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Research Article

A GLIMPSE ON THE SHIMMERING SCALES SURFACING THE GAUZY WINGS OF *CYDALIMA PERSPECTALIS* USING LIGHT MICROSCOPY

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ABSTRACT

Cydalima perspectalis is a moth commonly called as Box tree moth belonging to the family Cambridae under the order lepidoptera. The present work focuses on the different types of scale cells present on the varied coloured wing areas. The study has been conducted experimentally by scrapping off different coloured scales to a glass slide and fixing it with xylene and observing it under a light microscope. The dimensions of the scales were also studied by measuring it using micrometry. A total of 92 morphologically distinct types of scales were studied, which includes 64 scales of the dorsal wing, comprising of 35 scales from white coloured region and 29 scales from golden tipped region. From brown spotted region of the ventral wing, 28 different types of scales have been examined. Analysis of dorsal wing areas revealed the presence of several light brown and white coloured scales. Some of these scales were very difficult to see with naked eye because of the transparent nature. Majority of the scales of this region were broad and flat and they have a length range of about 82.7 µm to 126 µm and width range of 55.1 µm to 90.5 µm. While examining the ventral wing scales it was observed that majority of the scales are brown in colour. The scales of this region appear to be short and wide having pointed edges. These scales also possess certain stripes on its surface which helps to absorb the light. On analysing the ventral wing it was found that majority of the scales were brown in colour and most of these scales were short and wide. Dimensional analysis revealed that the scales of this area have a length range of about 70.9 µm to 126 µm and width range of about 55.1 µm to 90.5 µm. The results of this work demystified that, even though the moths are not as much attractive as other members of the order Lepidoptera including butterflies, their gauzy wings are blanketed with variety of powdery stuff known as 'scales' on its surface, that are marvelously beautiful, irrespective of their intricate markings and patterns.

Keywords: Gauzy wings, Light microscopy, Micrometry, Moth, Powdery stuff.

INTRODUCTION

The order Lepidoptera meaning scale-winged insects, includes butterflies and moths, which forms part of the class insecta, the dominant division of the sub-kingdom Articulata. The magnificent forms and pigmentation of the moths and butterflies caused them to be attracted by nature lovers. The colouration and patterns of their wings are formed by thousands of microscopic shimmering scales overlaying like tiles on a roof. The wing coverings of the lepidopteron including moths and butterflies are largely two-layered, comprising overall smaller ground scales and somewhat larger cover scales. The present study elucidates the morphology of different types of scale cells surfacing the wings of *Cydalima perspectalis* commonly called as box tree moth belonging to the family Crambidae.

MATERIALS AND METHODS

The moth species, *C. perspectalis* has been collected from botanical garden of Sree Narayana College Campus, Kollam (Plate 1). The scales that are present on the wings of moth species were taken as the experimental sample. Several scales have been scrapped off from different colored regions of the wing separately and placed on a glass slide. A drop of xylene has been added to the samples that occupies the glass slide. After it has been evaporated the samples were studied under light microscope, so that the photographs of each scale can be taken clearly and separately. Microscopic photography was adopted in this study, for taking the photomicrographs of prepared scale samples. Followed by this, the diameters of each scale

