

## Letter to the editor

### ***Gobius lagocephalus*: The world's most widespread *nomen dubium***

In a recent Letter to the Editor critiquing the study of Keith et al. (2005a), Sparks and Smith (2006) posed the question: is *Sicyopterus* (= *Gobius*) *lagocephalus* a widespread species, a species complex, or neither? As Sparks and Smith maintained, the answer to this question is simple: *Sicyopterus lagocephalus* is neither a widespread species nor a species complex because the sicydiine goby to which this name belongs cannot be ascertained. Therefore, the name must be considered a *nomen dubium*, and the biological entity(ies) often referred to as *S. lagocephalus* should make use the oldest available name(s) for this/these species. Sparks and Smith (2006) further argued that Keith et al.'s (2005a) so-called Indo–Pacific “*S. lagocephalus*” clade represented a species complex, as opposed to a single exceptionally widespread species. Regardless, Sparks and Smith (2006) asserted that none of the included Indo–Pacific *Sicyopterus* lineages could justifiably be referred to as *S. lagocephalus* because the name could only appropriately refer to a specimen from the type-locality of “American Seas.”

The focus of the Sparks and Smith (2006) study was not the nomenclatural issue (i.e., the designation of *Sicyopterus* [= *Gobius*] *lagocephalus* as a *nomen dubium*); instead, their discussion concerned the evidence and justification provided by Keith et al. (2005a) for recognizing their “*S. lagocephalus*” clade as a single species. Using data collected and analyzed by Keith et al. (2005a), Sparks and Smith provided character evidence that, according to many species concepts, would indicate that their widespread “*S. lagocephalus*” clade was composed of multiple species. Berrebi et al. (2006) responded to Sparks and Smith (2006) with regard to these phylogenetic concerns, but they chose to avoid the nomenclatural issue entirely. Instead, they commented that this was “another field of science” and claimed further that Maurice Kottelat had “solved” this taxonomic problem in an impending publication.

Kottelat (2007), in fact, has weighed in on the nomenclatural concern highlighted by Sparks and Nelson (2004) and Sparks and Smith (2006) by attempting, for a third time (see also Fricke, 1999; Watson et al., 2000), to designate a neotype for Pallas (1770) *Gobius lagocephalus*, for which no extant type-specimens are known. The recent and extensive taxonomic discussion surrounding the identity of *G. lagocephalus* (i.e., Fricke, 1999; Watson et al.,

2000; Sparks and Nelson, 2004; Keith et al., 2005a; Sparks and Smith (2006); Berrebi et al., 2006; Smith and Sparks, submitted for publication; Kottelat, 2007; this study), indicates that this nomenclatural issue is sufficiently controversial that it should be communicated through and vetted by the International Commission on Zoological Nomenclature (hereafter: Commission; International Commission on Zoological Nomenclature, 1999), and, contrary to the opinion offered by Berrebi et al. (2006), this issue is not “solved” by Kottelat's Letter to the Editor. To this end, we have submitted an application to the Commission (Smith and Sparks (submitted for publication); case 3383) to request the formal suppression of the name *G. lagocephalus* Pallas, 1770. However, in the interest of taxonomic stability, we also felt that it was necessary to respond to the validity of Kottelat (2007) criticism of our earlier studies (Sparks and Nelson, 2004; Sparks and Smith, 2006), including his invalid neotype designation that does not satisfy all requirements of the International Code of Zoological Nomenclature, 4th Edition (hereafter: Code).

