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Review: Ecology of Land Snails and Slugs

Pradeep S. Deshmukh

P.G. Department of Zoology

Government Vidarbha Institute of Science and Humanities, Amravati,

Maharashtra, India.

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Abstract:

The class Gastropoda comprises of three subclasses- Prosobranchia, Opisthobranchia and Pulmonata. The members of pulmonates are mainly freshwater basommatophoran snails and terrestrial stylommatophoran snails and slugs. Land snails are a group of more than 60 families. The Stylommatophoran pulmonate especially land snails form a very large group that constitutes 80,000 snails fall into more than 60 families, numbering approximately 15,000-20,000 species. The stylommatophorans are fully terrestrial animals and shows successful adaptation to the terrestrial environment. The order Stylommatophora is a largest pulmonate taxon, which includes the slugs and most terrestrial snails.

Keywords: Gastropoda, Pulmonata, Stylommatophora, Snails, Slugs.

Introduction:

The phylum Mollusca includes many familiar examples like snails, slugs, clams, oysters, chitons, squids, octopus etc. These molluscs occupy all available ecological niches ranging from abyssal depths of ocean to highly aired terrestrial regions or habitats. The tropics and subtropics are the most favorable regions for distribution of molluscs. Of these molluscs some snails and slugs are terrestrial forms included in the class Gastropoda.

The class Gastropoda comprises of three subclasses- Prosobranchia, Opisthobranchia and Pulmonata. The members of pulmonates are mainly freshwater basommatophoran snails and terrestrial stylommatophoran snails and slugs. Land snails are a group of more than 60 families. The Stylommatophoran pulmonate especially land snails form a very large group that constitutes 80,000 snails fall into more than 60 families, numbering approximately 15,000-20,000 species. The stylommatophorans are fully terrestrial animals and shows successful adaptation to the

terrestrial environment. All the stylommatophorans are true hermaphrodites, although they may show functional protandry.

Review:

The terrestrial pulmonates inhabit open woodlands, parks, gardens, cemeteries, hedgerows, borders of marshes, ditches and canals, vineyards and similar habitats where humid niches may be found. They usually do not occur in evergreen woods. They are nocturnal hiding by day in a contracted quiescent state under rocks, fallen logs, plants mats, or buried in soil and emerging at twilight to feed.

From economical importance point of view, snails and slugs are important to human being in several ways. Some of these forms are the serious pests of agriculture, particularly paddy, horticulture and social forestry. Most of the snails are the intermediate hosts of trematode parasites, hence are called as vector snails of various pathogenic parasites causing diseases to human, Schistosomiasis and other diseases such as fascioliasis, bilharziasis, paragoniasis and metagoniasis to domestic animals and birds. Because of this noted fact, studies on these snails and slugs undertaken by various authors in different parts of the world to elucidate various diverse aspects viz habitat, biology, physiology and their control by both, biological and chemical control means.

Pulmonates are gastropods adapted for terrestrial and amphibious habitats. They are derived from prosobranch ancestors and have one atrium and one nephridium. The gill has been lost, however, and the mantle cavity is a heavily vascularized lung adapted for respiration in air. There is typically a coiled shell but some slugs have reduced and internalized the shell, and are not coiled and are secondarily symmetrical. Pulmonates are hermaphroditic and do not have an operculum. They are found in terrestrial habitats as well as near shore, intertidal marine and freshwater environment.

The order Stylommatophora is a largest pulmonate taxon, which includes the slugs and most terrestrial snails. Two pairs of tentacles are present and the eyes are at the tip of the posterior pair. Terrestrial snails are coiled, asymmetrical, and have a shell, but slugs are uncoiled, symmetrical, and have lost or reduced shell. The land snails and slugs are of importance to man as pests because of damage caused in agriculture, horticulture and forestry, so



