Zootaxa 1374: 55–59 (2006)
www.mapress.com/zootaxa/

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

1374

Typhlichthys eigenmanni Charlton, 1933, an available name for a blind cavefish (Teleostei: Amblyopsidae), differentiated on the basis of characters of the central nervous system

LYNNE R. PARENTI

Division of Fishes, MRC NHB 159, National Museum of Natural History, PO Box 37012, Smithsonian Institution, Washington, D.C. 20013-7012. E-mail: parentil@si.edu

Abstract

Typhlichthys eigenmanni Charlton, 1933 was described inadvertently in a richly illustrated publication on the comparative anatomy of the central nervous system of blind cavefishes. Characters described by Charlton (1933) are sufficient to differentiate the species from *Amblyopsis rosae* (Eigenmann, 1898), with which he compared it in a detailed examination of the optic tectum, the primary visual center of the brain. These characters are: 1) a relatively narrow optic nerve, 2) a relatively large *tractus mesencephalo-cerebellaris anterior;* 3) the rostral bundle of the *fibrae tectales nervi optici* ascending in front of the *nucleus dorsali thalami* as opposed to coursing around its anterior pole; and, 4) relatively small *brachia tecti*. Efforts to locate Charlton's type specimens of *T. eigenmanni*, likely histological slides, have not been successful. The type locality is Ha Ha Tonka State Park, Camden Co., Missouri. Putative topotypes are catalogued in collections of the University of Michigan, Museum of Zoology. *Typhlichthys eigenmanni* Charlton, 1933 is a subjective synonym of *T. subterraneus* Girard, 1859, the Southern Cavefish.

Key words: blind cavefishes, *Typhlichthys eigenmanni,* Amplyopsidae, optic tectum, vouchers, Missouri

Introduction

"*Typhlichthys eigenmanni* Hubbs," with no year of description and no characters distinguishing it from other blind cavefishes of the family Amplyopsidae from Missouri, was listed by Hubbs (1938:265) in a table. *Typhlichthys eigenmanni* Hubbs 1938 has subsequently been treated as a *nomen nudum* by Woods & Inger (1957), Pfleiger (1971), Eschmeyer (1998, 2006), Poly & Proudlove (2004), among others. The purpose of this paper is to demonstrate that *Typhlichthys eigenmanni* Charlton, 1933 is an available name for a blind cavefish, and to draw attention to comparative anatomical characters of the

Accepted by C. Gilbert: 25 Oct. 2006; published: 7 Dec. 2006

central nervous system that may be used to distinguish among blind cavefish species and by which this name was made available.

Harry Hayward Charlton was a professor in the Department of Anatomy, University of Missouri, Columbia, in the early 20th century. In 1933, he published a paper on the comparative anatomy of the optic tectum, the primary visual center of the brain, of two Missouri blind cavefish species that he referred to by the names *Troglichthys rosae* and *Typhlichthys eigenmanni*. The first species, the Ozark Cavefish, was described in the genus *Typhlichthys* and is now classified as *Amplyopsis rosae* (Eigenmann, 1898). Charlton was an unintentional author of the binominal *Typhlichthys eigenmanni* which he credited to Hubbs (Charlton, 1933:287, footnote 1): "The description of this new subspecies has not yet been published, but Dr. Carl L. Hubbs, curator of fishes at the University of Michigan, in a personal communication, states that a full description will appear shortly, as indicated in the list of literature cited, and that he has named it *Typhlichthys eigenmanni* in honor of the late Doctor [Carl] Eigenmann." The literature cited by Charlton (1933) includes the following entry: "Hubbs, Carl L. 1932. Studies of the fishes of the order Cyprinidontes [sic]. X. A new blind cave fish from Missouri. Occ. Pap. Mus. Zool. Univ. Mich. (in press)." Hubbs's numbered series on cyprinodontiform fishes appeared in a variety of publication outlets (see Miller, 1981), but none with this title. Hubbs never described *Typhlichthys eigenmanni*, but Charlton did, unintentionally, using comparative neuroanatomical characters.

Characters

"The optic tectum and its related fiber tracts in blind fishes. A. *Troglichthys rosae* and *Typhlichthys eigenmanni"* is the title of Charlton's (1933) paper on the comparison of the central nervous system of two species of blind cavefishes. Brains of eleven specimens identified as *Typhlichthys eigenmanni* were serially sectioned and stained with methylene blue, neutral red, and haematoxylin (for cells), and silver-stained (for nerves). Size of all of the specimens of both species that Charlton (1933:287) examined were approximately 30 to 65 mm in [total] length, "… with *Typhlichthys eigenmanni* running just a little smaller on the average than *Troglichthys rosae*." Throughout the text, he used one or the other species as an example to describe certain characteristics which I interpret as general statements about blind cavefishes of the family Amblyopsidae. At least four explicit statements were made, however, that serve to distinguish *Typhlichthys eigenmanni* from other amblyopsids:

1) Optic Nerve

With regard to the diameter of the optic nerve, Charlton (1933:292) noted that: "In *Amblyopsis spelaeus*…the optic nerve appears quite similar to that of *Troglichthys rosae.*…

In *Typhlichthys eigenmanni*, a comparable nerve is found. It is, however, somewhat smaller."

