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Taxonomy and nomenclature of the longneck turtle (genus *Chelodina*) from south-western Australia

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Abstract - Gray (1856) recognised *Chelodina colliei* from south-western Australia as a different species from *Chelodina oblonga* Gray, 1841 from 'Western Australia'. In addition, Gray (1873) specifically mentioned specimens of *C. oblonga* from the Port Essington region of today's Northern Territory. Boulenger (1889) synonymized *C. colliei* with *C. oblonga*, a view followed by later reviewers for over seven decades. Goode (1967) and Burbidge (1967) both reinstated Gray's original concept that the longneck turtle of south-western Australia represents a distinct species, but erroneously applied and restricted the name *C. oblonga* to the south-western Australian species. Thomson (2000) detected this nomenclatural error and subsequently applied to the International Commission on Zoological Nomenclature (ICZN case 3351, Thomson 2006) to give precedence to *rugosa* over *oblonga* whenever the two were considered to be conspecific and to place on the official lists the names *colliei*, *oblonga* and *rugosa*, thus leaving *colliei* as the only available name for the south-western Australian *Chelodina*. Since then, the name *Chelodina colliei* was again used by several authors for the south-western Australian taxon, including in books and checklists (Bonin *et al.* 2006; Fritz and Havaš 2007; Iverson 2007). With case 3351 still under consideration by the ICZN, McCord and Joseph-Ouni (2007) further aggravated the nomenclatural confusion regarding the south-western Australian longneck turtle by fixing a 'neotype' for *C. oblonga* and by describing the genus *Macrodiremys* for *C. oblonga* (= *colliei*), both actions in violation of Articles 75.6 and 82.1 of the 1999 ICZN Code.

Keywords: Testudines, Chelidae, *Chelodina colliei*, *Chelodina oblonga*, nomenclature

INTRODUCTION

Fitzinger (1826) provided a key that defined the genus *Chelodina* based on the nominal type species *Emys longicollis* (= *Testudo longicollis* Shaw, 1794) from an unspecified locality, with the type probably coming from the Botany Bay area in Sydney (Cann 1998). The next and second species described in this genus was *Chelodina oblonga* Gray, 1841 with the type locality 'Western Australia'. Gray (1873) stated that the collection of the British Museum of Natural History also included specimens of *C. oblonga* from the Port Essington region (today in the Northern Territory). Gray (1856) described a separate species from south-western Western Australia, *Chelodina colliei* from the Swan River. The systematic and taxonomic concept of Gray (1856, 1873) was clear: he recognised *C. colliei* from south-western Australia on morphological grounds as a different species from *C. oblonga* of 'Western Australia' and of the Port Essington region of today's Northern Territory.

One species or two species in northern and south-western Australia?

Gray's taxonomic concept applied until Boulenger (1889) synonymized *C. colliei* with *C. oblonga*, a view followed by later reviewers for over seven decades. In addition, Ogilby (1890) described *Chelodina rugosa* from Cape York, Queensland, and Werner (1901) *Chelodina siebenrocki* from New Guinea ('Deutsch-Neu-Guinea'). Siebenrock (1909, 1915) synonymised both these taxa with *C. oblonga* which was considered to occur in Northern Australia, New Guinea and southwestern Australia until the 1960s (Worrell 1963; Pritchard 1967). However, Mertens and Wermuth (1955) and Wermuth and Mertens (1961) resurrected the New Guinea species *C. siebenrocki* from the synonymy of *C. oblonga* and restricted the name *C. oblonga* to the populations in northern Australia (including the Kimberley area in Western Australia) and south-western Australia.

Goode (1967) and Burbidge (1967) both revalidated Gray's original concept that the

Chelodina in south-western Australia represents a separate species from the *Chelodina* in northern Australia. Goode (1967), recognizing that the northern Australian form was more similar to that of New Guinea than to the form in the south-west, assigned the northern Australian populations to the species *C. siebenrocki*, even though he listed in order the dates of the names *C. rugosa* and *C. siebenrocki* in a single synonymy. In contradiction to Gray's (1856) taxonomic concept, Goode (1967) restricted the name *C. oblonga* to the south-western Australian form. Burbidge (1967) followed Goode's erroneous concept of restricting the name *C. oblonga* to the form in south-western Australia, but pointed out that *C. siebenrocki* was a junior synonym of *C. rugosa* and placed the long-necked turtles of northern Australia into the species *C. rugosa* which he resurrected from the synonymy of *C. oblonga*.

