

- XX. *A permanent record of British Moths in their natural attitudes of rest.* By A. H. HAMM, Assistant in the Hope Department of Zoology, Oxford University Museum. Communicated by PROFESSOR E. B. POULTON, D. Sc., F.R.S.

[Read November 21st, 1906.]

PLATE XXIX.

NATURALISTS have often described the remarkable harmony between many of our common insects and their environment. Indeed no one can have collected or observed insects without noticing this for himself, particularly in the species which usually rest upon tree-trunks, rocks and walls.

Although the art of photography has recently made such rapid strides and has been utilized so successfully to demonstrate and record many of the processes and facts of Nature, very little has been done, so far as I am aware, to illustrate by its means the attitudes and resting habits of our common insects. Now, however, by the development and perfection of "half-tone" illustration, figures can be multiplied to an indefinite extent easily, inexpensively, and so far as the printing is concerned in a permanent form. The paper it is to be feared is "another story," and one which requires, but has not as yet received serious consideration on behalf of posterity. The natural histories of British insects of the immediate future will I believe be largely illustrated in this way, and the present paper is an attempt to demonstrate the feasibility and success of the method.

Any one unacquainted with living insects in their natural surroundings entirely fails to appreciate and value the various colours and patterns seen on glancing through a collection of insects, more especially Lepidoptera. Even less is he able to understand their meaning in the illustrations of the numerous works on the subject. It is not too much to claim that the figures on Plate XXIX are

not open to this criticism, and that the moths represented tell their own story at once to experienced naturalist or beginner alike. And this is just because the figures are an accurate register of the insects in positions assumed by them on surfaces chosen by them.

Fig. 1 on Plate XXIX shows the male of *Hybernia leucophæaria*, Schiff., one of the commonest and earliest moths to appear in our oak woods. The example here shown is fairly typical of this extremely variable insect. The figure shows the moth in its characteristic attitude with the body approximately horizontal. The object of this position is also well seen, viz. in order to bring the dark markings or bars of the fore-wings into parallelism with the dark lines of shadow in the main fissures of the oak bark. Thus the attitude has an obvious procryptic meaning. In this and in all the other figures illustrating this paper the natural orientation of the moths was carefully preserved on the negatives and is now recorded on the Plate.

Another very common species, *Tephrosia biundularia*, Bork., occurs in nearly every wood throughout the country. In the south where the pale typical form occurs unmixed with others the insect is far more conspicuous than *leucophæaria*. This is especially the case when it is found on one of its usual resting places, the dark bark of the larch. On oak, however, it is far less prominent. Fig. 2 represents the female at rest upon this tree in its usual attitude, which is to be interpreted in the same manner as in the species last described. The asymmetrical position of the wings is doubtless due to the costal margin of the right fore-wing being fitted closely against the side of the vertical fissure in the bark. Had the attitude been symmetrical both sides of the fissure would have been entirely covered by part of one wing and a more conspicuous effect produced.

Eupithecia abbreviata, St., as every one knows who has had experience of "trunk-searching" for "Pugs," is very difficult to find when at rest upon oak; so much so indeed that collectors generally prefer to hunt the smooth stems of the underwood, where it is far more easily detected. In Fig. 3 is seen a specimen of this common "Pug" fitting into a depression in the bark of an oak, and the beautiful manner in which it harmonizes with its environment is very evident. The main lines of the moth's

markings are seen to be rendered vertical by the attitude, as in the moths represented in Figs. 1 and 2.

Among the moths which are usually found at rest upon rocks or stone walls the species of the genus *Bryophila* are probably the best known. The well-known *B. perla*, Fabr., is so common everywhere throughout the country that very little need be said of it. The range of variation in this moth is not very great, although in a few districts it tends to resemble some local peculiarity in the prevailing tints of the walls upon which it both feeds as a larva and rests as an imago. A typical example is shown in Fig. 4, upon an old, lichen-covered, stone wall. The peculiar grey lichen-like markings of its fore-wings are seen to blend almost perfectly with the surface upon which the moth is resting. *B. muralis*, Först. = *glandifera*, Hübn., is a species chiefly confined to our southern coasts and presents an interesting contrast to *B. perla* in its great variability, ranging, as it does, from a grey through a number of intermediate shades to a very dark green. This wide range of variation may be seen in a single district, as I have found in the locality in which I have chiefly observed it, viz. South Devon, where however the darker forms predominate. By this great variability the species is much aided in the struggle for existence in localities where stone walls and rocks are as varied in hue as they are in South Devon. Fig. 5 shows one of the darker forms which are extremely well concealed on many of the walls. In this particular instance the moth was rather more conspicuous than usual. Fig. 6 is an example of the yellowish-green form, which is less common than the other. It is however equally well protected when at rest on walls or rocks covered with yellowish-green lichens. It is to be observed that the moths of this genus adopt no special orientation in their attitudes of rest, a fact which is in correspondence with the irregular growth of lichen-masses on stone.

EXPLANATION OF PLATE XXIX.

Photographed direct from nature, natural size.

The orientation of the living insects is accurately recorded on the plate in every case.

- FIG. 1. *Hybernina leucophæaria*, Schiff., ♂, at rest on an oak trunk with head to the right, about $3\frac{1}{2}$ feet from the ground, Bagley Wood, near Oxford, March 9, 1902.
2. *Tephrosia biundularia*, Bork., ♀, at rest on an oak trunk with head to the right, about 3 feet from the ground, Henwood, near Oxford, May 10, 1902.
3. *Eupithecia abbreviata*, St., at rest on an oak trunk in a crevice of the bark, about $1\frac{1}{2}$ feet from the ground, Henwood, near Oxford, April 27, 1902.
4. *Bryophila perla*, Fabr., at rest on an old lichen-covered stone wall, $3\frac{1}{2}$ feet from the ground, Cheyney Lane, near Oxford, August 23, 1902.
5. *B. muralis*, Först. = *glandifera*, Hübn., at rest on a stone wall 2 feet from the ground, Newton Abbot, South Devon, August 15, 1902.
6. *B. muralis*, at rest on an old lichen-covered stone wall, 3 feet from the ground, near the Coast Guard Station, Dawlish, South Devon, August 13, 1902.



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