

Comments on the proposed conservation of usage of *Testudo gigantea* Schweigger, 1812 (currently *Geochelone (Aldabrachelys) gigantea*) (Reptilia, Testudines)
(Case 3463; see BZN 66: 34–50, 80–87)

(1) Roger Bour

*Laboratoire des Reptiles et Amphibiens, Département Systématique et Évolution,
Muséum national d'Histoire naturelle, CP 30, 25 rue Cuvier, F-75005 Paris, France*
(e-mail: bour@mnhn.fr)

Peter Pritchard

Chelonian Research Institute, 402 South Central Avenue, Oviedo, FL 32765, U.S.A.
(e-mail: chelonianri@aol.com)

Taxonomic questions often involve reference to antique documents, but taxonomy is not a religion. It is a blend of scientific observation and application of a consensual, evolving, and complex code of nomenclatural procedures. The present task – i.e. defining the taxon known as *Testudo gigantea* is an example of a purely taxonomic and nomenclatural problem which may secondarily serve as a case history for broader issues. In this case the issue was initiated by non-taxonomists apparently unschooled in the rules of zoological nomenclature and unwilling to abandon a name that they have become used to. They were supported by reviewers who did not follow the series of logical steps and preferred to appeal to fiat authority rather than accept informed scholarship. Disagreements do of course exist among scientists and scholars on many questions, some of which trivial some important. Full, honest, respectful and public discussion of these disagreements does not weaken science, indeed open debate contributes to its progress. But in the case of entrenched major disagreements, it is unacceptable that one group of individuals should claim to be the unique depository of an orthodoxy or ‘revealed truth’ and demand immunity from challenge. Such problems are not solved by lobbying or conducting a public vote. The ultimate decision should have nothing to do with the number of people sharing an opinion. The history of science is replete with examples where a single person turned out to be correct in the face of an overwhelming ‘majority’ of people who together disagreed with a lone voice of truth.

One reviewer of our paper was correct in saying that, intellectually speaking, this subject is a minefield. Like literal minefields, it is complete with brave soldiers and cowardly ones. However, those responsible for clearing minefields should not seek to cover them over with opaque material, but rather to deal with the mines one by one so that they present no hazard to future generations.

In conflicted situations in science it is not acceptable that important discussions proceed only behind closed doors, and in such cases ‘private discussions’ among authors, referees and editors are not a solution. These discussions should be aired publicly and every biology colleague who wishes to contribute to the discussion should be invited to comment on the case, provided that he/she respects the persons with whom he/she disagrees and does not resort to personal attacks or calumnies.

Critics raised a very broad philosophical question: do scientists, in this case taxonomists, have a ‘right to commit error,’ change their minds, and admit past

mistakes in taxonomic and nomenclatural analyses? And is it possible or acceptable for the perpetrators to correct these errors in the face of new evidence? Are we bound to follow these errors ad infinitum once they have been repeated by a few colleagues? If so, and pushing this situation to its extreme, do we still need a Code of Zoological Nomenclature? Why not just let 'usage', 'consensus' or 'majority' select the binominals and trinominals that should stand? If 'usage' proves to be based on a wrong interpretation of previous texts or type specimens, why not just discard these texts and specimens to protect 'usage'. Then, we no longer need the inconvenient old texts, the old specimens, nor even the museums that conserve them. Such an extreme interpretation may certainly be much appreciated by those people within or outside our governments who think that museums and their staff are very costly and should be terminated. Type specimens would then only be useful when they correspond to current nomenclatural 'usage', but could be 'suppressed' when they do not (as was the case in several recent decisions of the ICZN). Of course, we fully agree that 'usage' should be protected when it is really universal (but this is far from being the case for *Testudo gigantea*), and above all when it concerns not only taxonomists and nomenclaturists, but also laymen, the mass media, general textbooks and so on; i.e., for names like *Drosophila melanogaster*, *Tyrannosaurus rex* or *Homo erectus*. It is clearly acceptable to request that the ICZN invalidate nomina oblita – overlooked, obscure or forgotten senior synonyms of later names that have been in customary use for a long period. However it is an entirely different matter when it is discovered that the holotype of a species is a different taxon from that which it has been presumed to be. It is especially disturbing when the objectors to correction of such situations have apparently not troubled to read the details of the original description, nor examined the actual holotype.

***Testudo gigantea* Schweigger, 1812**

In a key paper describing about two dozen new species of chelonians, Schweigger described a new tortoise, which he named *Testudo gigantea*, the Giant Tortoise (1812, pp. 327; 362). Schweigger (1812, p. 327) added: 'Vidi animal e collectione regi Li[s]bonensi proventum in museo Parisiensi' ('I saw the animal from the King of Lisbon's collection at the Paris Museum'). To summarise the circumstances, Geoffroy Saint-Hilaire had chosen 10 turtle specimens from the King of Portugal's collections in Lisbon to bring to the Paris Museum, where they arrived in mid-November 1808. A tortoise 'de plus de 0m 60' ('longer than 60 cm') was present, as noted on a manuscript list by Lacepède (Daget & Saldanha, 1989, p. 139). It was the type and only specimen of the new species described by Schweigger (Bour, 2006b). One very important point, Schweigger stated precisely and unequivocally 'Habitat in Brasilia' ('Inhabits Brazil').

Pritchard (1986), initially impressed by the stated origin of the Schweigger type specimen ('Brasil'), was convinced that *Testudo gigantea* Schweigger was a synonym of *Testudo denticulata* Linnaeus, 1766 (today *Chelonoidis denticulata*), the (sometimes giant) yellow-footed tortoise of South America which can reach a straight length of 82 cm (Mittermeier in Pritchard & Trebbau, 1984, p. 225). This is a somewhat elongate, narrow-shelled species whose proportions are fully in accord with those indicated by Schweigger in his description. Bour located the type a few years ago, and when later he re-read Schweigger's original text, it became obvious that it was the

very specimen described by this talented student of Constant Duméril. The description and the given measurements leave no doubt about its identity. It must be remembered that the specimen (registered as MNHN 9554) was also described and measured by Duméril & Bibron themselves (1835, p. 89), without any details about its origin, under the heading *Testudo tabulata* Walbaum, 1782, a junior and invalid subjective synonym of *Testudo denticulata*. Its presence in the MNHN collections was further confirmed in a hand-written catalogue dated ca. 1864, with 'Brésil' ('Brazil') as locality (registration number: 120). Pritchard's hypothesis was supported.

