

SOME ORIBATEI FROM GHANA.
XI. THE GENUS *EPILOHMANNIA* BERLESE 1916¹

BY

John A. WALLWORK.

(Department of Zoology, University of Kentucky, U.S.A.).²

INTRODUCTION.

The genus *Epilohmannia*, which appears to be widely distributed through the warmer regions of the world, is represented by about 160 individuals belonging to four distinct species in my collections from Ghana. Each species is well represented in terms of numbers of individuals, and forms a conspicuous part of the oribatid mite fauna in samples collected at several localities.

Two species have been described previously from East Africa, namely *E. amygdaliformis* Berl. 1916 and *E. barbatula* Balogh 1958. Unfortunately these descriptions are too short to permit adequate comparisons with the Ghana material. European species are more easily compared as a result of the definitive work of SCHUSTER (1960). SCHUSTER postulates that the species *E. cylindrica* (Berl.), which is the type for the genus, is a species complex, the « *cylindrica*-complex », consisting of at least four distinct morphological groups, namely *E. styriaca* Schuster, *E. inexpectata* Schuster, *E. szanisloi* (Oudemans) and *E. szanisloi* form *minima*. VAN DER HAMMEN (1959) has compared OUDEMANS' species, *Lesseria szanisloi*, with the type material of BERLESE's species, *E. cylindrica*, and has noted the synonymy. *E. szanisloi* (Oudemans) is therefore suppressed in favour of *E. cylindrica* (Berl.), and this latter name would apply even in a strict sense to the species designated *E. szanisloi* (Oudemans) in SCHUSTER's work. The detailed descriptions provided by SCHUSTER form a sound basis for comparison between the European and Ghana species; the works of OUDEMANS (1917) and SELLNICK (1931) have also been consulted in this respect. These comparisons indicate that the four species collected in Ghana are quite different from the European species, and they are described below as new species.

1. Research supported by National Science Foundation Grant No. G 20860.

2. Present address : 8, Lon Menai, Menai Bridge, Anglesey, United Kingdom.

An attempt is made in the following descriptions to follow GRANDJEAN's general system of notation for the various morphological features of taxonomic significance. The system used by SCHUSTER differs somewhat from this, and the two systems are reconciled, where appropriate, to permit a meaningful comparison between the European and Ghana species.

As in recent papers in this series, the sampling localities from which specimens were obtained are indicated only by placenames. A more detailed description of these has been given earlier (WALLWORK 1960).

Epilohmannia Berlese 1916.

General characters. — This genus is unique in several respects and is the single representative of the family Epilohmanniidae (see GRANDJEAN 1953, p. 430). The principal distinguishing feature is the presence of a transverse suture separating two ventral plates, a condition termed schizogastric (VAN DER HAMMEN 1959). The more anterior of the two ventral plates surrounds the genital aperture laterally and anteriorly, and is referred to herein as the aggenital plate; the more posterior ventral plate surrounds the anal aperture laterally and anteriorly, and is referred to herein as the adanal plate. Other distinctive characters of this family include the propodosoma-hysterosomal articulation which is well developed and permits the retraction of the posterior part of the propodosoma within the hysterosoma, the presence of the lateral abdominal gland, the virtual condition of notogastral setae f_1 and the presence of two pairs of exopseudostigmatic setae on the prodorsum.

Sexual dimorphism. — An unusual feature of the Ghanaian species is the presence of sexual dimorphism. In three of the four species described below the males can be distinguished easily from the females by the body size (males smaller than females), the size of the genital aperture (relatively smaller in males), and the degree of slope of epimeral ridges IV (more steeply sloping in females). Collections of a fourth species contained only females. This phenomenon has not been described in members of this genus from other parts of the world, as far as I am aware. These sexual differences will be outlined in more detail in the following descriptions.

Epilohmannia neotricha n. sp. (fig. 1-19).

Collected in Ghana : 72 adults (34 males, 38 females).
Sexual dimorphism is present.

Male. — Average body length : 534.9 μ (range : 492.8 μ -616.0 μ). Average body width (measured at widest part of hysterosoma) : 259.5 μ (range : 261.8 μ -292.6 μ).

Female. — Average body length : 628.3 μ (range : 569.8 μ -723.8 μ). Average body width (measured at widest part of hysterosoma) : 325.5 μ (range : 292.6 μ -369.6 μ).

Very few specimens of this species were fully extended or contracted. Measurements of these specimens are not included in those given above.

Type locality. — Essuboni Forest Reserve.

Description of holotype, male. — Length of body : 569.8 μ ; width of hysterosoma (at widest part) : 292.6 μ . Dorsal and ventral views of holotype are given in

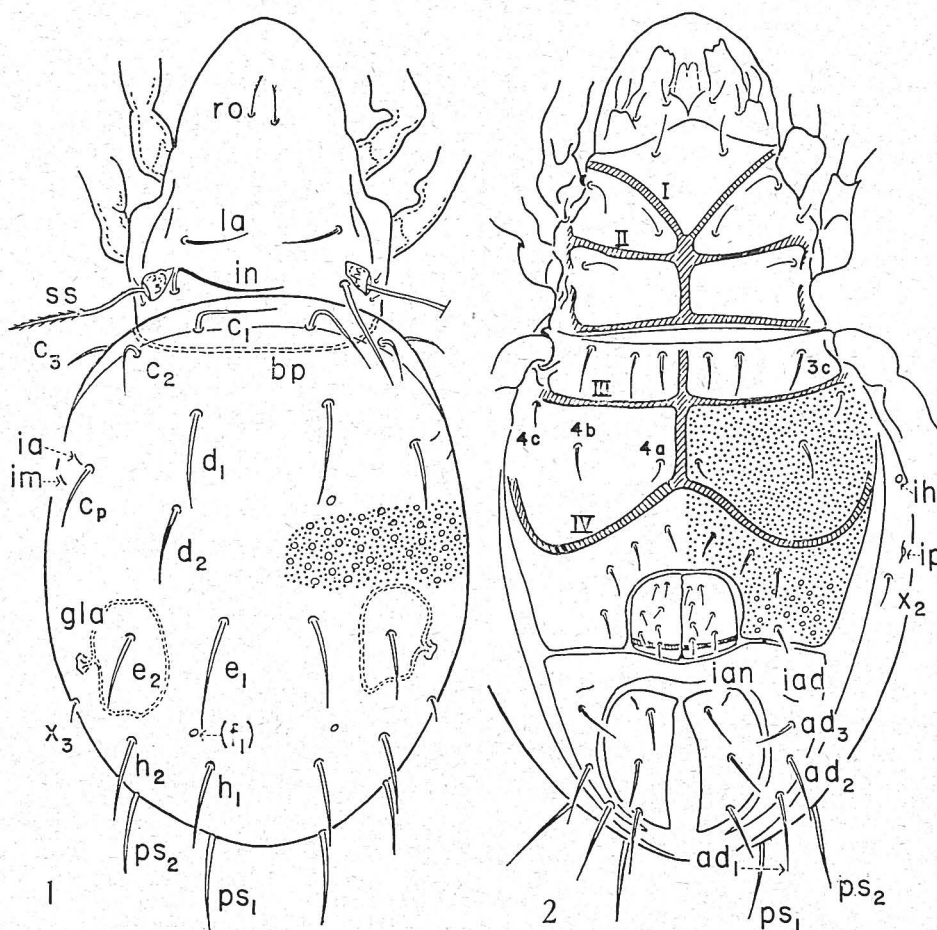


FIG. 1-2. — *Epilohmannia neotricha* n. sp. Holotype, male.

