AFRICAN JOURNAL OF PARASITOLOGY, MYCOLOGY AND ENTOMOLOGY
Official journal of the African Society of Parasitology

Experimental Evaluation of the Potential of Rotifers to Control Snail Intermediate Hosts of *Schistosoma mansoni* and *Schistosoma haematobium*

Diara Sy, Ph.D [1,2], Doudou Sow, Ph.D [3,4], Bruno Senghor, Ph.D [2,5], Mamadou Aliou Diallo, Ph.D [2,6], Malick Diop [2], Amele Nyedzie Wotodjo, Ph.D [2], Cheikh Sokhna, Ph.D [1,2] and Souleymane Doucoure, Ph.D [2,*]

[1] EMR MINES: Maladies Infectieuses, Négligées et Émergentes au Sud, Aix Marseille Université, Institut de Recherche pour le Développement, 13005 Marseille, France; radiadaty@gmail.com (D.S.); Cheikh.Sokhna@ird.fr (C.S.)

[2] EMR MINES: Maladies Infectieuses, Négligées et Émergentes au Sud, Institut de Recherche pour le Développement, Campus International Institut de Recherche pour le Développement-Université-Cheikh Anta Diop of Hann, Dakar BP 1386, Senegal; bruno.senghor@yahoo.fr (B.S.); mamadou.diallo1@ird.fr (M.A.D.); malick.diop@ird.fr (M.D.); amele-nyedzie.wotodjo@ird.fr (A.N.W.)

[3] Department of Parasitology-Mycology, Unité de Formation et de Recherche des Sciences de la Santé, Université Gaston Berger, Saint-Louis BP 234, Senegal; doudsow@yahoo.fr

[4] Centre de Recherche sur les Maladies Tropicales Négligées, Saint-Louis BP 234, Senegal

[5] Pôle Immunophysiopathologie et Maladies Infectieuses, Institut Pasteur de Dakar, Dakar BP 220, Senegal

[6] Department of Animal Biology, Faculty of Sciences and Techniques, Université-Cheikh Anta Diop, Dakar BP 5005, Senegal

* Corresponding author: souleymane.doucoure@ird.fr

Submitted: 19 October 2025, accepted: 3 February 2026, published: 12 February 2026

Abstract: This study focuses on an experimental evaluation of the potential of rotifers to control snail intermediate hosts of *Schistosoma mansoni* and *Schistosoma haematobium*. **Background.** Biological molluscicides could represent a breakthrough for the sustainable control of snail intermediate hosts of schistosomes. This study evaluated the impact of rotifers on *Biomphalaria* and *Bulinus* snails in controlled conditions. **Methodology.** The impact of rotifers was assessed on *Biomphalaria pfeifferi*, *Biomphalaria glabrata*, *Bulinus truncatus*, *Bulinus senegalensis*, and *Bulinus globosus.* For each snail species, a group of 15 juvenile and 15 adult individuals were exposed separately to rotifers. For each condition, a control group of unexposed snails was set up. Snail shell size, egg-laying capacity, and mortality were monitored in each condition. **Results.** After 37 days, a decrease in egg production was observed in all snail species, although this was only significant with *Bi. glabrata* (p = 0.0017). Egg production was inhibited in juveniles *Bi. glabrata* and *Bi. pfeiffeiri exposed to rotifers, while 57 and 27 egg masses were observed in their counterparts.* Regardless the species and age, rotifers hampered the viability of eggs. After 50 days, growth delay was observed in all species, with a significant impact on *Bi. glabrata* (p = 0.001), which had an average size of 9.5 mm and 6.4 mm in unexposed adults and juveniles compared to 6.24 mm and 3.94 mm in exposed individuals. The exposure to rotifers did not cause excess mortality in any of the snail species after

40 days. **Conclusions.** Significant life traits of snails were altered by exposure to rotifers. Further studies are needed to better understand snail/rotifer interactions and the possibilities this would offer for malacological control.

Keywords: schistosomiasis; *Bulinus*; *Biomphalaria*; rotifers; biological control

How to cite: Sy, D.; Sow, D.; Senghor, B.; Diallo, M.A.; Diop, M.; Wotodjo, A.N.; Sokhna, C.; Doucoure, S. Experimental Evaluation of the Potential of Rotifers to Control Snail Intermediate Hosts of *Schistosoma mansoni* and *Schistosoma haematobium*. *Afr. J. Parasitol. Mycol. Entomol.*, 2026, 3(2): 9; doi:10.35995/ajpme03020009.

Introduction

Schistosomiasis is a major public health problem, with 700 million people at risk and 251 million cases, mostly in sub-Saharan Africa (SSA) [1]. The disease is caused by the trematodes of the genus *Schistosoma* [2]. In SSA, schistosomiasis has a complex life cycle involving snails of the genus *Bulinus* and *Biomphalaria* as intermediate hosts and a mammal as the definitive host [3]. Control strategies rely primarily on mass drug administration (MDA) of praziquantel (PZQ), the only drug available for the regular treatment of school-age children, the main group at risk [4]. Although PZQ MDA has reduced the disease burden, it is ineffective against the immature stages of the parasite that maintain the schistosomiasis transmission cycle [5], thereby allowing for continued circulation of the parasite in human populations. In response to this limitation, malacological control is increasingly advocated as a complementary strategy to MDA for breaking the schistosomiasis transmission cycle [6] and could even contribute to its elimination in some endemic areas [7]. The regular use of chemical molluscicides such as niclosamide can lead to a rapid reduction in the snail population and, consequently, a drop in the level of disease transmission [8]. Despite some success with chemical molluscicides, their use is hampered by environmental concerns, particularly their impact on wildlife [9], as well as their high implementation costs [10]. To overcome these limitations, approaches to controlling snail populations have been developed using plants or aquatic predators. Among biological predators, the use of fish [11] and shrimp [12] predators has proven to be somewhat effective against snail populations and could help reduce the risk of schistosomiasis transmission. Unlike fish and shrimp, the impact of zooplankton on mollusk intermediate hosts of schistosomiasis remains poorly studied so far, despite some promising results.

