

The Pufferfish Genus *Fugu* ABE, 1952, a Junior Subjective Synonym of *Takifugu* ABE, 1949

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Abstract The pufferfish genus *Fugu* ABE, 1952, which has long been used by many authors, is a junior subjective synonym of *Takifugu* ABE, 1949. *Higanfugu* ABE, 1949 is similarly included in the synonymy of *Takifugu* ABE, whereas *Shippofugu* ABE, 1949 is more correctly included in the synonymy of *Torquigener* WHITLEY, 1930. Comments are also made on the status of the type species of all of the remaining generic and sub-generic categories erected by ABE in 1939, 1949, 1950, 1952 and 1954.

Pufferfishes in the genus *Takifugu* ABE, 1949 occur in the seas around China, Japan and Korea (ABE, 1949 c). Despite being poisonous, the fishes are eaten and highly esteemed by connoisseurs, the toxin being primarily concentrated in the viscera (TANI, 1945). Although a number of species are therefore commercially important, the nomenclatural status of the genus has remained confused. Literature searches have revealed that four different generic names have been applied at some time to *Takifugu* species: *Takifugu* ABE, 1949 (e.g., WHITLEY, 1953; TOMINAGA & UYENO, 1981; KUANG *et al.*, 1984; MATSUURA, 1984; SHEN, 1984; KISHIDA & YAMADA, 1986; MASUDA & ALLEN, 1987; SU *et al.*, 1986), *Fugu* ABE, 1952 (e.g., MATSUBARA, 1955; ANONYMOUS, 1962; FUJITA, 1962; ABE, 1963, 1965, 1988; KAMOHARA, 1967; CHENG *et al.*, 1975; MASUDA *et al.*, 1975; TYLER & PAXTON, 1979; TYLER, 1980; ARAI, 1983; FERNHOLM & WHEELER, 1983), *Spherooides* ANONYMOUS, 1798 (e.g., JORDAN & SNYDER, 1901 [spelled as *Spherooides*]; DE BEAUFORT *in* DE BEAUFORT & BRIGGS, 1962; ARAI & NAGAIWA, 1976), and *Torquigener* WHITLEY, 1930 (e.g., FRASER-BRUNNER, 1943). In addition, several subgeneric names for *Takifugu* species also have been proposed by ABE (1939, 1949 c, 1954).

As a first step in my taxonomic studies of *Takifugu* species, the nomenclatural status of the genus is herein resolved, and continued use of the name *Takifugu* ABE, 1949 is proposed.

Nomenclatural History

Before FRASER-BRUNNER's (1943) revisional study on the suborder Tetraodon-toidei was published, many marine pufferfishes, including members of *Takifugu*, had been placed in the catch-all genera *Tetraodon* LINNAEUS, 1758 and *Spherooides* ANONYMOUS, 1798. Consistently using both external and osteological characters for

a large number of species, FRASER-BRUNNER (1943) correctly showed that *Sphoeroides* sensu stricto is distinct from the other marine pufferfishes classified under his Lagocephalidae, that is, *Lagocephalus* SWAINSON, *Amblyrhynchotes* TROSCHEL (ex BIBRON) and *Torquigener* WHITLEY. Included in *Torquigener* (sensu FRASER-BRUNNER) were many species of *Takifugu*; viz., *Takifugu alboplumbeus* (RICHARDSON), *T. bimaculatus* (RICHARDSON), *T. chrysops* (HILGENDORF), *T. niphobles* (JORDAN et SNYDER), *T. oblongus* (BLOCH), *T. ocellatus* (OSBECK), *T. pardalis* (TEMMINCK et SCHLEGEL), *T. poecilonotus* (TEMMINCK et SCHLEGEL), *T. porphyreus* (TEMMINCK et SCHLEGEL) [called *Torquigener borealis* (JORDAN et SNYDER) by FRASER-BRUNNER], *T. rubripes* (TEMMINCK et SCHLEGEL), *T. vermicularis* (JORDAN et SNYDER), and *T. xanthopterus* (TEMMINCK et SCHLEGEL).

In 1939, ABE had proposed a new subgenus, *Torafugu*, for *Tetraodon xanthopterus* TEMMINCK et SCHLEGEL and *Tetraodon rubripes* TEMMINCK et SCHLEGEL, which he included in *Sphoeroides* ANONYMOUS. However, *Torafugu* ABE, 1939, is not available because a type species was not designated (International Code of Zoological Nomenclature, 1985, Article 13 b). Subsequently ABE published an extensive series of studies on pufferfishes around Japan (1942, 1944, 1949 a-c). The last mentioned provided an extensive synopsis of pufferfishes of Japan and adjacent regions. All of the known species of *Sphoeroides*, *Takifugu* and *Torquigener* from these regions were included in the genus *Sphoeroides* ANONYMOUS, subdivided into six subgenera: *Shippofugu*, *Takifugu*, *Torafugu*, *Shosafugu*, *Higanfugu* and *Liosarcus* (misspelling of *Liosaccus* GÜNTHER). Except for the previously described *Torafugu* and *Liosaccus*, the subgeneric names were new proposals, and *Torafugu* had not been validly proposed.

