

Descriptions of two Eulophid Species (Hym.).

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With 15 figures.

Ceranisuus Walker (Entedonini nec Tetrastichini nec Elachertini) **comb. nov.**

Ceranisuus Walker, The Entomologist 1840, vol. 1, p. VI, expl. of pl. N, fig. 2, ♂. Type species: *Cirrospilus pacuvius* Walker 1838, Ann. Nat. Hist. I, p. 383, ♀.

This genus formerly has been included in the Tetrastichini (Förster 1856 p. 54, 56, and others) or, under the name *Cirrospilus* Wstw., in the Elachertini (Dalla Torre 1898, p. 83), but as the following redescription shows it rather belongs to the Entedonini on account of the venation of the fore wing with a short radius issuing at an obtuse angle, the two strong bristles on the subcosta, the two placoid sensilla at the base of the marginal vein, the one-jointed maxillary palpi, the tridentate mandibles, and the two strong teeth on the digitus of the male. In the Elachertini there often are more bristles on the subcosta, the radius issues at an acute angle, the maxillary palpi are two-jointed, the mandibles have two large and 3-4 small teeth, and there are two rather small teeth on the digitus. In the Tetrastichini the radius issues at an acute angle, there often is only one placoid sensillum at the base of the marginal vein, and the digitus has one large tooth.

Ceranisuus pacuvius Walker

(Figs. 1-6).

In the spring of 1955 I succeeded in procuring some specimens of *Ceranisuus pacuvius* Walker, of which species I previously, as mentioned in Ent. Medd. 1955, p. 154, had one female and two males. One of these old spec-

imens was dissected, but I was unable to find the mandibles, and a dissection of a new specimen gave no better result. I then tried to mount the head of a specimen in frontal view and found a faint line beside the maxilla (fig. 2). This was little satisfying and, as the trophi were too small to dissect, I tried to split a head from above without touching the trophi, with the result that a small scale, not belonging to the same primitive segment as the maxillae, broke off from its attachment to these (fig. 3) and could be interpreted as a pair of vestigial mandibles. The rudimentary mandibles may have some connection with the biology of the species; in fact I do not know of any other chalcid with reduced mandibles unfit for gnawing purposes. Since the species seems to be incompletely described, a redescription is given below.

Length of female 0.9 mm, ovipositor (but slightly exerted) extending 0.4 mm from base of abdomen, wing expanse 1.9 mm. Length of male 0.85 mm, wing expanse 1.65 mm.

Female blackish brown, metallic, tinged with green, shining though with a slight reticulation on head and thorax; trophi, antennae, tegulae, petiole, legs and wing veins light brown; trochanters and knees lighter, coxae darker than the rest of the legs; wing membrane fumated. In the male the antennae are dark brown, especially so the shining scape, and the legs are slightly darker than in the female.

Female: Head small, nearly double as broad as long, 17:8, narrower than the thorax, 17:20, occiput concave with an acute margin, antennae inserted in the middle of the face on a frontal prominence, eyes angulated in front, genae subcompressed, genal suture distinct, vertex with 12-14 long bristles, clypeal margin almost straight, ocelli in a flattened triangle. Antenna composed of scape, pedicel, anellus, two funicle joints and a two-jointed club, radícula quadrata, scape slender, five times as

long as broad, 52:10, slightly flattened, pedicel subconical, 26:10, anellus laminate, first funicle joint rectangular, 13:9, second funicle joint larger, 15:11, club rather large, 36:17, with an apical process, :4, first joint of club rounded at base, shorter than broad, 15:17, apical joint conical, longer than broad, 21:16. Antennae feebly haired, with 3-4 hyaloid basiconic sensilla on the flagellar joints and presutural styliconic sensilla on the second funicle joint. Mandibles vestigial, slightly pointed, with two bristles on the outside, appearing as a small, thin scale pressed to the side of the maxillary complex; no dental folds. Maxillary and labial palpi one-jointed, small, with a bristle at the apex; ratio of maxillary palpus 4:1.5, of the shorter labial palpus 2:1.

