ACTA ENTOMOLOGICA MUSEI NATIONALIS PRAGAE

1961, XXXIV, 592

THE STRIDULATORY MECHANISM IN CENTROCORIS SPINIGER (F.) AND SOME OTHER COREIDAE (HETEROPTERA)

PAVEL ŠTYS

(Chair of Systematic Zoology, Charles University, Praha)

Introduction

Leston (1957) has summarized the knowledge of stridulatory mechanisms in terrestrial species of Heteroptera. The ability to stridulate was ascertained in 11 terrestrial families of bugs, and 14 types of stridulatory organs have already been registered. In a number of groups (Acanthosomidae, some subfamilies of Pentatomidae, Coreidae) the ability to stridulate was ascertained, but the stridulatory mechanisms have not yet been discovered.

It follows from the Leston's summary that the ability to stridulate was already registered in 3 genera of the family Coreidae: *Phyllomorpha* Lap., *Spathocera* Stein and *Centrocoris* Kolen. However, the stridulatory mechanism is still not known in any of these genera*).

Saunders (1893) had noticed that *Centrocoris spiniger* (Fabricius, 1781) "stridulates loudly", but he did not give more particulars. During my excursion to the western coast of the Caucasus in June 1960 I had an opportunity to collect the mentioned species, to observe its stridulation and to discover its stridulatory mechanism.

Field observations

Centrocoris spiniger (F.) is very common insect on the western coast of the Caucasus. In the period 21st to 28th June 1960 I found it many times (also in copula) in several places near the towns Tuapse and Sochi, always associated with its host-plant *Anthemis tinctoria* L. (det. V. Skalický). I failed to hear stridulation of the free specimens on the plants. But when individuals were picked up and held carefully between fingers, the stridulation was very distinctly heard, and the stridulatory movements could be observed as well.

*) Miller (1958) ascertained stridulatory mechanism also in the Ethiopean genus *Rhyticoris* Costa. The strigil is situated on the under side of the clavus, and the plectrum on the articular region of the hind wind.

The sound given out by this bug lasts even several seconds and is very loud; it consists in a squeaky, oscillating tone of unchanging level. When stridulating, *Centrocoris spiniger* (F.) moves the head and prothorax back and forth in an extraordinarily quick and quivering motion, while pterothorax, wings, legs and abdomen remain motionless.

In field observations it was unfortunately not noticed whether both males and females were stridulating. But almost all specimens stridulated, the numbers of males and females were approximately the same and in both sexes the same stridulatory mechanism was disclosed, it is therefore quite certain that stridulation in this species is not dependent on sex.

Stridulatory mechanism

It was observed that stridulation in *Centrocoris spiniger* (F.) was caused by friction of some part of the prothorax against the mesothorax. Also when attempting to imitate the stridulatory movements on dead supple specimens I have heard sounds resembling those from field observations. A more detailed examination proved that the only part of prothorax to be considered is the margin of the posterior foramen, which is brought into friction with rhytmical movements against the articular region of the wings. The stridulatory mechanism was discovered actually at these places.

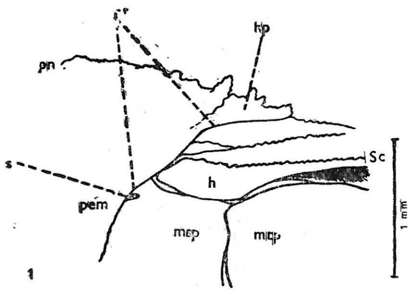
Plectrum (Figs. 1—3)

(The plectrum has been styled the moving part of the stridulatory mechanism, the strigil the still one). As plectrum functions the thickened margin of the secondary posterior prothoracal foramen, formed by posterior prolongation of pronotal and proepimeral lobes. Approximately under the lateral angles of pronotum, where the hind margin of proepimeron is bent, the edge of foramen is ridge-like thickened, and its inner surface, being in contact with the articular region of the fore wings, is striated. The space between striae is, in the middle, about 9 μ. Laterally the ridge becomes narrow, striae are situated only on its posteior margin and are even more sparse. Dorsally the ridge disappears on the ventral surface of the humeral process of pronotum. According to the topographical situation of the before mentioned ridge, its ventral part seems to be formed by the proepimeron and dorsal one by pronotum.

