

## ENTOMOLOGISCHE BERICHTEN

MAANDBLAD UITGEGEVEN DOOR

DE NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING

Deel 27

1 januari 1967

No. 1

Adres der Redactie:

B. J. LEMPKE, Oude IJselstraat 12<sup>III</sup>, Amsterdam-Zuid 2 — Nederland

INHOUD: G. Kruseman & C. A. W. Jeekel: *Stenobothrus (Stenobothrodes) cotticus* nov. spec., a new grasshopper from the French Alps (Orthoptera, Acrididae) (p. 1). — W. Nijveldt: Notes on Cecidomyiidae, I (p. 8). — J. P. van Lith: Contribution to the knowledge of the Bornean Psenini (Hymenoptera, Sphecidae) (p. 15). — Korte mededeling (p. 14: Aanbieding).

***Stenobothrus (Stenobothrodes) cotticus* nov. spec., a new grasshopper from the French Alps (Orthoptera, Acrididae)**

by

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In his monograph on French Orthoptera, CHOPARD, 1951 (Faune de France 56: 280), recorded *Stenobothrus rubicundus* (Germar) from two localities in the French Alps, viz. "Hautes-Alpes: mont Genève, vers 2.000 m. (BÉRENGUIER); Basses-Alpes: Larche (BRISOUT, AZAM)". Besides giving a description of the species, CHOPARD also cited some details on its behaviour and song.

In 1962, one of us (KRUSEMAN) accompanied by his wife and sister, visited Montgenèvre and collected a species of *Stenobothrus* there, the behaviour of which largely agreed with the data for *rubicundus* given by CHOPARD. The same species was abundantly met with on the Col d'Izoard.

In the field the material was preliminarily identified as *Stenobothrus rubicundus* although it was noted already that the hind tibiae were yellowish instead of red.

After the material had been mounted and was compared with *rubicundus* from elsewhere, it became instantly clear that it belonged to a quite different species, which, as far as we were able to trace, had not yet been described.

***Stenobothrus (Stenobothrodes) cotticus* nov. spec.**

Material. — France, Hautes-Alpes, Col d'Izoard, 2350 m, 20.VIII.1962, G. KRUSEMAN c.s., ♂ holotype, ♀ allotype, 87 ♂, 38 ♀ paratypes; France, Hautes-Alpes, Montgenèvre, 1850 m, 19.VIII.1962, G. KRUSEMAN c.s., 11 ♂, 2 ♀ paratypes; France, Hautes-Alpes, Molines-en-Queyras, 1700 m, 22.VIII.1962, G. KRUSEMAN c.s., 1 ♂ paratype.



*Description.* — Colour of the dorsal and lateral sides of the head and the thorax dark green, olivaceous or brown, more variegated in the female. Antennae dark brown or blackish. Behind the dorsal part of the eyes on each side of the head an obscure longitudinal band, which is continued on the pronotum by a black band intersected by the lateral keel. Consequently, there is a paler median longitudinal stripe, rather conspicuous in most female specimens, running from the fastigium to the caudal margin of the pronotum. Lateral side of prozona with a more or less distinct blackish spot. Abdomen dorsally and laterally blackish or brownish, the posterior half in the male orange brown to yellowish brown. Ventral side of head, thorax and abdomen yellowish brown. Tegmina of male when in rest black laterally, brownish dorsally. The white patch situated at about two thirds of the length, but generally inconspicuous and sometimes obsolete. When spread out the tegmina of the male are blackish brown, opaque, with black veins; some of the larger cells may have a rounded or elongate transparent centre. Wings of the male as dark as the elytra; a number of the larger cells, especially in the median field, with a rounded transparent centre. Tegmina of female when in rest dark grayish brown laterally, with some rather large, irregular, blackish spots, paler brown dorsally. The costal field with a yellowish longitudinal streak. White patch usually more conspicuous than in the male, also situated at about two thirds of the length. When spread out the tegmina of the female are brownish, opaque, with dark brown veins. The wings infusate, but less so than in the male, the veins black, the margins of the cells dark brown, the centre of the cells transparent. Posterior femora dorsally of same colour as head and thorax, the discus more or less infusate, the ventral side orange brown in the male, yellowish brown in the female. Dorsal carina of femora sometimes blackish just proximad of the middle and at about two thirds of the length. Knees of femora and the base of the tibiae blackish. Tibiae orange brown in the male, more yellowish brown in the female, the spines infusate.