***Testudo gigantea* as interpreted by Duméril & Bibron (1835)**

In 1835, Duméril and Bibron associated Schweigger's description with another unique specimen, which was obviously distinct. Duméril & Bibron actually described a new species, but mistakenly attributed it to Schweigger. *Testudo gigantea* sensu Duméril & Bibron (1835, p. 120) has the following features which did not fit with *Testudo gigantea* Schweigger, 1812: 'carapace bombée; écailles du disque très convexes; une écaille nuchale; suscaudale double' ('shell bulged; scutes of the disc very convex; one nuchal [cervical] scute; supracaudal scute double [divided]'). Other details also distinguish this specimen from that described by Schweigger, including the mention of the broad and rough scales of the forelimbs, and the great size: according to Duméril & Bibron, their 'new' *Testudo gigantea* had a shell length (over the curve) of 130 cm and a depth of 49 cm, versus 75.6 cm and 24.3 cm, respectively for the 'old' or Schweigger's specimen. The specimen is still preserved in the Paris Museum collections, with registration MNHN 9566, and it is an Aldabra tortoise.

***Testudo elephantina* Duméril & Bibron, 1835**

The description of *Testudo elephantina* by Duméril & Bibron (1835, p. 110) was based on about eight specimens, from 'Anjouan, Aldebra [sic], les Comores' and Bour (1984a, p. 291), following Rothschild (1915, p. 425), designated as lectotype a large stuffed male (MNHN 7874) on which the description was mostly based. The origin of the species was limited to Aldabra by Günther (1877, p. 18), and the type locality restricted to 'Malabar, Aldabra' by Bour (1984a, p. 291). As outlined by Duméril and Bibron themselves, *Testudo gigantea* was very close to their new species *Testudo elephantina*. This point of view was later shared, for instance, by Günther (1877, p. 22, note) and Boulenger (1889, p. 168). Finally, Rothschild (1897, p. 407), and then Siebenrock (1909, p. 529) combined both nominal species, *Testudo elephantina* being considered as a subspecies of *Testudo gigantea*, but of *Testudo gigantea* sensu Duméril & Bibron! Nevertheless, from the beginning of the 20th century, the valid name for the Aldabra tortoise seemed to have been definitely settled, or at least most often reduced to the nominal species *Testudo gigantea*, and later *Geochelone gigantea*, with Schweigger as author. Both have been widely used up to the present, although *Testudo elephantina* was also regularly used, either as specific or subspecific name, for those who recognised more than one taxon among Seychelles tortoises.

Surely one thing we can all agree upon (assuming that we have all read Schweigger's work) is that the type locality of *Testudo gigantea* is identified as Brazil by the original describer. There are no data to contest this. Whether or not one accepts that MNHN 9554 is indeed Schweigger's type does not change this type

locality; those who insist upon designating a neotype for the species would be bound to select a specimen of a Brazilian tortoise species, of which there are only two. One of them (*Chelonoidis carbonaria*) does not reach the size of Schweigger's specimen. That leaves only *Geochelone denticulata*, of which MNHM 9554 is a conveniently available example.

A neotype for *Testudo gigantea*?

Frazier (2006) strongly emphasized the 'general instability and chaos regarding the valid name of the Aldabra Tortoise'. He favoured an 'established nomenclatural system' (i.e. *Testudo gigantea* according to him; although 'general instability and chaos', and 'established nomenclatural system' are rather subjective), which is a commonly proposed argument – and the only one – against the use of *Testudo dussumieri* Gray, 1831 or *Testudo elephantina* Duméril & Bibron, 1835, the types of which are clearly Aldabra tortoises. Frazier believed that a neotype designation could clarify this situation, and selected a specimen for this purpose, actually more for nomenclatural than taxonomic reasons.

We wish to stress two points stated in the Code (1999) which were not taken into account by Frazier. Recommendation 75B, that 'before designating a neotype, an author should be satisfied that the proposed designation does not arouse serious objection from other specialists in the group in question', was not fulfilled. Furthermore, contrary to the wording of Article 75.3.5, Frazier's neotype is not 'consistent with what is known of the former name-bearing type from the original description' (e.g. absence vs. presence of a cervical scute; limbs shielded by tough and very broad scales vs. only postcranial skeleton, and fragments of skin; from Brazil vs. from Aldabra). Fortunately, the rediscovery of the holotype removes any value from the neotype as the type specimen of the same taxon, so we set aside the neotype according to Article 75.8 of the Code; Frazier's action thus becomes void.

Although aware of the results published by Bour (2006b) regarding the identity of *Testudo gigantea*, Frazier recently (BZN 66: 34–50) decided to request the ICZN to conserve the usage of this name for the Aldabra tortoise under the plenary power. For the reasons given above, we do not support this application.

True, some of the early writers in the field of chelonian systematics were frustrating in the vagueness of their descriptions of new taxa. But Schweigger was not one of these. He was a brilliant and meticulous man, and no arguments have been presented to suggest that his description of *Testudo gigantea* was faulty in any fundamental way. Schweigger wrote that his new species was based upon a large tortoise from Brazil in the King of Portugal's collection in Lisbon, and since the monarch in question had spent the early years of the 19th century (1808–1820) in Rio de Janeiro, where he had received numerous biological specimens collected by Alexandre Rodrigues Ferreira and party (Wilcken, 2004), this is a fully plausible type locality. On the other hand, to assume that Dom João received an Aldabra tortoise (now completely lost) during his stay in Brazil, without a shred of evidence, circumstantial or otherwise, to back this up, is an argument that should be disposed of with a slash from Occam's Razor.

