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First Documented Occurrence of Acherontia Atropos (African Death's Head Hawk Moth) In India: Life Cycle and Distribution at Pope's College, Tamil Nadu

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Abstract
The African Death's Head Hawk Moth *(Acherontia atropos)* is a rare and notable species belonging to the family Sphingidae. Native to southern Europe and Africa, it has expanded its range due to its migratory behavior. This moth is characterized by a distinct skull-like marking on the thorax, hence its name "Death's Head." While the larvae feed on a variety of host plants, the adults primarily consume nectar and honey from beehives. This study focuses on the identification, life cycle, and distribution of the African Death's Head Hawk Moth within the campus of Pope's College, Sawyerpuram, Thoothukudi, Tamil Nadu, India. Eggs were first observed on the host plants during the study period (22.10.2021 to 25.10.2021), and a total of 12 eggs were collected for observation. The eggs were laid on the upper surfaces of leaves of plants such as *Clerodendrum*, jasmine, and members of the Solanaceae family. After hatching, the larvae exhibited characteristic tail horns, which curled as they matured. The larval stage lasted 10-12 days, from 25.10.2021 to 07.11.2021. The larvae pupated in a reddish-brown, stout pupa resembling a swollen cocoon. The pupal stage lasted 15-17 days, from 07.11.2021 to 23.11.2021, occurring underground at a depth of approximately 20-25 cm. This study provides detailed observations of the egg, larval, pupal, and adult stages, noting physiological and morphological changes throughout the moth's development. These findings contribute to the understanding of the species' distribution and life cycle in this region, with an emphasis on its identification and characteristics.

Keywords: Distribution, African Death's Head Hawk Moth, Life Cycle, Morphological Characteristics, Physiological Changes, Sphingidae.

Introduction

The African Death's Head Hawk Moth (*Acherontia atropos*) is a member of the Sphingidae family, widely known for its large size and unique skull-like marking on the thorax, which has inspired its ominous name. Native to regions of southern Europe and Africa, this species has a migratory nature and has expanded its range into other parts of the world. Its presence in non-native habitats such as India is rare and warrants attention due to its potential impact on local ecosystems.

While the African Death's Head Hawk Moth is not typically considered a pest, its migratory behavior and its ability to feed on a wide range of host plants, including those that are economically significant, make it an intriguing species for study. Additionally, the moth's relationship with honeybees, particularly its tendency to raid hives for nectar, raises questions about its interactions with local pollinator populations. This paper aims to document the life cycle of *Acherontia atropos* in Sawyerpuram, Thoothukudi, Tamil Nadu, India, as part of the first report on its occurrence and development in the region.

Materials and Methods

Study Area

The study was conducted in the campus of Pope's College, Sawyerpuram, Thoothukudi, Tamil Nadu, India, over a period of approximately one month, from October 22, 2021, to November 23, 2021. The campus is home to a variety of plants, including species from the *Clerodendrum* genus, jasmine, and the Solanaceae family, which are known to host the larvae of the African Death's Head Hawk Moth.

Observation and Collection of Eggs

Eggs of *Acherontia atropos* were first observed on October 22, 2021, on the upper surfaces of leaves of the host plants. A total of 12 eggs were carefully collected for observation. These eggs were green to bluish-grey in color, oval in shape, and approximately 1-2 mm in diameter.

Larval Development and Observation
The collected eggs were monitored daily for hatching. Upon hatching, the larvae were observed for their characteristic features, including the prominent tail horns, which curled as they matured. The larvae were kept under controlled conditions in a small container with their host plants to replicate natural environmental conditions. Observations were made regarding their size, growth, and behavior.

Pupal Stage
Once the larvae reached maturity, they were observed pupating in the soil. The pupal stage was recorded as beginning around November 7, 2021, and lasting for 15-17 days. The pupae were reddish-brown and stout, resembling a swollen cocoon. The depth of pupation was recorded at approximately 20-25 cm underground.

Adult Emergence
The adult moths emerged from the pupae between November 23, 2021, and November 25, 2021. Upon emergence, the moths were collected and identified based on their characteristic thoracic skull marking, confirming their species as *Acherontia atropos.*

Results
Egg Stage
The eggs of Acherontia atropos were initially observed on October 22, 2021. They were green to bluish-grey and laid on the upper surfaces of leaves, typically of *Clerodendrum* and jasmine, as well as various Solanaceae species. Eggs remained in place for approximately 3-5 days before hatching.

Larval Stage
The larvae emerged from the eggs on October 25, 2021. The first instar larvae were small and pale, with characteristic tail horns that curled as they progressed through their stages. The larvae passed through five instars, with each instar exhibiting growth and a color change from pale green to dark green, with black spots along the body. The tail horns were particularly prominent in the later instars. The larval stage lasted 10-12 days, from October 25, 2021, to November 7, 2021.

Pupal Stage
Upon reaching maturity, the larvae burrowed into the soil, where they formed their pupae. The pupae were reddish-brown and stout, with a swollen, cocoon-like appearance. This stage lasted between 15-17 days, from November 7, 2021, to November 23, 2021. The pupae were found at a depth of 20-25 cm underground.

Adult Stage
The adult moths emerged from their pupal cases on November 23, 2021. The moths were large, with a wingspan of approximately 10-12 cm. Their most striking feature was the skull-like marking on the thorax, which is characteristic of the species. Adult moths were observed feeding on nectar and honey from flowers on the college campus.

Discussion
This study marks the first recorded instance of the African Death's Head Hawk Moth in Thoothukudi, Tamil Nadu, India. The species appears to have successfully completed its life cycle in the region, with adults emerging approximately 30 days after egg deposition. The presence of *Acherontia atropos* in non-native habitats may be linked to migratory patterns, and the moth's adaptability to different host plants suggests that it could establish a foothold in local ecosystems. The documented life cycle stages, from egg to adult, contribute valuable information to our understanding of the species' development in this new environment.

The larvae's feeding habits on *Clerodendrum*, jasmine, and Solanaceae species indicate that the moth is capable of exploiting a variety of plants in the region. Furthermore, the adult moth’s tendency to raid honey bee hives for nectar may lead to potential conflicts with local pollinators, particularly honey bees. Further studies are needed to assess the moth's impact on local ecosystems, especially its relationship with native flora and fauna.

Conclusion
This research provides the first comprehensive report of the African Death's Head Hawk Moth (Acherontia atropos) in Sawyerpuram, Thoothukudi, Tamil Nadu, India. The life cycle of the species, from egg to adult, was documented in detail, including observations on the morphological and physiological changes throughout its development. These findings contribute to the understanding of the distribution and ecology of this non-native species in the region. Given the moth’s migratory behavior and its ability to feed on a variety of host plants, further studies should focus on its long-term impact on local ecosystems.

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