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SEASONAL ABUNDANCE OF *Gyrodactylus macrochiri* HOFFMAN AND PUTZ, 1964 ON BLUEGILL AND LARGEMOUTH BASS

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Abstract: Specimens of *Gyrodactylus macrochiri* were collected from bluegill, *Lepomis macrochirus* and largemouth bass, *Micropterus salmoides*, in Walter F. George Reservoir at 2 week intervals from December 1967 to January 1969. The *G. macrochiri* populations were at high levels during the hosts' spawning in the spring, at temperatures similar to the spawning period in the fall period and during winter. During mid-summer at temperatures above 28 C the populations on both host species were at their lowest levels.

Gyrodactylus epizootics are common in the crowded conditions of hatcheries and losses among young fish can be extensive. It is important to understand the conditions under which parasites become abundant in order to maximize the effectiveness of prophylactic treatment as an effective management tool in disease control. This study was conducted to determine the periods of the year when *Gyrodactylus macrochiri* infestations are at the greatest intensity under natural conditions on largemouth bass and bluegill.

MATERIALS AND METHODS

Fish were collected with a 230 volt AC electro-fishing device along the shoreline at depths of 30-120 cm at 2 week intervals from 14 December 1967 to 6 January 1969. All collections were made from an 8 hectare cove 1.0 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 in lots of ten; after 1 hour, formalin was added to make a 5% solution.[11] In the laboratory the fish were measured and grouped according to length; the length ranged from 4.7 to 12.5 for bass and from 3.8 to 5.1 for bluegill. One side of the gill arches was removed and examined; the sediment remaining in the collection jars was concentrated by decantation and examined. Surface water temperature recorded for each collection (Fig. 1).

RESULTS AND DISCUSSION

The population of *G. macrochiri* on the largemouth bass was at a low level at the initiation of the study but increased rapidly in early February to an extremely high level. As the water temperature decreased below 10 C the population declined to a low level in early March. With the onset of the rapid spring increase in temperature an increase in the population occurred at temperatures between 20 C and 25 C. The temperature range was similar to the spawning temperatures (18 C and 25 C) observed for largemouth bass.[5] At temperatures above 25 C the *G. macrochiri* population declined to a low level. The population remained at a low level throughout the summer and fall, but in December it increased as the temperature declined below 12 C (Fig. 1).

The population of *G. macrochiri* on bluegill was also at a low level at the initiation of the study, and was relatively

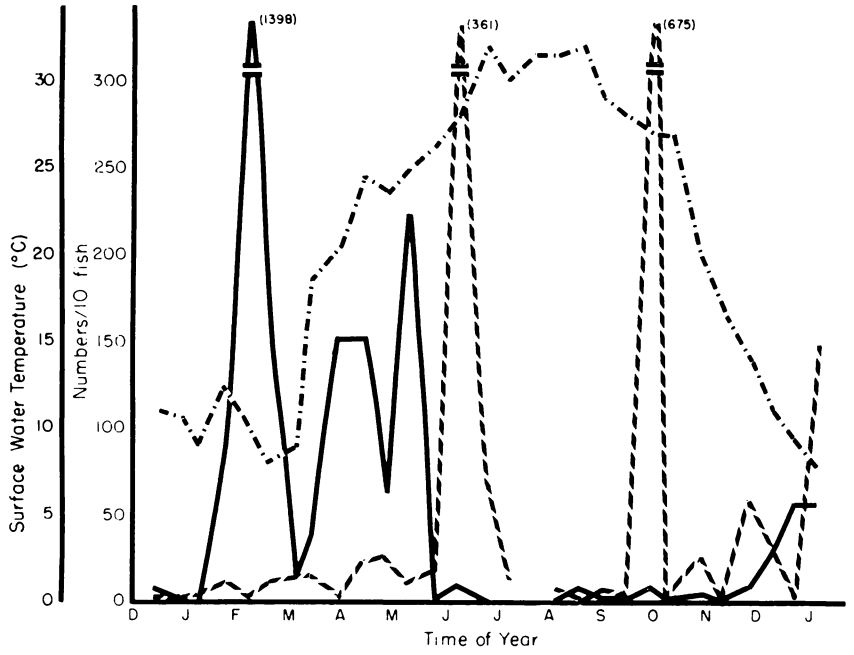

FIGURE 1. The seasonal Abundance of **Gyrodactylus macrochiri** on Largemouth Bass (———) and Bluegill (— — — —) and Surface Water Temperature (— · — · — · —).

