

## ANALYSIS OF THE EARTH WORM EUDRILUS EUGENIAE'S EVOLUTION

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Abstract

Earthworm species Eudrilus Eugenia are native to Africa, but they have been widely grown in the USA, Canada, Europe, and Asia for the fish bait business, where they are known as African night crawlers. In this research, Eudrilus eugeniae was raised in cow dung and its life cycle was examined during intervals of 15, 30, 45, and 60 days. Important factors were assessed, including cocoon hatchlings, formation, total biomass, and earthworm length. After 30 days, cocoon manufacturing began, and hatchlings were released 45 days later.

Key words: Eudrilus eugeniae, Life cycle, Cow dung.

#### Introduction

The "African night crawler" is the common name for the West African-born Eudrilus eugeniae species. Additionally, they may be found in India's Travancore and Poona as well as Sri Lanka's Western Ghats (Graff, 1981). In addition to living on the top layer (epigeic) of damp soil, Eudrilus eugeniae may be found anywhere organic matter gathers (Bouche, 1977). It is nocturnal and spends the daytime in the surface layer. The worm is flattened on the ventral side and is reddish brown in color with a convex dorsal surface. Paler than the rest of the body, the clitellum. The mature worms are around 25-30 cm long, 5-7 mm in diameter, include 250-300 segments, and have a maximum individual biomass weight of 5600 mg (Viljoen and Reinecke, 1994). In oligochaetes, the rate

of growth is largely correlated with nutritional status. Other variables affecting worm development rate include age. organic matter content, moisture (65-75%), temperature and (28-340C) (Lavelle, 1983). The first sign of clitellum development, according to Viljoen and Reinecke (1989 and 1994), emerged between 35 and 45 days; worms with fully grown clitella had no trouble copulating.In Eudrilus eugeniea, the development of the cocoon began 24 hours after copulation and proceeded for almost 300 days (Viljoen and Reinecke, 1989).

Eudrilus eugeniea produces irregular ovalshaped cocoons with sharply pointed edges and fibrous points. When the cocoons first develop, they are soft and grayish-white in color. However, they quickly become firm and change color to an orange-brown hue. Finally, just before hatching, the cocoons become dark brown in color. According to Reinecke and Viljoen (1988), the cocoon has a mean mass of 16.99mg, a mean length of 6.02mm (with a range of 4.3-7.8 mm), and a mean diameter of 2.1-(1994) 4.0mm.Viljoen and Reinecke recorded an average output of 1.3 cocoons/worm/day. The Eudrilus eugeniea cocoon underwent a 16.6-day incubation period at 250°C in cow dung, with an 84% hatching success rate and a mean of 2.5 hatchlings viable cocoon.1988 per

(Reinecke and Viljoen). The hatchlings are pink to crimson in color when they first emerge, with the majority of their segments still lacking in complete differentiation.

There are relatively few research on the four endemic species of the widely distributed Indian megascolicid worm, Lampito mauritii, including its growth, reproduction, and life cycle. It has the greatest frequency of distribution and can resist a broad range of temperature, soil moisture, and other physical elements (Kale, 1988). It also has a wide variety of habitats and dietary preferences (Kale and Bano, 1992). Bhattacharjee and Chaudhuri (2002) have only examined the form of the cocoon, the pattern of hatching, and the timing of emergence in this worm. Before experimenting with worms in the lab, and specifically agro-industrial more in settings, it is essential to have a solid grasp of their development and reproductive processes. Only 31 of the over 10,000 known earthworm species that exist in the globe are found in Thailand (Gates, 1939). Large-scale worm cultivation is highly desired for the production of biofertilizer Numerous and protein. species of earthworms, including Eisenia fetida, Lumbicus terrestris, Perionyx excavatus, and Eudrilus eugeniae, are cultivated around the globe. These four commercially significant species of earthworm play a crucial role in Thailand's vermicomposting of a range of organic wastes and are also a potential source of animal protein. In warmer regions of the globe, Eudrilus eugeniae is extensively dispersed and known as the "African Nightcrawler" (AF). According to Ayamuang (2000), introduced species like the blue worm or Indian worm (Perionyx excavates), red worm (Pheretima peguana), and

earthworm from Lao (P. excavates) are often found over a considerable portion of tropical Asia. However, the body size and coloring of the red worm (P. peguana) and AF earthworm (E. eugeniae) are practically identical.

Most earthworm species reproduce via cross-fertilization, although small a number also engage in parthenogenesis. In order for the spermathecal apertures to contact, two worms must move in opposing directions toward one another and adhere to one another at the ventral surface. The spermathecae of the partner worms are where the seminal fluid travels from the male pores to the clitellar area through the seminal grooves. Sperms are often transported by a spermatophore in species including Eisenia, Lumbricus, Dendrobaena, Dedeodrilus, Aporrectodea, and Octalasion. The clitellum generates a cocoon after copulation. Spermatozoa, luminous fluid, and ova are all present in the cocoon. The form of the cocoon might be round, lemon-shaped, oblong with pointy extremities, or another variation depending on the type of earthworm. They might be white, yellow, or brown, and during incubation, the color changes from yellow to brown. They are either white or yellow right away after laying, and as growth moves further, they progressively become brown. According to Stephenson (1930), different species hatch at different rates.

