Study on the Density, Hydrostatic Setting Velocity and Locomotion of Biomphalaria Straminea

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Research Article

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Abstract

[Background]

Schistosomiasis mansoni is one of the most prevalent neglected tropical diseases transmitted by snails of the genus Biomphalaria . The pla norbid freshwater snail Biomphalaria straminea as an invasive vector is expanding its geographic range for its great dispersal capacity in Gonuangdong Province, causing potential risk of an epidemic of S. mansoni in southern China . Previous studies have mainly focus ed on the environmental factors that affect B straminea' s distribution, but few studies have looked at its hydraulic characteristics for the water conservancy control. This stud y explored its primary parameters of the hydraulics characteristic s including density, hydrostatic setting velocity and l ocomotion in different water depth to evaluate its peculiar dispersion characteristics in natural environment.

[Methods] The density and hydrostatic setting velocity of B. stramine were measured by the drainage volume method and setting tube method, respectively. T he behavior and distribution characteristics of B. stramine in different water depths were observed by the Plexiglas tube method and the effect s of hydrostatic pressure on the climbing speed of B. stramine were also analyzed.

[Results] Our results show that the average density of the B. stramine is 1.08 g/cm 3 . The hydrostatic setting velocity of B. stramine is between 2.32 cm/s and 12.92 cm/s in the water , there is no significant difference betwe en the settling velocity and their shape type. In the Plexiglas tubes with different depths, we noted that the locomotion can occur in six manners. The B. stramine distribute mainly along the surface and at the bottom layer of the tubes and the proportion of the B. stramine on the surface water generally raised as time increase d. Also, we observed the climbing speed of B. stramine at different water depth, and obtained the regression equation of the hydrostatic pressure and their climbing speed of the B. stramine . It revealed that the climbing speed of B. stramine increases first and then decreases with the water depth increase, and reaches the maximum when the water depth at 120cm.

[Conclusion] The findings of this study indicate that there are si gnificant differen ces between the 50 density , the hydrostatic setting velocity and climbing speed of B. stramine compared with 51 Oncomelania hupensis . Future studies should be conducted more intensive on h ydraulics 52 characteristics of B . straminea and thus establish adequ ate water conservancy measures to control 53 its dispersion

Full-text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed. However, the manuscript can be downloaded and accessed as a PDF.

