

CRASPEDACUSTA IN THE SOUTHEASTERN UNITED STATES¹

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The freshwater medusa *Craspedacusta sowerbii* Lankester has been reported from approximately one hundred localities in the United States and southern Canada. Evidence has been presented by Kramp (1950) and by Lytle (1960) that this medusa is an exotic, introduced into the United States and other parts of the world in recent times from the Yangtze River basin in central China.

Most American records for *C. sowerbii* have come from the northeastern United States and it has been suggested that this apparent concentration of medusa records is a reflection of the greater density of the human population and more intensive biological investigations in that portion of the country. Relatively few records of freshwater medusae have been published from the southeastern quarter of the United States and it is the purpose of the present report to summarize the records of medusae in the Southeast and to supplement these records with a report of several recent occurrences in this area.

I wish to express my appreciation to the several persons who contributed specimens and observations on medusae in this area. I am particularly indebted to Dr. Charles Cutress of the United States National Museum and to Dr. Fritz Haas of the Chicago National History Museum for their generous cooperation and the loan of specimens. Dr. William R. Murchie of Flint College, University of Michigan, very kindly made available to me some papers and several lots of specimens from the collection of the late Dr. Frank Smith of the University of Michigan. Among the several other donors was the Carolina Biological Supply Company, Elon College, North Carolina, which made a gift of specimens collected in North Carolina.

Specimens from the following locations were examined during the present study (source of borrowed specimens indicated in parentheses); *Alabama*: Lake Purdy (Smith Collection), Lake Wilson (TVA collection),

Georgia: pool in Augusta (USNM), lake near Sonoraville (CNHM). *Kentucky*: Benson Creek (Smith Collection), Kentucky River near Cottonburg (USNM), Indian Lake (USNM). *Maryland*: rocky pool near Cabin John (USNM). *North Carolina*: Lake Jeanette (Carolina Biological Supply Co.). *West Virginia*: lake near Athens (USNM); Cheat Lake (USNM).

The previous records of medusae in the Southeast are summarized by state in Table 1 with the exception of records for Maryland, Virginia, and the District of Columbia. This latter area has previously been studied more intensively than other portions of the Southeast and previous records of medusae in these states are listed in a recent paper (Lytle, 1960).

Freshwater medusae have been collected and/or observed in ten new locations in the Southeast; these ten new records are listed by state in Table 2. Information regarding the appearance of medusae was received from many different sources and was often fragmentary in nature. Nevertheless, this information has proved valuable to us in locating *Craspedacusta* for experimental purposes and should prove useful in future analysis of the distribution and ecology of this form. In each case of a report of medusae from a new locality we endeavored to secure specimens and accurate data on the habitat. Several new reports which lacked sufficient data to be authoritative were omitted from this report.

NEW RECORDS

Alabama: The late Dr. W. E. Snow, formerly a biologist on the staff of the Tennessee Valley Authority at Wilson Dam, Alabama, reported medusae in Lake Wilson, a large TVA impoundment on the Tennessee River in northeastern Alabama on July 1 and 4, 1958. A few medusae were observed at several scattered points on the lake and a total of 17 specimens were collected. Subsequent examination of the alcohol-pre-

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served specimens revealed four male medusae and 13 female medusae, ranging in diameter from 11 to 15 mm. No medusae were observed in the lake during the summer of 1959 as reported by Dr. Gordon E. Smith of the TVA.

Georgia: During August of 1957 medusae were reported in Lake Sidney Lanier, a large impoundment near Gainesville, Georgia, by Mr. T. S. Callaway of Greensboro, Georgia.

Dr. W. D. Burbanck reported that several medusae were collected and kept in an aquarium at Emory University during the summers of 1957 and 1958.

A single male specimen collected during August 1946 in "a lake near Farmville, Georgia", was found in the collection of the Chicago Natural History Museum. No further collection data was available.

Professor R. E. Ware of Clemson College,

TABLE 1.
Previous records of freshwater medusae in the southeastern United States

