected from Filadelfia, Chaco, Paraguay.

Diagnosis: Until now, *Chelonoidis hoserae* sp. nov. has been treated as a southern population of *Chelonoidis carbonaria* (Spix, 1824), from Paraguay, eastern Bolivia and the immediately adjoining parts of south-west Brazil. Adults of this species are readily separated from *C. carbonaria*, including the newly described species *C. woolfi* sp. nov. and *C. fiacummingae* sp. nov. (previously regarded as north-western south American populations of *C. carbonaria*) by having a carapace that is blackish in colour, versus greyish brown or yellowish-brown and with distinctive large light yellow spots in the centre of each dorsal scute (excluding those on the lower margins), as well as a well-defined narrowing or waist in the middle of the carapace, not seen to the same extent in the other species.

There are no obvious yellow spots or large squares on the lower margins of each scute on the carapace as seen in *C. woolfi* sp. nov..

Chelonoidis hoserae sp. nov. also has a very different plastral pattern as compared with all other species in the complex, in *C. hoserae* sp. nov. being mostly dark in a symmetrical mottled pattern.

C. hoserae sp. nov. is also unique in that it has an enlarged scale or 'spur' on the inside of the fore limb elbow.

Carapace size of *C. hoserae* sp. nov. is 35-40 cm, versus the usual 30-35 cm in *C. carbonaria*.

The species *Chelonoidis carbonaria*, type from Pará, Brazil, herein confined to the northern half of Brazil and most of the Atlantic Coast of South America (being the form that matches the holotype), is distinguished by having a greyish to yellowish-brown carapace, which has semi-distinct lightening at the centre of each scute, with blackening at the edges, but not the distinctive blackish coloured carapace seen in *C. hoserae* sp. nov..

While mature specimens may have narrowing of the waist of the carapace, this is not heavily pronounced as seen in *C. hoserae* sp. nov..

For *C. carbonaria*, head and limb colours are generally light orangeish to red, while plastrons are mostly pale yellow.

The species *C. woolfi* sp. nov. from the eastern and southern parts of Colombia as well as Ecuador and Peru, is a blackish-shelled species, with large squarish yellow shapes in the centre of each of the dorsal scutes and yellow spots or large squares also prominent on the lower margins of each scute on the carapace. Most specimens of *C. woolfi* sp. nov. are further characterised by having extremely exaggerated scute rings on each of the dorsal scutes, which while obvious in specimens of *C. carbonaria* and *C. hoserae* sp. nov. are generally less pronounced in specimens of those species.

In this species limb colors generally are a pale yellow with a pink, orange or red tinge, with their heads and limbs are often slightly different colours.

The average size of *C. woolfi* sp. nov. is slightly smaller than the usual 30-35 cm seen in *C. carbonaria*.

The crown of *C. hoserae* sp. nov. is mainly black, versus mainly yellow in *C. woolfi* sp. nov. and *C. fiacummingae* sp. nov..

The species *C. fiacummingae* sp. nov. from Panama and immediately adjacent parts of far north Colombia is separated from *C. carbonaria*, *C. hoserae* sp. nov. and *C. woolfi* sp. nov. by the following unique suite of characters: A carapace base colour that is grey, dark brown, or coffee rather than black. Their pale plastrons have central dark areas resembling an exclamation point. Their heads and limbs are generally pale yellow to orange. The average size is slightly smaller than usual 30-35 cm seen in *C. carbonaria*. Furthermore their head is mainly yellow both above and on the sides of the face; usually having expanded areas of yellow or whitish-yellow in the centre of the dorsal scutes (excluding those on the lower margins), making the light areas occupy at least half of each scute (versus less than this in the other species); no obvious areas of yellow at the outer edges of the lower margin scutes of the carapace, which is generally grey, dark brown, or coffee in colour and a dark orangeish iris.

Like *C. woolfi* sp. nov., the species *C. fiacummingae* sp. nov. is further characterised by having extremely exaggerated scute rings in adults.

The four species *C. carbonaria*, *C. hoserae* sp. nov., *C. fiacummingae* sp. nov. and *C. woolfi* sp. nov. all until now treated as *C. carbonaria*, are separated from their nearest relative *C. denticulatus*, herein placed in a new subgenus *Parachelonoidis* subgen. nov. by the following unique suite of characters: General colour of the skin is dark olive, approaching black in parts, (versus light olive in *C. denticulatus*); main part of scales on legs a deep orangeish red in colour (versus yellow in *C. denticulatus*); tail of both sexes is moderately long (versus relatively short in *C. denticulatus*); posterior sternal notch is lunate, very broad and shallow, the depth being less than one fifth of the breadth (versus

posterior sternal notch being triangular, nearly half as deep as it is broad in *C. denticulatus*).

The subgenera *Pampatestudo* Lindholm, 1929 with the type species: *Testudo* (*Pampatestudo*) *chilensis* (= *Testudo* (Gopher) *chilensis* Gray, 1870), by original monotypy and *Darwintestudo* Antenbrink-Vetter and Vetter, 1998 with the type species *Darwintestudo hoodensis* (= *Testudo hoodensis* Van Denburgh, 1907), by original designation, are recognized for the relevant species groups, due to divergences in the range of about 13 MYA for the relevant species groups from the *Chelonoidis carbonaria* clade, being type species for the genus *Chelonoidis* Fitzinger, 1835.

Remaining in the subgenus *Chelonoidis* Fitzinger, 1835 is the species complex associated with *C. carbonaria*, including *C. carbonaria*, *C. hoserae* sp. nov., *C. fiacummingae* sp. nov. and *C. woolfi* sp. nov..

Chelonoidis denticulatus is regarded herein as a single species, being the entirety of the subgenus *Parachelonoidis* subgen. nov., but it can be split into subspecies, for which names are available (Rhodin et al. 2017).

Both subgenera *Chelonoidis* and *Parachelonoidis* subgen. nov. are separated from the other subgenera within *Chelonoidis* by the following suite of characters: Carapace elongate, margin not at all reverted, dark brown or black in colour, each dorsal shield yellowish in the centre to at least some extent; nuchal shield absent; gular shields distinct.

An image of *C. hoserae* sp. nov. in life can be found online at:

<https://www.inaturalist.org/observations/72283198>

An image of *C. woolfi* sp. nov. in life can be found online at:

<https://www.inaturalist.org/observations/70965042>

An image of *C. fiacummingae* sp. nov. in life can be found online at:

<https://www.inaturalist.org/observations/72103470>

Distribution: *C. hoserae* sp. nov. is found in Paraguay, immediately adjacent Argentina, eastern Bolivia and the immediately adjoining parts of south-west Brazil.

Etymology: Named in honour of my long suffering wife, Shireen Hoser, of Park Orchards, Victoria, Australia in recognition for her services to herpetology and wildlife conservation over more than a quarter of a century.

CHELONOIDIS WOOLFI SP. NOV.

LSIDurn:lsid:zoobank.org:act:7176B4E9-960F-4483-9E4A-D9D96EC36A40

Holotype: A preserved specimen at The Field Museum of Natural History, Chicago, Illinois, USA, specimen number FMNH Amphibians and Reptiles 61672, collected from Putumayo, Colombia. This facility allows access to its holdings.

Diagnosis: Until now, *C. woolfi* sp. nov. has been treated as a population of the well-known South American species *Chelonoidis carbonaria* (Spix, 1824). *C. woolfi* sp. nov. occurs in the eastern and southern parts of Colombia as well as Ecuador and Peru.

The species *C. hoserae* sp. nov. has been treated as a

southern population of *C. carbonaria* from Paraguay, eastern Bolivia and the immediately adjoining parts of south-west Brazil. Adults of this species are readily separated from *C. carbonaria*, including the newly described species *C. woolfi sp. nov.* and *C. fiacummingae sp. nov.* (previously regarded as north-western south American populations of *C. carbonaria*)

by having a carapace that is blackish in colour, versus greyish brown or yellowish-brown and with distinctive large light yellow spots in the centre of each dorsal scute (excluding those on the lower margins), as well as a well-defined narrowing or waist in the middle of the carapace, not seen to the same extent in the other species.

There are no obvious yellow spots or large squares on the lower margins of each scute on the carapace as seen in *C. woolfi sp. nov.*

Chelonoidis hoserae sp. nov. also has a very different plastral pattern as compared with all other species in the complex, in *C. hoserae sp. nov.* being mostly dark in a symmetrical mottled pattern.

C. hoserae sp. nov. is also unique in that it has an enlarged scale or 'spur' on the inside of the fore limb elbow.

Carapace size of *C. hoserae sp. nov.* is 35-40 cm, versus the usual 30-35 cm in *C. carbonaria*.

The species *Chelonoidis carbonaria*, herein confined to the northern half of Brazil and most of the Atlantic Coast of South America (being the form that matches the holotype), is distinguished by having a greyish to yellowish-brown carapace, which has semi-distinct lightening at the centre of each scute, with blackening at the edges, but not the distinctive blackish coloured carapace seen in *C. hoserae sp. nov.*

While mature specimens may have narrowing of the waist of the carapace, this is not heavily pronounced as seen in *C. hoserae sp. nov.*

For *C. carbonaria*, head and limb colours are generally light orangeish to red, while plastrons are mostly pale yellow.

The species *C. woolfi sp. nov.* from the eastern and southern parts of Colombia as well as Ecuador and Peru, is a blackish-shelled species, with large squarish yellow shapes in the centre of each of the dorsal scutes and yellow spots or large squares also prominent on the lower margins of each scute on the carapace. Most specimens of *C. woolfi sp. nov.* are further characterised by having extremely exaggerated scute rings on each of the dorsal scutes, which while obvious in specimens of *C. carbonaria* and *C. hoserae sp. nov.* are generally less pronounced in specimens of those species.

In this species limb colors generally are a pale yellow with a pink, orange or red tinge, and their heads and limbs are often slightly different colours.

The average size of *C. woolfi sp. nov.* is slightly smaller than the usual 30-35 cm seen in *C. carbonaria*.

The crown of *C. hoserae sp. nov.* is mainly black, versus mainly yellow in *C. woolfi sp. nov.* and *C. fiacummingae sp. nov.*

The species *C. fiacummingae sp. nov.* from Panama

and immediately adjacent parts of far north Colombia is separated from *C. carbonaria*, *C. hoserae sp. nov.* and *C. woolfi sp. nov.* by the following unique suite of characters: A carapace base colour that is grey, dark brown, or coffee rather than black. Their pale plastrons have central dark areas resembling an exclamation point. Their heads and limbs are generally pale yellow to orange. The average size is slightly smaller than usual 30-35 cm seen in *C. carbonaria*. Furthermore their head is mainly yellow both above and on the sides of the face; usually having expanded areas of yellow or whitish-yellow in the centre of the dorsal scutes (excluding those on the lower margins), making the light areas occupy at least half of each scute (versus less than this in the other species); no obvious areas of yellow at the outer edges of the lower margin scutes of the carapace, which is generally grey, dark brown, or coffee in colour and with a dark orangeish iris.

Like *C. woolfi sp. nov.*, the species *C. fiacummingae sp. nov.* is further characterised by having extremely exaggerated scute rings in adults.

The four species *C. carbonaria*, *C. hoserae sp. nov.*, *C. fiacummingae sp. nov.* and *C. woolfi sp. nov.* all until now treated as *C. carbonaria*, are separated from their nearest relative *C. denticulatus*, herein placed in a new subgenus *Parachelonoidis subgen. nov.* by the following unique suite of characters: General colour of the skin is dark olive, approaching black in parts, (versus light olive in *C. denticulatus*); main part of scales on legs a deep orangeish red in colour (versus yellow in *C. denticulatus*); tail of both sexes is moderately long (versus relatively short in *C. denticulatus*); posterior sternal notch is lunate, very broad and shallow, the depth being less than one fifth of the breadth (versus posterior sternal notch being triangular, nearly half as deep as it is broad in *C. denticulatus*).

The subgenera *Pampatestudo* Lindholm, 1929 with the type species: *Testudo (Pampatestudo) chilensis* (= *Testudo (Gopher) chilensis* Gray, 1870), by original monotypy and *Darwintestudo* Antenbrink-Vetter and Vetter, 1998 with the type species *Darwintestudo hoodensis* (= *Testudo hoodensis* Van Denburgh, 1907), by original designation, are recognized for the relevant species groups, due to divergences in the range of about 13 MYA for the relevant species groups from the *Chelonoidis carbonaria* clade, being type species for the genus *Chelonoidis* Fitzinger, 1835.

Remaining in the subgenus *Chelonoidis* Fitzinger, 1835 is the species complex associated with *C. carbonaria*, including *C. carbonaria*, *C. hoserae sp. nov.*, *C. fiacummingae sp. nov.* and *C. woolfi sp. nov.*

Chelonoidis denticulatus is regarded herein as a single species, being the entirety of the subgenus *Parachelonoidis subgen. nov.*, but it can be split into subspecies, for which names are available (Rhodin et al. 2017).

Both subgenera *Chelonoidis* and *Parachelonoidis subgen. nov.* are separated from the other subgenera within *Chelonoidis* by the following suite of characters: Carapace elongate, margin not at all reverted, dark brown or black in colour, each dorsal shield yellowish in

the centre to at least some extent; nuchal shield absent; gular shields distinct.

An image of *C. hoserae sp. nov.* in life can be found online at:

<https://www.inaturalist.org/observations/72283198>

An image of *C. woolfi sp. nov.* in life can be found online at:

<https://www.inaturalist.org/observations/70965042>

An image of *C. fiacummingae sp. nov.* in life can be found online at:

<https://www.inaturalist.org/observations/72103470>

Distribution: *C. woolfi sp. nov.* occurs in the eastern and southern parts of Colombia as well as Ecuador and Peru.

Etymology: Named in honour of Paul Woolf of Walloon, Brisbane, Queensland, Australia, foundation president of the Herpetological Society of Queensland Incorporated, in recognition of his many valuable contributions to herpetology in Australia over more than 3 decades.

CHELONOIDIS FIACUMMINGAE SP. NOV.

LSIDurn:lsid:zoobank.org:act:D2E2D0A4-93F5-41B7-BBFF-A4433826169C

Holotype: A preserved specimen at the Natural History Museum of Utah (UMNH), Salt Lake City, Utah, USA, specimen number UMNH:Herp:3865 collected at Yape, Darien, Panama. This facility allows access to its holdings.

Paratypes: 1/ A preserved specimen (Carapace only) at the Natural History Museum of Utah (UMNH), Salt Lake City, Utah, USA, specimen number UMNH:Herp: 9974 collected at Darien, Panama. 2/ A preserved specimen (Carapace only) at the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA, specimen number MCZ:Herp:R-67120 collected at Darien, Panama.

Diagnosis: Until now, *C. fiacummingae sp. nov.* has been treated as a population of the well-known South American species *Chelonoidis carbonaria* (Spix, 1824). *C. fiacummingae sp. nov.* occurs in Panama and immediately adjacent parts of far north Colombia.

The species *C. hoserae sp. nov.* has been treated as a southern population of *C. carbonaria* from Paraguay, eastern Bolivia and the immediately adjoining parts of south-west Brazil. Adults of this species are readily separated from *C. carbonaria*, including the newly described species *C. woolfi sp. nov.* and *C. fiacummingae sp. nov.* (previously regarded as north-western south American populations of *C. carbonaria*) by having a carapace that is blackish in colour, versus greyish brown or yellowish-brown and with distinctive large light yellow spots in the centre of each dorsal scute (excluding those on the lower margins), as well as a well-defined narrowing or waist in the middle of the carapace, not seen to the same extent in the other species.

There are no obvious yellow spots or large squares on the lower margins of each scute on the carapace as seen in *C. woolfi sp. nov.*

Chelonoidis hoserae sp. nov. also has a very different plastral pattern as compared with all other species in the complex, in *C. hoserae sp. nov.* being mostly dark in a symmetrical mottled pattern.

C. hoserae sp. nov. is also unique in that it has an enlarged scale or 'spur' on the inside of the fore limb elbow.

Carapace size of *C. hoserae sp. nov.* is 35-40 cm, versus the usual 30-35 cm in *C. carbonaria*.

The species *Chelonoidis carbonaria*, herein confined to the northern half of Brazil and most of the Atlantic Coast of South America (being the form that matches the holotype), is distinguished by having a greyish to yellowish-brown carapace, which has semi-distinct lightening at the centre of each scute, with blackening at the edges, but not the distinctive blackish coloured carapace seen in *C. hoserae sp. nov.*

While mature specimens may have narrowing of the waist of the carapace, this is not heavily pronounced as seen in *C. hoserae sp. nov.*

For *C. carbonaria*, head and limb colours are generally light orangeish to red, while plastrons are mostly pale yellow.

The species *C. woolfi sp. nov.* from the eastern and southern parts of Colombia as well as Ecuador and Peru, is a blackish-shelled species, with large squarish yellow shapes in the centre of each of the dorsal scutes and yellow spots or large squares also prominent on the lower margins of each scute on the carapace. Most specimens of *C. woolfi sp. nov.* are further characterised by having extremely exaggerated scute rings on each of the dorsal scutes, which while obvious in specimens of *C. carbonaria*, *C. hoserae sp. nov.* are generally less pronounced in specimens of those species.

In this species limb colors generally are a pale yellow with a pink, orange or red tinge, and their heads and limbs are often slightly different colours.

The average size of *C. woolfi sp. nov.* is slightly smaller than the usual 30-35 cm seen in *C. carbonaria*.

