SEASONAL ABUNDANCE OF ANCYROCEPHALINAEN (MONOGENOIDEA) PARASITES OF BLUEGILL, Lepomis macrochirus (RAF)

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SEASONAL ABUNDANCE OF ANCYROCEPHALINAEN (MONOGENOIDEA) PARASITES OF BLUEGILL, *Lepomis macrochirus* (RAF)

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Abstract: Nine species of Monogenea of the subfamily Ancyrocephalinae were collected from *Lepomis macrochirus* in Walter F. George Reservoir at 2 week intervals from December 1967 to January 1969. The abundance patterns and size of the organism formed three distinct groups: (1) The large species most abundant during the autumn and least abundant during the mid summer period were *Anchoradiscus triangularis* and *Clavunculus bifurcatus;* (2) the large species most abundant during the spring and least abundant during the mid summer period were *Lyrodiscus seminolensis* and *Cleidodiscus robustus;* and (3) the small species abundant during the summer but having a prewinter peak at water temperatures near 10 C were *Actinocleidus fergusoni, Urocleidus dispar, U. ferox, U. acer* and *Cleidodiscus nematocirrus.*

Knowledge of seasonal abundance of parasites will allow us to anticipate potential disease problems and suggest management procedures where feasible. The object of this study was to determine the seasonal abundance of ancyrocephalinaen parasites of one of the most important sport fish — the bluegill.

Seasonal abundance of the subfamily Ancyrocephalinae has been reported in only a few papers. Crane and Mizelle[5] found that on bluegill, *Lepomis macrochirus* Rafinesque, the *Urocleidus ferox* Mueller, 1934, population reached high levels in August and April and in January when the temperature was 8 C. The highest populations of *Actinocleidus fergusoni* Mizelle, 1938 occurred in July, January and May. Meyer[6], utilizing epizootic case histories, felt that *Dactylogyrus* populations were at the highest level in April but were common during the remainder of the spring and early summer and that *Cleidodiscus* on catfish was frequent from January to mid summer.

METHODS AND MATERIALS

Ten bluegill were collected using a 230 volt AC electrofishing device along the shoreline at depths of 30-120 cm. Specimens were collected at 2 week intervals from December 1967 to January 1969 in an 8 hectare cove 1.9 km south of Cottonton, Russell County, Alabama, in Walter F. George Reservoir on the Chattahoochee River. The fish were placed in a 1:4000 solution of formalin. After 1 hour, enough formalin was added to make a 5% solution[7]. In the laboratory the fish were measured and grouped according to length. The mean length ranged from 9.6-12.9 cm. 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 representative of the monogenoidean populations since only the gills on one side of the fish were examined. Surface water temperature was recorded for each collection (Fig. 1). In the following discussion a small ancyrocephalinaean will be defined as an organism ranging between 200μ and 500μ; a large ancyrocephalinaean will be an organism above 500μ.

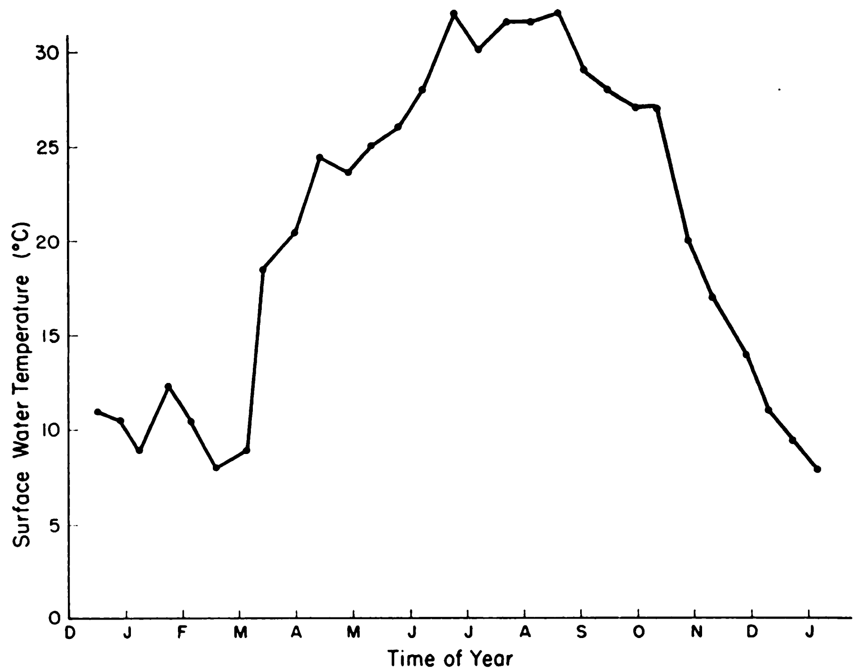

FIGURE 1. Surface water temperature (C).