Aldabrachelys* and *Dipsochelys

The remaining question is the choice of the generic name for the Aldabra tortoises and their relatives. *Aldabrachelys*, as a subgenus of *Geochelone* Fitzinger, 1835, was

coined by Loveridge and Williams to include the Aldabra Tortoise and related species, with *Testudo gigantea* Schweigger as type species by original designation (Loveridge & Williams, 1957, p. 225). In fact the discordance between the intended and the actual type specimen of *Testudo gigantea* was not noticed until 1982, when Bour erected a new genus, *Dipsochelys*, with *Testudo elephantina* as type species by original designation, to include the Aldabra tortoise and related species. Bour (1984a, p. 281) was apparently the first to resurrect the nominal species *T. dussumieri* and to recognise its availability, adding ‘Perhaps provisionally, we will consider this name as a ‘nomen oblitum’.’ On the other hand, Gerlach & Canning (1995, p. 133) were certainly the first to coin and use the combination *Dipsochelys dussumieri*; the main justification given being to avoid ‘confusion with the phenotypically similar Galápagos complex of *Chelonoidis elephantopus* (Harlan, 1827)’, which has since been renamed *Chelonoidis nigra* (Quoy & Gaimard, 1824). Since then, as outlined by Frazier (2006; 2008), Gerlach regularly used *Dipsochelys dussumieri* for the Aldabra tortoise.

Both *Aldabrachelys* and *Dipsochelys* could be considered as being valid candidate names for the Aldabra tortoise. The latter name is nowadays widely used (e.g. Grzimek, 2003; Bonin et al., 2006; Roberts, 2007; Cheke & Hume, 2008; Pedrono, 2008; Vetter, 2008; Wyneken et al., 2008), either as *D. elephantina* or as *D. dussumieri*, and we see no reason not to name the Aldabra tortoise *Dipsochelys dussumieri*.

Aldabrachelys was rarely used until recently; a claim to use *Aldabrachelys* rather than *Dipsochelys* cannot be made on the grounds of stability. Therefore, the genus *Aldabrachelys*, with *Testudo gigantea* as type species, is a junior subjective synonym of *Chelonoidis* Fitzinger, 1835, which has *Testudo boiei* Wagler, 1833 (a junior subjective synonym of *Testudo carbonaria* Spix, 1824) as type species by subsequent designation of Fitzinger, 1843. *Dipsochelys* is the valid genus name for the Aldabra tortoise and its relatives.

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(2) Anthony Cheke

139 Hurst Street, Oxford OX4 1HE, U.K.

(e-mail: anthony.cheke@innerbookshop.com)

While stability in nomenclature is clearly generally desirable, this utopian expectation should not be allowed to override advances and (re-)discoveries in taxonomy, phylogeny and museum science. In the case under consideration here, Frazier (BZN 66: 34–50) seeks to set aside the established rules of types and priority to attach a particular name to the giant tortoise from Aldabra, a species which has had three well-used specific names over the years. I agree with Frazier that the name should be stabilised, but not with his choice.

Bour (1982, 1984a, b) questioned whether the animal described as *Testudo gigantea* by Schweigger (1812) was an Aldabra tortoise, initially suggesting, on several plausible anatomical grounds, that it was ‘incontestably’ (Bour, 1982) or ‘most probably’ (Bour, 1984a) a Mascarene tortoise and a junior synonym of *Testudo* (currently *Cylindraspis*) *indica* Schneider, 1783, now known to have been endemic on Réunion island (Austin et al., 2002). Pritchard (1986), also recognising that Schweigger’s description did not fit animals from Aldabra, and noting the rather obvious clue that the type was said to come from Brazil, considered it fitted *Testudo* (now *Chelonoidis*) *denticulata* Linnaeus, 1766. At that time the type specimen was missing, but when rediscovered more recently (Bour, 2006; Bour & Pritchard, submitted), it proved to be exactly what Pritchard suspected, a *Chelonoidis denticulata*. Frazier doubts the identity of the rediscovered specimen basically on the grounds that Schweigger and Duméril & Bibron would not have made such a simple misidentification – but in fact tortoise taxonomists at the time regularly did exactly that, as Frazier’s own paragraphs 3, 4, 5 and 8 amply demonstrate. Given the details that Bour & Pritchard (submitted) have added to Bour’s (2006) original paper on the rediscovery, I see no reason to doubt that specimen MHN 9554 is Schweigger’s holotype, and that *Testudo gigantea* is thus a junior synonym of *T. denticulata*; Frazier’s neotype is thus invalidated under Article 75.3.5 of the Code. Thus unless the rules of priority are set aside, *gigantea* cannot continue to be used for the Aldabra tortoise. So the issue is – should the rules be set aside in this particular instance? This should surely only be done if there is an absolutely cast-iron case to preserve a thoroughly established name, the loss of which would cause substantial confusion and upheaval amongst users.

Is *gigantea* then so thoroughly established that it has an unassailable claim to preservation? If it had been the only name in general use for many decades, there might be a case for this, but clearly this is not the position, although there was a

period of active publication on Aldabra during the 1960s and 1970s when *gigantea* was used almost exclusively (e.g. tortoise papers in Stoddart & Westoll, 1979, and references therein). Two other names, *Testudo dussumieri* Gray, 1831 and *Testudo elephantina* Duméril & Bibron, 1835, both explicitly based on specimens from Aldabra (*dussumieri*) or Seychelles generally (*elephantina*) were coined in the 1830s. The latter was frequently used in the 19th century (fide Bour & Pritchard, submitted) as a synonym or variety of ‘*gigantea*’, but this was *gigantea* sensu Duméril & Bibron, 1835, who redescribed ‘*gigantea*’ from a quite different specimen from that used by Schweigger – their specimen survives in Paris as MHN 9566. Gray’s type of *dussumieri* seen in Leiden likewise survives – ref. RMNH 3231 (Bour & Pritchard, submitted). In his definitive monograph, Günther (1877) used *elephantina* as one of the four species he believed occurred in the Seychelles and Aldabra, but did not use *gigantea*.

