

OCCASIONAL PAPERS OF THE MUSEUM OF
ZOOLOGY

UNIVERSITY OF MICHIGAN

ANN ARBOR, MICHIGAN

A NEW SPECIES OF *CARUNCULINA* (UNIONIDAE:
PELECYPODA) FROM THE SAVANNAH RIVER,
SOUTH CAROLINA*

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IN THE years since 1951 the Limnology Department of the Academy of Natural Sciences of Philadelphia has conducted numerous biological surveys of the Savannah River. During the course of one of these surveys (June, 1962, results unpublished) the author collected specimens of an apparently undescribed species of *Carunculina*, which is described below.

Carunculina patrickae new species
(Pl I; Figs 1-2)

DIAGNOSIS.—Shell elliptical, inflated, rounded posteriorly and anteriorly in holotype (♀), pointed posteriorly at ridge termination in allotype (♂); beaks full and slightly elevated, sculptured with sharp ridges which, posteriorly, form small double-loop ridges curving acutely upward to the very prominent posterior ridge; epidermis brownish black becoming lighter toward disc, typically clothlike in appearance when wet, growth rests prominent, elevated and dark; rayless; nacre salmon colored and somewhat iridescent, becoming purplish at posterior extremity; muscle scars distinct; pseudocardinal teeth small and ragged, double in left valve, single in right valve; lateral teeth form almost straight line, striate, in the left valve double with the dorsal one smaller, in the right valve double with the ventral one rudimentary. Animal white, typical of the genus; gills separate and free from abdominal sac, posterior portion of outer gills form marsupium which extends somewhat beyond the original gill margin; ovisacs nine in holotype, as many as fourteen in paratypes; supra-anal, anal, and

* This work was supported in part by U. S. Atomic Energy Commission Grant No. AT (30-1) 2991.

branchial siphons present and all with dark brown margins; supra-anal separated from anal by fusion of mantle margin which equals length of siphon, opening very small; anal and branchial siphons not separated by fusion of mantle margin, edge of anal crenulated, edge of branchial strongly papillated; large caruncle at ventral margin in holotype, absent in allotype.

MEASUREMENTS.—Holotype: Length, 24.5 mm; height, 14 mm; diameter, 11 mm.; age, 4 yrs. Allotype: length, 21.5 mm.; height, 12.5 mm.; diameter, 10.25 mm.; age, 3 yrs.

TYPE LOCALITY.—Savannah River at approximately mile point 134.5 (U. S. Army Corps of Engineers Map) on the South Carolina bank. Collected June 28, 1962, from shallow slack water area at lower end of sand bar, mud-sand substrate.

TYPES—Holotype: University of Michigan Museum of Zoology, No. 227428. Allotype, No. 227429. Additional types to be deposited in the Academy of Natural Sciences of Philadelphia.

The specific name is in honor of Dr. Ruth Patrick of the Academy of Natural Sciences of Philadelphia.

DISCUSSION

The type collection of this species was made June 28, 1962, and contained nine live specimens. All were relaxed in Nembutal solution, killed and fixed in 10 per cent formalin, and preserved in 70 per cent ethyl alcohol. Histological sections of all specimens were subsequently prepared. Two of these specimens are designated as type and allotype; the remaining seven are designated as paratypes. Measurements of the paratypes are given in Table 1.

On June 4, 1965, an additional series of 31 live specimens and several dead were secured from the type locality. (Collecting during the interim had failed to produce additional specimens.) This additional series

TABLE 1
MEASUREMENTS (MM.) AND SEX AND AGE OF
PARATYPES OF *C. patrickae*

Specimen No	Length	Height	Diameter	Sex	Age (yrs.)
1	36	21	17	♂	5
2	35	21	16	♂	5
3	30.5	18	16.5	♀	4
4	26	15	11	♂	3
5	23	14	11.5	♂	3
7	19	12	9	♂	3
6	22	13.5	10	♀	3