Thorax somewhat longer than broad, 29:30, prothorax forming an arch of equal width throughout, not margined anteriorly, with a bristle on each side and some smaller ones along the hind margin and in the middle; mesonotum rather flat, with 4 large bristles; the anterior part only of the parapsidal furrows is distinct; parapsides with one bristle posteriorly, at the suture; scutellum large, convex, rounded behind, without longitudinal furrows, with a large bristle on each side near the suture; the axillae seem to meet in the middle, but this part is thin and not sharply defined; one small bristle laterally; metanotum rather large, forming an arched transverse wall, slightly angulated behind, with a small bristle on each side; propodeum rather large, smooth, spiracles large, round, neck very short, concave in the middle; phragma reaching the hind margin; petiole narrowed anteriorly.

Abdomen ovate, slightly longer than and almost as broad as thorax, 32:29 and 19:20, resp.; ovipositor thick, from base of abdomen :30, slightly exerted :1; sheath of ovipositor from apex to hinge :5, first segment foveate as broad and approximately as long as petiole; the

terga of almost equal length, with a row of 8-12 hairs anally; pygostyles with 3-4 long hairs.

Fore wing broadened distally, the ratio of length and width 65:25, longest hair of fringe :7, subcosta with two large setae dorsally and three ventral hairs basally, the fringe consists of 10 long bristles along marginal and postmarginal veins and 74 thinner and more close-set cilia along the oblate rounding; disc of wing with hairs uniformly distributed with about 22 hairs across to the base of marginal vein, where a line may be discerned within the retinaculous fold continuing anally in the submarginal line.

Venation delicate; ratio of subcosta, marginal vein, postmarginal vein, and radius 13:27:6:5, subcosta extends beyond the marginal vein, :2, the latter stretches to well over the middle of the wing, 38:24, the radial vein issues at an obtuse angle, widened into the knob, distal border inconspicuous, uncus with four placoid sensilla in a straight line, postmarginal vein inconspicuous distally; the veins hairy as the disc, subcosta with a row of 20 placoid sensilla, marginal vein with two placoid sensilla opposite the junction of the subcosta.

Hind wings pointed, broadest at the hamuli, ratio 57:9, longest fringe :9; costal fringe is formed of 26 short cilia, anal fringe of 49 cilia as long as the wing-width and becoming shorter proximally; wing disc with hairs uniformly distributed in about six lines; subcosta with a row of 10 placoid sensilla, marginal vein near the apex with two indistinct placoid sensilla dividing it

Fig. 1. *Ceranisia pacuvius* Wlk. ♂.

Fig. 2. Head, frontal view, obliquely from below. m: mandible.

Fig. 3. Mandible at the margin of the mouth.