Hence the earliest valid names available are *dussumieri* and *elephantina*. Once Bour (1982; 1984a, b) had queried the identity of *gigantea* with the Aldabra tortoise, and recommended the use of *elephantina* over *dussumieri* on the grounds that the latter was effectively a nomen oblitum, several authors started again using *elephantina* (see Frazier’s paragraphs 17 & 19, to which I should add myself (Cheke 1987)). In 1995 Gerlach & Canning (1995) revived *dussumieri*, and Gerlach and his associates have used it regularly ever since (e.g. Gerlach, 2004 and references therein), and its use has spread to other authors (Frazier’s paragraph 23) including myself (Cheke & Hume, 2008). Chambers (2004) provided a layman’s outline of the taxo-nomenclatural debates. It was perhaps unfortunate that *dussumieri* was revived, but its frequent use over the last 15 years or so means that it can no longer be realistically considered a nomen oblitum, and to suppress it now would be closing the stable door long after the horse (or tortoise?) had departed. I therefore propose that *dussumieri* should be confirmed by the Commission as the correct scientific epithet for the Aldabra tortoise, in accordance with the rules of the Code. It commemorates Jean-Jacques Dussumier, who was an assiduous French zoological explorer and collector in the early-mid 19th century (Laissus, 1973).

One senses from his use of ‘*Geochelone (Aldabrachelys) gigantea*’ that Frazier would also like to preserve *Geochelone* as the generic name for the Aldabra tortoise, a view that is taxonomically untenable in the light of the evident, indeed rampant, polyphyly (e.g. Le et al., 2006; Fritz & Bininda-Emonds, 2007) of the many species until recently included under this name. Hence a new generic name is essential, and the rivals here are *Aldabrachelys* Loveridge & Williams, 1957 and *Dipsochelys* Bour, 1982. Bour established *Dipsochelys* on the grounds that, as *Aldabrachelys* was founded on Schweigger’s *Testudo gigantea*, it fell into synonymy with, as he then thought, *Cylindraspis* (Bour, 1982), or as we now know (see above), *Chelonoidis*. However, Loveridge & Williams (1957) explicitly based their subgenus (as was) on the Aldabra tortoise, and it was simply due to the then usage of *gigantea* for that species that the name now falls into synonymy with *Chelonoidis*. Hence, given their perfectly clear intent, I see no serious objection, should the Commission so decide, to preserving *Aldabrachelys* over *Dipsochelys* as the valid genus for the Aldabra tortoise and its two extinct congeners from Madagascar. So doing would also partly satisfy those in the ‘*gigantea*’ camp, as they also invariably prefer *Aldabrachelys* over *Dipsochelys* if unable to use *Geochelone*. However I would equally have no objection

if the Commission preserved *Dipsochelys* and suppressed *Aldabrachelys*. It is however desirable to fix the genus name one way or the other.

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(3) John Collie

Scottish Natural Heritage, 19 Wellington Square, Ayr, KA7 1EZ, U.K.

(e-mail: john.collie@snh.gov.uk)

I support the application by Frazier to conserve the usage of *Testudo gigantea* Schweigger, 1812 for the giant land tortoise found on Aldabra Atoll in the western Indian Ocean. This name has been known locally and internationally for several generations and is utilised and established in numerous publications and articles. Having worked on Aldabra for over two years, and as a previous management authority for CITES in Seychelles, I can attest to the high level of recognition given to the specific name *gigantea* globally.

There is a real need for the Commission to stabilise and establish the name for the Aldabra tortoise once and for all so that there is continuity in the scientific and conservation efforts which have taken place over the past hundred years.

(4) E.N. Arnold

*Department of Zoology, Natural History Museum, Cromwell Road,
London SW7 5BD, U.K. (e-mail: enarnoldnhm@hotmail.com)*

As someone with a long involvement with Indian Ocean reptiles, I support the proposal of J. Frazier to conserve the species name of the Aldabra tortoise as *gigantea* and accept the designation of a neotype.

The present instability, where three species names have recently been used for this species, has many deleterious effects. 1. Scientific nomenclature is brought into disrepute, to the extent that some people have simply abandoned it in the present case and use vernaculars instead. 'Aldabra tortoise' is presently more certain in its meaning and ad hoc status than the competing scientific names, and avoids conflicts and uncertainties about which of these to use. 2. Name instability is bad for conservation of the species concerned. Most, perhaps all, international and national protective legislation uses the species name *gigantea* for the Aldabra tortoise. Any uncertainty about its meaning risks depriving the species of some of its legal protection. 3. Protracted disputes over scientific names such as the present one take up significant amounts of time that would have been more usefully spent on studying and conserving the animals concerned (witness the numerous published papers, comments and petitions in the present case). While arguing at length about nomenclatorial problems has all the appearances of scholarship it does not advance our knowledge of the natural world.

The name *gigantea* is by far the most commonly used and understood for the species, and the one which elicits nearly all the biological information about it when searching databases etc. Consequently, fixing the name *gigantea* for the Aldabra tortoise would help the very large audience of non-taxonomists, most of whom already use the name. It is the needs of these biologists, conservationists, legislators and hobbyists that should be addressed in the present case. What the much smaller number of taxonomists might prefer is far less important, especially as they are used to synonyms. Nomenclature should not merely be a playground for specialists but should address the needs of the majority of users.

If the species name *gigantea* is not fixed for the Aldabra tortoise, instability is likely to persist, as some specialists are unlikely to accept the alternative interpretation, that Schweigger's original description of *Testudo gigantea* really refers to a South American species. The scientific literature of the last twenty years or so shows that the description is open to radically different interpretations. While the case for the recent discovery of the actual type of *T. gigantea* may be credible, by no means everyone involved believes that it is certain.