Location	Nature of Habitat	Date Observed or Collected	Reference	Notes
<i>Alabama</i> Stallworth Lake, near Tuscaloosa	impoundment of Warrior River	Sept. 14-Oct. 9, 1928	White, 1930	males
Lake Purdy, near Birmingham	impoundment on Cahaba River	Aug. 1-28, 1933	Breder, 1937; papers of the late Dr. Frank Smith	females; dis- appeared after copper sulfate treatment of the lake
<i>Arkansas</i> near Prescott	Blue Lake	1927	Causey, 1938	
near Stamps	mill pond	1937	Causey, 1938	
<i>Florida</i> Little Lake Elbert in Winter Haven	natural lake	Aug. 1-15, 1943; also seen in 1942	Byers, 1944	males (about 24 specimens col- lected; mostly immature)
Silver Springs, near Ocala	natural spring	1954	Odum, 1957	hydroids only collected
<i>Georgia</i> Churchyard pool in Augusta	small concrete pool	Sept. 16, 1918	Hargitt, 1923 Payne, 1924	USNM No. 40794 USNM No. 40795 males
<i>Kentucky</i> Benson Creek, near Frankfort	near mouth of creek just above impound- ment of Kentucky River	Sept. 26-27, 1916; Sept. 1924	Garman, 1916, 1922, 1924	USNM No. 40053 USNM No. 42797 males
		July 30-Aug. 20, 1925	Payne, 1925, 1926	hydroids only
Kentucky River at High Bridge near College Hill	river	1917	Payne 1926	
	river	Sept. 1925	Payne 1926	males and females
at Valley View	river	1922	Payne 1926	
Three locations on the river between College Hill and Valley View		1925	Payne 1926	
Indian Lake, near Owensboro	unknown	Aug. 1927	Schmitt, 1927	USNM No. 42195 USNM No. 42198
<i>Louisiana</i> Monroe	small concrete tank	June 1935; also seen 1932 or 1933	Viosea and Burkenroad, 1936	males
<i>Mississippi</i> Belhaven College in Jackson	small concrete pool	Aug. 14-31, 1944	Fincher and Buchanan, 1944	males
<i>Tennessee</i> Jackson Lake, 12 mi. west of Knoxville	50-60 acre impoundment	July 15-Aug. 3, 1938; also seen 1936 and 1937	Powers, 1938	females
Mouth of Burton's Creek on Kentucky Lake, near Tennes- see 100	impoundment	July 24, 1952	Chadwick and Houston, 1953	females
<i>West Virginia</i> near Athens (Wood County)	unknown	1930	Schmitt, 1939	USNM No. 42674 one female
Cheat Lake 7 mi. NE of Morgantown	impoundment of Cheat River	Sept. 1939	Reese, 1940	USNM No. 52323 two females
Mercer County	unknown	unknown	Reese, 1940	
Fayette County	unknown	unknown	Reese, 1940	

TABLE 2.
New records of freshwater medusae in the southeastern United States

Location	Dates	Body of Water	Notes	Source of Record
<i>Alabama</i> Wilson Dam	July 1-4, 1958	Lake Wilson	Large impoundment on Tennessee River, medusae scarce; both males and females present	W. E. Snow, E. Pickard G. E. Smith
<i>Georgia</i> Gainesville	Aug. 1958; 1959	Lake Sidney Lanier	Large reservoir completed 1956	T. S. Callaway, W. D. Burbank
near Sonoraville	Aug. 1946	artificial lake	Lake 10-12 years old near Farmville (2 mi. SW Sonaraville) (CNHM No. 2808)	J. H. Cocks, F. Haas
near Toccoa	1942 and 1953	Lake Louise	USNM No. 52324	R. E. Ware
near Roswell	Sept. 1961	artificial lake	small impoundment near Chattahoochee River; close to Lake Sidney Lanier	R. P. Gravely, Jr.
<i>Kentucky</i> near Cottonburg	about Sept. 9, 1937	Kentucky River	Medusae collected at Camp Daniel Boone (Boy Scouts); about 18 mi. S. Lexington (USNM No. 51425)	E. Lotsfitch, D. W. Dunham, E. J. Karlin
<i>Maryland</i> Cabin John	Aug. 15-Sept. 5, 1959	rocky pool	5 mi. W. Cabin John; 2-3 acre pool on an island located just below The Great Falls, near the Maryland shore (USNM No. 51332)	J. Atkins, C. F. Lytle, C. E. Cutress
<i>North Carolina</i> near Greensboro	Aug. 20-Oct. 1, 1957; summer 1958	Lake Jeanette	Large impoundment about 20 years old; brief notice with photograph appeared in <i>Carolina Tips</i> 21 (5) :20, 1958.	V. M. Cutter, Jr., Carolina Bio- logical Supply Company
<i>Virginia</i> Philpott Reservoir 25 mi. NW of Martinsville	July, 1960	impoundment	Lake 20 years old, located at headwaters of Smith River	R. P. Gravely, Jr.
Pocahontas State Park 25 mi. SW of Richmond	1959; also reported present 1957, 1958	impoundment of Swift Creek	males and females present	N. E. Rice

South Carolina, observed freshwater medusae in Lake Louise, near Toccoa, Georgia, in September, 1942 and again in 1953. One male specimen collected in 1942 is deposited in the United States National Museum.

Mr. R. P. Gravely, Jr. of Martinsville, Virginia, observed numerous medusae in a small artificial lake south of Rosewell, Georgia, in September 1961. This lake is located just a few hundred yards from the Chattahoochee River which is itself impounded at this point.

Kentucky: Five small male specimens were collected in the Kentucky River at Camp Daniel Boone (a Boy Scout Camp) located 18 miles south of Lexington, Kentucky by Mr. Edward Lotsfitch on September 9, 1937. These specimens were discovered in the collection of Bowling Green State University, Bowling Green, Ohio, and were subsequently deposited in the United States National Museum by Prof. Edward J. Karlin.