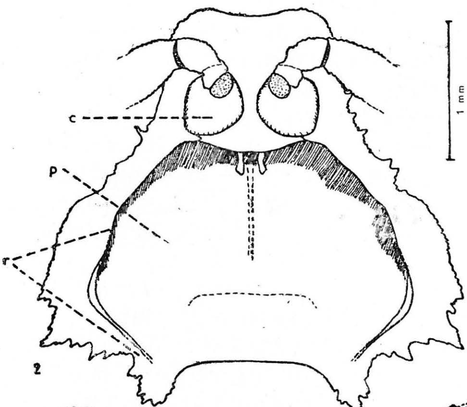
Strigil (Fig. 4)

From a dorsal view, on the articular region of the fore wings we can see 3 sclerites: the first basal (*a*), the second on the base of the R + M stem (*b*) and the third spaced between the sclerite *b* and base of clavus (*c*). (Because all literary data on the homology of articular wing sclerites in Heteroptera have shown to be incorrect or insufficiently supported, and our knowledge of morphology of these structures is comple-

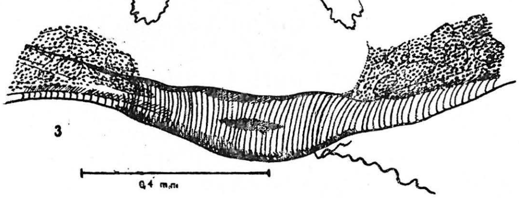
tely deficient, it is not possible — for the time being — to identify these plates.) On the sclerites *b* and *c* strong ridges have developed, also sclerite *a* is in some places slightly and irregularly grooved. It can be supposed that the previously mentioned sclerites function as strigil, and that the sound in caused by friction of the striated prothoracal ridge against these structures during the stridulatory movements of the prothorax. A small, clearly striate lima, which has developed as a smooth slanting plate at the base of the Sc and the hypocostal lamina, probably also takes part in the



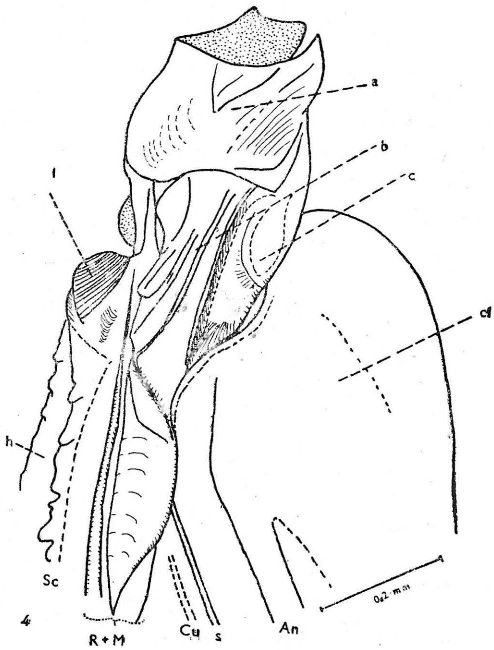
1



2



3



4

Fig. 1. Part of pro- and pterothorax, schematized, lateral view. h = hypocostal lamina, hp = humeral process of pronotum, msp = mesopleura, mtp = metapleura, pem = proepimeron, pn = pronotum, r = stridulatory ridge, s = spiraculum of mesothorax, Sc = subcostal vein.
Fig. 2. Ventral view on separated prothorax: c = fore coxae, p = ventral surface of pronotal lobe, r = stridulatory ridge.
Fig. 3. Right stridulatory ridge, inner view.
Fig. 4. Articular region of left fore wing, schematized: a, b, c = pteralia, cl = clavus, h = hypocostal lamina, l = lima, s = claval sulcus.

stridulation. This lima is immediately in contact with the prothoracic ridge; it is possible that actually only this part of the fore wing-base is involved in stridulation.

Stridulation in the genera Spathocera Stein and Phyllomorpha Lap.

Horváth (1894) — according to Leston (1957) — reported stridulation in *Spathocera laticornis* (Schilling, 1829) and ascribed it to the fast movements of antennae. Mulsant and Rey (1870) — according to Leston (1957) and Reuter (1909) — observed stridulation in *Phyllomorpha laciniata* (Villiers, 1789) and reported wing movements; other authors (gathered by Reuter, 1909) reported also fast movements of antennae. But in Leston's (1957) opinion antennal stridulation is excluded in this species.

