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A review of the turtle genus *Pelochelys* Gray, 1864 (Trionychidae) including the division into two subgenera and the formal descriptions of two new species.

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ABSTRACT

This paper revises the taxonomy for the living turtles of the genus *Pelochelys*.
In line with well-defined morphological evidence, extant species from the Australasian region are placed in a new subgenus. Two regional and divergent forms of *Pelochelys cantorii* Gray, 1864 are also formally described and named herein as new species, these being the specimens from Kalimantan (Borneo) and those from the Ganges system of India and Bangladesh.
Keywords: Taxonomy; Australasia; Asia; Trionychidae; *Chitra*; *Pelochelys*; *cantorii; bibroni; signifera;* new subgenus; *Ferepelochelys*; new species; *clivepalmeri*; *telstraorum*.

INTRODUCTION

The Trionychid turtle genus *Pelochelys* Gray, 1864 has been known to science under this name for 150 years, with the first species within the genus described sometime earlier. That was *Trionyx* (*Gymnopus*) *bibroni* Owen, 1853.

For most of the intervening period, all species within the genus were referred to as the single species *Pelochelys cantorii* Gray, 1864, or more commonly under the earlier available name, *P. bibroni* Owen, 1853. However the most recent taxonomic treatment of the genus was that of Webb (2002), who recognized both Gray's *Pelochelys cantorii* Gray, 1864 and Owen's species, already recognized by earlier authors and placed in the same genus.

Webb (2002) also split the New Guinea species *bibroni* into two, these being the nominate form from south of the main cordillera and a newly described taxon from the north side, named as *Pelochelys signifera* Webb, 2002.

In terms of the southern and south-east Asian taxon, until now recognized by most authors as a single species, namely, *P. cantorii*, research has been hampered by several factors including the following: 1/ Difficulty in locating specimens for study on the basis of several factors including: A/ political instability and wars in relevant places where they may occir; B/ the habitat and habits of the species (i.e. bottom dwelling of crocodile-infested large rivers) making it relatively difficult to locate and catch and; C/ the common confusion with similar looking species, notably turtles of the genus *Chitra* Gray, 1844. 2/ Several synonyms in use for the species leading taxonomists to believe that any unrecognized forms probably already have available names, thereby leading them to look elsewhere for turtle groups to study for the purposes of naming new taxa. 3/ Ongoing confusion, caused by the literature giving inaccurate distribution information for the taxon, derived in part from erroneous and unchecked records, misinterpretation of data including the result being conclusions made that don't necessarily match the facts, as well as other similar issues.

The taxonomic confusion in terms of these turtles came to my attention in 1993 and in the nearly two decades post-dating that year I assembled a sizeable portfolio of data on the taxon *Pelochelys cantorii* Gray, 1864 including photos, records and the like from the entire known range of the taxon and including alleged marine records for the species as well. On 17 August 2011 this material was stolen (see below).

Noting that all regional forms of this taxon are threatened in some way, including being potentially endangered, I have opted to publish the following revision and scientific descriptions with a minimum of available data. The alternative of not doing so and taxa being unrecognized and potentially becoming extinct is not something I wish to entertain.

PELOCHELYS SENSU LATO

Until recently, all species within the genus were recognized as a single taxon, namely one or other of *P. bibroni* or *P. cantorii*. As mentioned already, Webb (2002) was the most recent author to change the taxonomy of the genus *Pelochelys* by dividing the New Guinea taxon, then widely recognized and known as *P. bibroni* (and excluding *P. cantorii* from west of Wallace's line). Webb's division was a north-south one with the central cordillera of the island being the dividing line of note. However this division was actually foreshadowed by Rhodin *et al*. (1993).

A number of authors, including Rhodin *et al*. (1993) have suggested a strong sea-water tolerance by *Pelochelys* species, but this is not supported by the evidence. Rhodin *et al*. (1993) conceded that the preferred habitat for the taxon was fresh-water river systems well away from estuarine habitats. See also Liem (1983), Liem and Haynes (1977) and Jones (1950). This is also the case for Asiatic *P. cantorii.*

The known riverine distribution for all *Pelochelys* species also indicates little salt-water tolerance. The physical evidence of the morphological differences between Asiatic *P. cantorii* and the New Guinea taxa indicates deep historical divergence. Noting this fact, the two following points are further noted.