1 : Dorsal view. 2 : Ventral view. ro = rostral setae ; la = lamellar setae ; in = interlamellar setae ; ss = sensillus ; c_1 , c_2 , c_3 , c_p , d_1 , d_2 , e_1 , e_2 , h_1 , h_2 , x_2 , x_3 , ps_1 , ps_2 = normal notogastral setae ; (f_1) = virtual notogastral seta ; bp = posterior limit of prodorsum ; ia, im, ih, ip = notogastral fissures ; gla = aperture of lateral abdominal gland ; ad_1 , ad_2 , ad_3 = adanal setae ; iad = adanal fissure ; ian = anal fissure ; I, II, III, IV = epimeral ridges ; 3c, 4a, 4b, 4c = coxisternal setae.

figs. 1-2. Colour of body rich red-brown; anterior half of prodorsum and legs are yellow brown. Integument covering body and legs bears two types of punctate figures, namely a fine regular punctate pattern generally distributed over dorsal and ventral surfaces of the body, and a pattern of larger punctate figures irregularly distributed over the surface of the body, conspicuous on the posterior half of prodorsum, on the notogaster and aggenital and anal plates. The fine punctate figures appear as oblique internal striations on the anterior part of prodorsum and lateral margins of coxisternal plates (particularly coxisterna II); the larger figures (each measuring about $2\ \mu$ in diameter) appear to be depressions in the integument¹.

Prodorsum. — Rostral setae are delicate structures, easily overlooked on first examination, situated close together on anterior half of prodorsum, twice as long as their mutual distance. The left seta is inserted slightly anterior to the right one in the holotype (relative positions are variable in paratypes). Each seta is $20\ \mu$ long, glabrous proximally, barbed distally and terminally bifid (fig. 17 shows rostral seta of female which is entirely similar to that of the male). Lamellar setae inserted on posterior half of prodorsum, curved mediad over surface of prodorsum, minutely barbed, $40\ \mu$ long. Insertions of anterior and posterior exopseudostigmatic setae are close together, lateral to pseudostigma on each side (*exa*, *exp*, fig. 6); the posterior seta is slightly shorter than the anterior one. Interlamellar setae relatively long (about $100\ \mu$), minutely barbed, inserted near base of pseudostigma on each side. Sensillus is long and filiform, barbed distally, approximately the same length as interlamellar seta.

Notogaster. — Broadly oval in shape, bearing 14 pairs of true setae; setae f_1 are virtual, being represented only by their insertions. Centrodorsal setae (c_1 , d_1 , e_1 , h_1) are about $65\ \mu$ long; lateral dorsal setae (c_2 , d_2 , e_2 , h_2 , ps_2) are slightly shorter ($40\ \mu$); humeral setae c_3 are $20\ \mu$ long; setae x_2 and x_3 are short delicate structures, $10\ \mu$ long². All notogastral setae are curved posteriad and, with the possible exceptions of x_2 and x_3 , are minutely barbed. Seta x_3 is inserted posterior to the aperture of the lateral abdominal gland, on each side; seta x_2 is inserted immediately posterior to notogastral fissure *ip* (fig. 3).

Four pairs of notogastral fissures are present, namely *ia*, *im*, *ih* and *ip*. Fissures *ia* and *im* are located very close together near the insertion of notogastral seta *cp*; the designations of these two fissures in figs. 1 & 3 are arbitrary. Fissures *ia*, *im* and *ip* are elongated slits, *ih* is a small circular pore. Aperture of lateral abdominal gland is distinct, remote from ventro-lateral margin of notogaster.

1. A similar double punctate pattern has been described by GRANDJEAN (1958, p. 61 & fig. 4 G) for *Perlohmannia dissimilis*. GRANDJEAN uses the terms "punctuation de porosite" for the fine punctate pattern, and "punctuation de surface" for the larger depressions.

2. Setal notations in figs. 1-3 generally follow those of GRANDJEAN; exceptions are the particular notations given to setae x_2 and x_3 (Schuster 1960); setae designated x_1 by Schuster are herein designated c_3 .

Lateral region of podosoma. — Supracoxal spine (eI) is present, located between the insertions of legs I and II (fig. 6). Antiaxial seta (ic) of coxisternum I is inserted in this region, ventral to the supracoxal spine. Notations eI and ic thus correspond to id and ic respectively in *E. gigantea* Berl. (see SCHUSTER, 1960, fig. 7 d).