Goode's (1967) and Burbidge's (1967) confused nomenclatural concept – to restrict the name *C. oblonga* to the south-western Australian form and to consider *C. colliei* as its junior synonym – was generally accepted until Thomson (2000) clarified the nomenclatural situation of the south-western and northern Australian longneck turtle populations by demonstrating that the holotype of *C. oblonga* Gray, 1841 is most similar to the Northern Territory form at that time referred to as *C. rugosa* Ogilby, 1890. Thomson (2006) applied to the International Commission on Zoological Nomenclature (ICZN case 3351: *BZN* 63: 187–193) to conserve the current usage of the name *C. rugosa* for the northern long-necked turtle from northern Australia to preserve nomenclatural stability and to give *C. rugosa* precedence over *C. oblonga* Gray, 1841 whenever the two are considered to be synonyms; and to place on the Official List of Specific Names in Zoology the name *colliei* Gray, 1856, for the south-western Australian taxon. At present (March 2010) the ruling of the ICZN plenum in Case 3351 is still outstanding and not yet published. As proposed by Thomson (2006), Case 3351 is not directly related to the correct name *colliei* for the south-western Australian species. However, since Savage (2007) suggested in his comment on Case 3351 to the ICZN to conserve the name *Chelodina oblonga* Gray, 1841 for the species from south-western Australia, I maintain prevailing usage of names in this paper by referring to it as *C. oblonga* (= *colliei*).

To summarise, for 127 years, from Gray (1841) to Wermuth and Mertens (1961), Worrell (1963) and Pritchard (1967), the name *C. oblonga* was consistently applied to the long-necked turtles of northern Australia. This period included a 34 year period in the nineteenth century (1856–1889) when the south-western and northern Australian forms were considered to represent distinct species, with the name *C. oblonga* being applied to the northern Australian form and the name *C. colliei* to the south-western Australian form. Then, between 1889 and 1967, a 78 year period, only a single species was recognised covering both areas, to which the earliest available name, *C. oblonga*, was applied. This was followed by a period of 33 years (1967–1999) when *C. oblonga* was consistently but erroneously applied to the south-western species, while *rugosa* or *siebenrocki* was used for the northern taxon. Now there has been a period of ten years (2000–2010) when two alternative nomenclatures have been in force, one using *colliei* and the other one *oblonga* for the south-western taxon, while *rugosa* continued to be used for the northern taxon.

Subgeneric lineages within the genus *Chelodina*

Goode (1967) divided the genus *Chelodina* into two species-groups: the narrow-headed *C. longicollis* group (*C. longicollis*, *C. novaeguineae* and *C. steindachneri*) and the broad-headed *C. expansa* group (*C. expansa*, *C. siebenrocki* and *C. oblonga* (= *colliei*)). This concept of subgeneric grouping was later adopted by Legler (1981), Legler and Georges (1993), and Rhodin (1994a,b). However, Burbidge (1967) and Burbidge *et al.* (1974) differentiated three species groups: 1. *Chelodina longicollis* group (or subgeneric group A: *C. longicollis*, *C. novaeguineae* and *C. steindachneri*); 2. *Chelodina expansa* group (or subgeneric group B: *C. expansa*, *C. rugosa*, *C. siebenrocki*); 3. *Chelodina oblonga* (= *colliei*) group (or subgeneric group C: *C. oblonga* [= *colliei*] only, for the form endemic to south-western Australia). Allozyme electrophoresis (Georges and Adams 1992), mitochondrial 12S rRNA gene sequences (Seddon *et al.* 1997) and mitochondrial and nuclear gene sequence variation (Georges *et al.* 1998) also support the existence of the *C. oblonga* (= *colliei*) group, indicating that *C. oblonga (= colliei*, the form endemic to south-western Australia) is most closely related to, and a sister group of, the *C. longicollis* group rather than a member of the *C. expansa* group to which it is more similar in morphology and habits. The concept of a distinct subgeneric group for the south-western Australian taxon is also supported by the gonadal cycles of *C. oblonga* (= *colliei*) which differ substantially from those of the *Chelodina expansa* group B (Kuchling 1988).

More recently, Georges *et al.* (2002) identified by plasma electrophoresis three phylogenetic clades within the genus *Chelodina* which are congruent with the three species groups defined by Burbidge (1967) and Burbidge *et al.* (1974) and retained the name *Chelodina* for the entire genus. Georges *et al.* (2002) recommended recognition of the three clades as subgenera; *Chelodina* sensu stricto, *Macrochelodina* (see below), and the unnamed subgenus represented by *C. oblonga* (= *colliei*).

