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The reproductive life cycle of Spike Awl Snail, *Allopeas clavulinum* (Mollusca: Gastropoda: Pulmonata: Stylommatophora: Sublunidae)

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Abstract
Allopeas clavulinum is a terrestrial gastropod with few scattered records. Laboratory and field observation made it possible to determine the following parameters of the life cycle of this snail. These land snails are most often found in wetlands. The life cycle of a snail begins with the hatching of an egg. Eggs were laid from August to October in batches of two. The eggs were calcified and oval. The individual passed through several phases of their life cycle which depends on specific environmental condition. The beginning of growth took before laying of egg. The incubation period was 2 to 3 days. Baby snails (juvenile) hatched with embryonic shell that increases in size as they age. The baby snail's growth was very fast at first and then slowed down. In the young snail stage, the shell was lengthened and lengthened and it entered into the adult stage and reproduction began again. The snail continued to mature. Growth is indeterminate. This snail is a hermaphrodite with high reproductive success. The reproductive activity was greatest during the rainy season.

Keywords: *Allopeas,* Environment, Hermaphrodite, Juvenile, Reproduction

Introduction

Allopeas clavulinum (Potiez & Michaud 1838, Turgeon *et al.* 1998) commonly known as spike awl snail, although widespread, is among the least known snail with regard to its life cycle. The time span during which an animal is produced is referred to as its life cycle. It is a terrestrial, tropical and air -breathing snail, native to Great Britain, the Czech Republic, India and Australia. Most species of snails are marine animals, many are land animals and some are fresh water animals. Land snails are found on all continents. Almost all land snails, including garden snails, inhabit places from urban gardens to mountainous region with cold climates. Snails can successfully survive in many habitats with different temperatures and environmental conditions. Land snails are ecologically and economically important. Many species spread seeds and spores. In nature they recycle nutrient such as calcium and act as a bioindicator (Simone1999). They are an excellent indicator of pollution. Despite the importance of molluscan group, there are few studies on the phylogeny and biology of gastropods (Meireles *et al*. 2008, Silva *et al*. 2008, 2009).

Garden snails are a common pest of plants of all kinds. *A. clavulinum* is mostly found in moist soil, remaining on the ground under the pieces of stones, wood and plant debris. These snails feed on a wide variety of organic material, especially on green or dead herbaceous plants, rotting wood, fungi, bark and algae. Snail reproduction is fast and prolific meaning that small snail problem can turn into a large snail problem in just a few week. Their growing population suggests that under ideal growth conditions, they reproduce rapidly and their number increase rapidly (Raut & Ghose 1984, Raut 1991). Potentially, the snail can lay a batch of eggs every few week if favorable conditions prevail (Mead 1961). *A. clavulinum* is a hermaphrodite. Its shell consists of seven whorl and has an elongated almost straight sided shell that is shiny and translucent (Kerney & Cameron 1979). Only fully grown snails are capable of laying eggs. The rate of egg production can vary, greatly depending on the region and the age of parents (Raut & Barker 2002). Since studies of the life cycle of a land snail are very scarce, the purpose of these studies was to determine the life cycle of *A. clavulinum.*

Material and Methods

Caring for land snails is so easy. They required low maintenance .The life cycle of the snail *Allopeas clavulinum* was observed in its natural environment, in a clay pot, in which a tulsi plant(sacred basil –an aromatic plant)was planted. Water offered to the tulsi plant was sufficient to make the soil moisten and keep the snail active. No special care was taken. Observation covered the period from July 2017 to October 2021. Observation tooks place daily. Observation included egg laying, hatching and growth pattern. Daily activity has also been made available. Plant debris provides sites for egg laying and food (microflora).

Moreover, they were fed Chana dal (*Cicer arietinum*), they liked it (Saxena 2018).