The two New Guinea species were unable to regularly breach the sea-water barrier to the east of New Guinea along the coastline to intermingle as a single species in recent geological times. Secondly the Asiatic *P. cantorii* (as referred to by most recent authors to date) remains unknown from Java (Iskander 2004), and in spite of intensive searching of the island and is also not known to have ever been present in Sulawesi (see Webb 2002), which is also a heavily surveyed island. This being in spite of suitable riverine habitat there and a short physical

distance from east Kalimantan (Borneo), where the taxon is relatively abundant and regularly seen. Of course, unlike the major islands from Borneo west to Asia, Sulawesi has no recent historical land bridge to Asia during recent glacial maxima.

Webb (2002) reports on a *Pelochelys* specimen sold in a market in Sulawesi, but this is not necessarily indicative of the taxon on the island, as it may potentially include any of several other factors such as an animal brought in from elsewhere or a vagrant found at sea as was apparently the case documented by Radhakrishnan and Badrudeen (1975).

The alleged marine record of Radhakrishnan and Badrudeen (1975) from southern India, was re-examined critically and found to be questionable in terms of the conclusion reached.

These authors asserted that because a specimen was trawled alive some 5 km offshore in Palk Bay, off Mandapam southern India, that their finding "proves beyond doubt that the species can tolerate the marine environment, as against the belief that it is purely a freshwater form."

I subscribe that this finding does not in any way establish this fact.

Freshwater species are regularly washed to sea in floods and while then occurring in salt water and potentially being found alive there, invariably die within a relatively short time frame.

This is also exactly what happened to the specimen of *Pelochelys* found by these authors. In spite of their best efforts, the authors reported that their specimen refused all food offered and then died 14 days after capture.

In other words the animal was almost certainly very ill and in poor physical condition.

These facts indicate that the animal may have lost condition either as a result of the long-term sea-water immersion prior to capture, or alternatively, a lack of condition is what led to the animal being moved a considerable distance from the preferred habitat in the first instance.

What is however clear is that the animal in question was a non breeding specimen and not part of an established breeding population or an indication that the species regularly migrates across bodies of sea water.

The lack of salt-water tolerance demonstrated herein is relevant in terms of assessing the status of widely separated populations of *P. cantorii* with a view to assessing their taxonomy, nomenclature and in turn their long-term survival prospects, noting that some are found within the most (human) populated regions on earth. The distribution map for the genus *Chitra* Gray, 1844, as published by McCord and Pritchard (2002) is largely similar to that of that produced by Das (2008) for Asiatic *P. cantorii* (as referred to by most recent authors to date). While there are now known to be notable differences in terms of the Indonesian distribution with *Chitra* known from Java and Asiatic *P. cantorii* (as referred to by most recent authors to date) not known from there, the reverse for Kalimantan (Borneo) and alleged findings of subfossil *Chitra* remains on Sulawesi means that the significance of the maps is great.

Both maps demonstrate the restriction of modern living species in each genus to major river basins and an absence in the intervening regions.

Morphologically similar species within the genus *Chitra* have been split three ways in line with their main centres of distribution (as done by McCord and Pritchard in 2003). However for reasons not entirely clear, no such split has yet been done for the *P. cantorii* complex, even though the divisions are of near identical manner and each of the regional forms are sufficiently distinct as to warrant being placed in different species.

As a result of this anomaly and in order to resolve it, two regional forms, until now known as *P. cantorii* are hereby described as new species according to the Zoological Code (Ride *et al.* 1999).

The distributions of these newly named taxa are within large drainage regions separated by oceanic regions within enlarged river drainages as mapped out by Molengraaff (1921), Molengraaff and Weber (1921), Voris (2000) and sources cited therein according to the 120 metre sea depth level, which corresponded to the lowest approximate sea-level in recent ice-age maxima.

These drainage maps readily explain the modern distributions of these divergent forms.

Webb (2002), when publishing his description of the taxon, *P. signifera* Webb, 2002, detailed significant morphological differences between the two *Pelochelys* found east of Wallace's Line versus *P. cantorii* as widely known from west of this biogeographical division.

