

THE BROKEN HEMELYTRA IN CERTAIN HALOBATINAE.

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In his description of *Telmatometra** Dr. Bergroth notes that the membrane of the hemelytra being broken off near its basal margin, a description of its veins was not possible. At first I attached no significance to this and assumed that the membrane, being delicate, had been lost in some way. However, a short time after the appearance of the paper cited, a possible explanation presented itself. To me, it clears up the question completely and exhibits a very remarkable habit in certain Halobatines.

While out rowing on St. Mary's Lake, in the vicinity of White Plains, N. Y., on July 4, I noted close to the shore in a little cove made by some rocks, quite a colony of *Trepobates pictus* H. S., adults and nymphs. A scoop of the net yielded a goodly catch, among them one winged individual. In another similar cove, two more were secured from among a large number of the apterous form. These, being of opposite sexes, were preserved alive and set apart for breeding. On the 6th I was obliged to kill them, owing to the remarkable antics of the male. At first, he was noticed fussing with his wings, passing his hind legs under them repeatedly. Very soon he had one hemelytron so bent that the end (the membrane) stood straight up from the body. He continued these passes, so I imagined, to straighten the wing, but finally he succeeded in breaking off first the membrane of one hemelytron and then of the other, leaving the hemelytra in the condition Dr. Bergroth notes in *Telmatometra*. When the females began similar tactics, both were put in the cyanide bottle, because the winged form of *Trepobates* is so rare in these northern latitudes, that until I caught these three, I had taken only one other macropterous individual in eight years' collecting.

At the same time I also secured one ♀ *Rheumatobates rileyi*, fully winged, the only one I have ever seen. This commenced a like de-alating operation, and she, too, was promptly despatched.

A week later I captured no less than seven *Trepobates* with wings similarly broken off, (but only partly so in one individual), three of them being males and the remaining four females. Four *Rheumatobates* were secured at the same time and place, three females and one male, with hemelytra and wings broken off as in *Trepobates*. At a later date one more truncate winged *Trepobates* was found. All these occurred on a pond about a mile and a half from St. Mary's Lake, in which there had been neither *Trepobates* nor *Rheumatobates* earlier in the summer.

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All this led me to make an examination of the various Halobatine forms in my collection to find if any other had a similar peculiarity, which gave the following result:

Of 37 winged *Trepobatopsis denticornis*, Champ., collected by Prof. James S. Hine in Guatemala, 11 being males and 26 females, all have truncate tegmina with ragged edges, showing that the membrane has been broken off.

The thirteen *Trepobates pictus* collected by me locally in the last two summers gave nine individuals with artificially shortened wings, five males and four females, including the one that broke off its wings in the aquarium and one or two others with the wings only partly broken off. The very few winged *Rheumatobates rileyi* I possess, eight specimens in all, gave seven with shortened wings, the males being four and the females three. In *Telmatometra whitei* Bergr., all six types (1 male and 5 females) as Dr. Bergroth points out, have the membrane broken off, not near, however, but at the basal margin. In all the examples before me, the break is at the caudad margin of the corium, leaving intact the corial venation.

In *Rheumatobates*, the suture separating the membrane and corium appears as a whitish impressed line, or rather, groove, which is practically straight and crosses the tegmina from edge to edge, just caudad of the termination of the corial venation. The figure (1) is from a winged female *Rh. tenuipes* Mein. from Glen Echo, Md., which I owe to the kindness of Mr. O. Heidemann. It is, of course, largely diagrammatic, although drawn under the microscope by the aid of a camera lucida. It serves to show the general trend *a-b*, of the suture along which the break takes place. This indented line is present in the two species known to me in the macropterous form.

In *Trepobates pictus* there is a similar suture (Fig. 2, a-b), but it differs from that in *Rheumatobates* in that it does not go all the way across the hemelytron, but stops some distance from the submarginal vein, in a sort of node (not shown in figure). It also has a raised appearance, something in the nature of a true vein.

The hemelytra break off along this suture in both *Trepobates* and *Rheumatobates*. This is in all likelihood the case with the monotypic genera *Trepobatopsis* (Fig. 4) Champion and *Telmatometra* (Fig. 3) Bergroth, but the lack of entire-winged specimens does not permit confirmation by actual observation.