Head with the frontal costa in the male well impressed around the ocellus and below, in the female generally weakly impressed. Foveolae of male rather narrow, the pit about two and a half times longer than wide. Foveolae of female a little broader, the pit about two and one third times longer than wide. Greatest width of an eye about three quarters of the longest diameter. Subocular groove in the male 0.55 to 0.65, in the female 0.72 to 0.80 times the longest diameter of the eye. Antennae not at all clavate, in the male three quarters of the length of the hind femur, in the female about half as long as the hind femur.

Pronotum with the median keel incised by the principal sulcus at about 0.42 to 0.44 of its total length. Lateral keels of pronotum (fig. 1—2) angular in the prozona, diverging slightly in the metazona. Shortest distance between the lateral keels 0.50 to 0.65 times the largest width at the posterior margin.

Tegmina of male (fig. 3) surpassing the knees of the hind femora by one tenth to one sixth of the length of the hind femur. Tegmina of moderate width, the largest width about one quarter of the length. Anterior margin evenly rounded, sometimes faintly emarginate distally where the costa and subcosta are nearing each-other. Costal field narrow, subcostal field gradually widening from the base distad, about two times as broad as the costal field halfway, and narrowing again



slightly towards the apex. Radius distinctly S-shaped, the radial field strongly widening near the distal end of the median field. Cubital veins fused, except near the base. Wings of male (fig. 4) when in rest scarcely shorter than the elytra; their length about one and two thirds of the largest width. Median vein unbranched, the median field strongly widened. Wings with two distinct apical scallops.

Tegmina of female (fig. 5) generally shorter than the abdomen, surpassed by the hind femora by one quarter to one fifth of the length of the femur. Largest width slightly less than one quarter of the length. Subcostal field much narrower than in the male. Radius almost straight, the radial field also strongly widened distally. Wings of female (fig. 6) about two times as long as their largest breadth. Median field somewhat narrower than in the male.

Hind femora moderately broad, their width about one quarter of their length.

Subgenital plate of male evenly rounded in profile, the upper edge about rectangular.

Lower valves of female with strong teeth.

Measurements: total length of ♂ : 17.4—19.9 mm, of ♀ : 17.3—21.1 mm; pronotum of ♂ : 3.2—3.7 mm, of ♀ : 4.0—4.2 mm; tegmina of ♂ : 13.2—15.0 mm, of ♀ : 11.5—13.3 mm; hind femora of ♂ : 9.2—10.3 mm, of ♀ : 10.8—11.7 mm.

For a general picture of the ♂ and ♀ see fig. 7—10.

Location of type-material. — Zoölogisch Museum der Universiteit van Amsterdam.

Remarks. — According to the strongly widened median field of the wings and the absence of branches of the median vein of the wings, this species belongs to the subgenus *Stenobothrodes* Tarbinskii, 1948. In their treatment of the Orthoptera of the U.S.S.R., BEI-BIENKO & MISHCHENKO (1951, Opred. Faune SSSR 40 : 465; English translation, Jerusalem, 1964 : 92) refer to this group the following species: *Stenobothrus rubicundus* (Germar, 1817), *S. carbonarius* (Eversmann, 1848), *S. newskii* Zubovskii, 1900, *S. wernerii* Adelung, 1907, *S. sviridenkoi* Ramme, 1930, *S. caucasicus* Dovnar-Zapolskii, 1927, *S. eurasius* Zubovskii, 1898, and *S. tadjhicus* Mishchenko, 1951.

Of these eight species, only two, viz. *S. rubicundus* and *S. eurasius* have been recorded from Central Europe.

*S. rubicundus* differs from our new species at first sight by the bright red colour of the hind tibiae and the larger size, especially of the females (length of ♀ : 24—29 mm). Furthermore, the tegmina are distinctly broader, and differ in the venation, especially by the separate cubital veins. The median field of the wings of *rubicundus* is much wider, and the first lobe of the margin is much broader.

*S. eurasius*, together with *S. caucasicus* and *S. tadjhicus* from the U.S.S.R., has the wings hyaline with only the apex infusate. It differs furthermore in the red hind tibiae, not to mention differences in the venation of the tegmina.