The genus-group name *Macrochelodina*

The phylogenetic clades within the genus *Chelodina* had not received genus-group names until Wells and Wellington (1985) split the genus into three genera, using *Chelodina* for the narrow-headed species *longicollis* and *novaeguineae*, *Hesperochelodina* for the narrow-headed species *steindachneri* and *Macrochelodina* for the broad-headed long-necked species (*oblonga* [= *colliei*], *expansa*, *rugosa*, *siebenrocki* = *C. expansa* group sensu Goode [1967]). *Hesperochelodina* does not conform to the previously defined clades and has not been considered to represent a valid genus by subsequent workers, but Iverson *et al.* (2001) validated the name *Macrochelodina*. As type species for the genus *Macrochelodina*, Wells and Wellington (1985) designated *C. oblonga* Gray, 1841. However, *C. oblonga* (= *colliei*) is not part of the *C. expansa* group (Burbidge, 1967; Burbidge *et al.* 1974; Georges and Adams 1992; Seddon *et al.* 1997; Georges *et al.* 1998, 2002). As such *Macrochelodina* could have been a valid generic or subgeneric name for the *C. oblonga* (= *colliei*) group of south-western Australia. However, the holotype of *C. oblonga* Gray, 1841 with the type locality 'Western Australia' was later found to be conspecific with the Northern Territory form at that time referred to as *C. rugosa* (Thomson 2000).

Wells and Wellington's (1985) *Macrochelodina* encompassed two of the currently-recognised clades or subgenera, its type species having been specified to be *C. oblonga* Gray, 1841 which they considered to be the south-western Australian species. However, since the holotype of *C. oblonga* Gray, 1841 which defines the type species they designated for the genus *Macrochelodina* was later found not to represent the taxon endemic to south-western Australia but the northern Australian form (Thomson 2000), Wells and Wellington (1985) ended up providing a valid and available name, *Macrochelodina*, for the broad-headed clade of *Chelodina* (explicitly *C. expansa*, *C. rugosa*, *C. siebenrocki*), but excluding the endemic south-western Australian *C. oblonga* (= *colliei*).

Articles 67.9 and 70.3 of the Code of the International Commission on Zoological Nomenclature (ICZN) state: "*If an author discovers that a type species was misidentified, the author may select, and thereby fix as type species, the species that will, in his or her judgment, best serve stability and universality, either: 70.3.1. The nominal species previously cited as type species or 70.3.2: the taxonomic species actually involved in the misidentification*." Iverson *et al.* (2001) chose the course of 70.3.1 – the type of *C. oblonga* refers to a northern Australian taxon (Thomson 2000) - and fixed *C. rugosa* Ogilby, 1890 as new type species for the genus *Macrochelodina* Wells and Wellington, 1985. However, a change of type species for *Macrochelodina* was unnecessary at the time in order to apply the name *Macrochelodina* to the northern, broad-headed clade, as the original type species *oblonga* (as a senior synonym of *rugosa* – Thomson 2000) already serves the purpose of fixing *Macrochelodina* in its current sense. This makes the validity of the Iverson *et al.* (2001) new type species designation questionable. Such an act would only be necessary if and when the ICZN plenum should set aside the existing holotype and should fix a neotype for *C. oblonga* as proposed by Savage (2007). It would be unnecessary if the ICZN follows the course of Thomson's (2006) application.

The genus-group name *Macrodiremys*

McCord and Joseph-Ouni (2007) elevated Burbidge's (1967) subgeneric group C (*C. oblonga* [= *colliei*] group) to full generic status and named this genus *Macrodiremys*. Even though it is clear from their description that the intention of McCord and Joseph-Ouni (2007: 57, 58) was to provide a genus name for the south-western Australian taxon *C. oblonga* (= *colliei*), they fixed as type species for the genus *Macrodiremys* by original designation and monotypy *C. oblonga* Gray, 1841. In the same paper McCord and Joseph-Ouni (2007: 56) set aside Gray's 1841 *C. oblonga* holotype (BMNH 1947.3.5.89) and designated Gray's 1856 *C. colliei* lectotype (BMNH 1947.3.5.91) as the neotype of *C. oblonga*. However, this action was invalid under the 1999 ICZN Code Article 75.6 (Fritz 2008) and their purported 'neotype' had never any name-bearing status other than that which it possessed prior to its neotype designation.

