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REIDENTIFICATION OF WILLIAM BARTRAM'S SAVANNAH RIVER *AMBLOPLITES*, WITH EARLY EVIDENCE FOR A TENNESSEE-SAVANNAH FAUNAL EXCHANGE

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The illustrations of artist naturalists from the late 18th to early 19th centuries have been successfully used to identify species extant today (Pietsch, 1984; Berra, 1989; Randall and Wheeler, 1991). Since diagnostic characters are not always depicted accurately, in some cases identifications are limited to genera or families. Such works still have scientific merit, however, because the drawings can frequently be associated with living species, as well as providing insights into past scientific endeavors (Pietsch, 1984; Randall and Wheeler, 1991).

Berra (1989) presented the contributions to ichthyology by William Bartram (1739-1823), the first American-born artist/naturalist. These consisted of six drawings of different fish species made from Bartram's travels in the southeastern United States from 1773-1776. Berra (1989), following Harper (1958), used the morphological features presented in the illustrations and Bartram's own written accounts to determine each species represented. Among Bartram's works are five drawings of members of the family Centrarchidae, four of which (all from the St. Johns River, FL) are easily referable to the genus *Lepomis* by virtue of the presence of an emarginate caudal fin, rounded operculum, and three spines in the anal fin. The illustrations also show character states for pectoral fin shape, opercular flap length and border, mouth gape, and pigmentation typical of *L. auritus*, *L. gulosus*, *L. macrochirus mystacalis*, and *L. microlophus*. The fifth centrarchid drawing which was not as well executed as the others (Fig. 1) was identified by Berra (1989) as a member of the rock bass genus *Ambloplites* based on the five anal-fin spines depicted in the illustration. He tentatively identified it as representing the shadow bass, *A. ariommus*.

It is our purpose to provide information and data that support the conclusion that William Bartram's first ichthyological illustration was indeed an *Ambloplites*, but that the species represented is more likely the rock bass, *A. rupestris*, rather than the shadow bass, *A. ariommus*. We document the occurrence of *A. rupestris* in the Savannah River drainage today through literature and museum records and discuss the zoogeographic implications of Bartram's find.

Some colleagues (e.g., R.E. Jenkins, in litt.) have questioned the identification of Bartram's work as an *Ambloplites* because the illustration does not depict the proper relationships of certain features (such as the large mouth, well developed supramaxilla, large eye, and body pigment pattern) characteristic of the genus, and also because *Ambloplites* was not reported from the Savannah River by Dahlberg and Scott (1971), Swift et al. (1986), or Cashner (1980). Menhinick (1991), however, showed a Savannah record of *A. rupestris*. Although there is a slight possibility that Bartram based his initial fish drawing on some non-centrarchid percoid, the locality he provided makes this unlikely. Bartram (in Harper, 1943; in Berra, 1989) initially described the site as "... Savanah River near Tugilo Georgia [sic]." At the end of his annotation on the fish, Bartram added, "He is an Inhabitant of the Province of Georgia, in Savanah River high up in the country near the mouth of Tugilo River [sic]." Although, we cannot find "Tugilo River" or "Tugilo, GA, on any Georgia road map or topographic map of the region, we think it is reasonable to assume that Bartram was referring to the Tugaloo River, a southeasterly-flowing tributary to the upper Savannah River near the GA, NC, and SC borders. If the specimen did indeed

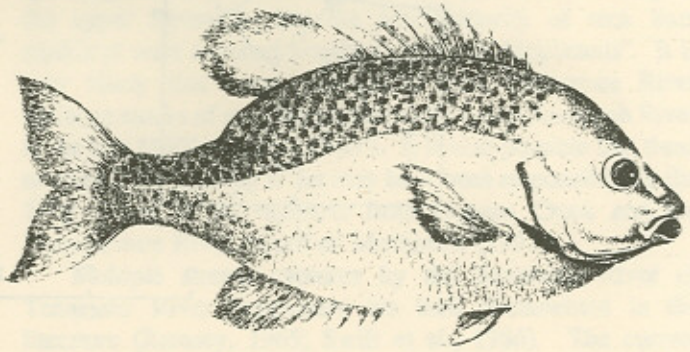

Figure 1. Bartram's illustration of *Ambloplites rupestris*.