Currently, earthworm species are still identified by their physical characteristics. According to Stephenson (1930), compared to the somatic system, the genital system is significantly more traditional and resistant to evolutionary change.Earthworm population dynamics, productivity, and energy flow cannot be completely comprehended until the



earthworm's life cycle is studied. Effective vermiculture also requires research on earthworm life cycles. With cow dung as a substrate, the current study's goal is to better understand the life cycle of the earthworm Eudrilus eugeniea.

#### Collection of cowdung Materials and Method

The cow dung was gathered. Cow manure was removed from the soil and predecomposed in plastic trays for 10 days with water sprinkled on top.

## Collection of earth worms

The adult clitellate earth worms, Eudrilus eugeniea, were then collected from the earthworm form.

## **Experimental set up**

The mature earthworms were introduced in the trays contain pre decomposed cow dung the moisture content was maintained between 50-70% throughout the study by sprinkling adequate quantities of water. During the experiment the aeration was given twice in a week.

# Observation of growth rate of Eudrilus eugeniea

In the growth rate such as number of earthworms cocoon production and weight of earth worms were observed.

## **Results and Discussion**

Growth (length and biomass) reproduction (cocoon and hatchling production) of Eudrilus eugeniae cultured in cow dungs at different time intervals like 15,30 45 and 60 daysS.

Table : Total Biomass and Length ofworms in different day intervals

| (cm) |  |  |  |
|------|--|--|--|
|------|--|--|--|

The length of earth worms was measured at regular intervals; on the day of hatching, it was around 0.32 0.21 cm; after 60 days, it reached its maximum length, which was approximately 18.35 0.26 cm. The Eudrilus eugeniae cocoons are seen in Figure 2. They are quite tiny and produce one to two hatchlings after 45 days.

### Discussion

The total biomass of Eudrilus eugeniae expanded considerably more quickly than Eisenia fetida, a species that often thrives well in organic waste. Additionally, Eisenia fetida required 6–8 weeks to make its first cocoon, whereas Eudrilus eugeniae attained sexual maturity in as little as 5 weeks (Edwards, 1988). This is a faster development than any other species of earth worm that has been documented to yet, and with such growth rates, population increase may happen extremely quickly. Comparatively speaking. Eudrilus eugeniae gained the most weight at a rate of 280 mg each week. In contrast to our data, Reinecke et al. (1992) reported a maximum weight growth for Eudrilus eugeniae of 150 mg per week, at 250C.

At 250C, Eudrilus eugeniae could produce 3.6 cocoons each week at its maximal rate. This pace is comparable to Eisenia fetida's reported weekly production rate of 3.8 cocoons, however Eisenia fetida reproduced most quickly at 200C. (1988) Edwards. Although less than Perionyx

|                      | -                                 |                 | <u>excavatus which has been reported to</u>               |
|----------------------|-----------------------------------|-----------------|---|
|                      | Number of Days                    |                 |   |
|                      | create up to 195 cocoons per week |                 |   |
| Parameters           | 0 Days                            | 15 Days         | 30  Days, $45  Days$ , $60  Days$ .                       |
|                      |                                   | 2               | <u>(Edwards et al., 1988), the maximal rate of</u>        |
| <b>Total Biomass</b> | $15 \pm 0.08$                     | $18.1 \pm 0.19$ | $22.2 \pm 0.14$ $23.8 \pm 1.04$ $24.4 \pm 0.52$           |
|                      |                                   |                 | cocoon formation in our research was                      |
| (mg)                 |                                   |                 |   |
| × 8,                 |                                   |                 | significantly duicker than the U.7 cocoons                |
| Length of adult      | $0.32 \pm 0.21$                   | $6.58 \pm 0.14$ | $8.61 \pm 0.23$ $14.83 \pm 0.28$ $18.35 \pm 0.26$ Eudring |
|                      |                                   |                 | per week that were recorded for Edulitus                  |
| worms                |                                   |                 | eugeniae by Neuhauseret al (1979)                         |
|                      |                                   |                 | cugentiae by recutauserer and (1979).                     |



Although the number of hatchlings per cocoon (more than two) was relatively percentage of earthworm low, the hatchlings at 25°C was high (81%), and the 6.5 hatchlings produced each week at this temperature compared favorably to the 10.4 and 5.2 cocoons per week produced by Eisenia fetida and P. excavatus at 20°C, respectively (Edwards et al., 1998). The hatchling success rate of Eudrilus eugeniae that we discovered was very close to the 78% reported by Reineckeet al. (1992), who noted that there were often more than two hatchlings per cocoon. Additionally, Eudrilus eugeniae was shown to generate live two earthworms per cocoon, according to Neuhauser et al. (1988).

For Eudrilus eugeniae, the shortest duration from cocoon production to sexual maturity was 47 + 3 days. In agreement with the findings of Reinecke et al. (1992), who stated that Eudrilus eugeniae began generating cocoons after 46 days, the period from hatchling to sexual maturity was 35 + 3 days. Excellent earthworm survival was observed, with minimal death occurring below 30 °C. This is in line with the findings of Reinecke et al. (1992), but it differs with the findings of Neuhauser et al. (1979), who hypothesized that few people lived longer than 12 weeks, irrespective of population density. All of our bigger size cultures' data indicates that Eudrilus eugeniae is a long-lived earthworm.

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