



## XVIII. Note on the “Singerjie” (*Platypleura capensis*)

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XVIII. *Note on the "Singerjie" (Platypleura capensis).*—By C. Lloyd Morgan.

[Read 27th August, 1879.]

In the following note, I propose to lay before the South African Philosophical Society a few remarks on the singing apparatus, the mouth organs, and the ovipositor of the "Singerjie," and at the outset I must state that the facts herein mentioned do nothing more than confirm the views of Reaumur, published more than a hundred years ago.

First, with regard to the singing apparatus. Few, I suppose, can have failed to notice in the hotter months of the year the sharp metallic sound produced by the insect under consideration. And few, I suppose, can have failed to stop for a moment to see what sort of insect possessed these tuneful powers. It is soon found that the male cicada alone possesses the power of singing, the female—recognised at once by the ovipositor folded beneath the abdominal somites—being dumb. If, now, the ventral surface of a male singerjie be examined, two large plates are at once observed, one on either side, but meeting in the centre, which plates extend backwards from the hinder thoracic portion over the anterior abdominal somite. On turning the insect over, and looking at the dorsal surface, two very much smaller plates are seen extending forward from either side of the first abdominal somite. Beneath each of these plates (which may easily be removed by the aid of fine-pointed scissors) is seen the somewhat wrinkled surface of a thickish membrane, which may be called the drum. Turning the insect over again, so as to examine more carefully the ventral aspect, and removing one of the large plates, two diaphragms are disclosed, separated by a transverse chitinous support. Of these, the anterior is white, narrow, and opaque, the posterior translucent, round,

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and tightly stretched. The second ventral covering plate should now be removed disclosing a second anterior and posterior diaphragms; and the abdominal portion of the insect should be separated from the rest of the body. When this is done there are seen taking their origin from a ventral medial rib two muscular pillars, each of which, proceeding upwards and outwards terminates in a chitinous plate, the upper side of which is in turn connected by a fine ligament with that membrane which has above been called the drum. Under a moderate microscopic power, this drum is seen to be strengthened with brownish ribs, which, together with its own elasticity, cause the drum to spring back after it has been drawn forward by the action of the muscular pillars. This can be experimentally proved by the aid of a pair of fine forceps; and each time the drum is drawn forward and springs back a click is heard. That the well-known metallic sound is produced by a rapid succession of such clicks is put beyond question by the fact, that by irritating with a knife-point the muscular pillars in a freshly-killed insect, the singing noise may be set a-going, which metallic sound will be continued for several seconds *at least* without again touching the muscle. A weak current of electricity also caused the singing to commence. The stretched diaphragms, one of which, running longitudinally along the medial line of the abdomen between the two muscular pillars I have not hitherto mentioned, are probably for intensifying the sound; and I have noticed that rythmical motions of the abdomen of a live insect produce rythmical alterations in the intensity *if not the pitch* of the sound. The covering plates are doubtless mainly for protection; but the fact that on their removal the sound is less full and intense shows that they also play the part of sounding boards.

Secondly, with regard to the mouth organs. The short broad head is prolonged into a somewhat lengthy proboscis, down the anterior portion of which runs a slight groove or depression. Slight constrictions roughly divide this trunk into three portions, the distal portion, bearing small hairs, easily seen under a low power. If this sheath be drawn downwards it is found to enclose three fine styles, covered at the proximal end by a

little plate. Under a high power, the central style is seen to terminate in a simple unnotched blade; but the two lateral styles are toothed on their exterior edges, the teeth facing downwards as in an ordinary hand-saw.

With regard to the homologies of these parts, it would clearly be unsafe to offer any definite opinion without careful study of the embryological development. It will be sufficient here to state that the generally recognised opinion—as I gather from my notes of Prof. Huxley's lectures, and from his "*Invertebrata*"—sets down the styles as mandibles and maxillæ (of which the former probably have coalesced to form one style), the little plate above being the labrum, while the fleshy trunk is the much-developed labium. On this labium, there seem to me to be clear traces of labial palpi. Under a high power, the central style bears—in some specimens at least—some traces of its compound nature. But in no way could I cause it to split up into two parts, so that the statement that there are four such styles is, I feel sure, incorrect.

On examining the ventral aspect of a female *singerjie*, one of the posterior somites is seen to be peculiarly developed. It is lengthened out, and bears a longitudinal groove. A little examination discloses the long lance-like and barbed ovipositor lying in this groove, doubled down under the body, with its point forward; and somewhat more careful dissection displays two processes extending backwards, and forming a kind of sheath, in which the ovipositor rests. At first sight, the ovipositor is a simple black lance, the terminal portion widening out like a flat spear-head, and bearing teeth. It is sometimes found, however (as in the specimen mounted and figured), that the "spear head" is asymmetrical, one side having apparently moved down while the other side had been pulled up. And when this is so, a central *symmetrical* untoothed lance head is seen between these asymmetrical toothed portions. The true structure of the ovipositor is thus disclosed. A black spear-shaped style, bearing a well defined ventral groove, lies in a sheath composed of two lateral portions, which lateral portions admit of a longitudinal motion, probably of a sawing nature.

Concerning the development of the ovipositor, opinion seems to be divided. According to Lacuze Duthiers, the median style, the lateral portions (in this case toothed) and the valvular sheath in which the ovipositor rests are all developments of the ninth abdominal somite. According to some recent investigations on the sting (which is but a modified ovipositor) of the hive-bee and the wasp, and the ovipositor of an Ichneumon-fly, however, so far as I understood it from Professor Huxley's description, the lateral toothed portions are the "result of the metamorphosis of papillæ seated on the sternal surface of the eighth somite, and these papillæ are so similar to those from which the limbs are developed that it becomes (to say the least) probable that they represent true appendages of the somites to which they are attached."

There is one more point in the anatomy of this insect to which I wished to have directed especial attention. Anterior to the large covering plate which protects the organs of the singing apparatus, is a much smaller covering plate, similar in form. It is my belief that this protects the auditory apparatus, but I find it impossible to work out the subject on specimens preserved in spirit, and therefore have no carefully observed facts by which in any way to substantiate my belief. This is a point I hope to look into at some future time.