Indeed, rotifers of the genus *Philodina* have been shown to alter significant life traits of *Biomphalaria straminea* and impact the survival of juvenile snails [13]. Moreover, compounds derived from rotifers could interfere with the motility of schistosomes [14]. Rotifers are metazoans that do not exceed 1 mm in size and are widely found in fresh water bodies [15]. Rotifers are involved in the food chain, particularly for fish in aquaculture [16]. However, despite a long-standing relative understanding of the impact of rotifers on snails and schistosomes [17], the scarcity of research does not provide sufficient information to consider their use in the control of schistosomiasis. To address this gap, we have designed an experimental study to assess the impact of rotifers on the growth and survival of several medically important snails, i.e., snails of the genus *Bulinus* and *Biomphalaria* transmitting schistosomiasis in Senegal.

Methodology

The rotifers used in this experiment were collected in the region of Ziguinchor, located approximately 450 km southwest of Dakar, the capital city of Senegal. Previous investigations have already revealed a high diversity of rotifer species in the region of Ziguinchor [18]. Three samples of 50 mL of water, each containing rotifers, were collected and stored at room temperature for one day before being transported to the IRD malacology platform in Dakar. Then, the water samples were pooled and centrifuged at 12,000 rpm for 2 min to recover the pellet that was observed under a binocular microscope to estimate the density of the rotifers, which was 10 individuals per mL. To increase the density, the rotifers were recovered from the pellet and cultured during 15 days using dechlorinated tap water at a temperature between 26 °C and 28 °C and exposed to artificial light [19]. The final density obtained was approximatively 550 rotifers per mL. In addition, rapid morphological identification revealed a mixture of different genera of rotifers [20].

Experimental Protocol

Schistosoma-free laboratory strains of *B. senegalensis*, *B. truncatus*, *B. globosus*, *Bi. Pfeifferi*, and *Bi. glabrata* were used in the experiment. For each species, two groups of 15 juveniles (1 to 3 mm) and 15 adults (4 to 5 mm) were exposed separately to a mixture of 150 rotifers of the genera in a tank containing 1 L of dechlorinated tap water. For each condition, a control group containing 15 snail individuals in 1 L of rotifer-free dechlorinated tap water was also set up. Both experimental and control tanks were maintained at 26 °C $\pm$ 1, and the rotifers ware fed with 5 mg of dried and crushed lettuce once a week. Each week, the density of rotifers was assessed and diluted if necessary to maintain a concentration of 150 rotifers/1 L. The impact of rotifers was evaluated by measuring the evolution of the three snail life traits: egg mass laying capacity and viability, snail mortality rate, and shell size growth.

The number of egg masses was measured each day from day 0 to day 37. The viability of the snail egg mass was assessed using a binocular microscope. Egg masses with a complete absence of embryos within the gelatinous mass were considered non-viable. Translucent egg masses were considered normal, while their opacity was a sign of non-viability. The mortality rate was also evaluated daily from day 0 to day 40, and a snail was considered dead if it shrunk in its shell, unable to climb the wall of the container to hang on to the dried lettuce leaves. The shell growth was measured at day 0, 8, 15, 37, and 43 using a Dino-Lite AM5218MZTF digital microscope (ANMO Electronics Corporation, Taipei, Taiwan). Shell length was measured according to the technique developed by Thiam et al. (2023). For *Bulinus*, the size was the length from the apex to the spinal notch. For *Biomphalaria*, size was considered as the diameter of the apex passing through the middle of the whorls [21].

Data Analysis

GraphPad Prism software (San Diego, CA, USA) was used to analyze the data. After confirmation of non-normal distribution, the non-parametric Kruskal–Wallis test was used for comparisons of snail size growth and egg laying between more than two groups. The survival of each species according to age (adults and juveniles) and exposure to rotifers was compared by the log-rank (Mantel–Cox) test. All differences were considered significant at $p < 0.05$.

Results

Snail Egg-Mass-Laying Capacity

For all the species studied, whatever the age of the individuals, the number of eggs laid was greater in unexposed snails (Figure 1). In unexposed snails, both adults and juveniles showed an increase in egg mass over time. On the other hand, in exposed snails, regardless of group, egg-laying capacity was considerably inhibited. *B. truncatus* oviposition in infested adults and juveniles was inhibited after 8 and 15 days, respectively. The total number of egg masses was 9 and 90 in infested and non-infested juveniles. In the adult groups, the same trend was observed, with 81 egg masses in unexposed vs 9 in exposed snails (Kruskal–Wallis test, $p = 0.212$). In the case of *B. globosus*, both adults and juveniles were inhibited after 15 days of exposure, with total egg masses of 8 and 12, respectively. At the same time, 99 and 85 egg masses were laid by the non-infested juveniles and adults (Kruskal–Wallis test, $p = 0.522$). In the case of *B. senegalensis*, although no inhibition was observed, egg-laying capacity slowed considerably (three and two egg masses in juveniles and adults) compared with unexposed individuals (67 and 73 egg masses in juveniles and adults) (Kruskal–Wallis test, $p = 0.438$).

