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THE GENUS *GYROSTIGMA* BRAUER (DIPTERA: *GASTEROPHILIDAE*)*

By

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With 12 Figures in the Text

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I. History

SJÖSTEDT (1908) gave a short sketch of the early history of the *Gyrostigma* problem. In 1839, HOPE figured a larva which had been found in an African rhinoceros, and OWEN some time later simply designated it as "*Oestrus Rhinocerontis*", meaning *Oestrus* from the rhinoceros. JOLI mentioned this larva again in 1846 and reproduced HOPE's illustration, but thought it would belong to the genus *Hypoderma*. DELEGORGUE in his "Voyage dans l'Afrique australe" (vol. 2, 1847, p. 356) described the rich animal life near the Vaal river in South Africa and said that the Black Rhinoceros [*Diceros bicornis* (L.)] there was found to be heavily infested with stomach bots. The White Rhinoceros, [*Diceros simus* (BURCHELL)] however, harboured relatively few of these bots, and this was thought to be constant and typical. Nowadays rhinos no longer occur in this area of South Africa, but we can conclude that the difference in the grade of infestation of these two species was only a local one, or even only accidental. The White Rhinoceroses now protected in the National Parks of Zululand are as heavily infested as those of the black species investigated by DELEGORGUE.

In his famous monograph on the *Oestridae*, BRAUER (1863) gave the first adequate description of the larva after HOPE's figure, still under "*Gastrophilus Rhinocerontis* OWEN". This name has no nomenclatorial standing, but BRAUER wanted only to indicate that he was dealing with OWEN's larva. However, he correctly stated for the first time that this larva was similar to *Gasterophilus*.

In 1884, BRAUER founded the genus *Gyrostigma* on larvae recovered from an Asiatic Two-horned Rhinoceros [*Didermoceros sumatrensis* (FISCHER)] which had died just after its arival in the Zooliogical Gardens of Hamburg. He found them to be different from the African larvae and named the species *G. sumatrensis*, the adults of which have until now remained unknown.

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In 1895, a paper appeared by CORTI, in which he described from a single female a new oestrid species from Gallaland which he named *Spathicera pavesii*, and which he believed to be related to *Gasterophilus*. Due to the enormous size of the specimen, CORTI presumed that it was the adult of larvae living in elephants or rhinoceroses, and evidently belonged to the genera *Cobboldia* or *Gyrostigma* created by BRAUER.

CORTI sent the only specimen to BRAUER, who studied it once more (1895). He suggested that *Spathicera* might represent the adult stage of *Gyrostigma*, but he did not dare to synonymize the two genera.

TWO years later, BRAUER (1897) described and partly figured a third stage larva from a Black Rhinoceros, shot at Gurui in Tanganyika. He designated it as "*Gyrostigma rhinocerontis bicornis*", and apparently wanted to indicate only that it was found in "*Rhinoceros bicornis*". ENDERLEIN (1899), however, accepted this name as a nomenclatorial, valid designation, and it was listed as such by later authors, until RODHAIN and BEQUAERT (1919) placed it into the synonymy of *G. pavesii* (CORTI).

In the meantime ENDERLEIN (1901) had published an important paper, in which he described from the 3rd instar larva the new species *Gyrostigma conjungens* found in a Black Rhinoceros near Kilimandjaro, and discussed larval material of "*Gyrostigma rhinocerontis bicornis*", pointing out the great variability in the shape of the slits in the posterior peritremes.

A third species of *Gyrostigma* was then described by SJÖSTEDT (1908), under the name *Spathicera meruensis*. He had shot a rhinoceros in the Kilimandjaro-Meru district and found in the stomach a great number of mature larvae, from which he succeeded in rearing one adult female. In another rhinoceros, he detected larvae which he assigned to BRAUER'S "*Gyrostigma rhinocerontis bicornis*", and which he found to be different from his new species. SJÖSTEDT, moreover, decided definitely to unite the genera *Spathicera* and *Gyrostigma*, but he treated *Gyrostigma* as a synonym, because it was based on a species known only from the larval stage.

RODHAIN and BEQUAERT (1919), who synonymized BRAUER'S species with *G. pavesii*, accepted SJÖSTEDT'S view of the specific difference of these two species. ZUMPT and PATERSON (1953) doubted "whether the larval characters given in the key of RODHAIN and BEQUAERT are of significance" with respect to a specific separation of *G. meruensis* and *G. pavesii*. They had seen quite a number of young and old 3rd instar larvae, but only one female fly from Zululand, which was "in some ways intermediate" between *G. meruensis* and *G. pavesii*.

Since then, I have been able to study a great number of larvae and adults from various parts of Africa, and I have also seen a female fly from "Abyssinia" in the Paris Museum, which may be identical with the specimen mentioned by RODHAIN and BEQUAERT under *G. meruensis*. It is in my opinion conspecific with specimens which can be clearly referred to CORTI'S *G. pavesii*.

The adult flies I saw show a pronounced variability which includes the features given in the descriptions for *G. pavesii* as well as for *G. meruensis*. The dark spots of the third larval stage of *G. meruensis*, to which SJÖSTEDT and also RODHAIN and BEQUAERT called special attention, may be characteristic of the mature larvae, and a similar appearance is known from several species of *Oestrinae*. The size and pigmentation of the larval denticles increase with the growing larvae, and on the other

hand, are fairly variable. Through the kindness of Professor BEIER, Vienna, I received an evidently paratypical specimen of the third larval stage of *G. meruensis* which is in my opinion not separable from BRAUER'S larvae. *I believe therefore that it is justified to place G. meruensis definitely into the synonymy of G. pavesii.*

The adult of *G. conjungens*, which in the larval stage is clearly different from *G. pavesii* and *G. sumatrensis*, remained unknown to all former authors.