In view of the facts that both eastern and western species are widely separated, likely to have been so for an extended geological time frame (as seen in the results of Sanders *et al.* 2010 for similarly separated fresh-water reptile species across the same geographical divide) and the obvious morphological differences between each species group the eastern taxa are formally placed in a separate subgenus, formally named for the first time.

The Australian fossil species *Murgonemys braithwaitei* White, 2001 is a significantly different Eocene taxon. Therefore that name is not available for the extant New Guinea taxa.

Pliocine/Pleistocine fossil and subfossil remains from Australia may or may not be attributable to the genus including the New Guinea taxa, until now known as *P. bibroni* and *P. signifera.*

While there are unconfirmed reports of *Pelochelys* from rivers in the Northern Territory of Australia, none have been caught and lodged in Australian museums to date.

The literature relevant to what is known about the species within the genus *Pelochelys* as defined to date, including relevant fossil taxa that have significant relationships to extant species include the following: Baur (1891), Bonin *et al*. (2006), Boulenger (1889, 1891), Brown *et al.* (2013), Chan-ard *et al*. (1999), Cogger and Zweifel (1998), Cox *et al.* (1998), Das (2008), Das and Maklarin (2006), de Rooij (1915), De Vis (1894), Diesmos *et al.* (2008), Ernst and Barbour (1989), Gaffney and Bartholomai (1979), Georges and Thomson (2006, 2010), Georges *et al.* (2008), Gray (1864), Iskander (2004), Jones (1950), Kowalski *et al.* (2011), Lehr and Holloway (2003), Liem (1983), Liem and Haynes (1977), Manthey and Grossmann (1997), McCord and Joseph-Ouni (2003), Meylan (1987), Molengraaff (1921), Molengraaff and Weber (1921), Murthy (2010), Owen (1853), Palot and Radhakrishnan (2011), Pauwels *et al.* (2003), Platt *et al.* (2008), Radhakrishnan and Badrudeen (1975), Rhodin *et al.* (1993), Riger *et al.* (2009), Rudolphi and Weser (1998), Sanders *et al.* (2010), Shiping *et al.* (2009), Smedley (1932), Vijaya (1982), Voris (2000), Waite (1903), Webb (1995, 1997, 2002) Xiao *et al.* (2013), Zhou and Li (2007) and sources cited therein.

As already mentioned, this genus, *Pelochelys* is closely allied to *Chitra* and specimens of each genus are regularly confused with one another by lay people. However *Pelochelys* may be readily distinguished from *Chitra* by the large and prominent orbits, which occupy a less anterior position on the skull.

THEFT OF MATERIALS TO IMPEDE SCIENCE AND WILDLIFE CONSERVATION

I note also the following: In 2006 an online petition sponsored by a group of animal-hating pseudoscientists including Wolfgang Wüster, Mark O'Shea, David John Williams, Bryan Fry and others posted at: http://www.aussiereptileclassifieds.com/phpPETITION (Hunter *et al.* 2006) called for my successful wildlife education business and all my other herpetological activity to be shut down by the government of Victoria, Australia. These men were successful in that after a ruthless five-year campaign, on 17 August 2011, 11 heavily armed police and wildlife officers conducted a highly illegal and violent raid on our family home and research facility. Myself, my wife and two young daughters were arrested at gunpoint and held captive in the kitchen of the house for nine hours while the facility was ransacked. Besides the unspeakable acts of killing captive snakes and criminal damage to cages and household goods, the raiding officers illegally shut down our business and effectively placed myself under house arrest at gunpoint for some months after the raid.

An application by myself to the Supreme Court of Victoria led to the re-opening of our unlawfully shut down wildlife education business, although much of the damage to the business and our reputation built up over more than 4 decades was irrepairable.

Of greater relevance here is that at the time of the raid, research files spanning more than 40 years were taken and never returned, including materials and records relevant to this paper. Material taken included all the computers, disks, hard drives, backups, cameras, scientific literature and other forms of information and information storage at the facility. All were loaded into the back of a truck and trailer and carted off.

Faced with the dilemma of deciding whether to spend another forty years gathering data, by which time I may be dead from old age, being aged 52 as of 2014, or publishing the relevant paper/s with minimal data, I have opted to publish.

