

5-1-2000

William Bartram's Early Observation of Nest Association Between Cyprinid Fishes

Philip A. Cochran

Follow this and additional works at: <https://trace.tennessee.edu/sfcproceedings>

 Part of the [Marine Biology Commons](#)

Recommended Citation

Cochran, Philip A. (2000) "William Bartram's Early Observation of Nest Association Between Cyprinid Fishes," *Southeastern Fishes Council Proceedings*: No. 40.

<https://doi.org/10.7290/sfcp40hp7v>

Available at: <https://trace.tennessee.edu/sfcproceedings/vol1/iss40/4>

This article is brought to you freely and openly by Volunteer, Open-access, Library-hosted Journals (VOL Journals), published in partnership with The University of Tennessee (UT) University Libraries. This article has been accepted for inclusion in Southeastern Fishes Council Proceedings by an authorized editor. For more information, please visit <https://trace.tennessee.edu/sfcproceedings>.

William Bartram's Early Observation of Nest Association Between Cyprinid Fishes

William Bartram's Early Observation of a Nest Association Between Cyprinid Fishes

PHILIP A. COCHRAN
Division of Natural Sciences
St. Norbert College
DePere, Wisconsin 54115
email: cochpa@mail.snc.edu

Interspecific nest associations among fishes, especially those involving cyprinids, have received substantial attention in recent years (e.g., Vives, 1990; Johnston, 1991, 1994a, 1994b; Johnston and Kleiner, 1994;). It may be of historical interest, therefore, to note an 18th century observation of this phenomenon by the prominent American naturalist William Bartram (1739-1823), even though he did not recognize it as such.

Bartram's contributions to North American ichthyology were reviewed by Berra (1989); some of his accounts on fishes of the southeastern United States, including the observation discussed herein, were grouped together by Cruickshank (1961). These accounts were excerpted from Bartram's (1791) report of his collecting trips during the period 1773-1776. The relevant passage is presented by Cruickshank (1961) under the heading, "The Gold Fish (Bartram's Minnow) in a Creek Flowing into Broad River, Georgia":

The waters at this place were still and shoal and flowed over a bed of gravel just beneath a rocky rapid. In this eddy shoal were a number of little gravelly pyramidal hills whose summits rose almost to the surface of the water, very artfully constructed by a species of small crayfish which inhabited them. Here seemed to be their citadel, or place of retreat for their young against the attacks and ravages of their enemy, the gold fish. These, in numerous bands, continually infested them, except at short intervals, when small detachments of veteran crayfish sallied out upon them from their cells within the gravelly pyramids, at which time a brilliant fight presented. The little gold fish instantly fled from every side, darting through the transparent waters like streams of lightning; some even sprang above the surface into the air, but all quickly returned to the charge, surrounding the pyramids as before, on the retreat of the crayfish; in this manner the war seemed to be continual.

[Like Cruickshank (1961), Van Doren (1947) used the phrase "brilliant fight" in the passage just quoted, but Slaughter (1996) used the phrase "brilliant sight."]

What Bartram misinterpreted as the constructions of crayfish were obviously the gravel mound nests of a cyprinid (Maurakis et al., 1991). Although Cruickshank (1961) did not provide an identification of the "gold fish" or "Bartram's minnow" in her glossary, Berra (1989) noted that Bartram wrote about the yellowfin shiner (*Notropis lutipinnis*) from the Broad River, Madison County, Georgia, and Slaughter (1996) equated the "gold-fish" with *N. lutipinnis*. This species is well

known as a nest associate of the bluehead chub (*Nocomis leptocephalus*), which builds a pebble mound nest (Maurakis et al., 1992), and the relationship may be obligatory for the shiner (McAuliffe and Bennett, 1981; Wallin, 1989, 1992). Indeed, Bartram's description of his "gold fish," as excerpted below from Cruickshank (1961), may be an amalgamation of observations of the spawning colors of the two species (e.g., Page and Burr, 1991), although it leans more heavily toward the shiner, which would have been by far numerically dominant (Wallin, 1989) and probably in a position of more ready visibility:

The gold fish is about the size of the anchovy, nearly four inches long, of a neat slender form; the head is covered with a salade of an ultramarine blue, the back of a reddish brown, the sides and belly of a flame or of the color of a fine red lead; a narrow dusky line runs along each side, from the gills to the tail; the eyes are large, with the iris like burnished gold.

It should be noted that *Notropis lutipinnis* from the Broad River system have been the target of recent biochemical and morphological analyses (Wood and Mayden, 1992), which suggest that they represent a distinct form closely related to the greenhead shiner (*Notropis chlorocephalus*). The latter species is also a nest associate of the bluehead chub (Johnston, 1991).