A few years ago, I received for the first time several 3rd instar larvae from a Black Rhinoceros killed in the Makueni district of Kenya. On my urgent request to try to rear the adults of this larva, Mr. J. G. TREMLETT of the Department of Veterinary Services eventually succeeded in hatching two females which are now at my disposal, and are described later in this paper. They are quite different from *G. pavesii* and much more reminiscent of a *Gasterophilus* species, a fact which had already been stated by ENDERLEIN (1901) for the 3rd larval stage. But they nevertheless clearly belong to *Gyrostigma*, and it is not necessary to place this species into a distinct genus as proposed by ENDERLEIN (1911). The differences between these two *Gyrostigma* species are not greater than those between the species of *Gasterophilus*. Mr. TREMLETT reared the adults from larvae found in a Black Rhinoceros which had to be destroyed in June 1961 in the Tsavo National Park, Kenya.

With respect to the biology of *Gyrostigma* species, very little is known. The second and third instar larvae are found attached to the wall of the stomach as observed by DELEGORGUE, apparently without causing severe pathological effects. The eggs were first discovered in the Congo by Mr. L. LEBRUN. They were firmly attached to the host's skin, mainly on the head, at the base of the ears, on the neck and the shoulders. RODHAIN (1915) obtained eggs from a caged fly and gave a description and figure of the egg, and later he and BEQUAERT (1919) were able to describe the first larval stage which had been extracted from an egg. It is still unknown under what circumstances the larvae hatch and how they find their way to the stomach. The mature larvae are passed through the anus, but it is doubtful whether they are normally excreted together with the faeces. Frequent checking of the large heaps of dung accumulated by the regular use of the same defaecation places by a certain number of White Rhinoceroses in the National Parks of Zululand, have never resulted in finding the pupal cases. Perhaps the larvae leave their hosts more or less actively at their resting places. The pupal stage lasts about six weeks.

II. The taxonomic position of the genus *Gyrostigma*

When BRAUER in his monograph of the Oestridae in 1863 mentioned the stomach-infesting bots of the African rhinoceroses as "*Gastrophilus Rhinocerontis*", he correctly indicated their close relationship to those

bots which develop in the alimentary tract of equids. CORTI (1895) describing his *Spathicera pavesii* also stated that it was related to *Gasterophilus*.

RODHAIN and BEQUAERT (1919) listed the genera *Gasterophilus* LEACH and *Gyrostigma* BRAUER under the *Gasterophilinae*, which he regarded as a subfamily of the Oestridae. TOWNSEND (1931) raised the subfamily to a distinct family and created the two tribes *Gasterophilini* and *Gyrostigmatini*[1] (see also TOWNSEND 1935). SÉGUY (1937) then valuated these tribes as subfamilies, but placed both, widely separated from one another, into the family Muscidae. ZUMPT (1957) accepted their rank of subfamilies, but listed both together again with the *Cobboldiinae* (parasites of elephants) under the distinct family *Gasterophilidae*.

The discovery of the adult of *Gyrostigma conjungens* has revealed a great similarity of this species to *Gasterophilus*, which no longer seems to justify placing these two genera into different subfamilies or tribes. *Gyrostigma* should be listed in future, as former authors have done, in the subfamily Gasterophilinae.

On the other hand, the differentiating features between *G. conjungens* and *G. pavesii* are very significant. The presence or absence of a lower marginal cross-vein (tp), for instance, is used in other dipterous groups as a generic feature, and also the general appearance of these two species is strikingly different. But the same is true for the *Gasterophilus* species which are regarded by most modern authors and also lately by GRUNIN (1955) as belonging to one genus only. The proposals by ENDERLEIN (1934) and TOWNSEND (1934) to split the genus *Gasterophilus* into four distinct genera have not been accepted by later authors.

This refusal can only be welcomed, at least for practical reasons, and it justifies maintaining one genus *Gyrostigma* s. lat. and not restoring ENDERLEIN'S genus *Stomachomyia* for *G. conjungens*.

In this connection, a most interesting event would be the rearing of adults of *G. sumatrensis*.

The important imaginal generic features of *Gyrostigma* are the following:

Head without ocelli, frons with ptilinal suture (lunula). Antennae composed of 3 segments and a bare arista; the second segment is large and deeply split, the dorsal part being large and covering the normal-shaped 3rd segment, the ventral part is short and broad, or long and narrow. Antennal groove large and deep, divided by a median keel. Mouth-parts non-functional consisting of a pair of small palpi and a rudimentary proboscis.

[1] The correct version should have been *Gyrostigmini*.

Thorax without bristles, also the hypopleurals are lacking; postscutellum not developed. Wing with the media straight. Legs without pulvilli. Segmentation of abdomen and hypopygial structure as in *Gasterophilus* (comp. PATTON, 1935).

III. The species of *Gyrostigma*

There are three valid species described, one from the Oriental region, and two from the Ethiopian region. The adults of only the last two are described and may be easily distinguished by the following key:

1 (2) Body predominantly black, with a variable, more or less parallel-sided median stripe of reddish colour on mesonotum and scutellum. This vitta may completely disappear in dark specimens. Hairs on thorax short. Wings long, exceeding the tip of the abdomen, almost completely black. Legs reddish-orange, sometimes femora blackened.