Fixing *gigantea* as the name of the Aldabra tortoise would also harmonise the case for using the generic name *Aldabrachelys* Loveridge and Williams, 1957 for it. The authors clearly intended *Aldabrachelys* to refer to the Aldabra tortoise and its relatives and clearly believed that the type species of the genus, named as *Testudo gigantea*, was this taxon. Alternative identifications of Schweigger's *T. gigantea* resulted in the creation of the more recent alternative generic name *Dipsochelys* which is presently used alongside *Aldabrachelys* (and also *Geochelone*!) adding to the multiplicity of combinations used for the Aldabra tortoise and the subsequent nomenclatorial confusion.

(5) Peter A. Meylan

Collegium of Natural Sciences, Eckerd College, 4200 54th Ave S., St. Petersburg, FL 33711, U.S.A. (e-mail: meylanpa@eckerd.edu)

I am writing to ask you to stabilise the tortoise genus name *Aldabrachelys* as proposed by Jack Frazier. In 1987, Walter Auffenberg (leading authority on the family TESTUDINIDAE in his day, now deceased) and I published a paper in which we described an extinct *Aldabrachelys* from Tanzania. We did this a few years after Bour offered his alternative name for the giant tortoises of Aldabra. At that time we did not find this necessary and to this day I have continued to use the genus name *Aldabrachelys* for these tortoises. In 1987 we wrote: 'Bour (1982) has recently stated that the specific name *gigantea* is not available for the giant tortoises of Aldabra. He also argues that because the subgeneric (or generic) name *Aldabrachelys* is associated with the name *gigantea*, it cannot be used either. He provides a new name, *Dipsochelys*, for the Seychelles tortoises. The crux of his argument is that Schweigger (1812) had a specimen of *Cylindraspis indica* (Schneider, 1783) in hand when he described *Testudo* (= *Geochelone*) *gigantea*. This is apparently debatable (Crumly, MS). Even if it could be shown with certainty that the name *gigantea* is based on a specimen of *Cylindraspis*, the name *Aldabrachelys* is not necessarily invalid. As stated in Article 70 of the Code of Zoological Nomenclature, when a type species is misidentified the case is to be referred to the Commission on Zoological Nomenclature for consideration. This has not been done. There is no doubt that Loveridge and Williams (1957) applied the name *Aldabrachelys* to those tortoises which today have their centre of abundance on Aldabra Island. Therefore we continue to use this well established and consistently used name.' (Meylan & Auffenberg, 1987, p. 74). More than 20 years later, I think this argument is still valid. I for one have always thought of the name *Dipsochelys* as an unnecessary nuisance.

Additional references

Meylan, P.A. & Auffenberg, D.W. 1987. The chelonians from the Laetoli Beds. Pp. 62–78 in Leakey, M.D. & Harris, J.M. (Eds.), *Laetoli: a Pliocene site in Northern Tanzania*. xxi, 561 pp. Clarendon Press, Oxford.

(6) R. Bruce Bury

US Geological Survey Forest and Rangeland Ecosystem Science Center, 3200 SW Jefferson Way, Corvallis, OR 97331, U.S.A. (e-mail: buryb@usgs.gov)

I read Jack Frazier's Case 3463 to the Commission, where he proposes to conserve the name *Testudo gigantea* for the Aldabra tortoise. I support his major points and arguments. The wide and frequent usage of the name *T. gigantea* needs to be continued. I see no need to confuse the scientific and environmental community with new name combinations. We need to focus our limited time and energies on the protection of this unique life form.

(7) C. Kenneth Dodd, Jr

University of Florida, Department of Wildlife Ecology and Conservation, Gainesville, FL 32611, U.S.A. (e-mail: terrapene600@gmail.com)

I have read the petition submitted by Jack Frazier regarding the Aldabra Tortoise, *Geochelone (Aldabrachelys) gigantea* (BZN 66: 34–50). Frazier has presented an accurate and unbiased summary of the highly complex nomenclatural history of this species. I concur with his conclusion that the many name changes proposed for this species have resulted unnecessarily in immense confusion, particularly among non-tortoise specialists and researchers and administrators working in conservation biology.

I absolutely concur with his position that: 1) USNM 269962 should be designated as the neotype of this taxon; 2) the name *dussumieri* should be suppressed; 3) the names *Aldabrachelys* and *gigantea* should be placed on the Official Lists of Generic and Specific Names in Zoology as specified in the petition; and 4) the name *dussumieri* should be placed on the Official Index of Rejected and Invalid Specific Names, as regards *Testudo dussumieri*.

Only by this action will the Commission be able to stabilise giant tortoise taxonomy in a manner which accurately reflects what is known from original descriptions and type designations. Changes in tortoise nomenclature are counter-productive in advancing clarity, accuracy, and the conservation of this species. In that regard, Frazier is commended for taking the time to exhaustively document Aldabra tortoise nomenclature and for preparing this petition.

(8) Otto Kraus

Zoologisches Institut & Museum, Universität Hamburg, Martin-Luther-King-Platz 3, 20146 Hamburg, Germany (e-mail: Otto.Kraus@zoologie.uni-hamburg.de)

I am acquainted with the case as I provided advisory comments when the application was under preparation. In order to avoid disadvantageous confusion, the well-known and frequently used names *gigantea* Schweigger, 1812 and *Aldabrachelys* Loveridge & Williams, 1957 should be stabilised. In a supplement, the applicant convincingly documented the prevailing usage (between 2000 and 2008).

(9) Colin McCarthy

Department of Zoology, Natural History Museum, Cromwell Road, London SW7 5BD, U.K. (e-mail: C.McCarthy@nhm.ac.uk)

Please can I lend my support to Case 3463 which aims to stabilise the name of the Aldabra tortoise. I believe Jack Frazier has convincingly shown that this is the best resolution to a most confusing nomenclatural problem. It is simply unacceptable to have at least 8 different binomial combinations for this tortoise and the time is long overdue for the situation to be stabilised.