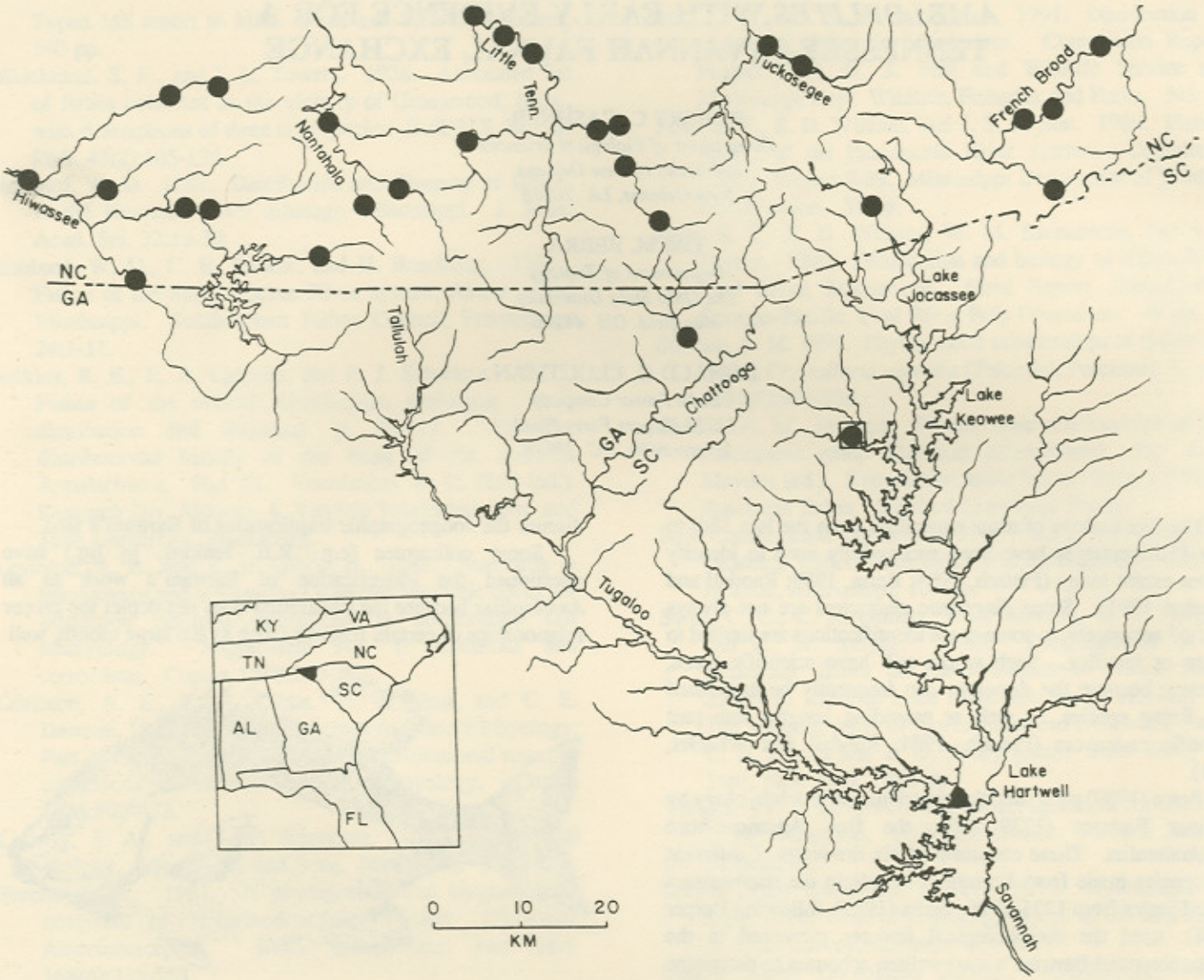

Figure 2. Distribution map of *A. rupestris* in western SC, northeastern GA, and southwestern NC. Bartram's record and Clemson localities plotted with closed triangle and boxed circle, respectively.

come from the Tugaloo River, then the locality, as best as we can determine, would actually be in South Carolina at a site now inundated by Lake Hartwell reservoir (Fig. 2).

Despite the lack of accuracy in portraying proportional characters in his initial fish illustrations and the somewhat atypical descriptions in his account (e.g., "...Fins & Tail black, except those placed on the fore part of his Body which are red or orange color [sic]."), we feel that Bartram was most likely depicting an *Ambloplites*. The primary reason for our conclusion is that Bartram displayed correct dorsal and anal spinous ray counts for all his lepomine subjects. All four illustrations of *Lepomis* are shown with the typical ten dorsal and three anal spines. The putative *Ambloplites* specimen illustrated in Berra (1989:221) has ten dorsal and five anal spines. The anal spine count serves to eliminate any other non-centrarchid percoids (e.g., *Morone*), and places the species represented in the centrarchid subfamily Centrarchinae. Three species of centrarchines are regularly recorded from the Savannah River drainage: mud sunfish, *Acantharachus pomotis*; flier, *Centrarchus macropterus*; and black crappie, *Pomoxis nigromaculatus* (Swift et al., 1986). The mud sunfish and flier are lowland forms that do not extend onto the piedmont and montaine provinces. The black crappie, which may occur farther up the Savannah drainage, has only seven or eight dorsal spines and a more posteriorly placed dorsal fin than the specimen in Bartram's drawing. The general body shape, median fin placement, and spine number are most characteristic of *Ambloplites*.