The crown of *C. hoserae sp. nov.* is mainly black, versus mainly yellow in *C. woolfi sp. nov.* and *C. fiacummingae sp. nov.*

The species *C. fiacummingae sp. nov.* from Panama and immediately adjacent parts of far north Colombia is separated from *C. carbonaria*, *C. hoserae sp. nov.* and *C. woolfi sp. nov.* by the following unique suite of characters: A carapace base colour that is grey, dark brown, or coffee rather than black. Their pale plastrons have central dark areas resembling an exclamation point. Their heads and limbs are generally pale yellow to orange. The average size is slightly smaller than usual 30-35 cm seen in *C. carbonaria*. Furthermore their head is mainly yellow both above and on the sides of the face; usually having expanded areas of yellow or whitish-yellow in the centre of the dorsal scutes (excluding those on the lower margins), making the light areas occupy at least half of each scute (versus less than this in the other species); no obvious areas of yellow at the outer edges of the lower margin scutes of the carapace, which is generally grey, dark brown, or coffee in colour

and a dark orangeish iris.

Like *C. woolfi* sp. nov., the species *C. fiacummingae* sp. nov. is further characterised by having extremely exaggerated scute rings in adults.

The four species *C. carbonaria*, *C. hoserae* sp. nov., *C. fiacummingae* sp. nov. and *C. woolfi* sp. nov. all until now treated as *C. carbonaria*, are separated from their nearest relative *C. denticulatus*, herein placed in a new subgenus *Parachelonoidis* subgen. nov. by the following unique suite of characters: General colour of the skin is dark olive, approaching black in parts, (versus light olive in *C. denticulatus*); main part of scales on legs a deep orangeish red in colour (versus yellow in *C. denticulatus*); tail of both sexes is moderately long (versus relatively short in *C. denticulatus*); posterior sternal notch is lunate, very broad and shallow, the depth being less than one fifth of the breadth (versus posterior sternal notch being triangular, nearly half as deep as it is broad in *C. denticulatus*).

The subgenera *Pampatestudo* Lindholm, 1929 with the type species: *Testudo (Pampatestudo) chilensis* (= *Testudo (Gopher) chilensis* Gray, 1870), by original monotypy and *Darwintestudo* Antenbrink-Vetter and Vetter, 1998 with the type species *Darwintestudo hoodensis* (= *Testudo hoodensis* Van Denburgh, 1907), by original designation, are recognized for the relevant species groups, due to divergences in the range of about 13 MYA for the relevant species groups from the *Chelonoidis carbonaria* clade, being type species for the genus *Chelonoidis* Fitzinger, 1835.

Remaining in the subgenus *Chelonoidis* Fitzinger, 1835 is the species complex associated with *C. carbonaria*, including *C. carbonaria*, *C. hoserae* sp. nov., *C. fiacummingae* sp. nov. and *C. woolfi* sp. nov..

Chelonoidis denticulatus is regarded herein as a single species, being the entirety of the subgenus *Parachelonoidis* subgen. nov., but it can be split into subspecies, for which names are available (Rhodin *et al.* 2017).

Both subgenera *Chelonoidis* and *Parachelonoidis* subgen. nov. are separated from the other subgenera within *Chelonoidis* by the following suite of characters: Carapace elongate, margin not at all reverted, dark brown or black in colour, each dorsal shield yellowish in the centre to at least some extent; nuchal shield absent; gular shields distinct.

An image of *C. hoserae* sp. nov. in life can be found online at:

<https://www.inaturalist.org/observations/72283198>

An image of *C. woolfi* sp. nov. in life can be found online at:

<https://www.inaturalist.org/observations/70965042>

An image of *C. fiacummingae* sp. nov. in life can be found online at:

<https://www.inaturalist.org/observations/72103470>

Distribution: *C. fiacummingae* sp. nov. occurs in Panama and immediately adjacent parts of far north Colombia.

Etymology: Named in honour of Fia Cumming of Lyons, ACT, Australia in recognition of her services to

wildlife conservation in Australia, including through her important work as one of the best investigative journalists in Australian history.

Reports by her of endemic government wildlife department corruption in Australia forced a rewrite of wildlife conservation laws in all states of Australia and Federally, giving important positive, long-term wildlife conservation outcomes.

PARACHELONOIDES SUBGEN. NOV.

LSIDurn:lsid:zoobank.org:act:CFAAD14E-A12C-4A99-BEEC-0A1FAD734A2B

Type species: *Testudo denticulata* Linnaeus, 1766.

Currently known as *Chelonoidis denticulatus* (Linnaeus, 1766).

Diagnosis:

The four species *C. carbonaria*, *C. hoserae* sp. nov., *C. fiacummingae* sp. nov. and *C. woolfi* sp. nov. all until now treated as *C. carbonaria*, are separated from their nearest relative *C. denticulatus* (Linnaeus 1766), herein placed in a new subgenus *Parachelonoidis* subgen. nov. by the following unique suite of characters: General colour of the skin is dark olive, approaching black in parts, (versus light olive in *C. denticulatus*); main part of scales on legs a deep orangeish red in colour (versus yellow in *C. denticulatus*); tail of both sexes is moderately long (versus relatively short in *C. denticulatus*); posterior sternal notch is lunate, very broad and shallow, the depth being less than one fifth of the breadth (versus posterior sternal notch being triangular, nearly half as deep as it is broad in *C. denticulatus*).

The subgenera *Pampatestudo* Lindholm, 1929 with the type species: *Testudo (Pampatestudo) chilensis* (= *Testudo (Gopher) chilensis* Gray, 1870), by original monotypy and *Darwintestudo* Antenbrink-Vetter and Vetter, 1998 with the type species *Darwintestudo hoodensis* (= *Testudo hoodensis* Van Denburgh, 1907), by original designation, are recognized for the relevant species groups, due to divergences in the range of about 13 MYA for the relevant species groups from the *Chelonoidis carbonaria* clade, being type species for the genus *Chelonoidis* Fitzinger, 1835.

Remaining in the subgenus *Chelonoidis* Fitzinger, 1835 is the species complex associated with *C. carbonaria*, including *C. carbonaria*, *C. hoserae* sp. nov., *C. fiacummingae* sp. nov. and *C. woolfi* sp. nov..

Chelonoidis denticulatus is regarded herein as a single species, being the entirety of the subgenus *Parachelonoidis* subgen. nov., but it can be split into subspecies, for which names are available (Rhodin *et al.* 2017).

Both subgenera *Chelonoidis* and *Parachelonoidis* subgen. nov. are separated from the other subgenera within *Chelonoidis* by the following suite of characters: Carapace elongate, margin not at all reverted, dark brown or black in colour, each dorsal shield yellowish in the centre to at least some extent; nuchal shield absent; gular shields distinct.

Distribution: Generally the forested parts of the northern half of South America.

Etymology: *Parachelonoidis subgen. nov.* reflects the fact that the relevant species is not quite "*Chelonoidis*".

Content: *Chelonoidis (Parachelonoidis) denticulatus* (Linnaeus 1766).

KINIXYS HOMEANA VARIANS SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:040337C6-9FFC-4AFD-BAA8-9A9672692B1D

Holotype: A preserved specimen at the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA, specimen number MCZ:Herp: R-34309 collected at Sakbayeme, Littoral, Cameroon, Africa, Latitude 4.033 N., Longitude 10.567 E. This facility allows access to their holdings.

Paratype: A preserved specimen at the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA, specimen number MCZ:Herp: R-34311 collected at Sakbayeme, Littoral, Cameroon, Africa, Latitude 4.033 N., Longitude 10.567 E.

Diagnosis: The type form of *Kinixys homeana* Bell, 1827 is that from West Africa (Sierra Leone). The subspecies *Kinixys homeana varians subsp. nov.* is the form of the species found east of the Dahomey Gap (generally including most of Benin and Togo).

The two subspecies are separated morphologically as follows:

They type form of *K. homeana homeana* are separated from *K. homeana varians subsp. nov.* by having noticeable greying around the nostril in younger specimens and not in the eastern subspecies.

K. homeana homeana have a strong yellowish hue to the carapace. This is not so in *K. homeana varians subsp. nov.*, which are generally more reddish in colour. The species *Kinixys homeana* Bell 1827 (both subspecies) are separated from other species in the genus by the following suite of characters: Anterior and posterior margins of carapace reverted and dentate; nuchal shield present; anterior extremity of plastron not projecting beyond the carapace; carapace descending vertically at rear.

Species in the genus *Kinixys* Bell, 1827 are separated from other similar species of tortoise by the following suite of characters: Posterior portion of carapace movable in the adult, hinged between the seventh and eighth marginals and the fourth and fifth costal plates. Neural plates hexagonal, short-sided behind. Supracaudal shield undivided. Plastron extensively united to the carapace by suture, with short axillary and inguinal buttresses, which do not reach the costal plates; entoplastron anterior to the humero-pectoral suture. Skull with a bony temporal arch; alveolar surface without median ridge; beak hooked; choanae between the eyes. Head shielded above. Limbs club-shaped, with blunt claws and large scales. Tail short, not longer in the young than in the adult (derived from Boulenger 1889). Images of *Kinixys homeana varians subsp. nov.* in life can be found online at:

<https://www.inaturalist.org/observations/20577766>

and

<https://www.inaturalist.org/observations/24507224>

Images of *Kinixys homeana homeana* Bell, 1827 in life can be found online at:

<https://www.inaturalist.org/observations/42155589>

and

<https://www.inaturalist.org/observations/37756020>

and

<https://www.inaturalist.org/observations/9624630>

and

<https://www.flickr.com/photos/93882360@N07/34871508725/>

Distribution: Wetter areas of Central Africa east of the Dahomey Gap.

Etymology: The name "*variens*" reflects that it is a variant of the nominate subspecies.

KINIXYS EROSA DIVERGENTENS SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:19E29740-342C-4BF7-B803-06F1E9ACF39A

Holotype: A preserved specimen at the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA, specimen number MCZ:Herp R-8364, collected from South Cameroon, Africa, Latitude 2.95 N., Longitude 9.917 E. This facility allows access to their holdings.

Paratype: A preserved specimen at the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA, specimen number MCZ:Herp R-8367, collected from South Cameroon, Africa, Latitude 2.95 N., Longitude 9.917 E.

Diagnosis: The type form of *Kinixys erosa* (Schweigger, 1812) is that from West Africa. The subspecies *Kinixys erosa divergentens subsp. nov.* is the form of the species found east of the Dahomey Gap (generally including most of Benin and Togo).

The forms described as *Kinixys castanea* Bell, 1827 and *Kinixys denticulata* Hallowell, 1839 also apply to West African forms and hence neither name is available for the central African or eastern form.

The two subspecies are separated morphologically as follows: *K. erosa divergentens subsp. nov.* have greyish to whitish upper surfaces of forelimbs, whereas western *K. erosa erosa* have dark grey to blackish upper surfaces. *K. erosa erosa* has a strong reddish hue in younger specimens and juveniles, versus a reddish-brown hue in *K. erosa divergentens subsp. nov.* Young *K. erosa divergentens subsp. nov.* have a noticeable lightening in the mid dorsal line, versus none or indistinct in the western *K. erosa erosa*.

The species *Kinixys erosa* (Schweigger, 1812) (both subspecies) are separated from other species in the genus by the following suite of characters: Anterior and posterior margins of carapace reverted and dentate; no nuchal shield; anterior extremity of plastron projects beyond the carapace; posterior part of carapace is sloping.

Species in the genus *Kinixys* Bell, 1827 are separated from other similar species of tortoise by the following suite of characters: Posterior portion of carapace movable in the adult, hinged between the seventh and eighth marginals and the fourth and fifth costal plates.

Neural plates hexagonal, short-sided behind. Supracaudal shield undivided. Plastron extensively united to the carapace by suture, with short axillary and inguinal buttresses, which do not reach the costal plates; entoplastron anterior to the humero-pectoral suture. Skull with a bony temporal arch; alveolar surface without median ridge; beak hooked; choanae between the eyes. Head shielded above. Limbs club-shaped, with blunt claws and large scales. Tail short, not longer in the young than in the adult (derived from Boulenger 1889). Images of *Kinixys erosa divergentens subsp. nov.* in life can be found online at:

<https://www.inaturalist.org/observations/24879529>
and

<https://www.inaturalist.org/observations/57023>
and

<https://www.inaturalist.org/observations/52981487>
Images of West African *Kinixys erosa erosa* (Schweigger, 1812) in life can be found online at:

<https://www.inaturalist.org/observations/36891354>
and

<https://www.inaturalist.org/observations/48950590>

Distribution: Wetter areas of Central Africa east of the Dahomey Gap.

Etymology: The name “*divergentens*” reflects that it is a divergent form of the nominate subspecies.

CYCLEMYS MCDERMOTTORUM SP. NOV.

LSIDurn:lsid:zoobank.org:act:B717114F-AD69-4E96-BAF5-9EC57C63A5A2

Holotype: A preserved specimen at the Zoologisches Forschungsmuseum Alexander Koenig (ZFMK), Bonn, Germany, specimen number: ZFMK 92567 collected from Phnom Kbal Spean, Banteay Srei District, Cambodia, Latitude 13.6863 N., Longitude 104.0156 E., in the Phnom Kulen National Park, in the watershed of the Stung Kbal Spean River. This facility allows access to its holdings.

Diagnosis: *Cyclemys mcdermottorum sp. nov.* currently only known from the Phnom Kulen National Park, Cambodia, has been treated by previous authors (e.g. Kim 2011) as an aberrant population of *C. oldhamii* Gray, 1863. However genetically it appears to be in many ways intermediate between both *C. oldhamii* and the recently described *C. atripons* Iverson and McCord, 1997.

Biologically it is clearly an allopatric species separate from each of the others and so is formally named herein.

C. mcdermottorum sp. nov. are readily separated from all other members of the genus *Cyclemys* Bell, 1834 by the following unique suite of characters: Plastron entirely dark (brown or black) or prevalent plastral colour dark (brown or black), being spotted, blotched or striated in pattern in younger specimens and generally striated dark in older specimens (all brown in aged specimens); femoral mid-seam approximately equal to or longer than anal mid-seam; anal notch wide, obtuse-angled; crown of the head speckled or with small dark blotches; shell rectangular when viewed from above; all juveniles and

adults have moderately defined head markings and stripes on the top and sides of the head and well defined stripes underneath as in the neck is dark with salmon striping; throat salmon in colour and also showing a mottled dark pattern (versus unstriped on upper surfaces of the head of adults in the morphologically similar *C. oldhamii*).

The similar species, *Cyclemys atripons* Iverson and McCord, 1997 is readily separated from *C. mcdermottorum sp. nov.* by having a generally light coloured plastron, as seen in the comparative images depicted in Fig 2, of Vamberger *et al.* (2017).

C. mcdermottorum sp. nov. in life are depicted in Geissler *et al.* (2019).

Distribution: Known only from the type locality, being the western side of the Phnom Kulen National Park, in the watershed of the Stung Kbal Spean River, Cambodia.

Etymology: Named in honour of Rory and Catherine McDermott dedicated workers at the Mount Hotham Ski Resort, Victoria, Australia, including as managers of the Wongungarra Ski Lodge, Hotham Heights, for services to snow sports and eco-tourism in Australia.

GRAPTEMYS CAGLEI FLAVOCULUS SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:37E3DD96-34C8-494C-9891-95B533991B6E

Holotype: A preserved specimen at the Texas A and M University, College Station, Texas, USA, Biodiversity Research and Teaching Collections. Biodiversity Research and Teaching Collections,

Specimen number TCWC Herpetology 98284 collected from the Guadalupe River, 2 miles Southwest of Comfort at Highway 27, Kerr County, Texas, USA, Latitude 29.949278 N., Longitude -98.926006 W. This facility allows access to its holdings.

Paratypes: Five preserved specimens, all at the University of Texas at Austin, Texas, USA, Texas Natural History Collections, TNHC Herpetology Collection, specimen numbers 34022, 34023, 36106, 41223 and 50013 all collected from Kerr County, Texas, USA.

Diagnosis: *Graptemys caglei flavooculus subsp. nov.* is the divergent population of *Graptemys caglei* Haynes and McKown, 1974 from the Guadalupe River, Texas, upstream of Seguin, Texas, USA. The nominate subspecies is found downstream from Seguin, Texas, USA and also in the nearby San Marcos River drainage also in Texas.

Graptemys caglei flavooculus subsp. nov. is separated from the nominate subspecies by having a deep yellow iris, (versus light yellow in the nominate subspecies), which also has an ill-defined blackish line running horizontally through the iris (midline to the pupil), versus well-defined in the nominate subspecies. In large specimens of *Graptemys caglei flavooculus subsp. nov.* the yellow spot under the eye is bounded by black, versus grey in *G. caglei caglei*. Anterior narrowing of the carapace is somewhat pronounced in *Graptemys caglei flavooculus subsp. nov.*, versus not so in *G. caglei caglei*.

G. caglei of both subspecies are separated from

morphologically similar species as follows: The carapace is typically green, occasionally toward brown with many reticulating, contour-like yellow markings. It is low-domed, moderately keeled and the posterior edge of the carapace is serrated. The plastron is cream in colour with varying amounts of dark patterning along the seams. The underside of each marginal is also marked with lines of dark pigment. The skin of *G. caglei* is dark green with white or cream markings. On the top of the head, there is a V-shaped marking which then heads toward the eye and forms a crescent around the eye (this crescent is frequently broken). Furthermore, there is a bold medial stripe from the nose back to the V-shaped marking. The chin and throat are marked with a number of latitudinal stripes, including a transverse bar or so-called "chin-strap".

Photos of live *Graptemys caglei flavooculus subsp. nov.* can be found online at:

<https://www.inaturalist.org/observations/67047449>

and

<https://www.inaturalist.org/observations/83716276>

and

<https://www.inaturalist.org/observations/84905612>

Photos of the type form of live *Graptemys caglei caglei* Haynes and McKown, 1974 can be found online at:

<https://www.inaturalist.org/observations/69328434>

and

<https://www.inaturalist.org/observations/32896331>

Distribution: *Graptemys caglei flavooculus subsp. nov.* is the divergent population of *Graptemys caglei* Haynes and McKown, 1974 from the Guadalupe River, Texas, upstream of Seguin, Texas, USA with most specimens known from Kerr County, Texas. The nominate subspecies is found downstream from Seguin, Texas, USA and also in the nearby San Marcos River drainage also in Texas.