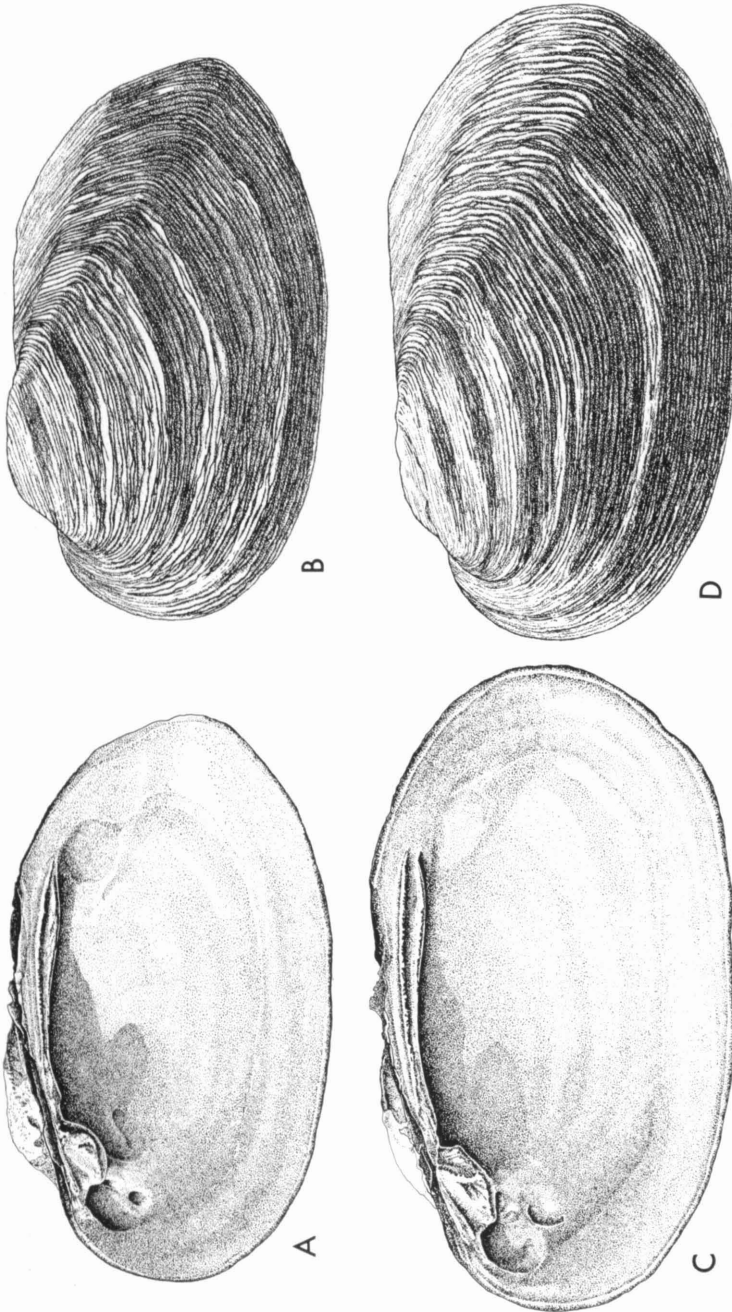


FIG. 1. A: Drawing of interior of right valve of allotype (δ); note prominent muscle scars and form of lateral tooth. B: Drawing of exterior of left valve of allotype; note posterior ridge and coarse growth lines, also note the somewhat pointed posterior margin. C: Drawing of interior of right valve of holotype (♀) showing ragged pseudocardinal tooth and double lateral; this view tends to distort the relative size of the rudimentary ventral lateral tooth. D: Drawing of exterior of left valve of holotype; note the rounded posterior margin.

contains gravid females and several very young specimens, the smallest being 10 mm. long. While detailed analysis of this collection is yet incomplete, it is obvious from cursory examination that the beak sculpture, prominent posterior ridge, and heavy growth lines clearly distinguish this species from all others in the genus. A more detailed anatomical study of the species is now feasible and is anticipated for the near future.

PRELIMINARY NOTES ON THE LIFE HISTORY

As is true for most of the unionids, detailed data concerning the life history of this species is lacking. The material at hand does, however, indicate normal seasonal reproductive activity characteristic of members of the Lampsilinae. The presence of mature gametes in both male and female acini (Pl. I) and the presence of early embryos in the marsupium (Fig. 3) would indicate that at the time of this collection spawning was just beginning. For how long a period the spawning