The determination of the species in Bartram's *Ambloplites* drawing is more difficult to resolve than the generic designation. Berra's (1989) identification as *A. ariommus* was based primarily on his understanding that the geographic range of the shadow bass encompassed all drainages in the southeastern United States. In fact, the shadow bass is

distributed only along the Gulf Slope drainages east of the Mississippi River and is not known to occur in any Atlantic Slope drainage (Cashner, 1980; Page and Burr, 1991). Berra also based his species identification on the proportional measurements he obtained directly from Bartram's drawing, noting that the body depth was greater than the range given for *A. rupestris* (Cashner, 1974). Body depth, as expressed in thousandths of standard length, is usually 415-435 in *A. rupestris* and 445-460 in *A. ariommus* (Cashner, 1974). Although, the Bartram illustration of *Ambloplites* has a body depth/SL of 450, his lack of precision in the portrayal of other morphometric characters reduces the diagnostic value of this character.

The number of spines depicted in the dorsal and anal fins, (10 and 5, respectively), is one less than the counts usually reported for each of the four species of *Ambloplites*. Although both values are variants that have been recorded for all *Ambloplites*, the lower counts are more frequently seen in *A. rupestris* than in the other species. For example, out of 650 specimens of *A. rupestris* examined, 8.1% had 10 dorsal spines and 9.2% had 5 anal spines; by contrast, only 3.4% of 442 *A. ariommus* had 10 dorsal spines and <1.0% had 5 anal spines (Cashner, 1974).

The most useful non-meristic trait in identifying *Ambloplites* species is color pattern of the lateral surface (Fig. 3). Shadow bass have four to five irregular blotches that extend from the dorsal fin base to the pelvic and anal fins, whereas rock bass have rows of spots. The pattern above the lateral line is clearly discernable in Bartram's *Ambloplites* (Fig. 1). Although the dorsolateral surface is darkly shaded, six rows of dark spots are nevertheless apparent. Dark spots also appear below the lateral line, but are more scattered and not organized into rows. This condition is not uncommon in specimens of *A. rupestris*.

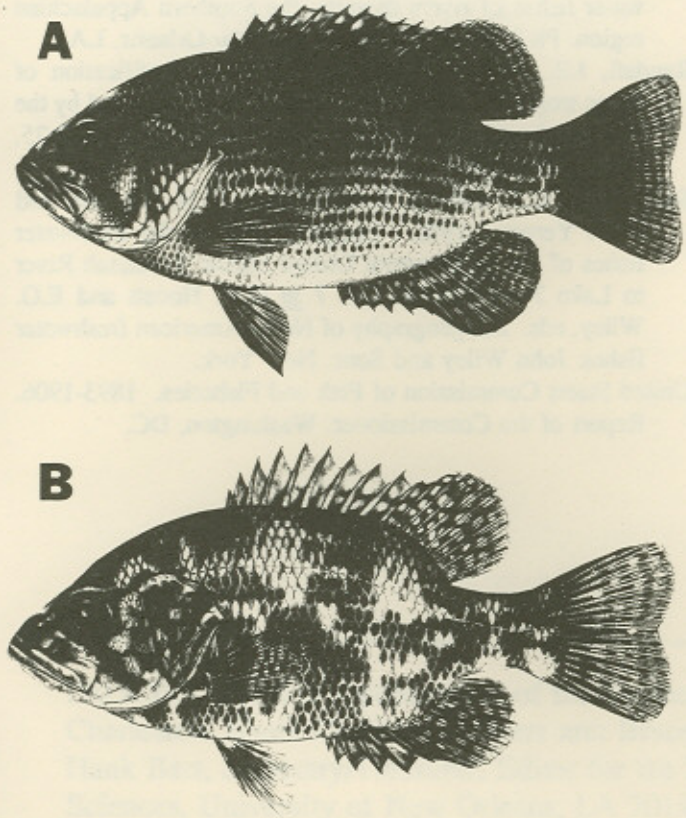

Figure 3. A. *Ambloplites rupestris* and B. *A. ariommus*.