The type species of the monotypic subgenera *Shippofugu*, *Takifugu* and *Higanfugu* were *Tetraodon hypselogeneion* BLEEKER, *Tetrodon oblongus* BLOCH and *Tetraodon pardalis* TEMMINCK et SCHLEGEL, respectively. Type species had not been designated for the subgenera *Torafugu* and *Shosafugu*: the former including *Sphoeroides ocellatus ocellatus* (LINNAEUS), *S. ocellatus obscurus* ABE and *S. xanthopterus* (TEMMINCK et SCHLEGEL); and the latter comprising *Sphoeroides stictonotus* (TEMMINCK et SCHLEGEL), *S. vermicularis vermicularis* (TEMMINCK et SCHLEGEL) [= *Takifugu snyderi* (ABE)], *S. vermicularis radiatus* ABE [= *Takifugu vermicularis* (TEMMINCK et SCHLEGEL)], *S. vermicularis porphyreus* (TEMMINCK et SCHLEGEL) [= *Takifugu porphyreus* (TEMMINCK et SCHLEGEL)], and *S. poecilonotus* (TEMMINCK et SCHLEGEL). Thus, the subgeneric names *Torafugu* and *Shosafugu* remained unavailable. The subgenus *Liosaccus* "HILGENDORF, 1879" was also considered by ABE (1949 c) to be monotypic. Subsequently, ABE (1954) acknowledged GÜNTHER's (1870) earlier authorship of *Liosaccus* [type species: *Tetrodon cutaneus* GÜNTHER = *Sphoeroides pachygaster* (MÜLLER et TROSCHEL)] and proposed *Akamefugu* as a subgeneric name for *Tetrodon chrysops* HILGENDORF.

Among the subgenera proposed by ABE (1949 c, 1954), the names *Shippofugu*, *Takifugu*, *Higanfugu*, and *Akamefugu* are available according to Article 68 d of the International Code of Zoological Nomenclature (1985). In 1950 ABE had, in ad-

dition, nominated type species for *Torafugu* and *Shosaifugu*, thereby making those names available. The type species of his subgenera are therefore as follows:

Shippofugu: *Tetraodon hypselogeneion* BLEEKER, 1852

Takifugu: *Tetrodon oblongus* BLOCH, 1786

Torafugu: *Tetraodon rubripes* TEMMINCK et SCHLEGEL, 1850

Shosaifugu: *Tetraodon vermicularis* TEMMINCK et SCHLEGEL, 1850

Higanfugu: *Tetraodon pardalis* TEMMINCK et SCHLEGEL, 1850

Akamefugu: *Tetrodon chrysops* HILGENDORF, 1879

In 1952, ABE proposed the inclusion of five subgenera, i.e., *Torafugu*, *Shosaifugu*, *Higanfugu*, *Liosaccus* (= *Akamefugu*) and *Takifugu* in his newly named genus *Fugu* (type species: *Tetraodon rubripes* TEMMINCK et SCHLEGEL, by original designation). He showed that these fishes are distinct in many ways from those remaining in *Sphoeroides* and *Torquigener*. TYLER (1980) later showed that *Fugu* is distinct from all other tetraodontid genera including *Amblyrhynchotes*, *Sphoeroides* and *Torquigener*. Thus the distinctiveness of the genus *Fugu* was confirmed. Subsequently, HARDY (1983 a) revised *Torquigener*, touching upon differences between *Fugu* and *Torquigener*. Because he included *Tetraodon hypselogeneion* BLEEKER in the latter (HARDY, 1893 a, b), *Shippofugu* therefore is included in the synonymy of *Torquigener*. HARDY (1984) also showed that the five species included in *Amblyrhynchotes* (sensu FRASER-BRUNNER) are subdivided into four different genera, *Amblyrhynchotes* TROSCHEL (ex BIBRON), *Contusus* WHITLEY, *Torquigener* WHITLEY, and *Tylerius* HARDY.

In summary, both *Takifugu* and *Higanfugu* are available (International Code of Zoological Nomenclature, 1985, Article 23 a) and were published in the same article (ABE, 1949 c), and are senior synonyms of *Fugu*. I hereby select *Takifugu* ABE, 1949 as having precedence over *Higanfugu*, ABE 1949, following the terms of Article 24 a, b of the International Code of Zoological Nomenclature (1985). Thus, based on this interpretation of included species, selecting *Takifugu* will maintain stability owing to the frequent reference to *Takifugu* in the literature, as opposed to the non-use of *Higanfugu*. *Torafugu* is a senior objective synonym of *Fugu*, so *Fugu* cannot be used in any event, but *Torafugu* is a junior subjective synonym of *Takifugu* as treated here. The synonymy of *Takifugu* is shown as follows:

Genus *Takifugu* ABE

Takifugu ABE, 1949: 90 (type species, *Tetrodon oblongus* BLOCH, by monotypy).

Higanfugu ABE, 1949: 93 (type species, *Tetraodon pardalis* TEMMINCK et SCHLEGEL, by monotypy).

Torafugu ABE, 1950: 199 (type species, *Tetraodon rubripes* TEMMINCK et SCHLEGEL, by original designation).

Shosaifugu ABE, 1950: 199 (type species, *Tetraodon vermicularis* TEMMINCK et SCHLEGEL, by original designation).

Akamefugu ABE, 1954: 122 (type species, *Tetrodon chrysops* HILGENDORF, by original

designation).

Fugu ABE, 1952: 36 (type species, *Tetraodon rubripes* TEMMINCK et SCHLEGEL, by original designation).

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