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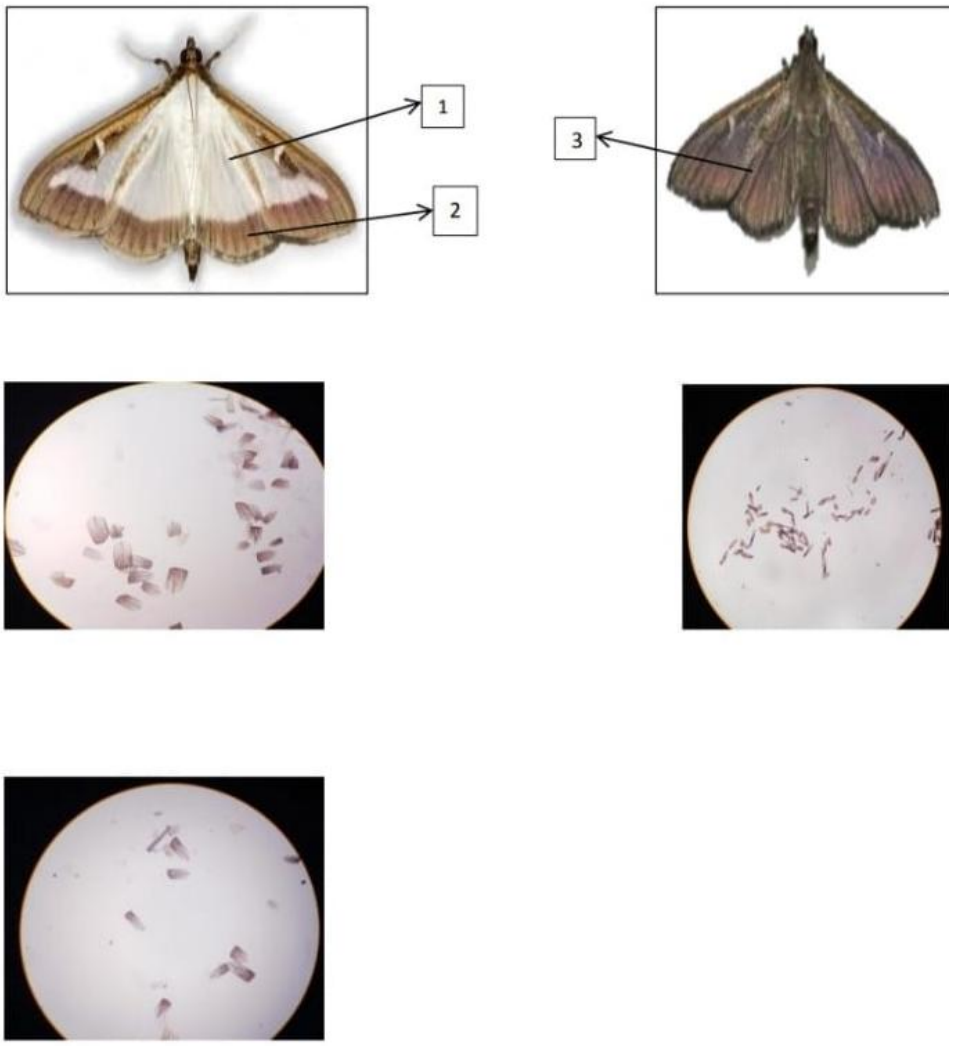
under study were measured using morphometrics. It is further preceded for result analysis.

RESULTS AND DISCUSSION

C. perspectalis has distinct colours in dorsal and ventral wings. They have white, slightly iridescent wings with a dark brown band at the outer margin and a characteristic white spot on the forewing and their wingspan is 4 cm. In the present study, scales from the white and golden tipped portion of the dorsal wing and dark brown portion of the ventral wing has been analysed. A total of 92 scales have been studied, which includes 64 scales of the dorsal wing, comprising of 35 scales from white coloured region and 29 scales from golden tipped region. From brown spotted region of the ventral wing, 28 scales have been examined (Plate I.1 to I.4).