Figures

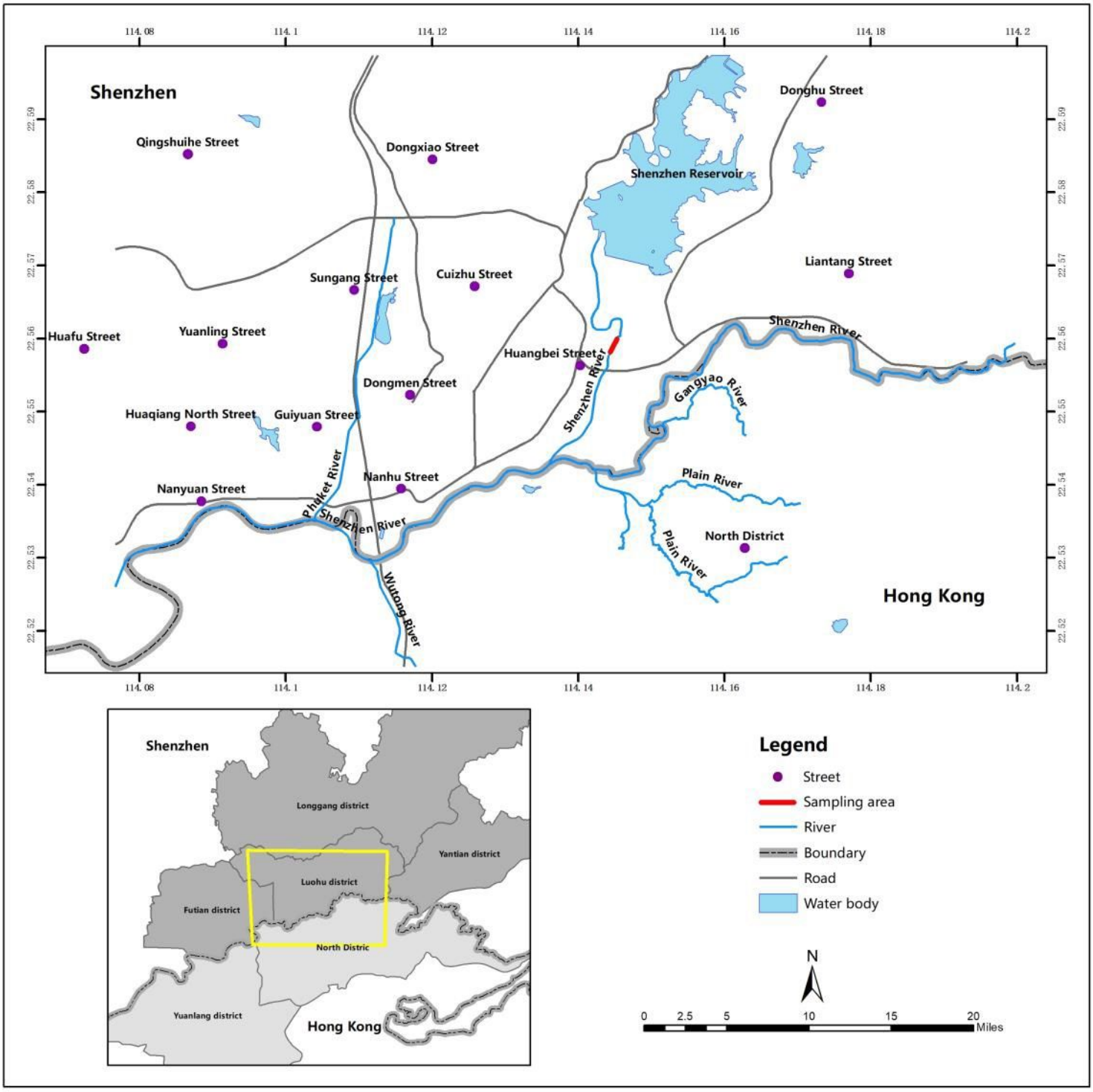

Figure 1

Map of the sampled site for B. straminea in Shenzhen, China Note: The designations employed and the presentation of the material on this map do not imply the expression of any opinion whatsoever on the part of Research Square concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. This map has been provided by the authors.

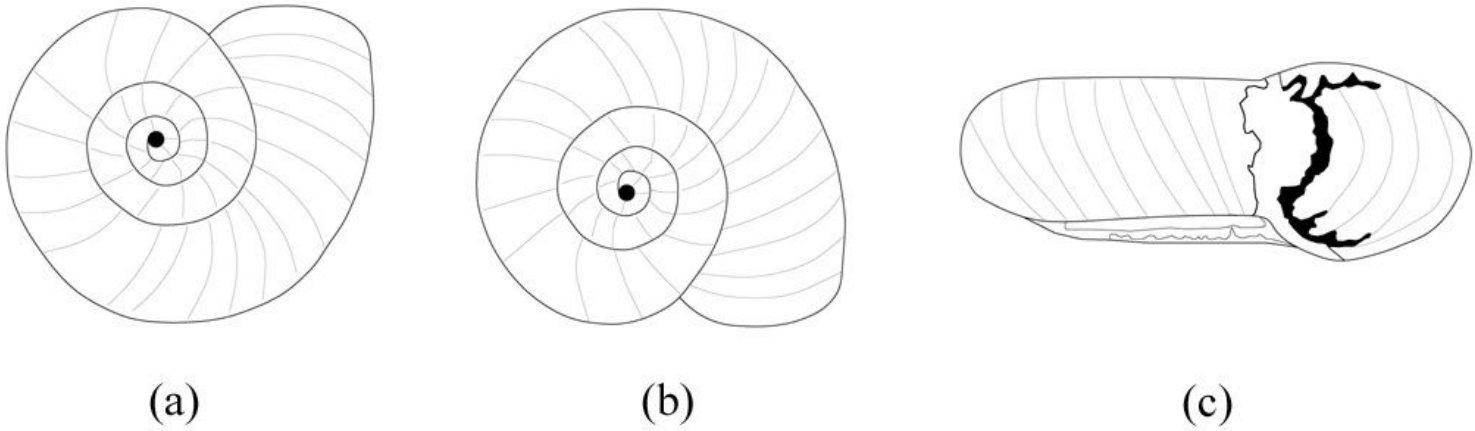

Figure 2

Three delivery methods of B. straminea in still water（a: aperture upward; b: aperture 613 downward; c: flatwise）