In his editorial, Kottelat (2007) questioned several aspects of the Sparks and Nelson (2004) and Sparks and Smith (2006) discussions regarding the taxonomic status of *G. lagocephalus* and the evidence provided by the original description (or descriptions? [see point 2 below]) for modern generic placement and assignment of this name. Kottelat criticized our arguments for (1) *nomen dubium* status for *G. lagocephalus*, (2) our translation and reliance on only the text of the original description by Pallas (1770) (e.g., our exclusion of the meristic information contained in Koelreuter (1764) non-binomial description of a goby that may or may not be the same species or specimen described by Pallas; see below), and (3) our decision not to designate yet a third neotype for *G. lagocephalus*:

(1) It is explicitly stated in the Introduction (XXVII, pt. 8) to the Code, “If an existing name-bearing type of a species-group taxon is indeterminate, so that the correct application of the name to a particular taxon is doubtful (i.e., the name is a *nomen dubium*), an author should request the Commission to set it aside and designate a neotype.” Given Kottelat's (2007) summation of the problem (see below), we were understandably surprised that he took issue with our designation (and that of Sparks and Nelson (2004)) of *G. lagocephalus* as a *nomen dubium*. According to Kottelat (2007):

- (a) “A *nomen dubium* whose type series is lost (like here) is the easiest case to handle, because a neotype designation efficiently solves the problem.”
- (b) “There is nothing in the original description allowing to decide that Pallas’s specimen is a *Sicyopterus* (from the Indo–Pacific Ocean) rather than a *Sicydium* (from the Atlantic Ocean). This conclusion was also reached by Sparks and Nelson (2004): 16 who commented that it is of uncertain placement beyond the subfamily level. Watson et al. (2000): 13 list the characters distinguishing *Sicyopterus* from *Sicydium*. They all relate to teeth characters which are not described by Pallas and cannot be observed on his figure.”

If the identity of the specimen(s) is uncertain, then *G. lagocephalus* must be considered a *nomen dubium*. In other words, if Kottelat believes that there is justification for designating a neotype for this species-group name, then, logically, he must agree with the previous designation by Sparks and Nelson (2004) and Sparks and Smith (2006) that *G. lagocephalus* is a *nomen dubium*.

(2) Much of the discussion in Kottelat’s (2007) commentary deals with his conjecture that Koelreuter’s (1764) description allows for the recognition of a second syntype of *G. lagocephalus* Pallas (1770). Although we find no evidence to support this allegation in Pallas (1770), we argue that even if this were true, it would not provide any additional information to aid the conclusive identification of *G. lagocephalus*. Once again, as Kottelat admits, the identity of this specimen is likewise dubious:

“In Koelreuter too, neither the description nor the drawings provide information on the diagnostic characters which would permit to decide whether the specimen is a *Sicyopterus* or a *Sicydium*.”

The allegation of a second type only weakens Kottelat’s argument for the designation of a neotype from Réunion because of further inconsistencies between Koelreuter’s counts and species of Indo–Pacific *Sicyopterus*. Moreover, Kottelat’s numerous conjectures regarding the possibility that these two specimens represent different species only supports our view that taxonomic stability is maximized by suppression of the name *G. lagocephalus*. Regardless of whether the counts provided by Koelreuter (1764) or Pallas (1770) originated from one specimen or two species, neither set of counts is consistent with any species of *Sicyopterus*. For example, the pectoral-fin ray counts of Pallas (1770) type and Koelreuter (1764) specimen are 15 and 17, respectively, Kottelat (2007); whereas, the counts of all species of *Sicyopterus* range from 18 to 23 (Watson et al., 2000). In fact, the Mascarene *Cotylopus* (Réunion [1 sp.] and Comoros [1 sp.]) and the American *Sicydium* have pectoral counts that are consistent with those provided by Koelreuter and Pallas (Watson et al.,

2000). With this line of reasoning, Kottelat only serves to undermine his own argument for designating a neotype from Réunion.

(3) Given that all parties now seem to agree that the name *G. lagocephalus* is dubious, we agree with Kottelat (2007) that there is no reason for a mature nomenclatural system to retain a *nomen dubium*; however, we argue below that his neotype designation does not meet the requirements of article 75.3 of the Code (neotype qualifying designations). Kottelat dismisses these Code violations by appealing to his perception of taxonomic stability, which we believe is indefensible, given his contradictory line of reasoning and the lack of evidence presented by Keith et al. (2005a) for a single widespread species. Prior to Kottelat’s neotype designation, Watson et al. (2000) synonymized 12 nominal species under *S. lagocephalus* on the basis of external morphological examination. Keith et al. (2005a) followed with a study based on molecular evidence that demonstrated significant geographic structure and long-term isolation of populations synonymized under *S. lagocephalus* by Watson et al. (2000). Sparks and Smith (2006) argued that the phylogenetic structure recovered by Keith et al. (2005a) is indicative of a species complex, not a single exceptionally widespread species. Based on the cursory nature of the former study and what we believe represents a misinterpretation of the evidence by the authors of the latter study, we would argue, on the contrary, that stability has actually been undermined for all those taxonomists working on the group by these various authors.