(10) Frauke Fleischer-Dogley, Lindsay Chong-Seng, Nancy Bunbury, Naomi Doak, Lars Kristoferson, Carl Gustaf Lundin, Patrick Lablache, Jeanette Larue, Jeanne Mortimer, Elvina Henriette-Payet, Pierre Pistorius & Rainer von Brandis
Seychelles Islands Foundation, La Ciotat Building, Mont Fleuri, PO Box 853, Victoria, Mahé, Republic of Seychelles (e-mail: sif@seycheles.sc)

Maurice Loustau-Lalanne

Seychelles Tourism Board and Seychelles Islands Foundation

Didier Dogley

Department of Environment, Seychelles and Seychelles Islands Foundation Board of Trustees

Stephen Blackmore

Royal Botanic Garden Edinburgh 20a Inverleith Row, Edinburgh, EH3 5LR and Seychelles Islands Foundation Board of Trustees

David Rowat

Marine Conservation Society Seychelles and Seychelles Islands Foundation Science Committee

Adrian Skerrett

Island Conservation Society and Seychelles Islands Foundation Science Committee

We write on behalf of the Seychelles Islands Foundation (SIF) and the SIF Science Committee in support of the petition by Jack Frazier to the ICZN to stabilise the name of the Aldabra giant tortoise, using the established name *Testudo gigantea* (currently *Geochelone [Aldabrachelys] gigantea*) and to suppress usage of *Testudo dussumieri* Gray, 1831 (currently *Dipsochelys dussumieri*) as published in the BZN 66(1) March, 2009.

The Seychelles Islands Foundation is a Public Trust which was established in 1979 and is responsible for managing and protecting the two UNESCO World Heritage Sites of Seychelles: Aldabra Atoll and the Vallée de Mai on Praslin. SIF coordinates all research and monitoring conducted at these two sites, including all work on the Aldabra giant tortoise on the atoll.

Within SIF, on Aldabra and in the Seychelles in general, *T. gigantea* (currently *G. gigantea*) is the recognised name used for the Aldabra tortoise. It is most widely used in the literature and appears in SIF official documents. This name has been in continuous use for over 100 years and has been recognised as the oldest name for the species for more than 50 years. Since 1982, when Bour argued that the name should be changed to *Dipsochelys elephantina*, which was followed by another proposal in 2006 to change the name to *Dipsochelys dussumieri*, there has been nomenclatural chaos. The current lack of clarity in the nomenclature has caused and continues to cause great confusion amongst researchers and organisations working with the Aldabra tortoise.

In view of this confusion, it is becoming increasingly necessary to stabilise the nomenclature and fix the name of the Aldabra tortoise. The most straightforward way to achieve this would be to maintain the neotype for *T. gigantea* (USNM 269962) that was designated in 2006, and to suppress *Dipsochelys dussumieri*.

(11) Paolo Casale

WWF Italy (& Marine Turtle Specialist Group IUCN/SSC), Via Po 25c, 00198 Roma, Italy (e-mail: paolo.casale@tiscali.it)

I support the proposal by J. Frazier (BZN 66: 34–50, Case 3463) to conserve the specific name *Testudo gigantea* Schweigger, 1812 for the Aldabra tortoise and to maintain the neotype for *T. gigantea* (USNM 269962) that was designated in 2006. As clearly explained by J. Frazier, *T. gigantea* has been in continuous use for over 100 years and has been recognised as the oldest name for the Aldabra tortoise. In my opinion, to resolve this nomenclatural issue and to put an end to the confusion observed since 1982 would be very important for any research and conservation initiatives on this species and should be done immediately.

(12) Eugene S. Gaffney

Department of Paleontology, American Museum of Natural History, Central Park West and 79th St., New York, NY 10024, U.S.A.
(e-mail: genegaffney373@comcast.net)

I agree completely with the request by the authors of Case 3463 for the conservation of the Aldabra name as argued in that submission. This is hardly a unique example but it is a very obvious one in herpetology and is one of the reasons that the ICZN exists.

(13) Vikash Tatayah and Carl Jones, MBE

Mauritian Wildlife Foundation, Grannum Road, Vacoas, Mauritius
(e-mail: vtatayah@mauritian-wildlife.org)

We have been following the debate over the nomenclature of the Aldabra Giant Tortoise very closely at the Mauritian Wildlife Foundation and, in line with common and accepted local usage in Mauritius and Rodrigues, would support the specific name *gigantea* over other suggestions.

As for the genus, *Geochelone* is currently in widespread use locally. We believe that *Aldabrachelys* has good potential, and would adopt the final decision of the Commission. Please consider the above as the official view of the Mauritian Wildlife Foundation.

(14) Robert P. Reynolds

Biological Survey Unit, USGS Patuxent Wildlife Research Center, National Museum of Natural History, PO Box 37012, Washington, DC 20013-7012, U.S.A.
(e-mail: reynolds@si.edu)

I am writing in support of the arguments presented by J. Frazier in Case 3463 to conserve the usage of *Testudo gigantea* Schweigger, 1812 and to suppress *Testudo dussumieri* Gray, 1831. I and my coauthors reviewed this issue thoroughly when we published our 'Catalog of Type Specimens of Recent Crocodylia and Testudines in the National Museum of Natural History, Smithsonian Institution' (Reynolds, R.P., Gotte, S.W. & Ernst, C.H. 2007. *Smithsonian Contributions to Zoology*, **626**: 1-49). At that time we were highly skeptical of the supposed rediscovery of the holotype of *Testudo gigantea* Schweigger, 1812 by Bour (2006), and we remain unconvinced of the validity of MNHN 9554 as the holotype of *T. gigantea* Schweigger, 1812. With consideration to the original description of *Testudo gigantea* by Schweigger, the assertion by Bour (2006) of the rediscovery of the holotype is neither particularly convincing nor unequivocal. Because of the uncertainty of the supposed rediscovery of the holotype, and for the sake of nomenclatural stability based on more than a century of usage of *T. gigantea* for the Aldabra tortoise, I encourage the Commissioners to support the petition of Case 3463.