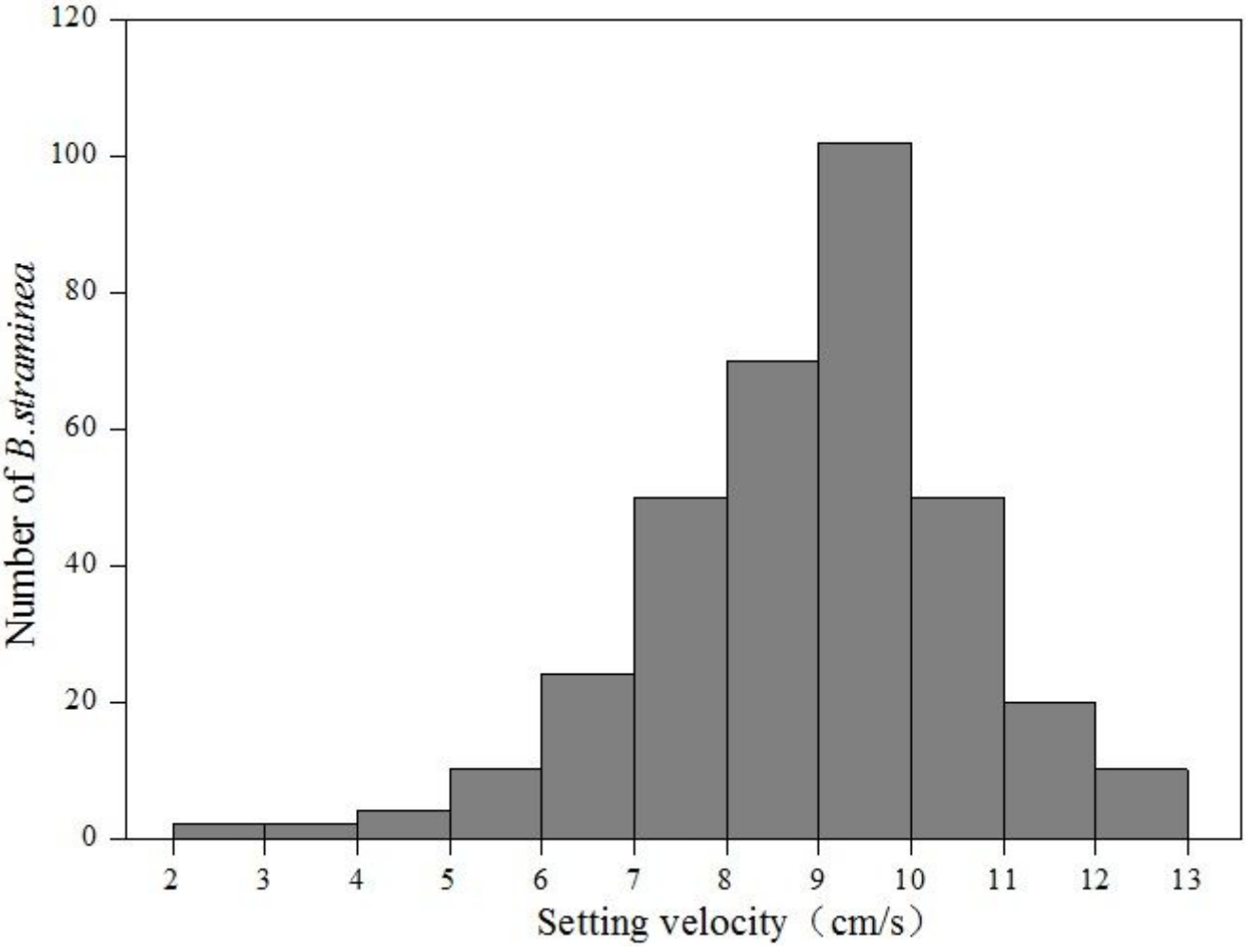

Figure 3

The frequency of the hydrostatic settling velocity of B. straminea

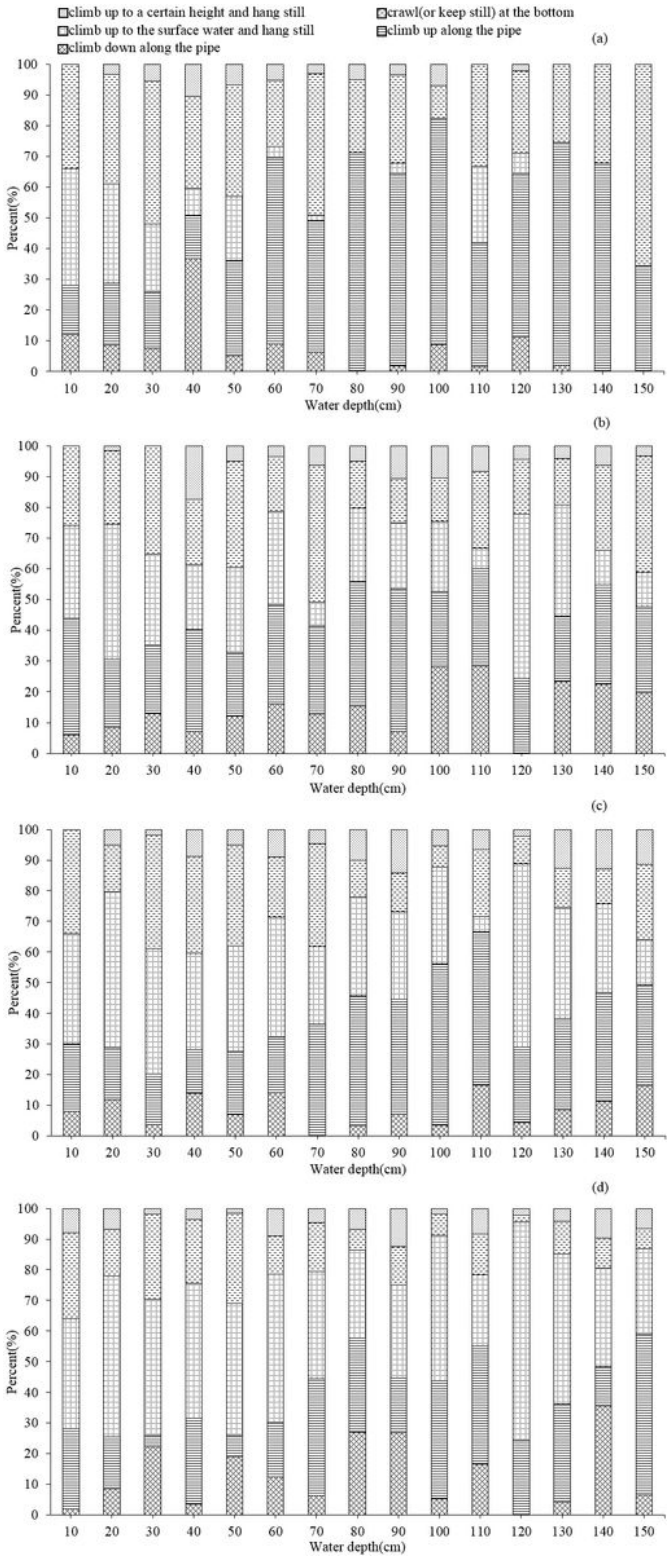

Figure 4

Percent of different motion types of B. straminea account for total snails, in different 616 water depths at different time after the experiment beginning (a: 30min; b: 60min; c: 90 min; d: 120min). Legend of Figure 4 doted square: climb up to a certain height and hang still; dashed square: crawl (or keep still) at the bottom; orthogonal lined square: climb up to the surface water and hang still; solidlined square: climb up along the pipe; oblique lined square: climb down along the pipe

