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Morphological characterization of lepidopteran fauna from Akola vicinity

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Abstract
The beautiful creature of nature, butterflies (Lepidoptera) have great aesthetic and commercial values as they are beneficial as pollinator and environmental indicator. The present survey was conducted to determine the characteristics of lepidopteran fauna collected from Akola vicinity during March-June 2015-2016. A total of 350 specimens were collected belonging to twelve different families *viz;* Noctuidae, Nymphallidae, Pieridae, Papillionidae, Sphingidae, Arctiidae, Lycaenidae, Hesperidae, Geometridae, Notondidae, Pyrallidae and Pterophoridae. Familywise recorded data showed that family Noctuidae observed rich fauna during the course of study and contributing about 26.57 per cent, followed by Nymphallidae 24.28 per cent, Pieridae 19.71 per cent, Papillionidae 9.7 per cent. Family Notondidae and Pyrallidae observed the minimum fauna in Akola vicinity. The characteristics of butterfly fauna collected from Akola are helpful in awareness, education and further research. A detail study is required for further exploration of lepidopteran fauna of Akola vicinity.

Keywords: Lepidopteran fauna, Noctuidae, Nymphallidae, Akola vicinity

1. Introduction
Insects contribute to more than half of all the species on the planet [8] with recent studies estimating the existing insect diversity close to 30 million species [5]. Lepidoptera is the second largest order after Coleoptera, with cosmopolitan distribution of which India is no exception and it comprises moths, butterflies and skippers. There are about 2, 00,000 species of Lepidoptera out of which 15,000 species belongs to butterflies (Papilionidea) and remaining are moths' over world [7]. The order Lepidoptera belongs to holometabolous which includes butterflies and moths are of diversified nature and they occur both as crop pests and pollinators [10]. The members are of great value both for conservation and for environmental planning in local scale. Individuals have great potential for inclusion in the faunistic analysis and environmental monitoring.

Butterflies and moths plays a pivotal role in determining the stability of an ecosystem since their numbers can fluctuate drastically with even slight changes in temperature, weather conditions, degradation or pollution. They also serve as indispensable links in the food web in the many ecosystems and niches they inhabit.

Butterflies are widely recognized as potentially valuable ecological indicators. Before the adult stage the larvae of the butterflies cause severe damage in the agriculture field and plantation areas. The degree of diversity depends upon the adaptability of a species to a particular microhabitat. Great variation has been occurring in diversity of insects due to various anthropogenic activities. The dimension, population size and diversity of the species are most significant biological elements of an ecosystem [2].

Study of biological diversity is being recognized as a vital parameter to assess the global and local environmental changes and sustainability of developmental activities of various species [9]. The insect diversity needs to be recorded in various faunally rich regions of the earth for a complete understanding of their role in the proper functioning of various ecological niches and for accurate estimation of their taxonomic richness. The lepidopteran fauna of Akola district has not been studied before. Therefore, the present study is the first attempt of its kind to explore the existing diversity along with their morphological study of lepidopteran fauna collected from Akola vicinity.

2. Materials and Methods
2.1 Collection of lepidopteran fauna from Akola vicinity
During this study, 350 specimens of lepidopteran fauna were collected belonging to twelve different families from Akola vicinity (Fig.1).

Mostly moths were collected from light trap, some moth and butterflies were collected from crop of Akola vicinity by using net and killed them by placing in polythene bags containing ethyl acetate blended cotton swab. Proper stretching and pinning of specimens were carried out using entomological pins for exact identification of their taxonomic characters. Labeling was carried out as soon as insects were dried to avoid loss of vital information.

After pinning and stretched, collected specimens were dried in insect drying chamber so that morphological and taxonomical characters could be preserved and used for further study. After drying specimens were stored according to the common external characters shown by insect for placing family wise.

For studying the distinguishing morphological characters of different specimens stereo zoom microscope (Nikon SMZ 800) with attached Nikon camera was used by adjusting the magnifying knob, zoom characters were studied under microscope based on taxonomic keys for different families. Based on morphological characters the collected lepidopteran fauna was classified into different families, using taxonomic key. Then pictorial key of the collected lepidopteran fauna was prepared by taking microscopic photographs of distinguished morphological character and comparing them with Online available preliminary/Draft Key to the commonly encountered families of lepidoptera to distinguish the fauna up to family level as well as fauna of British India used to clarify the character.