Although I had no opportunity to observe the stridulation of the above mentioned genera, I tried to ascertain whether they possess stridulatory mechanisms analogous to that found in *Centrocoris spiniger* (F.). It seems that in both genera exist similar prothorax — articular fore wing region mechanisms.

The articular region of the fore wings in *Spathocera lobata* (Herrich-Schäffer, 1842), has developed in similar form to *Centrocoris spiniger* (F.); the lima is also present. However, the thickened margin of the posterior foramen of the prothorax in *Spathocera* is flatter, and the ridge is not distinguishable on the ventral surface of the humeral processes of pronotum, neither are there the transverse striae, but — on the contrary — longitudinal ones, following the direction of the margin of prothoracal foramen, i. e. that laterally they are approximately in the cephalo-caudal direction, whilst on the ventral surface of the humeral processes they are nearly transverse to the longitudinal axis of the body.

Although the articular fore wing region in *Phyllomorpha laciniata* (Vill.) lacks ridges and lima, the sclerite *c* is conspicuously keel-like protruding. At the margin of posterior foramen of the prothorax I was not able to ascertain the stridulatory structures, but in the prolongation of this margin, on the ventral surface of the conspicuously large humeral processes, the transverse foliaceous ridge is developed. It is possible that friction of this ridge against the base of the fore wings makes the ridge vibrate and this causes the sounds emitted by *Phyllomorpha*. This is suggested also by the fact, that no other stridulatory mechanisms have been discovered, and that the position of this structure in *Phyllomorpha* resembles the position of stridulatory mechanisms in *Centrocoris* and *Spathocera*.

Discussion

The described stridulatory mechanism in the family Coreidae is unique among Heteroptera. The same mechanisms can be found both in males and females; apparently only the adults stridulate, for during stridulation imaginal structures are involved. Leston (1957) has called this type of

stridulation "intra-specific" and takes it as characteristic for Pentatomomorpha. My observations on Coreidae support his conclusions.

It is probable that the faculty of stridulation in Coreidae is not confined only to the 3 genera considered, because I have ascertained similar structures in several other genera. Some genera, however, certainly lack the stridulatory mechanism prothorax — base of fore wings.

It is interesting that stridulation has previously been reported only in the genera possessing well developed humeral processes of the pronotum. Maybe the development of these processes is in certain relation to stridulation, facilitating perhaps the resonance.

Conclusions

1. Stridulation in *Centrocoris spiniger* (F.) has been observed and the stridulatory mechanism described.
2. The ridge of the margin of the posterior secondary foramen of the prothorax functions as plectrum, the articular region of fore wing as strigil.
3. Similar stridulatory mechanisms obviously exist also in the genera *Phyllomorpha* Lap. and *Spathocera* Stein.
4. Stridulation in the family Coreidae is of the Leston's "intraspecific type" and is not sex-limited.
5. It is possible that the stridulation in Coreidae is in some relation to the evolution of pronotal humeral processes.

REFERENCES

Horváth, G., 1894: Sur la stridulation de Spathocera laticornis Schill. — *Feuill. jeun. Nat.* Paris **24**: 90. Not seen.

Leston, D., 1957: The Stridulatory Mechanisms in Terrestrial Species of Hemiptera-Heteroptera. — *Proc. zool. Soc.* London **128** (3): 369—386.

Miller, N. C. E., 1958: The presence of a stridulatory organ in Rhyticoris (Hemiptera-Heteroptera-Coreidae-Coreinae). — *Ent. mo. Mag.* **94** (= 4th Ser., 19): 238.

Mulsant, E. and Rey, C., 1870: Histoire naturelle des punaises de France; Coréides. — Paris. Not seen.

Reuter, O. M., 1909: Quelques mots sur les Phyllomorphes (Hem. Coreidae). — *Bull. Soc. ent. Fr.* 1909: 264—268.

Saunders, E., 1893: Hemiptera-Heteroptera collected by J. J. Walker. Esq., R. N., F. L. S., at Gibraltar and in North Africa. — *Ent. mo. Mag.* **29** (=2nd Ser., 4): 98—102.