Etymology: The subspecies name for *Graptemys caglei flavooculus subsp. nov.* derives from the Latin words "Flavo" meaning yellow and "Oculus" meaning eye, with the combined word being written "flavooculus", recognising the deep yellow iris in this subspecies.

**GRAPTEMYS PSEUDOGEOGRAPHICA
BRUNNEISOCULUS SUBSP. NOV.**

LSIDurn:lsid:zoobank.org:act:9A526946-89C2-4009-9BAE-2D4DB40F3B92

Holotype: A preserved specimen at the Museum of Vertebrate Zoology, University of California, Berkeley, California, USA, specimen number MVZ Amphibian and reptile specimens MVZ:Herp:250644, collected from Ouiska Chitto Creek (also known as the Whiskey Chitto) (a tributary of the Calcasieu River) at the end of Hanchey Rd. Allen Parish, Louisiana, USA, Latitude 30.7261 N., Longitude -92.9043 W. This facility allows access to its holdings.

Diagnosis: *Graptemys pseudogeographica brunneisoculus subsp. nov.* restricted to the Calcasieu River basin is readily separated from both other subspecies of *G. pseudogeographica* (Gray, 1831), being *G. pseudogeographica pseudogeographica* and *G. pseudogeographica kohnii* (Baur, 1890) by the

following unique suite of characters: A dark-brown iris that is bisected by black lines at the median line through the pupil, versus light coloured iris (or predominantly so, with at times a few darker flecks) in the other two species, the iris colour being whitish or yellow; a unique chin pattern being one or other of A/ A curved or angular (matching contours of chin), but transverse chin bar, or; B/ A three-spot pattern with elongated side spots (versus always spotted in the other two subspecies).

Graptemys pseudogeographica are separated from morphologically similar species as follows: They possess a dark olive or brown carapace. Young specimens have a row of saw-toothed knobs down the center of the back. As they age the knobs blunten. Adult males usually keep pronounced knobs, but they are hard to detect in large females. The plastron is light coloured, and usually has no markings. The head is dark coloured with light lines extending up the neck to the back of the eye. There is a light coloured line behind each eye that extends to the top of the head and then turns backwards down the neck. Some specimens have a line that behind the eye that wraps around to the bottom of the eye.

G. geographica (Lesueur, 1817) don't have a light coloured line behind each eye. *G. ouachitaensis* Cagle, 1953 are distinguished by having a large spot behind the eye, under the eye and on the lower jaw.

Quality colour photos of *Graptemys pseudogeographica brunneisoculus subsp. nov.* in life are published in Lindeman *et al.* (2015), page 180 at Fig. 2. and Fig. 3, with comparative photos of yellow-iris *G.*

pseudogeographica (Gray, 1831) from the nearby Sabine River Drainage (Louisiana/Texas border area) in Fig. 4.

Distribution: *Graptemys pseudogeographica brunneisoculus subsp. nov.* is restricted to the Calcasieu River basin in Louisiana, USA.

Etymology: The subspecies name "brunneisoculus" refers in Latin to the brown (=brunneis) eye (=oculus) unique to this taxon.

**GRAPTEMYS GEOGRAPHICA
AURANTIACOOCULUS SUBSP. NOV.**

LSIDurn:lsid:zoobank.org:act:7B43789D-9C90-4917-81A7-0F6EA36B22A3

Holotype: A preserved juvenile specimen at the Carnegie Museum of Natural History, Pittsburgh, Pennsylvania, USA, CM Herps Collection, specimen number 32483, collected from Dauphin, Pennsylvania, USA, Latitude 40.37 N., Longitude -76.93 S. This facility allows access to its holdings.

Paratypes: Two preserved specimens at the Carnegie Museum of Natural History, Pittsburgh, Pennsylvania, USA, CM Herps Collection, specimen number 31842 (adult female, head only), collected from 2 miles north of Duncannon, Perry, Pennsylvania, USA, Latitude 40.42 N., Latitude -77.02 W, and specimen number 29538 (head only) collected from the Susquehanna River, Fort Hunter, Dauphin, Pennsylvania, USA, Latitude 40.34 N., Longitude -76.91 W.

Diagnosis: *Graptemys geographica aurantiacooculus*

subsp. nov. has until now been treated as a population of *Graptemys geographica* (Lesueur, 1817) with a type locality of “marsh, on the borders of Lake Erie”, USA. *G. geographica aurantiacooculus subsp. nov.* occurs in the Susquehanna River drainage and nearby systems.

G. geographica aurantiacooculus subsp. nov. is readily separated from nominate *G. geographica geographica* by the following unique suite of characters: An orange iris, as opposed to yellow or occasionally yellow with an orangeish tinge in *G. geographica geographica*; a carapace pattern that has an irregular pattern of dark flecks, as opposed to one or other of the following: no such markings, slight lightening in the centre of each scute or dark ocelli on the scutes as seen in various populations of *G. geographica geographica*.

Adult female *G. geographica aurantiacooculus subsp. nov.* have a carapace that is noticeably narrower and deeper than seen in nominate *G. geographica geographica*.

G. geographica aurantiacooculus subsp. nov. also has somewhat thicker yellow lines on the top and sides of the head as compared to *G. geographica geographica* of the same age.

Emys megacephala Holbrook, 1836, with a type locality of Cumberland River, near Nashville, Tennessee, is of the same form as type *Graptemys geographica geographica*.

Graptemys geographica (both subspecies), can be separated from the morphologically similar species *G. pseudogeographica* and *G. ouachitensis* by its lower carapace keel, immaculate plastron, unique postorbital spot and more pugnacious behaviour. Also, the male *G. geographica* lack elongated foreclaws.

Photos of *G. geographica aurantiacooculus subsp. nov.* in life can be found online at:

<https://www.inaturalist.org/observations/83279587>

and

<https://www.inaturalist.org/observations/52582887>

and

<https://www.inaturalist.org/observations/28561000>

and

<https://www.inaturalist.org/observations/49560707>

and

<https://www.inaturalist.org/observations/44969730>

Photos of the type form of *Graptemys geographica geographica* (Lesueur, 1817) in life can be found online at:

<https://www.inaturalist.org/observations/85851937>

and

<https://www.inaturalist.org/observations/85703623>

and

<https://www.inaturalist.org/observations/47344305>

Distribution: *G. geographica aurantiacooculus subsp. nov.* occurs in the Susquehanna River drainage and other nearby Atlantic drainages.

Etymology: The subspecies *Graptemys geographica aurantiacooculus subsp. nov.* is named in reflection of the Latin words for orange eyes.

EMYS ORBICULARIS REPENS SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:2863EB19-234D-4BD6-BB3A-76D2B37C3733

Holotype: A preserved specimen in the University of Colorado, Museum of Natural History, Boulder, Colorado, USA, specimen number Herp:36643 collected 1 km west of Sedjenane, Bizerte Governorate, Tunisia. This facility allows access to its holdings.

Paratypes: Five preserved specimens from Algeria, being two at the University of Michigan, Museum of Zoology, Ann Arbor, Michigan, USA, UMMZ Herpetology Collection, specimen numbers 65798 and 65799, one from the National Museum of Natural History, Smithsonian Institution, Washington, DC, USA, specimen number USNM Amphibians and Reptiles 10986 and two from the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA, specimen numbers MCZ Herp R-5187 and MCZ Herp R-5189.

Diagnosis: *Emys orbicularis repens subsp. nov.* is similar in most respects to *E. orbicularis occidentalis* Fritz, 1993 as identified by Fritz (1993) in his paper, which it would otherwise be identified as, but it is readily separated from that taxon by the possession of prominent yellow markings on the limbs and when viewed from a distance, a yellowish-brown carapace, as opposed to a generally dark-brown carapace and yellow as opposed to whitish yellow iris.

The skin on the limbs of *Emys orbicularis repens subsp. nov.* are about 50 percent yellow markings, being spots or joined spots, versus less than 50 percent in *E. orbicularis occidentalis*.

The carapace of *E. orbicularis repens subsp. nov.* is heavily infused with closely spaced light wavy lines on a darker brown background, versus a darker brown background only lightly infused with such markings in *E. orbicularis occidentalis*.

Stuckas *et al.* (2014) identified this taxon (which they identified *E. orbicularis occidentalis*) as a distinct genetic unit, separate from *E. orbicularis occidentalis sensu stricto* and noted the conservation benefit of it being formally named.

Distribution: North-Eastern Algeria and nearby parts of north-west Tunisia, generally near the Mediterranean coast.

Etymology: “repens” in Latin, refers to the subspecies being relatively new and unexpected to science.

CUORA ADELYNHOSERAE SP. NOV.

LSIDurn:lsid:zoobank.org:act:BBEFE472-E741-4803-8A80-F01E8E9F69BB

Holotype: A preserved juvenile specimen at the (British) Museum of Natural History, London, UK, specimen number 98.12.20.1, collected from “Eastern Assam Hills”, India. This facility allows access to its holdings.

Paratype: A preserved specimen at the Zoological Survey of India, Calcutta, West Bengal, India, specimen number 23923 collected from Deban, 27 km east of Miao, in the Tirap District, Arunachal Pradesh, India, Latitude 26.5939 N., Longitude 95.3226 E.

Diagnosis: Until now, *Cuora adelynhoserae* sp. nov. has been treated as a western population of

Cuora mouhotii (Gray, 1862), which is astounding considering the obvious differences between the two morphologically different forms.

C. adelynhoserae sp. nov. is readily separated from *C. mouhotii* and all other similar species by the following unique suite of characters: A distinctive flat-topped, tricarinate shell, markedly serrated posterior marginals, a long and narrow nuchal shield, short but distinct bridge, strongly hooked upperjaw, large shields on the posterior part of the forehead and on the forelimbs; half-webbed digits and extremely large and obvious tubercles at the base of the tail and on the thighs.

The carapace is chocolate-brown, the vertebral keel brownish-yellow edged with dark brown. The plastron is chrome yellow with a single large chocolate-brown patch in the middle and inframarginals of the same colour, (as opposed to the plastral pattern of dark brown spots on a yellow-brown background seen in *C. mouhotii*); the head is brown with a yellow spot and streak behind each eye.

The Iris is orange, versus dark in colour in *Cuora mouhotii mouhotii* (Gray, 1862) or bright red in *Cuora mouhotii obsti* (Fritz, Andreas and Lehr, 1998).

The tail (at least in young males), exceeds the length of the plastron.

In adults, the limbs are dark grey. The carapace develops large melanistic patches with age.

High quality photos of *C. adelynhoserae* sp. nov. can be found on the internet at:

https://www.conservationleadershipprogramme.org/media/2014/11/100206_India_FR_Tortoisesturtles.pdf at page 35 (identified as *C. mouhotii*).

Distribution: Bangladesh, Bhutan, India (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland), western Myanmar.

Etymology: *Cuora adelynhoserae* sp. nov. is named in honour of my eldest daughter Adelyn Hoser, of Park Orchards, Victoria, Australia, in recognition of over 20 years of services to wildlife conservation globally.

CUORA JACKYHOSERAЕ SP. NOV.

LSIDurn:lsid:zoobank.org:act:EF8DC13B-4E61-49C7-A9E9-EAFC3DBBAC4C

Holotype: A preserved specimen at the Museum National D'Histoire Naturelle, Paris, France, specimen number MNHN-RA-0.7932, collected from India. This facility allows access to its holdings.

Diagnosis: Until now, *C. jackyhoserae* sp. nov. has been treated as the western (Indian) population of the widely distributed putative species *Cuora amboinensis* (Riche in Daudin, 1801), with a type locality of Ambon, Moluccas, Indonesia.

As of 2021, putative *C. amboinensis* is a species broken up by most herpetologists into up to four subspecies, occupying the range from Ambon, across the East Indies to south-east Asia and across to Eastern India and adjoining countries.

The molecular data of Protiva *et al.* (2016) indicated at least five species in the complex (see Fig. 5 and their

accounts of divergences between measured clades in the text of the paper).

The Indian form of the putative taxon *C. amboinensis* is the only obviously unnamed one in their phylogeny and so is formally identified and named as *C. jackyhoserae* sp. nov. herein.

Protiva *et al.* (2016) showed species-level divergence between the Borneo population and all others and hence its formal description also in this paper.

The four previously recognized subspecies, *Cuora amboinensis amboinensis* (Riche in Daudin, 1801), *Cuora amboinensis couro* (Lechenault in Schweigger 1812), type locality of Java, Indonesia and also occurring on nearby Sumatra, lower Peninsula Malaysia and Singapore, *Cuora amboinensis kamaroma* Rummeler and Fritz, 1991, type locality about 50 km north of Bangkok, Thailand and *Cuora amboinensis lineata* McCord and Philippen, 1998, with a type locality of Myitkyina, Kachin Province, Myanmar (Burma), are all herein recognized as full species, each occupying ranges close to their type localities.

Unnamed forms of putative *C. amboinensis* formally named for the first time in this paper and not necessarily included in the phylogenetic study of Protiva *et al.* (2016) are as follows:

C. jackyhoserae sp. nov. from eastern India and nearby parts of Bangladesh, Bhutan and Myanmar (Burma);

C. oxyslopp sp. nov. from the Philippines;

C. boxboyi sp. nov. from Sulawesi;

C. elfakariorum sp. nov. from Borneo;

C. richardwellsi sp. nov. from Enganno Island;

C. rosswellingtoni sp. nov. from Halmahera Island.

C. jackyhoserae sp. nov. in life is readily separated from all other species in *C. amboinensis* complex by colouration. It is similar in most respects to *C. lineata* (McCord and Philippen, 1998), but separated from that and all other species in the *C. amboinensis* by having in life a strong orange-coloured line running from the snout, above the eye and on the neck.

All but very old specimens of *C. jackyhoserae* sp. nov. are also characterised by having an orange line running down the middle of the dorsum of the carapace. In *C. lineata* (McCord and Philippen, 1998) a similar white or yellow stripe is seen.

C. lineata has an extremely strongly domed shell in adults and maximum carapace length of 230 mm, versus somewhat less so in *C. jackyhoserae* sp. nov. and a similar maximum carapace length.

The type form of *C. amboinensis* is separated from the other species in the complex by having a flat broad carapace, with a distinctive margin.

C. kamaroma is separated from the other species by having a highly domed carapace, without a well-developed margin and carapace length up to 250 mm.

C. couro is intermediate in characters between the two preceding species, but noticeably smaller, with a maximum carapace length of 220 mm and is readily identified and separated from the other two species by having a distinctive charcoal grey to black coloured skin

on the head and face, giving it more vivid head markings than seen in the two preceding species.

C. amboinensis, *C. oxyslopp sp. nov.* and *C. rosswellingtoni sp. nov.* have a maximum carapace length of just 200 mm, making them the smallest species in the complex.

C. oxyslopp sp. nov. are notable for their particularly domed carapace, which is not rounded in shape.

Furthermore, coloration in *C. oxyslopp sp. nov.* is quite different from that of adjacent species, showing significantly finer and whitish (usually not yellow) head stripes compared to broad yellow stripes in all other species except for the orange coloured ones in *C. jackyhoserae sp. nov.*

The pupil in *C. oxyslopp sp. nov.* has a completely different pattern to the other species, forming a broad black pattern versus being finely shaped in the others.

C. oxyslopp sp. nov. also has a narrower head than seen in other species in the complex.

The plastral pattern in typical *C. amboinensis* is highly variable, ranging from nearly entirely black to yellow with or without black spots.

C. oxyslopp sp. nov. has a plastral pattern of clear separated spots arranged in a regular pattern.

Soft parts of *C. oxyslopp sp. nov.* are a plain grey to cream in colour and lack reticulations seen in other species in the complex.

C. rosswellingtoni sp. nov. is similar in most respects to *C. amboinensis* but is separated from that species by more prominent markings on the limbs, an even more flattened carapace than is seen for the relatively flattened carapace of *C. amboinensis*, and a larger maximum adult carapace length of 220 mm.

C. rosswellingtoni sp. nov. also lacks a slight inward inflection of the mid-carapace as seen in *C. amboinensis*, with significantly less upturn of the outer edges.

C. boxboyi sp. nov. is separated from the other species in the complex by having a shell that is relatively flattened (in common with *C. rosswellingtoni sp. nov.* and *C. amboinensis*), a noticeably light brown to light grey carapace, except in extremely aged specimens, light grey, rather than dark grey or black on the top of the head and a massive preponderance of yellow on the face (sides of anterior head) not seen in any of the other species as well as a larger maximum adult carapace length of 220 mm.

C. elfakarium sp. nov. is a high-domed, dark-shelled form, with adults generally with a dark brown or black carapace. The top of the head is also brownish-grey in colour, as opposed to the grey-black or light grey seen in other species in the complex. Plastron is usually all or mainly light in colour, except in aged specimens and the carapace has little, if any upturn on the outer edges. Other than the stripe at the top of the head and neck, soft parts are generally unmarked.

C. richardwellsi sp. nov. is similar in most respects to *C. elfakarium sp. nov.* or *C. couro* but is separated from those species by the combination of having faded light grey on the sides of the head, being yellowish grey

between the whitish yellow lines on the head, a domed carapace, especially at the rear, a slightly expanded rear carapace and little if any upward inflection of the outer edge.

The carapace is dark brown except in aged specimens.

All species in the *C. amboinensis* species complex are diagnosed and separated from similar species, including others in the genus *Cuora* Gray, 1856 by the following suite of characters: Carapace depressed and tricarinate in the young, usually very convex and without or with a single keel in adult females and often heavily domed in adults; vertebral shields as long as broad or a little longer than broad in the adult, broader in the young, much narrower than the costals. Plastron as large as the opening of the shell in the adult, without distinct bridge; no anal notch: the line of junction between the hyoplastron and the carapace shorter than that between the hypoplastron and the carapace; pectoral shields as long as or shorter than the abdominals, as long as or slightly longer than the humerals; axillary and inguinal small or absent. Head relatively small; upper jaw scarcely hooked, without any emargination. Front part of arm with large transverse scales.