Thomson (2006) had already applied to the International Commission on Zoological Nomenclature (ICZN case 3351) to conserve the current usage of the name *C. rugosa* Ogilby, 1890 for the northern long-necked turtle from northern Australia to preserve nomenclatural stability and to give *C. rugosa* precedence over *C. oblonga* Gray, 1841 whenever the two are considered to be synonyms; and to place on the Official List of Specific Names in Zoology the name *colliei* Gray, 1856, as published in the binomen *Chelodina colliei* and as defined by the lectotype (BMNH 1947.3.5.91) for the south-western Australian taxon. Savage (2007) opposed Thomson's (2006) proposal and asked the ICZN to use its plenary power to set aside all previous designations of type specimen for *C. oblonga* Gray, 1841 and to designate as its neotype BMNH 1947.3.5.91, the lectotype of *C. colliei* Gray, 1856. In comment 64:2 on ICZN case 3351 Thomson (2007) stood by his original proposal. Fritz (2008), Kraus (2009), Georges (2009), and Iverson (2009) supported Thomson's application and reasoning and the usage of the name *Chelodina colliei* Gray, 1856 for the south-western Australian taxon. No ruling of the ICZN plenum in case 3351 has been published by April 2010.

When a case is under consideration by the ICZN, prevailing usage of names is to be maintained until the ruling of the Commission is published (Article 82.1). The main focus of ICZN case 3351 is to give *C. rugosa* Ogilby, 1890 precedence over *C. oblonga* Gray, 1841 (Thomson 2006). Thus, in the early 21st century all authors and reviewers followed the prevailing usage of the name *C. rugosa* for the northern Australian taxon. However, Gray's (1856) correct taxonomic concept and name *C. colliei* was applied again for the south-western Australian taxon by many authors, including in books and checklists of chelonians of the world (Bonin *et al.* 2006; Fritz and Havaš 2007; Iverson 2007).

McCord and Joseph-Ouni (2007), when invalidly setting aside Gray's 1841 *C. oblonga* holotype (BMNH 1947.3.5.89) and designated Gray's 1856 *C. colliei* lectotype (BMNH 1947.3.5.91) as the neotype of *C. oblonga*, neither made a submission to the ICZN for a ruling, nor discussed the open ICZN case 3351, nor referred to Savage's (2007) submission to the ICZN, nor referred to Thomson's (2007) arguments against Savage's submission, nor referred to recent publications (Bonin *et al.* 2006; Fritz and Havaš 2007; Iverson 2007) which used again the name *C. colliei* for the south-western Australian taxon. The rules of the International Commission on Zoological Nomenclature are clear and unambiguous in regard to designation of neotypes for species-group taxa: according to Article 75.6 of the 1999 ICZN Code "*When an author discovers that the existing name-bearing type of a nominal species-group taxon is not in taxonomic accord with the prevailing usage of names* and *stability or universality is threatened thereby, he or she should maintain prevailing usage* and *request the Commission to set aside under its plenary power the existing name-bearing type and designate a neotype*." Under ICZN rules individual authors specifically do not have the power to set aside existing species-group types and to designate neotypes (in contrast to genus-group type species, for which existing type species can be set aside and new type species fixed through publication without making an application to the Commission) – for very good reasons this nomenclatural act can only be done under ICZN plenary power. If an author (e.g. McCord and Joseph-Ouni 2007) simply designates a neotype for a species of which the original holotype exists and about whose taxonomic identity there is no doubt (Thomson 2000, 2006; Fritz 2008), the action is invalid and the designated 'neotype' has no name-bearing status other than that which it possessed prior to its neotype designation.

Availability of the genus group name *Macrodiremys*

At the time of McCord and Joseph-Ouni's (2007) publication (mailed on 30 November 2007) the ruling of the ICZN in Case 3351 was still pending. Therefore, the name bearing type of *Chelodina oblonga* Gray, 1841 was clearly the specimen BMNH 1947.3.5.89 at the time of McCord and Joseph-Ouni's (2007) publication. This would still apply even if a future ruling of the ICZN plenum should rule against Thomson's (2006) submission and designate a neotype for *C. oblonga* Gray, 1841 as proposed by Savage (2007): according to Article 80.3 of the 1999 ICZN Code "Rulings in Opinions have force immediately upon publication by the Commission in the *Bulletin of Zoological Nomenclature*", but clearly they cannot and must not be applied retrospectively to already published literature. It is therefore clear that on McCord and Joseph-Ouni's (2007) publication date, the holotype defining the species *C. oblonga* Gray, 1841 was the specimen with the catalogue no. 1947.3.5.89 in the Natural History Museum, London (BMNH). This specimen is regarded as conspecific with the holotype of *C. rugosa* Ogilby 1890, catalogue number R6256 in the Australian Museum, Sydney (Thomson 2000).