Likewise, family level identification of all lepidopteran fauna collected during investigations was carried out at Insect Biosystematic Laboratory, Department of Entomology, Post graduate Institute, Dr. P.D.K.V, Akola during 2015-2016.

3. Results

3.1 Morphological characterization of lepidopteran insect fauna found in Akola vicinity and deposited in museum

3.1.1 Noctuidae: Noctuidae emerged as largest family of lepidoptera in Akola vicinity. It contributes 26.57 per cent of the total lepidopteran fauna and it was composed of four species encountered in Akola locality during 2015 which are described below.

Forewing length is less than 3 cm, Tympanum present on last thoracic segments (may be scoop on first abdominal segments), Male antennae usually moderately uniform throughout; forewing venation with M2 almost touching M3. Well-developed frenulum present, relative long tibial spurs (Fig 2).

Gurule *et al*. [6] catalogued the 70 species of moths from family Noctuidae in Nashik district of Maharashtra.

Faunstic records of 56 specimens of moth contributing 14 families, out of this family Noctuidae was found to be dominant family which was represented by 13 specimens in Amboli Reserve Forest [1].

Sekhon *et al*. [11] reported the total 1300 representatives of 41 species referable to 24 genera belonging to family Noctuidae from western ghat, Maharashtra.

Thus, the more share of family Noctuidae was also reported by the previous researchers that strengthening the finding of present investigations particularly lepidopteran fauna in Maharashtra is concerned.

3.1.2 Nymphallidae

This family represents 21.71 per cent of the total collected lepidopteran fauna. It was composed of five species of butterfly encountered during 2015 which were described below.

Medium to large butterfly, forewing length is less than 4 cm, antennae are clubbed, hind wing without a tail like projection, forelegs greatly reduced, only two pairs of walking legs. Arolium is either reduced or absent.

As per Bora and Meitei [3], family Nymphallidae with 22 genera and 34 species was most dominant in Cachar district of Assam.

3.1.3 Pieridae

Pieridae family was composed of seven species of butterfly encountered during 2015 which were described below. Medium to small butterfly, fore wing length is less than 4 cm, forelegs not greatly reduced, three pair of walking legs, ground color of forewing mostly white or yellow, fore wing length is usually >2 cm, eye is not emarginated (indented) at base of antennae, amplexiform wing coupling apparatus is present.

3.1.4 Sphingidae

Sphingidae family was composed of two species, spingid moth, *Acherontia styx* and Hawk moth, *Herse convolvuli* were encountered during 2015 in Akola vicinity.

Forewing length is greater than 1.2 cm, forewing long and slender (greater than 3 times as long as wide), pointed apically, antennae is thickened, frenulum well developed (wing coupling apparatus), proboscis well developed, body is not excessively hairy (Fig 2).

Chandra *et al*. [4] collected 12 species of hawk moth belonging to 10 genera and 3 sub families. Species *Agnosiamicrota* is new addition to fauna of Madhya Pradesh.

3.1.5 Papilionidae

Papilionidae family composed of three species, *Papilio demoleus*, *Papilio aristolochiae*, *Papilio polytes* were encountered during 2015 in Akola vicinity.

Antennae clubbed without apiculus, forewing length is 4 cm and greater, hind wing with tail like projection. Arolium pad or pulvi are greatly reduced or absent (Fig 3).

3.1.6 Hesperidae

Hesperidae family composed of only species of skipper was encountered during 2015 in Akola vicinity. Antennal club with terminal portion slender, often hooked shaped (apiculus) stout bodies, short winged, wings are usually well rounded with more or less sharply tipped forewing (Fig. 5).

3.1.7 Arctiidae

Arctiidae family composed of two species of tiger moth was encountered during 2015 in Akola vicinity.

Forewing length is greater than 1.2 cm, tympanum present on last thoracic segments; antennae usually moderately uniform throughout, different color spots were present on wing.