Digits moderately webbed, with sharp claws. Carapace brown or blackish; plastron yellow with large black spots, or dark brown with the suture between the shields yellow; in the very young the black spots of the plastron are confluent into a broad longitudinal zone, the borders of the plastron being yellowish; head and neck grey, brown or blackish above, yellow or whitish interiorly; a (usually) yellow band borders the head and neck superiorly, meeting its fellow above the nostrils; a second yellow band passes through the eye and is separated from the upper jaw by a darker band; ear yellow (modified from Boulenger, 1889).

Photos of *C. jackyhoserae sp. nov.* in life can be found at:

<https://www.inaturalist.org/observations/34050984> and

<https://www.threatenedtaxa.org/index.php/JoTT/article/view/1915/4108>

and https://www.conservationleadershipprogramme.org/media/2014/11/100206_India_FR_Tortoisesturtles.pdf at page 33 (identified as *C. amboinensis*).

C. oxyslopp sp. nov. from the Philippines in life can be found on the internet at:

<https://www.flickr.com/photos/song-devan/5289168079/> and

<https://www.inaturalist.org/observations/4054297> and

<https://www.inaturalist.org/observations/64644428> and

<https://www.inaturalist.org/observations/9759256>

Photos of *C. boxboyi sp. nov.* from Sulawesi can be found in Rhodin *et al.* (2017) at page 86 (bottom right), Schoppe and Das (2011) at fig. 2., or on the internet at: <https://www.flickr.com/photos/135552775@N06/49529193916/>

and
<https://www.flickr.com/photos/ianbool/29651577068/>
 and
<https://www.flickr.com/photos/135552775@N06/49528687833/>
 and
<https://www.inaturalist.org/observations/19879644>
 and
<https://www.inaturalist.org/observations/36054539>
 Photos of *C. elfakarium* sp. nov. from Borneo is depicted on page 87 (bottom left) of Rhodin *et al.* (2017) or can be found on the internet at:
<https://www.flickr.com/photos/25872797@N02/43283837055/>
 and
<https://www.flickr.com/photos/elliottbudd/26287786968/>
 and
<https://www.flickr.com/photos/scincella1986/9429454304/>
C. couro is depicted on page 87 (top left) of Rhodin *et al.* (2017).
 Photos of *C. kamaroma* can be found on the internet at:
<https://www.flickr.com/photos/30142279@N07/49675777532/>
 and
<https://www.flickr.com/photos/berniedup/6963402976/>
 Photos of *C. lineata* in life can be seen in McCord and Philippen (1998) or Schoppe and Das (2011) at figs 8 and 9.
C. richardwellsi sp. nov. from Enganno Island can be seen in life online at:
<https://www.inaturalist.org/observations/72871387>
C. amboinensis of the type form from Ceram (immediately adjacent to Ambon) can be seen online at:
<https://www.inaturalist.org/observations/32940848>
Distribution: *C. jackyhoseræ* sp. nov. is apparently confined to the Brahmaputra basin in Eastern India, Bangladesh, Bhutan and potentially adjacent parts of Myanmar (Burma) and southern China.
Etymology: *C. jackyhoseræ* sp. nov. is named in honour of my youngest daughter Jacky Hoser, of Park Orchards, Victoria, Australia, in recognition of over 20 years of services to wildlife conservation globally.
CUORA OXYSLOPP SP. NOV.
LSIDurn:lsid:zoobank.org:act:6C90D101-67B9-42E3-9232-12BE87AB83AD
Holotype: A preserved specimen at the California Academy of Sciences, San Francisco, California, USA, specimen number CAS HERP 133090 from Zamboanguita Municipality, Negros Island, Philippines. This facility allows access to its holdings.
Paratypes: Two preserved specimen at the California Academy of Sciences, San Francisco, California, USA, specimen numbers CAS HERP 133091 and 133092 from Zamboanguita Municipality, Negros Island, Philippines.
Diagnosis: Until now, *Cuora oxyslopp* sp. nov. has been treated as a Philippines population of the widely

distributed putative species *Cuora amboinensis* (Riche in Daudin, 1801), with a type locality of Ambon, Moluccas, Indonesia and found west of there to eastern India.

As of 2021, putative *C. amboinensis* is a species broken up by most herpetologists into up to four subspecies, occupying the range from Ambon, across the East Indies to south-east Asia and across to Eastern India and adjoining countries.

The molecular data of Protiva *et al.* (2016) indicated at least five species in the complex (see Fig. 5 and their accounts of divergences between measured clades in the text of the paper).

They did not include DNA from the widely divergent Philippines form.

The Indian form of the putative taxon *C. amboinensis* was the only obviously unnamed one in their phylogeny and so was formally identified and named as *C. jackyhoseræ* sp. nov. in this paper.

Protiva *et al.* (2016) showed species-level divergence between the Borneo population and all others and hence its formal description also in this paper.

The four previously recognized subspecies, *Cuora amboinensis amboinensis* (Riche in Daudin, 1801), *Cuora amboinensis couro* (Lechenault in Schweigger 1812), type locality of Java, Indonesia and also occurring on nearby Sumatra, lower Peninsula Malaysia and Singapore, *Cuora amboinensis kamaroma* Rummel and Fritz, 1991, type locality about 50 km north of Bangkok, Thailand and *Cuora amboinensis lineata* McCord and Philippen, 1998, with a type locality of Myitkyina, Kachin Province, Myanmar (Burma), are all herein recognized as full species, each occupying ranges close to their type localities.

Unnamed forms of putative *C. amboinensis* formally named for the first time in this paper and not necessarily included in the phylogenetic study of Protiva *et al.* (2016) are as follows:

C. jackyhoseræ sp. nov. from eastern India and nearby parts of Bangladesh, Bhutan and Myanmar (Burma);

C. oxyslopp sp. nov. from the Philippines;

C. boxboyi sp. nov. from Sulawesi;

C. elfakarium sp. nov. from Borneo;

C. richardwellsi sp. nov. from Enganno Island;

C. rosswellingtoni sp. nov. from Halmahera Island.

C. jackyhoseræ sp. nov. in life is readily separated from all other species in *C. amboinensis* complex by colouration. It is similar in most respects to *C. lineata* (McCord and Philippen, 1998), but separated from that and all other species in the *C. amboinensis* by having in life a strong orange-coloured line running from the snout, above the eye and on the neck.

All but very old specimens of *C. jackyhoseræ* sp. nov. are also characterised by having an orange line running down the middle of the dorsum of the carapace. In *C. lineata* (McCord and Philippen, 1998) a similar white or yellow stripe is seen.

C. lineata has an extremely strongly domed shell in adults and maximum carapace length of 230 mm,

versus somewhat less so in *C. jackyhoserae* sp. nov. and a similar maximum carapace length.

The type form of *C. amboinensis* is separated from the other species in the complex by having a flat broad carapace, with a distinctive margin.

C. kamaroma is separated from the other species by having a highly domed carapace, without a well-developed margin and carapace length up to 250 mm.

C. couro is intermediate in characters between the two preceding species, but noticeably smaller, with a maximum carapace length of 220 mm and is readily identified and separated from the other two species by having a distinctive charcoal grey to black coloured skin on the head and face, giving it more vivid head markings than seen in the two preceding species.

C. amboinensis, *C. oxyslopp* sp. nov. and *C. rosswellingtoni* sp. nov. have a maximum carapace length of just 200 mm, making them the smallest species in the complex.

C. oxyslopp sp. nov. are notable for their particularly domed carapace, which is not rounded in shape.

Furthermore, coloration in *C. oxyslopp* sp. nov. is quite different from that of adjacent species, showing significantly finer and whitish (usually not yellow) head stripes compared to broad yellow stripes in all other species except for the orange coloured ones in *C. jackyhoserae* sp. nov..

The pupil in *C. oxyslopp* sp. nov. has a completely different pattern to the other species, forming a broad black pattern versus being finely shaped in the others.

C. oxyslopp sp. nov. also has a narrower head than seen in other species in the complex.

The plastral pattern in typical *C. amboinensis* is highly variable, ranging from nearly entirely black to yellow with or without black spots.

C. oxyslopp sp. nov. has a plastral pattern of clear separated spots arranged in a regular pattern.

Soft parts of *C. oxyslopp* sp. nov. are a plain grey to cream in colour and lack reticulations seen in other species in the complex.

C. rosswellingtoni sp. nov. is similar in most respects to *C. amboinensis* but is separated from that species by more prominent markings on the limbs, an even more flattened carapace than is seen for the relatively flattened carapace of *C. amboinensis*, and a larger maximum adult carapace length of 220 mm.

C. rosswellingtoni sp. nov. also lacks a slight inward inflection of the mid-carapace as seen in *C. amboinensis*, with significantly less upturn of the outer edges.

C. boxboyi sp. nov. is separated from the other species in the complex by having a shell that is relatively flattened (in common with *C. rosswellingtoni* sp. nov. and *C. amboinensis*), a noticeably light brown to light grey carapace, except in extremely aged specimens, light grey, rather than dark grey or black on the top of the head and a massive preponderance of yellow on the face (sides of anterior head) not seen in any of the other species as well as a larger maximum adult carapace length of 220 mm.

C. elfakariorum sp. nov. is a high-domed, dark-shelled form, with adults generally with a dark brown or black carapace. The top of the head is also brownish-grey in colour, as opposed to the grey-black or light grey seen in other species in the complex. Plastron is usually all or mainly light in colour, except in aged specimens and the carapace has little, if any upturn on the outer edges. Other than the stripe at the top of the head and neck, soft parts are generally unmarked.

C. richardwellsi sp. nov. is similar in most respects to *C. elfakariorum* sp. nov. or *C. couro* but is separated from those species by the combination of having faded light grey on the sides of the head, being yellowish grey between the whitish yellow lines on the head, a domed carapace, especially at the rear, a slightly expanded rear carapace and little if any upward inflection of the outer edge.

The carapace is dark brown except in aged specimens.

All species in the *C. amboinensis* species complex are diagnosed and separated from similar species, including others in the genus *Cuora* Gray, 1856 by the following suite of characters: Carapace depressed and tricarinate in the young, usually very convex and without or with a single keel in adult females and often heavily domed in adults; vertebral shields as long as broad or a little longer than broad in the adult, broader in the young, much narrower than the costals. Plastron as large as the opening of the shell in the adult, without distinct bridge; no anal notch: the line of junction between the hyoplastron and the carapace shorter than that between the hypoplastron and the carapace; pectoral shields as long as or shorter than the abdominals, as long as or slightly longer than the humerals; axillary and inguinal small or absent. Head relatively small; upper jaw scarcely hooked, without any emargination. Front part of arm with large transverse scales. Digits moderately webbed, with sharp claws. Carapace brown or blackish; plastron yellow with large black spots, or dark brown with the suture between the shields yellow; in the very young the black spots of the plastron are confluent into a broad longitudinal zone, the borders of the plastron being yellowish; head and neck grey, brown or blackish above, yellow or whitish interiorly; a (usually) yellow band borders the head and neck superiorly, meeting its fellow above the nostrils; a second yellow band passes through the eye and is separated from the upper jaw by a darker band; ear yellow (modified from Boulenger, 1889).

Photos of *C. jackyhoserae* sp. nov. in life can be found at:

<https://www.inaturalist.org/observations/34050984>

and

<https://www.threatenedtaxa.org/index.php/JoTT/article/view/1915/4108>

and https://www.conservationleadershipprogramme.org/media/2014/11/100206_India_FR_Tortoisesturtles.pdf at page 33 (identified as *C. amboinensis*).

C. oxyslopp sp. nov. from the Philippines in life can be found on the internet at:

<https://www.flickr.com/photos/song-devan/5289168079/>
and

<https://www.inaturalist.org/observations/4054297>
and

<https://www.inaturalist.org/observations/64644428>
and

<https://www.inaturalist.org/observations/9759256>
Photos of *C. boxboyi sp. nov.* from Sulawesi can be found in Rhodin *et al.* (2017) at page 86 (bottom right), Schoppe and Das (2011) at fig. 2., or on the internet at: <https://www.flickr.com/photos/135552775@N06/49529193916/>

and
<https://www.flickr.com/photos/ianbool/29651577068/>
and

<https://www.flickr.com/photos/135552775@N06/49528687833/>

and
<https://www.inaturalist.org/observations/19879644>
and

<https://www.inaturalist.org/observations/36054539>
Photos of *C. elfakariorum sp. nov.* from Borneo is depicted on page 87 (bottom left) of Rhodin *et al.* (2017) or can be found on the internet at: <https://www.flickr.com/photos/25872797@N02/43283837055/>

and
<https://www.flickr.com/photos/elliottbudd/26287786968/>
and

<https://www.flickr.com/photos/scincella1986/9429454304/>
C. couro is depicted on page 87 (top left) of Rhodin *et al.* (2017).

Photos of *C. kamaroma* can be found on the internet at: <https://www.flickr.com/photos/30142279@N07/49675777532/>

and
<https://www.flickr.com/photos/berniedup/6963402976/>
Photos of *C. lineata* in life can be seen in McCord and Philippen (1998) or Schoppe and Das (2011) at figs 8 and 9. *C. richardwellsi sp. nov.* from Enganno Island can be seen in life online at:

<https://www.inaturalist.org/observations/72871387>
C. amboinensis of the type form from Ceram (immediately adjacent to Ambon) can be seen online at: <https://www.inaturalist.org/observations/32940848>

Distribution: *C. oxyslopp sp. nov.* is restricted to the Philippine Islands. Specimens from Palawan are tentatively referred to the species *C. elfakariorum sp. nov.* from Borneo.

Etymology: *C. oxyslopp sp. nov.* is named in honour of two Great Dane dogs our family have owned, named "Oxy", being short for *Oxyranus* and "Slop" or "Slopp" because that is what he did with his tongue as he slobbered on many things, in recognition to their services in animal education with our family wildlife display, education and conservation business over two decades between years 2000 and 2020.

CUORA BOXBOYI SP. NOV.

LSIDurn:lsid:zoobank.org:act:7D155912-9EBF-44BC-B056-F3363DE41CF6

Holotype: A preserved specimen at the Naturalis Museum, The Netherlands, specimen number RMNH.RENA.38826 collected from Gorontalo, North Sulawesi, Indonesia. This facility allows access to its holdings.

Paratypes: 1/ Two preserved specimens at the Museum of Vertebrate Zoology, University of California, Berkeley, California, USA, MVZ Herp Collection, specimen number 253597 collected from Desa Alisang, Kecamatan Basi Dondo, Kabupaten Toli-Toli, Propinsi Sulawesi Tengah, Central Sulawesi, Indonesia, Latitude 0.7769 N., Longitude 120.6659 E. and specimen number 253595 collected from Desa Banggabara, Kecamatan Sarudu, Kabupaten Mamuju Utara, Propinsi Sulawesi Barat, Sulawesi Island, Indonesia, Latitude -1.6155 S., Longitude 119.3055 E.

2/ A preserved specimen at the Staatliches Museum für Naturkunde, Stuttgart, Germany, specimen number SMNS Herpetologie 5353 collected from Selatan (South), Sulawesi, Indonesia.

Diagnosis: Until now, *Cuora boxboyi sp. nov.* has been treated as a Sulawesi (Indonesia) population of the widely distributed putative species *Cuora amboinensis* (Riche in Daudin, 1801), with a type locality of Ambon, Moluccas, Indonesia and found west of there to eastern India.

As of 2021, putative *C. amboinensis* is a species broken up by most herpetologists into up to four subspecies, occupying the range from Ambon, across the East Indies to south-east Asia and across to Eastern India and adjoining countries.

The molecular data of Protiva *et al.* (2016) indicated at least five species in the complex (see Fig. 5 and their accounts of divergences between measured clades in the text of the paper).

They did not include DNA from the divergent Sulawesi form.

The Indian form of the putative taxon *C. amboinensis* was the only obviously unnamed one in their phylogeny and so was formally identified and named as *C. jackyhoserae sp. nov.* in this paper.

Protiva *et al.* (2016) showed species-level divergence between the Borneo population and all others and hence its formal description herein (this paper) as well.

The four previously recognized subspecies, *Cuora amboinensis amboinensis* (Riche in Daudin, 1801), *Cuora amboinensis couro* (Lechenault in Schweigger 1812), type locality of Java, Indonesia and also occurring on nearby Sumatra, lower Peninsula Malaysia and Singapore, *Cuora amboinensis kamaroma* Rummeler and Fritz, 1991, type locality about 50 km north of Bangkok, Thailand and *Cuora amboinensis lineata* McCord and Philippen, 1998, with a type locality of Myitkyina, Kachin Province, Myanmar (Burma), are all herein recognized as full species, each occupying ranges close to their type localities.

Unnamed forms of putative *C. amboinensis* formally

named for the first time in this paper and not necessarily included in the phylogenetic study of Protiva *et al.* (2016) are as follows:

C. jackyhoserae sp. nov. from eastern India and nearby parts of Bangladesh, Bhutan and Myanmar (Burma);

C. oxyslopp sp. nov. from the Philippines;

C. boxboyi sp. nov. from Sulawesi;

C. elfakriorum sp. nov. from Borneo;

C. richardwellsi sp. nov. from Enganno Island;

C. rosswellingtoni sp. nov. from Halmahera Island.

C. jackyhoserae sp. nov. in life is readily separated from all other species in *C. amboinensis* complex by colouration. It is similar in most respects to *C. lineata* (McCord and Philippen, 1998), but separated from that and all other species in the *C. amboinensis* by having in life a strong orange-coloured line running from the snout, above the eye and on the neck.

All but very old specimens of *C. jackyhoserae sp. nov.* are also characterised by having an orange line running down the middle of the dorsum of the carapace. In *C. lineata* (McCord and Philippen, 1998) a similar white or yellow stripe is seen.

C. lineata has an extremely strongly domed shell in adults and maximum carapace length of 230 mm, versus somewhat less so in *C. jackyhoserae sp. nov.* and a similar maximum carapace length.