Results and Discussion

As *Allopeas clavulinum* is hermaphrodite, it was able to reproduce through self-fertilization. This is an important feature of the snail that ensures the survival of the species in the event of environmental disturbance (Heller 2001). Reproductive success was greater in *A. clavulinum*, as the number of the hatchlings produced was increased. Initially, there were few snails, but within two months after the reproductive activity, the number increased considerably (Fig.1, 2). Snails were active in the late evening, night and early morning hours (Elzbieta & Roksela 2009). The life cycle of a snail includes four stages- eggs, baby snails (juveniles), young snail and adult snail. The life cycle of *A. clavulinum* begins with the hatching of the egg. The eggs were laid in spring/ autumn (August to October). They delivered egg at a consistent rate. The eggs went through a process of growth inside the snail, until they were ready to be born. After that snail laid their eggs. The number of eggs laid by an individual was generally two (Fig. 3). The egg was an oval, calcified, small whitish ball. The eggs were laid in a moist and sheltered place. They were miniature, almost a few millimeters. At first they were milky white, after sometimes they started to be cream-colored. A small black hole appeared before hatching (Fig. 4). Some snails hatched within 24 hours, other took 48 to 72 hours. Hatching depends on the environmental conditions (Bruno 1989). The newly hatched juveniles had a translucent and soft shell and body (Fig. 5). The initial part of the shell (embryonic spiral) was smooth, bearing a different sculptural design from the rest of the shells. They had a bone shell when they were born. When the juvenile were ready to leave the egg, it continued to tap the egg shell from the inside, as a result of this gradual weakening of the egg shell took place. Snails were born with a shell that enlarges with age. At first the shell was small and soft, but later became large and hard due to the calcium deposit. The Initial source of calcium for the shell was the remains of their empty egg shell. The young were initially colorless but as they aged, color appeared in their shell (Fig. 6). Baby Snails grow very fast in the beginning but later the growth slowed down and they entered into the next phase of life cycle, the young snails. A phase of rapid growth phase was followed by a phase of slow growth (Maltz 2003). The slow growth phase in the species may be related to the development of the reproductive system (Maltz 2003, Maltz *et al*. 2008). As the snail grew larger and larger, the shell got longer and longer, became stronger and then it entered the next stage of the life cycle, the adult stage. Individuals have reached sexual maturity and egg laying has begun. Mating was not observed. Eggs were laid without mating (Ghose 1959). The time required to reach sexual maturity depends on ambient environmental condition such as soil conditions and humidity. Snail activity and egg production were found to cease during the extreme cold to extreme summer months from November to June (Dun 1967).

Conclusion

The easiest time to find a snail is after rains. They enjoyed each other's company. The right habitat and enough food were essential. The reproduction of the snails appeared to be related to the seasonal such as favorable weather, with great reproductive activity during the rainy season. They had long periods of inactivity during inclement weather. They aestivate in summer and hibernate in winter. The time from laid eggs to a mature reproductive adult depends on the temperature, photoperiod and feeding regime where it was reared. The ability to lay eggs without mating and the high reproductive rate found in this study show that even one snail can established another population.

References

Bruno, B. 1989. Growth and reproduction of the minute land snail *Punctum pygmaeum* (Draparnaud). *Journal of Molluscan Studies*, **55:** 383-387.

Turgeon, D.D. *et al.* 1998. Common and scientific names of invertebrates from the United State and Canada: Mollusks. 2nd edition. *American Fisheries Society.* Special publication, **26:** Bethesda, Maryland: 526 Pp.

Dun, G.S. 1967. The Giant snail. Papua New Guinea *Agric*., **18(4):** 123-125.

Elzbieta, K.K. & A. Roksela 2009. Life cycle of *Perforatella bidentata* (Gmelin, 1791). Gastropoda: Pulmonata: Helicidae. *Folia Malacologica*. **17(4):** 199-214.

Ghose, K.C.1959. Observation on the mating and ovi position of two land Pulmonates, *Achatina fulica* Bowdich and *Macrchlamys indica* Godwin-Austen. *Bombay Natural History Society*, **56:** 183-187.

Heller, J. 2001. Life History Strategies, In G.M. Barker (ed.).*The biology of terrestrial molluscs*. CABI Publishing. Wallingford, UK. Pp. 413-445.