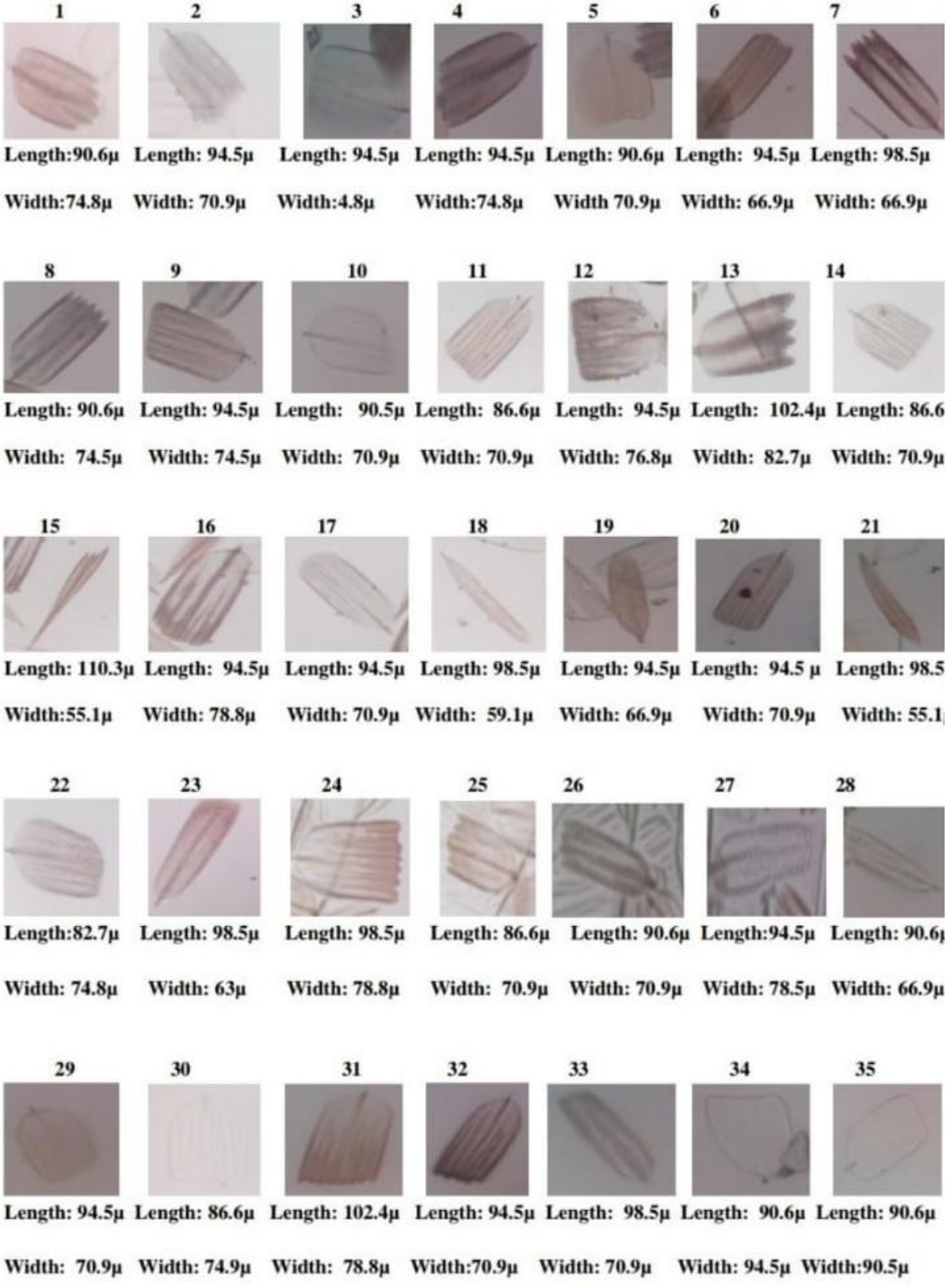
PLATE I

***Cydalima perspectalis*(Box tree moth)**



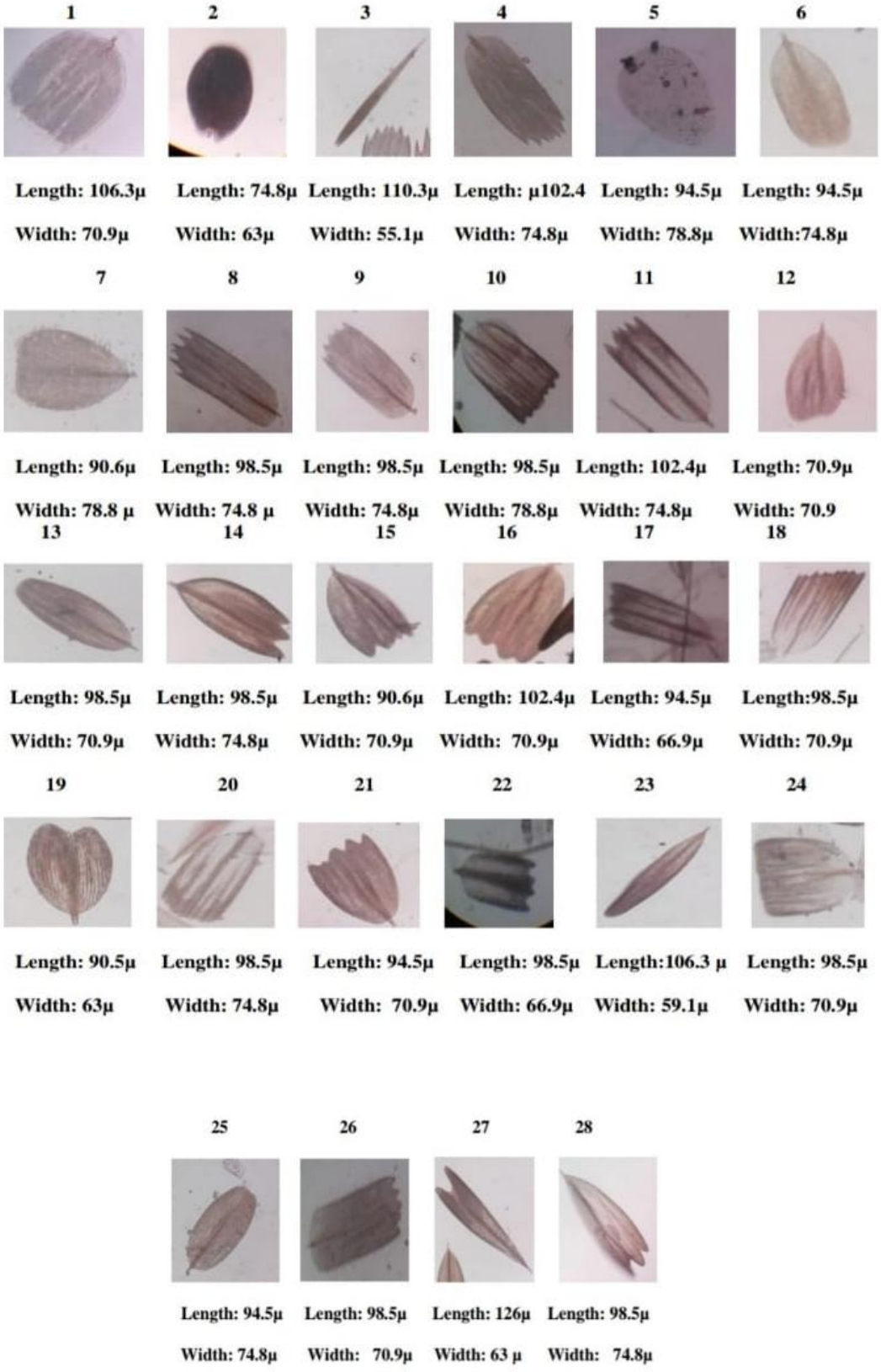
DORSAL SIDE

1.WHITE PORTION



VENTRAL SIDE

3 BROWN PORTION



Analysis of dorsal wing areas revealed the presence of several light brown and white coloured scales. Some of these scales were very difficult to see with naked eye because of the transparent nature (plate I.1, I.2). Majority of the scales of this region were broad and flat. While examining the ventral wing scales it was observed that most of the scales were seen in brown colour. The scales of this region appear to be short and wide having pointed edges. These scales also possess certain stripes on its surface which helps to absorb the light. The dimensional analysis pinpointed that the scales on the white coloured and golden tipped region of the dorsal side shows variation both in terms of length and width. At the white coloured region, the dimension of the scales ranged from 82.7 to 110.3 µm length and 55.1 to 90.5 µm width. Analysis of scales on golden tipped region of the dorsal wing revealed that the dimension ranges from 82.7 to 126 µm in terms of length and 55.1 to 82.7 µm width. Dimensions of the scales on brown colored region of the ventral wing ranges from 70.9 to 126 µm in length and 63 to 78.8 µm in width.

The powdery stuff blanketing the gauzy wings of the moths are the tiny scales which are actually made from modified hairs. It is these pigmented shimmering scales which gives different colouration and patterns to the wings of this insect. As per the study conducted at Princeton University of US (2005), the difference that is shown by the scales in their structure depends on their location on the wing and is independent of the colour. The Lepidopteran scale vesiture of the wings serves a variety of functions. Since these Scales are easily detachable, it helps the insects to free their wing if it is caught in a