G. pavesii (CORTI)

2 (1) Body predominantly yellow to reddish-yellow, without a differently-coloured median vitta. Hairs on thorax long. Wing shorter, not exceeding the tip of the abdomen, only partly infuscated. Legs yellow, partly brownish.

G. conjungens ENDERLEIN

The 3rd instar larvae of the three known species are distinguishable by the structure of the posterior peritremes (see Figs. 4, 10 and 12).

1. *Gyrostigma pavesii* (CORTI)

Spathicera pavesii CORTI, Ann. Mus. Stor. nat. Genova 35, 1895, p. 145; BRAUER, Sitzber. Akad. Wiss. Wien 104, 1895, p. 582 figs.; Bau, Genera Insect. Oestrinae 43, 1906, p. 10 fig.; SJÖSTEDT, Kilimandjaro-Meru Exp. 1905—1906, vol. 2 (10), Diptera, 1908, p. 18.

Gyrostigma pavesii RODHAIN and BEQUAERT, Bull. Soc. Path. exot. 8, 1915, p. 275 fig.; BEQUAERT, Bull. Amer. Mus. nat. Hist. 35, 1916, p. 383 figs.; RODHAIN and BEQUAERT, Bull. Sci. France Belg. 52, 1919, p. 449 figs.; SÉGUY, Genera Insect. Muscidae 205, 1937, p. 158 figs.; ZUMPT and PATERSON, J. ent. Soc. S. Afr. 16, 1953, p. 68 fig.

Gyrostigma rhinocerontis bicornis BRAUER, Denkschr. Akad. Wiss. Wien 64, 1897, p. 261 fig.; ENDERLEIN, Sitzber. Akad. Wiss. Wien 108, 1899, p. 235 figs.; et Arch. Naturgesch. 67 (Beiheft), 1901, p. 28 figs.; Bau, Genera Insect. Oestrinae 43, 1906, p. 10 fig., RODHAIN and BEQUAERT, Bull. Sci. France Belg. 52, 1919, p. 449.

Spathicera rhinocerontis bicornis SJÖSTEDT, Kilimandjaro-Meru Exp. 1905 to 1906, vol. 2 (10), Diptera, 1908, p. 15 figs.

Spathicera meruensis SJÖSTEDT, id. ibid. p. 12 figs. (*syn. nov.*).

Gyrostigma meruensis ENDERLEIN, Stett. ent. Ztg. **72**, 1911, p. 142; RODHAIN and BEQUAERT, Bull. Sci. France Belg. **52**, 1919, p. 445; ZUMPT and PATERSON, J. ent. Soc. S. Afr. 16, 1953, p. 68 fig. (*syn. nov.*).

There are at present 3 ♂♂ and 7 ♀♀ from Zululand before me. In order to make a comparison with the diagnosis of *G. conjungens* easier, the description is based on the female.

Female (Fig. 1) — Head orange and reddish to dark-brown. Eyes bare, with small facets, separated by a broad frons which is widened towards the lunula. The frons at the narrowest point (near the vertex) measures 2/3 to 3/4 of the eye-length. The broad ocellar triangle, which has the ocelli lacking, is dull orange and more or less darkened medially. Its hind part is provided with hairs. The length and the shape of the

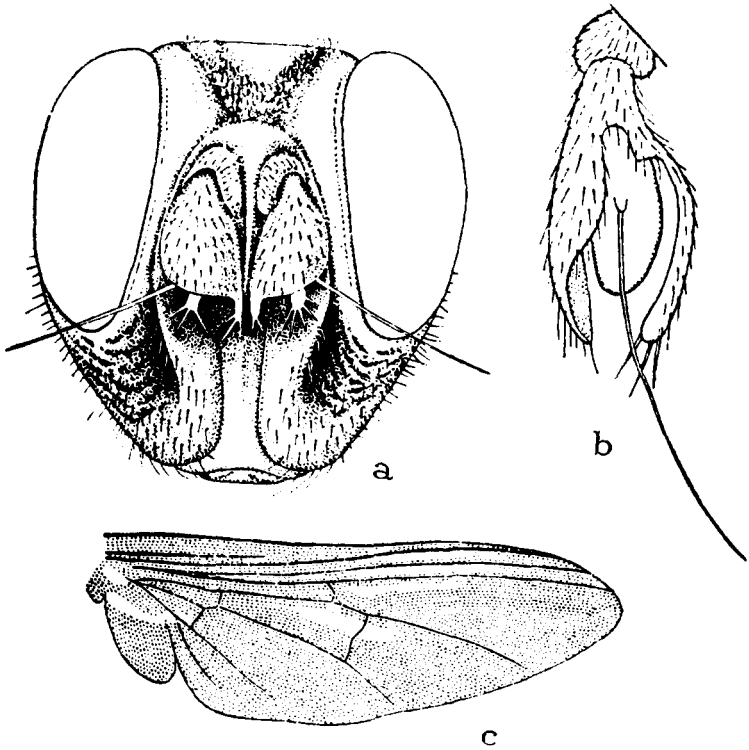

Fig. 1. *Gyrostigma pavesii* (CORTI). Head of female fly in frontal view, antenna laterally and wing (after GRUNIN)

triangle are variable; it may reach only to the middle of the frontal stripe, or be extended almost up to the lunula, the tip may be pointed or blunt. The frontal stripe is well-defined and slightly narrowed towards the lunula. It is red-brown to dark-brown, dull, velvet-like and beset with hairs which, however, easily break off. Parafrontalia and -facialia glossy orange, stiff yellow hairs are found only on the former along the frontal stripe. Antennal groove orange, with a well-developed median keel; antennae of the same colour. The second segment is deeply split, the dorsal part is broad and completely covers the normally-shaped 3rd segment. The ventral part is long and narrow, terminally provided with

long bristles. Arista long and bare. Bucca about 2/5 as high as one eye is long, coloured and of the same velvety appearance as the frontal stripe. Hairs reddish brown and stiff. Palpi orange, globular, rudiment of proboscis minute.