Naturally, there must be some reason for this self-mutilation, because, unless it be a survival of some acquired habit once necessary in its economy, no insect is given to purposeless acts. Two seemingly reasonable explanations suggest themselves, one of which is closely associated with the breeding habits of the Hemipteron. In the macropterous form of *Rheumatobates rileyi*,

Bergr., *Rh. tenuipes* Mein. and *Trepobates pictus* H. S. the hemelytra extend much beyond the end of the abdomen, being about twice as long as the latter. In all three the male is smaller than the female and has a somewhat shorter abdomen. In consequence the male has to sit quite far back on the female in copulation, in order to approach her genitalia. Now, long wings in the female would be decidedly in the way of the male, as can be readily appreciated, provided they did not actually prevent the generative act altogether. In consequence, the female finds it imperative to shorten her wings in order to give access to the male, which she does by breaking them off at the line of weakness, thereby leaving the greater part of the abdomen exposed. But while this would seem to be an explanation of the act in the female, it scarcely covers the case of the male, since his genitalia are in no way covered or directly prevented from coming into contact with those of the female by his long hemelytra. In the length of the tegmina, however, lies the clew. Both *Trepobates* and *Rheumatobates* rest very close to the surface of the water, so much so that the body of the latter seen from above seems to touch the surface, although when seen from the side it can at once be noted that such is not the case. Now, as pointed out above, the males in both these genera have to sit far back on the females, and in that position the tip end of the hemelytra would produce an indentation in the surface film or be slightly submerged. The smallness of the bug would tend to make it appear that the former would be the case. This resistance, of course, would operate in two ways. It would be a great assistance to the unwilling and struggling female in getting rid of the amorous yet unwelcome male; and it would be decidedly in his way by preventing the approach of his genitalia to hers. Hence the male, for similar reasons to the female finds it necessary to rid himself of members which, while they may at some period subserve a useful purpose, are decided obstacles to the real end of insect life.

The second solution offered in explanation of this self-mutilation is grounded on the following observations.

The first truncate winged *Rheumatobates* I captured was in a deep currentless pool in a stream, by no means a normal breeding place. All the others, as well as the *Trepobates* were found, as previously noted, in a small pond which at a time when St. Mary's Lake had its full quota of both forms in several instars, had not a single individual of either on its placid surface. But later, when the Lake was populous with adults, some fully winged, the pond had on it all these truncate winged individuals as well as a few nymphs and some wingless adults. It may well be, therefore, that the object of the wings is to facilitate migration, either to provide against in-breeding, or to allow their

fortunate possessor to find new worlds to people. In either case, once they have been employed to flee from birthplace to other haunts their mission is accomplished and instead of being a help they become a hindrance to the perpetuation of the species and are better dispensed with, which is done in the manner related. It is quite possible that the apocopated hemelytra in *Trepobatopsis* and *Telmatometra* have a like cause.

It may not be out of place to point out that as the figures show, the corial venation in two of the genera, viz., *Trepobates* and *Rheumatobates* is preserved intact, whence we may deduce that such is the condition also in *Trepobatopsis* and *Telmatometra*. Further, the veins of the membrane in the first two are simple longitudinal ones, and I venture to hazard the opinion that this is their character in the second two. The affinities that this corial venation shows are matters that I am only too happy to leave to others, who are learned in phylogeny.

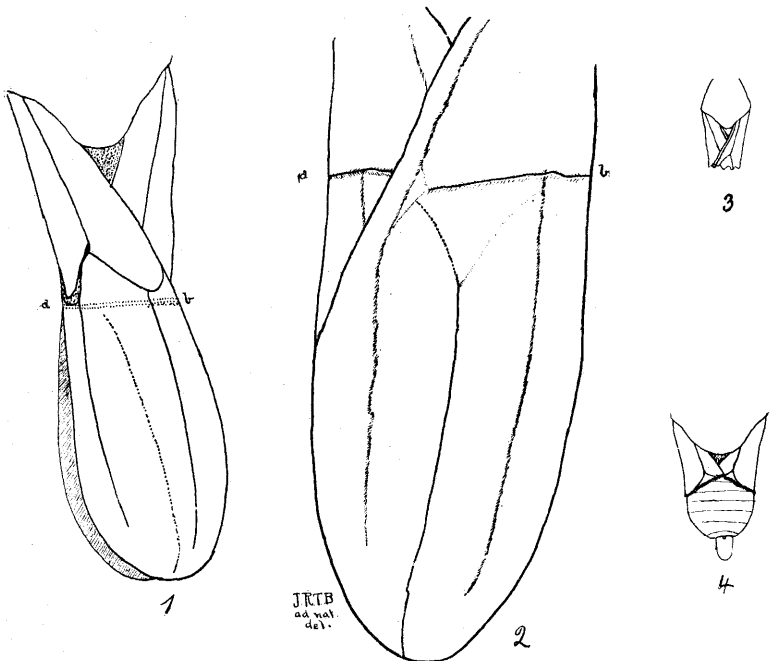


Fig. 1. Hemelytra of *Rheumatobates tenuipes* Meinert, ♀, showing the indented suture, a-b, between the Corium and Membrane, along which the membrane is broken off. $\times 35$.

Fig. 2. The same in *Trepobates pictus*, Herrich-Schaeffer. $\times 35$.

Fig. 3. Sketch of Truncate Hemelytra of *Telmatometra whitei*, Bergroth. From one of the types. Shows corial venation. $\times 3\frac{1}{2}$.

Fig. 4. Sketch of Truncate Hemelytra of *Trepobatopsis denticornis*, Champion ♂. Shows corial venation. $\times 5$.