

WHEN IS A HAIR A SCALE ?

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Introduction

Butterflies and Moths are grouped together as Lepidoptera (an Order in the Class: Insecta). They are diagnosed as insects having scales on their wings (lepid = scale, ptera = wings). In fact their entire body is covered with scales. However, several other non-lepidopterans have scales on their wings. Here I show some insect scales and hairs.

Butterflies & Moths (Lepidoptera)

The scales are tiny flat plates that overlap somewhat like the tiles on a roof. Each individual scale has a colour and it is these colours that give a butterfly (and moth) wings their pattern (Fig. 1).



Fig. 1. Canadian Tiger Swallowtail, individually coloured scales give the pattern

Figure 2 shows the fore wing of a moth; it is just possible to see the individual scales.

17 mm



Fig. 2. Right forewing of a Plusiinae moth.

Figure 3 is a close up of the edge of the wing of a butterfly that shows more clearly the dense overlapping scales and how the colour pattern is made



Fig. 3.

The North American Polyphemus Moth has an 'eye-spot' on each wing (Fig. 4). The clear wing membranes in these spots lack scales. Each spot is ringed with bands of colored scales that enhance the 'vertebrate eye' effect (a defense strategy) (Fig. 5).



Fig. 4. Eye spot on Polyphemus wing

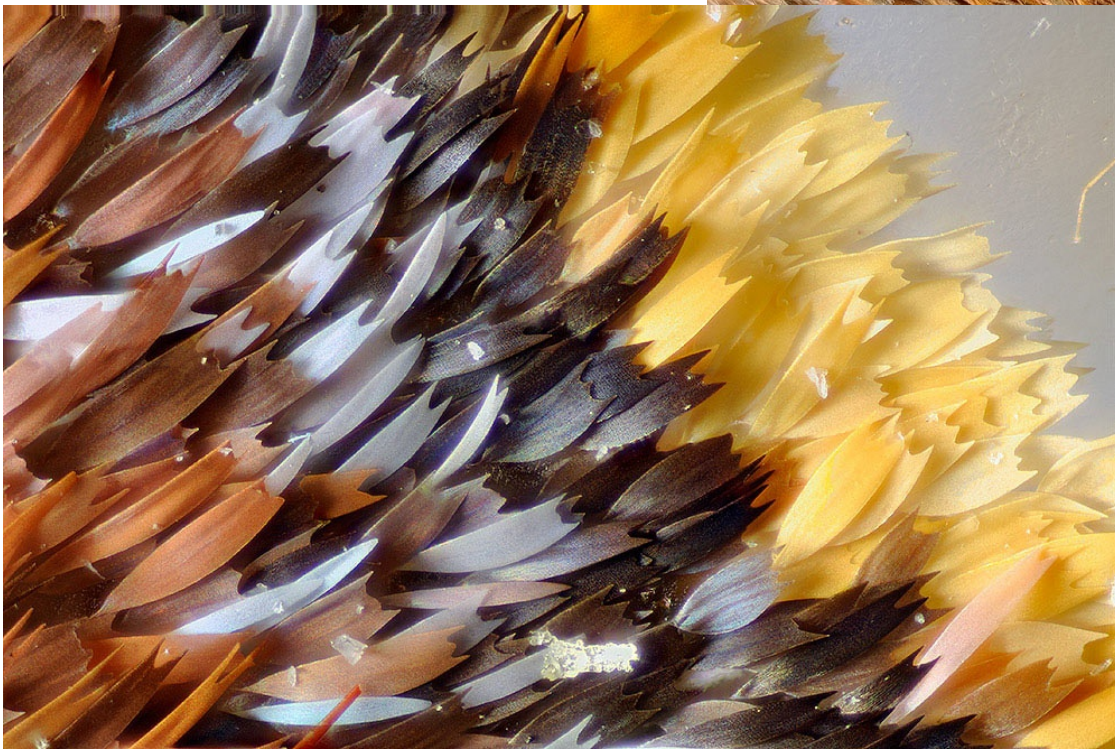


Fig. 5. Close up of part of the eye spot showing arrangement of different coloured scales

Figure 6 is a close up of a moth wing showing that each scale is individually coloured, has longitudinal ridges and can have different shapes and a toothed margin.