Underlying this motivation has been an increasing concern that a delay to formally identify and name undescribed biodiversity may lead to its extinction before another scientist gets around to the matter.

Engstrom *et al*. (2002) 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."

A number of authors including Kaiser (2012a, 2012b, 2013 and 2014), Kaiser *et al.* (2013), Naish (2013) and Wüster *et al.* (2014), all part of the group of people effectively controlled by Wolfgang Wüster of Wales, UK, have been highly critical of the fact that I have assigned names to unnamed clades of snakes. Their unscientific and childish attacks, continued incessantly on social media such as Facebook and Twitter are rejected herein as destabilizing the nomenclature and impeding the progress of science.

Their ridiculous comments and false and defamatory statements are systematically rebutted by Hoser (2013).

I also note that many taxa formally named by myself for the first time in earlier publications (e.g. Hoser 2000a, 2000b) are in fact threatened species.

Therefore I note the sensible remarks of Engstrom *et al*. (2002) as a perfectly reasonable explanation for the publishing of taxon descriptions for such unnamed groups. This remains the case even if a sizeable amount of my original research, files, photos and data have been stolen and therefore cannot be relied upon and incorporated into these contemporary publications.

NOMENCLATURAL STATEMENT IN TERMS OF THE DESCRIPTIONS WITHIN THIS PAPER

Unless mandated by the zoological code, no names proposed within this paper should be amended in any way for the purposes of correction, gender change or the like. In terms of priority of names in the event of conflict, where more than one newly named taxon is deemed conspecific or within a single taxon group by a later author, the priority to be taken is by page priority, this meaning the first taxon described in full is the one to take precedent.

FEREPELOCHELYS SUBGEN. NOV.

Type species: *Trionyx* (*Gymnopus*) *bibroni* Owen, 1853.

Diagnosis: This subgenus differs from the nominate genus by the modal position of neural bone reversal (see also definitions by Meylan 1987 and Rhodin *et al*. 1993). In *Ferepelochelys subgen. nov*. this is at position 5/6, as opposed to being at 6 for *Pelochelys* from Asia (the nominate subgenus).

Furthermore all *Ferepelochelys gen. nov.* from New Guinea have 9 neurals (8 distinct bony elements, the fused first neural counting as 2) whereas in Asiatic *Pelochelys* may have 7, 8 or 9 neurals.

The two species within *Ferepelochelys subgen. nov.* are separated from *Pelochelys* species as follows:

Ferepelochelys signifera of northern New Guinea is separated from all other *Pelochelys* by the following suite of characters: Juvenile carapace smooth, except for low tubercles in nuchal region and longitudinal ridges over central bony disc area and covered with a distinct, dark pattern of close-set, small dots and markings; adult carapace uniformly brownish (no distinct pattern).

Ferepelochelys bibroni of southern New Guinea is separated from all other *Pelochelys* by the following suite of characters: Juveniles with overall rough-textured, tuberculate carapace; adults with yellow neck stripes and contrasting yellow markings on carapace.

By contrast *Pelochelys* species (grouped by most authors within the single species *cantorii*) are separated from *Ferepelochelys gen. nov.* by the following suite of characters:

Juvenile carapace smooth, except for low tubercles in nuchal region and longitudinal ridges over central bony disc area and lacking a distinct, close-set variegated pattern of dark markings, being mostly uniform brownish, but may have indistinct, pale spots; adult carapace uniformly brownish (no distinct pattern) (modified from Webb 2003).

Distribution: Known only from river drainages on the north side and south-side of island New Guinea.

Etymology: *Ferepelochelys* is in reference to these species being "not quite" *Pelochelys*.

PELOCHELYS CLIVEPALMERI SP. NOV.

Holotype: A skeletonised specimen number: BMNH 80.9.25.6, at the British Museum of Natural History, London, UK. The specimen was collected at "Koti'' (equivalent to Kutai, 00.35 S, 117.17 E, Kalimantan Timur Province) within the Indonesian part of Borneo. This is a public facility that allows access to specimens by scientists.