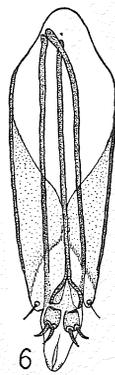
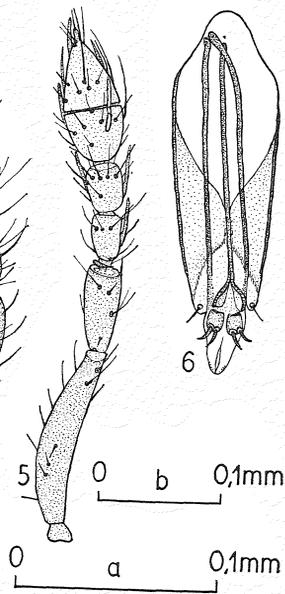
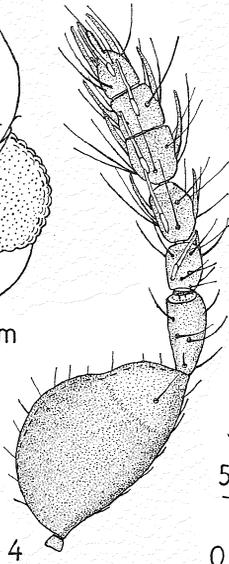
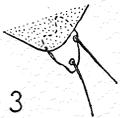
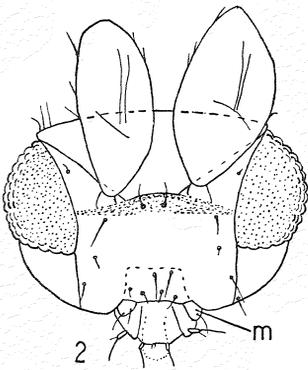
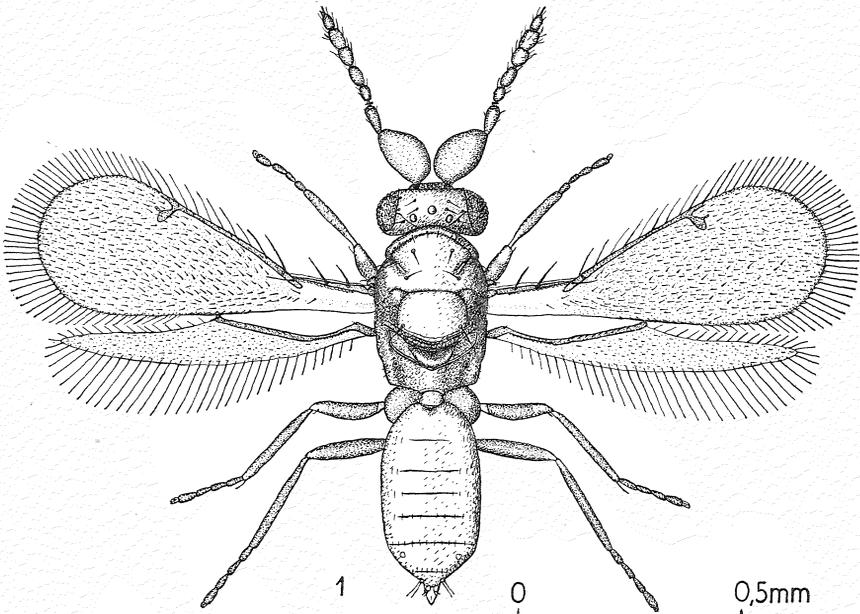
Fig. 4. Antenna.

Fig. 5. ♀, antenna.

Fig. 6. ♂, phallus.

Fig. a. Scale of figs. 3, 6.

Fig. b. Scale of figs. 2, 4, 5.



into three parts, 50:9:20, the marginal vein both dorsally and ventrally with 7-8 hairs of moderate length, the apex with a straight hook and two shorter curved ones, and dorsally a row of 6 trichoid sensilla.

Legs seem to be similar to those of the male described below.

Male: Smaller than female. The ratio of length and width of thorax 27:18, of abdomen 28:15. Antennae composed of scape, pedicel, anellus, two funicle joints and a three-jointed club; radícula quadrate, scape unusually large and swollen, as long as the width of the head, 17:17, upper side a little convex, lower side inflated, ratio of length and width 59:34, thickness about :20; a slight transverse impression may be seen one quarter from the apex, and two longitudinal lines run on the lower side, apparently forming a slit; on the inner side of scape there is a row of 12-13 hairs, and also on the surface some hairs are scattered; pedicel conical, nearly two and a half times as long as broad, 25:11; anellus lamella-like, oblique, first joint of funicle longer than broad, 12:10, second joint a little longer than first 15:11; ratio of club 41:13; first joint of club rounded at base, slightly longer than broad, 14:13, second joint nearly quadrate, 13:13, terminal joint longer than broad, subconical, 14:10, with an apical process :8; flagellum with rather long hairs and with basiconic sensilla, 3 on the first joint of funicle, 4 on the second, and 4 on the club joints; the club process with an apical hair.

