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Morphological and Behavioural Distinctiveness of the Flying Insecticide *Apus affinis* from the Semi-Arid Region of Jhalda, Purulia, West Bengal



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Abstract

The gregarious house swifts (*Apus affinis*) nesting in the ceiling of a double storied building in Jhalda were studied for their morphological and behavioural peculiarities. The black little bird possessed a small, slightly curved beak with big rounded eyes and slender body. The birds were found with narrow stream-lined wings which helped them to capture their prey and collect their nest building materials while in their wings. Several insects such as the mosquitoes, spiders, ants etc. could be identified from the food bolus prepared by the swift to feed its young. This confirmed the insectivorous habit of the bird and at the same time it could be credited for being a beneficial living insecticide which may perhaps check the population of the mosquitoes (and spiders) and hence prevent the harm caused to the animals and plants due to these insects.

Keywords : *Apus affinis*, Streamlined Wings, Clustered Colonies, Scotophase, Photophase, Feathers.

Introduction

Birds are the only feathered creatures persisting in this world. At present there are about 1200 species of birds in India, representing about 75 families and 20 orders (Ali, 2004). The reason behind this huge number of birds in India is due to its climatic diversity, which provides different types of ecological habitats to meet the requirements as well as taste of such a huge variety of birds (Hoyo *et al.*, 1999). The food habits of the birds may also play a role in determining the socio economic condition or even environmental safety of a particular area.

In our present study we have closely observed the peculiar morphological and behavioural characteristics of the house swift, *Apus affinis*, belonging to the order apodiformes with special emphasis on their food habit, inhabiting the feather ornamented nests built in the ceiling of a double storey building situated in Jhalda. Purulia (West Bengal) at co-ordinates 23.37°N 85.97°E. Jhalda is the western most part of West Bengal (Figure 1) and shares its boundary with the adjacent state of Jharkhand. This region is said to be a semi-arid region with an average annual rainfall ranging between 1100-1500 mm and the temperature reaching upto 50° in the summer months.

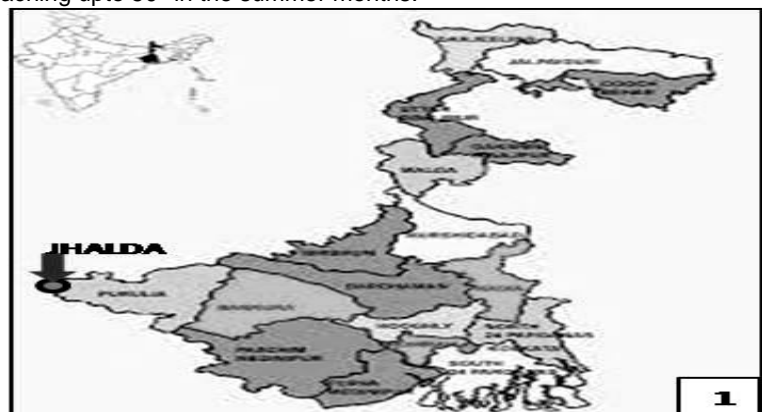


Figure 1: Map of West Bengal Showing the Exact Location of the Semi-Arid Region of Jhalda.

Asian Resonance

The *A. affinis* have been usually reported to be very quick in flight activities and can fly for unusually long hours (Chantler and Driessens, 1995). The bird is also known as “Babila” or “Batasi”. Though a few reports and descriptions (Chantler and Driessens; 1995, Hotta; 1994, Hotta; 1996) are available on the collective behaviour of the birds of *Apus sp.* from different parts of the world, no systematic studies on *Apus affinis* depicting the morphological and behavioural uniqueness in connection to their distinct insectivorous nature residing in the western part of West Bengal has been found. The bird is not quite frequently observed in this part of West Bengal and was observed for the first time to build their peculiar nests in the ceiling of a double-storey building in 2005 and hence drew our attention.

The prime objective of the present research is to study systematically the morphological and behavioural distinctiveness of the *A. affinis* as a result of the adaptation of the bird in connection to their typical insectivorous nature. The current work is also aimed to investigate on the role played by the bird in controlling the insects and arachnids which are otherwise considered harmful for the human population. As far as our knowledge is concerned this report is going to be the first attempt to make the common men aware of the importance of such natural insecticide in this part of West Bengal.