Evidently most closely related to *S. cotticus* are the four remaining species, viz. *S. carbonarius*, *S. newskii*, *S. wernerii* and *S. sviridenkoi*, which are distributed in

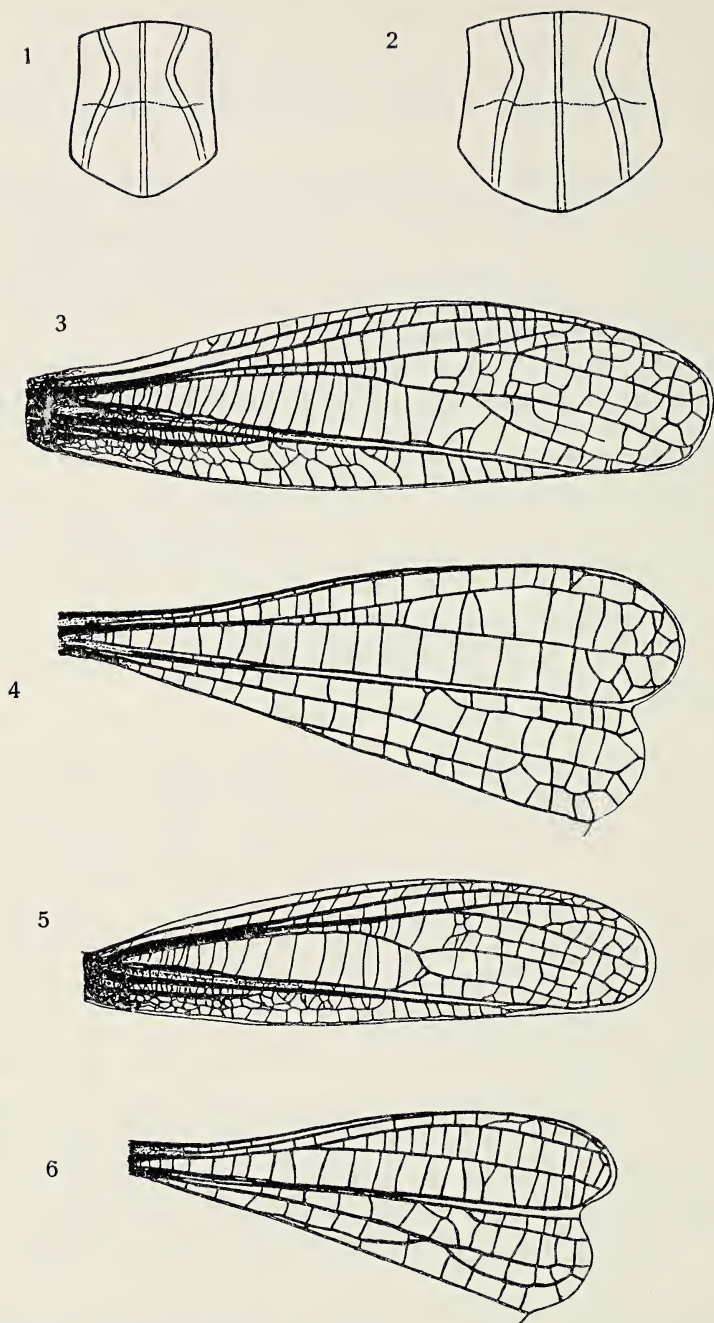


Fig. 1—6. *Stenobothrus* (*Stenobothrodes*) *coticus* nov. spec. 1: pronotum of ♂; 2: pronotum of ♀; 3: right tegmen of ♂ holotype; 4: anterior part of right wing of ♂ holotype; 5: right tegmen of ♀ allotype; 6: anterior part of right wing of ♀ allotype.

an area from the southeast of the European part of the U.S.S.R. and Mongolia to Eastern Turkey and Northwest Iran.

*S. carbonarius* differs from *S. cotticus* by having the cubital veins of the tegmina not fused. Actual comparison of a male and female of *carbonarius* from Russia, identified by MISHCHENKO, with *cotticus* has shown that in *carbonarius* the costal field of the tegmina is about twice as broad as the subcostal field. The radius is not S-shaped, and the radial field is widening distad much more gradually than in *cotticus*. The median fields of the tegmina and of the wings are conspicuously less widened. In the female the elytra are only slightly surpassed by the hind femora.