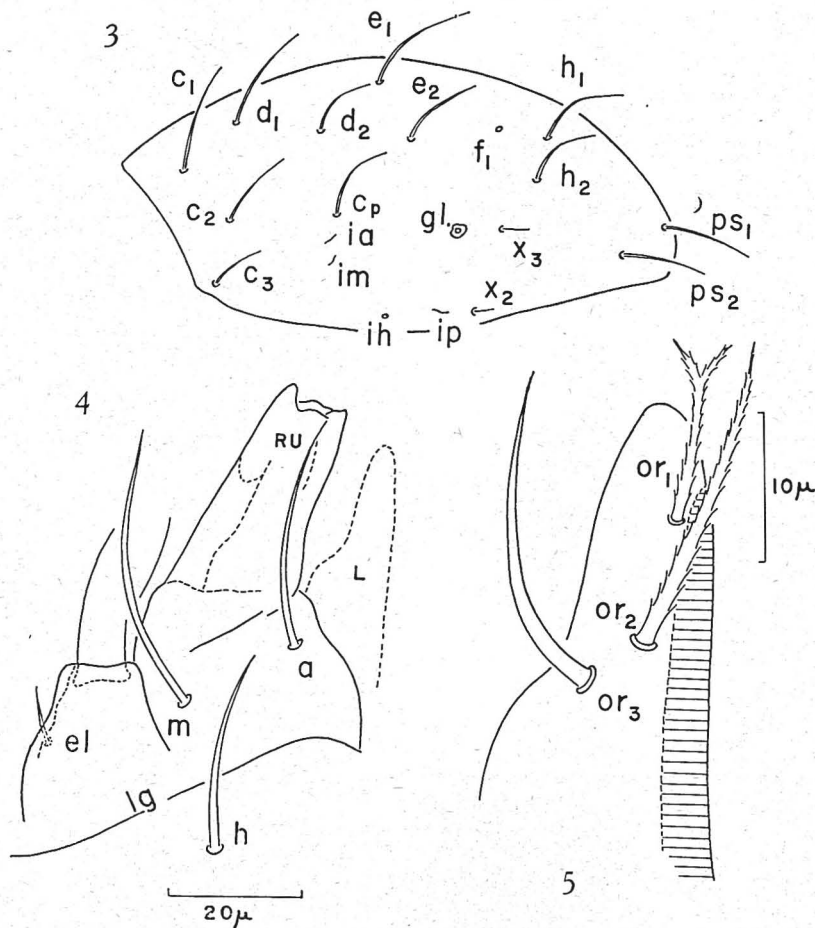


FIG. 3-5. — *Epilohmannia neotricha* n. sp. Paratype, male.

3 : Lateral view of notogaster. 4 : Gnathosoma, right, ventral view. 5 : Lateral lip, ventral view, right side. RU = rutellum; L = lateral lip; a, m = infracapitular setae; el = palpal spine; lg = labio-genal articulation; h = hysterosomal seta; or_1 , or_2 , or_3 = adoral setae; other notations are as in fig. 1-2.

Ventral region of podosoma. — Epimeral ridges I are convergent, forming a strong V-shaped figure separating the two plates, coxisterna I; these two plates are contiguous in the mid-line for a short distance only. Coxisterna II are broadly contiguous in the mid-line; they are separated from coxisterna III by the ventro-

sejugal depression. Coxisterna III are broadly contiguous in the mid-line. Coxisterna IV are large plates, contiguous in the mid-line for about half their lengths; epimeral ridges IV, which delimit these plates posteriorly, are broadly decurved postero-laterad; the ridges join medially in a sternal ridge which separates the contiguous portions of coxisterna IV. Coxisternal setal formula is (3-1-3-3); seta 3 *c* (antiaxial) is remote from the humeral region; seta 4 *b* is inserted antero-lateral to 4 *a*.

Genito-anal region. — Aggenital neotrichy is present, a character reflected in the species name. Holotype bears 4 pairs of aggenital setae (the number is variable in paratypes). Genital aperture is appreciably smaller than anal aperture (a male character); each genital plate bears 7 setae, arranged in a paraxial row of 4 and an antiaxial row of 3 setae. A transverse chitinised ridge is also present on each genital plate near the posterior margin; no genital setae are inserted posterior to this ridge. There are 3 pairs of minutely barbed adanal setae, 3 pairs of anal setae. Adanal fissure present on each side as a transverse slit, located immediately anterior to the most anterior adanal seta (*ad*₃); each anal plate bears an anal fissure located near antero-lateral margin of the plate, and obliquely oriented with respect to the long axis of the body.

Male organ. — The penis was observed in every case; several paratypes were dissected to confirm sex determinations. The organ resembles that of *Perlohmannia dissimilis* in general form (see GRANDJEAN, 1958, fig. 3 D); the distal cone is sharply pointed; eugenital setae inserted around the base and on the sides of this cone.

Gnathosoma. — Labio-genal articulation (*lg*) is complete (fig. 4), decurved posteriad on each side, sternarthral. This articulation delimits the anterior margin of the menton or hysterosome (= camerostome SCHUSTER 1960), and separates this anteriorly from the labial jaw carrying infracapitular setae *a* and *m*. Hysterosome bears a single pair of setae (*h*); it is triangular in shape, with apex directed posteriorly between coxisterna I. Rutellum (RU) is without ventral expansion, atelebasic, as shown in fig. 4. Three adoral setae are inserted on each lateral lip (fig. 5); seta *or*₁ is minutely barbed and terminally bifid; seta *or*₂ is also barbed; seta *or*₃ is slightly longer than the other two, strongly curved.

The palp is composed of two articles, namely a fused basal part bearing 3 setae, and a free tarsus bearing 8 setae and solenidion ω . Tarsal setae (*ul*) and *acm* are eupathidial; the small seta *su* is barely visible in its close association with seta *ul'* (fig. 7). Palpal spine (*el*) is inserted dorsally, near the base of the palp.

The labrum (fig. 8) is strongly pleated, resembling that of *Perlohmannia dissimilis* (see GRANDJEAN, 1958, fig. 4 A).

The mandible is strongly dentate; the anterior seta is more strongly developed than the posterior one.

Legs. — The femur of legs I and II is greatly reduced in size and appears to be fused or partly fused with the trochanter ; the genu is much larger (figs. 9 & 11) ; thus legs I and II appear to consist of only 4 articles. Legs III and IV show the normal arrangement of 5 articles ; trochanters III and IV are well developed ;