Regrettably, Kottelat’s neotype designation (SMF 28571; type locality: Réunion: Ravine St. Gilles), the same specimen which was invalidly designated by Watson et al. (2000), contradicts multiple requirements of the code, and, like those of Fricke (1999) and Watson et al. (2000) before him, should also be considered invalid for the following two Code violations:

- (a) (Code article 75.3.6). The proposed neotype is from a locality (Réunion) far removed from Pallas (1770) stated type locality (“American Seas”). In fact, the proposed neotype is from a different ocean basin (Pacific vs. Atlantic) on the other side of the world. Moreover, the genus *Sicyopterus* does not occur in or near any “American Seas”, whereas the sicydiine genus *Sicydium* does occur in the Western Atlantic and Caribbean. Given that no taxonomist familiar with the group (e.g., Sparks and Nelson, 2004; Kottelat, 2007) can confirm the generic status of *G. lagocephalus*, what possible justification can be used for applying the name described for a goby from the “American Seas” to a species within a genus that is restricted to the Indo–Pacific? Given that the Code explicitly states, “the neotype [should come] as nearly as practicable from the original type locality”; obviously, there is no justification.

(b) (Code article 75.3.5). As noted above and by Kottelat, the few potential discriminating features (e.g., pectoral-fin ray count) suggest that *G. lagocephalus* does not belong in *Sicyopterus*. Instead, the counts provided by both Pallas and Koelreuter are more consistent with either the Atlantic and Caribbean species of *Sicydium*, or the Mascarene species of *Cotylopus* (Watson et al., 2000; Keith et al., 2005b). Given the absence of extant type specimens and the lack of data to refute Pallas (1770) description (and Koelreuter (1764) counts), we must rely on the veracity of the original description. Otherwise, ichthyologists could contrive untestable conjectures ad infinitum to strengthen any story they wanted to make about the identity of *G. lagocephalus*.

In summary, the only neotype designation that is both consistent with the type-locality and the original description would be to fix the name *G. lagocephalus* to any one species of *Sicydium*, the only sicydiine gobies from the Americas. We do not believe that this is the proper course of action here because any such designation would necessarily be arbitrary and threaten the usage of a name from the well-established Atlantic and Caribbean species of *Sicydium*. Although we acknowledge that suppression of *G. lagocephalus* eliminates a commonly used species-group name, we believe that suppression not only maximizes taxonomic stability, but that it is the only justifiable action that does not: (1) threaten usage of well-established and nomenclaturally unproblematic names, or (2) violate any articles or guidelines of the Code.

Kottelat's view that our concluding statement "is an unfortunate illustration of a semantic confusion between a species and its name" is an arrant misrepresentation of Sparks and Nelson (2004) and Sparks and Smith (2006). We obviously believe that there are *Sicyopterus* species in the Indo-Pacific, and we discuss their reality at length (Sparks and Nelson, 2004; Sparks and Smith (2006); Smith and Sparks (submitted for publication)). Moreover, we have argued that multiple species of *Sicyopterus* are represented in Watson et al.'s (2000) and Keith et al.'s (2005a). "*S. lagocephalus*", which, in fact, was the focus of our critique (Sparks and Nelson, 2004). Regardless of the number of species of *Sicyopterus* in the Indo-Pacific, we have argued above that under no circumstances should any of those species be referred to as *S. lagocephalus*. Nomenclatural stability and veracity can only be maximized by the formal suppression of *G. lagocephalus* Pallas, 1770, notwithstanding Fricke (1999), Watson et al. (2000), and Kottelat (2007) invalid neotype designations based on specimens from the Mascarene region. Despite Berrebi et al. (2006) claim that this nomenclatural issue was "solved" by Kottelat's Letter to the Editor, such a problem

can only be resolved by a formal ruling by the Commission (Smith and Sparks, submitted for publication). In the interest of taxonomic stability, we anticipate that *G. lagocephalus* will forever remain an unavailable name on the Official Index of Rejected and Invalid Specific Names in Zoology.

