

Hanek

# The role of season, habitat, host age, and sex on gill parasites of *Ambloplites rupestris* (Raf.)<sup>1</sup>

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One thousand and forty-five rock bass (*Ambloplites rupestris* (Raf.)) were collected from May 1970 through October 1972 from the Bay of Quinte, Ontario. During the same sampling period, 1043 specimens of the same host were collected from West Lake, Prince Edward County, Ontario.

Data were collected on three groups of gill parasites, Monogenea (four species), Copepoda (three species), and glochidia (one species). The data, treated synecologically, were analysed using a two-factor ANOVA and Duncan's multiple range test. The roles of season, habitat, host age, and sex on parasite load were analysed.

Host sex was found to have no effect on the three groups of parasites. The abundance of parasites increased with host age ( $P < 0.001$ ). A marked seasonal effect was noted for all three groups of parasites ( $P < 0.001$ ). A eutrophic habitat, West Lake, was found significantly more favourable ( $P < 0.001$ ) for Monogenea, while an oligotrophic habitat, Glenora, was clearly more favourable ( $P < 0.001$ ) for Copepoda.

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Mille quarante-cinq crapets de roche (*Ambloplites rupestris* (Raf.)) ont été capturés de mai 1970 à la fin d'octobre 1972 dans la Baie de Quinte, en Ontario; un échantillonnage parallèle dans le lac West, comté Prince-Edouard, en Ontario, a donné 1043 spécimens de la même espèce.

Trois groupes de parasites branchiaux de cette espèce ont été étudiés; ce sont les monogènes (quatre espèces), les copépodes (trois espèces) et les glochidies (une espèce). Les données, considérées de façon synécologique, ont été étudiées par une analyse de variance à deux caractères et par le test de Duncan. Ont pu être déterminés de cette façon les rôles respectifs de la saison, de l'habitat, de l'âge et du sexe de l'hôte sur l'abondance des parasites.

Le sexe de l'hôte est sans influence sur l'abondance des parasites. En revanche, l'abondance des parasites augmente selon l'âge de l'hôte ( $P < 0.001$ ). Le temps de l'année a un effet marqué sur l'abondance des trois groupes ( $P < 0.001$ ). L'habitat eutrophe, le lac West, est significativement plus propice ( $P < 0.001$ ) à l'abondance des monogènes, alors que l'habitat oligotrophe, Glenora, avantage nettement ( $P < 0.001$ ) les copépodes.

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## Introduction

The gill parasite fauna of *Ambloplites rupestris* (rock bass) is well documented, with five species of Monogenea, nine Copepoda, and one glochidia being listed by Hanek and Fernando (1978), Hoffman (1967), and Mizelle et al. (1956). The presentation of data collected on *A. rupestris* will follow a format identical with that used in previous work (Hanek and Fernando 1978) on the biology of gill parasites of *Lepomis gibbosus* (L.). Consequently, the Methods and General Discussion will not be repeated here.

Quinte (Glenora) (44°03' N, 76°48' W and 44°06' N, 76°51' W) exhibiting typical oligotrophic features and (b) West Lake (43°54' N, 77°40' W and 43°57' N, 77°46' W) exhibiting typical eutrophic features.

## Results and Discussion

### Gill Parasite Spectrum

The gill parasite spectrum consisted of the following: (a) four species of Monogenea, viz. *Cleidodiscus alatus* Mueller 1938, *Cleidodiscus glenorensis* Hanek and Fernando 1972, *Cleidodiscus stentor* Mueller 1937, and *Urocleidus chautauquensis* (Mueller 1938) Mizelle and Hughes 1938; (b) three species of Copepoda, viz. *Achtereus ambloplitis* Kellicott 1880, *Ergasilus caeruleus* Wilson 1911, and *Ergasilus centrarchidarum* Wright 1882; and (c) one species of glochidia, viz. glochidia of *Lampsilis radiata* (Gmelin 1792).

A synecological approach, treating communities and their constituent species in general terms and

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comparing ecological differences between groups of parasites, viz. Monogenea, Copepoda, and glochidia, was adopted and is used throughout this presentation.

#### Host's Sex

Host sex is not statistically significant for any group of parasites under consideration.