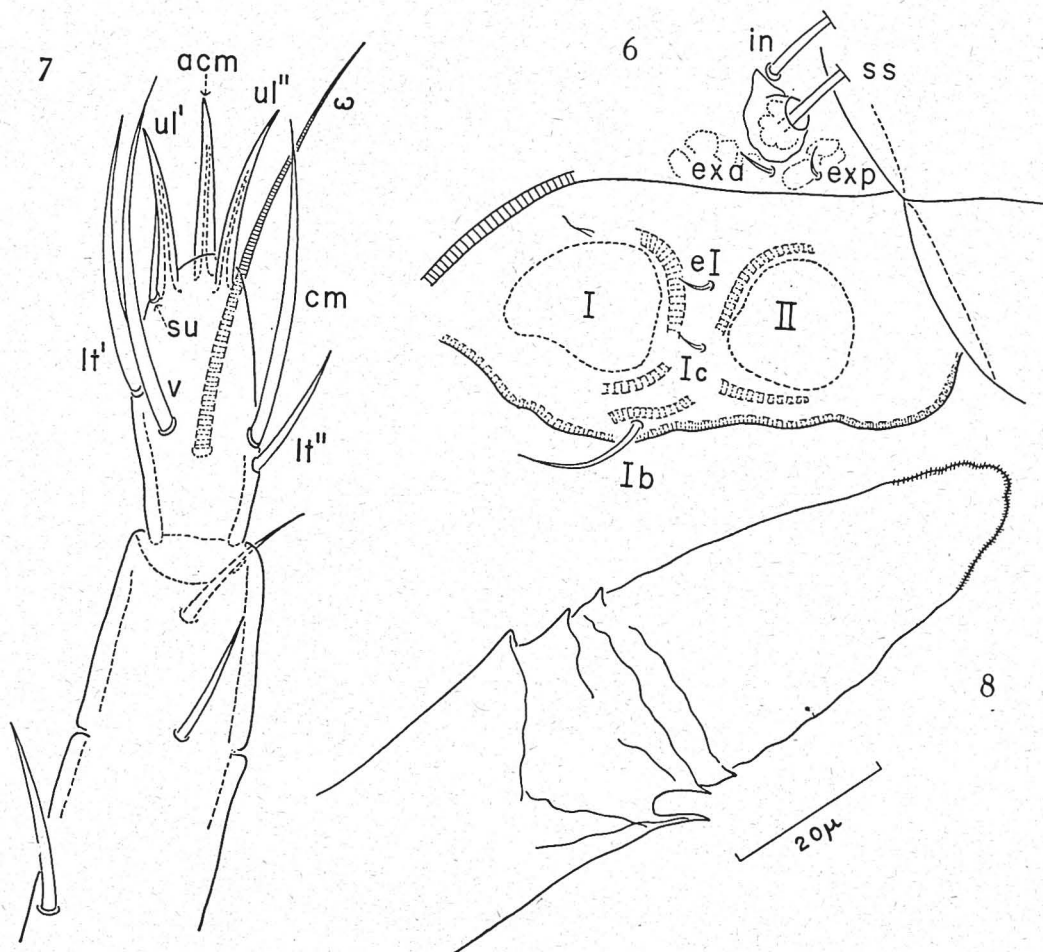


FIG. 6-8. — *Epilohmannia neotricha* n. sp. Paratype, male.

6 : Lateral region of propodosoma. 7 : Palp. 8 : Labrum. *exa*, *exp* = anterior and posterior exopseudostigmatic setae ; *eI* = supracoxal spine ; *Ib*, *Ic* = coxisternal seta ; *I*, *II* = insertions of legs I, II ; *lt'*, *lt''*, *v*, *su*, *acm*, *ul'*, *ul''*, *cm* = tarsal setae on palp ; ω = solenidion. Other notations as in fig. 1-2.

each bears a pointed spur dorsally. Femur is distinct and larger than the genu on legs III and IV (fig. 13).

The number of solenidions on genu-tibia-tarsus of legs I-IV is given by the following formula :

$$\text{I (2 — 1 — 3) ; II (1 — 1 — 2) ; III (1 — 1 — 0) ; IV (1 — 1 — 0).}$$

The dorsal seta d is not distinct on genu and tibia I-IV ; as far as I can judge this seta appears to be in close association with the solenidion on these articles (figs. 9, 11 & 13) ; the association is with solenidion σ'' on genu I ; a similar association exists between ω_2 I and seta ft'' (fig. 10). The association between solenidion and seta is very close, and the two components cannot be separated by dissection ; the evidence for its presence rests on the double insertion. Tarsus I bears 3 solenidions ; ω_1 is curved, baculiform, ω_2 terminates distally in a fine tip, ω_3 is shorter

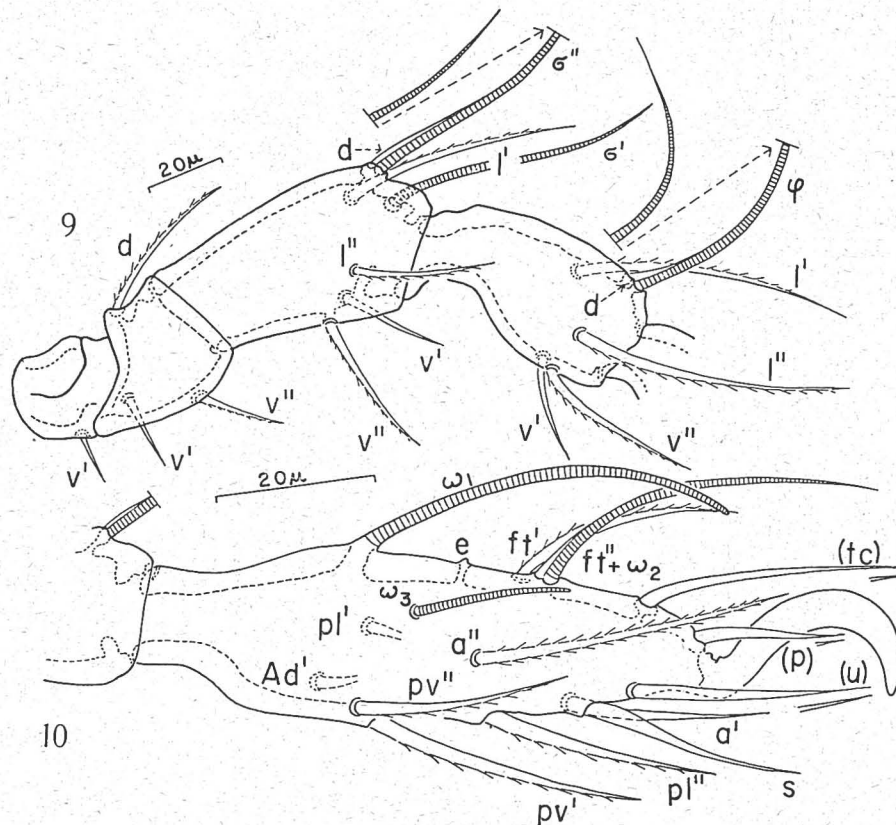


FIG. 9-10. — *Epilohmannia neotricha* n. sp. Paratype, male.

9 : Trochanter-femur-genu-tibia of leg I, antiaxial. 10 : Tarsus I, antiaxial.

than ω_1 and ω_2 and is baculiform in shape, located antiaxially. Tarsus II bears 2 baculiform solenidions (fig. 12).

The chaetotaxy of tarsi I-VI (figs. 10, 12, 14 & 15) is expressed by the formula :

$$(17 - 12 - 10 - 9)$$

The famulus on tarsus I is reduced to a conical projection. Setae (p) are present on tarsus I only ; tarsi I and II bear an additional seta, ad' , paraxially ; the iter al setae (it) are lacking on all tarsi. Tarsus IV bears a strongly thickened seta (seta s) ;

seta a'' IV is somewhat thickened and densely setose; seta ft' IV is lacking. All tarsi are monodactyle, claw strongly curved. Dorsal fissure present on all tarsi.