Fore wing a little narrower than in the female, ratio 55:21; fringe slightly longer, :8, counting 9-10 bristles along the marginal vein and 55 round the apex until the retinaculous fold; ratio of subcosta, marginal vein, postmarginal vein and radius 12:24:5:4, subcosta extends beyond the marginal vein :2. Hind wing narrower than fore wing, 50:6.5; largest bristles in the fringe longer than wing width :8; marginal vein with hardly discernible placoid sensilla.

Legs slender, anterior coxa subconical, obliquely attached to the trunk, two and a half times as long as broad, 9:3.5, with a few hairs, middle coxa small, subconical, swoln, 5:4, with a long hair, posterior coxa the largest, 10.5:5, ovate-conical, with a bristle; all the femora slightly swoln, the ratio of lengths 14:12:15, of widths 3.5:3:3.5; the femora with a subapical bristle, very weak, however, on the posterior femur; a few hairs on the anterior femur, some more on the middle femur, and a dense covering on the hind femur; tibiae straight, hairy, most so on the hind leg; fore tibia a little swoln; the ratio of lengths of the tibiae 14:18:18, of widths 2:2:2; fore tibia with a short spur, middle and hind tibiae with a spur $\frac{3}{4}$ as long as metatarsal joint; on the hind leg the spur is stronger than on the middle leg; tarsi shorter than tibiae, ratio of lengths 11:14:14, joints almost equal, in the fore leg the terminal joint is the largest, on the middle and hind leg the metatarsus is as large as the terminal joint.

Phallus nearly half as long as abdomen, 28:13, broadest basally; parameres not sharply pointed, with a subapical bristle; digiti slightly longer than broad, each with two strong teeth as long as the digitus itself; the basal sclerites of the digiti united into the central volsellar apodeme, which is as long as the aedeagal apodemes; apex of aedeagus with a few sensilla and a longitudinal phallotreme.—Pygostyles more conspicuous than in the female.

Variation: The female from the forest Ryget was a little larger, 1.05 mm, the ovipositor shorter, 0.35 mm, wing expanse 2.0 mm. In one case I found a third, smaller tooth on one digitus of the male.

Material: A slide with a female from the forest Ryget, North Sealand, Denmark, 23. 5. 1926, a slide with two males, same locality, 6. 6. 1926, two slides, each with a male, Fortunens Indelukke, North Sealand, 5. 6. 1955,

a slide with a male, same locality, 12. 6. 1955, and a slide with a female, same locality, 19. 6. 1955.

Biology unknown. The specimens from Fortunens Indelukke were swept on low bush vegetation in a mixed forest.

The species was identified by means of the figure in Walker 1840 (pl. N, fig. 2). An identification after Schmiedeknecht's key (1909, p. 421) leads to the subtribe *Pediobiina*, since the parapsidal furrows are distinct only anteriorly. Most genera of this group are American and have 3 or 4 joints in the funicle of the antenna, only the genus *Pediobius* Walker with one European species (*coedicius* Walker 1846, p. 183) may have a two-jointed funicle (antenna 8-jointed with one anellus), but may be separated from *Ceranisus* Wlk. by its short marginal cilia, and possibly by other characters too. The vestigial mandibles, and the strongly swollen scape in the male may be characteristics of the present species.

Perhaps this species, known from England and Denmark, is the only *Ceranisus* species so far described. The American species referred to this genus by Ashmead (1904, pp. 349—50) have been transferred to *Tetrastichus* by Burks (1943, p. 509), and the three *Ceranisus*(?) species from Ceylon (Motschulsky 1863, p. 66) are so poorly described that nothing can be said of their systematic position.

***Tetrastichus dubius* Bakkendorf.**

(Figs. 7—15).

Tetrastichus dubius Bkdf. ♂. Ent. Medd. 27, 1955, p. 152.

In the spring of 1955 I found also some specimens of this species, enabling me to refer a female to the male previously described, and to recognize a certain variability in the wing size, especially in the male, which may be micropterous or with wings of intermediate size. A description of the female is given below.