RESULTS AND DISCUSSION

Abundance of Ancyrocephalinae which occurred on bluegill in Walter F. George Reservoir were not significantly correlated to length of host. The species can be divided into three groups according to the patterns of abundance and average size of the parasite. (1) a group of large species was most abundant during autumn and least abundant during the mid summer period; (2) a group of large species was most abundant during the spring; (3) a group of small species was abundant during the summer but had a prewinter peak at water temperatures near 10 C.

The large species of group 1 were present during the majority of the year but reached their lowest level during the warm summer months. These populations reached their highest level in late autumn after the temperature had dropped to near winter levels. The population of *Anchoradiscus triangularis* (Summers, 1937) Mizelle, 1941 was negatively related to the high water temperature (Fig. 2). Decreasing gradually from moderate initial levels the parasite reached its lowest level during July and August. The population fluctuated but moved generally upward during autumn to a peak in early December, then descended again to moderate levels. The population of *Clavunculus bifurcatus* (Mizelle, 1941) Mizelle, Stokely, Jaskoski, Seamster, and Monaco, 1956 decreased from an initially low density and was rarely detected until October (Fig. 2). During the autumn the population increased steadily to a peak in early December then fell to the level of the previous winter.

The large species in group 2 tended to be rare most of the year but reached their highest level during the spring. *Cleidodiscus robustus* Mueller, 1934 first appeared in March (Fig. 3). The population rose to a peak in June, then disappeared from the samples. *Lyrodiscus seminolensis* Rogers, 1967 was observed in the winter months but did not reach a peak until May (Fig. 3). By September the *L. seminolensis* population was reduced to an undetectable level.

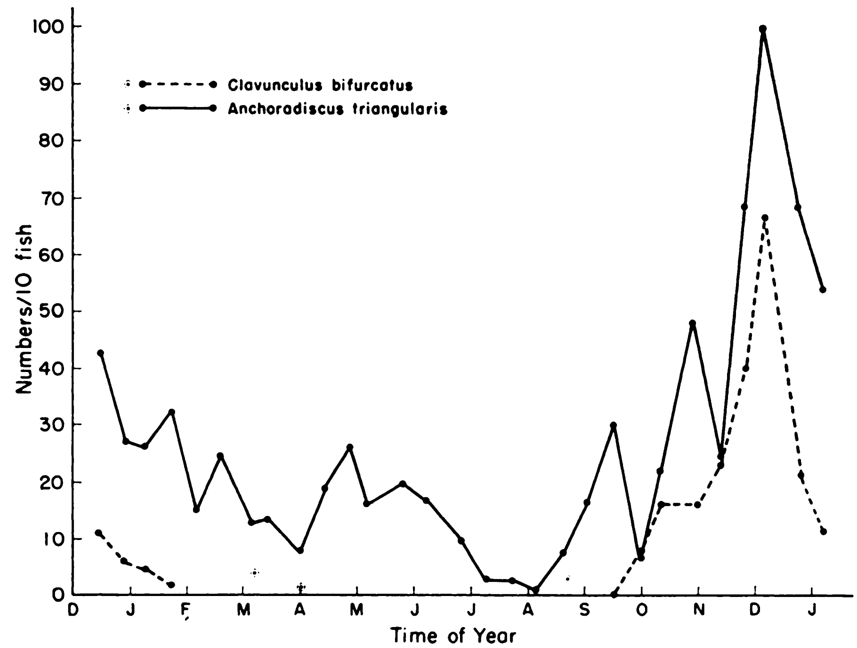

FIGURE 2. Seasonal periodicity of Ancryocephalinae of group 1 (**Clavunculus bifurcatus, Anchoradiscus triangularis**).

