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*Full Length Research Paper*

# Population, seasonal abundance, *Dockovdia oruensis* infection and other parasites of *Potadoma moerchi* in southwestern Nigeria

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***Dockovdia oruensis*** **and some other infections were studied in relation to the population and seasonal abundance of** ***Potadoma moerchi*** **from three streams in a town endemic for schistosomiasis in Ijebu North, southwestern Nigeria from November 2002 to October 2003. 72.9% of the total 958 specimens of** ***P. moerchi*** **collected were from Eri-Oru Stream. 55.6% and 100% of the snails from Eri-Oru and Ojupon, respectively, were recorded during dry season. 21.3% of the** ***P. moerchi*** **had** ***D. oruensis*** **infection. Eri-Oru had the highest monthly frequency of** ***D. oruensis*** **infection.** ***P. moerchi*** **specimens in 35 -45 mm size class had the highest prevalence of** ***D. oruensis*** **infection. Intensity of infection ranged from one to 12 mites/snail. One (0.8%) of the** ***P. moerchi*** **specimens in 25 - 35 mm size class collected in January 2003 from Eri-Oru had** ***Chaetogaster limnaei*** **infection. 5.9% (15) and 0.1% (1) of the** ***P. moerchi*** **collected from Ojupon and Eri-Oru respectively had trematode infection. 93.8% of the trematode-infected** ***P. moerchi*** **specimens were in 25-35 mm size class.**

**Key words:** *Dockovdia oruensis*, *Potadoma moerchi*, *Chaetogaster limnaei*, trematode infection, water mite, Nigeria.

## INTRODUCTION

Three families of water mites, which are Pionidae, Unionicolidae and Hygrobatidae, have been reported to have parasitic association with freshwater molluscs. Hitherto, five unionicolid species have been associated exclusively with prosobranch gastropods while only one hygrobatid species, *Dockovdia cookarum,* has been associated with a prosobranch gastropod, *Lanistes libycus* (Gledhill and Vidrine, 2002; Gledhill, 2003).

*Potadoma moerchi* is a prosobranch gastropod mollusc belonging to the family Thiaridae (Brown, 1994). It occurs in freshwater bodies in the region of Western Africa from Eastern Ghana to Western Nigeria (Brown and Kristensen, 1993). It is one of the freshwater snails which have been found possible valuable tool for monitoring and evaluating metal burden of freshwater bodies in the tropics (Adewunmi et al., 1996).

During a study on the transmission of urinary schistosemiasis in a town (Oru) in Ijebu North area of Southwestern Nigeria, some *P. moerchi* specimens were found to harbour water mites in their mantle cavity (Agbolade, unpublished observation). Recently, the water mite was described as a new species, *D. oruensis*, by Gledhill and Agbolade (2006). It was noted that *D. oruensis* was the second water mite species from the Hygrobatidae to be reported as a parasite of a freshwater mollusc and the first record of a water mite from a thiarid gasropod.

This report presents the prevalence and intensity of *D. oruensis* in relation to the population and seasonal abundance of *P. moerchi* from some streams in Oru, Ijebu North, Western Nigeria. *Chaetogaster limnaei* and trematode infections found in the snail species are also reported.

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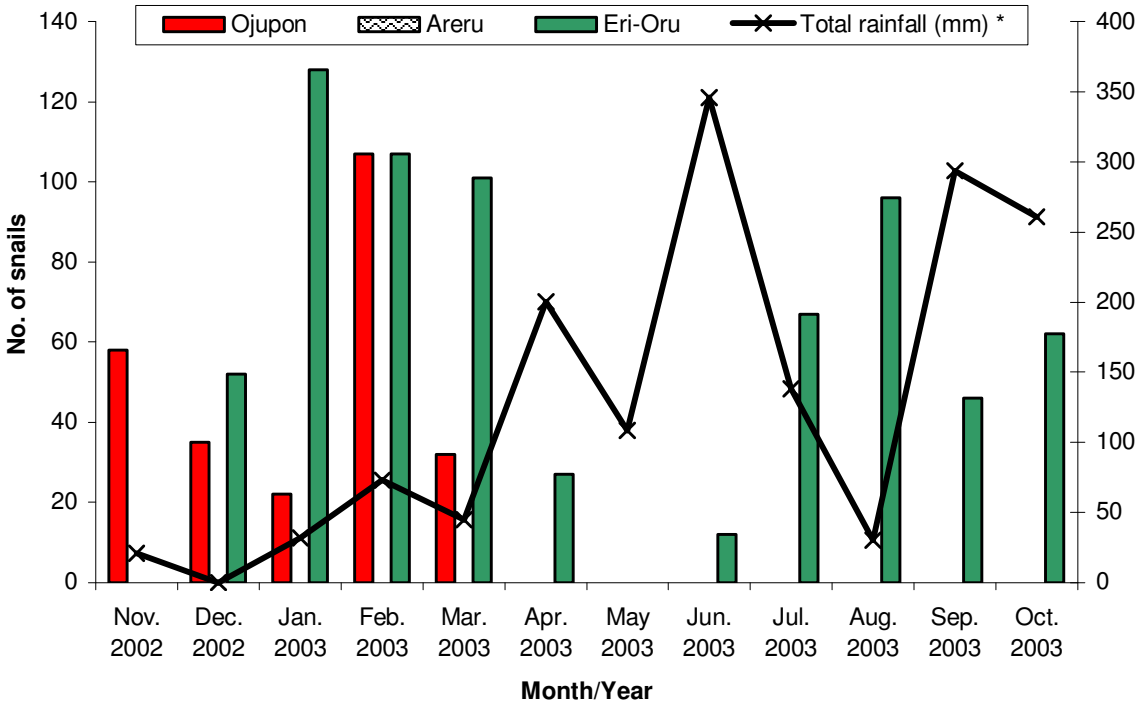


