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A SUMMARY OF FINDINGS ON THE NEMATODE, *GOEZIA* SP. IN THE SOUTHEASTERN UNITED STATES

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Goezia was first detected in North America at Lake Hollingsworth in Central Florida during June, 1969 (Ware, 1970). A recently introduced population of striped bass, *Morone saxatilis,* was found to be infected by the nematode. The following year, three additional populations of striped bass were parasitized, located in Lakes Bentley, Parker, and Hunter in the same general area of Florida.

The introduction of this parasite into Florida was at first believed to be related to the striped bass stocking program (Gaines and Rogers, 1971). *Goezia* was reported as a marine nematode and the young stripers had been fed a diet of marine herring during hatchery culture. A similar means of infection had been reported in France (Dollfus, 1935). Later investigations, however, found the worm to be wide-spread in Central Florida and it was apparently endemic to certain watersheds connected with marine environs. The lakes and streams of the St. John River System, which drains to the Atlantic, and the Peace and Hillsborough watersheds of the Gulf Coast were all verified positive for *Goezia.* Conversely, some landlocked lakes in the same area were negative. A portion of these waters that were positive for worms had never received striped bass. Plus, two of the introduced striper populations were found to be parasite-free, Lakes Talquin and Julianna. Additional fishes diagnosed as positive hosts were largemouth bass, *Micropterus salmoides,* black crappie, *Pomoxis nigromaculatus,* redear sunfish, *Lepomis microlophus,* brown bullhead, *Ictalurus nebulosus,* and *Tilapia aurea.*

Fish kills associated with *Goezia* infections have been limited to the two reported populations of striped bass (Ware, 1970): (1) An estimated 90% kill in Lake Hollingsworth in 1969, and (2) an approximate 90% kill in Lake Hunter during 1970. In both cases, mortality was related to the presence of *Goezia* under stress conditions created by a low food supply. Following the kill in Lake Hunter, striped bass were reintroduced but at a much lower stocking rate. Although these fish became parasitized, they survived in good numbers as have fish from subsequent stockings. In this respect, a comparison between the physical condition, K (Hile), of an infected striper population (Lake Hunter)

and a parasite-free population (Lake Julianna) found the condition of infected fish to be significantly higher (Student's t = 4.65) at the 0.01 level (df = 180). Lake Hunter mean K was 2.06, while the Julianna mean K was 1.96. There was no significant difference in growth rates between populations (Ware, 1972). The better condition of infected fish was attributed to the greater abundance of food (shad) in Lake Hunter.

Other reported occurrences of *Goezia* in the Southeast have been limited to the States of Maryland and South Carolina. The Maryland incidence involved a shipment of Florida largemouth bass, *M. s. floridanus,* from Lake Dora, Florida that were diagnosed positive. These fish were destroyed (David Whorton, personal communication). In South Carolina *Goezia* has been found in glut herring, *Alosa aestivalis,* of the Cooper River watershed near Moncks Corner.

Additional investigations of largemouth bass brood stock in state hatcheries of Alabama, Arkansas, Georgia, Kentucky, Louisiana, South Carolina, and Tennessee found no evidence of *Goezia.* Striped bass examined in Alabama, Tennessee, and South Carolina were also free of worms.

The pathology of *Goezia* was reported by Gaines and Rogers (1971) as characteristically inhabiting the stomach wall of its host. Worms formed hemorrhagic ulcer-like depressions in the stomach or were encysted on the external wall and mesentery. In severe cases, secondary infections were observed related to the presence of *Aeromonas* sp. Seasonal observations found adult worms most common during the spring months, appearing in groups of 3 or 4 open ulcers in the internal stomach wall. By late summer larval stages were found as encysted nodules or migrating through stomach tissue. In January adult worms appeared in the mesentery or encysted on the external stomach wall.

Little additional information is known about the biology of *Goezia.* In Florida, its presence is in greatest evidence during summer months when ulcer-like cysts are readily apparent in the stomachs of infected fish. Number of cysts per individual usually range between 1 and 3, although as many as 8 cysts have been found. In heavy infections, the stomach is grossly distorted, knotted, and would appear reduced in its capacity for ingested food.

Based on these observations of *Goezia,* the authors recommend close surveillance of all out-of-state shipments of live fishes from Florida and other areas suspected of contamination. With the recent interest in Florida largemouth bass the range of this nematode could be extended unnecessarily, and with consequences not fully understood at this time. It would take little additional effort to obtain *Goezia*-free specimens, since in the case of Florida bass, many populations have been found negative for worms.

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