



Review on the freshwater pulmonate snail *Indoplanorbis exustus* (Deshayes, 1834)

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Abstract: *Indoplanorbis exustus* (Deshayes, 1834) is a freshwater pulmonate snail widely distributed in tropical and subtropical zones. It acts as an intermediate host for trematode parasites of both medical and veterinary importance by harbouring larval stage of trematodes for domestic and wild animals. These snails show different and distinct modes of growth which are reflected in ecological adaptations. Molluscs have also proven to be useful as models for understanding basic mechanisms of developmental biology.

IndexTerms - *Indoplanorbis exustus*, pulmonate snail, Intermediate host

I. INTRODUCTION

Snails are a large and diverse group of invertebrates belong to phylum Mollusca and Class Gastropoda. They are widely distributed throughout the world. In particular, gastropod biomass may dominate lower tropic level (Habdija et al 1995) significantly contributing to, and potentially altering, the structure and function of the aquatic systems they inhabit.

The decline of freshwater snails began in the early twentieth century. Dam construction and other channel modifications, siltation, and industrial and agricultural pollution have all degraded the river habitats on which most species depend. As a result, the species richness and the abundance of freshwater snails have declined dramatically. The value of freshwater snails lies in their ecological role in the aquatic food web and in maintaining water quality. In healthy river ecosystems throughout the Southeast, freshwater snails number in the millions and serve as an important source of food for other wildlife. Molluscs, because of their diverse and often beautiful shell shapes, accessibility, and importance as food and disease vectors, have played important cultural and economic roles in human history. These soft bodied animals show different and distinct modes of growth which are reflected in ecological adaptations. Equally important molluscs have also proven to be useful as models for understanding basic mechanisms of developmental biology.

1.1 Classification:

Kingdom: Animalia Linnaeus, 1758
Phylum: Mollusca
Class: Gastropoda
Family: Planorbidae
Genus: *Indoplanorbis*
Species: *Indoplanorbis exustus* (Deshayes, 1834)

1.2 Description:

Indoplanorbis exustus (Deshayes, 1834) (Gastropoda: Planorbidae) is a freshwater snail found in various tropical regions.

The shell of *Indoplanorbis exustus*, like all planorbids is sinistral in coiling, but is carried upside down and thus appears to be dextral (Brown DS 1994). The shell of *Indoplanorbis exustus* is discoid, dorsoventrally flat shapes with rapidly increasing whorls. Each whorl is higher than it is wide. The width of the shell is 5-25 mm. The height of the shell is 4.5-13 mm. The aperture is oval to round and shell is thin. It is brownish or olive colors.

It feeds on fresh and decaying aquatic plants like azolla, hydrilla, algae etc.

Life span of *Indoplanorbis exustus* is 4 months.

1.3 Habitat:

Indoplanorbis exustus is found attached to leaves of aquatic plants of ponds, rivers, lakes and reservoirs. It is also seen less commonly in man-made habitats such as paddy fields, ditches, etc. The snail may also occur in semi-permanent pools formed in flooded areas of fields, where it can survive the dry season buried in mud (Liu L et.al. 2010). The desiccation tolerance of adult snails is high while the resistance of juvenile snails is very low.

It can survive, mature and reproduce at water temperature of 20 to 32°C and P^H of water ranges from 7.8 to 8 (Mantale AB 2009).

Sexually matured snail does not show egg laying property in dirty water. Egg laying ceased in dirty water (Mantale AB 2009, Mantale AB & Patil MU 2012).

1.4 Reproduction:

Indoplanorbis exustus is a hermaphroditic invasive snail species having both male and female genital organs in one and same individual. Testes and ovaries are united to form a single gland called hermaphrodite gland or the ovotestes. The male and female genital organs are separated from each other and they are so arranged that the self-

fertilization is impossible so that only the union of two individuals is necessary for reproduction. They copulate reciprocally, with exchange of sperms which results in cross fertilization.

1.5 Eggs of *Indoplanorbis exustus*:

Populations are perennial with a fairly restricted egg-laying season. Egg-laying begins as early as June and usually ends by October. Egg capsules were generally laid at night or early in the morning by *I. exustus*. During oviposition, egg masses are firmly attached to a substrate, such as rocks, stones and pieces of grass stems in case of marine basommatophorans and leaves of plants, stones and submerged pieces of wood in freshwater species (Berrie 1965).

The freshly laid eggs varied from 4.0 to 5.0mm in their diameter. Egg masses are flattened and like a coiled whorl. The egg capsules lie side by side in 2-3 rows. The shape of egg capsule is more or less rectangular, the average length being 0.7mm and width 0.5mm. (Mantale AB, 2009). Normally each capsule contained only one egg. The number of capsules varied from 7-60. Over its life span of 4 months, a snail lays about 60 egg clusters.

1.6 Age related changes:

Growth rate is faster in smallest size snails. Egg laying frequency increased and growth rate decreased from 12-14 mm, shell length animals. The egg laying frequency in older animals decreased and finally ceases completely. It was found that egg-laying activity ceases in *Indoplanorbis exustus* at old age (Mantale AB, 2009 & Mantale AB & Patil MU, 2012).

1.7 Morphological details of CNS:

The CNS of *Indoplanorbis exustus* is made up of compact mass of central ganglia in the form of circum-oesophageal ring. The circum-oesophageal ring of the snail *I. exustus* consists of 11 ganglia. It consists of paired cerebral, buccal, pedal, pleural and parietal ganglia and a single visceral ganglion (Mantale AB, 2009 & Mantale AB & Patil MU, 2017).

1.8 Ecological Impact: Intermediate Host

Indoplanorbis exustus is of economic importance as it is best known as the intermediate host responsible for the transmission of several species of the genus *Schistosoma* which infect cattle and cause reduced livestock productivity. The snail is also of medical importance as a source of cercarial dermatitis among rural workers, particularly in India. *Indoplanorbis exustus* is the most important host for *S. nasale* and *S. spindale*, as well as for *S. indicum* in certain regions. *I. exustus* may be the sole natural intermediate host for these three *Schistosoma* species on the Indian sub-continent (Liu L et.al. 2010).

1.9 Distribution:

Indoplanorbis exustus (Deshayes, 1834) (Gastropoda: Planorbidae) is a freshwater snail found in various tropical regions. Currently, it is widely distributed in Asia, Africa, and the Caribbean region (Liu L et.al. 2010). This organism has been reported as an intermediate host for various trematode parasites (Trematoda: Digenea) in veterinary and medical fields (Devkota R, 2015 & Krailas D, 2022). *Indoplanorbis exustus* is known as the intermediate host for *Schistosoma indicum*, *S. nasale*, and *S. spindale*, as well as other trematodes such as *Clinostomum giganticum* and *Echinostoma* spp. (Devkota R, 2015 & Krailas D, 2022).

II Conclusion:

Indoplanorbis exustus is an invasive species, has successfully colonized a wide variety of aquatic habitats over a wide geographic range. These snails serve as an intermediate host for many parasitic trematodes that affect human and cattle.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest.

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