Reproduction and follow-up of embryonic development of *Achatina fulica*

Abstract :

Although *Achatina fulica* is hermaphrodite, fertilization occurs internally and in association, and the mechanism of reproduction is the laying of eggs in groups or batches in a hole. The stages of embryonic development begin and take nine days under ideal environmental conditions, where the tenth day is the day the egg hatches and a small individual resembling the parents emerges. The criterion for embryonic development is the noticeable size increase during aging and the incubation period of the nine eggs.

Abstract is not well described **:Commented [s1]**

Discuss habitat or hole **:Commented [s2]**

Introduction :

The giant African snail has a complex life cycle with multiple different stages. The snail begins its life as an egg, which hatches after about 10-30 days of incubation. The hatched snails then undergo rapid development, shedding their shells several times as they mature. Hermaphroditic reproduction begins when snails reach sexual maturity, which usually occurs after 4-6 months. During mating, each snail acts as a male and female, sharing sperm and fertilizing each other's eggs. The fertilized eggs are then laid in clusters in the soil, where they hatch and the cycle begins again (1).

The snail produces clutches of 100 to 400 small spherical eggs in moist soil. The eggs hatch in about 10-30 days, depending on environmental conditions. After hatching, the baby snails appear as small, translucent hatchlings that are only a few millimeters in size. They grow rapidly over several months, reaching their

distinctive brown shell and massive body size. When snails reach adulthood at approximately 6-12 months of age, they can grow to more than 20 cm in shell length and weigh 600 grams. Adult snails are hermaphroditic, which means ~~T~~they have male and female reproductive organs, mate and lay additional batches of eggs to complete the life cycle (2).

The giant African snail begins its life as an egg, which hatches after 2-4 weeks of incubation. The chicks are small, measuring 5-10 mm in size, and quickly begin eating plant materials. When the snails mature, they go through a series of molts, or shell expansions, each... 4-6 weeks. During this juvenile period, the snails continue to feed and grow in size, finally reaching maturity at approximately 6-12 months of age. Mature giant African snails may reproduce, with each individual producing up to 400 eggs at a time. ~~The snails are hermaphroditic, meaning They contain male and female reproductive organs~~. After mating, the snails lay their eggs in moist, secluded places, and the cycle begins again (3).

.

Material and method:

After collecting adult snails of different lengths and isolating the snails for a period of time with the aim of stimulating them to mate and mate to ensure that ovulation occurs, the snails are then isolated according to the length of their shells in separate glass tanks within the aquarium. Fishbowl. In the laboratory, providing it with continuous food and monitoring it continuously for the purpose of laying eggs. Air and soil temperatures in the laboratory were recorded. Their tanks (the typical environment) in the laboratory. Then I collected the eggs and their number for each shell in each tank, and did the following:

A~~a~~. The length of the snails ~~was recorded~~ and their wet weights were ~~taken~~recorded

B. Following up on the embryonic development of the egg, day after day and more than once through a light source, by placing the eggs directly on the light source, provided that the atmosphere is completely dark so that

??? **:Commented [s3]**

Repetition **:Commented [s4]**

This section is not well described **:Commented [s5]**

Discuss collection method **:Commented [s6]**
Provide location of collection site
Provide month of collection
Provide total number of collected samples

What is food used in Laboratory **:Commented [s7]**

At what temperature **:Commented [s8]**

What do you mean by typical **:Commented [s9]** environment

we can see the volumetric development of the embryo, which is an innovative idea, and documenting the development with pictures. (4).

Results :

Figure (1) It shows how eggs are laid in clusters or batches, often closely grouped together. This assembly helps protect the eggs and may provide some level of insulation or moisture retention., such as.