3.1.8 Geometridae

Geometridae family was encountered during the 2015 in Akola vicinity.

Forewing length is greater than 1.2 cm, tympanum present on first abdominal segments, base of the proboscis naked, forewing usually broadly triangular. Different types of antennae are present, simple, feathery, plumose type (Fig 3).

3.1.9 Pterophoridae
Pterophoridae family was encountered during the 2015 in Akola vicinity. Forewing length is less than 1.2 cm, base of proboscis is scaled, forewing and hindwing divide into numerous lanceolate branches, legs are extremely long.

3.1.10 Bombycidae
Forewing length usually greater than 3 cm, forewing long and slender (greater than 3 times as long as wide), pointed apically, frenulum well developed, proboscis well developed, body usually not excessively hairy.

3.1.11 Lassiocampidae
Forewing length usually greater than 3 cm, forewing broadly triangular, often rounded apically, frenulum poorly well developed, proboscis reduced or absent, body usually very hairy, wing usually held tent like, hind wing usually not pattern.

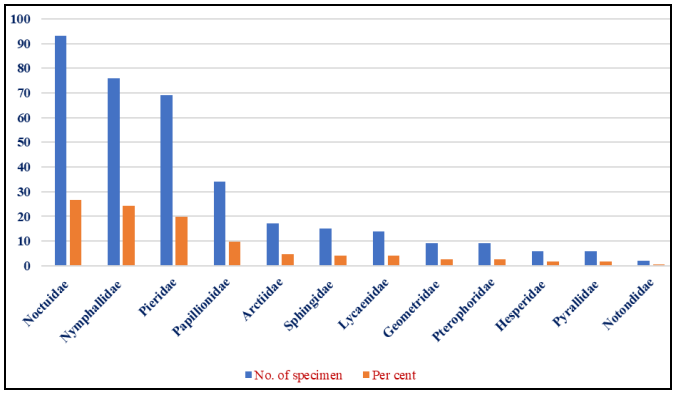

Fig 1: Family- wise per cent composition of lepidopteran fauna in Akola vicinity X-axis-Different families of lepidoptera Y-axis-per cent composition

