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The Seasonal Abundance of the Ancyrocephalinae (Monogenea) on Largemouth Bass in Walter F. George Reservoir

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ABSTRACT: Four species of Ancyrocephalinae were collected from largemouth bass in Walter F. George Reservoir from December 1967 to January 1969. The abundance of Urocleidus principalis and U. furcatus peaked at 28 C in June and mid-September, declined in the early fall, and then rose to another peak in December at 9 C. The abundance of Actinocephalus fusiformis peaked prior to the spring period of maximum temperature change in June and mid-September at 28 C and in December at 9 C. Abundance of Clavunculus bursatus peaked in the early spring and late fall at 9 C. The peaks of abundance seemed to be a water temperature-associated phenomenon.

The objective of this study is to describe seasonal changes in abundance of monogenean populations on the largemouth bass. Few studies of the population dynamics of Monogenea on North American fishes have been conducted. Mizelle and Crane (1964), working with largemouth bass, Micropterus salmoides (Lacepède), from a California pond found that Actinocephalus fusiformis (Mueller, 1934) Mueller, 1937, comprised 7% of the branchial Monogenea present in June and 3% in August; that Clavunculus unguis (Mizelle and Cronin, 1943) Mizelle, Stokely, Jaskoski, Seamster, and Monaco, 1956, noted present in June and 3% in August; and that Urocleidus furcatus (Mueller, 1937) Mizelle and Hughes, 1938, comprised 23% in June and 32% in August; and that U. principalis (Mizelle, 1936) Mizelle and Hughes, 1938, remained at 60% of the sample during both months. Crane and Mizelle (1968) found that on the bluegill, Lepomis macrochirus Rafinesque, in a California pond the U. ferox Mueller, 1934, population "peaks of August and April showed a positive relationship with temperature, whereas that for January occurred when the annual temperature was low (8 C)." The population peaks of A. fergusoni Mizelle, 1938, occurred in July, January, and May but the peaks were not correlated with the annual temperature. Meyer (1970) found that Dactylogyrus sp. epizootics in fish ponds in the Southeast peaked in April but were common in the spring and early summer. Paperna (1963) found an optimum temperature for Dactylogyrus on carp to be between 24 and 28 C.

Materials and Methods

Biweekly collections of largemouth bass were made from 14 December 1967 to 6 January 1969 in a 20-acre cove 1.2 miles south of Cottonton, Russell County, Alabama, in Walter F. George Reservoir on the Chattahoochee River. Initially, 10 fish per sample were collected with the aid of an electrofishing device. Because of difficulty experienced in collecting hosts, the sample number was reduced to five fish (187 total). Surface water temperature was recorded for each collection (Fig. 1). The fish were placed in a 1:4,000 solution of formalin as suggested by Putz and Hoffman (1963). After 1 hr, enough formalin was added to make a 5% solution. In the laboratory the fish were measured and grouped according to size. One side of the gill arch was removed and examined; the sediment remaining in the 5% formalin solution was concentrated by decantation and examined. Parasites collected were retained for later identification. Sample totals should be considered relative figures repre-
sentative of the monogenean populations since only the gills on one side of the fish were examined. Because of variability in the number of fish per sample and mean length (4.7 to 12.5 inches) of the host a standard sample of five fish with standardized mean lengths of 8 inches was adopted and the data were adjusted to these standards.

Results and Discussion

Four species of Ancyrocephalinae normally occur on the largemouth bass in Walter F. George Reservoir: Clavunculus bursatus (Mueller, 1936) Mizelle, Stokely, Jaskoski, Seamster, and Monaco, 1956, Urocleidus furcatus, U. principalis, and Actinocleidus fusiformis. Specimens of U. furcatus and U. principalis constituted a major portion of the population. Mizelle and Crane (1964) noted that no more than four of the seven species of Ancyrocephalinae reported from largemouth bass occurred at any one locality. This may be because of competition within species groups or difficulty in separating three species groups—C. bursatus from C. unguis, U. principalis from U. helicis (Mueller, 1936) Mizelle and Hughes, 1938, and U. furcatus and U. dispar.

The abundance of U. principalis (Fig. 2) varied (14 to 150) during the winter months, but in the spring increased to a peak (302) in mid-April after the period of maximum change of the surface water temperature. Abundance declined until late May prior to increasing to a peak (394) in June when surface water temperature was 28 C. It then declined to a moderate level (167 to 276) and remained at this level during the summer. In September abundance (459) peaked at a temperature of 28 C then declined steadily during the fall period of maximum temperature change. In December at a water temperature of 9 C, abundance had again risen near the level (299) of the spring peak. In January the abundance had decreased to the low level (58) of the previous winter.

