A Stridulating Organ in Harvest-spiders. By R. F. Lawrence, Ph.D., Director, Natal Museum, Pietermaritzburg, South Africa.

In 1931 (1) the writer described and figured a row of minute teeth on the inner surface of the second cheliceral segment in the genera Biacumontia and Lawrenceella of the family Triënonychidae. These teeth were found
to occur in both sexes of all the species of these genera, and they have since been found in two others, Cryptobunus and Lispomontia (2), where they also occur in both sexes of all the species. They do not seem to be present in any other family or suborder of South African harvest-spiders.

On more detailed examination it seems that what had been termed minute teeth could be more correctly described as very short ridges. As can be seen in fig. 1B,
these chitinous ridges constitute a parallel series lying side by side to form a row of considerable length. In all these genera this row, which is more or less straight in Biacumontia and Lawrencella, but slightly curved in Cryptobunus and Lispomontia (fig. 1), does not lie parallel to the long axis of the segment but in an oblique direction, its proximal apex a little nearer to the anterior surface of the segment than is the distal apex. The row occupies about three-quarters the length of the segment in Lispomontia and Cryptobunus, considerably less (about half the segment) in Biacumontia, and less than half in Lawrencella. The number of ridges also varies considerably in these genera, being about 14 in Lawrencella, 15–17 in Biacumontia, 28–30 in Lispomontia, and 40–50 in Cryptobunus. In Lispomontia the ridges are larger and coarser than in Cryptobunus, but the organ is best developed in the latter genus, the individual ridges being fairly long and very clearly seen. Fig. 1 B shows the ridges of Cryptobunus silvicolus seen from above, while fig. 1 A represents the row seen in profile, the teeth of the saw-like edge being the individual ridges seen end on. Fig. 1 A shows a few of them under higher magnification.

In view of these ridges occurring in the same position, and possessing much the same structure as the stridulatory ridges on the inner surface of the chelicerae of Solifugæ, it is reasonable to suppose that their function is also a stridulatory one.

Stridulatory organs occurring in Arachnida on the corresponding segment of the chelicerae are found in a large number of Solifugæ, and in some genera of scorpions and spiders. In these groups the organ is composed either of a series of parallel ridges or of highly modified hairs and bristles.

In Solifugæ the stridulatory mechanism is poorly developed or absent in North African, Mediterranean, and Asiatic families, the Karschiidae, Rhagodidae, and Galeodidæ. Lipophaga, a South African representative of the family Karschiidae, is an exception, having an unusually large number of distinct though short ridges. The organ is much more strongly developed in the Solpugidæ, Dæsiidæ, and Hexisopodidæ, the majority of the species of which families are found in South Africa.
The South African genus *Chelypus*, of the aberrant family Hexisopodidae, has anastomosing furrows on the inner surface of the chelicera instead of the usual ridges. Hewitt (4) has noted that while in the nocturnal species of South African Solifugae the ridges are strongly and equally developed in both sexes, in the diurnal group, of which *Solpuga hostilis* is a good example, they are reduced or even quite absent in the males.

With regard to scorpions, Pocock (6) has shown that stridulatory organs of this type occur in certain genera of the family Scorpionidae, such as the South African genus *Opisthophthalmus*, where they occur on the basal segment of the chelicerae as in Spiders and Solifuges. They are found in both sexes. In *Opisthophthalmus* they consist of two separate organs, differing both in position and structure, the one consisting of a patch of stiff, chitinous, rectangularly bent bristles on the dorsum of the segment, the other of a number of peculiarly modified hairs or bristles, which are paddle- or racquet-shaped (the “membranous notes” of Pocock) and are situated in a row on the inner surface of the basal segment. The number of these notes or modified hairs varies in different species, from 3 to 8 according to Pocock, from 1–7 according to Hewitt (5), but the number as observed by these authors also varies within the limits of the same species. Pocock has remarked upon the resemblance of this latter organ to that found in *Solpuga*, both in the similarity of its position and in the fact that the structure of the instrument on the right-hand chelicera is similar to that on the left (6).

The backward and forward movement of the chelicerae, which is an accompaniment of stridulation in *Opisthophthalmus*, would bring both these organs into play simultaneously; a large portion of the patch of bent chitinous spines which forms the first-named organ is found on the inner as well as the dorsal surface of the chelicera in most species of *Opisthophthalmus*; judging from their position in preserved specimens, the stridulatory spines occupying the opposed inner surfaces of the chelicerae would rub against each other just as frequently as those on the dorsal surfaces would impinge on the ventral surface of the carapace. The flattened leaf-like hairs of the second organ also meet or cross each other
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In the middle line between the chelicerae; movements of the chelicerae in a backward and forward direction would bring about a rapid bending of these hairs against each other, followed by an alternate recovery due to their elasticity, resulting in a state of continuous vibration.

In Araneæ stridulatory organs are associated with the chelicerae in the families Argyopidae (Lepthyphantes), Sicariidae (Sicarius, Loxosceles, and Scytodes), and in a number of large-sized species of Aviculariidae from India and Malaysia (Pecilotheria, Musagetes, Selencosmia, etc.).

In all these spiders the surfaces of friction are situated on the outer side of the chelicerae and the inner side of the basal portion of the pedipalp. In the genera of Argyopidae (Simon (9)) and Sicariidae (Cambridge (8), Simon (10), and Petrunkevitch (12)) the chelicerae are simply provided with a series of fine parallel ridges resembling those of the Opilionid genera under consideration; the opposing surface of friction consists of a row of simple peg-like teeth on the inner surface of the pedipalp femur.

The structure of the sound-producing organs in Aviculariid spiders is considerably more complex, consisting of strong chitinous rods of variable shape and size, spines, and highly modified hairs (Pocock (7)).

Summing up, cheliceral sound-producing organs, in which the two opposing surfaces of friction bear structures of identical form, are found in two other orders of Arachnida besides the Opiliones—the Scorpions and Solifugæ.

These stridulatory organs of South African Laniatores most closely resemble those of the Solifugæ, seeing that in both these orders they take the form of simple ridges and occur definitely on the inner surfaces of the chelicerae; these ridges, like those of the Solifugæ (fig. 2), lie in a horizontal plane and are more or less parallel to the long axis of the body, so that up-and-down movements of the chelicerae would bring the opposing ridges across each other in a rasp-like manner. In Solifugæ, however, the ridges, though individually longer, are far fewer in number than those of harvest-spiders (as a rule they do not exceed 12).

Generally speaking, in all four groups of Arachnida in which stridulatory ridges are associated with the chelicerae they occur in both sexes, though for some spiders (Lepthyphantes) they are better developed in males,
and for some Solifuges in the females. Stridulatory organs when found in other parts of the body may be confined to males alone, as in certain Araneid genera of the family Theridiidae (Asagena, Steatoda, etc. (11), and Argyrodes (3 and 13)).

The fact, therefore, that in these genera of harvest-spiders the ridges occur in both sexes seems to offer further support for regarding them as organs of stridulation.

REFERENCES.


(9) SIMON, E. Histoire Nat. des Araignées, vol. i. p. 689, fig. 775 e (1892).

(10) —. Op. cit. i. p. 269, figs. 228, 229 (1892).

