XIV. *On the Wings of the* Hemiptera. *By* R. J. Ashton, *Esq. F. L. S., &c.*

[Read 6th November, 1837.]

At a meeting of this Society, some months ago, I exhibited an insect (*Centrotus cornutus*) as affording an instance of the connection of the anterior and posterior wings during flight, in an order (*Hemiptera*) in which I believed it was not known to exist. I was not, at that time, aware of the fact which I have since ascertained, viz. that the possession of a connecting apparatus in the wings is not peculiar to the insect adduced, but is common (I believe without exception) to the whole order of *Hemiptera*, or to the allied orders of *Hemiptera* and *Homoptera*, of some entomologists. This has struck me as involving a somewhat curious circumstance, inasmuch as one of the orders of insects is founded principally on this character, and derives its name (*Hymenoptera*) (see Note 1) therefrom; it is not a little strange, therefore, that its occurrence *throughout* another order should not have been long ago noticed, as it renders the name *Hymenoptera* inappropriate as the designation of the order so named.

The existence of a peculiar uniting apparatus in some of the nocturnal *Lepidoptera* is indeed an old observation, but there it is not an universal, nor indeed an usual character, being found in very few instances.

As I believe that the structure by which this union of the wings is effected in the *Hemiptera* has never been described, I may perhaps be excused for offering a description of it.

I have discovered *two* distinct organizations whereby the wings are united in the majority of instances, and I conceive that whatever variations may exist in the structure in particular insects from the types I am about to describe, are merely modifications of one or the other of these forms.

In *Notonecta Glauca* there is found, at the hinder margin of the under side of the anterior wing, two small corneous projections, curved and inclined at the top towards each other, leaving merely a small slit or opening between them above, and forming together a short cylindrical *groove* or socket parallel to the hinder edge of the wing. (See Plate VII. fig. 5 a, b.) At the point which answers to this in the posterior wing (fig. 6 z), the membrane at the anterior margin is turned up and slightly backwards, and the edge is thickened so as to form a prominent and moderately

thick *rib*. This rib, when the insect unites its wings, passes through the narrow slit above mentioned, and thus catches and is retained in the *groove* during the insect's flight. Of the efficacy of this simple contrivance for the purpose in question, any one may satisfy himself by the difficulty experienced in disengaging the wings of one of these insects when united. I must not omit in this place to mention the instance exhibited here of the perfection *usque ad imum* with which all the creations of Omnipotence are endowed; for although the apparatus I have thus endeavoured to describe is so minute as to require an exceedingly high microscopic power to examine it, yet is the interior of the groove discovered to be lined with a pubescence apparently similar to that beneath the tarsi of many insects, doubtless principally for the purpose of protecting the membrane of the wing from abrasion or injury by friction whilst inclosed in it.

The other form of the structure to which I have above alluded is the following. In the insects so constituted, a small portion of the anterior edge of the hinder wing is turned upwards, and from it a simple corneous process projects backwards, the general form of which is represented at fig. 8, as it occurs in the above mentioned insect, *Centrotus cornutus*. This process does not occur upon the principal nervure of the wing which runs along the anterior margin, but rather on the (generally narrow) portion of membrane found anterior to that nervure, and quite at the edge of the wing. This tooth or process of the posterior wing catches into a corresponding *recess* formed in the hinder margin of the under side of the anterior wing, the edge of which, at that point, is bent down and reflected forwards, forming a small channel for the reception of the above process. (Fig. 7.) I have ascertained that the under side of the process above described is finely *dentated*, and have little doubt that there is a corresponding *indentation* in the *recess*, which considerably strengthens the union of the parts when joined.

The point at which the wings unite is, in all cases that I have examined, situated at the apical extremity of the hinder nervure of the anterior wing, and where that wing possesses a membranous piece at its extremity, as in *Notonecta*, is just at the point of division between the corneous and membranous points; consequently the point of union varies according to circumstances connected with the form, &c. of the wing, in some being proportionably nearer to, and in others further from the base of the wing.