Female: Body length 1.4 mm, wing expanse 2.55 mm. Colour blackish, metallic, tinged with bluish, head somewhat brownish, face with two (sometimes inconspicuous) yellow lines running from points outside the bases of the antennae to the clypeus, eyes and ocelli bright red, scape and pedicel yellowish brown, darker dorsally, fla-

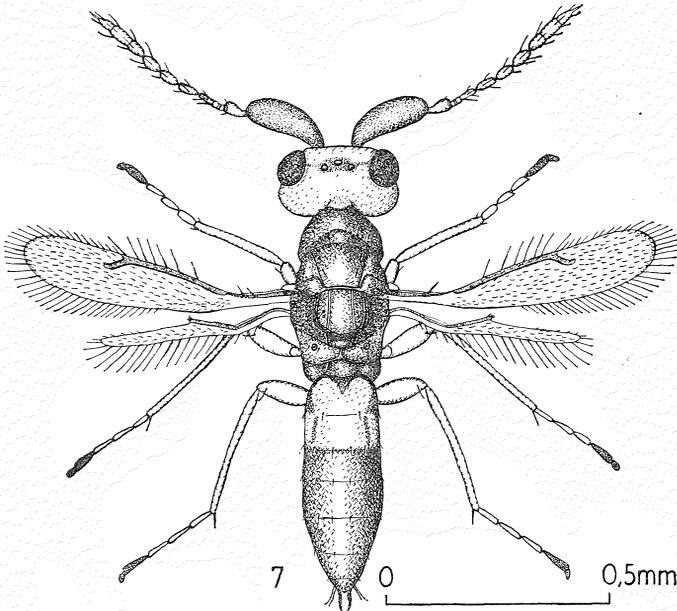


Fig. 7. *Tetrastichus dubius* Bkdf., micropterous male.

gellum greyish brown, tegulae yellowish spotted with brown, legs light yellow, coxae blackish brown except for the yellow tip of the hind coxa and the apical half of the middle and fore coxa, tarsi greyish though with a blackish terminal joint, wing veins greyish, base of abdomen light yellowish with the groove as well as the lateral and hind margins of the two foremost terga dark like the rest of the abdomen; head and thorax finely reticulate.

Head about double as broad as long, broader than thorax, 27:22, eyes rather small, ocelli placed in a flat triangle, margin of occiput rounded. Antennae inserted approximately in the middle of the face, separated by a distance, which is nearly twice their width at base, shorter than head and thorax together, about 44:51, composed of scape, pedicel, 4 anelli, 3 funicle joints and a 3-jointed club; radicula quadrate, scape slender, about four and a half times as long as broad, 63:14, pedicel conical, more than twice as long as broad, 28:12; anellus is apparently 3-jointed, but in the larger specimens it can be seen that the "second joint" in reality consists of two distinct lamella-like joints; the first and the fourth anellus are larger, and the latter may be quadrate; funicle slightly broader distally, 10:11:12, first joint longer than the two others 28:20:20; club considerably broader than funicle, three times as long as broad, 46:17, with an apical process, :4, first joint rounded at the base, ratio 17:7, second joint slightly longer than broad, 18:17, the distal suture somewhat oblique, distinct on one side only or apparently wanting, last joint conical, 15:15; flagella with rather long cilia and basiconic sensilla, 2 on each joint of funicle; on the joints of the club with 6-7 setae, which may be difficult to distinguish from the cilia, since most of the latter also have a light-coloured base; pre-sutural styliconic sensilla are present on all flagellar joints. Mandibles tridentate, with a few hairs, two apical teeth pointed, inner tooth broad, rounded, two dental folds. Palpi one-jointed, maxillary palpi four times as long as broad, 12:3, with one apical and two subapical bristles and a hair in the middle, labial palpi smaller, 3:2, with a pair of apical bristles.