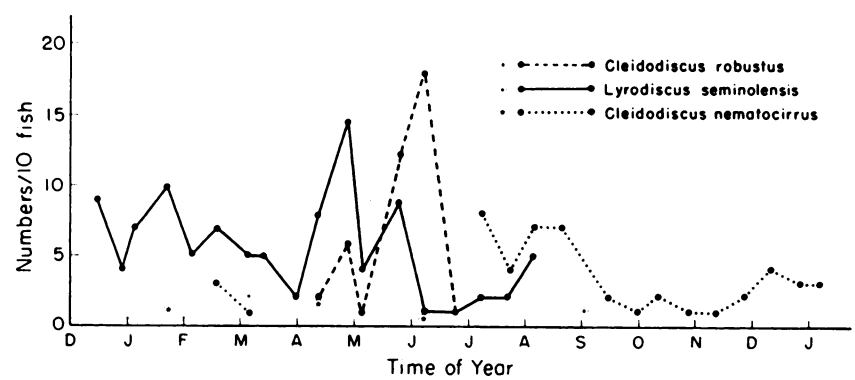

FIGURE 3. Seasonal periodicity of Ancyrocephalinae of group 2. (**Cleidodiscus robustus, Lyrodiscus seminolensis** and **Cleidodiscus nematocirrus**).

Species of group 3 were small ancyrocephalinaeans abundant during the warmest months and usually exhibiting a prewinter peak. *Actinocleidus fergusoni* was the most abundant species on the bluegill (Fig. 4). Its population increased from a December low to a moderate population in late February, then declined during spring. In June it increased to a high level at the warmest July temperatures. During the remaining summer and autumn months the population was at a moderate level but in December rose to the highest level observed.

The population of *Urocleidus ferox* was low initially and did not increase significantly until the surface temperature rose above 25 C in June (Fig. 4). In July it reached a peak, then declined to a moderate level. In autumn, when the surface temperature dropped below 26 C, the population decreased to the low levels of the previous winter and spring during the period of maximum temperature decline. It rose rapidly to a high level as the surface temperature approached 10 C. It had declined to a moderate level at the conclusion of the study as the surface temperature dropped below 10 C.

The population of *Urocleidus acer* (Mueller, 1936) Mizelle and Hughes, 1938 and *Urocleidus dispar* (Mueller, 1936) Mizelle and Hughes, 1938 was low during the months prior to the spring increase in temperatures above 6 C. During the warm months the population of *U. dispar* oscillated regularly reaching high levels at two month intervals from June through October when the surface temperature declined below 6 C. High populations of *U. acer* occurred in June and September at temperatures between 7 C and 9 C and

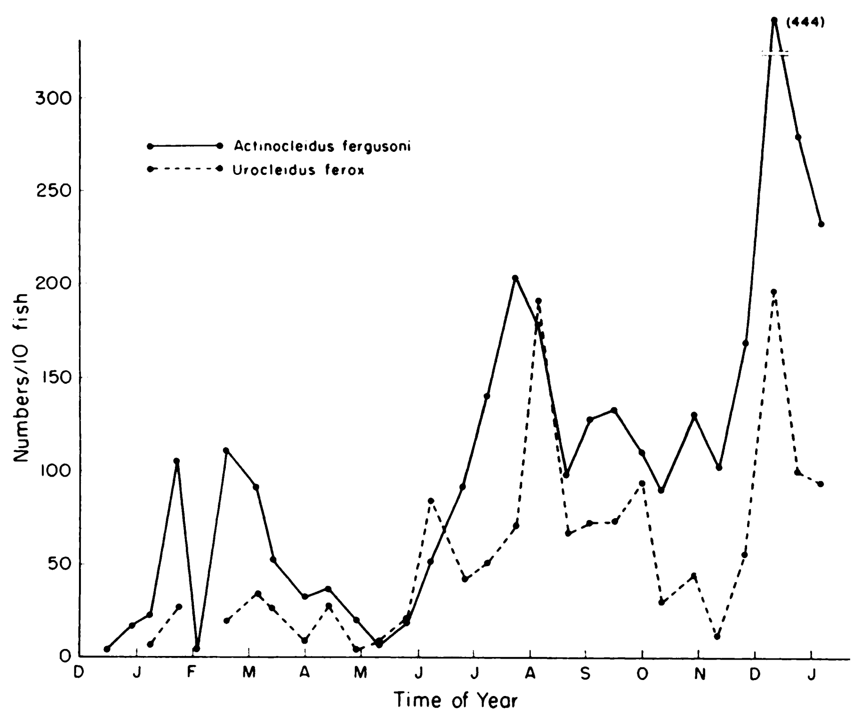

FIGURE 4. Seasonal periodicity of **Actinocleidus fergusoni** and **Urocleidus ferox.**

the population was at a moderate level during the warmer months when temperatures increased above 30 C. The population of both species declined to a low level during the period of maximum temperature decline but rose to a high level at temperatures near 10 C, decreasing at lower temperatures (Fig. 5).