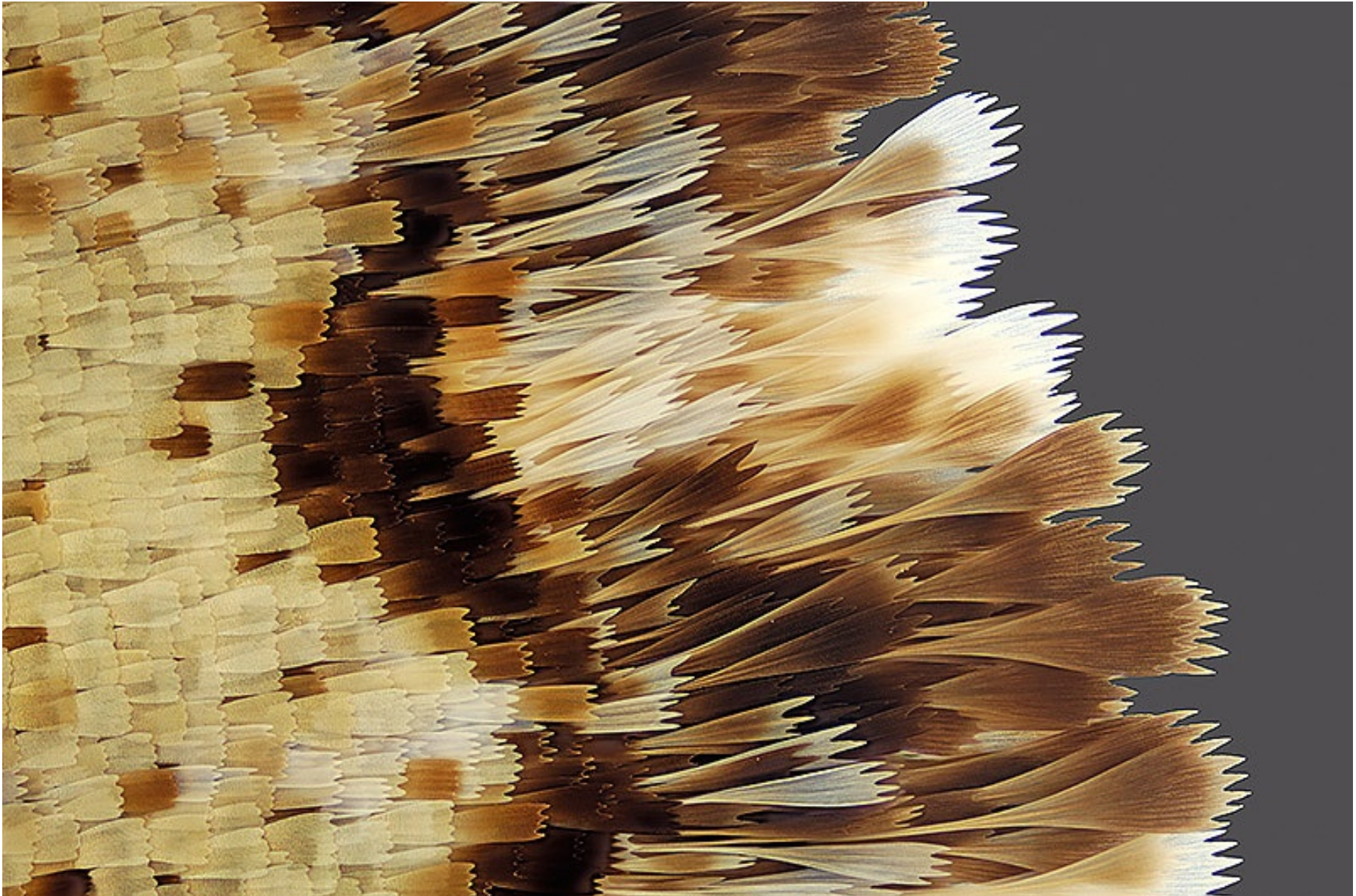


Fig. 6. Tip of forewing of moth showing scales at high magnification.

Figure 7 shows the tip of an individual scale. $1 \mu = 1/1,000$ of a millimeter..