Thorax deep black, with a variable longitudinal median stripe of reddish colour. This stripe extends from the head down to the tip of the

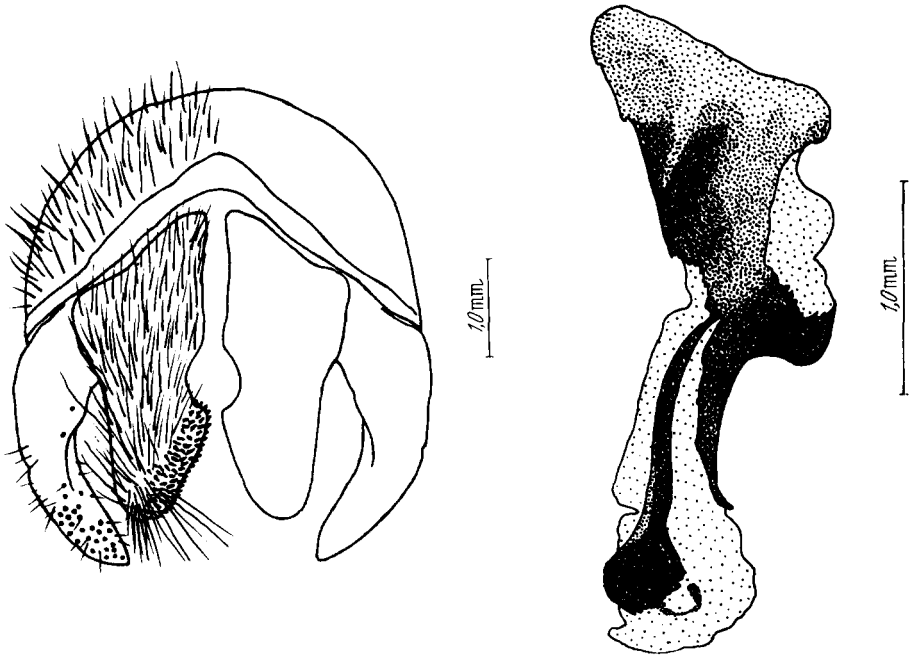

Fig. 2. *Gyrostigma pavesii* (CORTI). Cerci with paralobi in frontal view, phallosome laterally (original)

scutellum. Normally it is about as broad as the base of the ocellar triangle and slightly narrowed in the middle of the mesonotum. There is however one specimen before me in which this median vitta is completely lacking, and another one in which it is accompanied for almost its whole length by a second longitudinal vitta on either side. The pleura and shoulders are deep black too, or partly ill-defined and irregularly reddish, pro- and poststigma dark red-brown or black-brown. The whole thorax is covered with black hairs, those on the median vitta are reddish. Postscutellum not developed. Wings long, reaching beyond the tip of the abdomen. They are predominantly deep black, only in some parts along the veins narrowly and to a variable extent weakly hyaline. A lower marginal cross-vein (tp) is present. Legs reddish-orange, femora blackened rarely in dark specimens. Claws except at base black, pulvilli lacking.

Abdomen deep black like the thorax, only the tip is reddish to a lesser or greater extent. Seventh segment prominently swollen ventrally. Hairs on the dorsal side thin and short, on the ventral side longer and thicker, black. The reddish genital segments bear stiff reddish hairs.

Male (Fig. 2) — The two sexes are very similar to one another in general appearance. The width of frons in the specimens before me measures about 2/3 of eye-length. The structure of the hypopygium fits the general plan of the *Gasterophilus* species.

Length: 24 to 35 mm.

Puparium — Deep black, with the anterior spiracles protruding.

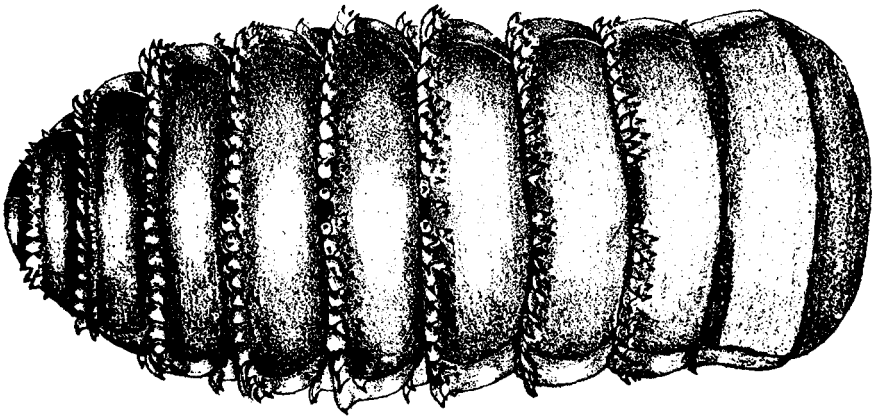

Fig. 3. *Gyrostigma pavesii* (CORTI). Dorsal view of 3rd instar larva (after RODHAIN and BEQUAERT)

Larva III (Figs. 3 and 4) — The mature larva reaches a length of up to 40 mm. The colour is whitish to yellow, and when approaching maturity, irregular dark brown spots appear. The body is composed of the usual 12 segments, but the separation of the first two is ill-defined and detectable only in stretched specimens. The 3rd to 11th segments are provided with bands of 3 to 4 rows of spines which, in each band, decrease in size from the first to the last row. The band is interrupted dorsally, narrowly on the 10th segment and broadly on the 11th segment. The 5th to 8th segments have a pad laterally and posteriorly, each with 3 to 5 spines. Very characteristic is the structure of the posterior peritremes, which are united medially as in the genus *Gasterophilus*. The three slits in each peritreme are strongly tortuous and extremely long. Their pronounced variability was studied by ENDERLEIN (1901, see figure).