Thorax more than one and a half time as long as broad, 37:22, broadest in the middle; prothorax transverse, bell-shaped, hairy; mesoscutum longer than scutellum, 15:10, with two widely separated bristles medi-

ally to the parapsidal furrows, which are distinct and almost straight; parapsides with one bristle, axillae naked, scutellum with a bristle on each side laterally to the furrows, which are slightly convergent posteriorly, behind each bristle a placoid sensillum; metanotum shorter than propodeum, slightly angulated posteriorly; propodeum with a median keel, hind margin concave in the middle, spiracles circular, placed at a distance of their own diameter from the anterior margin. Phragma truncate, reaching the end of the propodeum. Petiole slightly transverse.

Abdomen longer than head and thorax together, 59:51, as broad as the thorax, 22:22; basal groove as broad as the petiole, pointed anally; the segments almost equal in length; ovipositor forming the pointed apex of abdomen, extending over three quarters of the length of the latter, 59:44, from apex to hinge :13; the terga with a few bristles, pygostyles with a pair of long bristles.

Fore wing almost three times as long as broad, 92:32; subcosta with two bristles dorsally and 2-3 ventral hairs basally, costal cell ventrally and apically with a row of 4-5 hairs, radial vein with 5-7 hairs dorsally and 2-4 ventrally; marginal fringe consists of 12 cilia along the marginal vein followed by 100 more close-set cilia around the apex to the retinaculous fold; the cilia along the costal margin are shorter, the cilia on the apex and along the anal rounding longer than those on the marginal vein; length of the longest cilia one quarter of the wing width, :8; from the base of the marginal vein the wing disc is covered with hairs evenly distributed with about 21 hairs across, the length of the hairs being $\frac{1}{20}$ of the wing width; within the retinaculous fold there is a row of 16 hairs, which distally merges into the submarginal cilia; inside this row there is a naked stripe of the wing disc bordered by 33 hairs, and proximally to this stripe an oblique row of 4 hairs stretching to the base of the marginal vein.

Wing veins not very delicate; the length ratio of subcosta, marginal vein, postmarginal vein and radius 18:34:1:7; subcosta extends beyond the marginal vein, :2, the latter reaches beyond the middle of the wing, 52:92, postmarginal vein nearly absent, reduced to a minute triangle, radial vein distinctly clavate, uncus with a row of 4 placoid sensilla diminishing distally, one placoid sensillum on marginal vein opposite the junction with the subcosta, and on the latter vein a row of about 16 placoid sensilla, one of which has a separate position proximally to the inner bristle.

Hind wing: ratio 75:8; broadest at the hamuli, curved forwards and tapering towards the apex; with hairs evenly distributed with about 7 hairs across; costal fringe with 34 hairs, attaining one third of the wing width, anal fringe with 57 cilia, the longest of which are as long as the wing width, :8; marginal vein with a row of 9 hairs, anally, at the hamuli, a row of close-set short, trichoid sensilla, two placoid sensilla on the basal half, dividing the vein into three parts, 12:27:38 (on left wing 15:20:45), on the subcosta a row of 10 small placoid sensilla.

Legs slender; fore coxa slightly swollen, a little more than double as long as broad, 12:5.5, with a few hairs and a bristle on the inside at the apex; middle coxa with a truncate tip, twice as long as broad, 11:5.5, with a few hairs; hind coxa the largest, conical, 14:7, with

Fig. 8. *Tetrastichus dubius* Bkdf., ♂, head, frontal view, a little obliquely from below.

Fig. 9. Mandibles, seen from the inside.

Fig. 10. Maxillae and labium.

Fig. 11. Antenna.

Fig. 12. ♀, antenna.