Variations. — The principal source of variation is the number of aggenital setae. Typically there are 4 pairs; frequently 5 setae occur on one side, 4 on the other; occasionally there are 5 pairs of setae; two paratypes show a 3 : 4 distribution of these setae, and in three specimens collected at Numia there are 3 pairs of aggenital setae.

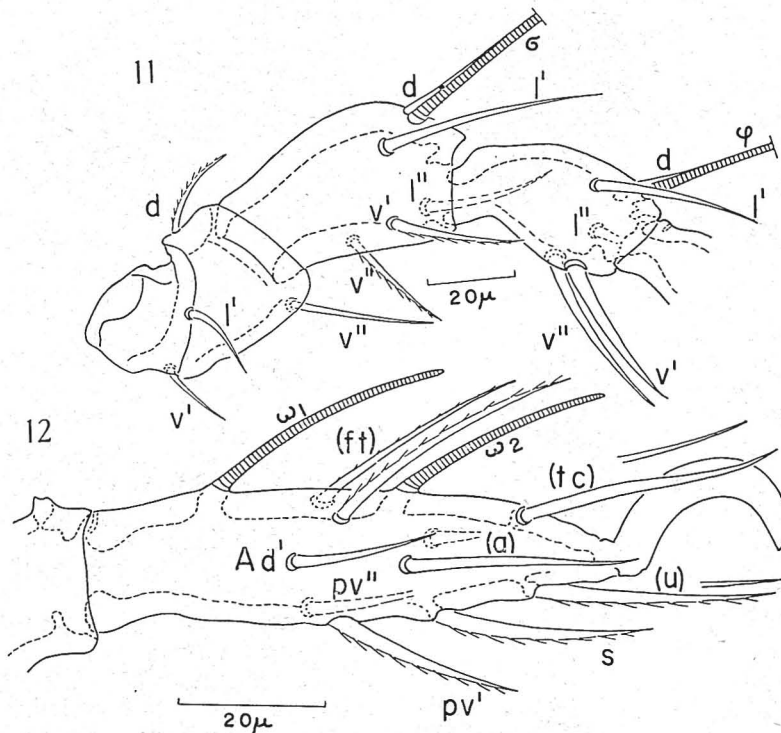


FIG. 11-12. — *Epilohmannia neotricha* n. sp. Paratype, male.
11 : Trochanter-femur-genu-tibia of leg II, paraxial. 12 : Tarsus II, paraxial.

The number of genital setae is variable, although the typical number is 7 on each plate (the typical number in European species of this genus appears to be 8). Two paratypes show an 8 : 7 distribution of genital setae, another specimen 6 : 7.

One paratype bears 4 setae on one coxisternal plate IV, the corresponding plate on the other side being normal with 3. The paraxial seta on coxisternal plates III (3a) is located at a level posterior to that of the other two setae, in a number of cases.

As indicated earlier, the locations of the rostral setae are variable. Usually the left seta is inserted slightly anterior to the right one; in some instances the

setae are inserted on the same level; the right seta is never located anterior to the left one in the males examined (cf. locations of rostral setae in females).

Several paratypes are dull brown in colour; the "punctuation de surface" is not developed in these individuals.

Description of allotype, female. — Length of body : 646.8 μ ; width of hysterostoma (at widest part) : 338.8 μ . Figs. 16-18 show views of allotype female. The distinctive morphological features are described briefly below.

Dorsal surface. — Very similar to the male. Rostral setae (fig. 17) are 30-40 μ long, barbed distally, terminally bifid; the right seta is inserted anterior to the left one in the allotype.

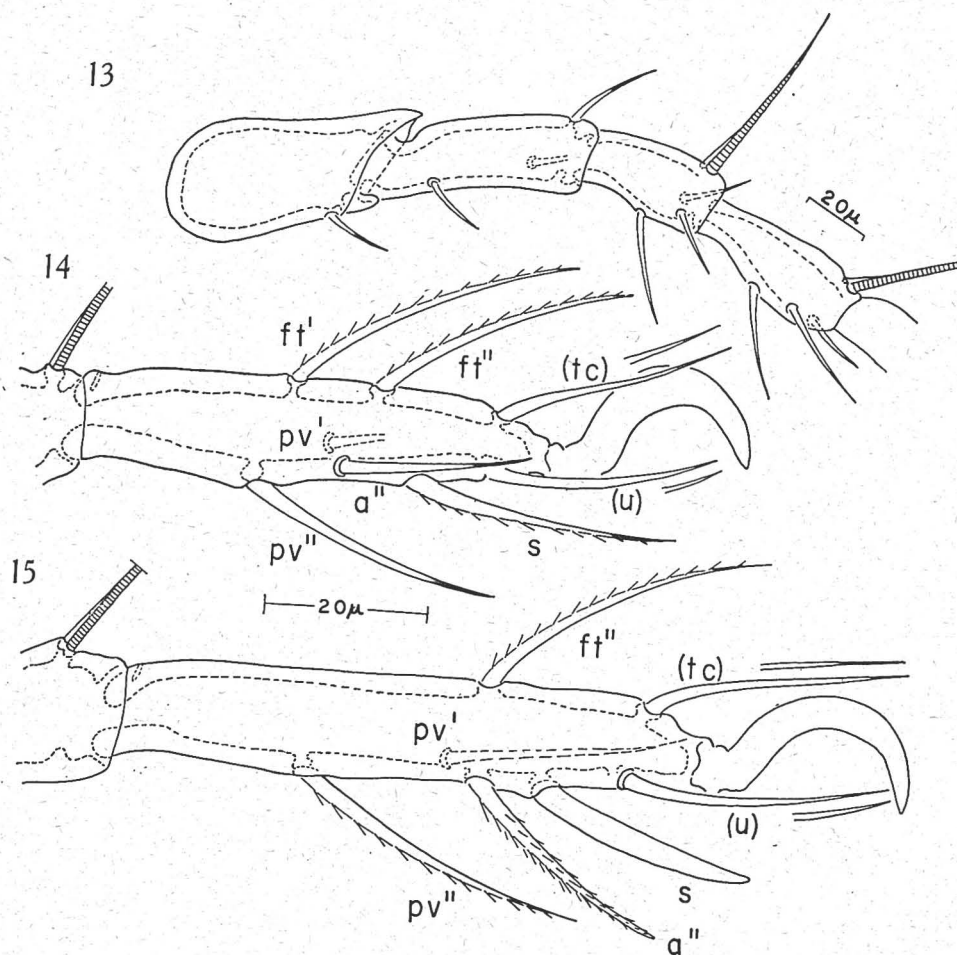


FIG. 13-15. — *Epilohmannia neotricha* n. sp. Paratype, male.
13 : Trochanter-femur-genu-tibia of leg IV, paraxial. 14 : Tarsus III, paraxial.
15 : Tarsus IV, paraxial.