## References

- Berrebi, P., Galewski, T., Keith, P., 2006. *Sicyopterus* "*lagocephalus*", a unique widespread taxon confirmed by mtFNA sequences. *Mol. Phylogenet. Evol* 40, 903–904.
- Fricke, R., 1999. Fishes of the Mascarene Islands (Réunion, Mauritius, Rodriguez). An annotated checklist, with descriptions of new species. Koeltz, Koenigstein.
- International Commission on Zoological Nomenclature, 1999. International code of zoological nomenclature. Fourth edition. International Trust for Zoological Nomenclature, London.
- Keith, P., Galewski, T., Cattaneo-Berrebi, G., Hoareau, T., Berrebi, P., 2005a. Ubiquity of *Sicyopterus lagocephalus* (Teleostei: Gobioidi) and phylogeography of the genus *Sicyopterus* in the Indo-Pacific area inferred from mitochondrial cytochrome b gene. *Mol. Phylogenet. Evol* 37, 721–732.
- Keith, P., Hoareau, T., Bosc, P., 2005b. The genus *Cotylopus* (Teleostei: Gobioidi) endemic to the rivers of islands of the Indian Ocean with description of a new species from Mayotte (Comoros). *J. Nat. Hist* 39, 1395–1405.
- Koelreuter, J.G. [I.T.], 1764. Descriptionis piscium rariorum e museo petropolitano exceptorum continuatio. *Novi Commentarii Academiae Scientiarum Imperialis Petropolitanae* 9 (1762–1763 [1764]), 420–470, pls. 9–10.
- Kottelat, M., 2007. Nomenclatural status and identity of *Gobius lagocephalus* (Teleostei: Gobiidae). *Mol. Phylogenet. Evol.* 43, 693–695.
- Pallas, P.S., 1770. *Spicilegium zoologicum quibus novae imprimis et obscurae animalium species iconibus, descriptionibus atque commentariis illustrantur*. Fasciculus octavus. Lange, Berlin.
- Smith, W.L. and Sparks, J.S. submitted. *Gobius lagocephalus* Pallas, 1770 (currently *Sicyopterus lagocephalus*; Teleostei, Gobiidae): proposed suppression of the specific name. *Bull. Zool. Nomenclat.* (submitted for publication).
- Sparks, J.S., Nelson, D.W., 2004. Review of the Malagasy sicydiine gobies (Teleostei: Gobiidae), with description of a new species and comments on the taxonomic status of *Gobius lagocephalus* Pallas, 1770. *Amer. Mus. Novitates* 3440, 1–20.
- Sparks, J.S., Smith, W.L., 2006. *Sicyopterus lagocephalus*: widespread species, species complex, or neither? A critique on the use of molecular data for species identification. *Mol. Phylogenet. Evol.* 40, 900–902.
- Watson, R.E., Marquet, G., Pöllabauer, C., 2000. New Caledonia fish species of the genus *Sicyopterus* (Teleostei: Gobioidi: Sicydiinae). *Aqua* 4, 5–34.

Wm. Leo Smith \*

John S. Sparks

Department of Ichthyology, Division of Vertebrate Zoology,  
American Museum of Natural History,  
Central Park West at 79th Street, NY 10024, USA  
E-mail addresses: leosmith@amnh.org (W.L. Smith),  
jsparks@amnh.org (J.S. Sparks)

Available online 27 September 2006

\* Corresponding author. Fax: +1 212 769 5642.