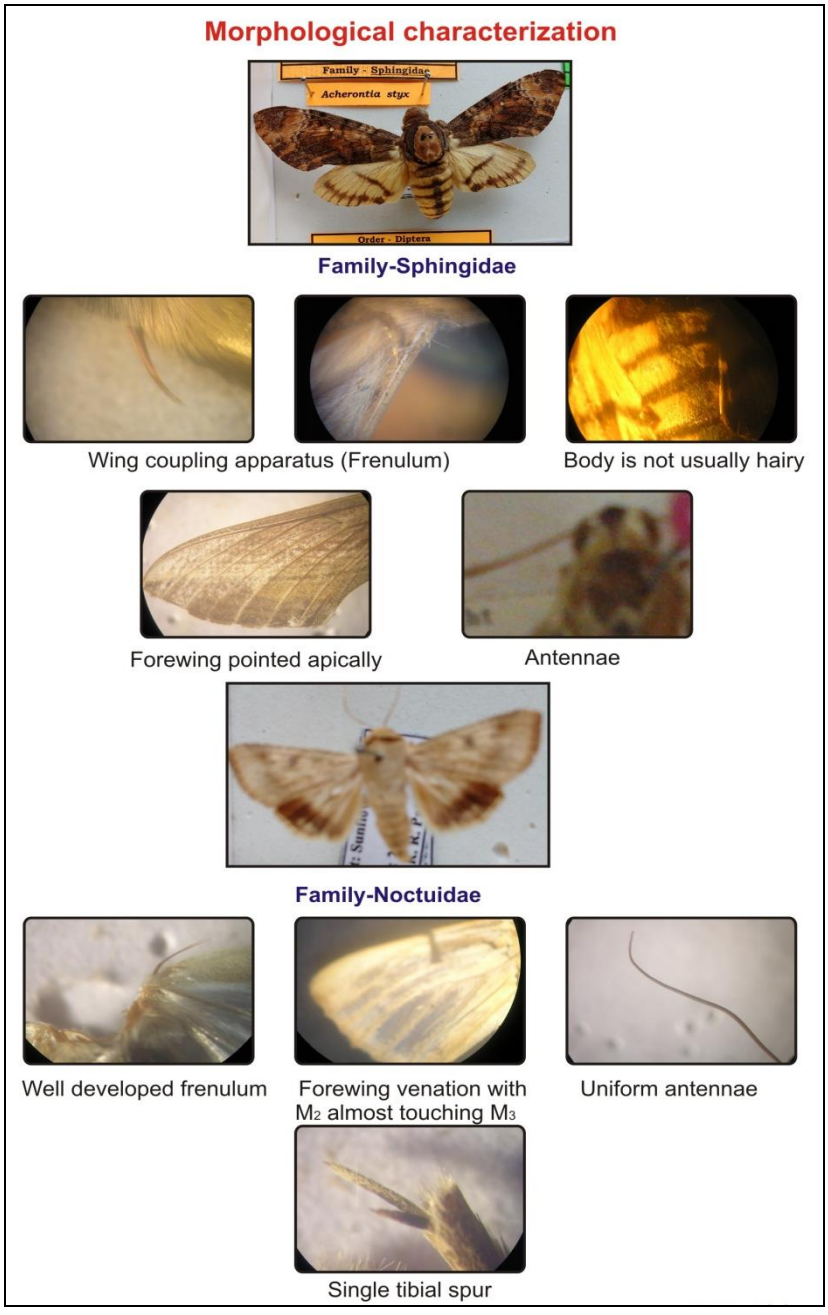

Fig 2: Morphological characterization of Sphingidae and noctuidae family

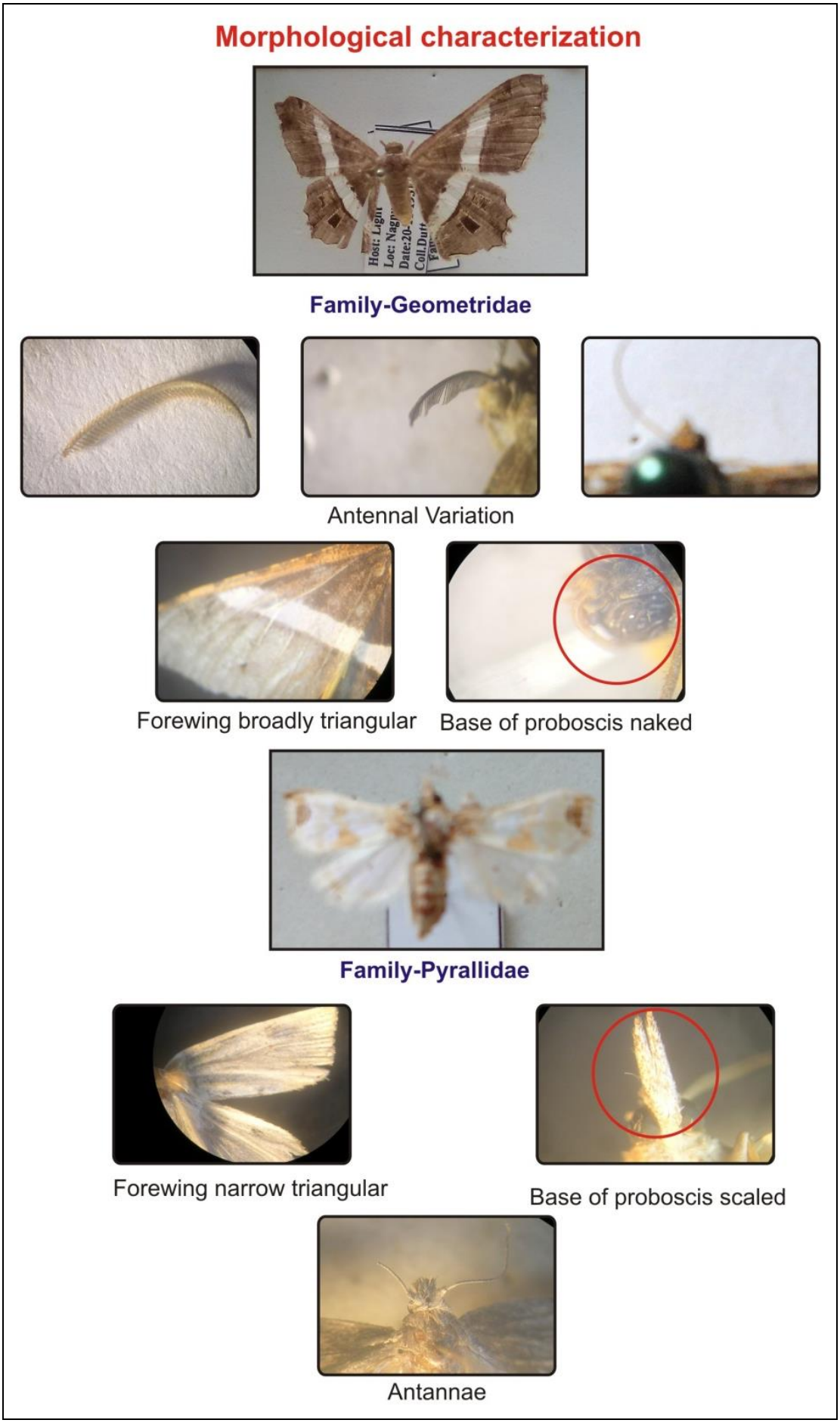

Fig 3: Morphological chracterization of geometridae and pyrallidae family

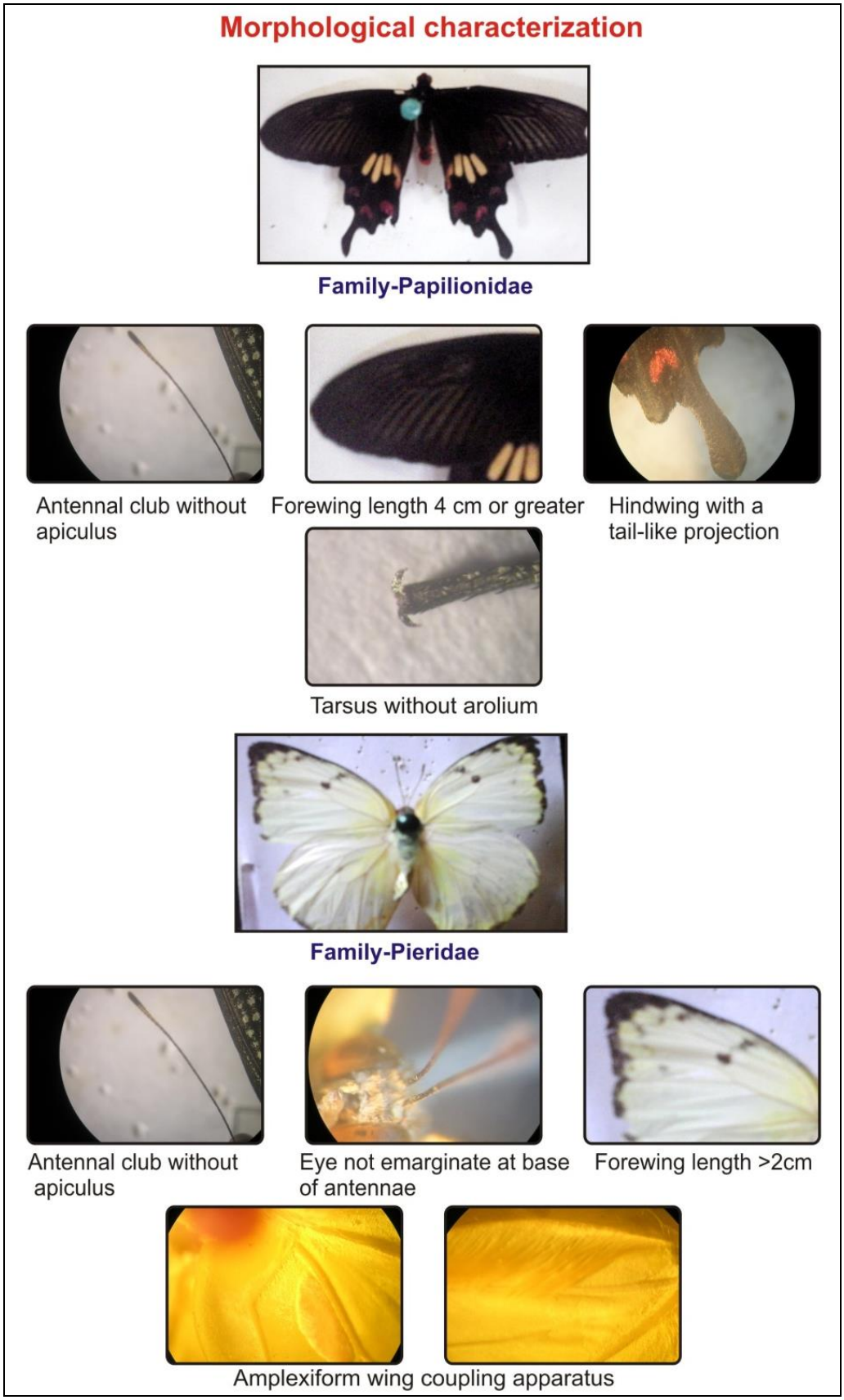

Fig 4: Morphological characterization of papilionidae and pieridae family

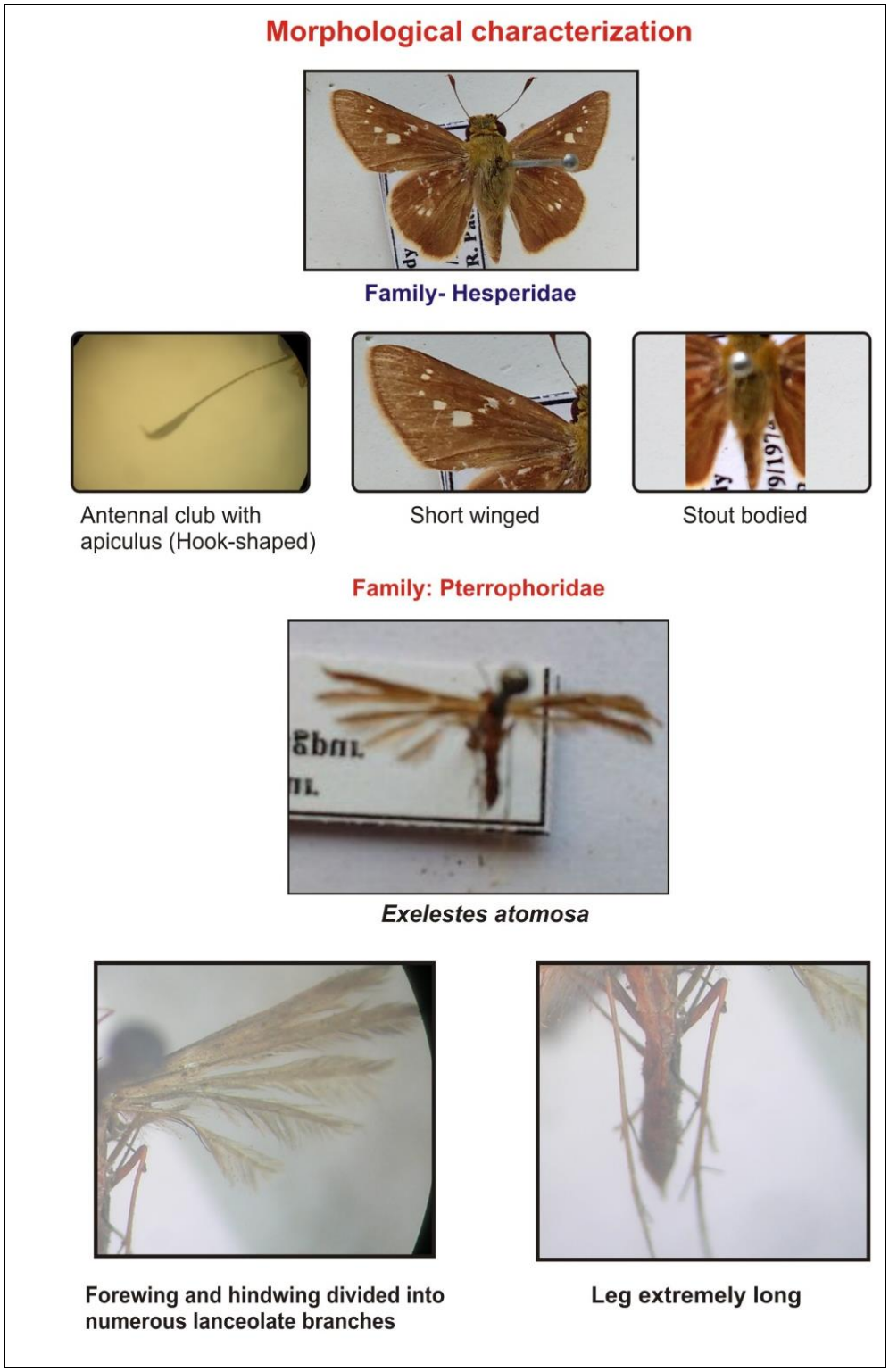

Fig 5: Morphological characterization of hesperidae and pterrophoridae family

4. Conclusion

Among the total collected lepidopteran fauna from Akola vicinity, Noctuidae family was emerged out as the most dominant in *Kharif* agro ecosystem.

For the characterization of lepidopteran fauna up to family level morphological characters *viz;* antennae, tibial spur, tympanum, wing venation, proboscis, wing coupling apparatus *etc.