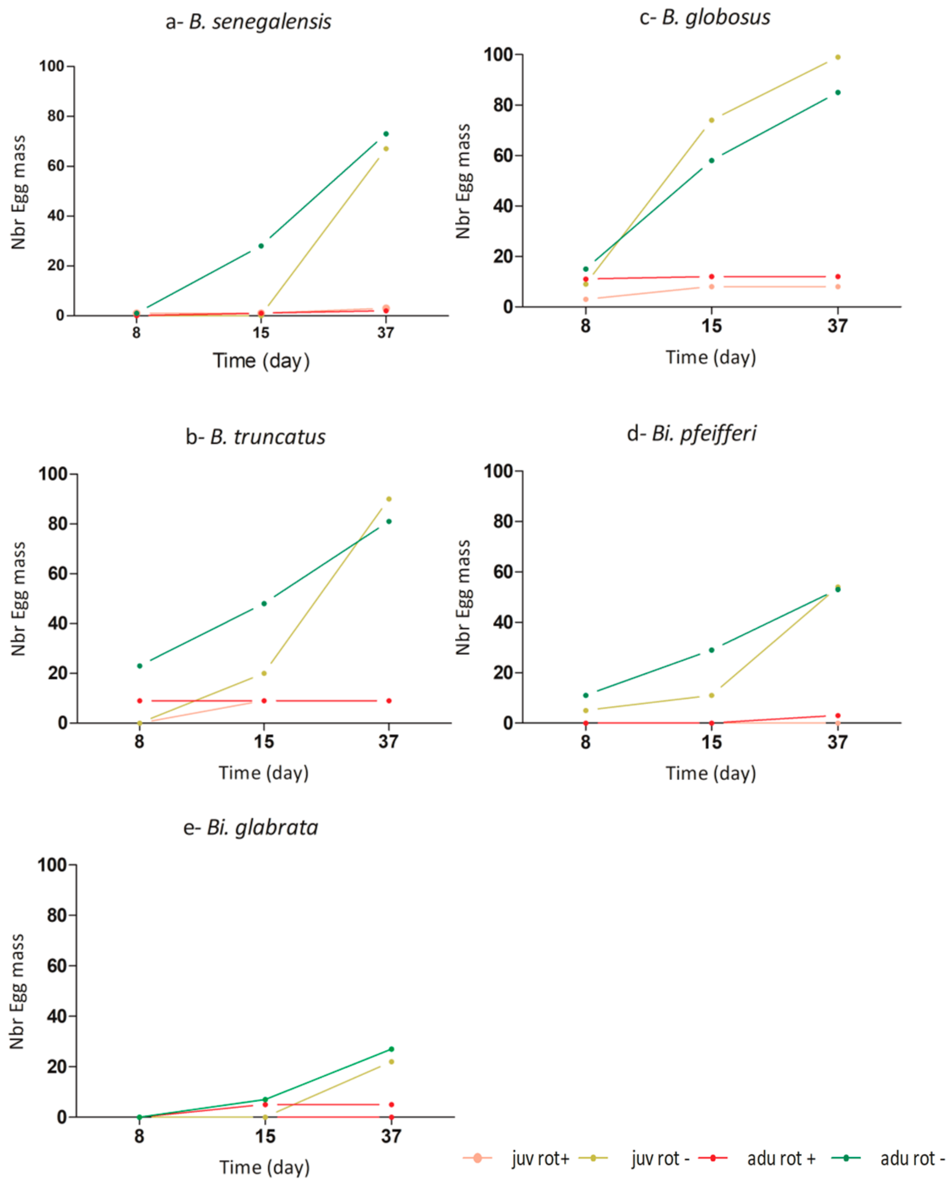

Figure 1: Evolution of the number of egg masses according the age (adult/juvenile) and exposure to rotifers. Legend: evolution of egg-laying capacity of each snail species according to age and exposure to rotifers: (**a**) *B. senegalensis*, (**b**) *B. truncatus* (**c**) *B. globosus*, (**d**) *Bi. pfeifferi*, (**e**) *Bi. glabrata*.

Juveniles of the *Biomphalaria* genus were particularly affected by exposure to rotifers, with a total absence of oviposition throughout the follow-up period, while it was delayed in exposed adults until 15 and 37 days for *Bi. glabrata* and *Bi. pfeifferi*, respectively. The egg masses in non-infested juveniles were 22 and 54 in *Bi. glabrata* and *Bi. pfeifferi*. The total egg mass was was 3 and 53 in exposed and non-exposed adults in *Bi. pfeifferi*. In *Bi. glabrata*, 5 and 27 egg masses were observed in exposed and non-exposed adults. The overall analysis showed a significant difference in the impact of rotifers on *Bi. glabrata* (Kruskal–Wallis test, p = 0.0017), contrary to what was observed with *Bi. pfeifferi* (Kruskal–Wallis test, p = 0.080).

Observation with a binocular microscope showed that egg masses from infested snails were opaque, contained no embryo, and were colonized by rotifers in contrast of egg masses from non-infested snails that remained translucent with embryos (Figure 2).