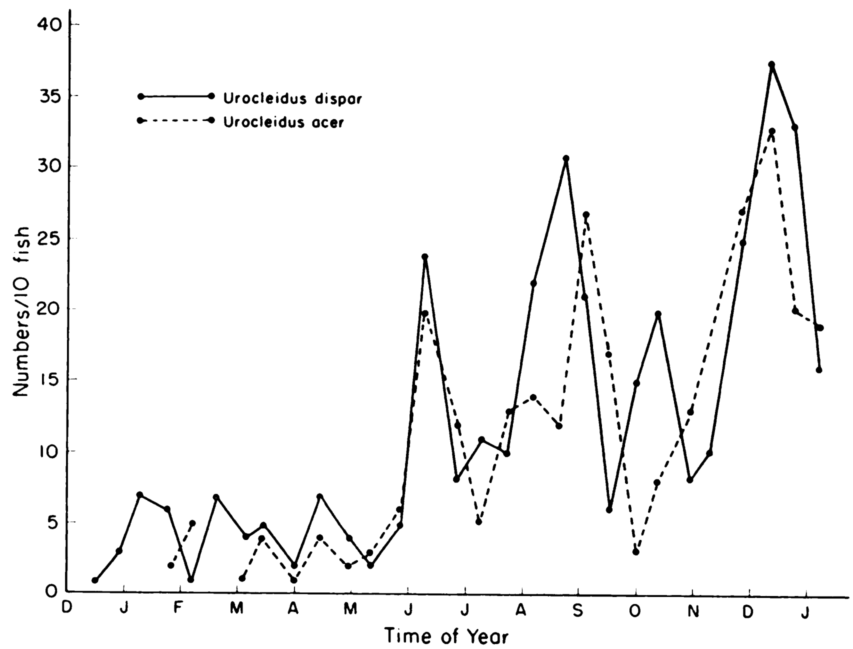

FIGURE 5. Seasonal periodicity of **Urocleidus dispar** and **Urocleidus acer**.

Cleidodiscus nematocirrus Mueller, 1937 was rare during most of the study but it did reach its highest level during the warmest summer temperatures (Fig. 2).

The largest species of groups 1 and 2 reached their greatest abundance during the cool spring and autumn months. The small species of group 3 were abundant during the summer at temperatures above 26 C; at these temepratures the large species were extremely rare and were almost completely absent at temperatures above 30 C. Malmberg[8] reported that *Gyrodactylus* species were generally larger during the cooler months. Allee, et al.[1] suggested that cooler water retards the growth rate and delays sexual activity of an organism which produces a larger animal in planktonic organisms. In this case the phenomena of size increasing with cooler temperatures was functioning between species rather than within the same species. The slower growth rate in cold water will also explain the low total ancyrocephalinaean population existing at extreme winter temperatures below 10 C.

The summer increases of group 3 parasites coincided with the temperatures at which spawning of bluegill seems to be at a maximum[4] and the fall decline of parasites coincided with decreases in temperature below this range. Bluegill characteristically have closely associated spawning beds during the summer. The bedding behavior probably contributed to the increases of the parasites which experience optimum temperature conditions during this period.

Many species reach extremely high population levels during late autumn at temperatures of approximately 10 C. Bissett[3] found that the temperature below which cold-blooded vertebrates did not release antibodies to be 12 C. Beckert[2] demonstrated the existence of such a relationship between *Ichthiophthirious multifilii* and white catfish, *Ictalurus catus*. The extremely high population levels during late fall may have represented a period in which the temperature was below that necessary for release of protective antibodies of the fish but above the minimum temperature required for reproduction of the parasites. The fact that a similar increase did not occur during the spring of 1968 may have been due to the rapid rise of water temperature to a level which activated the host immunological response.

There are no doubt a number of other factors influencing ancyrocephalinaean populations other than the temperature related phenomenon discussed above. However the seasonal trends indicating the favorable conditions for parasite infestations will be valuable tools in determining potential disease problems.

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