Larva II (Figs. 5 and 6) — The second larval instar is not before me, but it has been described and figured by RODHAIN and BEQUAERT (1919). Some of the specimens seen by these authors were 20 mm long, the

shortest about 10 mm. They are more elongated than those of the 3rd stage, and the spinulation is much more delicate, but otherwise similarly arranged. The posterior peritremes show two slits each, which are sinuous, and not simply bent as in *G. conjungens*.

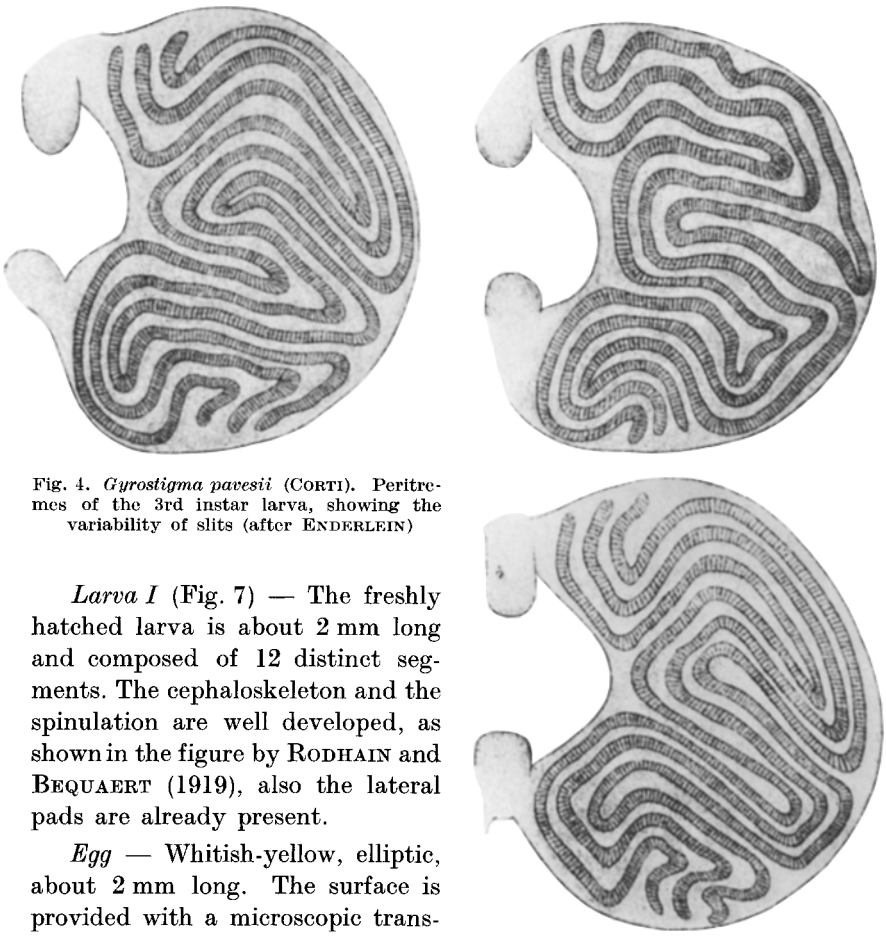

Fig. 4. *Gyrostigma pavesii* (CORTI). Peritremes of the 3rd instar larva, showing the variability of slits (after ENDERLEIN)

Larva I (Fig. 7) — The freshly hatched larva is about 2 mm long and composed of 12 distinct segments. The cephaloskeleton and the spinulation are well developed, as shown in the figure by RODHAIN and BEQUAERT (1919), also the lateral pads are already present.

Egg — Whitish-yellow, elliptic, about 2 mm long. The surface is provided with a microscopic transverse striation. The eggs are singly and firmly attached to the skin of the host, at the more slender tip of the shell which bears a falciform appendage.

Distribution. The larvae of *G. pavesii* have been found in the Black as well as the White Rhinoceros, and they are to be expected wherever these animals still occur. I have seen specimens from Zululand, N. Rhodesia, the North-Eastern Congo, Kenya and Tanganyika, and *G. pavesii* is also recorded from Ethiopia, Gallaland and the Chari district.

Adults have been hatched or caught on the wing in Zululand from March to the beginning of May and from October to December. A batch of larvae isolated on sand on the 19th February resulted in 2 ♂♂ and 4 ♀♀ from the 31st March until the 2nd April. The females lived in the cage for 3 to 5 days and produced eggs. A pair from Fort Jameson in N. Rhodesia were hatched on the 10th February.