that in moist regions or during rainy season the control measures are necessary. Furthermore, snails and slugs are intermediate hosts for certain parasitic worms of man and some domestic animals. Dundee *et.al*, (1965) and Gillmore (1982) made detailed survey on the distribution of land snails as pests in United States. For the control purpose of these pest snails it is essential to understand in detail ecobiology of these snails. A number of workers have studied the ecology of the molluscs from marine as well as freshwater environment (Morton, 1958). Early work on land molluscs was concerned with slugs whereas the snails were practically neglected. Miles *et.al*, (1931) studied the ecology and the control of slugs in East Lancashire, England and reported that copper sulphate was the best suitable substance for the prevention of slug pest. Numerous reports on the dormant state (aestivation and hibernation) of land snails are available both from the temperate and cold countries (Williams, 1951). Land snails which are generally moisture loving is active in monsoon and spent the dry seasons in dormant state. The dormancy extends from November to June (Raut and Ghose, 1977). Monsoon influences the breeding and egg laying behaviour of the snails. The distribution and population of snail depends on type of soil, temperature, rainfall, humidity and natural enemies. The variation in population density of snails from one place to other is probably due to a number of biotic as well as abiotic factors, was reported by Raut (1979) while studying the distribution and population of two pestiferous land snails, *Achatina fulica* and *Macrochlamys indica*. Barnes and Weil (1944 and 1945). Studied the distribution and activities of slugs from North America. The discontinuous distribution of *Biomphalaria pfeifferi* in the lake Sibaya area of the Zululand coastal plain corresponds to an ecological succession amongst water bodies associated with the lakes fluctuating water level. Nduku (1976) while working on *B. pfeifferi* found that calcium is a limiting factor in the biology of the snail. Burch (1955) in a study of land snails of Eastern Virginia, U.S.A., found an increase in the number of snail with the increase in Calcium, Magnesium, Potassium and organic content of the soil. The snails and slugs feeds on green, leafy vegetables, stems, bulbs and tubers. They were also observed consuming fungi, lichens, algae and animal materials present over the surface of the soil and within the soil also. The feeding habits and food plants of various land snails have drawn the attention of researchers. Members of family Cucurbitaceous is probably the favorite food of the giant African snail, *A. fulica* (Green, 1910). Deshmukh (2007) also reported the favorite food of land snail *Macrochlamys petrosa* is leaves of family Cucurbitaceae plants. Information regarding the natural diet of the more common species of land snail is less. Macan

(1950) while working on the basommatophoran snails gave information regarding vegetation and other water bodies of water in the Windermere. Van Der Steen et.al. (1973) reported the influence of food quality on feeding, reproduction and growth in the land snails, *Macrochlamys gudei*. Deshpande (1980) while working on the marine pulmonate slug, *Onchidium verruculatum* have observed aggregation behaviour of the large number of adult slugs when there is an ample of food.

As far as the food and feeding habits of the slug *Laevicaulis alte* is concerned, Kulkarni (1974) showed that feeding habits varied according to the environmental factors. These slugs were found to feed throughout the night, early morning and at sunset. Raut and Ghose (1983) offered about 65 different plants to the snails, *A. fulica* and *M. indica* and observed their feeding habits. Deshmukh (2007) offered about 15 different plants to land snail *M. petrosa* and observed which food readily accepted, reluctantly accepted and which food is refused. Recently, survival and food choice of the grey field slug *Deroceros reticulatum* on the different seed types under laboratory conditions was studied by Gebauer, (2002). Since snails and slugs are found as pest throughout the World, it has become necessary to solve this problem by artificial control. Various researchers studied this problem (Vyawahare, 1986). Molluscan pest can be destroyed in several ways, by chemical means (molluscicides), through the biotechnical measures and by mechanical methods. Copper sulphate is the classical molluscicide which has been used against terrestrial pulmonates and is regarded as favourite compound for the control of giant African snail, *A. fulica* (Christie et. al, 1978).

Conclusion:

Ecology of snail population is dependent upon soil, climate and availability of food. These factors play an important role in the life history and development of snails. A characteristic feature of molluscs is high water content in the various body parts. As a result there is a close relationship between population density and the moisture of the soil in a particular area. Due to evaporation of water from the mantle and other parts and also due to the secretion of mucus; body water is lost and must be replaced rapidly by water uptake from the environment. This occurs not only by drinking, but also by absorption of water through the skin itself, which is non-keratinized and consists of a single cell layer .

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