ESSAY

Stizostedion Rafinesque, 1820 (Percidae) is the Valid Generic Name for Walleye, Sauger, and Eurasian Pikeperch

John Clay Bruner | University of Alberta, Department of Biological Sciences, 116 St & 85 Ave, Edmonton, Alberta T6G 2E9, Canada. E-mail: jbruner@ualberta.ca

Theodore Nicholas Gill's misconception of Lorenz Okenfuss's use of the Latvian vernacular name Sander for Cuvier's French vernacular name Les Sandres, as a properly coined Latin name, led to Gill's and subsequent authors' incorrect acceptance of *Sander* as the senior synonym for *Stizostedion*. However, some authors, aware Sander is a common name and never proposed as a valid generic name, have continued using the correct generic name *Stizostedion*. American Fisheries Society guidelines for publication in their journals and the Canadian Journal of Fisheries and Aquatic Sciences requires authors to use the current edition of *Common and Scientific Names of Fishes from the United States, Canada, and Mexico*, which has incorrectly used Sander in the last two editions. Thus, fishery biologists have been forced to use an incorrect generic name for one of the most important freshwater fisheries of North America.

> Stability of zoological nomenclature will never be attained as long as authors exercise indiscriminately their privilege of introducing into the literature any name that suits their fancy or convenience. Few users of scientific terminology have the means, the time, or the inclination to verify the validity of each name they use. They are prone to accept, and thus tend to promote the perpetuation of, names as they find them in secondary bibliographic references. The practice of overturning valid, well established names in favor of others derived from unacceptable or questionable sources has degenerated from a nuisance to a calamity and reflects discredit on the work of systematists.
>
> Hershkovitz (1949).

Bloch (1785) listed the common names *Sandat* and Sander for *Perca lucioperca* in Liefland (now modern day Latvia and Estonia). Fischer (1791) also listed the Latvian and Estonian common names in his description of *Perca lucioperca* as *Sandat* and Sander. Vitins et al. (2001) confirmed that Fischer (1791) used Latvian names in his 48 descriptions of fish species. The first correct use of a valid generic name for the percids Walleye, Sauger, and the Eurasian pikeperch was by Constantine Samuel Rafinesque (1820). Rafinesque (1820) erected the subgeneric name *Stizostedion* for *Perca salmonea* Rafinesque, 1818, synonym of *Stizostedion vitreum* (Mitchill, 1818), stating that:

> The *Perca Salmonea* may also form a peculiar subgenus, or section distinguished by the cylindrical shape of the body, long head and jaws, large teeth, and a second spine outside of the opercule over the base of the pectoral fins. It may be called *Stizostedion*, which means pungent throat. I could have made peculiar genera of each of them, under the proposed names; but as they otherwise agree with the reduced genus *Perca*, I have preferred delaying this innovation until more species are found possessing the same distinctions, in which case my two perches may then be called *Stizostedion salmoneum*, and *Lepibema chrysops*.

Rafinesque's *Stizostedion* thus was the first correctly described generic or subgeneric name.

Jordan and Gilbert (1877) accepted *Stizostedion* Rafinesque, 1820, as the type genus for *Perca salmonea* Rafinesque, 1818. Because *Perca vitrea* Mitchill, 1818 (published by Mitchill in March 1818) is a senior synonym *Perca salmonea* Rafinesque, 1818 (published in September), the type species for *Stizostedion* is *Stizostedion vitreum*.

Theodore Nicholas Gill (1894) concluded *Stizostedion* was the correct generic name for Walleye, Sauger, and Pikeperch. In that paper, he did not cite the works of Bloch (1785) and Fischer (1791) and may have been unaware of them. However, Gill (1894) cited Bosc (1819) to report that "Bosc defined the names *Sandat* and *Sandre* in the following words, neither being used as a scientific or Latin designation of an accepted genus." The following papers agree with Gill's (1894) placement of Walleye, Sauger, and European pikeperch in *Stizostedion*: Billington et al. (1991), Faber and Stepien (1997, 1998), Stepien and Faber, (1998), Bruner (2011), Haponski and Stepien (2013, the only paper to include all five living species).

Jordan and Evermann (1896) recognized two genera, *Stizostedion* for Walleye and Sauger, and *Lucioperca* for Eurasian pikeperch. They divided *Stizostedion* into two subgenera, subgenus *Stizostedion* for *Stizostedion vitreum*, and subgenus *Cynoperca* for *Stizostedion canadense* (Smith, 1834).