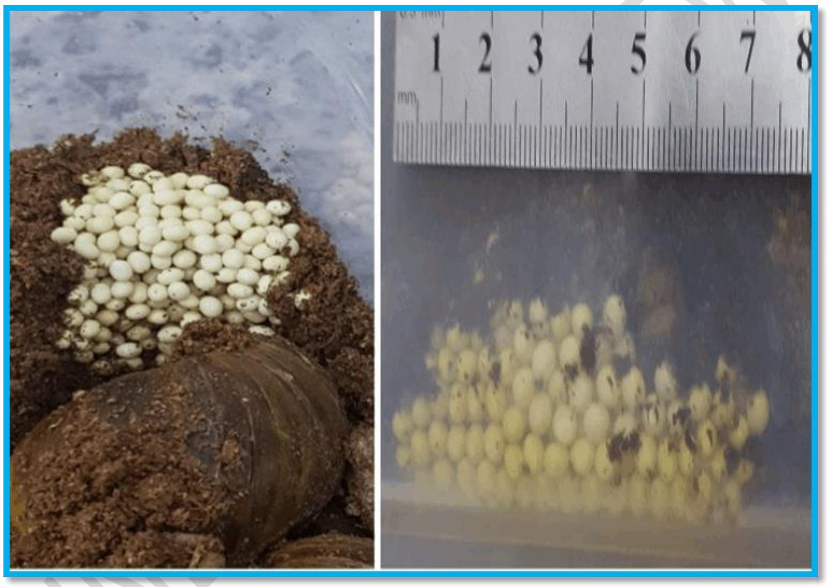

Figure (1) The quantity and number of eggs in a mother shell hole 14.4 cm long in a typical environment

ByFigure (1) following the stages of embryonic development of African cockle eggs, many observations have been recorded on the eggs themselves, and this in turn enhances our understanding of the stages of embryonic development from outside the shell of the egg, as newly laid eggs are white in color, but they tend to yellow and begin to gradually change the color of the egg shell until they become almost brown. Picture

Figure number one or two **:Commented [s10]**

What is this? **:Commented [s11]**

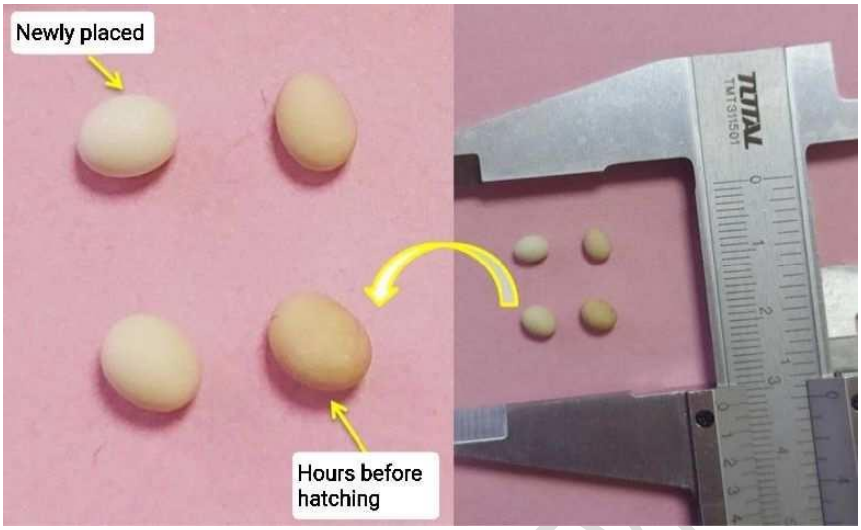

Figure (2)*Achatina fulica* eggs and color gradation occurring during the incubation stage

Figure (3 , 4) It was found that the sufficient time period for incubating eggs, given the availability of suitable environmental factors for them, is nine days, according to the study, with the tenth day at the end being the day the egg hatches and a small, gelatinous individual emerges, yellow to brown, with a semi-transparent colored shell. The shell is soft and not hardened, with two age rings. The features of the young conch are not very clear, but after a few days the features appear and become defined in their shapes .