(15) Kim M. Howell

Department of Zoology and Wildlife Conservation, University of Dar es Salaam, P.O. Box 35064, Dar es Salaam, Tanzania (e-mail: kmhowell@udsm.ac.tz)

I find the arguments put forward by Jack Frazier to be convincing. As he notes, *gigantea* is the accepted and most widely used name. My experience within the range of this species and, as a former member of the CITES Animals Committee (Co-representative for Africa), is that *gigantea* is generally in use and recognised. In the African region we often must deal with issues relating to the commercial trade in this species and to have another name in existence simply adds to the confusion and may well provide a loophole for the illegal export of this species under a different name or one not familiar to the authorities who control such matters on the continent.

In my opinion, it is good science, good taxonomic practice, and would make for the best management and conservation of the species to accept Frazier's arguments and conserve *Testudo gigantea*.

(16) Peter K.L. Ng

Dept of Biological Sciences, National University of Singapore, Science Drive 4, Singapore 117543 (e-mail: dbsngkl@nus.edu.sg)

I agree with the application; the constant ‘to-ing and fro-ing’ with names, dealing with the fog of history and conjectures about original intent is not helpful. The uncertainties of the old literature and old missing, mislabelled or dubiously labelled specimens will not be easily solved and the debate is rather pointless. Even though I am not a herpetologist here are the facts as I see them: we know there is a species of Aldabra tortoise and we know it is endangered and it needs one unambiguous name. I agree that *gigantea* is the name normally associated with it, and I have seen this in almost all major conservation documents and other papers I have read. The logical thing is therefore to keep this name for the species, recognise the neotype as selected by Frazier, and suppress all other purported type material, even if later shown to be so. This will convey the stability necessary for the biologists to move ahead with the much needed conservation efforts in keeping the species alive. It matters not what Schweigger’s (1812) original intent or specimen was. Sentiments and history aside, the name used now and for practical purposes is what matters. The subgenus name is a less clear-cut case, although the name itself suggests its conservation will cause fewer problems – but that is another matter as I suspect genus concepts will change even more in the future.

(17) Ravi Chellam

Country Director, WCS-India Program, No. 269, 5th Main Road, Canara Bank Layout, Kodigehalli, Bengaluru – 560 097, India (e-mail: rChellam@wcs.org)

I write to strongly support the petition by Jack Frazier to conserve the usage of *Testudo gigantea* Schweigger, 1812 by the designation of a neotype. Further, I agree that *Testudo dussumieri* Gray, 1831 should be suppressed.

The arguments of Frazier are logical and well-reasoned, and will result in the least amount of confusion. The most obvious advantage of adopting Frazier’s application is the stabilisation of a name which has been in wide and continuous use for more than a century. The need to stabilise the name for the Aldabra tortoise is becoming more and more serious due to the potential risk of extinction. The only extant natural population is on a remote and isolated island and is vulnerable. Climate change models predict sea level changes which represent a real threat to a low lying island such as Aldabra. The usage of *Testudo gigantea* Schweigger, 1812 for the Aldabra tortoise is appropriate and least disruptive, and should be conserved.

(18) Eric P. Palkovacs

School of Biology & Ecology, University of Maine, 5751 Murray Hall, Orono, ME 04473, U.S.A. (e-mail: eric.palkovacs@maine.edu)

I support the conservation of the name *Testudo gigantea* Schweigger, 1812 in reference to the Aldabra tortoise, as proposed by J. Frazier in Case 3463. As

described by Frazier, uncertainty and confusion have bred nomenclatural instability, with non-trivial scientific and conservation implications. This petition simplifies the situation in the most valid and logical possible way. The resulting nomenclatural stability will aid in efforts to communicate about and, ultimately, to conserve this unique surviving lineage.

(19) Justin Gerlach

Nature Protection Trust of Seychelles, PO Box 207, Victoria, Mahé, Seychelles
(e-mail: jstgerlach@aol.com)

Frazier's petition to fix the name of the Aldabra tortoise as *Aldabrachelys gigantea* (incorrectly petitioned as *Geochelone (Aldabrachelys) gigantea*) rests on three points: questions over the status of the type specimen of *Testudo gigantea* Schweigger, 1812, arguments of nomenclatural stability and the wider impacts of nomenclature. The arguments put forward by Frazier are flawed on all three points.

Status of the type specimen of *Testudo gigantea* Schweigger, 1812

The contentious and complicated history of the nomenclature of the Aldabra giant tortoise derives from the misplacing of the type specimen described by Schweigger (1812). Schweigger described a large (but not gigantic) tortoise from Brazil originating from the King of Lisbon's collection. On historical grounds this is unlikely to have been a tortoise from the Indian Ocean, which had been dominated by the French and Dutch since the mid 17th century. Much of the material originally held in Lisbon is South American in origin, reflecting Lisbon's role as a colonial power in South America. Accordingly the origin 'Brasilia' is highly plausible. Furthermore the description given by Schweigger notes three distinctive features: the lack of projecting marginal scutes, the lack of a cervical or nuchal scute and the presence of notably large, thickened scales on the limbs. In contrast the Aldabra tortoise has flared marginals, usually (but not always) has a nuchal scute and has no distinctively enlarged scales on the limbs. However all of these features are highly distinctive in South American tortoises, particularly *Chelonoidis denticulata*. Although the type was misplaced in the Muséum National d'Histoire Naturelle, Paris probably in the 1800s, Bour (2006) describes a specimen which corresponds extremely closely to the type. His account of this specimen leaves no reasonable doubt that it is indeed the type of *Testudo gigantea*. This specimen is also easily identifiable as a South American red-footed tortoise *Chelonoidis denticulata*.

On this basis the original description and the holotype of *Testudo gigantea* are identifiable as *Chelonoidis denticulata* and cannot be applied to the Aldabra tortoise without a fundamental changing of taxonomic history. A very strong case would be needed for such a change to be acceptable.

