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Full Length Research paper

Dockovdia cookarum infection and the prosobranch gastropod *Lanistes libycus* host in Omi Stream, Ago-Iwoye, south-western, Nigeria

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***Dockovdia cookarum* infection was studied in relation to the abundance and size classes of *Lanistes libycus* from Omi Stream, Ago-Iwoye, Nigeria, between September 1997 and June 1998. 57.6% of the 262 *L. libycus* recorded were collected during periods of heavy rainfall. 17.2% (45) of the *L. libycus* examined had *D. cookarum* infection. The water mite prevalences were higher in rainy season than in dry season, and ranged between 3.0% and 44.4% monthly. *L. libycus* in 21-30 mm size class had the highest prevalence (73.3%). Intensity of infection was higher in rainy season than in dry season, and ranged between 1 and 6 mite(s)/snail. 2.6% of the *L. libycus* specimens in the 21-30 mm size class had concurrent *D. cookarum* and *Chaetogaster limnaei* infections.**

Key words: *Dockovdia cookarum*, water mites, *Lanistes libycus*, freshwater molluscs, Nigeria

INTRODUCTION

Some water mites are known to parasitize molluscs at one stage or the other of their life cycle. The majority of these parasitic water mites infest freshwater bivalves, while relatively few are harboured by freshwater gastropods (Gledhill, 1985a, b). Five unionicolid water mites had been associated exclusively with prosobranch gastropod molluscs, including *Unionicola (Baderatax) macani* Gledhill, 1985 associated with *Lanistes ovum* Peters from Nigeria (Gledhill and Vidrine, 2002).

Lanistes libycus is a freshwater gastropod mollusc common in West Africa, and widely distributed in south-western Nigeria (Ukoli, 1989; Brown, 1994). A study of freshwater bodies in Ago-Iwoye in this area revealed the occurrence of a water mite species in the mantle cavity of *L. libycus* from Omi Stream (Agbolade, unpublished observation). The water mite was recently described as a new genus and species, *Dockovdia cookarum* by Gledhill (2002). Gledhill noted that *D. cookarum* was the first water mite species from the family Hygrobatidae to be reported as a parasite of a freshwater mollusc.

This report presents an account of the prevalence and intensity of *D. cookarum* in relation to the abundance and size classes of *L. libycus* from Omi Stream.

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MATERIALS AND METHODS

Study area and sampling site

Ago-Iwoye is located in Ijebu North area of Ogun State, south-western Nigeria, and is the main seat of Olabisi Onabanjo University (O.O.U.). The town lies within the tropical rain forest belt, between latitudes 6° 55′ and 6° 56′, and longitudes 3° 54′ and 3° 56′. Omi Stream flows through the back of the mini-campus of O.O.U. The stream is frequented by many inhabitants of Ago-Iwoye for purposes such as bathing, laundry, fishing, and edible water snail. The section of the Stream around the back of the mini – campus of O.O.U. was chosen as sampling site based on accessibility. Different parts of the sampling site have sandy, muddy or rocky substratum.

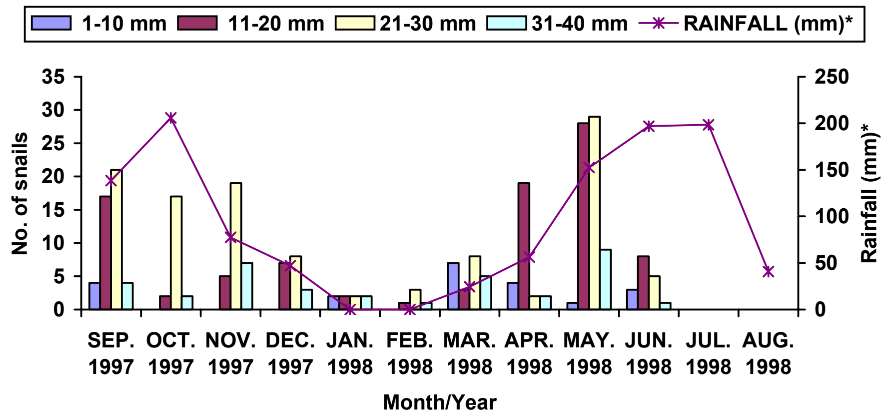

Figure 1. Monthly size distribution of *Lanistes libycus* from Omi stream and rainfall pattern in the study area. *Source: Federal Department of Meteorological Service.