(**A**) (**B**)

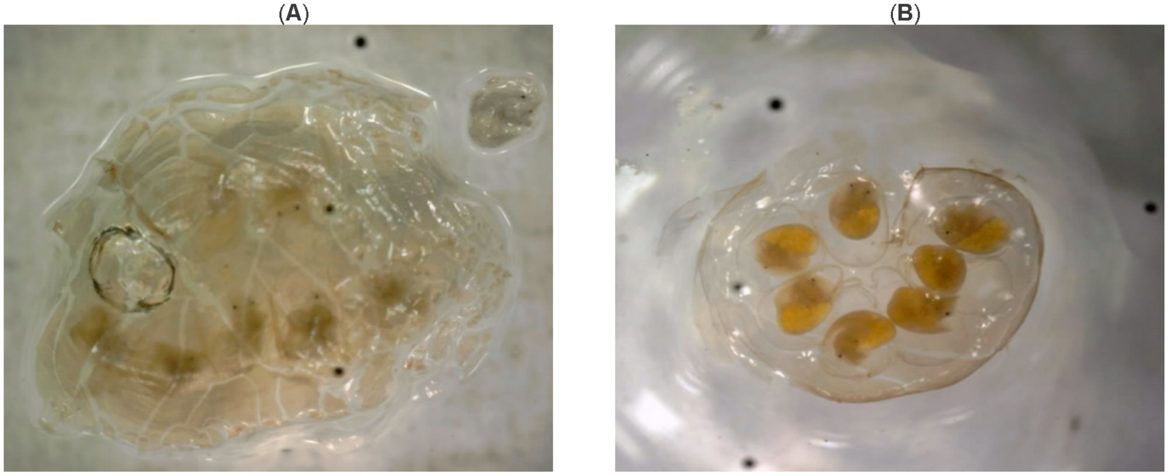

Figure 2: Images of *B. pfeifferi* snail eggs collected from tanks. Legend: images of *B. pfeifferi* snail eggs collected from tanks. (**A**) Egg mass collected from a rotifer-infested experimental pond; the gelatinous mass is empty with a complete absence of embryos. (**B**) Egg mass collected from a control pond where the embryos are visible and differentiated and are well-colored in yellow.

The Survival of Snails

Regardless of the species and age of the snails, the same mortality trend was observed between rotifer-exposed and unexposed snails (Figure 3). Mortality trends for *B. globosus* were almost identical in all conditions (juveniles, adults, rotifer-infested, and non-infested), with survival rates varying between 33 and 40% at day 40 (log-rank test, p = 0.990). In the case of *B truncatus*, at day 40, the mortality rate was around 13% for the unexposed and exposed adult populations, while it remained high (50%) in infested juveniles, representing double the size of the unexposed juvenile population (25%) (log-rank test, p = 0.746). *B. senegalensis* was the most sensitive *Bulinus* species, with a drop in survival rate under all conditions from days 15. At day 40, the survival rate was less than 10% in all conditions (log-rank test, p = 0.834). In *Bi. glabrata*, the survival rate at day 40 was 9.72%, 16.66%, 20%, and 37, 5% in unexposed adults, exposed juveniles, unexposed juveniles, and exposed adults, respectively (log-rank test, p = 0.654). In *Bi. pfeifferi*, the survival rate at 40 days was 11.11% and 33.3% in unexposed and exposed juveniles, respectively, while the same mortality rate (16.66%) was observed in both exposed and unexposed adults (log-rank test, p = 0.985).