The type form of *C. amboinensis* is separated from the other species in the complex by having a flat broad carapace, with a distinctive margin.

C. kamaroma is separated from the other species by having a highly domed carapace, without a well-developed margin and carapace length up to 250 mm.

C. couro is intermediate in characters between the two preceding species, but noticeably smaller, with a maximum carapace length of 220 mm and is readily identified and separated from the other two species by having a distinctive charcoal grey to black coloured skin on the head and face, giving it more vivid head markings than seen in the two preceding species.

C. amboinensis, *C. oxyslopp sp. nov.* and *C. rosswellingtoni sp. nov.* have a maximum carapace length of just 200 mm, making them the smallest species in the complex.

C. oxyslopp sp. nov. are notable for their particularly domed carapace, which is not rounded in shape.

Furthermore, coloration in *C. oxyslopp sp. nov.* is quite different from that of adjacent species, showing significantly finer and whitish (usually not yellow) head stripes compared to broad yellow stripes in all other species except for the orange coloured ones in *C. jackyhoserae sp. nov.*

The pupil in *C. oxyslopp sp. nov.* has a completely different pattern to the other species, forming a broad black pattern versus being finely shaped in the others.

C. oxyslopp sp. nov. also has a narrower head than seen in other species in the complex.

The plastral pattern in typical *C. amboinensis* is highly variable, ranging from nearly entirely black to yellow with or without black spots.

C. oxyslopp sp. nov. has a plastral pattern of clear separated spots arranged in a regular pattern.

Soft parts of *C. oxyslopp sp. nov.* are a plain grey to cream in colour and lack reticulations seen in other species in the complex.

C. rosswellingtoni sp. nov. is similar in most respects to *C. amboinensis* but is separated from that species by more prominent markings on the limbs, an even more flattened carapace than is seen for the relatively flattened carapace of *C. amboinensis*, and a larger maximum adult carapace length of 220 mm.

C. rosswellingtoni sp. nov. also lacks a slight inward inflection of the mid-carapace as seen in *C. amboinensis*, with significantly less upturn of the outer edges.

C. boxboyi sp. nov. is separated from the other species in the complex by having a shell that is relatively flattened (in common with *C. rosswellingtoni sp. nov.* and *C. amboinensis*), a noticeably light brown to light grey carapace, except in extremely aged specimens, light grey, rather than dark grey or black on the top of the head and a massive preponderance of yellow on the face (sides of anterior head) not seen in any of the other species as well as a larger maximum adult carapace length of 220 mm.

C. elfakriorum sp. nov. is a high-domed, dark-shelled form, with adults generally with a dark brown or black carapace. The top of the head is also brownish-grey in colour, as opposed to the grey-black or light grey seen in other species in the complex. Plastron is usually all or mainly light in colour, except in aged specimens and the carapace has little, if any upturn on the outer edges. Other than the stripe at the top of the head and neck, soft parts are generally unmarked.

C. richardwellsi sp. nov. is similar in most respects to *C. elfakriorum sp. nov.* or *C. couro* but is separated from those species by the combination of having faded light grey on the sides of the head, being yellowish grey between the whitish yellow lines on the head, a domed carapace, especially at the rear, a slightly expanded rear carapace and little if any upward inflection of the outer edge.

The carapace is dark brown except in aged specimens. All species in the *C. amboinensis* species complex are diagnosed and separated from similar species, including others in the genus *Cuora* Gray, 1856 by the following suite of characters: Carapace depressed and tricarinate in the young, usually very convex and without or with a single keel in adult females and often heavily domed in adults; vertebral shields as long as broad or a little longer than broad in the adult, broader in the young, much narrower than the costals. Plastron as large as the opening of the shell in the adult, without distinct bridge; no anal notch: the line of junction between the hyoplastron and the carapace shorter than that between the hypoplastron and the carapace; pectoral shields as long as or shorter than the abdominals, as long as or slightly longer than the humerals; axillary and inguinal small or absent. Head relatively small; upper jaw

scarcely hooked, without any emargination. Front part of arm with large transverse scales. Digits moderately webbed, with sharp claws. Carapace brown or blackish; plastron yellow with large black spots, or dark brown with the suture between the shields yellow; in the very young the black spots of the plastron are confluent into a broad longitudinal zone, the borders of the plastron being yellowish; head and neck grey, brown or blackish above, yellow or whitish interiorly; a (usually) yellow band borders the head and neck superiorly, meeting its fellow above the nostrils; a second yellow band passes through the eye and is separated from the upper jaw by a darker band; ear yellow (modified from Boulenger, 1889).

Photos of *C. jackyhoserae* sp. nov. in life can be found at:

<https://www.inaturalist.org/observations/34050984>

and

<https://www.threatenedtaxa.org/index.php/JoTT/article/view/1915/4108>

and https://www.conservationleadershipprogramme.org/media/2014/11/100206_India_FR_Tortoisesturtles.pdf at page 33 (identified as *C. amboinensis*).

C. oxylopp sp. nov. from the Philippines in life can be found on the internet at:

<https://www.flickr.com/photos/song-devan/5289168079/>

and

<https://www.inaturalist.org/observations/4054297>

and

<https://www.inaturalist.org/observations/64644428>

and

<https://www.inaturalist.org/observations/9759256>

Photos of *C. boxboyi* sp. nov. from Sulawesi can be found in Rhodin *et al.* (2017) at page 86 (bottom right), Schoppe and Das (2011) at fig. 2., or on the internet at:

<https://www.flickr.com/photos/135552775@N06/49529193916/>

and

<https://www.flickr.com/photos/ianbool/29651577068/>

and

<https://www.flickr.com/photos/135552775@N06/49528687833/>

and

<https://www.inaturalist.org/observations/19879644>

and

<https://www.inaturalist.org/observations/36054539>

Photos of *C. elfakhariorum* sp. nov. from Borneo is depicted on page 87 (bottom left) of Rhodin *et al.* (2017) or can be found on the internet at:

<https://www.flickr.com/photos/25872797@N02/43283837055/>

and

<https://www.flickr.com/photos/elliottbudd/26287786968/>

and

<https://www.flickr.com/photos/scincella1986/9429454304/>

C. couro is depicted on page 87 (top left) of Rhodin *et al.* (2017).

Photos of *C. kamaroma* can be found on the internet at: <https://www.flickr.com/photos/30142279@N07/49675777532/>

and

<https://www.flickr.com/photos/berniedup/6963402976/>

Photos of *C. lineata* in life can be seen in McCord and Philippen (1998) or Schoppe and Das (2011) at figs 8 and 9.

C. richardwellsi sp. nov. from Enganno Island can be seen in life online at:

<https://www.inaturalist.org/observations/72871387>

C. amboinensis of the type form from Ceram (immediately adjacent to Ambon) can be seen online at: <https://www.inaturalist.org/observations/32940848>

Distribution: *C. boxboyi* sp. nov. is restricted to the Indonesian Island of Sulawesi and immediately adjacent shelf islands that were connected during the most recent ice-age maxima.

Etymology: *C. boxboyi* sp. nov. is named in honour of Harrison Richard Wain, born on December 15, 1999 in Sydney, Australia, better known as the Musician "Boxboy" in recognition of his services to the music and entertainment industries.

CUORA ELFAKHARIORUM SP. NOV.

LSIDurn:lsid:zoobank.org:act:BF36411B-4B04-4435-A1D0-59EB3426F3FA

Holotype: A preserved female specimen at the (British) Museum of Natural History, London, UK, specimen number 1863.12.11.163, collected from Borneo. This facility allows access to its holdings.

Paratypes: 1/ A preserved juvenile specimen at the (British) Museum of Natural History, London, UK, specimen number 1856.9.27.4, collected from Borneo. 2/ A preserved specimen at the Museum National D'Histoire Naturelle, Paris, France, specimen number MNHN-RA-1898.14 collected from Sarawak, Malaysia. 3/ A preserved specimen at The Field Museum of Natural History, Chicago, Illinois, USA, specimen number FMNH Amphibians and Reptiles 63275 collected from Lahad Datu District, Sabah, Malaysia. 4/ Two preserved specimens at Naturalis, The Netherlands, specimen numbers RMNH.RENA.3340 and RMNH.RENA.3886 both collected from Borneo.

Diagnosis: Until now, *Cuora elfakhariorum* sp. nov. has been treated as a Borneo (Indonesia) population of the widely distributed putative species *Cuora amboinensis* (Riche in Daudin, 1801), with a type locality of Ambon, Moluccas, Indonesia and found west of there to eastern India.

As of 2021, putative *C. amboinensis* is a species broken up by most herpetologists into up to four subspecies, occupying the range from Ambon, across the East Indies to south-east Asia and across to Eastern India and adjoining countries.

The molecular data of Protiva *et al.* (2016) indicated at least five species in the complex (see Fig. 5 and their accounts of divergences between measured clades in the text of the paper).

Their results did not place the Borneo population with

any recognized subspecies, although Borneo specimens had variously been assigned to either *C. amboinensis amboinensis* (Riche in Daudin, 1801) or *Cuora amboinensis kamaroma* Rummler and Fritz, 1991, type locality about 50 km north of Bangkok, Thailand (*sensu* Ernst *et al.* (2016) at page 145, Fig. 1.). Protiva *et al.* (2016) showed species-level divergence between the Borneo population and all others and hence its formal description herein.

The Indian form of the putative taxon *C. amboinensis* was the only obviously unnamed one in their phylogeny and so was formally identified and named as *C. jackyhoserae sp. nov.* in this paper.

The four previously recognized subspecies, *Cuora amboinensis amboinensis* (Riche in Daudin, 1801), *Cuora amboinensis couro* (Lechenault in Schweigger 1812), type locality of Java, Indonesia and also occurring on nearby Sumatra, lower Peninsula Malaysia and Singapore, *Cuora amboinensis kamaroma* Rummler and Fritz, 1991, type locality about 50 km north of Bangkok, Thailand and *Cuora amboinensis lineata* McCord and Philippen, 1998, with a type locality of Myitkyina, Kachin Province, Myanmar (Burma), are all herein recognized as full species, each occupying ranges close to their type localities.

Unnamed forms of putative *C. amboinensis* formally named for the first time in this paper and not necessarily included in the phylogenetic study of Protiva *et al.* (2016) are as follows:

C. jackyhoserae sp. nov. from eastern India and nearby parts of Bangladesh, Bhutan and Myanmar (Burma);

C. oxyslopp sp. nov. from the Philippines;

C. boxboyi sp. nov. from Sulawesi;

C. elfakariorum sp. nov. from Borneo;

C. richardwellsi sp. nov. from Enganno Island;

C. rosswellingtoni sp. nov. from Halmahera Island.

C. jackyhoserae sp. nov. in life is readily separated from all other species in *C. amboinensis* complex by colouration. It is similar in most respects to *C. lineata* (McCord and Philippen, 1998), but separated from that and all other species in the *C. amboinensis* by having in life a strong orange-coloured line running from the snout, above the eye and on the neck.

All but very old specimens of *C. jackyhoserae sp. nov.* are also characterised by having an orange line running down the middle of the dorsum of the carapace. In *C. lineata* (McCord and Philippen, 1998) a similar white or yellow stripe is seen.

C. lineata has an extremely strongly domed shell in adults and maximum carapace length of 230 mm, versus somewhat less so in *C. jackyhoserae sp. nov.* and a similar maximum carapace length.

The type form of *C. amboinensis* is separated from the other species in the complex by having a flat broad carapace, with a distinctive margin.

C. kamaroma is separated from the other species by having a highly domed carapace, without a well-developed margin and carapace length up to 250 mm.

C. couro is intermediate in characters between the two

preceding species, but noticeably smaller, with a maximum carapace length of 220 mm and is readily identified and separated from the other two species by having a distinctive charcoal grey to black coloured skin on the head and face, giving it more vivid head markings than seen in the two preceding species.

C. amboinensis, *C. oxyslopp sp. nov.* and *C. rosswellingtoni sp. nov.* have a maximum carapace length of just 200 mm, making them the smallest species in the complex.

C. oxyslopp sp. nov. are notable for their particularly domed carapace, which is not rounded in shape.

Furthermore, coloration in *C. oxyslopp sp. nov.* is quite different from that of adjacent species, showing significantly finer and whitish (usually not yellow) head stripes compared to broad yellow stripes in all other species except for the orange coloured ones in *C. jackyhoserae sp. nov.*

The pupil in *C. oxyslopp sp. nov.* has a completely different pattern to the other species, forming a broad black pattern versus being finely shaped in the others.

C. oxyslopp sp. nov. also has a narrower head than seen in other species in the complex.

The plastral pattern in typical *C. amboinensis* is highly variable, ranging from nearly entirely black to yellow with or without black spots.

C. oxyslopp sp. nov. has a plastral pattern of clear separated spots arranged in a regular pattern.

Soft parts of *C. oxyslopp sp. nov.* are a plain grey to cream in colour and lack reticulations seen in other species in the complex.

C. rosswellingtoni sp. nov. is similar in most respects to *C. amboinensis* but is separated from that species by more prominent markings on the limbs, an even more flattened carapace than is seen for the relatively flattened carapace of *C. amboinensis*, and a larger maximum adult carapace length of 220 mm.

C. rosswellingtoni sp. nov. also lacks a slight inward inflection of the mid-carapace as seen in *C. amboinensis*, with significantly less upturn of the outer edges.

C. boxboyi sp. nov. is separated from the other species in the complex by having a shell that is relatively flattened (in common with *C. rosswellingtoni sp. nov.* and *C. amboinensis*), a noticeably light brown to light grey carapace, except in extremely aged specimens, light grey, rather than dark grey or black on the top of the head and a massive preponderance of yellow on the face (sides of anterior head) not seen in any of the other species as well as a larger maximum adult carapace length of 220 mm.

C. elfakariorum sp. nov. is a high-domed, dark-shelled form, with adults generally with a dark brown or black carapace. The top of the head is also brownish-grey in colour, as opposed to the grey-black or light grey seen in other species in the complex. Plastron is usually all or mainly light in colour, except in aged specimens and the carapace has little, if any upturn on the outer edges. Other than the stripe at the top of the head and neck, soft parts are generally unmarked.

C. richardwellsi sp. nov. is similar in most respects to *C. elfakhariorum* sp. nov. or *C. couro* but is separated from those species by the combination of having faded light grey on the sides of the head, being yellowish grey between the whitish yellow lines on the head, a domed carapace, especially at the rear, a slightly expanded rear carapace and little if any upward inflection of the outer edge.

The carapace is dark brown except in aged specimens. All species in the *C. amboinensis* species complex are diagnosed and separated from similar species, including others in the genus *Cuora* Gray, 1856 by the following suite of characters: Carapace depressed and tricarinate in the young, usually very convex and without or with a single keel in adult females and often heavily domed in adults; vertebral shields as long as broad or a little longer than broad in the adult, broader in the young, much narrower than the costals. Plastron as large as the opening of the shell in the adult, without distinct bridge; no anal notch: the line of junction between the hyoplastron and the carapace shorter than that between the hypoplastron and the carapace; pectoral shields as long as or shorter than the abdominals, as long as or slightly longer than the humerals; axillary and inguinal small or absent. Head relatively small; upper jaw scarcely hooked, without any emargination. Front part of arm with large transverse scales. Digits moderately webbed, with sharp claws. Carapace brown or blackish; plastron yellow with large black spots, or dark brown with the suture between the shields yellow; in the very young the black spots of the plastron are confluent into a broad longitudinal zone, the borders of the plastron being yellowish; head and neck grey, brown or blackish above, yellow or whitish interiorly; a (usually) yellow band borders the head and neck superiorly, meeting its fellow above the nostrils; a second yellow band passes through the eye and is separated from the upper jaw by a darker band; ear yellow (modified from Boulenger, 1889).

Photos of *C. jackyhoserae* sp. nov. in life can be found at:

<https://www.inaturalist.org/observations/34050984>

and

<https://www.threatenedtaxa.org/index.php/JoTT/article/view/1915/4108>

and https://www.conservationleadershipprogramme.org/media/2014/11/100206_India_FR_Tortoisesturtles.pdf at page 33 (identified as *C. amboinensis*).

C. oxyslopp sp. nov. from the Philippines in life can be found on the internet at:

<https://www.flickr.com/photos/song-devan/5289168079/>

and

<https://www.inaturalist.org/observations/4054297>

and

<https://www.inaturalist.org/observations/64644428>

and

<https://www.inaturalist.org/observations/9759256>

Photos of *C. boxboyi* sp. nov. from Sulawesi can be found in Rhodin *et al.* (2017) at page 86 (bottom right),

Schoppe and Das (2011) at fig. 2., or on the internet at: <https://www.flickr.com/photos/135552775@N06/49529193916/>

and

<https://www.flickr.com/photos/ianbool/29651577068/>

and

<https://www.flickr.com/photos/135552775@N06/49528687833/>

and

<https://www.inaturalist.org/observations/19879644>

and

<https://www.inaturalist.org/observations/36054539>

Photos of *C. elfakhariorum* sp. nov. from Borneo is depicted on page 87 (bottom left) of Rhodin *et al.* (2017) or can be found on the internet at:

<https://www.flickr.com/photos/25872797@N02/43283837055/>

and

<https://www.flickr.com/photos/elliottbudd/26287786968/>

and

<https://www.flickr.com/photos/scincella1986/9429454304/>

C. couro is depicted on page 87 (top left) of Rhodin *et al.* (2017).

Photos of *C. kamaroma* can be found on the internet at: <https://www.flickr.com/photos/30142279@N07/49675777532/>

and

<https://www.flickr.com/photos/berniedup/6963402976/>

and

Photos of *C. lineata* in life can be seen in McCord and Philpenn (1998) or Schoppe and Das (2011) at figs 8 and 9.