Nomenclatural stability

As noted by Frazier *Testudo gigantea* was applied to the tortoises on Aldabra from the late 19th century. Frazier cites Hubrecht (1881) as being the first person to associate *T. gigantea* with Aldabra. However, in reality Hubrecht referred the type of *T. dussumieri* (from Aldabra) to *T. gigantea*. This is at best a very tenuous association and the first clear statement that *T. gigantea* could be applied to the tortoises

specifically from Aldabra is that of Rothschild (1915). Other names were explicitly associated with Aldabra from an earlier date: *T. dussumieri* (1831), *T. elephantina* (from 1835) and *T. daudinii* (1896). *T. dussumieri* was overlooked for the next 150 years, and *T. daudinii* was only associated with Aldabra tortoises four times, last in 1967 (Bolau 1896; Rothschild 1915; Wermuth & Mertens 1961; Honegger 1967). *T. elephantina* was applied to the Aldabra population regularly until 1954, followed by a 30 year gap until its reappearance in 1983. Thus *T. gigantea* has only been associated with Aldabra for 94 years, compared to 178 years for *T. dussumieri* and 174 years for *T. elephantina*. *Testudo gigantea* has no claim to priority or to uniquely regular use.

The extent of the current confusion and lack of stability is shown by Frazier's own listing of five generic names (*Aldabrachelys*, *Dipsochelys*, *Geochelone*, *Megalochelys* and *Testudo*) with 7 combinations used in the past decade and a total of 9 names in the past two decades. Frazier gives a list of 31 citations in support of the continued use of *gigantea* since 1986, but only 11 of these have any connection to taxonomy, the others mentioning Aldabra tortoises only in passing. The same is true of the statements relating to non taxonomic aspects of biology; the majority of citations concern other species and the name used in their passing reference to Aldabra tortoises is essentially irrelevant. Frazier's list is also misleading in that it does not consider the number of citations of other names. A wider comparison shows that over the past 10 years, peer-reviewed publications including discussion of the taxonomy of Aldabra tortoises have used *gigantea* 4 times and *dussumieri* 9 times. In the same time period non-taxonomic papers (ecology and behaviour) including Aldabra tortoises have used *gigantea* 9 times and *dussumieri* 7 times. This means that in the total scientific literature of the past decade no name has had significantly greater currency or stability, with *gigantea* being used 13 times and *dussumieri* 16 times. Frazier (2006) himself noted the 'general instability and chaos regarding the valid name of the Aldabra Tortoise' and this is borne out by the present analysis. There is no stability to protect.

Wider impacts of nomenclature

Although Frazier is correct in noting that international bodies and conventions use *Geochelone gigantea* for the Aldabra tortoise this has little practical relevance; the tortoises referred to are explicitly the Aldabra tortoises, for which there is no significant identification issue whatever name is applied. Of the three citations given for the use of *G. gigantea* in Seychelles government documents, one is primary legislation specifically concerning tortoises, the other two have no relevance to tortoises and only refer to tortoises as examples of the biodiversity of the islands. Other examples can be cited where different names have been used, for example the Seychelles Biodiversity Strategy and Action Plan (Republic of Seychelles 1997) uses *Dipsochelys* (without a species name) and the reports of the Seychelles Islands Foundation which manages Aldabra have variously used *Geochelone gigantea*, *Testudo gigantea* and *Dipsochelys dussumieri* (e.g. Betts, 2000).

A further implication of this nomenclatural issue is the unintended consequence of potentially validating a misleading name. In 1957 Loveridge & Williams created *Aldabrachelys* as a subgenus of *Geochelone*, designating *Testudo gigantea* as the type species. This name was rejected by Bour (1982) on the basis of the misidentification

of *T. gigantea*. Rejection of *gigantea* required the rejection of *Aldabrachelys* and the creation of a new generic name, *Dipsochelys*. Since then *Aldabrachelys* has been very rarely used (only twice in the past decade in relevant systematic literature) and *Dipsochelys* remains the most widely applied distinct generic name for the Madagascar-Seychelles-Aldabra tortoises. Validation of *gigantea*, as proposed by Frazier, would also validate *Aldabrachelys* as the generic name based on *gigantea*. This is highly undesirable as it would require the adoption of a currently rarely used name, and would apply to all giant tortoises (living and extinct) from Madagascar, Seychelles and Aldabra, not only to the Aldabran population. The name *Aldabrachelys* is very unfortunate in that it clearly ties the genus to Aldabra; whilst Aldabra supports the largest wild population of giant tortoises in the world it has only been occupied by giant tortoises for the past 115,000 years, compared to some 10 million years for Madagascar. There is little doubt that the genus originated on Madagascar and has only a recent history on Aldabra. To promote *Aldabrachelys* over *Dipsochelys* would have a confusing effect on interpretations of a substantial part of the evolutionary history of the genus. Whilst this is not a taxonomic point, it would be very unfortunate for public education and comprehension of nomenclature.

In conclusion, the original description and holotype of *Testudo gigantea* demonstrate that this name applies to the South American *Chelonoidis denticulata*. Setting aside the existing holotype specimen in favour of the neotype proposed by Frazier would be a significant nomenclatural act and should only be undertaken with a strong justification and unequivocal support. The claim that *Testudo gigantea* is a stable name cannot be justified as even Frazier notes that there has not been any stability in the nomenclature of the Aldabra tortoise for the past 27 years. Although Frazier states that his neotype designation was undertaken after 'after extended consultation with numerous specialists in chelonian systematics' he did not include any of the specialists who have worked specifically on the nomenclature of the Aldabran tortoises in the past 25 years, all of whom would have been expected to urge against proposal of a neotype and this petition. Accordingly I recommend that the International Commission on Zoological Nomenclature reject the petition of Case 3463 and allow the Code to operate, validating *Testudo dussumieri* Gray, 1831 (now *Dipsochelys dussumieri*) as the valid name for the Aldabra giant tortoise and retaining *Testudo gigantea* Schweigger, 1812 as a junior synonym of *Chelonoidis denticulata* (Linnaeus, 1766).

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