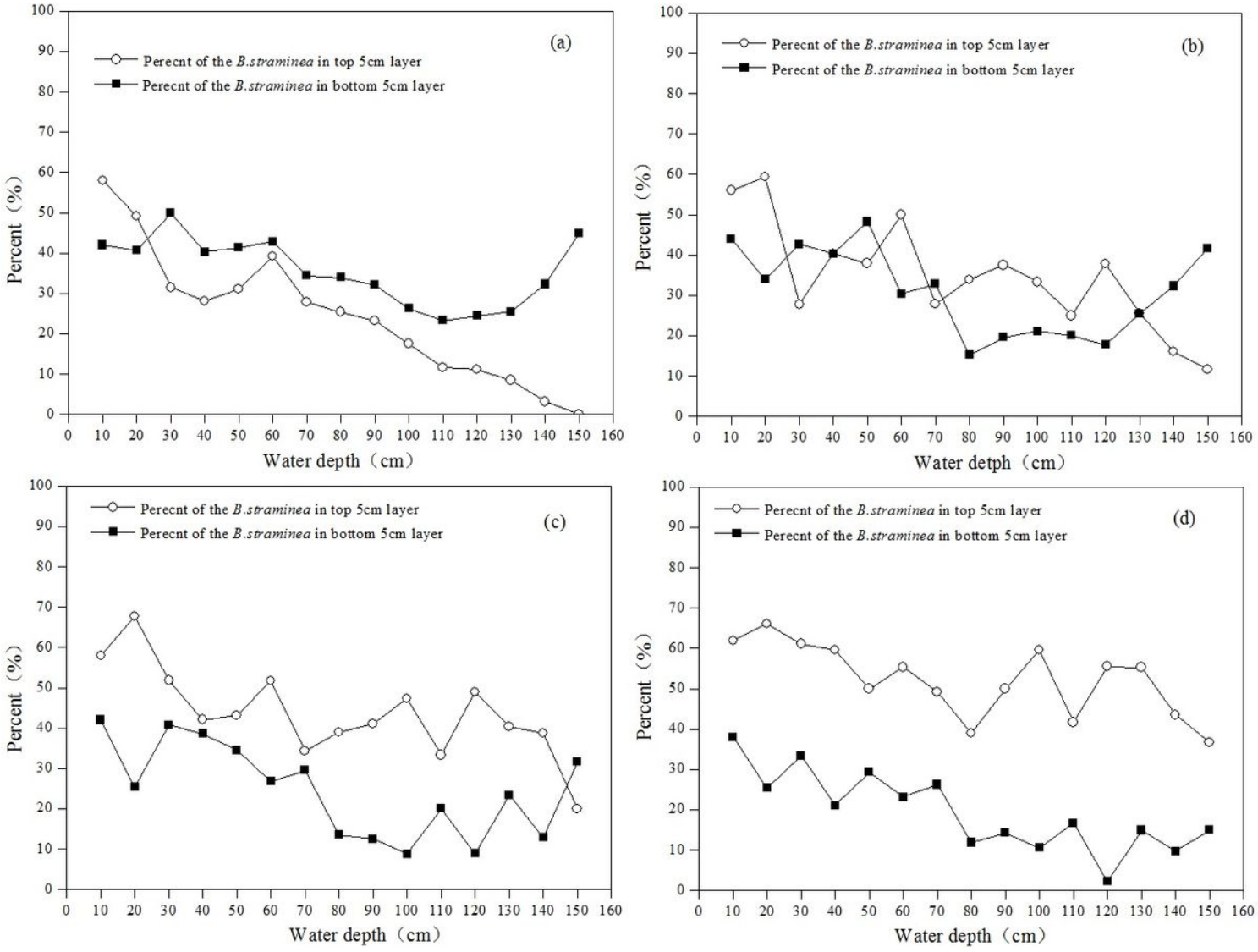

Figure 5

Percent of B. straminea at top 5 cm layer and bottom 5 cm layer account for total snails, in different water depths at different time after the experiment beginning(a:30min; b:60min; c:90 min; d:120min). Legend of Figure 5 open circles line: percent of B. straminea in top 5 cm layer; solid squared line: percent of B. straminea in bottom 5 cm layer