Notogastral setae relatively longer than those of male ($c_1 = 95 \mu$; $c_2 = 65 \mu$); all setae are finely barbed.

Ventral region of podosoma. — Epimeral ridges I form a V-shaped figure, as in the male. Coxisternal plates I, II and III as in the male. Coxisternal

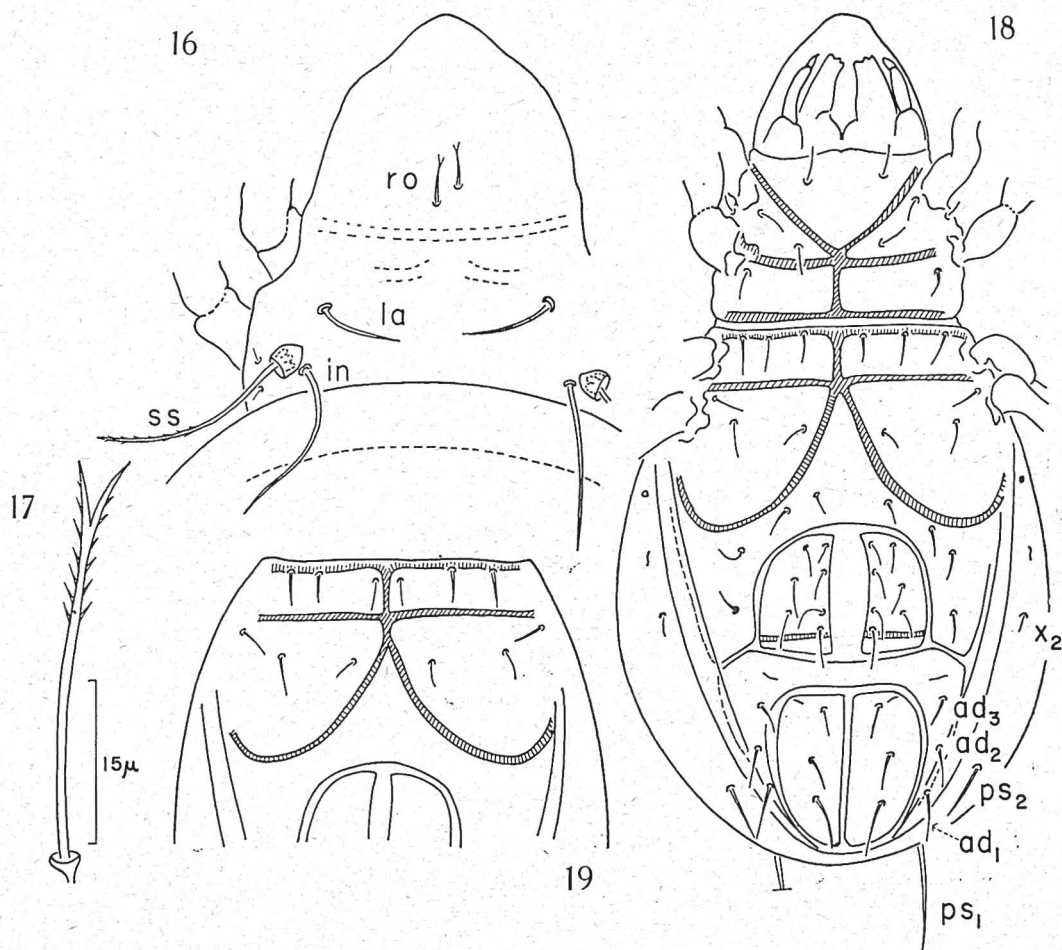


FIG. 16-19. — *Epilohmannia neotricha* n. sp.

Fig. 16-18. — Allotype, female. Fig. 19. — Paratype, female.

16 : Prodorsum, dorsal view. 17 : Rostral seta. 18 : Ventral view.

19 : Paratyptic variation in form of epimeral ridges IV. Notations as in fig. 1-2.

plates IV are not contiguous; epimeral ridges IV are V-shaped and sharply decurved postero-laterad (fig. 18); these ridges do not join medially in a common sternal ridge in the allotype. Coxisternal setal formula is (3 — 1 — 3 — 3).

Genito-anal region. — Genital aperture is relatively larger than that of the male, and is as wide or wider than anal aperture. Each genital plate bears 7 setae and

a transverse chitinised ridge near the posterior margin. Other features of the region resemble those of the male. The ovipositor is extruded in several specimens; the eugenital lobes are widely separated in distended specimens; the chaetotaxy appears to be normal although a detailed examination was not made.

Gnathosoma and legs. — Similar in all respects to the male.

Variations. — Paratypic variations include the presence of 5 pairs of aggenital setae or, more commonly, a 5 : 4 distribution; one paratype shows a 6 : 4 distribution, and another (from Numia) has 3 pairs of aggenital setae.

Several paratypes, particularly those collected at Axim, have a short sternal ridge between coxisternal plates IV; this arrangement is shown in fig. 19. Sternal ridge shows a strong development in one paratype, and resembles the condition found in the male.

Distribution of *E. neotricha* in Ghana. — Essuboni Forest Reserve (30 males, 30 females); Axim (1 male, 7 females); Numia (3 males, 1 female).

Remarks. — *E. neotricha* possesses several features which distinguish it from the European species. These include: the presence of 7 pairs of genital setae, disposition to aggenital neotrichy, form of epimeral ridges IV, position and transverse orientation of the adanal fissure, form of the notogastral fissure *ih*, and the position of the aperture of the lateral abdominal gland. To these may be added the virtual condition of notogastral seta *f*₁, and the occurrence of sexual dimorphism; these two features have not been recorded in species described previously, although the possibility that they exist but have remained undetected cannot be ruled out at the present time.

SCHUSTER (1960) has divided the European species into two groups, the “*cylindrica*-group” and the “*gigantea*-group”, on the basis of the form of the notogastral setae. *E. neotricha* resembles members of the “*cylindrica*-group” in this respect, although the notogastral setae (with the exception of *c*₃, *x*₂ and *x*₃) are much longer than in *E. cylindrica*. In particular the Ghana species is similar to *E. inexpectata* Schuster in possessing only one strongly thickened seta on tarsus IV, and in the form of epimeral ridges I. The distinguishing characters given above serve to separate these two species and, in addition, they differ in the form of the sensillus (fusiform in *inexpectata*, filiform in *neotricha*), and in the locations of coxisternal setae 3 *c* and 4 *c*.

***Epilohmannia flexuosa* n. sp. (fig. 20-22).**

Collected in Ghana: 18 adults (10 females, 8 males).