From the examination I have made amongst insects of this

order, I incline to the opinion that the structure *first* described is the peculiar characteristic of the *Heteropterous* division of the *Hemiptera*, and that that *last* described is peculiar to the *Homopterous* division of that order. I think I am justified in estimating the former structure as the more perfect, and consequently more difficult to disengage of the two. I am perhaps incorrect in the view I now advance of the occasion for a different structure in the two divisions of this order, but the difference which presents itself in the nature of the wings in those two divisions naturally suggests it. May not the more homogeneous texture of the upper and under wings, and the comparatively firmer and more compact structure of the lower one in the *Homoptera*, require a less intimate fastening of the two together than in the *Heteroptera?* in which the wings, from the lower one being comparatively thinner and more membranous in its texture, and its structure being adapted for folding up when at rest, (which necessarily detracts from its compactness and firmness when extended,) are probably more exposed to accidental disturbances during flight, and more difficult to re-engage when separated, thus requiring a comparatively more perfect and inseparable connexion.

By the detection of the above described apparatus, the true *alary* nature of the hemelytra in this order is established, which hitherto appears to have been more or less a subject of doubt amongst entomologists.

The difference between the simple structures I have above described, and the more complex series of hooklets which connect the wings of the *Hymenoptera*, is interesting.

I apprehend that were the wings of the latter not actually united along the greater part of their length, they would not, from their membranous texture, present one firm and *air-tight* surface to act on the air, which I conjecture to be essential in both these orders. This, in the *Hemiptera*, is effected by the more firm texture of the upper wing, and the *peculiar relative forms of* the two wings when united.

I cannot conclude without drawing attention to the circumstance, that the *Hemiptera*, in possessing this apparatus, appear to occupy the place of transition (as respects the wings) from the *Coleoptera*, in which the upper wings are simply organs of protection, to the *Hymenoptera*, in which they are purely organs of flight; those of the *Hemiptera* partaking in about equal degree of both these characters, the texture of the upper wing also being actually divided, so that about a moiety nearly approaches to each of the two orders in question, and the connecting apparatus

appearing also (as I submit) of a rudimentary or intermediate nature. (Note 2.)

Note 1.—I am aware that "ὑμὴν" also signifies "membrana," but assume that the word was elegantly used, originally, to denote the *peculiar* feature of the wings of the *Hymenoptera*, which the *yoked-connection* or *union* (quasi *matrimony*) between them presented, because used in the former sense of "membrane," it is quite as applicable to the *Homoptera*, *Diptera*, *Lepidoptera*, &c. which would deprive the name of its significance. In either case, however, it is now equally inappropriate.

Note 2.—Linnæus appears to have propounded an observation nearly approaching the above, when he says, "Hemelytra media quasi alas inter et elytra" (Syst. Nat. ed. 12, i. 534), though he was unacquainted with the existence of the uniting apparatus between the wings, which is the ground of the above proposition.

XV. *Observations on the Destruction of the Apple Crop by Insects.* *By* W. Spence, *Esq.*, *F. R. S.*, *&c.*

[Read August, 1838.]

After spending five weeks very pleasantly at Cheltenham, we bent our course, about three weeks ago, to this charmingly romantic watering place (Malvern), where, being close to the great cider districts of Herefordshire and Worcestershire, my attention has been so strongly attracted by the deplorable failure of the apple crop, and the apparent probability of its being caused by insects, that I cannot help addressing you to suggest whether it might not be desirable that the Entomological Society should institute an investigation into the cause of the mischief, which (as by all accounts it extends to Devonshire and throughout the kingdom, the cider growers declaring that where they usually made fifty casks they will not this year make five) will evidently cause a very serious loss, of which, in every point of view, it would be creditable to us at least to attempt to ascertain the cause; and this, it strikes me, might be best effected by calling upon such of the members as reside in the apple districts to communicate their observations, and to make inquiries as to the facts of the case.

I have of course made inquiries of the farmers near here, who gave me just the answer I expected—"Oh, a blight, caused by