Maryland: Freshwater medusae appeared in a rocky overflow pool in the bed of the Potomac River just below The Great Falls during August and September of 1959. The pool was approximately two to three acres in size at the time of a collection on September 5, 1959. The medusae appeared restricted to a small portion of the pool at the time of collection; several hundred were preserved for study and a sample deposited in the United States National Museum. All specimens examined from the pool were female.

North Carolina: Medusae appeared in Lake Jeanette, located just outside the city limits of Greensboro, North Carolina, during the summers of 1957 and 1958. In 1957 the medusae were abundant and were observed by Dr. Victor M. Cutter, Jr. of the Women's College of the University of North Carolina, from about August 20 to October 1. The following year only a few

scattered medusae were seen. Lake Jeanette is a twenty-year-old impoundment about three miles in length, formed by damming a small winding creek valley. A sample of 257 specimens collected in the summer of 1957 were provided by the Carolina Biological Supply Company. All the specimens were found to be males. This is the first record of freshwater medusae in North Carolina.

Virginia: Specimens were collected in July 1960 in Philpott Reservoir, an impoundment 25 miles northwest of Martinsville, Virginia, by Mr. R. P. Gravely, Jr. This reservoir is located at the headwaters of Smith River, a tributary of the Roanoke

River in southwestern Virginia. The medusae were observed in large numbers in one small cove of the lake.

Dr. Nolan E. Rice of the University of Richmond collected medusae in an impounded portion of Swift Creek in Pocahontas State Park, about 25 miles southwest of Richmond, Virginia, during the summer of 1959. Two collections totalling 180 specimens contained both male and female medusae in approximately equal numbers (89 males and 91 females). A large number of embryos were preserved for histological study. An attendant at the park stated that the medusae were also present in the lake during the summers of 1957 and 1958.



Figure 1. The known distribution of *Craspedacusta sowerbii* in the southeastern United States.

DISCUSSION

The known distribution of *C. sowerbii* in the southeastern United States is illustrated in Figure 1. A major feature of the distribution is the paucity of records from the Coastal Plain south of the Virginia-North Carolina border. The significance of this pattern is unknown. The distribution of an exotic species, such as *C. sowerbii* is limited by two major factors: its introduction into new habitats and the actual availability of suitable habitats. In the case of *C. sowerbii* there is little evidence which suggests that its distribution is limited by habitat availability in this area, since the medusae have previously been found in such a wide variety of habitats. Although *C. sowerbii* does seem to occur most frequently in man-made bodies of water (Pennak, 1956; Lytle, 1960), the list of different types of aquatic habitat in which the species has been found is long and varied. Present evidence indicates that the species is highly eurytopic and not likely to be limited in the Coastal Plain by a lack of suitable habitats.

Pennak (1956), Rice (1958), and other authors have commented on the predominance of medusa populations which appear to consist of only one sex. Only two previous records from North America have been published of populations in which both sexes were present (Payne, 1926; Rice, (1958). Payne (loc cit.) found the two sexes present in Benson Creek, Kentucky, in approximately equal numbers, citing a collection of 110 in which there were 52 females and 58 males. Rice (1958), however, sampled a population in Southampton Quarry in Richmond, Virginia, several times during the summer and early fall of 1956, and found the sex ratio changed markedly during the course of the season. At times the population contained males and females in approximately equal numbers, but at other times there was a heavy predominance of females, and for one two-week period males appeared to be completely absent from the population. These results clearly indicate that caution must be exercised in drawing conclusions from a single collection or from any small sample from a medusa population.

An examination of the literature reveals many reports in which the sex of the medusae was not determined and many other cases in which the sex of only one or a few

medusae was determined. There are, however, a few cases in which large samples have been collected and examined and found to consist of only males or only females. The data on sex of the medusae as indicated in Figure 1 must be considered in view of these limitations. Many of the collections examined were small and merely establish the presence of the sex indicated; not that the population consisted exclusively of that sex.

Two new populations reported in this study were found to contain both sexes. As noted above, the sexes were present in approximately equal numbers in the collection of Rice from Pocahontas State Park, Virginia, but females predominated in the small sample available from Lake Wilson, Alabama.

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Since this manuscript was submitted for publication, an additional reference to *Craspedacusta* in the southeastern United States has come to my attention. Price (1957) reported the medusae in Broad Creek, Harford County, Maryland, on September 16, 1956. Broad Creek is a tributary of the Conowingo River in northeastern Maryland.

ABSTRACT

The distribution of the freshwater medusa *Craspedacusta sowerbii* in the southeastern United States is reviewed and extended by ten new locality records. Specimens from twelve localities were studied to determine the sex of the medusae; collections from two of the new localities reported were found to include both male and female medusae. *C. sowerbii* is reported for the first time from North Carolina.