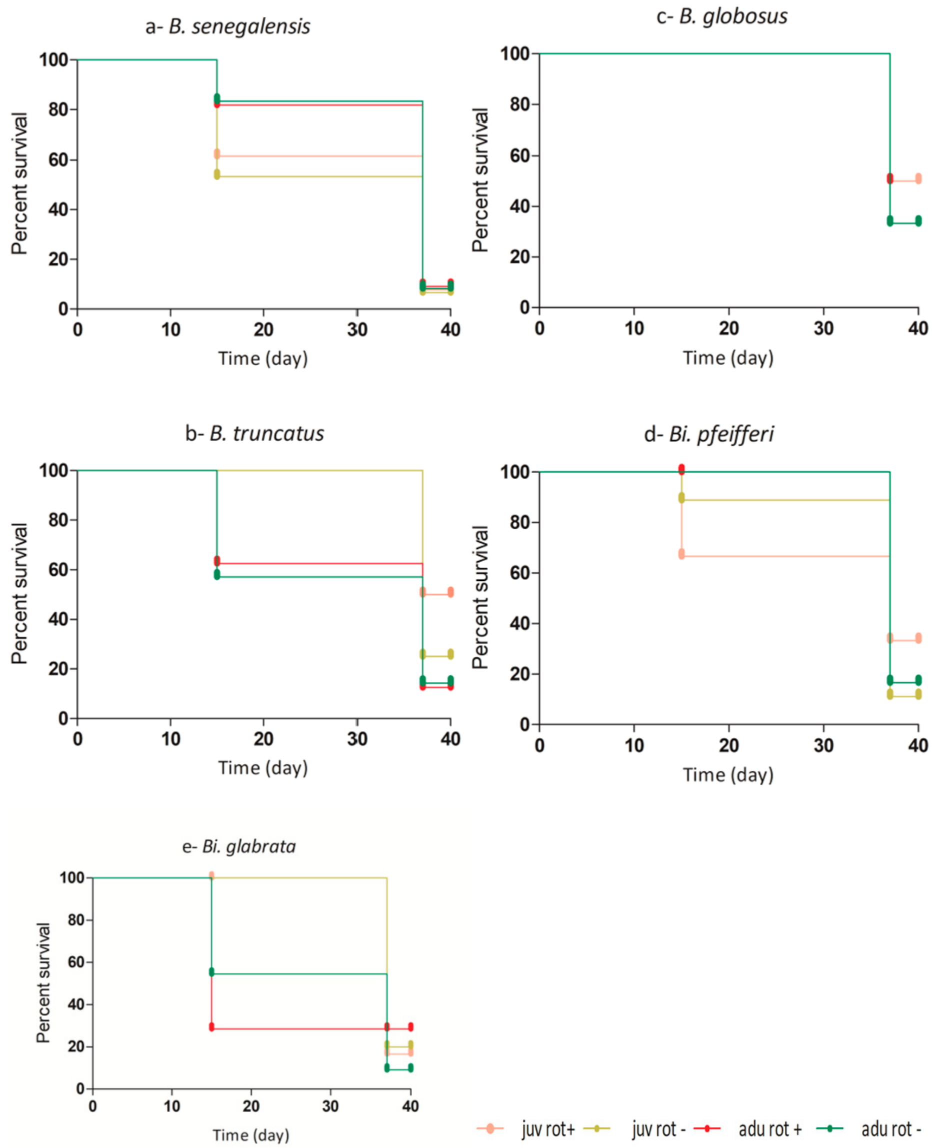

Figure 3: Evolution of the snail mortality according the age (adult/juvenile) and exposure to rotifers. Legend: the survival rate of each snail species based on age and exposure to rotifers is monitored over a period of 40 days. (**a**) *B. senegalensis*, (**b**) *B. truncatus*, (**c**) *B. globosus*, (**d**) *Bi. pfeifferi*, (**e**) *Bi. glabrata*

The Shell Size Growth

Infested *Bi. pfeifferi* adults had a larger average size (9.28 mm) than healthy adults (8.59 mm). However, healthy juveniles (7.21 mm) were larger than infested juveniles (5.59 mm) (Kruskal–Wallis test, p = 0.0802). In *Bi. glabrata*, at day 55, the size was 3.97 mm and 6.24 mm in exposed and unexposed juveniles, respectively. The size was 6.84 mm and 9.55 mm in exposed and unexposed adults, respectively (Kruskal–Wallis test, p = 0.001) (Figure 4).