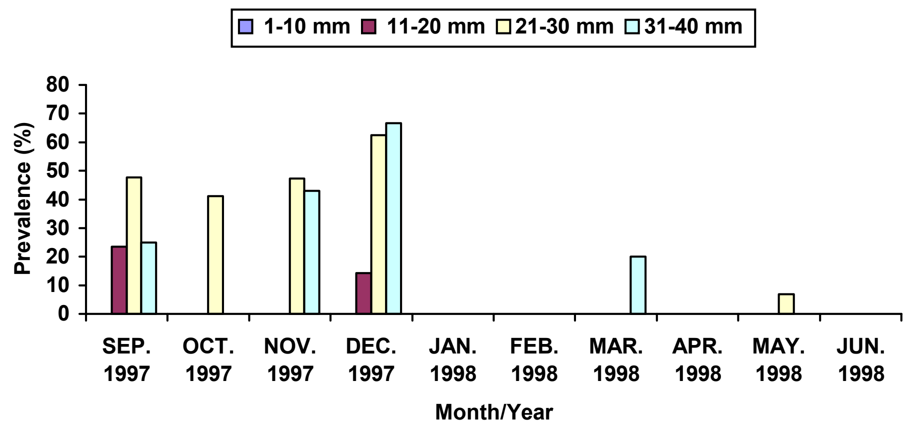

Figure 2. Monthly prevalence of *D. cookarum* infection according to size Classes of *L. libycus*.

Sample collection and examination

L. libycus sample collection was done from September 1997 to June 1998. During each working visit, sampling was done at different locations of the sampling site for 40 minutes to one hour. This was done using a pair of stainless steel tongs and, sometimes, long-handled scoop.

In the laboratory, the shell height of each *L. libycus* sample collected was measured with a pair of vernier callipers. The shell was crushed with mortar and pestle. Subsequently, the mantle was dissected in a petri dish containing water and examined for water mites as had been previously described (Fashuyi, 1990). All examinations were done with dissecting microscope.

RESULTS

A total of 262 samples of *L. libycus* were recorded in this study. Figure 1 gives the monthly size distribution of *L. libycus* from Omi Stream in relation to rainfall pattern. 57.6% (151) of the snails was collected in September to October 1997 and May to June 1998, which were periods of heavy rainfall. 20.2% (53) of the snails was collected during period of little or no rainfall (December 1997 to March 1998). Among the four size classes, the abundance of 1 – 10 mm size class (8.0%) was statistically similar (χ^2 = 1.50, df = 1, P > 0.05) to that of 31 – 40 mm size class (13.7%). Likewise, the abundance of 11 – 20 mm size class (35.1%) was statistically similar ((χ^2 = 0.90, df = 1, P > 0.05) to that of 21 – 30 mm size class (43.5%).

17.2% (45) of the *L. libycus* samples collected had *D. cookarum* infection in their mantle cavity. The monthly prevalence of *D. cookarum* infection according to size classes of *L. libycus* is summarized in Figure 2. In 1997, the total prevalences of infection for September (32.6%), October (33.3%), November (38.7%) and December (44.4%) were not significantly different (χ^2 = 2.43, df = 3, P > 0.05). In 1998, the total prevalences of *D. cookarum* infection for March (4.4%) and May (3.0%) were not significantly different (χ^2 = 0.26, df = 1, P> 0.05). Among *L. libycus* infected with *D. cookarum*, the prevalences of infection among 11 – 20 mm (11.1%), 21 – 30 mm (73.3%) and 31 – 40 mm (15.6%) size classes were significantly different (χ^2 = 72.18, df = 2, P > 0.05).

The intensity of *D. cookarum* in infected *L. libycus* specimens examined ranged from 1 to 6 mite(s) /snail. In September to December 1997, 33.3% of the infected *L. libycus* specimens had 1 mite/snail, while 66.7% had intensity range of 2 to 6 mites/snail. In March to June 1998, the intensity was 1 mite/snail. The total geometric mean intensity was 1.7 mites/snail. Among the size classes, geometric mean intensities were 1.5 mites/snail for 11 – 20 mm, and 1.8 mites/snail for both 21 – 30 mm and 31 – 40 mm size classes.

6.1% (16) of the *L. libycus* specimens examined had *Chaetogaster limnaei* (von Baer) in their mantle cavity. Among 11 – 20 mm, 21 – 30 mm, and 31 – 40 mm size classes, the prevalences of *C. limnaei* were 3.3%, 8.8% and 8.3%, respectively. The intensity of *C. limnaei* infection ranged from 1 to 5/snail. Three (2.6%) *L. libycus* specimens in 21 – 30 mm size class had concurrent *D. cookarum* and *C. limnaei* infections. One (0.9%) *L. libycus* specimen in 21 – 30 mm size class had concurrent infections of *D. cookarum* and an unidentified nematode species.