Paratype: An adult specimen number: SP(P)285 at the Sabah Parks Zoological Museum, Kota Kinabalu, Sabah, Malaysia. It was collected at the junction of Sungei Kinarom and Sungei Serimsim, Sabah, Borneo, within a lowland rainforest, on 30 August 2001. This is a public facility that allows access to specimens by scientists.

Diagnosis: In the past *Pelochelys clivepalmeri sp. nov.* was identified as a variant of *P. cantorii.* However *Pelochelys clivepalmeri sp. nov.* is most readily separated from other *Pelochelys* species, including *P. cantorii* on the basis of colouration and other external features.

In *Pelochelys telstraorum sp. nov.* (from Bangladesh and India), described below the adult colouration is olive green with slightly darker dots, these darker dots being absent in *P. cantorii* and *P. clivepalmeri sp. nov*. or if present in these species are only prominent in the anterior part of the carapace and in subadult specimens. In *Pelochelys telstraorum sp. nov.* the neck and the head are lighter in colour with a distinct yellow tinge (as opposed to whitish-yellow in *P. cantorii* and *P. clivepalmeri sp. nov.*). The ventral side is whitish with a light-yellow tinge at angles. The plastron is whitish with light pink plastrol callosities.

P. cantorii adults have numerous closely placed raised tubercle-like structures on the upper anterior carapace. These are limited in number in widely scattered and of smaller size in both *Pelochelys telstraorum sp. nov.* and *P. clivepalmeri sp. nov.*. and can be used to separate the relevant species.

In *P. clivepalmeri sp. nov.* a noticeable light streak runs along both the upper and lower jaw as opposed to only on the lower jaw in *P. cantorii.*

Distribution: Known definitively only from eastern Kalimantan (Borneo). Thought to be the only *Pelochelys taxon* from Borneo.

Etymology: Named in honour of Australian politician Clive Palmer in recognition of his valiant attempts to shake up the duopoly of Liberal/Labor leadership of the country, which over many decades has descended into an evil culture of corruption and nepotism.

The shape of the carapace of the taxon also bears a passing similarity to Mr. Palmer's physical shape (as of 2014).

PELOCHELYS TELSTRAORUM SP. NOV.

Holotype: A specimen number 1781 (skull only) in the herpetology collection lodged at the Museum of India 27, Jawaharlal Nehru Road, Park Street Area, Kolkata (Calcutta), West Bengal 700016, India, collected locally. This is a public facility that allows access to specimens by scientists.

Paratype: A specimen number 1886 (33a. A.S.B.) in the herpetology collection lodged at the Museum of India 27, Jawaharlal Nehru Road, Park Street Area, Kolkata (Calcutta), West Bengal 700016, India, collected locally. This is a public facility that allows access to specimens by scientists.

Diagnosis: In the past *Pelochelys telstraorum sp. nov.* was identified as a variant of *P. cantorii.* However *Pelochelys telstraorum sp. nov.* is most readily separated from other *Pelochelys* species, including *P. cantorii* on the basis of

colouration and other external features.

In *Pelochelys telstraorum sp. nov.* the adult colouration is olive green with slightly darker dots, these darker dots being absent in *P. cantorii* and *P. clivepalmeri sp. nov*. or if present in these species are only prominent in the anterior part of the carapace and in subadult specimens. In *Pelochelys telstraorum sp. nov.* the neck and the head are lighter in colour with a distinct yellow tinge (as opposed to whitish-yellow in *P. cantorii* and *P. clivepalmeri sp. nov*.). The ventral side is whitish with a light-yellow tinge at angles. The plastron is whitish with light pink callosities.

P. cantorii adults have numerous raised tubercle-like structures on the upper anterior carapace. These are limited in number in widely scattered and of smaller size in both *Pelochelys telstraorum sp. nov.* and *P. clivepalmeri sp. nov.*

Distribution: Known definitively only from the middle and lower Ganges River System in India/Bangladesh and nearby areas of the upper bay of Bengal in India and Bangladesh. Specimens retrieved from southern India appear to be of this taxon.

Etymology: Named in honour of the many Indian-based employees of the Australian company Telstra, in recognition for their efforts to sell Australians beneficial telecommunications services and make sense of complicated phone bills.

CONFLICT OF INTEREST

This author reports no conflict of interest in terms of any material within this paper.

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