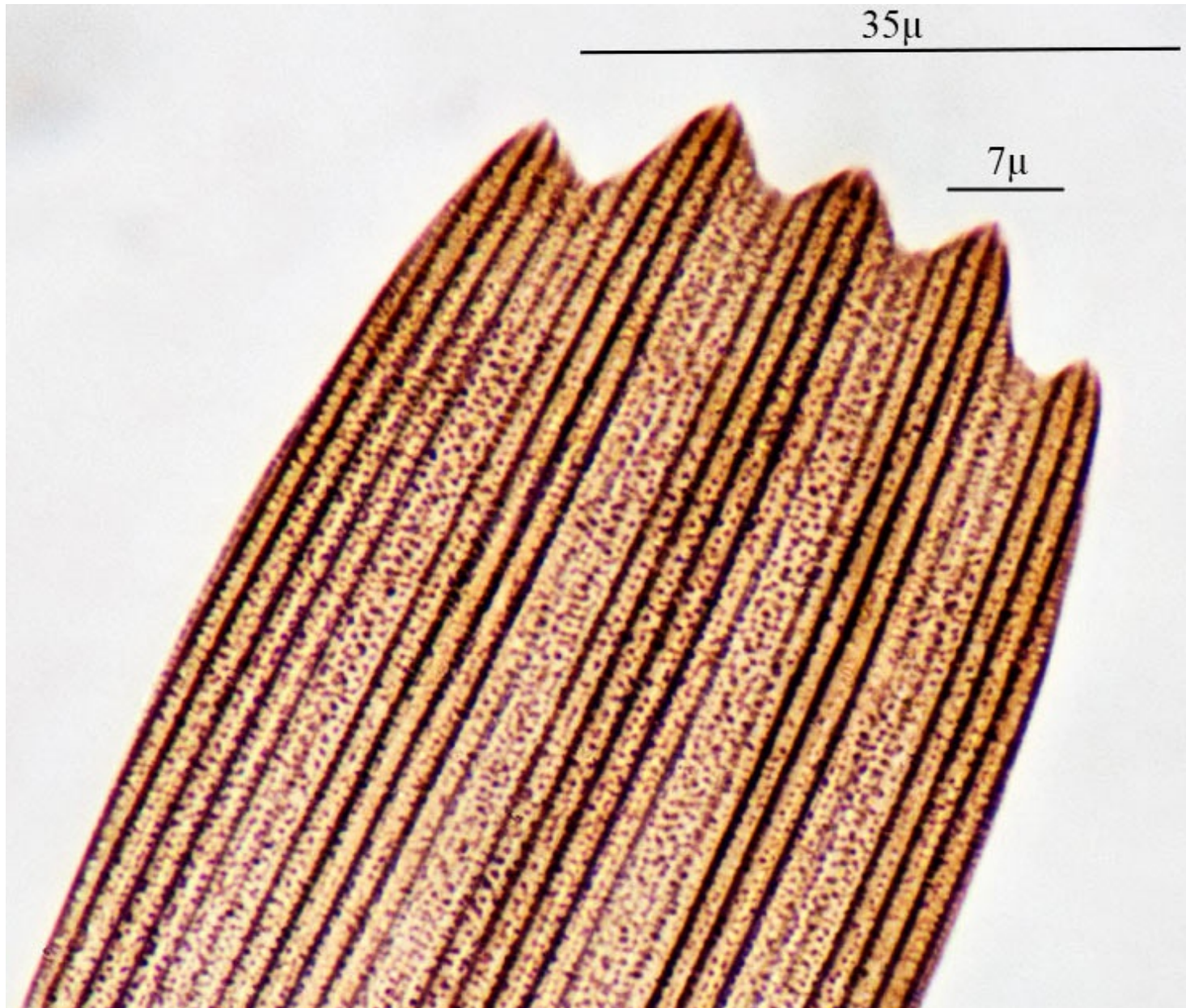


Fig. 7.

As mentioned earlier, it is not just the wings of butterflies and moths that are covered with scales, the entire body, except the eyes, is also scale-covered (Fig. 8).



Fig. 8. Head of a moth showing it scale-covered; except for the eye.

Flies (Diptera)

Each scale on a butterfly/moth is essentially a modified hair. So, when does a 'hair' become a 'scale'?

This little moth-fly (Family Psychodidae) has a very hairy body and hairy wings (Fig. 9). Likely not much chance of mistaking these as hairs, when seen enlarged. But when seen with the naked eye this insect does look like a small moth (thus scales on the wing) giving it the common name of 'moth-fly' (it is a true fly).