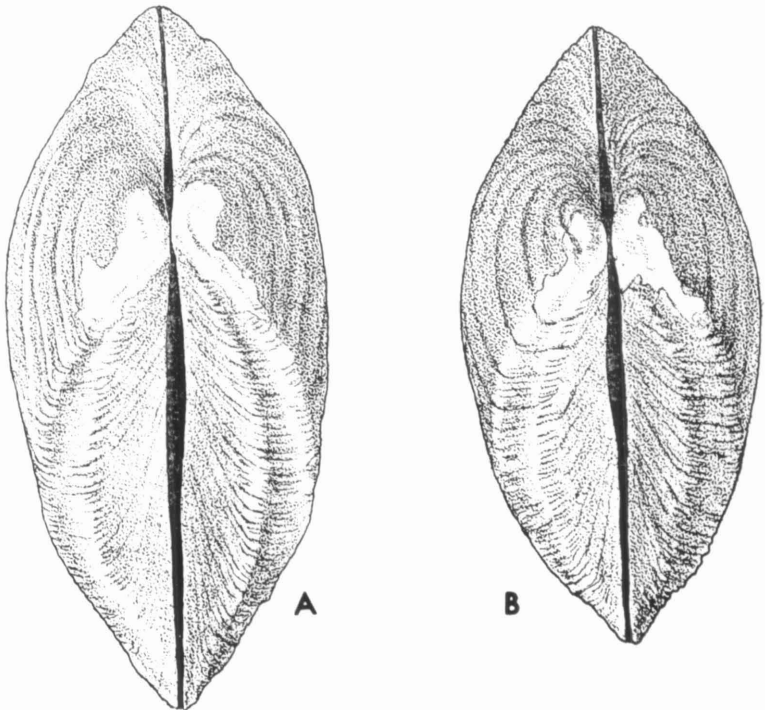


FIG. 2. A: Dorsal view (drawing) of holotype; apparent here are the distinctive heavy growth lines and the prominent posterior ridge, note form of beak sculpture. B: Dorsal view (drawing) of allotype; note same characters as in holotype.

process continues is not known. However, the condition of the gonads would indicate that the spawning process might continue throughout most of the summer. Histological examination of the gonads of a few specimens, from the early June collection of 1965, revealed earlier stages of gametogenesis and the presence of few mature gametes; females in this collection were still carrying mature glochidia from the previous season. These data would indicate that the gonads are active throughout most of the year and that the period during which the marsupium is not charged with embryos and/or glochidia is extremely short. These results agree closely with the data for *Actinonaias ellipsiformis* as reported by van der Schalie and van der Schalie (1963). The glochidium of this species appears to be very similar to those described for other species in this genus. Fish host relations are completely unknown at present.

PRELIMINARY PHYLOGENETIC CONSIDERATIONS

While this species clearly exhibits the characteristics of the genus to which it has been assigned, its relation to other taxa is not presently clear. The presence of a distinct supra-anal siphon and the general shape of the shell would indicate relationship with the group of *Carun-*

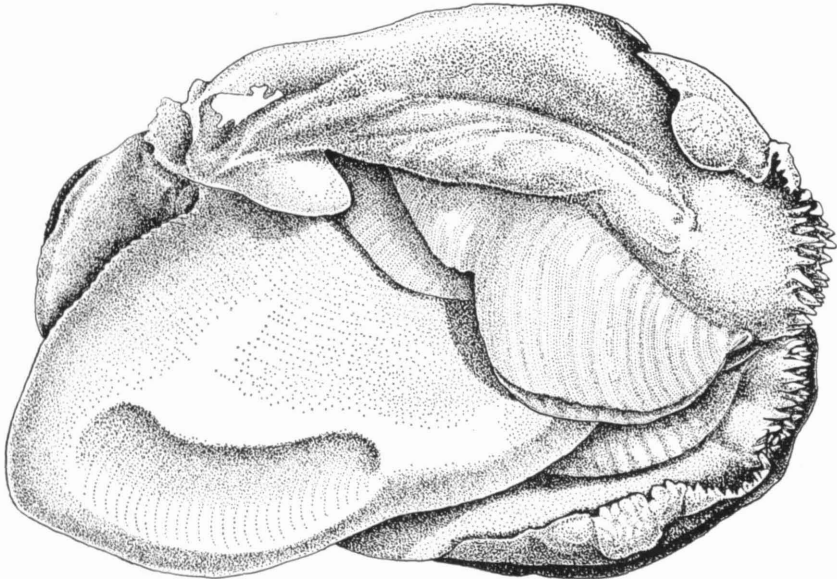


FIG. 3. Drawing of paratype, No. 3, left valve removed and mantle reflected; note characteristic shape of marsupium (partially charged with embryos), heavy papillation on branchial siphon, and large caruncle.