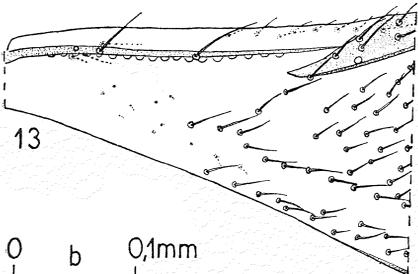
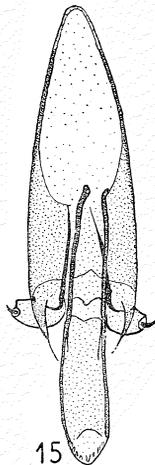
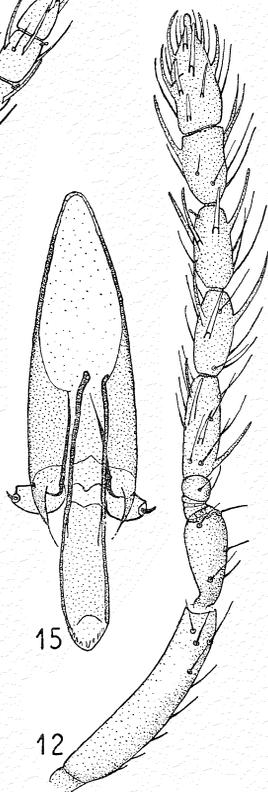
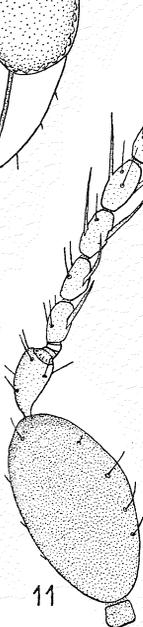
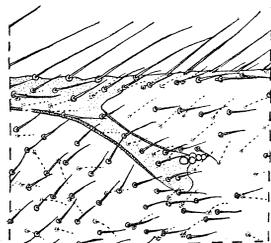
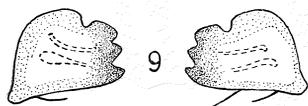
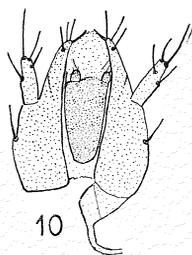
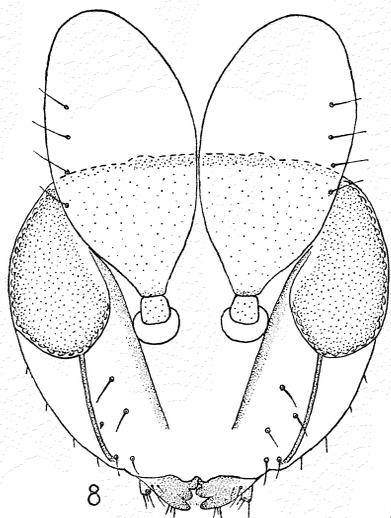
Fig. 13. Base of fore wing; hairs on lower side shown by dotted lines.

Fig. 14. Radial vein.

Fig. 15. ♂, phallus.

Fig. a. Scale of figs. 9, 10, 15.

Fig. b. Scale of figs. 8, 11—14.



0 b 0,1mm

0 a 0,1mm

at least one weak bristle at the apex; all trochanteres with 2-3 hairs; all the femora slightly swollen, hind one the longest, 17:17:23, and a little thicker than the two others, 4:4:5.5, fore femur with a lateral row of 6 hairs, and a bristle on the inside near the apex, middle femur with a similar bristle and a lateral row of 7 hairs, and further a row of hairs on the edge and some scattered hairs; hind femur with an apical bristle, a row of 8 hairs and some scattered hairs; tibiae straight, hind tibia the longest, 21:25:31, and a little thicker than the two others, 2:2:2.5, all tibiae densely covered with hairs towards the apex, each with a spur as long as the metatarsus; length of tarsi 18:18:21; in all tarsi the terminal joint is the longest.

Male: Eyes in a fresh specimen light red, ocelli dark red; subcosta more often with only one dorsal bristle, phallus broadest proximally to the middle, parameres with an apical bristle, digitus with a strong tooth, its basal sclerite half as long as the phallus, ergots in the middle of the aedeagus.