The names began to be confused after Joel Asaphi Allen (1902), a curator of mammals at the American Museum of Natural History, published a paper in which the names of Lorenz Okenfuss (who published under the name Lorenz Oken) were brought to the attention of biologists. Allen discussed 11 terms from Oken's (1816) *Lehrbuch der Naturgeschichte*, among which were nine mammal names that he decided were available as valid genera (Allen 1902). The

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German systematist Matschie (1904) published the first objection to Allen's acceptance of Oken's mammal names, writing:

Die in Oken's *Lehrbuch der Naturgeschicht* verwendeten Bezeichnungen dürfen deshalb nicht gebraucht werden, weil die Grundsatze der binaren Nomenklatur is diesem Buche nicht befolgt sind. [The designations employed in Oken's Textbook of Natural History therefore must not be used, because the principles of binary nomenclature in this book are not followed.]

Hershkovitz (1949) later wrote, "None of the above names credited to Oken, 1816, has the status of a generic name in the 'Lehrbuch.' Oken's system of nomenclature is neither Linnaean nor scientific. Most names proposed by Oken for his categories are expressed in vernacular or pseudo-scientific terminology." Hemming (1956) published Opinion 417 of the International Commission on Zoological Nomenclature, which made the names in Oken's 1816 publication unavailable.

However, Allen's 1902 paper attracted Theodore Nicholas Gill's attention (professor at George Washington University, and a long-time research associate at the Smithsonian Institution of Natural History), who then went through Oken's publications for fish names and discovered another paper published by Oken (1817). Gill (1903), not aware that Sander was a Latvian common name, wrote "I [Gill 1894] was unable to find a latinized generic name for the Pike-perches earlier than 1820, when Rafinesque published the name *Stizostedion.* The name Sander, published in the year 1817 [by Oken] as Cuvier's, must now be received and take its place."

The International Code of Zoological Nomenclature, (2000), 4th Edition ('the Code'), Chapter 4: Criteria of availability, Article 11, states in Recommendation 11A:

> Use of vernacular names. An unmodified vernacular word should not be used as a scientific name. Appropriate latinization is the preferred means of formation of names from vernacular words." Although there are Latin nouns that end in "-er", e.g. *frater*, *mater*, *magister*, according to Article 11.8. "Genus-group names. A genus-group name (see also Article 10.3) must be a word of two or more letters and must be, or be treated as, a noun in the nominative singular." This is why Stark (1828) used the "-us" ending when he coined the name *Sandrus*. It is also why Jordan (1929) used the properly formed *Sandrus* for the Eurasian Pikeperch. Gill's (1903) error in thinking Sander was a Latin name was the beginning of chain of publications that has perpetuated this nomenclature error to this day.

For example, David Starr Jordan (1917), not realizing that Gill had mistaken a common name for a scientific name, wrote in his *Genera of Fishes*, "Professor Oken gives Latin equivalents to all the French names in the first edition of the *Règne Animal* of Cuvier."… "Sander (Cuvier) Oken, 294, ("Les Sandres" Cuvier), Sander Oken, 1182, type *Perca lucioperca* L." However, American authors were not inclined to adopt Sander as the genus name, continuing to use *Stizostedion* for Walleye and Sauger (e.g., Forbes and Richardson 1920; Hubbs 1926; Simon 1946; Hubbs and Lagler 1947; Harlan and Speaker 1956; Trautman 1957; Smith and Bailey 1961).

Even Jordan (1929) continued using *Stizostedion* Rafinesque for the Walleye and Blue Pike, and elevated the subgenus *Cynoperca* Gill and Jordan, 1877 to generic status for the Sauger, but then used *Sandrus* Oken (*Lucioperca* Cuvier) for the Eurasian pikeperch. The genus *Sandrus* was attributed to Stark (1828) by Jordan and Evermann (1896), not to Oken (1817). In this same footnote, Jordan and Evermann used the genus *Lucioperca* for the Eurasian pikeperch and ascribed it to Fleming (1822).

Collette (1963) rejected giving credit to Fleming for coining the genus *Lucioperca*, saying,

> The first available use of *Lucioperca* is that of Schinz (1822: 475, type species *Perca lucioperca* Linnaeus by monotypy). In the same year, Fleming (1822: 394) listed *Lucioperca* (*L. vulgaris*) as a subgenus of *Perca*. Although Fleming's usage was accepted by Jordan and Evermann (1896:1020), I [Collette] am forced to reject his subgenus *Lucioperca* as unavailable because there is no description and the only species name (*vulgaris*) has not been used for a pikeperch.