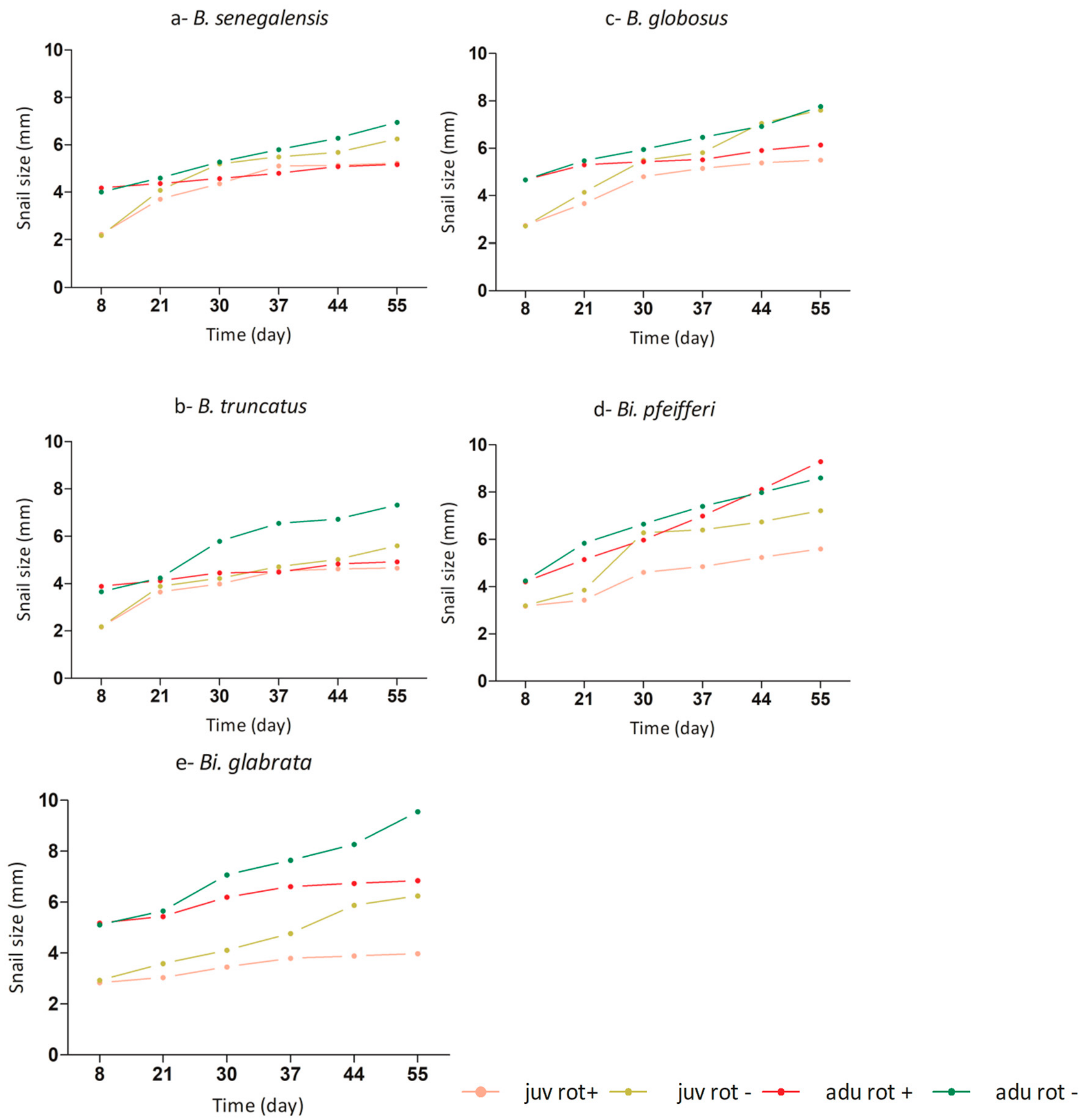

Figure 4: Evolution of the snail size according the age (adult/juvenile) and exposure to rotifers. Legend: evolution of snail shell size growth per species (adult/juveniles) and the exposure to rotifers. (**a**) *B. senegalensis*, (**b**) *B. truncatus*, (**c**) *B. globosus*, (**d**) *Bi. pfeifferi*, (**e**) *Bi. glabrata*.

In *Bulinus*, the size of the shell in unexposed individuals was larger than that of exposed individuals at 55 days of follow-up, both in adults and juveniles. On the other hand, at day 55, unexposed juveniles were larger than exposed adults in all *Bulinus* species. At the end of follow-up, the size of exposed and unexposed *B. sengalensis* adults was 5.16 mm and 6.94 mm, respectively. The size of unexposed *B. senegalensis* juveniles was 6.27 mm compared to 5.21 mm for exposed juveniles (Kruskal–Wallis test, p = 0.245). For *B. truncatus*, the size of exposed and unexposed juveniles was 4.65 mm and 5.59 mm, respectively, while it was 7.32 mm and 4.91 mm for unexposed and exposed adults (Kruskal–Wallis test, p = 0.212).

The same trend was observed in *B. globosus*, with 7.76 mm and 6.13 mm in unexposed and exposed adults, respectively. The size of unexposed and exposed juveniles was 7.60 mm and 5.49 mm, respectively (Kruskal–Wallis test, p = 0.147).

Discussion

This study evaluated the impact of rotifers on different species of *Biomphalaria* and *Bulinus* snails. It provides new insights into the impact of rotifers on snail intermediate hosts of schistosome in SSA.

Overall, during this study, the exposure of the snails to both rotifers considerably impacted the *Biomphalaria* and *Bulinus* egg-mass-laying capacity and hatching rate The ability of rotifers to negatively impact these two parameters may lead to a reduction in the population density of snails and could thus constitute an important breakthrough for the control of intermediate hosts of schistosomes. Previous studies have highlighted the capacity of rotifers of the genus of *Philodina* to negatively impact the fecundity rate of *Bi. straminea* [13]. This shows the potential of using rotifers in the biological control of snail intermediate hosts of schistosomes. In this current study, we observed that the juvenile population of *Biomphalaria* seems particularly sensitive to rotifer exposure compared to adult individuals and the genus of *Bulinus*. This suggests that rotifers may have a species- and age-specific effect on snail fecundity. In this case, it is possible that the use of rotifers is more suitable for controlling *Biomphalaria* and consequently *S. mansoni*. Our study confirms that, in addition to *Biomphalaria*, rotifers can also be used against a wide range of *Bulinus* snails of medical importance. Therefore, it is worth exploring the potential of rotifers to control snails in a wide variety of ecological and epidemiological contexts.

The impact on egg-laying capacity and egg viability remains the key element through which rotifers may directly influence the density of snail populations. However, the reduction in growth in exposed snails should not be overlooked, as it could impact their reproductive and survival capacities and thus their population density. For example, growth delay could have an impact on the snails' ability to proliferate, notably when snails are exposed to the chemical molluscicide [22]. The evolution of snail size is also important in their survival process during seasonal changes, particularly during their aestivation in temporary ponds [23–25]. Similarly, in the event of thermal stress, larger snails may be more resistant to changing conditions than smaller individuals [24]. Thus, the growth delay caused by exposure to rotifers could indirectly also be beneficial from the perspective of the biological control of snail intermediate hosts of schistosomes.

However, throughout the study, mortality trends were almost identical between infested and non-infested snails. The exposure to rotifers does not seem to have any impact on snail mortality, regardless the species or age. Mortality seems more related to the specificity of each species. The mortality is conditioned by snail species, although it has previously been shown that rotifer infestation can induce excess mortality [13]. These differences could be explained by the nature of the rotifers used, their density, or even the snail species. This raises the question of the biological mechanism used by rotifers to impact snail life traits like size and reproduction or whether snails have defense mechanisms against rotifers. Further research, including studies under natural conditions, are needed to decipher the molecular interactions between rotifers and snail intermediate hosts of schistosomes.