Variation: The body length of the female varies from 1.45 mm to 1.15 mm, the wing expanse from about 2.8 to 1.9 mm; in the male the body length varies from 1.35 to 0.85 mm, the wing expanse from 2.0 to 1.25 mm. In the material from 1955 there was a female with small and narrower wings, ratio of fore wing 67:19, longest cilia in fringe :7, ratio of length and width of thorax 31:17, fringe consisting of 10 cilia along marginal vein followed by 76 cilia until the retinaculous fold, hind wing with 18 costal and 42 anal cilia. The male was represented in the old material by macropterous and micropterous forms, and in the material from 1955 by intermediate and micropterous forms. The ratio of fore wing in a micropterous male was 44:9, longest cilia in the fringe :6, the ratio of hind wing 31:3, longest cilia in the fringe :6, ratio of length and width of thorax 26:16; fringe

on fore wing consisting of 8 cilia along marginal vein followed by 40 cilia until the retinaculous fold, hind wing with 8 costal and 21 anal cilia. Out of ten males five (or perhaps seven) had only one dorsal bristle on the subcosta of both fore wings, the five others had only one bristle in either the right or the left fore wing, but in the three cases two bristles could be found in the opposite fore wing.

Material: In all fourteen slides from North Sealand, Denmark; 1 ♂, Fortunens Indelukke, 20. 5. 1925; 1 ♂, 1 micropterous ♂, 1 ♀, Ryget 7. 6. 1925; 1 ♂ and 1 ♀, Sorte Mose, Lillerød 2. 6. 1929; 1 ♀ allotype, 1 ♀, 3 ♀, 1 ♂ and 1 ♀, 4 slides, each with 1 ♂, Ganløse Ore, 26. 6. 1955; 1 ♂, Sorte Mose Lillerød, bred 10. 5. 1955 from a lot of *Agropyrum* stems. All in the author's collection.

Biology: In one case a male was bred from a lot of couch grass stems, *Agropyrum repens* (L.), growing between *Calluna vulgaris* in a mixed forest. The locality in Ganløse Ore was a shady road with weak grasses in a young oak forest. No other *Tetrastichus* sp. was swept in this locality, which makes it probable that the combination of male and female is correct.

30. 5. 1956 a normal female was bred from *Agropyrum repens* (Sorte Mose, Lillerød), and by splitting up a stem another female, only 0.9 mm in length and thus difficult to identify, was found gnawing its way out in the vicinity of the remains of three heteropterous egg-shells, placed in a common slit in the stem. This may indicate that this species has a larval development similar to those of *Tetrastichus conomeli* and *pseudopodiellus* Bkdf.

An identification of this species after Kurdjumov's key (1913, p. 246) of the females of the subgenus *Geniocerus* Ratz. leads to *thysanotus* Förster (1861, p. 38), the original description of which is not accessible here. The female, however, differs from this species, as defined by the author (1955, p. 155), by its more narrow wings with long fringes, by subcosta having only two bristles, and

by the yellow colour of the femora. In *thysanotus* the wings have short fringes, the subcosta has (3)4-5 bristles, and almost the basal half of the femora is dark.

Finally I have studied the descriptions of some allied species of the genus *Ootetrastichus* Perkins, especially *O. formosanus* Timberlake (Proc. Haw. Ent. Soc. 4, 1921, pp. 557—64), introduced to Hawaii from Formosa in order to control *Perkinsiella saccharicida* Kirk. In these species the scape of the male is even more enlarged than in *dubius*, and in *formosanus* the funicle of the female is more slender, its first joint being about four times as long as broad; further there are some colour differences. Burks has transferred some species of *Ootetrastichus* Perk. to *Tetrastichus* Hal., and when the males of this genus becomes more thoroughly investigated *Ootetrastichus* possibly will be reduced to the rank of a subgenus. The relatively few *Tetrastichus* species in which the male sex is known show a great interspecific variation as to antennal characters, base upon which a subdivision of the genus may be made.

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