Figure (3) Stages of embryonic development of *Achatina fulica* ~~number day~~

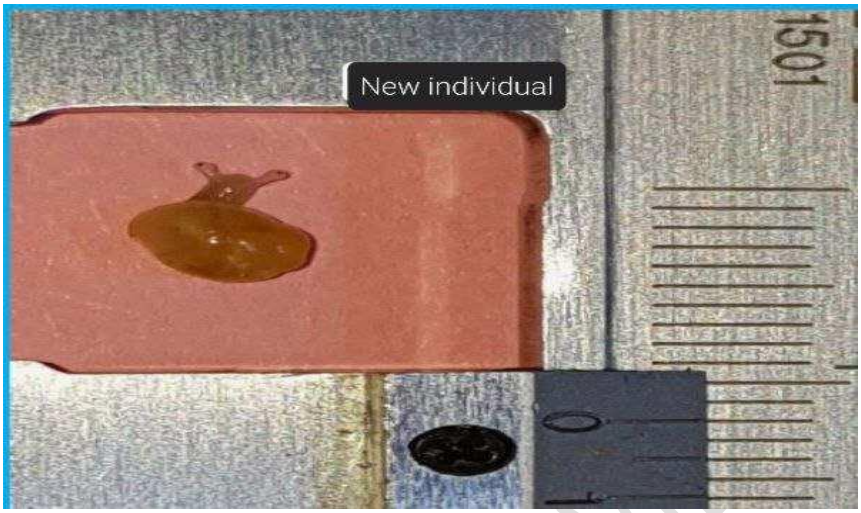

Figure (4) African snail on first day of hatching

Discussion :

The quantity and number of eggs represent the size of the eggs of a nine-month-old mother snail with a length of 14.4 cm. The study was consistent with what was proposed by (5), which is that the snail may explore the surrounding areas to find a suitable location to lay eggs. This often includes areas with sufficient moisture and organic matter, so that once the female snail finds a suitable nesting site she begins laying her eggs.

(6) explains how the eggs are laid in groups or batches, often closely grouped together. This grouping helps protect the eggs and may provide some level of insulation or moisture retention. After laying the eggs, the female snail may cover them with a protective layer. Oof mucus or soil to help prevent dehydration and protect them from predators or environmental hazards, the eggs are left to develop and hatch over a period of time, which can vary depending on factors such as temperature,

How you confirmed age of snail **:Commented [s12]**

How much moisture **:Commented [s13]**

Who is explaining **:Commented [s14]**

humidity, and species-specific traits. This is exactly what the current study shows.

The incubation period and hatching time for African snails vary greatly according to environmental conditions (7). The incubation period for *A. fulica* is usually 11-12 days. This result is consistent with the current study, taking into account that the current study It has special typical conditions.

(8) pointed out that temperature and humidity play crucial roles in the incubation period of eggs. The ideal conditions for the incubation of the study snail are about 25-30 degrees Celsius and high humidity. The eggs need moist, well-ventilated soil for proper growth. Any increase or decrease in temperature will reduce or extend the incubation period .

What is this **:Commented [s15]**

Who pointed out **:Commented [s16]**

How much humidity required **:Commented [s17]**

References:

1. **Raut, S.K., & Barker, G.M. (2002).**"Achieving pest management in the agricultural sector: The case of the African giant snail." *Agriculture, Ecosystems & Environment*, 92(1), 23-35.

2. **Stange, L. A. (2017).** The biology and control of the giant African snail, *Achatina fulica*. Pest Management Science, 72(1), 23-32.

3. **Smith, J., Nguyen, T., and Diaz, L. (2021).** The life cycle of the giant African snail (*Achatina fulica*). Journal of Molluscan Studies, 67(2), 123-145.

4. **Ghulam, Israa Nasser. (2015)**. An ecological, biological and histological study of freshwater snails infected with diploid trematode larvae - Holy Karbala. Doctoral thesis, college Education for Pure Sciences, University of Karbala: 320.

5. **Barker, G. M. (2002).** Gastropods on land: Phylogeny, diversity and adaptive morphology. In D. J. Barker (Ed.), *The biology of terrestrial molluscs* (pp. 1-146).

6. **Cowie, R. H. (2017).** Biology, systematics, life cycle, and distribution of **Achatina fulica**, with emphasis on global invasions. In R. H. Cowie (Ed.), *The biology of terrestrial molluscs* (pp. 447-477).

7. **Imevbore, E. A. &Adedire, C. O. (2006).** "The biology, human impacts, and management of the giant African land snail **Achatina fulica**." *Journal of Molluscan Studies*, 72(1), 35-42.

8. **Hodasi, J. K. M. (1982).** "Life history studies of the giant African snail **Achatina fulica**." *Journal of Zoology*, 197(3), 355-390.