For example, in natural ponds, several snail species are often found in sympatry. It would have been more convincing to study the impact of rotifers, taking into account the interaction between different snail species to see whether rotifers preferentially target molluscs according to species. Similarly, it would be useful to study the effect of rotifers on schistosoma-infested snails. Several models have shown excess mortality in infested *Biomphalaria* exposed to rotifers and their ability to impact parasite motility [13,14]. This study considered a mixture of rotifer genera; thus, it would be pertinent to study exactly which rotifer species have an impact on snails.

Our study shows that the presence of rotifers affects the growth and egg-laying capacity of snails, although there is no significant difference between the exposed and unexposed groups. Despite the strong trend observed, this lack of significant difference could be due to the limited number of measurements carried out during the study, by the limited sample size used for each snail species, or the density of rotifers. This may be explained by the scope of the study, which not only included five snail species but also investigated three parameters in addition to the viability of the eggs obtained.

Conclusions

This study demonstrates that rotifers of the genera have a major impact on the reproduction and growth of snail intermediate hosts of schistosomiasis, although their effect on snail mortality is limited.

These results suggest that rotifers could be a promising biological control method for reducing snail vector populations of schistosomiasis in sub-Saharan Africa. However, further studies are needed to better understand their ecological interactions and potential for large-scale applications.

Author Contributions: Conceptualization, D.S. (Diara Sy), D.S. (Doudou Sow), S.D. and C.S.; methodology, D.S. (Diara Sy), S.D. and M.D.; formal analysis, D.S. (Diara Sy), S.D. and D.S. (Doudou Sow); funding acquisition, C.S. and D.S. (Doudou Sow); writing—original draft preparation, D.S. (Diara Sy) and S.D.; writing—review and editing, B.S., M.A.D., A.N.W. and D.S. (Doudou Sow). All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by CEA-AGIR (Centre d'Exellence Africain "Environnement, Santé, Société)-Université Cheikh Anta DIOP and by the Unité Mixte de Recherche Vecteurs Infections Tropicales et Méditerranéennes (VITROME) Campus UCAD/IRD de Hann, BP 1386. The sponsors had no role in the design, execution, interpretation, or writing of the study. Diara Sy was funded by the Fondation Méditerranée Infection.

Acknowledgments: We thank Ndèye Oumy Diop and Elisabeth Marie Veronique Senghor for their assistance in conducting the experiments. We are grateful to the Host–Pathogen–Environment Interactions (IHPE) laboratory in Perpignan, France, for providing the *Bi. glabrata* strain.

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. Schistosomiasis (Bilharzia). Available online: https://www.who.int/health-topics/schistosomiasis (accessed on 7 September 2025).
2. Gryseels, B.; Polman, K.; Clerinx, J.; Kestens, L. Human Schistosomiasis. *Lancet* **2006**, *368*, 1106–1118. [CrossRef] [PubMed]
3. Mandahl-Barth, G. Intermediate Hosts of Schistosoma. *Bull. World Health Organ.* **1957**, *17*, 1–65. [PubMed]
4. Andrews, P. Praziquantel: Mechanisms of Anti-Schistosomal Activity. *Pharmacol. Ther.* **1985**, *29*, 129–156. [CrossRef]
5. Doenhoff, M.J.; Hagan, P.; Cioli, D.; Southgate, V.; Pica-Mattoccia, L.; Botros, S.; Coles, G.; Tchuenté, L.a.T.; Mbaye, A.; Engels, D. Praziquantel: Its Use in Control of Schistosomiasis in Sub-Saharan Africa and Current Research Needs. *Parasitology* **2009**, *136*, 1825–1835. [CrossRef] [PubMed]
6. WHO Guideline on Control and Elimination of Human Schistosomiasis. Available online: https://www.who.int/publications/i/item/9789240041608 (accessed on 15 January 2026).
7. Ali, S.M.; Allan, F.; Ayi, I.; Chandre, F.; Coelho, P.M.Z.; El-Hawary, A.K.; Jiamrong, D.; Kariuki, C.; Kouakou N'Goran, E.; Madsen, H.; et al. *Field Use of Molluscicides in Schistosomiasis Control Programmes: An Operational Manual for Programmemanagers*; WHO: Geneva, Switzerland, 2017.
8. Trippler, L.; Ali, S.M.; Masoud, M.O.; Mohammed, Z.H.; Amour, A.K.; Suleiman, K.R.; Ame, S.M.; Kabole, F.; Hattendorf, J.; Knopp, S. Impact of Chemical Snail Control on Intermediate Host Snail Populations for Urogenital Schistosomiasis Elimination in Pemba, Tanzania: Findings of a 3-Year Intervention Study. *Parasit. Vectors* **2024**, *17*, 489. [CrossRef] [PubMed]
9. Hepditch, S.L.J.; Birceanu, O.; Wilkie, M.P. A Toxic Unit and Additive Index Approach to Understanding the Interactions of 2 Piscicides, 3-Trifluoromethyl-4-Nitrophenol and Niclosamide, in Rainbow Trout. *Environ. Toxicol. Chem.* **2021**, *40*, 1419–1430. [CrossRef] [PubMed]