C. richardwellsi sp. nov. from Enganno Island can be seen in life online at:

<https://www.inaturalist.org/observations/72871387>

C. amboinensis of the type form from Ceram (immediately adjacent to Ambon) can be seen online at:

<https://www.inaturalist.org/observations/32940848>

and

Distribution: *C. elfakhariorum* sp. nov. is restricted to the Indonesian/Malaysian Island of Borneo and immediately adjacent shelf islands that were connected during the most recent ice-age maxima. Specimens from Palawan (Philippines) are tentatively referred to the species *C. elfakhariorum* sp. nov. from Borneo.

Etymology: *C. elfakhariorum* sp. nov. is named in honour of three brothers Daniel, Akram and Moses Elfakhari in recognition of their services to the taxi industry in Australia over many decades and critically important (and largely unrecognized) assistances to wildlife conservation in Australia over the same period.

CUORA RICHARDWELLSI SP. NOV.

LSIDurn:lsid:zoobank.org:act:C93C760D-2D48-4703-AE5E-F841ADFBAE11

Holotype: A preserved specimen at the Smithsonian Institution, National Museum of Natural History, Washington, DC, USA specimen number USNM Amphibians and Reptiles 35759 collected from Engano

Island (= Pulau Enggano), Indonesia, Latitude -5.4 S., Longitude 102.25 E. This facility allows access to its holdings.

Paratype: A preserved specimen at the Smithsonian Institution, National Museum of Natural History, Washington, DC, USA specimen number USNM Amphibians and Reptiles 35760 collected from Engano Island (= Pulau Enggano), Indonesia, Latitude -5.4 S., Longitude 102.25 E.

Diagnosis: Until now, *Cuora richardwellsi* sp. nov. from Engano Island (= Pulau Enggano), Indonesia has been treated as an insular population of the widely distributed putative species *Cuora amboinensis* (Riche in Daudin, 1801), with a type locality of Ambon, Moluccas, Indonesia and found west of there to eastern India.

As of 2021, putative *C. amboinensis* is a species broken up by most herpetologists into up to four subspecies, occupying the range from Ambon, across the East Indies to south-east Asia and across to Eastern India and adjoining countries.

The molecular data of Protiva *et al.* (2016) indicated at least five species in the complex (see Fig. 5 and their accounts of divergences between measured clades in the text of the paper).

Their results did not place the Borneo population with any recognized subspecies, although Borneo specimens had variously been assigned to either *C. amboinensis amboinensis* (Riche in Daudin, 1801) or *Cuora amboinensis kamaroma* Rummler and Fritz, 1991, type locality about 50 km north of Bangkok, Thailand (*sensu* Ernst *et al.* (2016) at page 145, Fig. 1.).

Protiva *et al.* (2016) showed species-level divergence between the Borneo population and all others and hence its formal description in this paper.

The Indian form of the putative taxon *C. amboinensis* was the only obviously unnamed one in their phylogeny and so was formally identified and named as *C. jackyhoserae* sp. nov. in this paper.

The four previously recognized subspecies, *Cuora amboinensis amboinensis* (Riche in Daudin, 1801), *Cuora amboinensis couro* (Lechenault in Schweigger 1812), type locality of Java, Indonesia and also occurring on nearby Sumatra, lower Peninsula Malaysia and Singapore, *Cuora amboinensis kamaroma* Rummler and Fritz, 1991, type locality about 50 km north of Bangkok, Thailand and *Cuora amboinensis lineata* McCord and Philippen, 1998, with a type locality of Myitkyina, Kachin Province, Myanmar (Burma), are all herein recognized as full species, each occupying ranges close to their type localities.

Unnamed forms of putative *C. amboinensis* formally named for the first time in this paper and not necessarily included in the phylogenetic study of Protiva *et al.* (2016) are as follows:

C. jackyhoserae sp. nov. from eastern India and nearby parts of Bangladesh, Bhutan and Myanmar (Burma);

C. oxyslopp sp. nov. from the Philippines;

C. boxboyi sp. nov. from Sulawesi;

C. elfakariorum sp. nov. from Borneo;

C. richardwellsi sp. nov. from Enganno Island;

C. rosswellingtoni sp. nov. from Halmahera Island.

C. jackyhoserae sp. nov. in life is readily separated from all other species in *C. amboinensis* complex by colouration. It is similar in most respects to *C. lineata* (McCord and Philippen, 1998), but separated from that and all other species in the *C. amboinensis* by having in life a strong orange-coloured line running from the snout, above the eye and on the neck.

All but very old specimens of *C. jackyhoserae* sp. nov. are also characterised by having an orange line running down the middle of the dorsum of the carapace. In *C. lineata* (McCord and Philippen, 1998) a similar white or yellow stripe is seen.

C. lineata has an extremely strongly domed shell in adults and maximum carapace length of 230 mm, versus somewhat less so in *C. jackyhoserae* sp. nov. and a similar maximum carapace length.

The type form of *C. amboinensis* is separated from the other species in the complex by having a flat broad carapace, with a distinctive margin.

C. kamaroma is separated from the other species by having a highly domed carapace, without a well-developed margin and carapace length up to 250 mm.

C. couro is intermediate in characters between the two preceding species, but noticeably smaller, with a maximum carapace length of 220 mm and is readily identified and separated from the other two species by having a distinctive charcoal grey to black coloured skin on the head and face, giving it more vivid head markings than seen in the two preceding species.

C. amboinensis, *C. oxyslopp* sp. nov. and *C. rosswellingtoni* sp. nov. have a maximum carapace length of just 200 mm, making them the smallest species in the complex.

C. oxyslopp sp. nov. are notable for their particularly domed carapace, which is not rounded in shape.

Furthermore, coloration in *C. oxyslopp* sp. nov. is quite different from that of adjacent species, showing significantly finer and whitish (usually not yellow) head stripes compared to broad yellow stripes in all other species except for the orange coloured ones in *C. jackyhoserae* sp. nov..

The pupil in *C. oxyslopp* sp. nov. has a completely different pattern to the other species, forming a broad black pattern versus being finely shaped in the others.

C. oxyslopp sp. nov. also has a narrower head than seen in other species in the complex.

The plastral pattern in typical *C. amboinensis* is highly variable, ranging from nearly entirely black to yellow with or without black spots.

C. oxyslopp sp. nov. has a plastral pattern of clear separated spots arranged in a regular pattern.

Soft parts of *C. oxyslopp* sp. nov. are a plain grey to cream in colour and lack reticulations seen in other species in the complex.

C. rosswellingtoni sp. nov. is similar in most respects to *C. amboinensis* but is separated from that species by more prominent markings on the limbs, an even more

flattened carapace than is seen for the relatively flattened carapace of *C. amboinensis*, and a larger maximum adult carapace length of 220 mm.

C. rosswellingtoni sp. nov. also lacks a slight inward inflection of the mid-carapace as seen in *C. amboinensis*, with significantly less upturn of the outer edges.

C. boxboyi sp. nov. is separated from the other species in the complex by having a shell that is relatively flattened (in common with *C. rosswellingtoni* sp. nov. and *C. amboinensis*), a noticeably light brown to light grey carapace, except in extremely aged specimens, light grey, rather than dark grey or black on the top of the head and a massive preponderance of yellow on the face (sides of anterior head) not seen in any of the other species as well as a larger maximum adult carapace length of 220 mm.

C. elfakiorum sp. nov. is a high-domed, dark-shelled form, with adults generally with a dark brown or black carapace. The top of the head is also brownish-grey in colour, as opposed to the grey-black or light grey seen in other species in the complex. Plastron is usually all or mainly light in colour, except in aged specimens and the carapace has little, if any upturn on the outer edges. Other than the stripe at the top of the head and neck, soft parts are generally unmarked.

C. richardwellsii sp. nov. is similar in most respects to *C. elfakiorum* sp. nov. or *C. couro* but is separated from those species by the combination of having faded light grey on the sides of the head, being yellowish grey between the whitish yellow lines on the head, a domed carapace, especially at the rear, a slightly expanded rear carapace and little if any upward inflection of the outer edge.

The carapace is dark brown except in aged specimens. All species in the *C. amboinensis* species complex are diagnosed and separated from similar species, including others in the genus *Cuora* Gray, 1856 by the following suite of characters: Carapace depressed and tricarinate in the young, usually very convex and without or with a single keel in adult females and often heavily domed in adults; vertebral shields as long as broad or a little longer than broad in the adult, broader in the young, much narrower than the costals. Plastron as large as the opening of the shell in the adult, without distinct bridge; no anal notch: the line of junction between the hyoplastron and the carapace shorter than that between the hypoplastron and the carapace; pectoral shields as long as or shorter than the abdominals, as long as or slightly longer than the humerals;

axillary and inguinal small or absent. Head relatively small; upper jaw scarcely hooked, without any emargination. Front part of arm with large transverse scales. Digits moderately webbed, with sharp claws. Carapace brown or blackish; plastron yellow with large black spots, or dark brown with the suture between the shields yellow; in the very young the black spots of the plastron are confluent into a broad longitudinal zone, the borders of the plastron being yellowish; head and neck grey, brown or blackish above, yellow or whitish

interiorly; a (usually) yellow band borders the head and neck superiorly, meeting its fellow above the nostrils; a second yellow band passes through the eye and is separated from the upper jaw by a darker band; ear yellow (modified from Boulenger, 1889).

Photos of *C. jackyhoserae* sp. nov. in life can be found at:

<https://www.inaturalist.org/observations/34050984> and

<https://www.threatenedtaxa.org/index.php/JoTT/article/view/1915/4108>

and https://www.conservationleadershipprogramme.org/media/2014/11/100206_India_FR_Tortoisesturtles.pdf at page 33 (identified as *C. amboinensis*).

C. oxyslopp sp. nov. from the Philippines in life can be found on the internet at:

<https://www.flickr.com/photos/song-devan/5289168079/> and

<https://www.inaturalist.org/observations/4054297> and

<https://www.inaturalist.org/observations/64644428> and

<https://www.inaturalist.org/observations/9759256>

Photos of *C. boxboyi* sp. nov. from Sulawesi can be found in Rhodin *et al.* (2017) at page 86 (bottom right), Schoppe and Das (2011) at fig. 2., or on the internet at:

<https://www.flickr.com/photos/135552775@N06/49529193916/>

and

<https://www.flickr.com/photos/ianbool/29651577068/> and

<https://www.flickr.com/photos/135552775@N06/49528687833/>

and

<https://www.inaturalist.org/observations/19879644> and

<https://www.inaturalist.org/observations/36054539>

Photos of *C. elfakiorum* sp. nov. from Borneo is depicted on page 87 (bottom left) of Rhodin *et al.* (2017) or can be found on the internet at:

<https://www.flickr.com/photos/25872797@N02/43283837055/>

and

<https://www.flickr.com/photos/elliottbudd/26287786968/> and

<https://www.flickr.com/photos/scincella1986/9429454304/>

C. couro is depicted on page 87 (top left) of Rhodin *et al.* (2017).

Photos of *C. kamaroma* can be found on the internet at:

<https://www.flickr.com/photos/30142279@N07/49675777532/>

and

<https://www.flickr.com/photos/berniedup/6963402976/>

Photos of *C. lineata* in life can be seen in McCord and Philippen (1998) or Schoppe and Das (2011) at figs 8 and 9.

C. richardwellsi sp. nov. from Enganno Island can be seen in life online at:

<https://www.inaturalist.org/observations/72871387>

C. amboinensis of the type form from Ceram

(immediately adjacent to Ambon) can be seen online at:

<https://www.inaturalist.org/observations/32940848>

Distribution: *C. richardwellsi* sp. nov. is believed to be restricted to the Indonesian island of Enganno off the west coast of Sumatra. Specimens from Sumatra are tentatively referred to the species *C. couro* (Lechenault in Schweigger, 1812), with a type locality of Java.

Etymology: *C. richardwellsi* sp. nov. is named in honour of Richard W. Wells, now of Lismore in New South Wales, Australia in recognition of significant contributions to herpetology in Australia over many decades and in numerous roles. While best known for various landmark taxonomic publications co-written with (Cliff) Ross Wellington, including Wells and Wellington (1984, 1985), these form but a tiny fraction of his total contributions.

CUORA ROSSWELLINGTONI SP. NOV.

LSIDurn:lsid:zoobank.org:act:1E6405DC-A58E-4B10-99E1-91409A613533

Holotype: A preserved specimen at the Smithsonian Institution, National Museum of Natural History, Washington, DC, USA specimen number Amphibians and Reptiles 216004 collected from Toguraci, Jailolo District, Halmahera, Indonesia. This facility allows access to its holdings.

Paratypes: 4 preserved specimens at the Smithsonian Institution, National Museum of Natural History, Washington, DC, USA specimen numbers Amphibians and Reptiles 237627-30 collected from Toguraci, Jailolo District, Halmahera, Indonesia.

Diagnosis: Until now, *Cuora rosswellingtoni* sp. nov. from Halmahera Island, Indonesia has been treated as an insular population of the widely distributed putative species *Cuora amboinensis* (Riche in Daudin, 1801), with a type locality of Ambon, Moluccas, Indonesia and found west of there to eastern India.

As of 2021, putative *C. amboinensis* is a species broken up by most herpetologists into up to four subspecies, occupying the range from Ambon, across the East Indies to south-east Asia and across to Eastern India and adjoining countries.

The molecular data of Protiva *et al.* (2016) indicated at least five species in the complex (see Fig. 5 and their accounts of divergences between measured clades in the text of the paper).

Their results did not place the Borneo population with any recognized subspecies, although Borneo specimens had variously been assigned to either *C. amboinensis amboinensis* (Riche in Daudin, 1801) or *Cuora amboinensis kamaroma* Rummeler and Fritz, 1991, type locality about 50 km north of Bangkok, Thailand (*sensu* Ernst *et al.* (2016) at page 145, Fig. 1.). Protiva *et al.* (2016) showed species-level divergence between the Borneo population and all others and hence its formal description in this paper.

The Indian form of the putative taxon *C. amboinensis* was the only obviously unnamed one in their phylogeny and so was formally identified and named as *C. jackyhoserae* sp. nov. in this paper.

The four previously recognized subspecies, *Cuora amboinensis amboinensis* (Riche in Daudin, 1801), *Cuora amboinensis couro* (Lechenault in Schweigger 1812), type locality of Java, Indonesia and also occurring on nearby Sumatra, lower Peninsula Malaysia and Singapore, *Cuora amboinensis kamaroma* Rummeler and Fritz, 1991, type locality about 50 km north of Bangkok, Thailand and *Cuora amboinensis lineata* McCord and Philippen, 1998, with a type locality of Myitkyina, Kachin Province, Myanmar (Burma), are all herein recognized as full species, each occupying ranges close to their type localities.

Unnamed forms of putative *C. amboinensis* formally named for the first time in this paper and not necessarily included in the phylogenetic study of Protiva *et al.* (2016) are as follows:

C. jackyhoserae sp. nov. from eastern India and nearby parts of Bangladesh, Bhutan and Myanmar (Burma);

C. oxyslopp sp. nov. from the Philippines;

C. boxboyi sp. nov. from Sulawesi;

C. elfakarium sp. nov. from Borneo;

C. richardwellsi sp. nov. from Enganno Island;

C. rosswellingtoni sp. nov. from Halmahera Island.

C. jackyhoserae sp. nov. in life is readily separated from all other species in *C. amboinensis* complex by colouration. It is similar in most respects to *C. lineata* (McCord and Philippen, 1998), but separated from that and all other species in the *C. amboinensis* by having in life a strong orange-coloured line running from the snout, above the eye and on the neck.

All but very old specimens of *C. jackyhoserae* sp. nov. are also characterised by having an orange line running down the middle of the dorsum of the carapace. In *C. lineata* (McCord and Philippen, 1998) a similar white or yellow stripe is seen.

C. lineata has an extremely strongly domed shell in adults and maximum carapace length of 230 mm, versus somewhat less so in *C. jackyhoserae* sp. nov. and a similar maximum carapace length.

The type form of *C. amboinensis* is separated from the other species in the complex by having a flat broad carapace, with a distinctive margin.

C. kamaroma is separated from the other species by having a highly domed carapace, without a well-developed margin and carapace length up to 250 mm.

C. couro is intermediate in characters between the two preceding species, but noticeably smaller, with a maximum carapace length of 220 mm and is readily identified and separated from the other two species by having a distinctive charcoal grey to black coloured skin on the head and face, giving it more vivid head markings than seen in the two preceding species.

C. amboinensis, *C. oxyslopp* sp. nov. and *C. rosswellingtoni* sp. nov. have a maximum carapace length of just 200 mm, making them the smallest

species in the complex.

C. oxyslopp sp. nov. are notable for their particularly domed carapace, which is not rounded in shape.

Furthermore, coloration in *C. oxyslopp sp. nov.* is quite different from that of adjacent species, showing significantly finer and whitish (usually not yellow) head stripes compared to broad yellow stripes in all other species except for the orange coloured ones in *C. jackyhoserae sp. nov.*

The pupil in *C. oxyslopp sp. nov.* has a completely different pattern to the other species, forming a broad black pattern versus being finely shaped in the others.

C. oxyslopp sp. nov. also has a narrower head than seen in other species in the complex.

The plastral pattern in typical *C. amboinensis* is highly variable, ranging from nearly entirely black to yellow with or without black spots.

C. oxyslopp sp. nov. has a plastral pattern of clear separated spots arranged in a regular pattern.

Soft parts of *C. oxyslopp sp. nov.* are a plain grey to cream in colour and lack reticulations seen in other species in the complex.

C. rosswellingtoni sp. nov. is similar in most respects to *C. amboinensis* but is separated from that species by more prominent markings on the limbs, an even more flattened carapace than is seen for the relatively flattened carapace of *C. amboinensis*, and a larger maximum adult carapace length of 220 mm.

C. rosswellingtoni sp. nov. also lacks a slight inward inflection of the mid-carapace as seen in *C. amboinensis*, with significantly less upturn of the outer edges.