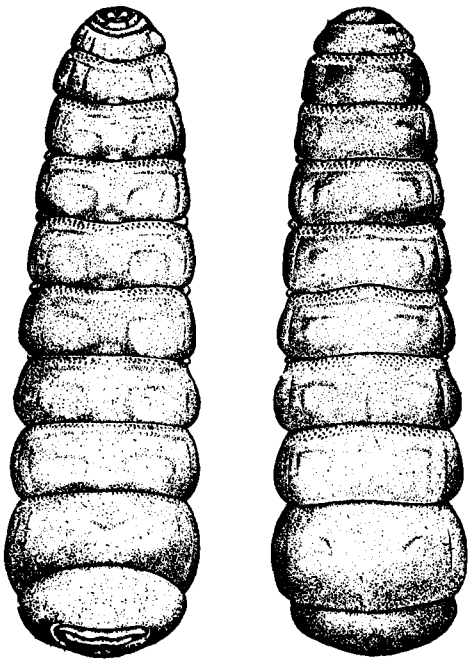

Fig. 5. *Gyrostigma pavesii* (CORTI). Ventral and dorsal views of the 2nd instar larva (after RODHAIN and BEQUAERT)

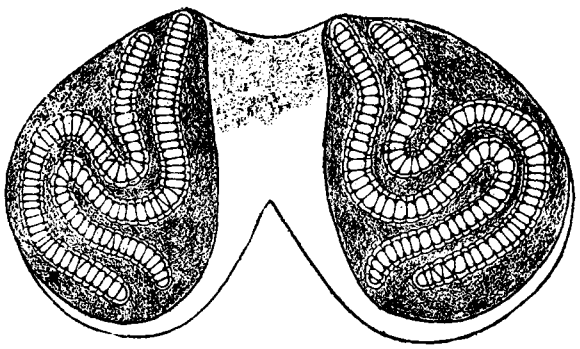

Fig. 6

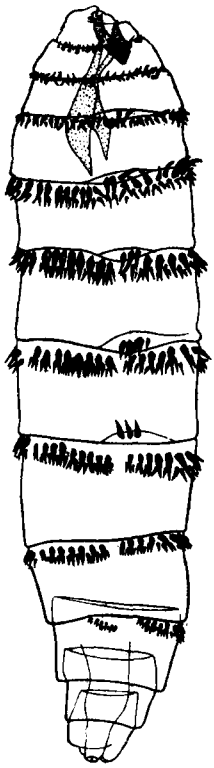

Fig. 7

Fig. 6. *Gyrostigma pavesii* (CORTI). Posterior peritremes of the 2nd instar larva (after RODHAIN and BEQUAERT)

Fig. 7. *Gyrostigma pavesii* (CORTI). Freshly hatched 1st instar larva (after RODHAIN and BEQUAERT)

2. *Gyrostigma conjungens* ENDERLEIN

Gyrostigma conjungens ENDERLEIN, Arch. Naturgesch. 67 (Beiheft) 1901, p. 23 figs.; RODHAIN and BEQUAERT, Bull. Sci. France Belg. **52**, 1919, p. 444 fig.; ZUMPT and PATERSON, J. ent. Soc. S. Afr. 16, 1953, p. 68 fig.

Spathicera conjungens SJÖSTEDT, Kilimandjaro-Meru Exp. 1905—1906, vol. 2 (10), Diptera, 1908, p. 15 fig.

Stomachomyia conjungens ENDERLEIN, Stett. ent. Ztg. 72, 1911, p. 144.

Female (figs. 8 and 9). Head yellow and reddish-brown. Eyes bare, with small facets, separated by a broad, almost parallel frons which measures at its narrowest point 1.2 times the length of one eye. The parafrontalia are narrow and not clearly defined from the frontal stripe, an ocellar triangle is not developed and ocelli are lacking. The vertex is provided with denser and longer reddish hairs, those on the frons are shorter, yellow and adjacent. The whole frons is dull and covered by a dense yellow pollinosity. Face similar to that of *G. pavesii*, the parafacialia are narrower, dull, and covered with a dense

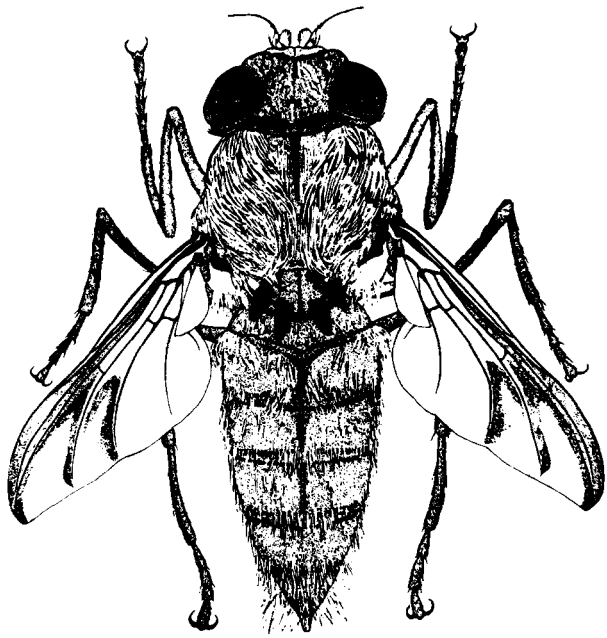

Fig. 8. *Gyrostigma conjungens* ENDERLEIN. Female fly (original)

Fig. 9. *Gyrostigma conjungens* ENDERLEIN. Lateral view of antenna of female fly (original)

pollinosity like that on the frons. The median keel of the antennal groove is narrow and low. Oral groove with much smaller palpi than in *G. pavesii*, and with only a tiny rudiment of proboscis. Second antennal segment as large and deeply split as in *G. pavesii*, but the ventral part is shorter and provided with three finger-like lobes, arista long and bare. Bucca about 1/3rd as high as long, also densely yellow pollinose and with yellow hairs.