Collette (1963), also rejected the availability of Sander. He wrote,

> Gill (1903), Chevey (1925), and Cărăusu (1952) considered that the first available name was Sander, originating in Oken (1817). Sander is listed in the column entitled 'Cuvier's System' on page 1182 (misprinted 1782) of Oken but the closest approach to it in the columns labeled 'Oken's System' is on the succeeding page where, under Barsche, is listed 'Perca, etc.' Therefore, it does not seem to me [Collette] that in this case Oken was either proposing or accepting a generic name. Oken gave no indication of doing more than referring to the *Règne Animal* when he used Sander, the Austrian vernacular version of Les Sandres. Furthermore, Oken's system is apparently modified from his *Lehrbuch der Naturgeschichte* (Oken, 1816) where he placed *fluviatilis*, *cernua*, *lucioperca*, *zingel*, and *aspera* all in *Perca* without mention of Sander. …. and the valid name for the genus therefore is *Stizostedion* Rafinesque, 1820.

I agree with Collette that Oken was not erecting a new genus for *Perca lucioperca.* Oken (1817) lists in a column under Cuvier's System, under the heading Zingel, and indented to the right, "*Perca, Apogon, Terapon, Sander, Enoplosus, Centropomus*." This is the reverse order of the headings of paragraphs found on pages 292–295 in Cuvier (1816), "Les Centropomes, Les Enoploses, Les Sandres, Les Esclaves (Terapon), Les Apogons, Les Perches." Oken is merely listing the Eastern European common name Sander for Cuvier's French common name Les Sandres. He is not erecting a new genus. He did not designate a type species. He did not illustrate Sander, and he never provided a description. Sander cannot be considered the senior synonym for Walleye, Sauger, and Eurasian pikeperch. Collette and Bănărescu (1977) later confirmed the validity of the generic name *Stizostedion*.

Eschmeyer and Bailey (1990) in their *Genera of Fishes* wrote,

> *Sander* Oken (ex Cuvier) 1817:1182 [ref. 3303]. Masc. *Perca lucioperca* of Bloch (= *Perca lucioperca* Linneaus 1758:289). Type by subsequent monotypy. Technical addition of species after Latinization not investigated. Based on "Les Sandres" of Cuvier 1816:294 [ref. 993] (see Gill

> 1903:966 [ref. 5768]). Synonym of *Stizostedion* Rafinesque 1820. Percidae." Eschmeyer and Bailey (p. 597) added to the literature cited for Oken, L. 1817 [ref. 3303], [See Gill 1903:965-967 [ref. 5768] for discussion of pagination and Cuvier's French "generic" names Latinized by Oken.]

Eschmeyer and Bailey thus cited Gill (1903), who made the mistake of thinking Sander was a Latin name, and were misled by Gill's error into giving the Latvian common name Sander as a senior synonym of *Stizostedion* Rafinesque. Eschmeyer (1998) repeated the same error word for word in his *Catalog of Fishes*.

Maurice G. Kottelat (1997) reviewed the systematics and nomenclature of the European freshwater fishes. Kottelat (1997) wrote of his checklist, "I certainly do not consider it as a systematic revision but more as a working document on which to base further researches." Kottelat singled out as noteworthy two changes: present name *Sander lucioperca* earlier name *Stizostedion lucioperca*, and present name *Sander volgensis* earlier name *Stizostedion volgense*. Kottelat stated that Sander Oken, 1817, is the senior synonym of *Stizostedion*. He quoted Gill (1903) and Eschmeyer (1990) (*sic*) as confirmation. However, as we have seen above, Gill was wrong about Sander being a Latin name and both Eschmeyer and Bailey (1990) were misled by Gill's (1903) paper. Kottelat admitted that he did not review any literature from the former Soviet Union. As a result, he missed the important paper by Fischer (1791), not in Kottelat's literature cited, on the 48 fishes of Latvia, and would not have seen Fischer's listing Sandat and Sander as Latvian vernacular names for *Stizostedion lucioperca*. However, there is no equivalent reason for his missing Bloch's (1785) Berlin paper, also not in Kottelat's literature cited, in which Sandat and Sander are listed as the common names of *Stizostedion lucioperca* in Latvia. Kottelat (1997) wrote, "Synonyms based on North American material have usually been omitted." Although Kottelat did cite Rafinesque (1820) and Collette and Bănărescu (1977), he did not cite Collette's (1963) revision of Percidae, in which he would have read Collette's argument against Sander being a valid name. Kottelat wrote with respect to his choice of names, "I have tended to choose unconventional alternatives, not for the pleasure of being provocative …but partly because unconventional problems will attract more attention and hopefully generate the much needed detailed studies." This is exactly what Hershkovitz (1949) warned us against.