C. boxboyi sp. nov. is separated from the other species in the complex by having a shell that is relatively flattened (in common with *C. rosswellingtoni sp. nov.* and *C. amboinensis*), a noticeably light brown to light grey carapace, except in extremely aged specimens, light grey, rather than dark grey or black on the top of the head and a massive preponderance of yellow on the face (sides of anterior head) not seen in any of the other species as well as a larger maximum adult carapace length of 220 mm.

C. elfakariorum sp. nov. is a high-domed, dark-shelled form, with adults generally with a dark brown or black carapace. The top of the head is also brownish-grey in colour, as opposed to the grey-black or light grey seen in other species in the complex. Plastron is usually all or mainly light in colour, except in aged specimens and the carapace has little, if any upturn on the outer edges. Other than the stripe at the top of the head and neck, soft parts are generally unmarked.

C. richardwellsi sp. nov. is similar in most respects to *C. elfakariorum sp. nov.* or *C. couro* but is separated from those species by the combination of having faded light grey on the sides of the head, being yellowish grey between the whitish yellow lines on the head, a domed carapace, especially at the rear, a slightly expanded rear carapace and little if any upward inflection of the outer edge.

The carapace is dark brown except in aged specimens.

All species in the *C. amboinensis* species complex are diagnosed and separated from similar species, including others in the genus *Cuora* Gray, 1856 by the following suite of characters: Carapace depressed and tricarinate in the young, usually very convex and without or with a single keel in adult females and often heavily domed in adults; vertebral shields as long as broad or a little longer than broad in the adult, broader in the young, much narrower than the costals. Plastron as large as the opening of the shell in the adult, without distinct bridge; no anal notch: the line of junction between the hyoplastron and the carapace shorter than that between the hypoplastron and the carapace; pectoral shields as long as or shorter than the abdominals, as long as or slightly longer than the humerals; axillary and inguinal small or absent. Head relatively small; upper jaw scarcely hooked, without any emargination. Front part of arm with large transverse scales. Digits moderately webbed, with sharp claws. Carapace brown or blackish; plastron yellow with large black spots, or dark brown with the suture between the shields yellow; in the very young the black spots of the plastron are confluent into a broad longitudinal zone, the borders of the plastron being yellowish; head and neck grey, brown or blackish above, yellow or whitish interiorly; a (usually) yellow band borders the head and neck superiorly, meeting its fellow above the nostrils; a second yellow band passes through the eye and is separated from the upper jaw by a darker band; ear yellow (modified from Boulenger, 1889).

Photos of *C. jackyhoserae sp. nov.* in life can be found at:

<https://www.inaturalist.org/observations/34050984>

and

<https://www.threatenedtaxa.org/index.php/JoTT/article/view/1915/4108>

and https://www.conservationleadershipprogramme.org/media/2014/11/100206_India_FR_Tortoisesturtles.pdf at page 33 (identified as *C. amboinensis*).

C. oxyslopp sp. nov. from the Philippines in life can be found on the internet at:

<https://www.flickr.com/photos/song-devan/5289168079/>

and

<https://www.inaturalist.org/observations/4054297>

and

<https://www.inaturalist.org/observations/64644428>

and

<https://www.inaturalist.org/observations/9759256>

Photos of *C. boxboyi sp. nov.* from Sulawesi can be found in Rhodin *et al.* (2017) at page 86 (bottom right), Schoppe and Das (2011) at fig. 2., or on the internet at:

<https://www.flickr.com/photos/135552775@N06/49529193916/>

and

<https://www.flickr.com/photos/ianbool/29651577068/>

and

<https://www.flickr.com/photos/135552775@N06/49528687833/>

and
<https://www.inaturalist.org/observations/19879644>
 and
<https://www.inaturalist.org/observations/36054539>
 Photos of *C. elfakarium sp. nov.* from Borneo is depicted on page 87 (bottom left) of Rhodin *et al.* (2017) or can be found on the internet at:
<https://www.flickr.com/photos/25872797@N02/43283837055/>
 and
<https://www.flickr.com/photos/elliottbudd/26287786968/>
 and
<https://www.flickr.com/photos/scincella1986/9429454304/>
C. couro is depicted on page 87 (top left) of Rhodin *et al.* (2017).
 Photos of *C. kamaroma* can be found on the internet at:
<https://www.flickr.com/photos/30142279@N07/49675777532/>
 and
<https://www.flickr.com/photos/berniedup/6963402976/>
 Photos of *C. lineata* in life can be seen in McCord and Philippen (1998) or Schoppe and Das (2011) at figs 8 and 9.
C. richardwellsi sp. nov. from Enganno Island can be seen in life online at:
<https://www.inaturalist.org/observations/72871387>
C. amboinensis of the type form from Ceram (immediately adjacent to Ambon) can be seen online at:
<https://www.inaturalist.org/observations/32940848>
Distribution: *C. rosswellingtoni sp. nov.* is believed to be restricted to the Indonesian island of Halmahera and immediately adjacent islets, including Bacan.
Etymology: *C. rosswellingtoni sp. nov.* is named in honour of Cliff Ross Wellington, now of Ramornie, northern in New South Wales, Australia in recognition of significant contributions to herpetology in Australia over many decades and in numerous roles. While best known for various landmark taxonomic publications co-written with Richard Wells including Wells and Wellington (1984, 1985), these form but a tiny fraction of his total contributions.
CHERSINA SWILEORUM SP. NOV.
LSIDurn:lsid:zoobank.org:act:5AE1E27D-3C44-4DC9-9F5F-6710BB9860D8
Holotype: A preserved specimen at The Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA, specimen number MCZ Herp R-42210, collected from Steinkopf, South Africa, Latitude -29.267 S., Longitude 17.733 E. This facility allows access to its holdings.
Diagnosis: Until now, *C. swileorum sp. nov.* from north-west South Africa and nearby Namibia has been treated as a northern outlier population of *Chersina angulata* (Duméril in Schweigger, 1812).
C. swileorum sp. nov. is readily separated from *C. angulata* by the following suite of characters: Having a carapace that is generally more rounded in shape than

the usual loaf-shaped carapace of the other regional forms of *C. angulata*; orange-red on the skin of the face and neck (versus usually yellowish) and a reddish-orange outer rim of the plastron.

Both males and females of *C. swileorum sp. nov.* grow larger than *C. angulata* and whereas females are generally smaller than males in *C. angulata* this is not the case for *C. swileorum sp. nov.*.

C. angulata is notable in having deeper plastron concavity in males than is seen in *C. swileorum sp. nov.* and *C. angulata* is further distinguished by having an elongated and up-curved gular shield.

Spitzweg *et al.* (2020) gave evidence to show that *C. swileorum sp. nov.* diverged from the *C. angulata* about 3.8 MYA, which is species-level divergence, even in the face of evidence of potential hybridisation between the two taxa in the south-west of South Africa.

The African Angulate Tortoise, *Chersina angulata* (Duméril in Schweigger, 1812), long suspected of comprising up to four well-defined regional forms (*sensu* Archer, 1967) remained prior to this formal description as being treated by herpetologists as a single species until now.

However, Spitzweg *et al.* (2020) presented compelling evidence for the splitting of the putative species at least two ways, this being the southern population and that from Namaqualand, in far northwest South Africa and adjacent Namibia (as done herein).

While there has been expressed doubt as to the exact provenance of the type specimen for the species *C. angulata* by Spitzweg *et al.* (2020), the drawing of the type material (with reference to the colouration of the lower head) shows it is not of the north-west form.

The type locality for "*Testudo bellii* Gray, 1828" is "Cape of Good Hope" (Latitude 34.3568 S., Longitude 18.4740 E.) and again not of the northern form.

"Cape of Good Hope" is located south of Cape Town, South Africa, where the species *C. angulata* is common and the holotype of is evidently of that form.

The specimen described as *Chersina angulata pallida* Gray, 1831 is again of colouration of the southern form and not that of the north-west of the range of the putative species *Chersina angulata*.

Hence the until now unnamed form from Namaqualand, stated by Spitzweg *et al.* (2020) as having diverged from the nominate form (in pure state) some 3.8 MYA is formally named in this paper as a new species, *C. swileorum sp. nov.*

A colour image of *C. swileorum sp. nov.* in life can be found online at:

<https://www.inaturalist.org/observations/10881141>

A photo of a live *Chersina angulata* (Duméril in Schweigger, 1812) of the type form from near Cape Town, South Africa can be found online at:

<https://www.inaturalist.org/observations/75814700>

Distribution: The northern half of the western side South Africa along the coast and near coastal areas, into Namibia, with a distribution centered on Namaqualand.

Etymology: Named in honour of Ernest Swile and his

family, from Athlone, Cape Town, South Africa in recognition of their contributions to herpetology in southern Africa.

CHERSOBIUS MANDELA SP. NOV.

LSIDurn:lsid:zoobank.org:act:47E2D144-C99B-48DB-B115-E9156FE67A93

Holotype: A preserved adult male specimen at the Port Elizabeth (now Gqeberha) Museum herpetological collection specimen number PEM RI 7307, collected from a dirt road between Pofadder and Onseepkans, Northern Cape Province, South Africa, Latitude 29.0451 S., Longitude 19.2450 E., at 920 metres above sea level (= 2919 feet ASL). This facility allows access to its holdings.

There is a detailed description of the holotype in Branch *et al.* (2007) including a photograph of it in life on page 27.

Diagnosis: *Chersobius mandela sp. nov.* has until now been treated as either *Chersobius signatus* (Gmelin, 1789) or a potentially unnamed subspecies of that taxon.

However it is morphologically and distributionally divergent, allopatric and was found by Daniels *et al.* (2009) to have a cyt b divergence of from 1.97 to 2.46 percent from the two putative subspecies of *C. signatus* which is a species-level divergence for this taxon.

C. mandela sp. nov. is readily separated from both putative subspecies of *C. signatus* by the following unique combination of characters: A carapace coloration consisting of an orange background, yellowing towards the centre of the scutes, with a heavy dark speckling that does not coalesce to form blotches or rays, as also seen in the southern subspecies *C. signatus cafer* (Daudin, 1802), that race being found from Klawer south to Piketberg and Citrusdal, in south-western South Africa.

However *C. mandela sp. nov.* is separated from *C. signatus cafer* by having serrations in the rear marginals that are greater in size than seen in that subspecies and approaching the size in the differently coloured northern subspecies *C. signatus signatus*, that taxon found from the orange River south to just north of Klawer.

The nearest known population of *C. signatus signatus* is found about 250 km to the west of Pofadder at Springbok, with the intervening zone between constituting unfavourable habitat for putative *C. signatus* or *C. mandela sp. nov.*, with the reasonable expectation neither taxon, or any intermediates occur there.

C. signatus signatus is separated from both *C. signatus cafer* and *C. mandela sp. nov.* by having an overall dark appearance and a light-brown background colour. The carapace has large, dark speckles and sometimes rays of background colour.

C. signatus cafer is separated from *C. signatus signatus* and *C. mandela sp. nov.* by having an orange-red or salmon-pink carapace, with a pattern of finer dark stipples and short, thin black rays and minimal serration in the rear marginals.

Both *C. signatus* (both subspecies) and *C. mandela sp.*

nov. are separated from other species in the genus by having a clearly speckled carapace, versus not so in the others, hence the common name "Specked Padloper". Tortoises of the genus *Chersobius* Fitzinger, 1835 are readily separated from similar and closely related genera as follows: They have a single, large inguinal scute, whereas the number is variable in the morphologically similar *Homopus* Duméril and Bibron, 1834. The midline pectoral scute of *Chersobius* is consistently longer and the nuchal scute shorter, than seen in *Homopus*. The fourth to fifth vertebral suture is narrow in *Homopus* and broad in *Chersobius*. Forelimb scales also differ with 3-4 large rows and 5-6 smaller rows, respectively, in *Homopus* and *Chersobius*. *Chersobius* males have a plastral concavity and *Homopus* males not. Three *Chersobius* species (*C. signatus*, *C. mandela sp. nov.* and *C. boulengeri*) are distinguishable from *Homopus* by having 12 or more marginal scutes, whereas *Homopus* species have 11 or fewer.

There are five toes on the forefeet in *Chersobius*. The glans penes are respectively V-shaped and heart-shaped in *Homopus* and *Chersobius*. Ecological differences include that *Chersobius* species are rupicolous and inhabit arid regions, whereas *Homopus* species inhabit more mesic habitats. *Homopus* females produce multi-egg clutches and tend to be bigger compared to single-egg clutching *Chersobius* females. Females of all species are with some exceptions, larger than conspecific males, and all males have larger shell openings than females have (modified from Hofmeyr and Branch, 2018).

Distribution: *Chersobius mandela sp. nov.* is known only from the type locality being just north of Pofadder, northern South Africa. It is almost certainly a taxon restricted to a small area and fieldwork should be undertaken to locate remaining populations of the species and to ensure its future survival in a country where the population of humans has gone up four fold in the period 1980-2020.

Etymology: *Chersobius mandela sp. nov.* is named in honour of a well-known deceased South African, Nelson Rolihlahla Mandela. He spent a large part of his life as an anti-apartheid revolutionary. He later served as President of South Africa from 1994 to 1999. He was the country's first black head of state and the first elected in a fully representative democratic election.

While he was an imperfect man, he did manage to make peace between racial groups in South Africa (with great assistance of others of various race and colour) and prevented a generally foreseen bloodbath between white and black people that in the 1970's and 1980's was at the time seen as inevitable.

FUNKICHELYS GEN. NOV.

LSIDurn:lsid:zoobank.org:act:5F1FA601-6340-41A3-800D-BCD1A5317EB9

Type species: *Funkichelys funki sp. nov.*

Diagnosis: Both genera *Homopus* Duméril and Bibron, 1834 and *Funkichelys gen. nov.* are readily separated from all other similar African genera by the following

suite of characters: They are small African tortoises with the triturating surfaces of maxilla and premaxilla without ridges; maxillary not entering roof of palate; prootic narrowly exposed dorsally; quadrate enclosing stapes; centrum of third cervical biconvex; carapace without hinge; no submarginal scutes; gulars divided; gular region only slightly thickened; four toes on the feet.

Funkichelys gen. nov. including the species *Funkichelys funki* sp. nov. and *F. femoralis* (Boulenger, 1888) are separated from *Homopus* with type species *Homopus areolatus* (Thunberg, 1787) and all other similar species by the following suite of characters: 17 cm in maximum carapace length. Its carapace is flattened dorsally, scarcely indented in the cervical region and has the anterior and posterior marginals expanded, reverted, and serrated. A small, broad cervical scute is present and the first vertebral is longer than broad, or at least as long as broad, while the others are broader than long. Eleven marginals lie on each side and the supracaudal is undivided. The carapace is yellowish brown to dark brown or olive with the scutes dark bordered in younger individuals. The scutes of some are orange or red tinged. The plastron is yellow to olive, with dark pigment on the anterior of each scute in the young, but immaculate in older tortoises. Its forelobe is anteriorly truncated and scarcely notched; the hindlobe has an anal notch. The plastral formula is: abd > hum > an >> fem > gul > pect. Each bridge has a single axillary and two or three inguinal scutes, the innermost touching the femoral scute. The head is moderate in size, with at best a weakly hooked, tricuspid upper jaw (versus strongly beaked in *Homopus*) and a nonprojecting snout. Several small scales lie above the nostrils. The prefrontal scale is large and divided longitudinally; the frontal is also large or is subdivided; other head scales are small. Head and neck are yellow to tan with some pink or orange pigment; the jaws are brown. The forelimbs are anteriorly covered with large imbricate scales in three or four longitudinal rows and a large conical tubercle is present on the thigh. The heels have large spurlike tubercles. Four claws occur on each forefoot. Limbs and tail are yellow to tan with tinges of pink or orange. The smaller males have a posteriorly concave plastron with deeper anal notches and possess longer, thicker tails than females.

The species *Funkichelys funki* sp. nov. has until now been treated as a western population of *F. femoralis* (Boulenger, 1888), previously known as *Homopus femoralis* Boulenger, 1888.

In the absence of locality information, *F. funki* sp. nov. is most readily and reliably separated from *F. femoralis* by inspection of the plastron. The humeral shields (second pair from anterior) in *F. femoralis* are noticeably triangular in shape, versus not so in *F. funki* sp. nov., where they are more or less rectangular in shape. This has been consistent in several dozen specimens of each species I have inspected.

Furthermore the two species are readily separated as follows: *F. funki* sp. nov. is of reddish-brown colour, versus yellowish brown in *F. femoralis*. *F. funki* sp. nov. has thin, often indistinct dark etching between scutes on

the carapace, vs thick and well defined lines between carapace scutes in *F. femoralis*. Dark lines etching the scutes of the carapace are thick and obvious in *F. femoralis* and not so in *F. funki* sp. nov.

Hofmeyr *et al.* (2016) found a 26.14 MYA divergence between the putative species *Homopus areolatus* (Thunberg, 1787) and *Homopus femoralis* Boulenger, 1888, further supporting the contention that transferring the latter species to another genus is the correct taxonomic action.

The same authors also found species-level divergences between both preceding putative species, as in *F. femoralis* and *F. funki* sp. nov. (see Fig. 2), which is reflected in the taxonomic position of this paper.

Distribution: *Funkichelys* gen. nov. are endemic to South Africa.

Etymology: *Funkichelys* gen. nov. is named in honour of Dr. Richard Funk, veterinary surgeon of Mesa, Arizona, USA, (previously of Florida, USA), in recognition of a lifetime's contribution to herpetology, including working with several threatened and endangered species of land tortoises and numerous important publications.

Content: *Funkichelys funki* sp. nov. (type species); *F. femoralis* (Boulenger, 1888).

FUNKICHELYS FUNKI SP. NOV.

LSIDurn:lsid:zoobank.org:act:C9E77E10-7397-4B34-8F3C-B0543FEB3720

Holotype: A preserved specimen at the (British) Museum of Natural History, London, UK, reptile collection, specimen number: BMNH 1988.425, collected at Karoo National Park, Beaufort West, Cape Province, South Africa. This facility allows access to its holdings.