DISCUSSION

In this study, we observed that *L. libycus* was more abundant during periods of heavy rainfall than period of little or no rainfall. This was inconsistent with previous reports that some other freshwater snails were more abundant during period of little or no rainfall (Lwambo, 1988). In September to November 1997 and May to June 1998, the water volume and velocity in Omi Stream were high. Many of the *L. libycus* collected might have been flushed to the sampling site from the upper region of the stream. A sizeable proportion of the snails were attached to fallen leaves (including those of *Bambusa* sp.), twigs and plants at the brink of the stream. Vegetation had been identified as an important factor influencing the population of freshwater snails (Ukoli, 1984). During period of little or no rainfall, the water volume and velocity were low. Also, fallen leaves and twigs were more abundant than during heavy rainfall season. Ordinarily, these factors ought to have favoured a higher density of *L. libycus* during period of little or no rainfall (Brown, 1994). But, as it had been noted elsewhere for *L. ovum* (Fashuyi, 1990) and *L. libycus* (Agbolade, 2000, 2002), *L. libycus* is commonly collected for consumption, especially by children, in the study area. The low water volume and velocity associated with relatively dry period renders numerous parts of the Stream readily accessibly to adults and children for *L. libycus* collection. Conversely, high volume and velocity of water will naturally scare many, especially children, away from the Stream during heavy rainfall season. Moreover, many inhabitants have little or no reason to visit the Stream during heavy rainfall period since water is usually available from some other sources. The foregoing reasons might have contributed to the observed seasonal density of *L. libycus* in Omi Stream. This assertion is further strengthened by the observation that *Melanoides tuberculata* (Muller) and *Potadoma moerchii* (Reeve), recorded from the Stream during the study, were more abundant during little or no rainfall period (Agbolade, personal observation). Although snail sampling was not done in July and August 1998, the heavy rainfall recorded in July suggested that *L. libycus* would have had high abundance, at least, in July 1998.

The relative low abundance of 1 – 10mm size class *L. libycus* in this study may be a reflection of their inability to withstand high water velocity during heavy rainfall period. Moreover, during dry period, many 1 – 10 mm size class specimens might have been left unnoticed, especially that the rocky substratum of some areas of the Stream seriously hindered successful scooping.

The recorded prevalence (17.2%) of *D. cookarum* infection in this study agreed with the opinion that the hygrobatid species is highly adapted for exploitation of *L. libycus* and that there is a long association between them (Gledhill, 2002). *L. libycus* belongs in the family Ampullaridae (Brown, 1994). The occurrence of *D. cookarum* in *L. libycus* conformed with previous records of water mite species in some other African prosobranch hosts, which were exclusively ampullarids (Gledhill, 1985b, 2002). The prevalence of *D. cookarum* in *L. libycus* was less than that of *U. (B.) macani* in *L. ovum* from Ajara fish ponds in Badagry (Fashuyi, 1990). Greater dispersion of *D. cookarum* might have been enhanced by the lotic nature of Omi Stream.

The prevalence of *D. cookarum* infection in *L. libycus* in this study appeared high during heavy rainfall period till the end of rainy season in December, disagreeing with the report of Fashuyi (1990). The relatively few samples of *L. libycus* collected from the peak of dry season to the return of rainy season might have contributed to the low monthly prevalences of *D. cookarum* in this period. The low prevalence and absence of *D. cookarum* infection in May and June respectively, which were periods of heavy rainfall, suggested the possibility of some other influencing factors which require further studies. In this study, 21 – 30mm size class had the highest prevalence of *D. cookarum* infection, and this possibly showed that *L. libycus* in this size class were most susceptible to infection.

The intensity range of *D. cookarum* in *L. libycus* was lower than the range reported for *U. (B.) macani* in *L. ovum* (Fashuyi, 1990). The lotic nature of Omi Stream in contrast to the lentic nature of the ponds studied by Fashuyi (1990) might have contributed to the discrepancy. The intensity of *D. cookarum* seemed generally high in rainy season and low in dry season, in variance with previous reports (Fashuyi, 1990). Possible relative preponderance of the water mites in the Stream and the relative ease of their invasion into *L. libycus* during rainy period might have contributed to this observation. In the study area, *L. libycus* also harboured *C. limnaei*, and an unidentified nematode species, each of which co-existed with *D. cookarum* in some *L. libycus* specimens. *C. limnaei* had also been reported in *L. ovum* (Fashuyi, 1990).

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