What of the crayfish noted by Bartram? They were probably preying on cyprinid eggs. Vives (1990), for example, reported attempts by crayfish to enter the spawning pits on mounds constructed by hornyhead chubs (*Nocomis biguttatus*), and predation is an important element in discussions of the potential costs and benefits to participants in nest associations (Johnston, 1991; Johnston and Page, 1992). Benefits to fishes that nest in pebble mounds may be associated with the positioning of eggs within the interstices among pebbles, where they may be protected from at least some predators and from siltation in a microenvironment that is supplied with a flow of water sufficient to aerate the eggs. Bartram's use of the phrase "cells within the gravelly pyramids" may reflect the porous nature of the mounds he observed.

Johnston (1994a) cited Cope (1869) in support of the claim that nest association has been known for over a hundred years. Like Bartram, however, Cope (1869) misinterpreted his observations of mound nests. He inferred that catostomids had deposited their eggs beneath the piles of stones he observed in the Roanoke River, and he thought that several species of cyprinids gathered at the mounds only to feed on the suckers' eggs.

LITERATURE CITED

- Bartram, W. 1791. Travels through North and South Carolina, Georgia, east and west Florida, the Cherokee country, the extensive territories of the Muscogulges, or Creek Confederacy, and the country of the Choctaws, containing an account of the soil and natural productions of those regions, together with observations on the manners of the Indians. James and Johnson, Philadelphia, Pennsylvania [Note: I have referred to reprintings of this work in volumes edited by Van Doren (1928) and Slaughter (1996)].
- Berra, T.M. 1989. The significance of William Bartram (1739-1823) to North American ichthyology. *Am. Midl. Nat.* 122:214-227.
- Cope, E.D. 1869. On the distribution of freshwater fishes in the Allegheny region of south-western Virginia. *J. Acad. Nat. Sci. Phila.* 2:207-247.
- Cruikshank, H.G. 1961. John and William Bartram's America. Doubleday and Co., Garden City, New York. 378 pp.
- Johnston, C.E. 1991. Spawning activities of *Notropis chlorocephalus*, *Notropis chiliticus*, and *Hybopsis hysinotus*, nest associates of *Nocomis leptcephalus* in the southeastern United States, with comments on nest association. *Brimleyana* 17:77-88.
- Johnston, C.E. 1994a. The benefit to some minnows of spawning in the nests of other species. *Env. Biol. Fishes* 40:213-218.
- Johnston, C.E. 1994b. Nest association in fishes: evidence for mutualism. *Behav. Ecol. Sociobiol.* 35:379-383.
- Johnston, C.E. and K.J. Kleiner. 1994. Reproductive behavior of the rainbow shiner (*Notropis chrosomus*) and the rough shiner (*Notropis baileyi*), nest associates of the bluehead chub (*Nocomis leptcephalus*) (Pisces: Cyprinidae) in the Alabama River drainage. *J. Ala. Acad. Sci.* 65:230-240.
- Johnston, C.E. and L.M. Page. 1992. The evolution of complex reproductive strategies in North American minnows (Cyprinidae), p. 600-621. *In*: Systematics, historical ecology, and North American freshwater fishes. R.L. Mayden (ed.). Stanford Univ. Press, Palo Alto, California.
- Maurakis, E.G., W.S. Woolcott and M.H. Sabaj. 1991. Reproductive-behavioral phylogenetics of *Nocomis* species-groups. *Am. Midl. Nat.* 126:103-110.
- Maurakis, E.G., W.S. Woolcott and M.H. Sabaj. 1992. Water currents in spawning areas of pebble nests of *Nocomis leptcephalus* (Pisces: Cyprinidae). *Southeastern Fishes Council Proceedings* 25:1-3.
- McAuliffe, J.R. and D.H. Bennett. 1981. Observations on the spawning habits of the yellowfin shiner, *Notropis lutipinnis*. *J. Elisha Mitchell Sci. Soc.* 97:200-203.
- Page, L.M. and B.M. Burr. 1991. A field guide to freshwater fishes of North America north of Mexico. Peterson Field Guide Series. Houghton Mifflin Co., Boston, Massachusetts. 432 p.
- Slaughter, T.P. (ed.). 1996. William Bartram: Travels and other writings. The Library of America Series, No. 84, Literary Classics of the United States, Inc. New York. 701 p.
- Van Doren, M. (ed.). 1947. Travels of William Bartram. Dover Publications, New York. 414 p.
- Vives, S.P. 1990. Nesting ecology and behavior of hornyhead chub *Nocomis biguttatus*, a keystone species in Allequash Creek, Wisconsin. *Am. Midl. Nat.* 124:46-56.
- Wallin, J.E. 1989. Bluehead chub (*Nocomis leptcephalus*) nests used by yellowfin shiners. *Copeia* 1989:1077-1080.
- Wallin, J.E. 1992. The symbiotic nest association of yellowfin shiners, *Notropis lutipinnis*, and bluehead chubs, *Nocomis leptcephalus*. *Env. Biol. Fishes* 33:287-292.
- Wood, R.M. and R.L. Mayden. 1992. Systematics, evolution, and biogeography of *Notropis chlorocephalus* and *N. lutipinnis*. *Copeia* 1992:68-81.