culina texasensis (Ortmann, 1912). If one accepts beak sculpturing as a conservative taxonomic character, then the closest affinity of this species would be with *C. haleiana* (group of *C. texasensis*) which has raised beaks that often exhibit a rudimentary posterior loop. The salmon nacre would also indicate this affinity (Simpson, 1900, 1914; Ortmann, 1912). None of the three species (*C. pulla*, *C. paula*, *C. minor*) reported from this general geographic area (Southeastern U. S., Atlantic drainage) appear to be closely related to this form. It is futile to attempt further phylogenetic interpretation until substantially more information concerning the distribution and basic biology of this group is available. It is indeed unfortunate that the paucity of properly prepared animal material, along with pertinent ecological data, available in most other museum collections make detailed comparative studies all but impossible. The obvious inference is that many workers in the field do not yet consider the biology of the organism important.

Ecological considerations shall be treated in detail in a general paper on the molluscs of the Savannah River (in preparation).

ACKNOWLEDGMENTS

I am indebted to Dr. Henry van der Schalie for his generous assistance in the preparation of this paper; to Mr. John Tottenham for the preparation of the drawings; to Annette van der Schalie for the preparation of the histological sections; and to Mr. Louis Martonyi for the preparation of the photographs.

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Accepted for publication January 24, 1966

PLATE

PLATE I

UPPER LEFT: Sagittal section through gonad of holotype; walls of the acini very thin and lumen obliterated by many large ova; original magnification $\times 100$.

UPPER RIGHT: Enlargement of Upper Left. Mature ovum, showing presence of vitelline membrane; note thin wall of acini and presence of stalk; original magnification $\times 750$.

LOWER LEFT: Transverse section through gonad of allotype; acini showing active spermatogenesis and mature sperm in lumen; original magnification $\times 100$.

LOWER RIGHT: Enlargement of Lower Left. Note mature sperm in lumen; original magnification $\times 750$.

Above reduced to 60 per cent of original

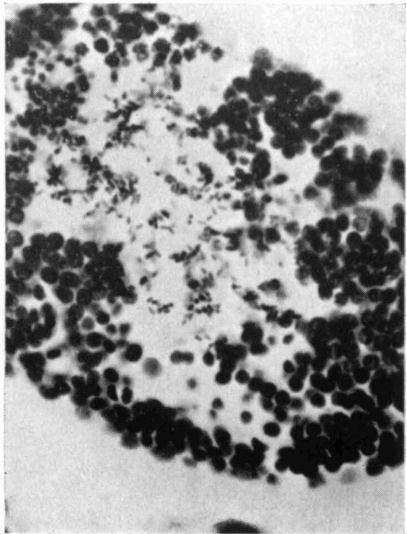
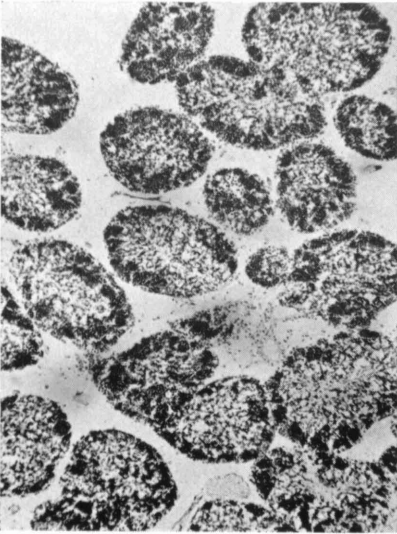
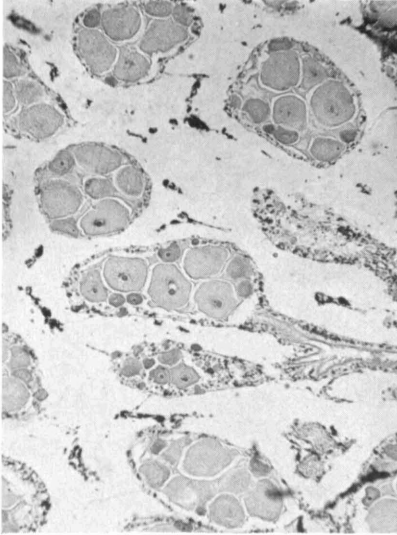


PLATE I