Chelodina oblonga Gray, 1841 had originally also been fixed as type species for the genus *Macrochelodina* Wells and Wellington, 1985. Wells and Wellington clearly intended the type species to be the south-western species (*C. oblonga* [= *colliei*]) which they erroneously regarded as a member of the northern, broad-headed clade. Since the original type species *oblonga* is a senior synonym of *rugosa* (Thomson 2000), Wells and Wellington (1985) had evidently misidentified the type species and thus fixed *Macrochelodina* in its current sense as genus group name for the northern, broad-headed clade. However, in McCord and Joseph-Ouni's (2007) case there was no taxonomic misidentification involved in the type species they fixed for the genus *Macrodiremys*: they specifically referred to Thomson's (2000) correction of the previous misidentification of the *C. oblonga* holotype (BMNH 1947.3.5.89). What was involved was their violation of the 1999 ICZN Code by invalidly setting aside Gray's (1841) holotype and invalidly designating a 'neotype' for *C. oblonga*.

This leaves open three possibilities for the availability of the genus group name *Macrodiremys.*

According to Article 69.2.4 of the ICZN: "*if an author subsequently designates as type species a species originally included … as an expressly stated misidentification or misapplication of a previously established nominal species, the species so designated is the nominal species denoted by the name of the taxonomic species actually involved (and not the nominal species cited)*". McCord and Joseph-Ouni (2007) when establishing the nominal genus *Macrodiremys* fixed *Chelodina oblonga* as the type species by monotypy, but they expressly employed the name

C. oblonga in the sense of a misidentification used by Goode (1967) and other authors and not in the taxonomic sense of Gray (1841), the original author of the binomen. According to ICZN Article 11.10 by that act McCord and Joseph-Ouni (2007) can be deemed to have established the new nominal species *Macrodiremys oblonga* McCord and Joseph-Ouni, 2007 for the taxon actually involved and to have fixed this (and not *Chelodina oblonga* Gray, 1841) as the type species of *Macrodiremys*. If the invalidity of McCord and Joseph-Ouni's (2007) neotype designation for *C. oblonga* is ignored and their wording ("the type species is herein fixed as *Macrochelodina* (*Chelodina*) *oblonga* (Gray, 1841)... ", McCord and Joseph-Ouni 2007: 57) considered to be irrelevant, it could be argued that the type species of *Macrodiremys oblonga* McCord and Joseph-Ouni, 2007 is defined by the type of *Chelodina colliei* (BMNH 1947.3.5.91). In this case *Macrodiremys* could simply be used by default as genus-group name for the south-western longneck turtle (e.g. Artner 2008; Rhodin *et al.* 2008).

However, since McCord and Joseph-Ouni's (2007) neotype designation for *C. oblonga* is invalid under the ICZN Code, it can also be argued that McCord and Joseph-Ouni's subsequent nomination of a redefined *C. oblonga* must also be invalid, so that ICZN Art. 11.10 cannot apply. In that case the genus *Macrodiremys* is a junior synonym of *Macrochelodina* and does not apply to the south-western longneck turtle. In that case no available genus-group name exists for the south-western longneck turtle.

It can also be argued that the designation of a neotype for *C. oblonga* by McCord and Joseph-Ouni (2007) and the provision of a new generic name for the south-western species are two very different nomenclatural acts and that ICZN Article 11.10 can apply to the latter even though the first was invalid. In that case, since McCord and Joseph-Ouni's (2007) neotype designation for *C. oblonga* is invalid under the ICZN Code, the type species of *Macrodiremys* as designated by McCord and Joseph-Ouni is a misapplication of the species defined by the *C. oblonga* Gray, 1841 holotype (BMNH catalogue no. 1947.3.5.89) to the south-western Australian taxon. Then, in order to uphold the original intention of McCord and Joseph-Ouni (2007) to provide a genus group name for the south-western Australian longneck turtle, a new nomenclatural act is necessary according to ICZN Article 70.3.2 to fix a new type species for *Macrodiremys*.

There is no clear cut answer in this case and it does not seem reasonable to try to solve this confusing situation prior to the ruling of the ICZN plenum in case 3351 being published. Hopefully, in their ruling on case 3351, the ICZN plenum will take suitable action to solve these problems.

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