**Figure 1.** Monthly abundance of *Potadoma moerchi* in Ojupon, Areru and Eri-Oru streams in relation to rainfall pattern in the study area. * Source: Federal Department of Meteorological Services.

## MATERIALS AND METHODS

### Study area and sampling sites

Oru is a town in Ijebu North Local Government Area of Ogun State, Southwestern Nigeria. It lies within the tropical rain forest belt, between latitudes 6° 56′ and 6° 57′ N, longitudes 3° 56′ and 3° 58′ E. The location, estimated population size, the inhabitants of the town and the three important streams sampled, which are Ojupon, Eri-Oru and Areru have been described in some earlier papers (Agbolade et al., 2004, 2005).

### Snail collection and examination

*P. moerchi* sample collection was done from November 2002 to October 2003. During each working visit to each stream, collection wad done for 45 to 60 min using a pair of stainless steel tongs and, sometimes, a long-handled scoop. In the laboratory, the shell height measurement and examination of the mantle cavity of each *P. moerchi* sample collected were done as previously described for *L. libycus* (Agbolade and Odaibo, 2004; Agbolade et al., 2005).

## RESULTS

A total of 958 specimens of *P. moerchi* were recorded in this study. 72.9% (698) of the specimens was recorded from Eri-Oru stream which had statistically highest abundance ($P < 0.001$) when compared with Ojupon and Areru streams which had 26.5% (254) and 0.6% (6) of the total specimens, respectively. The monthly abundance of *P. moerchi* in the streams in relation to rainfall pattern is shown in Figure 1. All of the snails from Ojupon and 55.6% (388) of those from Eri-Oru were recorded between November 2002 and March 2003.

All the snails from Areru were of 25-35 mm size class. In Ojupon, snails of size classes 5 - 15, 15 – 25, 25 – 35 and 35 – 45 mm had abundance ranges of 0 - 2.8, 0 - 5.5, 5.5 - 35.8 and 0 - 0.4%, respectively. In Eri-Oru, snails of size classes 5 - 15m, 15 - 25, 25 - 35 and 35 - 45mm had abundance ranges of 0 - 0.1, 0 - 3.6, 0 - 17.1 and 0-0.4%, respectively.

Overall, 21.3% (204) of the *P. moerchi* specimens collected in this study has *D. oruensis* infection. The prevalences of infection in Ojupon (36.6%), Areru (33.3%) and Eri-Oru (15.6%) were significantly different ($\chi^2 = 8.95$, $P < 0.02$). The monthly prevalence of *D. oruensis* infection in *P. moerchi* from the streams studied is summarized in Figure 2. In Ojupon, the prevalence was statistically highest in January 2003 (63.6%) and lowest in November 2002 (19.0%) ($\chi^2 = 30.47$, $P < 0.001$). In Eri-Oru, the prevalence was statistically highest in October 2003 (41.9%) and lowest in March 2003 (5.0%) ($\chi^2 = 65.99$, $P < 0.001$).