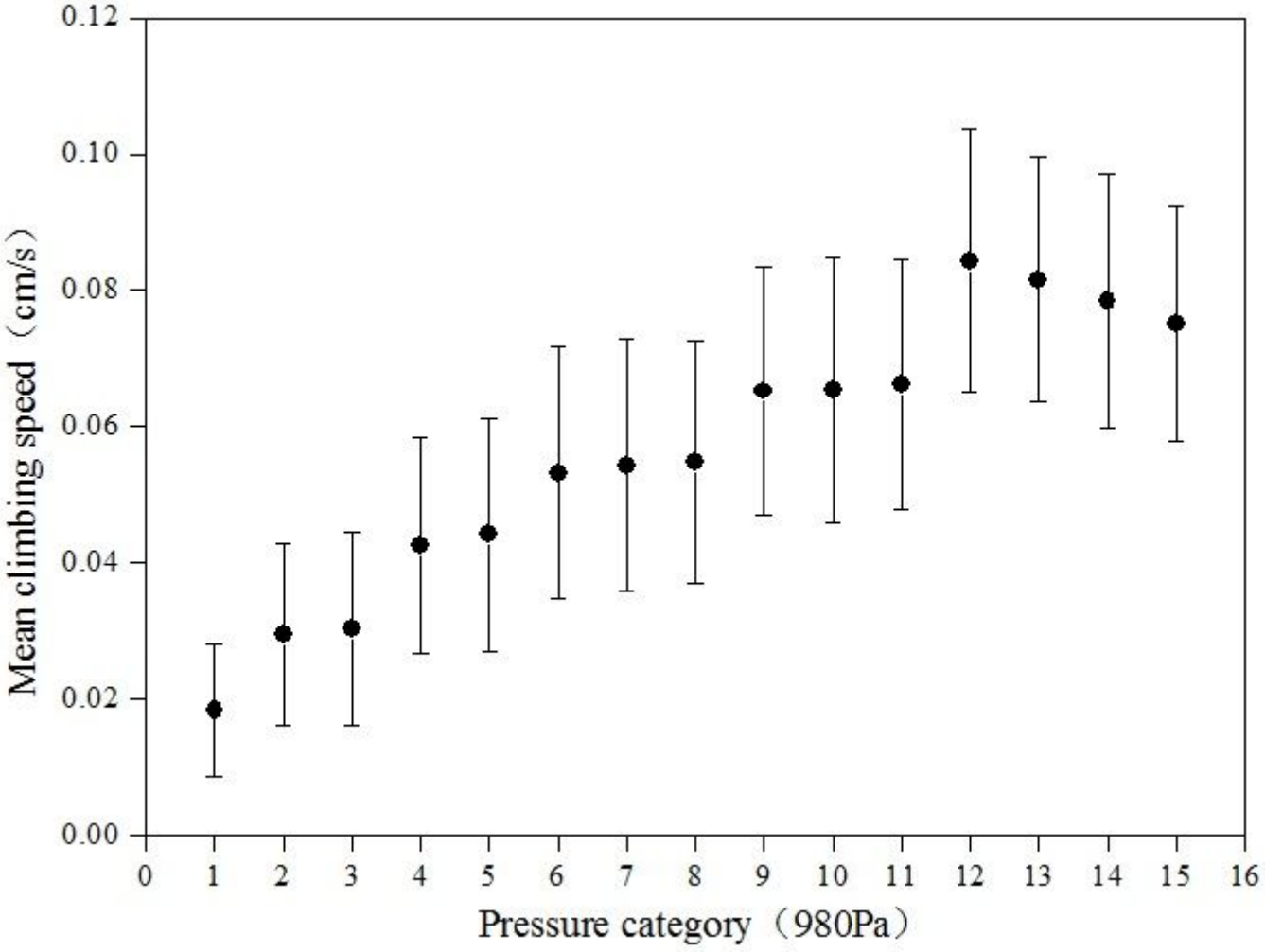

Figure 6

Mean climbing speed of B. straminea under different water pressures