Sexual dimorphism is present.

Male. — Average body length: 521.0 μ (range: 508.2 μ -539.0 μ). Average body width (measured at widest part of hysterosoma): 259.2 μ (range: 246.4 μ -251.8 μ). Average length of hysterosoma: 318.3 μ (range: 292.6 μ -338.8 μ).

Female. — Average body length : 590.9 μ (range : 539.0 μ -662.2 μ). Average body width (measured at widest part of hysterostoma) : 315.7 μ (range : 292.6 μ -338.8 μ). Average length of hysterostoma : 400.4 μ (range : 369.6 μ -431.2 μ).

Several specimens (including the holotype) are strongly contracted; for this reason length of hysterostoma is given in the above measurements for use as an index of body size.

Type locality. — Essuboni Forest Reserve.

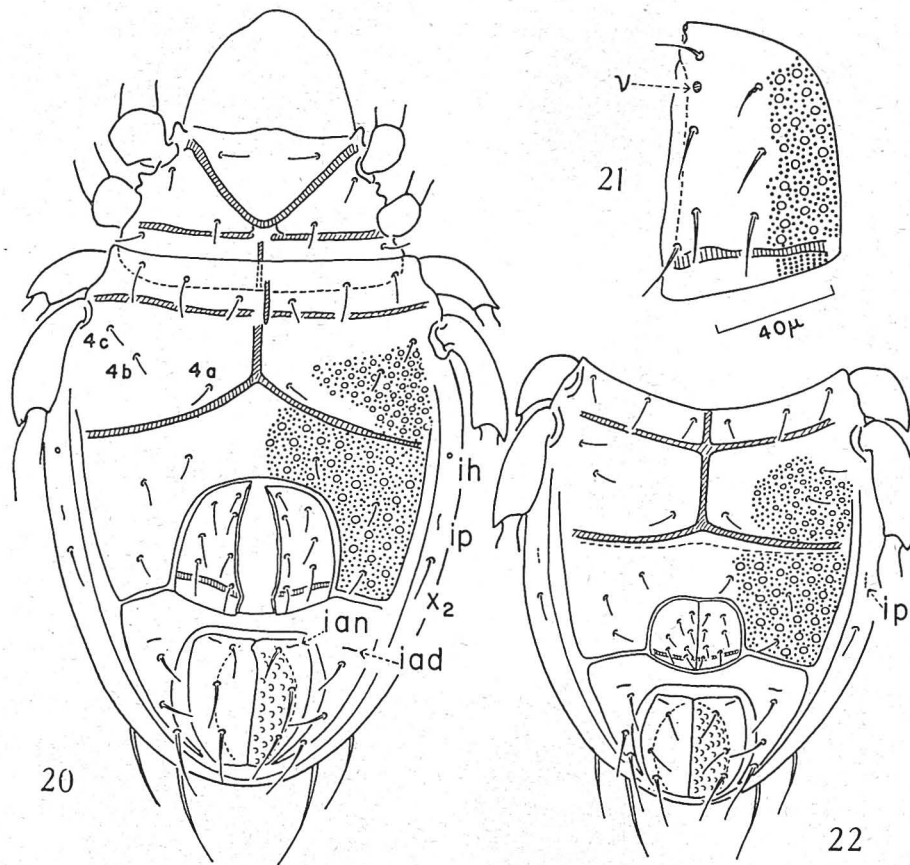


FIG. 20-22. — *Epilohmannia flexuosa* n. sp.

20 : Holotype, female, ventral view. 21 : Genital cover from paratype female, showing location of virtual seta (*v*). 22 : Allotype, male, ventral view of hysterosoma. Notations as in fig. 1-2.

Description of holotype, female. — Length of body : 569.8 μ ; width of hysterosoma (at widest part) : 308.0 μ ; length of hysterosoma : 400.4 μ . Ventral view of holotype is shown in fig. 20. Colour of body rich red-brown; legs pale brown. Integumental microsculpture ("punctuation de surface") is more distinct than

in *E. neotricha*, especially on the anal plates; these surface depressions are larger on aggenital and notogastral regions than on other parts of the body.

Prodorsum. — Characteristic features strongly resemble those of *E. neotricha*. Rostral setae are 30 μ long; right seta is inserted anterior to the left one in holotype. Anterior exopseudostigmatic seta is inserted lateral to pseudostigma; posterior seta inserted a short distance behind anterior one. Sensillus is barbed distally, filiform.

Notogaster. — Setae f_1 are virtual; there are 14 pairs of true setae. Centrodorsal setae are 70-90 μ long; lateral dorsal setae are 50 μ long. Aperture of lateral abdominal gland is remote from ventro-lateral margin of notogaster. Notogastral setae x_2 and x_3 located in similar positions (relative to aperture of lateral abdominal gland) to those of *E. neotricha*. Fissures *ia* and *im* are slits, located close together near the insertion of notogastral seta *cp*; fissure *ip* is a slit located near ventro-lateral margin (anterior to seta x_2); fissure *ih* is a small rounded pore situated anterior to fissure *ip*. The form and distribution of notogastral setae and fissures is very similar to that of *E. neotricha*.

Lateral region of podosoma. — As in *E. neotricha*.

Ventral region of podosoma. — Epimeral ridges I are convergent and meet in the mid-line forming a broad V-shape; the base of this V-shape is rounded rather than angular. Coxisternal plates I are not contiguous. Coxisternal plates II are broadly contiguous and so are coxisternal plates III. Sternal ridge separating coxisternal plates IV is well developed; the plates are contiguous for more than half their length. Epimeral ridges IV are slightly decurved postero-laterally, forming a shallow inverted V-shape. Coxisternal setal formula is (3 — 1 — 3 — 3); seta 3 *c* (antiaxial) is remote from the humeral region; seta 4 *a* is inserted near to the point of divergence of epimeral ridges IV; seta 4 *b* is inserted antero-lateral to 4 *a*, and 4 *c* is antero-lateral to 4 *b*.

Genito-anal region. — Details of this region are very similar to those described for *E. neotricha*, except for the absence of aggenital neotrichy. Genital aperture is slightly larger than anal aperture in holotype female. Genital plates each with 7 setae arranged in a paraxial row of 4 and an antiaxial row of 3. Three pairs each of aggenital, adanal and anal setae. Adanal fissure transverse; anal fissure oblique, located antero-laterally on anal plate. The ovipositor is normal.

Gnathosoma. — Similar in all respects to that of *E. neotricha*.