Materials and Methods

The study was mostly conducted by collecting the birds that dropped from their nests or were injured by some mechanical devices such as ceiling fans, hanging lights etc. The different body parts of the birds as well as their nests were photographed using a S21S Cannon digital camera. The various body parts were measured using a meter scale with maximum precision of 10^{-3} meter. To study the scotophasic and photophasic as well as the nest building behaviour of the birds a routine day-night monitoring was done for a period of 10 months to cover the sultry summer (April-July) as well as the chill winter days (December-January).

Results

Morphological Characteristics

The body is slender in appearance covered with blackish feathers (Fig. 2). The beak has been found to be small and slightly curved at the front resembling the English alphabet “V”. (Figures 2, 3, 4). The adult individuals are about 12cm-15cm in length with long and narrow wings having an aspect ratio of 3:1. The bird is blackish-brown in appearance with a ventrally white neck (Figure 4). The eyes are deep blue-black and perfect round in structure (Fig. 4).

Figure-2

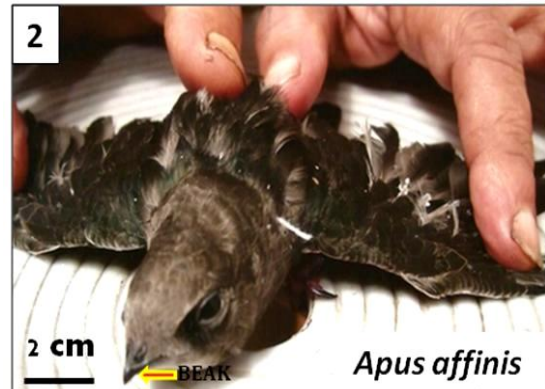


Figure 2: An Adult *Apus affinis*, With A “V”-Shaped Beak and Outstretched Streamlined Wings.

Figure-3

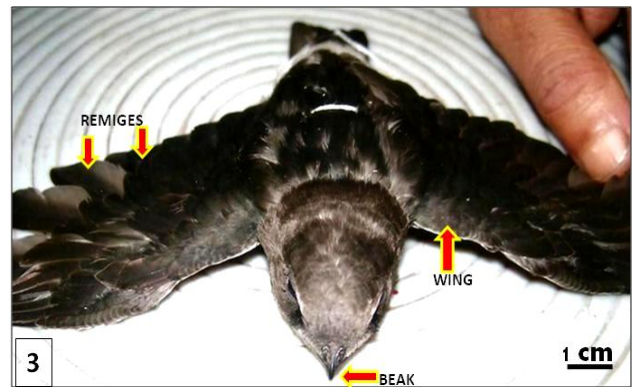


Figure 3: An Adult *Apus affinis*, With Its Long and Narrow Wings Displayed To Show the Arrangement of Remiges. The “V”-Shaped Beak Can Also Be Noticed.

Figure-4

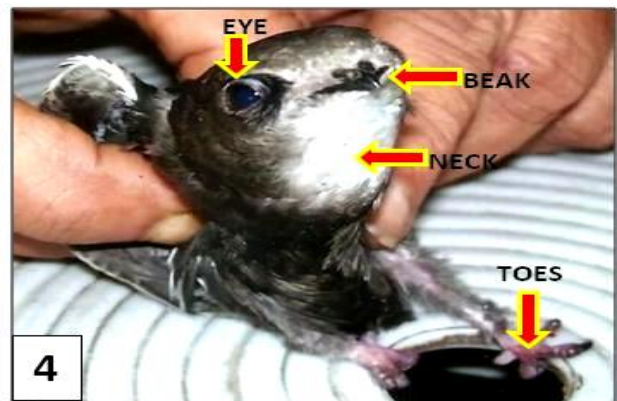


Figure 4: An Adult *Apus affinis*, With Bluish-Black Rounded Eyes, Small Pointed Beak, White Neck and Clinging Toes.

Wings and Tail

The wings are much longer than wider and stream lined as expected from a good hoverer. Each wing measures about 10-13 cm in length and the

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remiges exhibited a five tier arrangement as shown in figure 5.

The rectrices were equally strong and imparted a tail length of $4.2 \pm 0.3\text{cm}$ ($n=14$) to the adult bird. The rectrices arose from a white zone at the proximal tip of the body covered with white covert feathers (Figure 5).