The prevalence of *D. oruensis* infection according to the size classes of *P. moerchi* is shown in Figure 3. In Ojupon, *D. oruensis* infection was statistically most prevalent in 35 – 45 mm size class and least prevalent in 15 – 25 mm size class ($\chi^2 = 8.81$, $P < 0.02$). Similarly, in

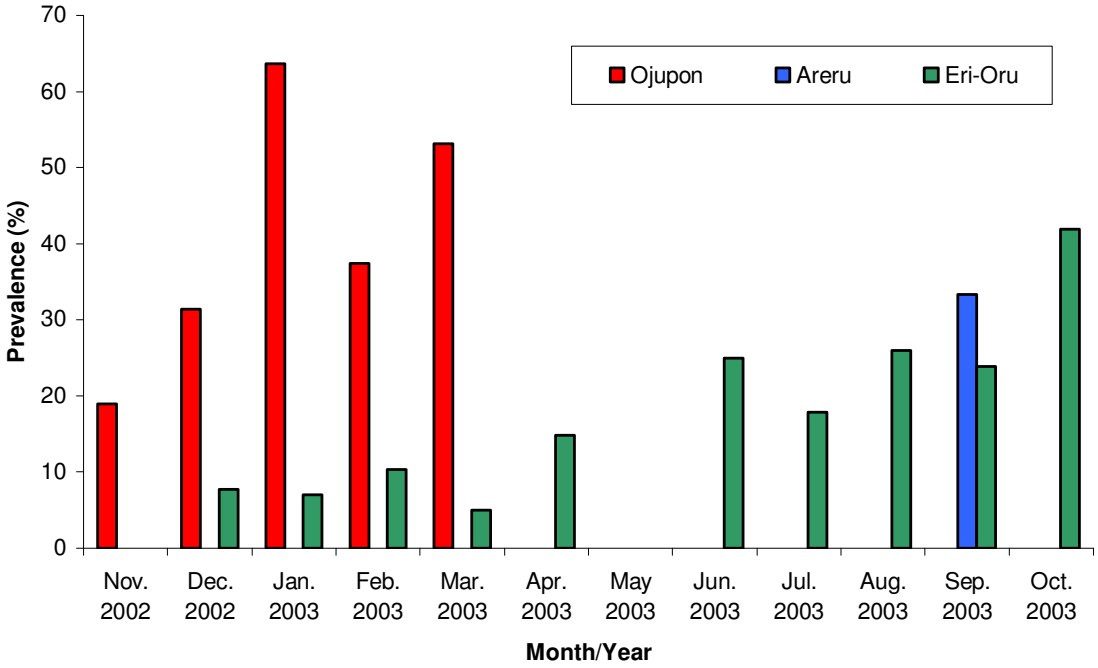


**Figure 2.** Prevalence of *Dockovdia oruensis* infection in *Potadoma moerchi* according to stream.

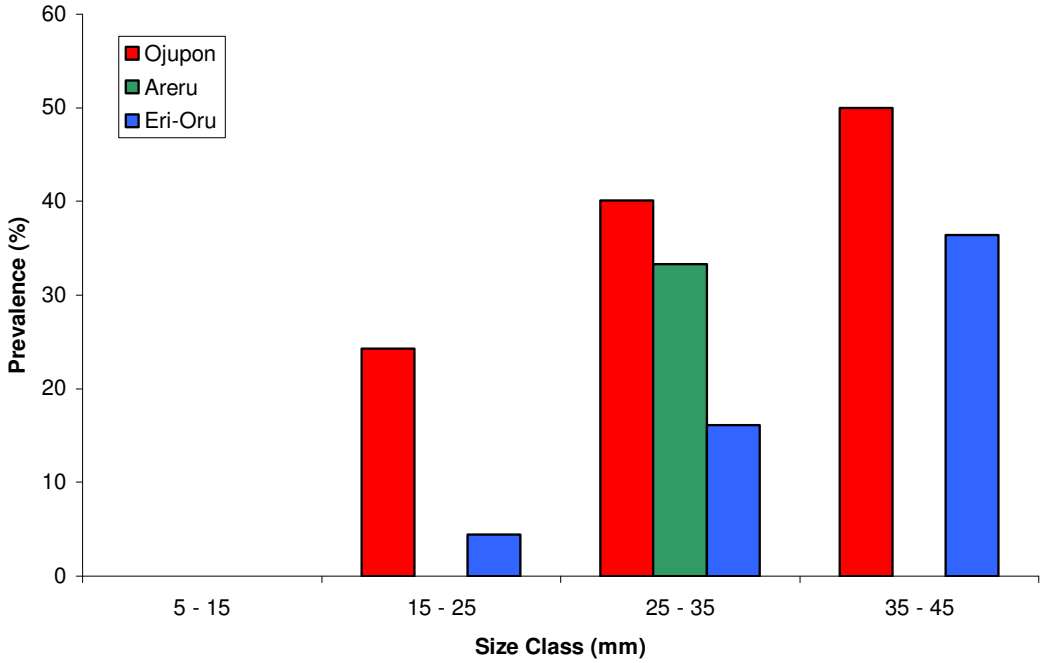


**Figure 3.** Prevalence of *Dockovdia oruensis* infection among the size classes of *Potadoma moerchi*

Eri-Oru, the water mite infection was statistically most prevalent in 35 – 45 mm size class and least prevalent in 15 – 25 mm size class ($\chi^2$ = 27.64, P < 0.001). The intensity of *D. oruensis* infection according to stream is summarized in Table 1.