2) Tractus mesenchephalo-cerebellaris anterior

The bundle of nerve fibers identified as the *tractus mesencephalo-cerebellaris anterior* "…arises not only from the optic tectum, but from the geniculate ganglion and pretectal nucleus…" (Charlton, 1933:300). The size of this tract was compared among blind fishes and other taxa by Charlton (1933:301) who reported that "…The largest tract studied was in *Monocanthus* [sic], while that of *Microgadus* and *Anableps* were only slightly smaller. Next came the two blind fishes, *Typhlichthys* having a tract somewhat larger than *Troglichthys,* and finally *Clarius,* where the cerebellar tract is about the same size or slightly smaller than in the blind forms."

3) Fibrae tectales nervi optici

Charlton (1933:308) described the complex path of these fiber bundles: "The caudal ascending bundle is accompanied by fibers…which turn caudally into the [optic] bulb at the point where the *fibrae tectales nervi optici* turn rostrally to join the anterior bundle. This description applies to both the blind fishes; the rostral bundle in *Typhlichthys eigenmanni*, however, seems to ascend in front of the *nucleus dorsalis thalami* instead of bending around its anterior pole."

4) Brachia tecti

The *brachia tecti* are bundles of myelinated fibers that connect the *corpus geniculatum laterale* with the optic tectum (Meader, 1934:386). Charlton (1933:312) noted that "The brachia are quite prominent in the blind fishes, being somewhat larger, however, in *Troglichthys* than in *Typhlichthys*."

Thus, four characters were discussed that may be used to distinguish among blind cavefish species and by which *Typhlichthys eigenmanni* Charlton, 1933 was made available: 1) a relatively narrow optic nerve; 2) a relatively large *tractus mesencephalo-cerebellaris anterior;* 3) the rostral bundle of the *fibrae tectales nervi optici* ascending in front of the *nucleus dorsali thalami* as opposed to coursing around its anterior pole; and, 4) relatively small *brachia tecti*.

Specimens

Limited data on the eleven specimens of *Typhlichthys eigenmanni* used by Charlton (1933) was provided in his comparative brain study. Charlton (1933: 287) acknowledged a debt to "…Robert M. Snyder, Jr., who graciously permitted collections of *Typhlichthys eigenmanni* to be made in a cave situated upon his property." Snyder (1876–1937) was a well-known Kansas City businessman who lived in a mansion, known as Ha Ha Tonka

Castle, Camden County, Missouri, now the site of a state park. Current location of the putative syntypes, histological preparations and the specimens from which they were prepared, if they are still extant, is unknown. Ralph G. Meader, studying the optic system of the soldierfish, *Sargocentron vexillarium*, for his Ph.D. at Yale in the early 1930s, may have used the specimens (Meader, 1934:365): "An opportunity has been afforded for comparison with many other species of teleosts through the deposit of Dr. Harry H. Charlton's collection of prepared teleost brains with the Department of Anatomy of the Yale School of Medicine." Efforts to date to locate the slides at Yale have been unsuccessful, however. This is not due to poor curatorial practices, but to the failure of authors to recognize the value of voucher material and to have it catalogued in appropriate repositories. Systematists have long recognized the value of voucher material, of course, and have encouraged colleagues to deposit material in museum collections. Unfortunately, the current trend, even in systematics journals, is to not publish this information, which some erroneously consider to be supplementary (see discussion in Funk, Hoch, Prather & Wagner, 2005).

Abbreviated species synonymy

Typhlichthys subterraneus Girard, 1859

Typhlichthys subterraneus Girard, 1859: 63 (type locality: Kentucky, Warren Co.: from a well near Bowling Green; Syntypes: USNM 8563 [3]).

Typhlichthys eigenmanni Charlton, 1933: 285–324; figs. 1?, 6, 9, 13–16, 21, 23 (type locality: Missouri, Camden Co. cave on the property of Robert M. Snyder, Jr [Ha Ha Tonka Castle], 11 syntypes, range “somewhat less than” 30 to 65 mm in length [whereabouts of types unknown]).

Typhlichthys eigenmanni Hubbs, 1938: 265 (*nomen nudum*, available as *Typhlichthys eigenmanni* Charlton, 1933).

Remarks: *Typhlichthys eigenmanni* Charlton, 1933, is treated as a subjective synonym of *Typhlichthys subterraneus* Girard, 1859, the Southern Cavefish, the name applied to blind amblyopsids in southeastern Missouri (see Mayden & Cross, 1983). Charlton’s (1933) figure 1 is identified as *Typhlichthys eigenmanni* in the text, but as *Troglichthys rosae* in the figure caption. See Poly& Proudlove (2004:4) for additional synonyms.

Acknowledgments

Reprints of Charlton’s 1933 paper and others on the comparative neuroanatomy of fishes were donated to the Division of Fishes library by Mary M. and Brian Mokler, the daughter and son-in-law of Ralph G. Meader, through the courtesy of Richard W. Thorington, Jr., Curator of Mammals, NMNH. Information on the UMMZ collections was obtained from

the website http://www.ummz.lsa.umich.edu/fishes/fish_index.html on 16 March 2006. Judy Nolke, University of Missouri, Columbia, School of Medicine, provided some information on H. H. Charlton. Information on Robert M. Snyder Jr is from the University of Missouri, Kansas City website, http://www.umkc.edu/. Michael Donoghue, Richard Prum and Gregory Watkins-Colwell, Yale University, graciously attempted to locate Charlton's histological slides on the Yale campus. Bill Eschmeyer, California Academy of Sciences, San Francisco, kindly read and commented on an earlier draft of the manuscript.

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