Influence of temperature on microsporidia infections in a natural population of Simuliidae, Diptera.

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Introduction

The importance of family Simuliidae for human health lies in the fact that the females of certain species within the genus *Simulium* Latreille, 1802 are vectors of *Onchocerca volvulus* (Leuckart, 1893) Railliet & Heney, 1910 (Nematoda: Onchocercidae), a filarid that causes the human onchocerciasis, found in the Neotropical Americas and Western and Central Africa (Shelley, 2002). In Brazil, the onchocerciasis was reported in the northern part of the state of Roraima by Moraes & Chaves (1974); in northern Goiás by Gerais & Ribeiro (1986), and more recently, in northern Amazonas by Shelley *et al.* (1997). In south and southeastern Brazil, where there is not 0nchocerciasis transmission, the importance of Simuliidae is related to the high biting rates, in regions where the populations of anthropophilic species show high densities. The few studies found in literature approaching the relationship between microsporidia and simuliids under the influence of temperature are restricted to Culiciidae, and are laboratorial studies within controlled temperature (Undeen *et al*., 1993). The importance of the present study lies in the acquisition of information that will help further studies on the biology and ecology of microsporidia found in Brazil, which will help the establishment of determinant parameters of the host-parasite relationship, as well as the enzootics and epizootics, allowing the utilization of this pathogen as part of a blackfly integrated management program. This study held as objective evaluating the correlation between the water temperature of the breeding site and the prevalence of Microsporidia infections in the population of *S. pertinax*.

Material and methods

This study was carried in a two non consecutive years period with weekly samples (May 2001 to 2002 and May 2003 to 2004), in Santo Ale ixo river, Magé/RJ (S 22º 32' W 43º 02'). The data on mean maximum and minimum temperature and the pluviometric precipitation were obtained in the National Institute of Meterology, RJ and were examined with the objective of establishing if these two years were atypical. The water temperature was measured in all samplings using a digital termometer. The *S. pertinax* larvae that showed the infection symptoms were dissected and stained according to Becnel (1997). The protozoans were identified in a light phase microscope, using the identification key proposed by Weiser (1991). The seasonal profile of the microsporidia was established from the relative frequencies of the genera. Based on this evaluation, Sorensen similarity test was applied on the weekly infection data, in order to verify the incidence pattern of the infection. Due to the coexistence of more than one microsporidia genus, it was applied Fager affinity index at 1% error. The linear correlation applied to the total infected larvae per sampling period, as well as for the total infected larvae per microsporidia genus. So, with the objective of estimating the annual infection profile was calculated the prevalence for 77 weeks involved in this research.

Results

This data showed that this year was not atypical, when compared to the last decade time series. On the 1° period a total of 10.603 simuliids larvae were sampled, and 207 infected larvae detected, from which 201 were infected by the *Amblyospora* sp. and 6 larvae by *Polydispyrenia* sp. *Amblyospora* sp. showed relative frequency of 1.90 % in the larval population, representing 97.10 % of the microsporidia. *Polydispyrenia* sp. had relative frequency of 0.06, what stands for just 2.90

% of the microsporidia. In the 2° period, 24.116 larvae were sampled, 396 of these were infected by *Amblyospora* sp. (relative frequency of 1.64 %) which stood for 90.40 % of the microsporidia, and 42 infected by *Polydispyrenia* sp. (0.17 % relative frequency), and representing 9.60 % of the microsporidia. Low parasitary similarity was achieved (59.34 %) and according to the affinity index, it was observed that Tcalc = 15.4540 > Ttab 1 % = 3.91. The correlation between the total infected larvae and water temperature was negative. The correlation between the water temperature and the *Amblyospora* sp. infections in the 1° period was negative and strong, and in the 2° period it was negative. *Polydispyrenia* sp. showed no significant correlation in the both periods.

Conclusions

Even though the negative correlation between *Amblyospora* sp. and the water temperature, the same analysis was performed using the infection rates instead of the absolute numbers, with the objective of verifying if the sample size had influence in the result. There was correlation between the water temperature and the infection rates only in the first period and with the genera *Amblyospora*, so probably the another factor had influence in infections by *Amblyospora* on this river, once the temperature in both periods don't considerable to was distingue. Besides, the correlation analysis applied to the pluviometrical precipitation, and only in the first period there was a strong correlation for *Amblyospora* sp. This allowed to establish that neither the water temperature or the precipitation influenced the infection rate. Then it is acceptable to state that the infection rates do not show correlation with the abiotic factors in this river, due to the fact that it is a high drainage breeding site, where the host behaviour is different from that observed in normal drainage breeding sites, in addition to the little variation between the maximum e minimum temperatures, that were within an optimal range for microsporidia infections (Undeen *et al.*, 1993).

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