Nelson et al. (2003) then followed Kottelat (1997) writing,

> Gill (1903) concluded that Sander was a valid and properly formed generic name and had priority over *Stizostedion.* … Although the International Commission of Zoological Nomenclature could have been petitioned to conserve *Stizostedion*, other references to *Sander* in the European literature suggest to us that it is now too late to petition and we thus employ the generic name *Sander*.

Nelson et al. (2003) did not corroborate whether or not Gill was correct and so sank *Stizostedion*, a name correctly in use for 183 years. They also were misled by Gill's mistake that Sander is a Latin name. Nelson et al. (2004) perpetuated this mistake writing, "Reasons for changing the generic name from *Stizostedion* to *Sander* are given in Nelson et al. (2003)."

In contrast, Miller and Robison (2004) in *Fishes of Oklahoma* wrote,

> We continue to use the generic name *Stizostedion* despite the fact that some workers are using Sander for the pikeperch. In our view, the latter was a buried name and probably intended as a common name by the author, Oken 1817. The international rules of zoological nomenclature do not favor use of such a name, so we believe *Stizostedion* is the valid name for the pikeperch.

Bruner (2011) also recently recognized the generic name as *Stizostedion*. Bruner pointed out that Fischer (1791) had listed Sander as a common name for *Perca lucioperca* (= *Stizostedion lucioperca*). Furthermore, the species Oken referred to of Cuvier (1816) was an illegal trinomial *Perca lucio perca* Bl., and the correct authorship of *Stizostedion lucioperca* (Linnaeus 1758) is Linneaus (1758), not Marc Eleiser Bloch (1785).

Page et al. (2013) further perpetuated the error of Nelson et al. (2003, 2004) by accepting the Latvian common name for pikeperch as a generic name. According to the guide for authors, in writing for American Fisheries Society journals and the *Canadian Journal of Fisheries and Aquatic Sciences*, authors are expected to follow certain style conventions pertaining to capitalization, spelling, punctuation, mathematical expressions, technical terms, and so forth. "The standard resource for the common and scientific names of North American fish species is the current edition of *Common and Scientific Names of Fishes from the United States, Canada, and Mexico* (American Fisheries Society, Bethesda, Maryland)." Unfortunately, AFS authors who follow the seventh edition will be forced to use the wrong generic name for Walleye, Sauger, and Eurasian pikeperch until a future edition of *Common and Scientific Names* corrects the error.

Perpetuation of Gill's (1903) error about the origin of the word Sander by Jordan (1917, 1923), Chevey (1925), Cărăusu (1952), Eschmeyer and Bailey (1990), Kottelat (1997), Eschmeyer (1998), Nelson et al. (2003, 2004), Nelson (2006), and Page et al. (2013) has led to the misconception that Sander is a Latin name and is the senior synonym for Walleye, Sauger and Eurasian pikeperch. This mistake has also misled fisheries biologists into using the wrong scientific term for Walleye fisheries that are worth billions. Because the rules of the International Code of Zoological Nomenclature were not followed initially for the establishment of the genus *Sander*, and the first use of an available generic name for Walleye was *Stizostedion* Rafinesque, 1820, the latter rightly remains the correct generic name for Walleye, Sauger, and Eurasian pikeperch. In addition to the authors listed above who recognized *Stizostedion* as the valid name in 1961 and earlier, the following are among those who have correctly used *Stizostedion* more recently: Collette (1963), Nelson (1976, 1984, 1994), Collette and Bănărescu (1977), Coad (1995), Faber and Stepien (1997, 1998), Stepien and Faber (1998), Miller and Robison (2004), Bruner (2011), Nelson et al. (2016), and Robison and Buchanan (2020).

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ORCID

John Clay Bruner https://orcid.org/0000-0002-0114-7050

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