10. Rollinson, D.; Knopp, S.; Levitz, S.; Stothard, J.R.; Tchuem Tchuenté, L.-A.; Garba, A.; Mohammed, K.A.; Schur, N.; Person, B.; Colley, D.G.; et al. Time to Set the Agenda for Schistosomiasis Elimination. *Acta Trop.* **2013**, *128*, 423–440. [CrossRef] [PubMed]
11. Kloos, H.; Passos, L.K.J.; Loverde, P.; Oliveira, R.C.; Gazzinelli, A. Distribution and Schistosoma Mansoni Infection of Biomphalaria Glabrata in Different Habitats in a Rural Area in the Jequitinhonha Valley, Minas Gerais, Brazil: Environmental and Epidemiological Aspects. *Mem. Inst. Oswaldo Cruz* **2004**, *99*, 673–681. [CrossRef] [PubMed]
12. Sokolow, S.H.; Huttinger, E.; Jouanard, N.; Hsieh, M.H.; Lafferty, K.D.; Kuris, A.M.; Riveau, G.; Senghor, S.; Thiam, C.; N'Diaye, A.; et al. Reduced Transmission of Human Schistosomiasis after Restoration of a Native River Prawn That Preys on the Snail Intermediate Host. *Proc. Natl. Acad. Sci. USA* **2015**, *112*, 9650–9655. [CrossRef] [PubMed]
13. Lin, D.; Xiang, S.; Sanogo, B.; Liang, Y.; Sun, X.; Wu, Z. Molecular Characterization of Rotifers and Their Potential Use in the Biological Control of Biomphalaria. *Front. Cell. Infect. Microbiol.* **2021**, *11*, 744352. [CrossRef] [PubMed]
14. Gao, J.; Yang, N.; Lewis, F.A.; Yau, P.; Collins, J.J.; Sweedler, J.V.; Newmark, P.A. A Rotifer-Derived Paralytic Compound Prevents Transmission of Schistosomiasis to a Mammalian Host. *PLoS Biol.* **2019**, *17*, e3000485. [CrossRef] [PubMed]
15. Pourriot, R.; Francez, A.-J. Introduction pratique à la systématique des organismes des eaux continentales françaises.-8: Rotifères. *Publ. Société Linn. Lyon* **1986**, *55*, 148–176. [CrossRef]
16. Troadec, J.-P. L'homme et les Ressources Halieutiques: Essai sur L'usage D'une Ressource Commune Renouvelable. 1999. Available online: https://archimer.ifremer.fr/doc/00391/50196/ (accessed on 15 January 2026).
17. Mossallam, S.F.; Amer, E.I.; Abou-El-Naga, I.F. New Scope on the Relationship between Rotifers and Biomphalaria Alexandrina Snails. *Asian Pac. J. Trop. Biomed.* **2013**, *3*, 595–603; discussion 602. [CrossRef] [PubMed]
18. De Ridder, M. Recherches Écologiques et Biogéographiques Sur Les Rotifères de La Basse-Casamance (Sénégal). *Rev. Hydrobiol. Trop.* **1983**, *10*, 41–55.
19. Bonou, C.A. Etude de la Productivité Planctonique dans des Étangs D'aquaculture en Milieu Saumâtre Tropical. Available online: https://theses.fr/1990INPT007A (accessed on 15 January 2026).
20. Ricci, C.; Melone, G. Key to the Identification of the Genera of Bdelloid Rotifers. *Hydrobiologia* **2000**, *418*, 73–80. [CrossRef]
21. Thiam, F.; Fall, C.B.; Gaye, P.M.; Senghor, B.; Diamanka, A.; Wotodjo, A.N.; Abotsi, K.; Parola, P.; Faye, B.; Sokhna, C.; et al. Study of the Behavior of Snails Intermediate Hosts of *Schistosoma* spp. under Different Maintenance Conditions and Their Resistance to Salinity in an African Laboratory Environment. *Heliyon* **2022**, *8*, e10289. [CrossRef] [PubMed]
22. Konan, C.K.; Tian-Bi, Y.-N.T.; Diakité, N.R.; Ouattara, M.; Coulibaly, J.T.; Salia, D.; Koné, A.; Kakou, A.K.; Assaré, R.K.; Ehouman, M.A.; et al. Spatial Variation of Life-History Traits in *Bulinus Truncatus*, the Intermediate Host of Schistosomes, in the Context of Field Application of Niclosamide in Côte d'Ivoire. *BMC Zool.* **2022**, *7*, 7. [CrossRef] [PubMed]
23. Diaw, O.T.; Seye, M.; Sarr, Y. Resistance to drought of mollusks of the genus *Bulinus*, vectors of human and animal trematode infections in Senegal. II. Study under natural conditions in the North-Sudan area. Ecology and resistance to drought of *Bulinus umbilicatus* and *B. senegalensis*. *Rev. Elev. Med. Vet. Pays Trop.* **1989**, *42*, 177–187. [CrossRef] [PubMed]
24. Knigge, T.; Di Lellis, M.A.; Monsinjon, T.; Köhler, H.-R. Relevance of Body Size and Shell Colouration for Thermal Absorption and Heat Loss in White Garden Snails, *Theba Pisana* (Helicidae), from Northern France. *J. Therm. Biol.* **2017**, *69*, 54–63. [CrossRef] [PubMed]
25. Sy, D.; Senghor, B.; Sokhna, C.; Diallo, M.A.; Wotodjo, A.N.; Sow, D.; Doucoure, S. Exploring the Adaptation of *Bulinus senegalensis* and *Bulinus umbilicatus* to the Dry and Rainy Season in Ephemeral Pond in Niakhar (Senegal), an Area of Seasonal Transmission of Urogenital Schistosomiasis. *Trop. Med. Infect. Dis.* **2024**, *9*, 121. [CrossRef] [PubMed]