*S. newskii* (erroneously cited as *nevskii* by BEI-BIENKO & MISHCHENKO, 1951) has the wings of the male very broad, the length being about one and one quarter times the width.

*S. weneri* and *S. sviridenkoi* have been illustrated by RAMME (1951, *Mitt. zool. Mus. Berl.* 27 : 385, 386, pl. 25 fig. 1, 2, pl. 31 fig. 6). From these pictures it is evident that in both these species the subcostal field of the tegmina is not wider than the costal field, that the radius is not S-shaped, and that the radial field is not widening abruptly. Actual comparison of two males and a female of *S. weneri* from Iran, identified by F. WILLEMSE, and a male of *S. sviridenkoi* from Armenia, identified by MISHCHENKO, has confirmed these differences. In both species, furthermore, the antennae are yellowish and distally infusate, and slightly but distinctly club-shaped.

From the four species mentioned, *cotticus* differs also in the strongly angularly incurved lateral keels of the pronotum.

Summarizing, it seems that the most characteristic features of *cotticus* are found in the tegmina having the subcostal field twice as broad as the costal field, the radius S-shaped, and the radial field strongly and abruptly widened distad, as well as in the strongly inflexed pronotal carinae.

Although *S. cotticus* has been found near Montgenèvre, a locality cited for *S. rubicundus* by CHOPARD, its discovery of course does not prove that previous authors mistook it for *rubicundus*. That this is quite probable, however, may be concluded from the fact that the behaviour of *cotticus* agreed with the data cited by CHOPARD. The only difference noted was, that the animals in flight did not attain the, for such a small grasshopper rather exorbitant, height of three to four meters but of one to one and a half meters.

Recently, DREUX (1962, *Recherches écologiques et biogéographiques sur les Orthoptères des Alpes françaises*, Thèse, Paris, p. 627) has given a number of additional records for *rubicundus* in the French Alps. His localities are confined to three regions, viz., the Massif de la Vanoise in the Graian Alps, the Briançon region in the Cottian Alps, and a few localities in the Maritime Alps to the south-east of Barcelonnette.

In all probability part of these records, notably those from the Cottian Alps, will eventually prove to pertain to *cotticus* and not to *rubicundus*. It is, however, certain that *rubicundus* occurs in the Maritime Alps as we collected it on either side of the Col de Tende (France, Alpes Maritimes, Viévol, 1000 m, 25.VIII. 1965, M. C. & G. KRUSEMAN, 2 ♂, 1 ♀; Italia, Prov. Cuneo, Limone Piemonte, 1000—1200 m, 23—27.IX.1959, C. A. W. JEEKEL, 1 ♂, 2 ♀).