In January 2003, one (0.8%) of the *P. moerchi* specimens in 25 – 35 mm size class from Eri-Oru had *C. limnaei* infection in its mantle cavity. 5.9% (15) of *P. moerchi* collected from Ojupon had prepatent trematode infection. These trematode-positive specimens were collected in

**Table 1.** Intensity of *Dockovdia oruensis* in *Potadoma moerchi* according to stream.

| Streams | Intensity (mites/snail) | |
|---|---|---|
| | Range | Geometric mean |
| Ojupon | 1 – 5 | 1.4 |
| Areru | 1 – 2 | 1.4 |
| Eri-Oru | 1 - 12 | 1.3 |

January to March 2003. 6.7% (1) of the trematode-infected *P. moerchi* was in 15-25 mm size class while the remaining 93.3% (14) were in 25 – 35 mm size class. Similarly, 0.1% (1) of the specimens recorded from Eri-Oru had prepatent trematode infection. The only specimen was collected in February 2003 and was in 25 – 35 mm size class. In many cases the trematodes occurred as daughter sporocysts from which numerous non-furcocercous cercariae forcefully emerged on splitting.

## DISCUSSION

This study showed that Eri-Oru had the highest total and monthly abundance of *P. moerchi* in the study area. The stream had rocky substratum, twigs, fallen leaves, emergent and submerged aquatic macrophytes, and was relatively shallow at the sampling site. These factors might have contributed to the observed relative abundance of *P. moerchi* in Eri-Oru as had been previously reported for some other snails in some other freshwater bodies (Ukoli, 1984; Brown, 1994; Agbolade and Odaibo, 2004; Kariuki et al., 2004).

The observation that 55.6% and 100% of the snails from Eri-Oru and Ojupon respectively were recorded during dry season suggests the seasonality of their abundance in the study area. This agreed with previous observations on *P. moerchi* elsewhere in Ijebu North (Agbolade and Odaibo, 2004), and some other freshwater snails (Lwambo, 1988; Fashuyi, 1990; Brown, 1994). *P. moerchi* specimens of 25 – 35 mm size class appeared to be most abundant in this study.

The occurrence of *D. oruensis* infection in numerous specimens of *P. moerchi* in this study is important because it corroborates an earlier assertion that the water mite is actively parasitic in the mantle cavity of the snail host (Gledhill and Agbolade, 2006). The prevalence of infection was higher than that reported for *D. cookarum* in *L. libycus* (Agbolade and Odaibo, 2004; Agbolade et al., 2005) but lower than that reported for *Unionicola (Baderatax) macani* in *L. ovum* (Fashuyi, 1990).

In this study, Eri-Oru had the highest monthly frequency of *D. oruensis* infection while Ojupon had the highest total prevalence. In Eri-Oru, *D. oruensis* had higher prevalences in rainy season than in dry season. The occurrence of highest prevalence of *D. oruensis* infection among *P. moerchi* specimens in 35 – 45 mm size class conformed to a previous report on *D. cookarum* infection in *L. libycus* (Agbolade et al., 2005). This suggests higher vulnerability of *P. moerchi* of that size class to *D. oruensis* infection. The intensity of *D. oruensis* infection in *P. moerchi* was low in this study.

The presence of trematode cercariae in *P. moerchi* in this study is an important find being the first of its kind in Ijebu North area of Southwestern Nigeria. The recorded prevalence of trematode cercariae in *P. moerchi* was higher than that earlier reported in *L. libycus* (Agbolade et al., 2005). The infection was most common in *P. moerchi* of 25 – 35 mm size class. The trematode cercariae may elicit cercarial itching in humans who frequent the streams studied for various purposes including collection of *L. libycus* and *P. moerchi* for consumption (Agbolade and Odaibo, 2004; Agbolade et al., 2004). Although schistosomiasis is endemic in the study area (Agbolade et al., 2004), *Potadoma* species have not been incriminated as vector of schistosomiasis in tropical Africa (Ukoli, 1984). Nevertheless, *Potadoma* species have long been suspected to be the first intermediate hosts of *Paragonimus* in tropical Africa (Nozais et al., 1980; Ukoli, 1984). Further studies are required to confirm the identity of the cercariae harboured by *P. moerchi* in the study area.

The occurrence of *C. limnaei* infection in *P. moerchi* in this study is another important find. This is because, to the best of our knowledge, this is the first record of such an association in *P. moerchi*. However, the relatively low prevalence of the annelids in *P. moerchi* may imply that they are accidental parasites in the snail hosts. Further studies are required to establish the infection status of these annelids in *P. moerchi*.

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