The abundance of U. furcatus (Fig. 2) was at the lowest level (14) in January then increased to a moderate level and remained at this level (79 to 156) until June. Abundance increased in June after the spring period of maximum temperature change then declined to the former levels. Abundance increased to a peak (301) in mid-September. As in the U. principalis, summer peaks in abundance seemed to be associated with a surface water temperature near 28 C then rose to its highest level (320) in December at a surface water temperature of 9 C. In October and November, during the period of maximum temperature change, abundance declined. In January abundance again decreased to a low level (60).

The abundance of C. bursatus (Fig. 3) declined after the initial December sample but gradually increased to a peak (67) in early February at a water temperature of 9 C. C. bursatus abundance was at a low level (8) in late March and early April and again in late September and October (8 to
13) during the periods of rapid temperature change but in the remaining spring and summer months it varied at a moderate level (13 to 53). In December the abundance again exhibited a peak (71) at a water temperature of 9 C.

The abundance of A. fusiformis (Fig. 3) increased during the winter months, reaching the highest level (60) in mid-March. During the spring period of maximum temperature change the abundance decreased, then expanded to a peak (77) in late June. Abundance in the summer remained at a moderate level (38 to 54) until a mid-September peak (101). In the fall abundance declined and then rose during the period of maximum temperature decline to its highest level (131). During November and December abundance varied (43 to 117) but seemed to indicate a slow decline.

The abundance of the four species of Ancyrocephalinae occurring on largemouth bass exhibited population trends which seemed to be water temperature-associated phenomena. The abundance of U. principalis and U. furcatus was at moderate to low levels during the winter. The abundance of C. bursatus and A. fusiformis demonstrated peaks prior to the spring period of maximum temperature increase. Declines in abundance were observed for all four species during this period of maximum temperature increase. These declines may be indicative of a period of acclimation for the parasites between the two periods of relative temperature stability during summer and winter. As the temperature rose to 28 C in late June and declined to 28 C in mid-September the abundance of all species except C. bursatus peaked indicating a temperature optimum. During the midsummer period when surface water temperature exceeded 30 C the abundance of the three species remained at a moderately high level. This high level of abundance may be a result of the tendency of bass to associate themselves with the temperatures (27 C; Dendy, 1948) close to the parasites' optimum. After a fall decline the abundance of all four species increased to extremely high levels as the temperature approached 9 C then declined. This phenomenon was experienced by Crane and Mizelle (1968) at a similar temperature with the ancyrocephalans of bluegill but no plausible explanation for it exists.

The phenomenon may have represented a period in which the water temperature was below that necessary for release of fish antibodies but above the minimum temperature required for ancyrocephalinaean reproduction. Bisset (1947) found the temperature below which cold-blooded vertebrates did not release antibodies to be 12 C. Water temperature is an important factor directly influencing the reproductive rate and life-span of Monogenea (Bychowsky, 1957); however, an equally important indirect influence of water temperature is exerted on the host's life history and antibody response to the parasite. Water temperature is not the only factor influencing parasite population (Bauer, 1969) but it is particularly critical to external parasites with direct life cycles and short life-spans, such as the ancyrocephalineans.

**Literature Cited**


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ABSTRACT: The cercaria of Petasiger novemdecim, an echinostome larva of the Magnacauda group, with a dorsally uninterrupted row of 19–21, rarely 23, collar spines, including a group of four angle spines, parasitizes Biomphalaria glabrata olivacea, and encysts in the gills and internal layer of the esophagus of the fish, Lebistes reticulatus. These cysts, when fed to a short-billed grebe, Podiceps dominicus speciosus, develop into adult echinostomes in its small intestine with the same number of collar spines as the cercaria. Fourteen species are considered as synonyms of P. pungens. The diagnostic value of different characters is discussed.

Lutz (1928) described Petasiger novemdecim from the intestine of Podiceps dominicus (L.) in an unknown part of Venezuela, characterized by 19 cephalic spines. Apart from the diagram of this species, Lutz’s description of the parasite is very fragmentary. Nasir and Scorza (1968) found a cercaria of the type Magnacauda Byrd and Reiber, 1940, from Biomphalaria glabrata olivacea (Say), which was experimentally connected with the adult Stephanoprora denticulata (Rudolphi, 1802) Odhner, 1910. During this research we came across a cercaria which, like that of S. den-

ticulata, encysted in guppies, Lebistes reticulatus (Peters). These cysts, unlike those of S. denticulata, when fed to a domestic pigeon failed to develop into adult parasites. This appeared rather strange, and a search was made to find natural definitive hosts which might harbor the trematodes likely to correspond with the cercaria in question. Autopsies of a short-billed or least grebe, Podiceps dominicus speciosus (Lynch Arribalzaga), trapped from the same locality from which the snails were collected revealed the presence of several hundred echinostomes (with 19–21 collar spines) in its intestine. Guppies from the same locality were examined, and their gills were loaded with cysts similar to the ones obtained from the experimental infections.