Fig. 9 Moth-fly

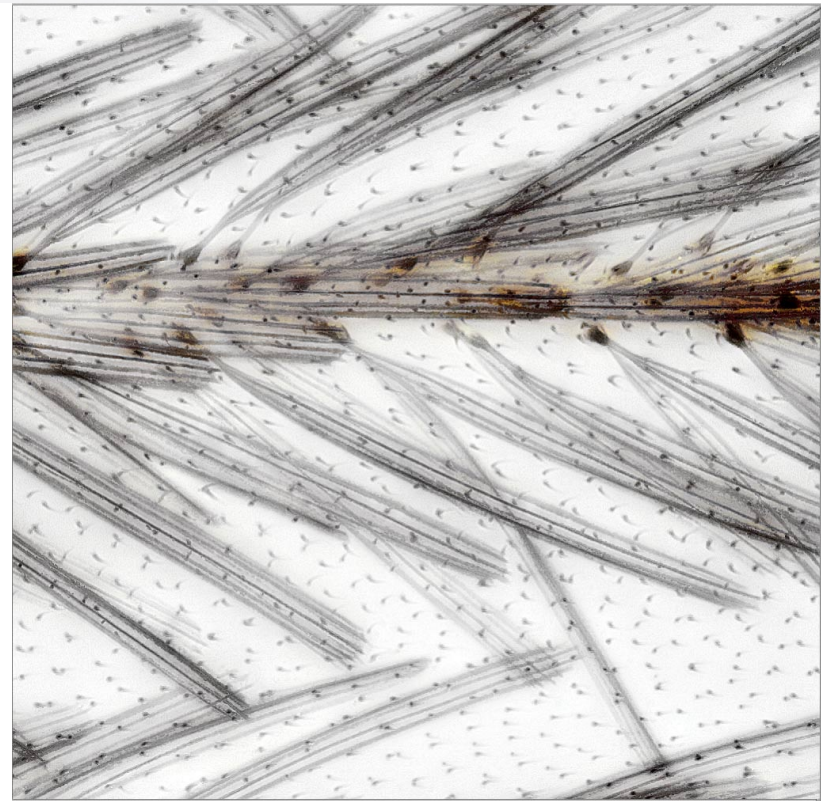
How about mosquito wings?(Figs. 10, 11). The wing veins have rather thick 'hairs' compared with the fringe of more 'hair-like-hairs'. When magnified, the 'hairs' on the wing veins, although not coloured, show some of the characteristics of butterfly/moth scales: i.e. flat, ridges, toothed tips (Fig.12).



Fig. 12. Mosquito wing magnified to show 'scale-like' hairs.



Figs. 10, 11. Mosquito wing showing thick 'hairs' on the veins



Beetles (Coleoptera)

In beetles the fore wings (elytra) are thickened and serve as a strong protection for the hind wings and body. Many beetles have shiny, hair-less elytra, but this Marbled Fungus Weevil has both a hairy-head and hairy elytra which give the appearance of scales (Figs, 13, 14, 15).