Figure-5

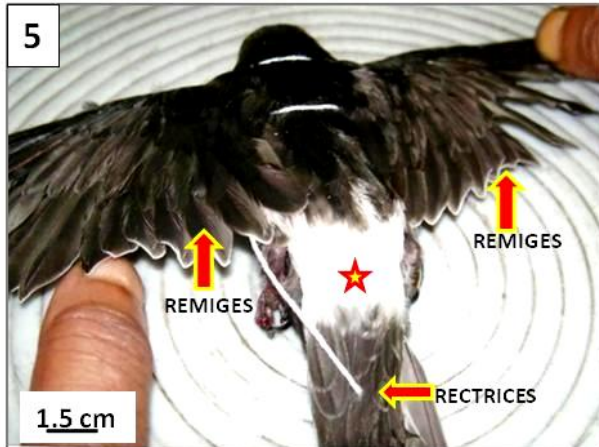


Figure 5: The Wings of An Adult *Apus affinis*, Displayed To Show the Arrangement and Location of the Remiges and Rectrices. It Could Be Noticed that the Rectrices Grow From An Area Covered With White Covert Feathers (Marked With Star).

Legs

The legs are very short with all the four toes directed forward. The toes are provided with very sharp and long claws (Figure 6).

Figure-6

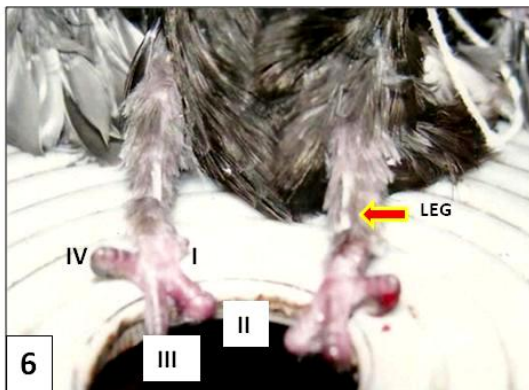


Figure 6: The Legs of An Adult *Apus affinis* Showing All the Four Forward Directed Toes (I, II, III and IV) Provided With Sharp Claws.

Behavioural Characteristics

On observing the birds throughout the day it has been noticed that the birds are very active as well as swift throughout the day and frequently visit and leave their nests. The birds utter peculiar "phurrrr" sound while in their wings. This may be a communicating signal for the other birds since they prefer to live in colonies or at least in pairs.

Nest Building

Both the males as well as females were found to be actively engaged in building the hemispherical nests hanging from the ceiling. According to our observation the birds started to build their nests in early February i.e., spring and continued with the process till late August. The photophase was found to exert an impact on the nest building process and the birds became more active with the decreasing scotophasic hours. The nest entrance was found to be a small slit build either in a lateral direction or at the bottom of the nest. It is again a very lengthy process and our observation suggests that a swift pair may take even more than two months to build its cosy nest as shown in figure 7 and 8. The nests were built by gluing light, windblown materials such as feathers, straws, dry leaves, twigs etc. with their salivary secretions that were collected in the air. Multiple nests were found attached to each other and covered with insulating material hanging from the ceiling.