#### Host's Age

A definite host's age effect on all three groups of parasites was noted, viz. Monogenea ( $F = 40.231$ ;  $P < 0.001$ ), Copepoda ( $F = 61.454$ ;  $P < 0.001$ ), and glochidia of *L. radiata* ( $F = 44.629$ ;  $P < 0.001$ ); Duncan's test ( $P < 0.01$ ) indicates 2 to 2+ and 3 to 3+ age group significantly different from the other age groups for all three groups of parasites.

The total parasite load (Monogenea, Copepoda, and glochidia) showed an  $F$  value of 69.7947 ( $P < 0.001$ ) with Duncan's test ( $P < 0.01$ ) naturally indicating 2 to 2+ and 3 to 3+ age groups significantly different from the other age groups.

It can be, therefore, concluded that there is a clear relationship between the age of *A. rupestris* and its gill parasite load. The increase in intensity with the age of *A. rupestris*, particularly of those 4 and 4+ years and older, is documented here.

#### Season

A clear seasonal effect was noted for all three groups of parasites in both localities. The following readings were obtained in Glenora: (a) Monogenea ( $F = 86.622$ ;  $P < 0.001$ ); Duncan's test ( $P < 0.01$ ) indicates (i) 'summer' significantly different from the other seasonal divisions; and (ii) 'fall' significantly different from the other seasonal divisions; (b) Copepoda ( $F = 51.322$ ;  $P < 0.001$ ); Duncan's test ( $P < 0.01$ ) indicates 'fall' significantly different from the other seasonal divisions; (c) glochidia ( $F = 66.801$ ;  $P < 0.001$ ); Duncan's test indicates (i) 'spring' significantly different from the other seasonal divisions; and (ii) 'summer' significantly different from the other seasonal divisions; (d) Total parasite load (Monogenea, Copepoda, and glochidia) followed naturally the patterns exhibited by Monogenea and Copepoda, showing an  $F$  value of 76.884 ( $P < 0.001$ ), with Duncan's test ( $P < 0.01$ ) showing (i) 'summer' significantly different from the other seasonal divisions; and (ii) 'fall' significantly different from the other seasonal divisions.

For West Lake, the following readings were recorded: (a) Monogenea ( $F = 39.431$ ;  $P < 0.001$ ); Duncan's test ( $P < 0.01$ ) indicates (i) 'summer' significantly different from the other seasonal divisions;

and (ii) 'fall' significantly different from the other seasonal divisions; (b) Copepoda ( $F = 47.341$ ;  $P < 0.001$ ); Duncan's test ( $P < 0.01$ ) indicating 'summer' significantly different from the other seasonal divisions; (c) glochidia ( $F = 61.454$ ;  $P < 0.001$ ); Duncan's test ( $P < 0.01$ ) indicating 'spring' significantly different from the other seasonal divisions; and (ii) 'summer' significantly different from the other seasonal divisions; (d) Total parasite load (Monogenea, Copepoda, and glochidia) followed the patterns exhibited by Monogenea and Copepoda, showing an  $F$  value of 67.422 ( $P < 0.001$ ), with Duncan's test ( $P < 0.01$ ) showing: (i) 'summer' significantly different from the other seasonal divisions; and (ii) 'fall' significantly different from the other seasonal divisions.

Both Monogenea and Copepoda were encountered at moderate to high levels throughout the entire sampling period. The abundance of glochidia of *L. radiata* was restricted to the late spring-summer in both localities. Monogenea were encountered at highest levels during the winter-spring (= winter peak) in both localities although the abundance was considerably higher in West Lake. In West Lake, Copepoda exhibited a summer peak which was followed by a sharp decline during the fall to a fairly constant level which remained until the next upswing. In Glenora, however, the Copepoda remained at very high levels throughout winter, spring, and summer, registering a noticeable decline during fall.

#### Habitat

A clear effect of the host's habitat was detected for all three groups of parasites: Monogenea ( $F = 61.452$ ;  $P < 0.001$ ); Copepoda ( $F = 69.7947$ ;  $P < 0.001$ ); and glochidia of *L. radiata* ( $F = 44.629$ ;  $P < 0.001$ ), with Duncan's test (both  $P < 0.01$ ) clearly indicating significant differences between the two localities.

It can be stated that an oligotrophic habitat (Glenora) was more favourable for Copepoda and glochidia of *L. radiata*, while Monogenea were in significantly greater numbers in a eutrophic habitat (West Lake).

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