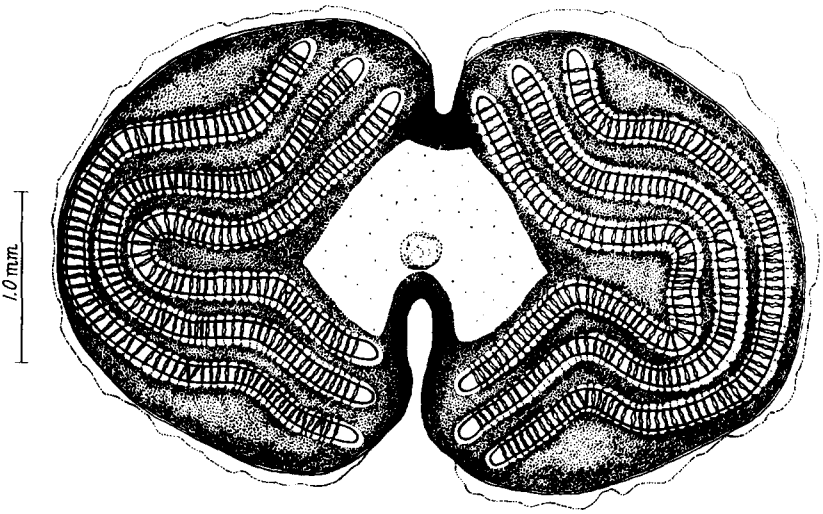

Fig. 10. *Gyrostigma conjungens* ENDERLEIN. Posterior peritremes of 3rd instar larva (original)

Thorax with the integument yellow to reddish-yellow, but densely covered with long, yellow and reddish hairs, the latter form two pairs of stiff brushes at the margin of the scutellum. Postscutellum not developed. Wings relatively shorter than in *G. pavesii*, not reaching beyond the tip of the abdomen. Furthermore, the lower marginal cross-vein (tp) is lacking, and the blackish infuscation is restricted to some terminal parts along the veins, as shown in the figure. Legs yellow, partly brownish, claws black except at base, pulvilli wanting.

Abdomen yellow to yellow-brown, laterally and ventrally partly blackish, with yellow hairs which are denser and longer and also more yellow-brown at the hind margins of the segments than on the anterior parts. Seventh segment not prominently swollen as in the female of *G. pavesii*.

Length: 20—24 mm.

Male — Not known.

Puparium — In older specimens completely black. The two specimens before me have hatched from puparia which are strikingly different

in outer shape. The one is much broader and shorter (17 to 6 mm) than the other which is slender and elongate (19 to 5 mm). This difference is reflected in the shape of the abdomen of the adults being stouter in the one than in the other.

Larva III (Fig. 10) — The mature larva reaches a length of up to 24 mm. The spinulation is very similar to that of *G. pavesii*; actual constant differences are very few and concern only the arrangement and

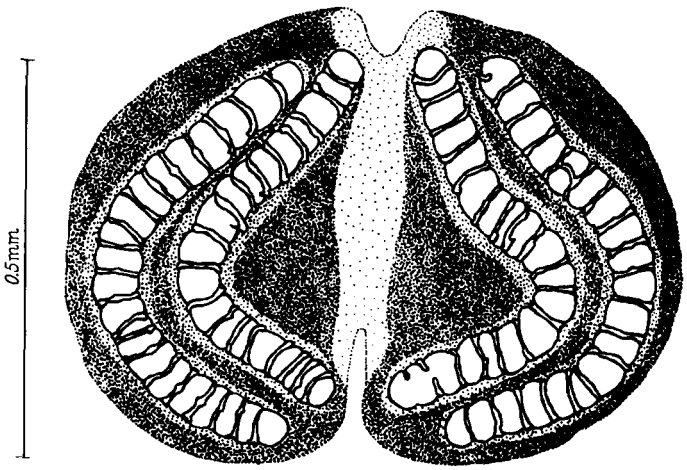

Fig. 11. *Gyrostigma conjungens* ENDERLEIN. Posterior peritremes of 2nd instar larva (original)

number of certain spines, as studied by ENDERLEIN (1901). The main and very characteristic separating feature lies in the shape of the slits in the posterior peritremes, which are simply bent in *G. conjungens*, but tortuous in *G. pavesii*.

Larva II (Fig. 11) — There are three specimens before me which measure 10 to 11 mm in length, but they are not ripe for moulting and those which are may reach a much greater length. With respect to shape and spinulation, it is apparently very similar to *G. pavesii*. I have not yet seen the second instar larva of this species, according to the description and figure by RODHAIN and BEQUAERT (1919), however, the spines in *G. conjungens* may be a little more prominent, but otherwise they are arranged as in *G. pavesii*. The main differences are again found in the shape of the slits in the posterior peritremes. In *G. conjungens*, they are simply bent, in *G. pavesii*, they are sinuous.

Larva I and *eggs* have not yet been found.

Distribution: ENDERLEIN described the species from larvae of the third stage, collected from the stomach of a Black Rhinoceros. It had been shot by Mr. SCHILLINGS on the 23rd October, 1899, near the river

Mt. Nairobi, at the foot of Kilimandjaro, Tanganyika. Larvae of *G. conjungens* were apparently not found again until 1959, when the East African Veterinary Research Organization got hold of some specimens of the 2nd and 3rd larval stages collected from the Black Rhinoceros in Makueni and Makundi, Kenya (March, 1959). The two adults which Mr. J. G. TREMLETT hatched came from the same host in the Tsavo National Park, Kenya. The larvae had been isolated on the 23rd June, 1961, and the flies appeared on the 6. August, 1961.