Paratype: A preserved specimen at the (British) Museum of Natural History, London, UK, reptile collection, specimen number: BMNH 1988.426, collected at Karoo National Park, Beaufort West, Cape Province, South Africa.

Diagnosis: The species *Funkichelys funki* sp. nov. has until now been treated as a western population of *F. femoralis* (Boulenger, 1888), with a type locality of Cradock, South Africa, previously known as *Homopus femoralis* Boulenger, 1888.

In the absence of locality information, *F. funki* sp. nov. is most readily and reliably separated from *F. femoralis* by inspection of the plastron. The humeral shields (second pair from anterior) in *F. femoralis* are noticeably triangular in shape, versus not so in *F. funki* sp. nov., where they are more or less rectangular in shape. This has been consistent in several dozen specimens of each species I have inspected and yet has never previously been reported in the literature.

Furthermore the two species are readily separated as follows: *F. funki* sp. nov. is of reddish-brown colour, versus yellowish brown in *F. femoralis*. *F. funki* sp. nov. has thin, often indistinct dark etching between scutes on the carapace, vs thick and well defined lines between carapace scutes in *F. femoralis*. Dark lines etching the scutes of the carapace are thick and obvious in *F.*

femoralis and not so in *F. funki sp. nov.*

Images of *F. funki sp. nov.* in life can be seen in Rhodin *et al.* (2017) at page 140 top right and online at:

<https://www.inaturalist.org/observations/9837266>
(carapace and plastron shots)

and

<https://www.inaturalist.org/observations/38955294>

and

<https://www.inaturalist.org/observations/9820014>

The type form of *F. femoralis* (herein also identified as the Cradock form, in reflection of the type locality for the species) can be seen in life online in images at:

<https://www.inaturalist.org/observations/21417512>

and

<https://www.inaturalist.org/observations/10262573>

and

<https://www.inaturalist.org/observations/10389242>

which collectively also include dorsal and ventral views.

Hofmeyr *et al.* (2016), found a 3.9 MYA divergence between *F. funki sp. nov.* and *F. femoralis* as defined herein.

Both genera *Homopus* Duméril and Bibron, 1834 and *Funkichelys gen. nov.* are readily separated from all other similar African genera by the following suite of characters: They are small African tortoises with the triturating surfaces of maxilla and premaxilla without ridges; maxillary not entering roof of palate; prootic narrowly exposed dorsally; quadrate enclosing stapes; centrum of third cervical biconvex; carapace without hinge; no submarginal scutes; gulars divided; gular region only slightly thickened; four toes on the feet.

Funkichelys gen. nov. including the species *Funkichelys funki sp. nov.* and *F. femoralis* (Boulenger, 1888) are separated from *Homopus* type species *Homopus areolatus* (Thunberg, 1787) and all other similar species by the following suite of characters: 17 cm in maximum carapace length. Its carapace is flattened dorsally, scarcely indented in the cervical region and has the anterior and posterior marginals expanded, reverted, and serrated. A small, broad cervical scute is present, and the first vertebral is longer than broad, or at least as long as broad, while the others are broader than long. Eleven marginals lie on each side and the supracaudal is undivided. The carapace is yellowish brown to dark brown or olive with the scutes dark bordered in younger individuals. The scutes of some are orange or red tinged. The plastron is yellow to olive, with dark pigment on the anterior of each scute in the young, but immaculate in older tortoises. Its forelobe is anteriorly truncated and scarcely notched; the hindlobe has an anal notch. The plastral formula is: abd > hum > an >< fem > gul > pect. Each bridge has a single axillary and two or three inguinal scutes, the innermost touching the femoral scute. The head is moderate in size, with at best a weakly hooked, tricuspid upper jaw (versus strongly beaked in *Homopus*) and a nonprojecting snout. Several small scales lie above the nostrils. The prefrontal scale is large and divided longitudinally; the frontal is also large or is subdivided; other head scales are small.

Head and neck are yellow to tan with some pink or orange pigment; the jaws are brown. The forelimbs are anteriorly covered with large imbricate scales in three or four longitudinal rows and a large conical tubercle is present on the thigh. The heels have large spurlike tubercles. Four claws occur on each forefoot. Limbs and tail are yellow to tan with tinges of pink or orange.

The smaller males have a posteriorly concave plastron with deeper anal notches and possess longer, thicker tails than females.

Hofmeyr *et al.* (2016) found a 26.14 MYA divergence between the putative species *Homopus areolatus* (Thunberg, 1787) and *Homopus femoralis* Boulenger, 1888, further supporting the contention that transferring the latter species to another genus is the correct taxonomic action.

The same authors also found species-level divergences between both preceding putative species, *Funkichelys funki sp. nov.* and *F. femoralis*, (see Fig. 2), which is reflected in the taxonomic position of this paper.

Distribution: *F. funki sp. nov.* is found in the Sutherland, Merweville, Fraserburg and Beaufort

West Districts and separated from the eastern population by the 150 km-wide "Nelspoort Interval", as defined by Clark *et al.* (2011) and sources cited therein. The approximate distribution of *F. funki sp. nov.* is also depicted in Fig 1 of Clark *et al.* (2011).

F. femoralis is found east of the "Nelspoort Interval" and generally occurs at altitudes of over 900 m in the eastern Cape, the south-west Orange Free State, and presumably the extreme south-west of the Transvaal.

Etymology: *F. funki sp. nov.* is named in honour of Dr. Richard Funk, veterinary surgeon of Mesa, Arizona, USA, (previously of Florida, USA), in recognition of a lifetime's contribution to herpetology, including working with several threatened and endangered species of land tortoises and a number of important publications on herpetological matters.

HOMOPUS TREVORHAWKESWOODI SP. NOV.

LSIDurn:lsid:zoobank.org:act:B6DBC5AC-1AA5-4402-BD91-8E7B5C00525A

Holotype: A preserved specimen at the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA, specimen number MCZ Herp R-22474, collected from Grahamstown (AKA Makhanda), South Africa, Latitude -33.3 S., Longitude 26.533 E. This facility allows access to its holdings.

Paratypes: 1/ A preserved specimen at the University of Kansas Biodiversity Institute. University of Kansas, Lawrence, Kansas, USA, KUBI Herpetology Collection, specimen number KU KUH 195099 collected at Port Elizabeth (now known as officially renamed Gqeberha), South Africa. 2/ A preserved specimen at Naturalis Biodiversity Center, The Netherlands, specimen number ZMA.RENA.19055, collected at Port Elizabeth (now known as officially renamed Gqeberha), South Africa. 3/ A preserved dry specimen at Cornell University Museum of Vertebrates, Ithaca, New York, USA, CUMV Amphibian and Reptile Collection, specimen number Rept R-0011249 collected at Port Elizabeth (now known

as officially renamed Gqeberha), South Africa. 4/ A preserved dry specimen at the National Museum of Natural History, Smithsonian Institution, Washington, DC, USA, specimen number USNM Amphibians and Reptiles 39420 collected from Grahamstown (AKA Makhanda), South Africa, Latitude -33.3 S., Longitude 26.533 E. 5/ A preserved male specimen at the (British) Museum of Natural History, London, UK, specimen number 1890.8.29.1-2 collected from Port Elizabeth (now known as officially renamed Gqeberha), South Africa.

Diagnosis: Until now *Homopus trevorhawkeswoodi sp. nov.* has been regarded as the eastern population of *H. areolatus* (Thunberg, 1787).

H. trevorhawkeswoodi sp. nov. is readily separated from *H. areolatus* as follows:

In all but very aged specimens of *H. trevorhawkeswoodi sp. nov.* the outer edges of the dorsal scutes are bounded by thick, well-defined blackish brown lines, in turn with thick greenish-yellow outer areas occupying a sizeable part of each scute, being brown on the surface of the inner region of each scute.

In *H. areolatus* the blackish lines on the outer edges of the scutes are thin, ill defined or even absent. When viewed at a distance, the carapace of *H. areolatus* is yellowish brown or yellowish-orange, versus greenish brown in *H. trevorhawkeswoodi sp. nov.* In *H. areolatus* the outer area of each scute is yellowish, with orange or orange brown in the inner region of each scute.

The subspecies *H. trevorhawkeswoodi knysaensis subsp. nov.* from Knysa, west along the coast and nearby areas to Struisbaai is separated from nominate subspecies *H. trevorhawkeswoodi trevorhawkeswoodi subsp. nov.* by having expanded yellow-green outer areas of each scute and a reduced brown coloured inner scute area, typically being equal to, or less than the yellow-green outer areas in diameter, versus being greater in diameter in the nominate form *H. trevorhawkeswoodi trevorhawkeswoodi subsp. nov.* (and *H. trevorhawkeswoodi bloemfonteinensis subsp. nov.*). The inner area of each dorsal scute is dark brown in *H. trevorhawkeswoodi knysaensis subsp. nov.*, rather than medium to light brown in *H. trevorhawkeswoodi sp. nov.*

H. trevorhawkeswoodi bloemfonteinensis subsp. nov. from Bloemfontein and nearby parts of Free State is similar in most respects to *H. trevorhawkeswoodi trevorhawkeswoodi subsp. nov.*, but is noticeably faded in colour in most respects and is generally separated on that basis. The limbs tend to be light grey on top, rather than whitish as seen in *H. trevorhawkeswoodi trevorhawkeswoodi subsp. nov.*

The nominate subspecies *H. trevorhawkeswoodi trevorhawkeswoodi subsp. nov.* is found in a region generally bound by Cape St. Francis, just west of Port Elizabeth (now known as officially renamed Gqeberha), in a generally triangular region to the east of there and bound approximately by Fort Beaufort and Port Albert.

The northern limit of *H. trevorhawkeswoodi trevorhawkeswoodi subsp. nov.* and southern limit of *H. trevorhawkeswoodi bloemfonteinensis subsp. nov.* is

uncertain, but *H. trevorhawkeswoodi sp. nov.* is known from locations within the intervening region.

The image depicted with Thunberg's, 1787 description of *H. areolatus* (Thunberg, 1787) is clearly of a specimen with a provenance of Cape Town, South Africa, as evidenced by the colouration of the carapace (yellow outers of each scute and light reddish-range inner scutes and no trace of green), meaning the eastern form was until now the unnamed species.

Hofmeyr *et al.* (2020), found that the taxa herein described as *H. trevorhawkeswoodi sp. nov.* and *H. areolatus* (Thunberg, 1787) diverged more than 2.5 MYA in the Pliocene. The same authors found the subspecies of *H. trevorhawkeswoodi sp. nov.* as identified herein diverged from one another more than 1.5 MYA. Hofmeyr *et al.* (2016) found a 6.43 MYA divergence between *H. trevorhawkeswoodi sp. nov.* and *H. areolatus* (Thunberg, 1787) and over 3 MYA for the subspecies of *H. trevorhawkeswoodi sp. nov.*

Colour images of *H. trevorhawkeswoodi sp. nov.* (of the nominate subspecies) in life can be found online at: <https://www.inaturalist.org/observations/41104576>

and

<https://www.inaturalist.org/observations/80391390>

and

<https://www.inaturalist.org/observations/37215272>

and

<https://www.inaturalist.org/observations/16520155>

Colour images of *H. trevorhawkeswoodi knysaensis subsp. nov.* in life can be found online at:

<https://www.inaturalist.org/observations/82145048>

and

<https://www.inaturalist.org/observations/11214561>

and

<https://www.inaturalist.org/observations/57302877>

Colour images of the nominate form of *Homopus areolatus* depicted in life can be found in Rhodin *et al.* (2017) at page 140 and online at:

[https://commons.wikimedia.org/wiki/](https://commons.wikimedia.org/wiki/File:Homopus_areolatus_-_Common_Padloper_-_Cape_Town.jpg)

File:Homopus_areolatus_-_Common_Padloper_-_Cape_Town.jpg

and

<https://www.inaturalist.org/observations/71497635>

and

<https://www.inaturalist.org/observations/24354766>

The species *H. trevorhawkeswoodi sp. nov.* and *H. areolatus* constituting the entirety of the genus *Homopus* Duméril and Bibron, 1834 are separated from other similar species and genera by the following unique suite of characters: The slightly domed carapace (females to 30 cm) is dorsally flattened, scarcely indented in the cervical region, has the anterior marginals only slightly expanded and the unexpanded posterior marginals not or only slightly serrated. A small but broad cervical scute is present; the first and fourth vertebrals are longer than broad and the others are broader than long. A slight medial keel may be present, especially in younger specimens. Vertebrals and pleurals have broad areolae

surrounded by raised growth annuli. There are usually 11, but occasionally 10 to 13, marginals on each side and the supracaudal is undivided. Areolae of the carapacial scutes are reddish brown with yellow, olive, dark-brown, or black borders. A dark bar of some form usually lies along the anterior seam of each marginal. The yellowish or yellowish-brown plastron usually has some dark pigment toward the center. Its forelobe is anteriorly truncated, the hindlobe notched posteriorly. The plastral formula is: abd > hum > an > fem << pect << gul. Each bridge has one or two (sometimes to five) axillary scutes and three or four inguinals, the innermost touching the femoral scute. The head is moderate in size with a nonprojecting snout and a strongly hooked, tricuspid upper jaw. Usually, no small scales lie above the nostrils, and the large prefrontal scale may be divided or partially (posteriorly) divided longitudinally. The frontal scale may be subdivided. Other dorsal head scales are small. The head varies from yellow to tan or reddish brown, the jaws are tan. The neck varies from yellowish brown to reddish brown, as do the limbs and tail. Each forelimb is covered anteriorly with large, overlapping scales in three or four longitudinal rows. There are four claws on each forefoot.

Males are smaller than females and have a posteriorly concave, usually uniformly colored plastron and longer, thicker tails than females. Females have a flat, usually medially dark plastron and a short tail. During the breeding season, the prefrontal scales of the males tend to show an orange-red coloration for several weeks. To a lesser extent, this coloration is sometimes present in females as well.

Both genera *Homopus* Duméril and Bibron, 1834 and *Funkichelys* gen. nov. as defined within this paper, are readily separated from all other similar African genera by the following suite of characters: They are small African tortoises with the triturating surfaces of maxilla and premaxilla without ridges; maxillary not entering roof of palate; prootic narrowly exposed dorsally; quadrate enclosing stapes; centrum of third cervical biconvex; carapace without hinge; no submarginal scutes; gulars divided; gular region only slightly thickened; four toes on the feet.

Funkichelys gen. nov. including the species *Funkichelys funki* sp. nov. and *F. femoralis* (Boulenger, 1888) are separated from *Homopus* type species *Homopus areolatus* (Thunberg, 1787) and all other similar species by the following suite of characters: 17 cm in maximum carapace length. Its carapace is flattened dorsally, scarcely indented in the cervical region and has the anterior and posterior marginals expanded, reverted, and serrated. A small, broad cervical scute is present, and the first vertebral is longer than broad, or at least as long as broad, while the others are broader than long. Eleven marginals lie on each side and the supracaudal is undivided. The carapace is yellowish brown to dark brown or olive with the scutes dark bordered in younger individuals. The scutes of some are orange or red tinged. The plastron is yellow to olive, with dark pigment on the anterior of each scute in the young, but immaculate in older tortoises. Its forelobe is anteriorly

truncated and scarcely notched; the hindlobe has an anal notch. The plastral formula is: abd > hum > an << fem > gul > pect. Each bridge has a single axillary and two or three inguinal scutes, the innermost touching the femoral scute. The head is moderate in size, with at best a weakly hooked, tricuspid upper jaw (versus strongly beaked in *Homopus*) and a nonprojecting snout. Several small scales lie above the nostrils. The prefrontal scale is large and divided longitudinally; the frontal is also large or is subdivided; other head scales are small. Head and neck are yellow to tan with some pink or orange pigment; the jaws are brown. The forelimbs are anteriorly covered with large imbricate scales in three or four longitudinal rows and a large conical tubercle is present on the thigh. The heels have large spurlike tubercles. Four claws occur on each forefoot. Limbs and tail are yellow to tan with tinges of pink or orange.

The usually smaller males have a posteriorly concave plastron with deeper anal notches and possess longer, thicker tails than females.

Hofmeyr *et al.* (2016) found a 26.14 MYA divergence between the putative species *Homopus areolatus* (Thunberg, 1787) and *Homopus femoralis* Boulenger, 1888, further supporting the contention that transferring the latter species to another genus is the correct taxonomic action.

The same authors also found species-level divergences between relevant preceding identified herein putative species, (see Fig. 2), which is reflected in the taxonomic position of this paper.

Distribution: *H. trevorhawkeswoodi trevorhawkeswoodi* subsp. nov. is endemic to South Africa.

The nominate subspecies *H. trevorhawkeswoodi trevorhawkeswoodi* subsp. nov. is found in a region generally bound by Cape St. Francis, just west of Port Elizabeth (now known as officially renamed Gqeberha), in a generally triangular region to the east of there and bound approximately by Fort Beaufort and Port Albert.

The subspecies *H. trevorhawkeswoodi knysaensis* subsp. nov. occurs from Knysa, west along the coast and nearby areas to Struisbaai.

The subspecies *H. trevorhawkeswoodi bloemfonteinensis* subsp. nov. is known from Bloemfontein and nearby parts of Free State.

Etymology: Named in honour of esteemed Zoologist, Trevor Hawkeswood of Sydney, New South Wales, Australia, in recognition of his many contributions to zoology over some decades, including his strong advocacy against taxonomic vandalism as practiced by Welsh criminal Wolfgang Wüster and his gang of thieves as detailed by Cogger (2014), Hoser (2007, 2009, 2012a-c, 2013c-d, 2015a-g), Hawkeswood (2021) and ICZN (2021).

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Hoser, R. T. 2021. Audit finds dozens of unnamed turtle taxa. A body of evidence results in newly named genera, subgenera, species and subspecies based on historical and morphological divergence. *Australasian Journal of Herpetology* 52/53:1-128.