Figure 7

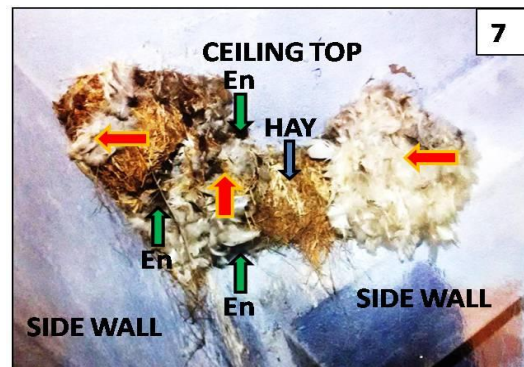


Figure 8

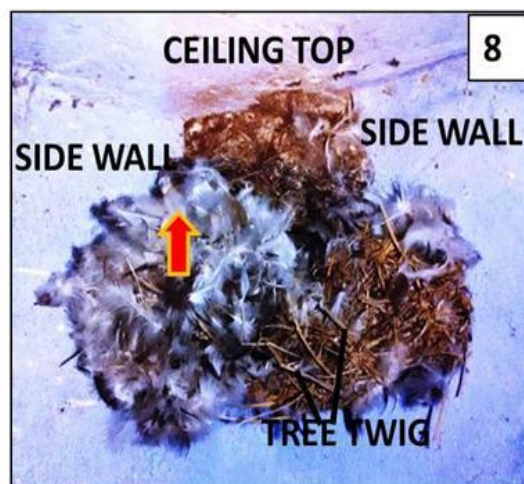


Figure 7 and 8: The Nest of the *Apus affinis* Attached To The Ceiling of A Double Storey Building. The Nest is Built with Wind Driven Materials Such As Feathers (Shown With Arrow), Twigs, Hay, Paper, Seeds, Etc. Fig. 7 Shows A Larger Composite Nest With Multiple Entrances (En). Fig. 8 Shows A Relatively Smaller and Compact Nest.

Asian Resonance

Photophasic and Scotophasic Activities

The birds left their nests in the early hours of the day with the appearance of the day light and frequently visited the nests until the sunset when they stayed inside until the next day break. This behaviour was observed during the nest building in spring and after the eggs was hatched.

Food

The birds of either sex lived together in the same nest among the colony and two of the adult birds injured and caught while entering the nests were found with bulged throats containing food bolus. The food bolus were examined and found to contain many mosquitoes along with few small and medium sized spiders and other ant like insects collected in the air from nearby locations.

Discussion

As depicted from the current study, the house swifts build their characteristic nests preferably and probably only in the ceiling or other edges of high or double storey building because they need height to take off for their long timed flight which is not possible from a low height (single storeyed building). The nest is an important resource for house swifts not only because it spends a lot of time in building the nest but also because the nest is used as a roost site round the year as well as for breeding and nestling of the young ones (Hotta, 2012). The nests are built with insulating materials probably to provide an ideal temperature to the young birds inside the nests so that they do not face extreme heat or cold.

The characteristic arrangement of the toes of this bird precludes the possibility of its perching on the tree twigs or horizontal aerial cables and hence, they cling vertically with their needle-sharp hooked claws (Ali, 2004), making an acute to right angle with the inclined ceiling surfaces while building their nests and feeding their young ones. The half chewed food bolus was probably brought to feed the newly hatched birds as Hotta (2012) have suggested that the easiest way to know whether the parent birds have returned to the nest with a food ball is to look for its bulged throat.

The presence of multiple nests suggests that the birds are gregarious and colonial nesters. It is interesting that the nests slits are built either in the downward or lateral directions so that the birds can easily drop into the air from their entrance. The birds complete almost all their activities while in flight motion such as collection of nest building materials, catching of their prey. The *A. affinis* has a very few predators due to their swift flight stances and mastery on the air.

The birds while in the air do not wait to collect their prey but capture the prey directly with their beak while in their flight mode. Hotta (2012) has analysed 11 food balls and showed that a food ball included 9-447 insects and spiders included under 10 orders and 35 families, 17 (48.6%) of which belonged to order Diptera. However, he also found that the prey species varied greatly from one food ball to another, which applied to the food balls collected on the same day.

The black swift contributes largely in checking the harmful mosquito and arachnid population which would otherwise create diseases such as Malaria, Filaria, Dengue, Encephalitis etc., in the human population and pose harm to the plants respectively. Thus, we can say that the *A. affinis* are harmless to the human population and their prey collecting behaviour proves to be really beneficial for the human community, particularly in the area from the Jhalda zone where cases of malaria and filarial are of frequent occurrence. According to the text of **Santana and Cortis** (1996) in Gibraltar (Spain), all the swifts including their nests and eggs are protected by the Nature Protection Ordinance law, 1992. In India similar legal protection must be provided to save these natural insecticides. The Development and Planning Commission of India should adopt proper measures while constructing the roofs and ceilings of newly constructed buildings so that they provide nesting opportunity for the nesting of the beneficial swifts.

Conclusion

Studying the morphological characteristics we can say that particularly the wings and beak of *A. affinis*, have been so designed that it supports the day long flying behaviour of the bird in combination with the magnificent prey capturing technique. The dry arid zone of Jhalda, Purulia have been blessed with the gregarious population of house swift which is acting as an excellent living insecticide, especially in their post breeding season when they feed their young ones with the saliva laden food bolus consisting of all kinds of mosquitoes which are vectors of different infectious diseases and arachnids which acts as pests for us. Thus, such birds must be preserved and protected along with their nests to combat the harmful insect pests naturally and free of cost.

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