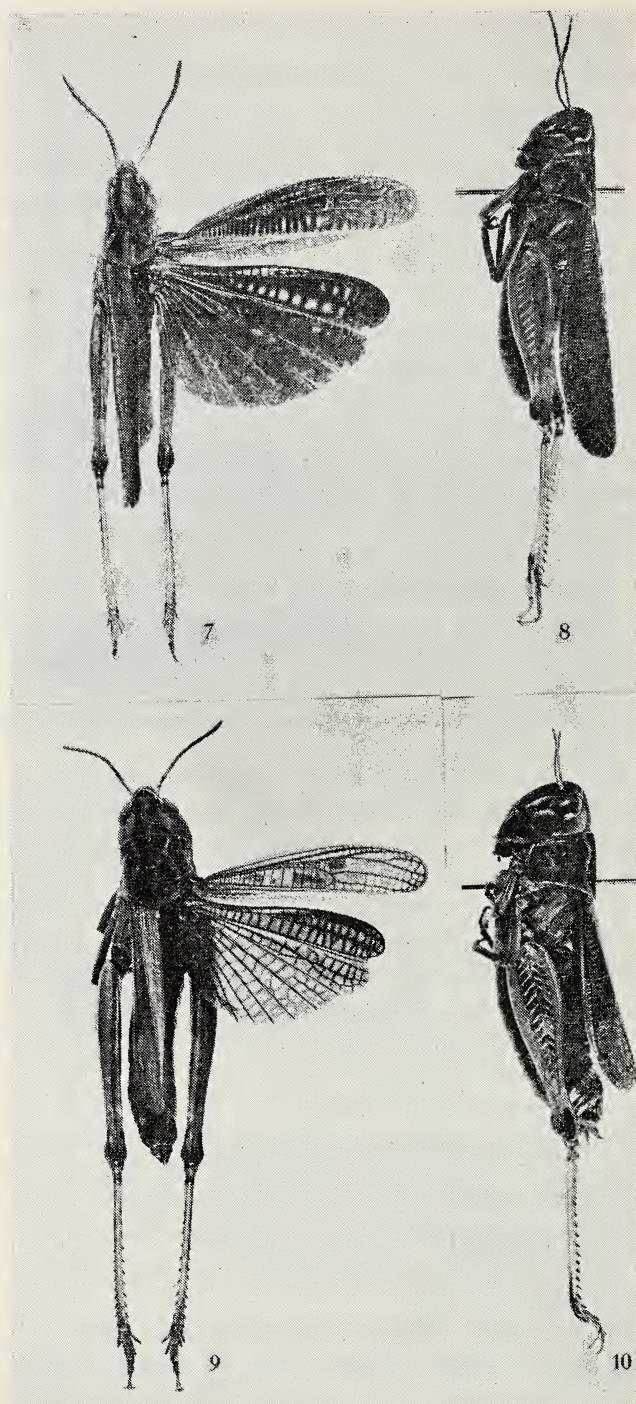


Fig. 7—10. *Stenobothrus* (*Stenobothrodes*) *cotticus* nov. spec. 7: ♂ holotype, dorsal aspect; 8: ♂ holotype, lateral aspect; 9: ♀ allotype, dorsal aspect; 10: ♀ allotype, lateral aspect.

It may be noted that we collected *rubicundus* at an altitude of 1000 to 1200 m, whereas *cotticus* was found between 1700 and 2350 m. According to DREUX *rubicundus* was found between 1000 and 1700 m in the Massif de la Vanoise and between 2000 and 2500 m in the Cottian Alps and in the Maritime Alps. It will be interesting to know whether these differences in altitude concern the two species now distinguished. In other words, the localities recorded by DREUX above an altitude of 2000 m may possibly pertain to *cotticus*.

The behaviour of *rubicundus*, unfortunately, is still insufficiently described, but according to observations by JEEKEL in Istria, the male of this species displays a very peculiar, hovering flight, which reminds of the flight of a cerambycid beetle. The male moves slowly in the air, while making the typical rattling sound, and may even stand still in the air before dropping to the ground. The height of its flight is seldom over one meter.

Although *cotticus* also makes a strong rattling sound during its flight, the slow hovering movement has not been observed by KRUSEMAN.

With its nearest relatives occurring in the southern part of the U.S.S.R. and adjacent Middle East regions, the discovery of the new species in the West Alps is quite remarkable and of great zoogeographical interest. We know of no parallel in this distributional pattern.

**Acknowledgements.** — We want to express our indebtedness to our friend Dr. F. WILLEMSE, Eysgelshoven, for taking the photographs of the type-specimens of *cotticus*, and for the loan of material of *S. carbonarius*, *S. werneri*, and *S. sviridenkoi*. The aid of Dr. O. DAMSTÉ, Muiderberg, in verifying the correctness of the chosen specific name, which, of course, refers to the part of the Alps where the new species was found, is also appreciated.

### Résumé

Une nouvelle espèce de sauterelle du genre *Stenobothrus*, le *Stenobothrus cotticus* nov. spec., est décrit des Alpes françaises. Parmi les *Stenobothrus* connus de la France, la nouvelle espèce avoisine le *Stenobothrus rubicundus* (Germar), avec lequel elle a été peut-être confondue autrefois.

Il est nécessaire de modifier la clef de CHOPARD dans la Faune de France 56, 1951, comme suit:

1. Ailes très fortement enfumées, à champ médian élargi et à nervure M sans branches . . . . . 1a
- Ailes transparentes ou faiblement enfumées, à champ médian étroit et à nervure M avec une ou deux branches . . . . . 2
- 1a. Plus grand. Cu et Cu p libres. Tibias postérieures rouges . . . *rubicundus*
- Plus petit. Cu et Cu p fusionnées. Tibias postérieures jaunes . . . *cotticus*
2. Voir CHOPARD.