spider's web (Barish & Weiss, 1999). In addition to this, the scales enable development of vivid or indistinct patterns which help the organisms protect itself by concealment and camouflage, mimicry and warning. The morphology of scales has been studied by Downey, (1975) and they classified the scales into three groups namely hair like or piliform, blade like or lamellae and other variable form. In the present study only wing scales are focused. Many morphologically distinct scales have been observed during the present study on box tree moth. Majority of the scales present on the dorsal wingregions were broad and flat. On analyzing the ventral wing it was found that majority of the scales were short and wide. Scales vary in colour, which can be due to structure or pigmentation (Barish & Weiss, 1999). Analysis of dorsal wing areas of *Olepa ricini* revealed the presence of several light brown and white coloured scales, whereas most of the scales present on the ventral wing region is brown in colour. The dimensions of the scales range from 70.9 to 126 µm length and 55.1 to 90.5 µm width. Similar observations were made by Downey, (1975) and pointed out that the scales observed from the wings of certain butterflies range in size from 30 µm to 80 µm length and 30 µm to 500 µm width. In the present study it was also found that the scales present on the ventral wing area has the highest dimension in terms of width. But in terms of length, the values are almost similar on both wing areas of this fascinating moth named *C. perspectalis.*

CONCLUSION

The results of this work demistified that, even though the moths are not as much attractive as other members of the order Lepidoptera including butterflies, their gauzy wings are blanketed with variety of powdery stuff known as 'scales' on its surface, that are marvelously beautiful, irrespective of their intricate markings and patterns.

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