As previously noted, rock bass have not been reported from the upper Savannah River drainage in any publication on state or regional ichthyofaunas, except for the recent record shown by Menhinick (1991). We report here on the collection of two specimens of *A. rupestris* from Oconee Creek, Oconee Co., SC, (Fig. 2) on 28 July 1982, by Melvin Cobb. The specimens which are currently in the teaching collection of Jeff Foltz, Clemson University, measure 75.0 mm and 131.1 mm SL, and have body depth/SL values of 400 and 393, respectively. Each has XI-11 dorsal fin elements, VI-10 anal fin elements, 22 breast scale rows, and a lateral pattern dominated by rows of spots. Although supporting our contention, confirmation of the presence of *A. rupestris* in the upper Savannah today does not conclusively prove that the species was present during Bartram's time. From the 1890's to the early 1900's, over 13,000 hatchery raised rock bass were distributed in GA and SC (U.S. Commission of Fish and Fisheries, 1893-1906). Some of the specified localities were in the Alabama and Apalachicola river drainages. A few (e.g., Washington, GA, and Allendale, SC) were in the vicinity of the upper Savannah, but the vast majority of rock bass stockings were reported simply as going to "applicants". It is very likely that some transplants from Tennessee River drainage stocks of rock bass reached the upper Savannah River in the late 1890's or early 1900's. It is also possible that these or some later stocking effort may have been responsible for the 1982 record of *A. rupestris* from Oconee Creek and the Horsepasture River record of Menhinick (1991).

Multiple stream captures by the Savannah River of Tennessee River headwaters are well documented in the literature (Ramsey, 1965; Swift et al., 1986). The current distribution of rock bass in streams of the Tennessee River drainage, in close proximity to the headwaters of the upper Savannah, suggests that it was susceptible to such capture (Fig. 2). There are a number of other Tennessee River drainage species that also occur in the Savannah, which supports the Tennessee stream capture hypothesis. These include: *Clinostomus funduloides*, *Cyprinella galactura*, *Luxilus coccogenis*, *Nocomis micropogon*, *Notropis leuciodus*, *N. rubricroceus*, *N. spectrunculus*, *Rhinichthys cataractae*, *Etheostoma zonale*, and *Cottus bairdi* (Deubler, 1955; Ramsey, 1965). If Bartram did indeed record the first specimen of *A. rupestris* from the Savannah River, he provided documentation of a stream capture event with the Tennessee River that occurred more than 200 years ago. The apparent scarcity of rock bass records in the upper Savannah River drainage may result from the presence of major impoundments which have caused habitat loss and consequent restriction of range in those areas. No data exist from pre-impoundment surveys to determine whether or not *A. rupestris* was more widespread in the Savannah River drainage than it is today.

The possibility that there was once a population of shadow

bass in the upper Savannah is unlikely, although it cannot be completely dismissed. The presence of *Luxilus zonistius*, *N. hypsilepis*, *Gambusia affinis*, and *Micropterus coosae* in the upper Savannah drainage are cited as evidence of an older connection with the Chattahoochee River system (Ramsey, 1965; Swift et al., 1986; Lydeard et al., 1991). The biological support for this connection may not be as strong as other lines of evidence. Both *G. holbrooki* and *G. affinis* are now known to occur in the upper Savannah. Their co-occurrence could be the result of stream capture between the Chattahoochee or Tennessee and the upper Savannah, but the introduction of *G. affinis* by federal or state agencies is also likely. The *N. hypsilepis* record from the upper Savannah is from habitat atypical for the species. The possibility of bait-bucket introduction cannot be completely dismissed (C. R. Gilbert, in. litt.). Finally, it has been suggested that the *Micropterus* in the Savannah commonly referred to as *M. coosae* may represent a distinct and undescribed form (C. R. Gilbert, in. litt.). *Ambloplites ariommus* is native to the Chattahoochee River system, but is primarily distributed below the Fall Line. Most of the current records for the species in the Chattahoochee system are from elevations of < 500 ft and all other populations of *A. ariommus* in Georgia inhabit areas that do not exceed that elevation. *Ambloplites ariommus* tends to be a lowland inhabitant, which argues against an upper Chattooga-Savannah transfer of this species. All records of *Ambloplites* in the Savannah, from Bartram's to Menhinick's are from elevations >1500 ft.

Without the specimen on which Bartram actually based his drawing, we cannot be absolutely certain whether it was *A. rupestris* or *A. ariommus*. However, circumstantial evidence, based on meristic characters, color pattern, habitat preference, geographic range, and prior drainage connections, strongly suggests that it was a rock bass.

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