James, H. Thorp & D. Christopher Rogers 2011. *Field guide to freshwater invertebrates of North America. Elsevier.*

Kerney, M.P. & R.A.D. Cameron 1979. A field guide to the land snails of Britain and North-West Europe. **1-24**. London. (Collins). Pp.1-288.

Maltz, T.K. & A.S. Drozd 2008. Life cycle of Clausiliids of Poland- Knowns and Unknowns.*Annales Zoologici.,* **58(4):** 857-880.

Maltz, T.K. 2003. Life cycle and population dynamics of *Heliodonta obvoluta* (O.F. Muller, 1774) [Gastropoda: Pulmonata: Helicidae). *Folia Malacologica*, **11:** 63-88.

Mead, A.R. 1961. Factors favoring dispersal and survival. The Giant African Snail: a problem in economic malacology. *University of Chicago Press. Chicago*, 17-355.

Meireles, L.M.O., L. C. Silva, F. O. Junqueira & E.C. A. Bessa 2008. The influence of diet and isolation on growth and survival in the land snail, *Bulimulus tenuissimus (*Mollusca Bulletin) in laboratory. *Rev. Bras. Zool.,* **25:** 224-227.

Poteiz, V.L.V. & A.L.G. Michaud 1838. *Galerie des Mollusques,ou catalogue methodique ,descriptif et raisonne'des mollusques et Coquilles du Museum de Douai*. Paris: Bailliere.

Raut, S .K. & K. C. Ghose 1984. Pestiferous land snails of India. In: *Zoological survey of India, Bani Press, Calcutta* :Pp 1-151.

Raut, S.K. & G.M. Barker 2002. *Achatina fulica* Bowdich and other Achatinidae as pest in tropical agriculture. In*: Molluscs as crop pests* (G.M. Barker, ed.). *CABI , Wallingford, UK*, Pp.55-114.

Raut,S. K. 1991. Population dynamics of the pestiferous snail, *Achatina fulica* Gastropoda Achatinidae. Malacology. *University of Chicago Press. Chicago.* **24(1-2):** 79-106.

Saxena, S. 2018. Food preference and feeding behavior in Spike Awlsnail, *Alloveas clavulinum. Edu world* , **12(**14**):** 16-22

Silva, L., L. Meireles, T. Vargas, F.O. Junqueira & E.C.A. Bessa 2009. Life history of the land snail *Habroconus semenlini* (Stylommatophora: Euconulidae) under laboratory condition. *Rev. Biol. Trop.* **57** San Jose.

Silva, L.C., L.M.O. Meireles, F.O. Junqueira & E.S.A. Bessa 2008. Development and Reproduction in *Bulimulus tenuissimus* (Mollusca, Bulimulidae) in laboratory. *Rev. Bras. Zool*.**, 25:** 220-223.

Simone, L.R.L. 1999. Biodiversity of the state of Sao Paulo, Brazil: synthesis of knowledge at the end of the century. *Molluscan Gastropods*, **4:** 176.

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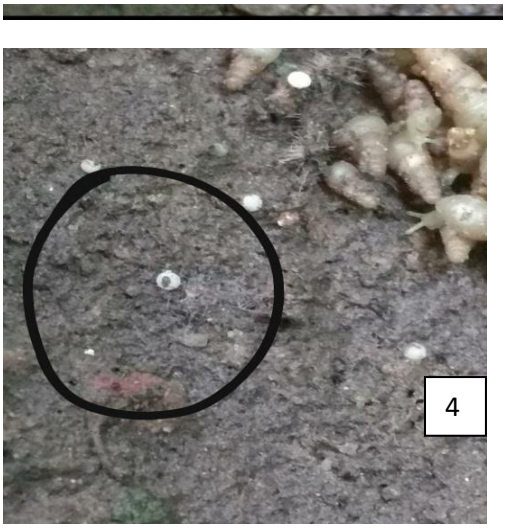

Fig. 1 Initial period of reproduction

Fig. 2 Later period of reproduction

Fig. 3 Eggs in batch of two

Fig. 4 Small black hole on egg

Fig. 5 Colorless Juvenile

Fig.6 Colored shell of Juvenile