stable during winter and spring. The population rose to a peak in early June at a temperature of about 28 C. The population decreased to low levels during the warmest period of the year, but peaked again in September at 27 C. Both peaks of the *G. macrochiri* population on bluegill occurred when the water temperatures were near the temperature range (24 C to 27 C) which Clugston[5] observed as the temperatures of maximum spawning activity of bluegill. During the fall, the population increased and at the culmination of the study in early January the population had risen to a high level (Fig. 2).

G. macrochiri demonstrated an ability to expand to high population levels in a short period of time on both host species. Bychowsky[3] considered the reproductive potential of dactylogyrids, which are egg laying monopisthocotyleans, to be equal to gyrodactylids in a 4 week period, but he felt viviparity of gyrodactylids increases the survival of young. *G. macrochiri* populations exhibited more rapid numerical increases than members of the Dactylogyridae collected on the same fish[12,13] and gyrodactylids because of greater reproductive survival associated with viviparity may potentially be a greater problem than the other monopisthocotyleans of largemouth bass and bluegill.

The literature on the seasonal abundance of *Gyrodactylus* populations indicate that conditions in the cool months are favorable. *Gyrodactylus atratuli* Putz and Hoffman, 1963 on the blacknose dace, *Rhinichthys atratulus* (Hermann), collected at a 12 C water temperature disappeared when placed in an aquarium at 19 C to 26 C; the loss was attributed by Putz and Hoffman[11] to unfavorable water quality, accumulation of metabolic by-products, or an increased immune response of the host at warmer temperatures. *Gyrodactylus elegans* Nordmann,

1932 was found to reach numbers sufficient to be enzootic on golden shiners, *Notemigonus crysoleucas* (Mitchell), at water temperatures between 5 C and 15.5 C.[7,10] Anthony[1] found *G. elegans* on *Carassuis auratus* L. to be most abundant in April and May at 8.5 C to 9 C. Bauer[2] found that *Gyrodactylus* occurs from February through April. Meyer[8] observed that *Gyrodactylus* epizootics in Arkansas occurred from January through July, peaking in April. *Gyrodactylus macrochiri* Hoffman and Putz, 1964 on bluegill was found by Hoffman and Putz[6] to have an optimum temperature nearer 12 C than 20 C.

G. macrochiri for which largemouth bass and bluegill seemed to be primary hosts were observed to be at high population levels under three circumstances: (1) during the spring reproductive period when close association and the stress of spawning create conditions favorable to parasite infestations, (2) during the fall when temperatures are similar to spawning temperatures and (3) during the winter when temperatures are below 10 C.

The literature also indicated that the extremely warm temperatures of midsummer are detrimental to *Gyrodactylus* populations. Chappell[4] found that *Gyrodactylus rarus* Wegener, 1907 on the three-spined stickleback, *Gasterosteus aculeatus* L. was constant in prevalence except during August when prevalence decreased from 80% to less than 1%. Infections of *G. rarus* increased from September to March then decreased. Although they attributed it to human error, Noble, et al.[9] observed statistically significant decreases in frequency of infection of *G. elegans* on an estuarine fish, *Gillichthys mirabilis* Cooper, in two of three Septembers. During mid-summer, parasite populations on both fish species were at the lowest levels. Although bluegill do spawn periodically throughout the summer at a reduced intensity, conditions at temperatures above 28 C seem to be unfavorable to *G. macrochiri* populations.

Gyrodactylus populations, even under natural conditions, seem to have the ability to expand very rapidly when optimal conditions present themselves and are a constant threat in the hatchery situation. The periods of abundance discussed in this paper are conditions when maximum benefit can be obtained from prophylactic treatments to reduce the stress on adult stocks and to prevent infection of young fish.

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