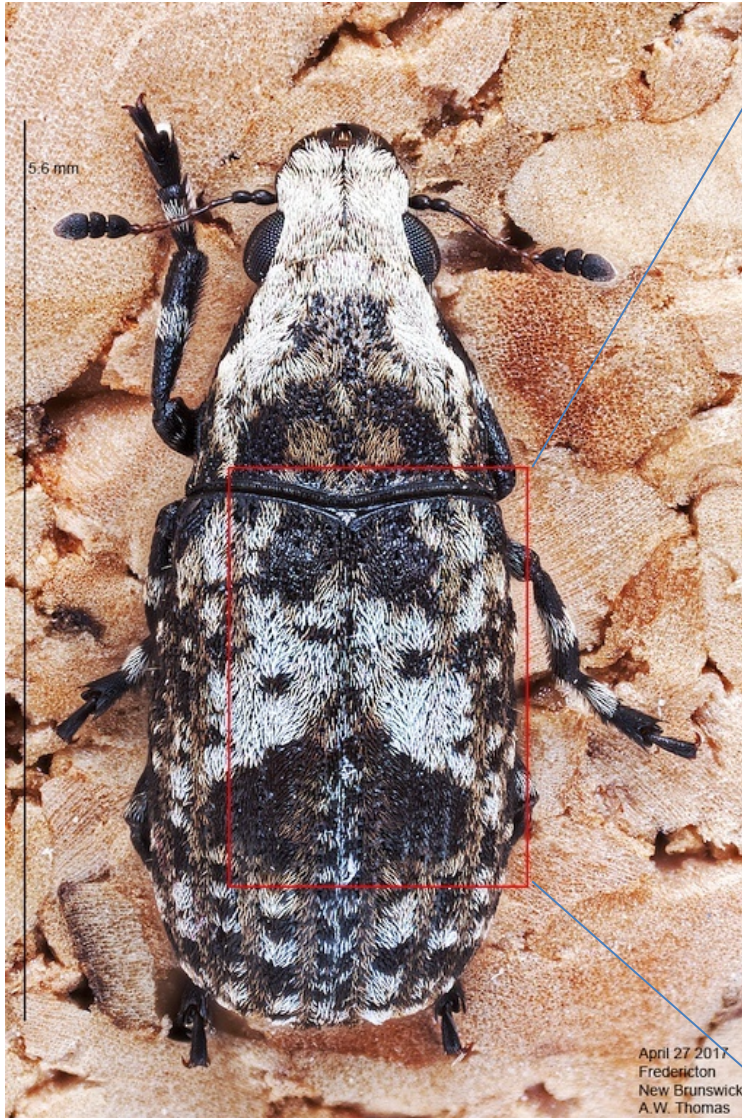


Fig. 13. Marbled Fungus Weevil. Red square is the magnified image in Fig. 14.



Fig. 14. Red square is the magnified image in Fig. 15.

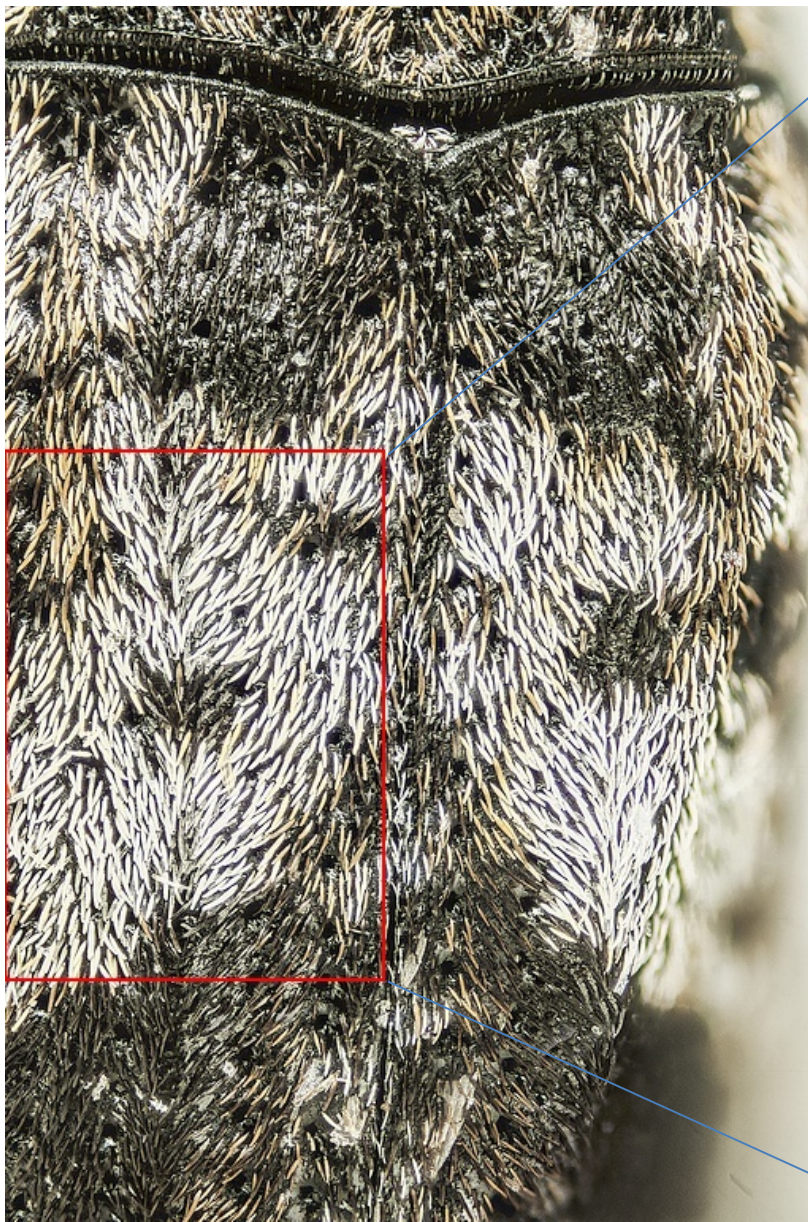


Fig. 15. Magnified portion of elytron showing thick 'scale-like' hairs. Red square is magnified image in Fig.16.

Fig. 16. 'Scale-like' hairs on elytron of a Marbled Fungus Weevil

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