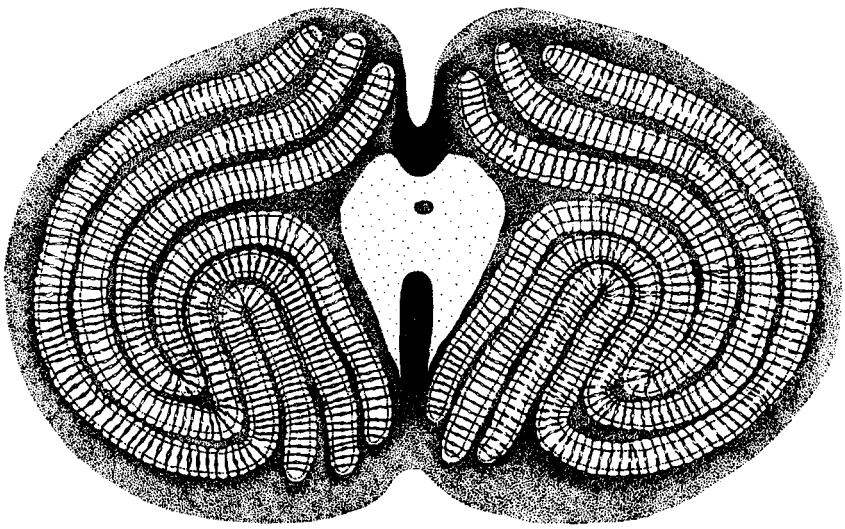

Fig. 12. *Gyrostigma sumatrensis* BRAUER. Posterior peritremes of 3rd instar larva (original)

3. *Gyrostigma sumatrensis* BRAUER

Gyrostigma sumatrensis BRAUER, Verh. zool.-bot. Ges. Wien 34, 1884, p. 269 figs.; ENDERLEIN, Sitzber. Akad. Wiss. Wien 108, 1899, p. 235 figs.; et Arch. Naturgesch. 67 (Beiheft) 1901, p. 24 fig.; Bau, Genera Insect. Oestrinae 43, 1906, p. 10 figs.; RODHAIN and BEQUAERT, Bull. Sci. France Belg. 52, 1919, p. 442 fig.; ZUMPT and PATERSON, J. ent. Soc. S. Afr. 16, 1953, p. 69 fig.

Of this species, only the third instar larva is known, several specimens of which had been recovered from the Asiatic Two-horned Rhinoceros from Sumatra, a specimen having died in both the Zoological Gardens of Hamburg and Leipzig at the end of the last century. Since then, no more specimens have found their way to a scientist. One of the larvae from the Hamburg batch is before me.

Larva III (Fig. 12) — The larva before me measures 29 mm in length, BRAUER in his description gave 31 mm. In general appearance it is quite similar to *G. pavesii*. The bands of spines are composed of 3 rows which are narrowly interrupted dorsally on segment III to X and

broadly on segment XI. Lateral pads are present on segment V to VII as in *G. pavesii*, but they are weakly developed and bare of spines (rarely one present) on the 8th segment. The posterior peritremes have the slits slightly tortuous and are with respect to shape somewhat intermediate between *G. conjungens* and *G. pavesii*.

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Zusammenfassung

Die Gattung *Gyrostigma* BRAUER (Diptera: *Gasterophilidae*) enthält die folgenden drei Arten, deren Larven sich im Magen von afrikanischen und orientalischen Nashörnern entwickeln: *G. pavesii* (CORTI), *G. conjugens* ENDERLEIN und *G. sumatrensis* BRAUER. Die bisher als selbständig geführte *G. meruensis* SJÖSTEDT wird als Synonym von *G. pavesii* angesehen.

Gyrostigma pavesii entwickelt sich im afrikanischen Schwarzen Nashorn [*Diceros bicornis* (L.)] und im Breitmaulnashorn [*Diceros simus* (BURCHELL)], *G. conjungens* im Schwarzen Nashorn, und *G. sumatrensis* im Sumatranashorn [*Didermoceros sumatrensis* (FISCHER)]. Die Imago von *G. pavesii* wurde bereits von CORTI im Jahre 1895 bekanntgemacht, die von *G. conjungens* war bisher unbekannt und es wird zum ersten Mal das Weibchen beschrieben. Die Entdeckung der Imago von *G. sumatrensis* steht noch aus. Das letzte Larvenstadium aller drei Arten ist seit langem bekannt. Hinsichtlich der Gestalt und Bedornung sind die drei Arten einander sehr ähnlich, jedoch leicht trennbar durch die Form der Schlitze in den hinteren Stigmen. Das 2. Larvenstadium ist nur von den beiden afrikanischen Arten *G. pavesii* und *G. conjungens* bekannt, die sich ebenfalls durch die Form der Schlitze der hinteren Stigmen voneinander trennen lassen. Die Eier werden bei *G. pavesii* auf der Haut der Wirte abgelegt, und es ist auch deren 1. Larvenstadium beschrieben. Unbekannt ist jedoch, wie das 1. Larvenstadium in den Verdauungskanal der Wirte gelangt.

Die Imago von *G. conjungens* ist den *Gasterophilus*-Arten äußerlich viel ähnlicher als die von *G. pavesii*. Es wird als unnötig betrachtet, die Gattung *Gyrostigma* in eine besondere Unterfamilie zu stellen und daher vorgeschlagen, sie in Zukunft neben *Gasterophilus* bei den *Gasterophilinae* zu führen.

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