Southeastern Fishes Council Proceedings

Information For Contributors

The primary purpose of the *Proceedings* is to publish peer-reviewed research papers and critical reviews of activities; regional reports and notes; and other pertinent information pertaining to the biology and conservation of southeastern fishes. The *Proceedings* is also an outlet for range extensions, distributions, and status papers, covering ecology and conservation ichthyology. Life history studies, faunal surveys, management issues, behavior, genetics and taxonomy of southeastern fishes are appropriate topics for papers in the *Proceedings*. Review papers or information on imperiled waters or fishes are particularly appropriate.

Manuscripts should be submitted in duplicate. A good guide for manuscript preparation is the Sixth Edition of the *CBE Style Manual* available from the Council of Biology Editors, One Illinois Center, Suite 200, 111 East Wacker Drive, Chicago, IL 60601-4298.

The entire manuscript including the Abstract (required for longer articles), Introduction, Methods, Results, Discussion, Acknowledgments, Literature Cited, Appendices, Tables, and Figure Legends must be double-spaced. The title, author's name and author's address (including fax number and email address for corresponding author) should be centered on the first page. Indicate a suggested running head of less than ten words at the bottom of the first page. An Abstract (if necessary) will be placed at the beginning of the text. Acknowledgments will be cited in the text immediately before the Literature Cited. All references cited in the paper will follow the standard format of using the last name of the author(s) followed by the year of publication of the paper. In the Literature Cited, the references will be alphabetical by the author's last name and chronological under a single authorship. Literature cited should be standardized and abbreviated, using the *World List of Aquatic Sciences And Fisheries Serial Titles* or guidelines in *CBE Manual for Authors, Editors, and Publishers 6th ed.* for journals not included in the *World List*.

Tables should be typed on a separate page, consecutively numbered and should have a short descriptive heading. Figures (to include maps, graphs, charts, drawings and photographs) should be consecutively numbered and if grouped as one figure each part block lettered in the lower left corner. Computer-generated graphics should be high quality prints; for drawings, high quality prints or photocopies are preferred to the original line art. Legends for figures must be on a separate sheet and each figure must be identified on the back. The desired location of each table or figure should be indicated in the margin of the manuscript. When possible, tables and figures will be reduced to one column width (3.5 in), so lettering on figures should be of appropriate size. Color figures can be printed at the author's expense.

Manuscripts will be subject to editing and will be reviewed by at least two anonymous persons knowledgeable in the subject matter. The edited manuscript and page proofs will be furnished to the author. Upon returning the reviewed and corrected manuscript to the editor, a PC disk copy of the final form of the text, tables and computer-generated graphics is also requested. Specific formatting information for the disk will be sent to the author with the edited manuscript. Reprints can be ordered at the time of printing, and will be supplied to the author at the cost of printing.

Regional reports, news notes and other short communications will also be edited and included when possible in the next number.

Only manuscripts from members of The Southeastern Fishes Council will be considered for publication. There is no charge for publishing in the *Proceedings*. All manuscripts and short communications should be sent to the editor:

Frank Pezold, Editor

Southeastern Fishes Council Proceedings
Museum of Natural History (Zoology)
College of Pure and Applied Sciences
241 Hanna Hall

The University of Louisiana at Monroe
Monroe, LA 71209

Phone: (318) 342-1750; Fax: (318) 342-1755

email: bipezold@ulm.edu

Southeastern Fishes Council Web Site:

<http://www.flmnh.ufl.edu/fish/organizations/sfc/SFCDefault.htm>

Proceedings is a publication of the Southeastern Fishes Council, Inc, and is published in Charleston, South Carolina. Officers are Stephen T. Ross, Chair; Mary Freeman, Chair-Elect; Gerald Dinkins, Secretary; and Peggy Shute, Treasurer. Editor for the *Proceedings* is Frank Pezold, Museum of Natural History (Zoology), College of Pure and Applied Sciences, The University of Louisiana at Monroe, Monroe LA 71209, (318) 342-1750, bipezold@ulm.edu; Associate Editor is George R. Sedberry, Marine Resources Research Institute, P.O. Box 12559, Charleston, SC 29422-2559, (843)762-5045, sedberryg@mrd.dnr.state.sc.us. *Proceedings* is printed on recycled paper.