* are found to be the most distinguishing characters for identification up to family level.

The distinguishing morphological characters with pictorial form of lepidopteran fauna differentiating the families have been used to develop pictorial key for easy identification up to family level, would be helpful to the students, amateur and researchers *etc.*

5. References

1. Bharamal DL. An inventory of the moth fauna of (Lepidoptera) of Amboli Reserve Forest, Maharashtra, India, International Journal of Current Microbiology and Applied Science. 2015; 4(9):803-806.
2. Bliss LC. Adaptations of arctic and alpine plants to environmental conditions. Arctic. 1962; 15:117-44.
3. Bora A, Meitei LR. Diversity of butterflies (Order-Lepidoptera) in Assam University campus and its

vicinity, Cachar district, Assam, India Journal of Biodiversity and Enviornmental sciences. 2014; 5(3):328-339.
4. Chandra K, Roshni Pandey, Rita Bhandari, Sambath S. Diversity of hawk moths (Lepidoptera: Sphingidae) in Veerangana Durgavati Wildlife Sanctuary, Damoh, Madhya Pradesh biological forum – An International Journal. 2013; 5(1):73-77.
5. Godfrey H, Lewis CJ, Memmott OT. Studying insect diversity in the tropics. Philosophical Transaction of Royal Society of London. 1999; 354(1391):1811-1824.
6. Gurule SA, Nikam SM, Borse V. Faunastic studies on macro moth (Lepidoptera: Noctuoidea) from north Maharashtra. International conference on biodiversity and its conservation. www.researchgate.net, 2011.
7. Holloway JD, Bradley JD, Carter DJ. The Guide of insects of importance to man (Lepidoptera): 1992, 1-21.
8. May PG. Flower selection and the dynamics of lipid reserves in two nectarivorous butterflies. Ecology. 1992; 73:2181-2191.
9. Rajagopal T, Sekar M, Manimozhi A, Baskar N, Archunan G. Diversity and community structure of butterfly of Arignar Anna Zoological Park, Chennai, Tamil Nadu. Journal of Environmental Biology. 2011; 32:201-207.
10. Richards DW. Imm's General text book of Entomology. Classification and Biology 10th Edition, B.I Publication, New Delhi. 1997; 2:1072-1161.
11. Sekhon CK. Faunistic records of noctuid moths (Lepidoptera: Noctuoidea) from Chamba district of Himachal Pradesh. International Journal of Multidisciplinary Research and Development. 2015; 2(3):65-67.