Legs. — These are entirely similar to those of *E. neotricha*. Chaetotaxy of tarsi I-IV is (17 — 12 — 10 — 9); seta *s* on tarsus IV is strongly thickened; seta *a''* on tarsus IV is slightly thickened, densely setose; seta *ft'* IV is lacking.

Variations. — Fig. 21 shows a variation in the chaetotaxy of the genital plate. A seta, reduced to the virtual condition, is present (designated *v*) in addition to

the 7 true setae. This was observed in 2 cases out of 18 examined (i. e. 9 individuals), the virtual seta being located in the paraxial row in both cases.

Anal fissure is indistinct in several paratypes. No other variations were noted.

Description of allotype, male. — Length of body : 508.2 μ ; width of hysterostoma (at widest part) : 259.2 μ ; length of hysterostoma : 323.4 μ . Ventral view of hysterostoma of allotype is shown in fig. 22.

Dorsal surface. — Features entirely resemble those of female, except that the left rostral seta is inserted slightly anterior to right one.

Ventral surface. — Epimeral ridges IV are not as strongly decurved posterolaterad as in female ; the ridges extend laterally in a near-straight line from their point of divergence. Sternal ridge separating coxisternal plates IV is relatively longer than in female ; consequently the coxisternal plates are contiguous for almost their entire length.

Genital aperture is appreciably smaller than anal aperture (i. e. relatively smaller than in female). Other details of the ventral surface resemble those of the female.

Gnathosoma and legs. — As in the female.

Variations. — The only variation noted was the presence of 8 true genital setae instead of 7 ; the additional seta is located in the paraxial row. This variation occurred in 3 cases out of 16 examined (i. e. 8 individuals).

Distribution of *E. flexuosa* in Ghana. — Esuboni Forest Reserve (10 females, 8 males).

Remarks. — This species is very similar to *E. neutricha*, but can be distinguished easily on the basis of the absence of aggenital neutrichy and the form of epimeral ridges IV.

***Epilohmannia dimorpha* n. sp. (fig. 23-28).**

Collected in Ghana : 24 adults (16 females, 8 males).

Sexual dimorphism is present.

Male. — Average body length : 492.8 μ (range : 462.0 μ -523.6 μ). Average body width (measured at widest part of hysterostoma) : 228.8 μ (range : 200.2 μ -246.4 μ). Average length of hysterostoma : 321.2 μ (range : 292.6 μ -354.2 μ).

Female. — Average body length : 540.7 μ (range : 508.2 μ -631.4 μ). Average body width (measured at widest part of hysterostoma) : 271.4 μ (range : 261.8 μ -308.0 μ). Average length of hysterostoma : 376.4 μ (range : 338.8 μ -415.8 μ).

Type locality. — Akuse.

Description of holotype, female. — Length of body : 539.0 μ ; width of hysterosoma (at widest part) : 261.8 μ ; length of hysterosoma : 338.8 μ . Ventral view of holotype is shown in fig. 23, lateral view in fig. 26. Colour of body rich red-brown, legs pale brown. Integumental microsculpture consists of a fine regular punctate pattern distributed over dorsal and ventral surfaces, and an irregular punctate pattern distributed over dorsal and ventral surfaces, and an irregular

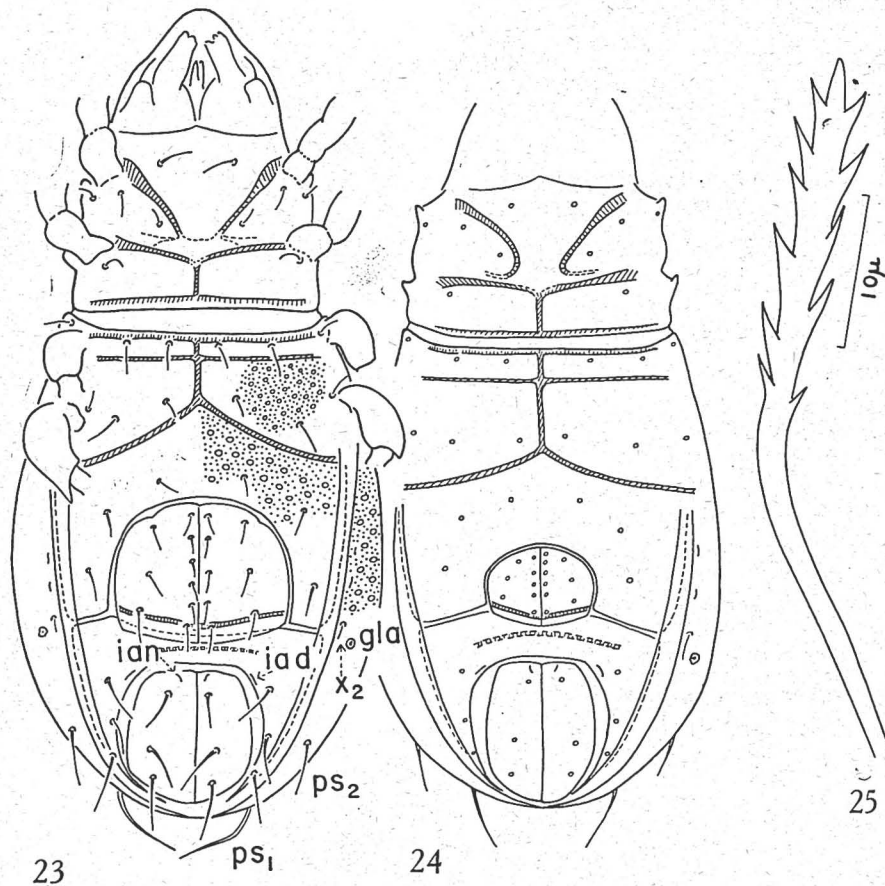


FIG. 23-25. — *Epilohmannia dimorpha* n. sp.

23 : Holotype, female, ventral view. 24 : Allotype, male, ventral view. 25 : Sensillus. Notations as in fig. 1-2.

pattern of larger depressions distributed in a similar manner to those of *E. flexuosa* except that these depressions are not well developed on anal plates of holotype (although they are conspicuous in several of the paratypes). The cuticular depressions on notogaster and aggenital plates are appreciably larger than those on the remainder of the body.

Prodorsum. — Rostral setae inserted on same level in holotype ; insertions vary in paratypes. Lamellar setae are fine delicate structures, curving mediad

over surface of prodorsum. Interlamellar setae are thickened, minutely barbed bristles, slightly shorter than sensillus, inserted median to pseudostigmata. Anterior exopseudostigmatic seta is appreciably longer than the posterior one; the anterior seta is inserted immediately anterior to the pseudostigma; the posterior seta is inserted postero-lateral to the pseudostigma. Sensillus is filiform, barbed distally (fig. 25).

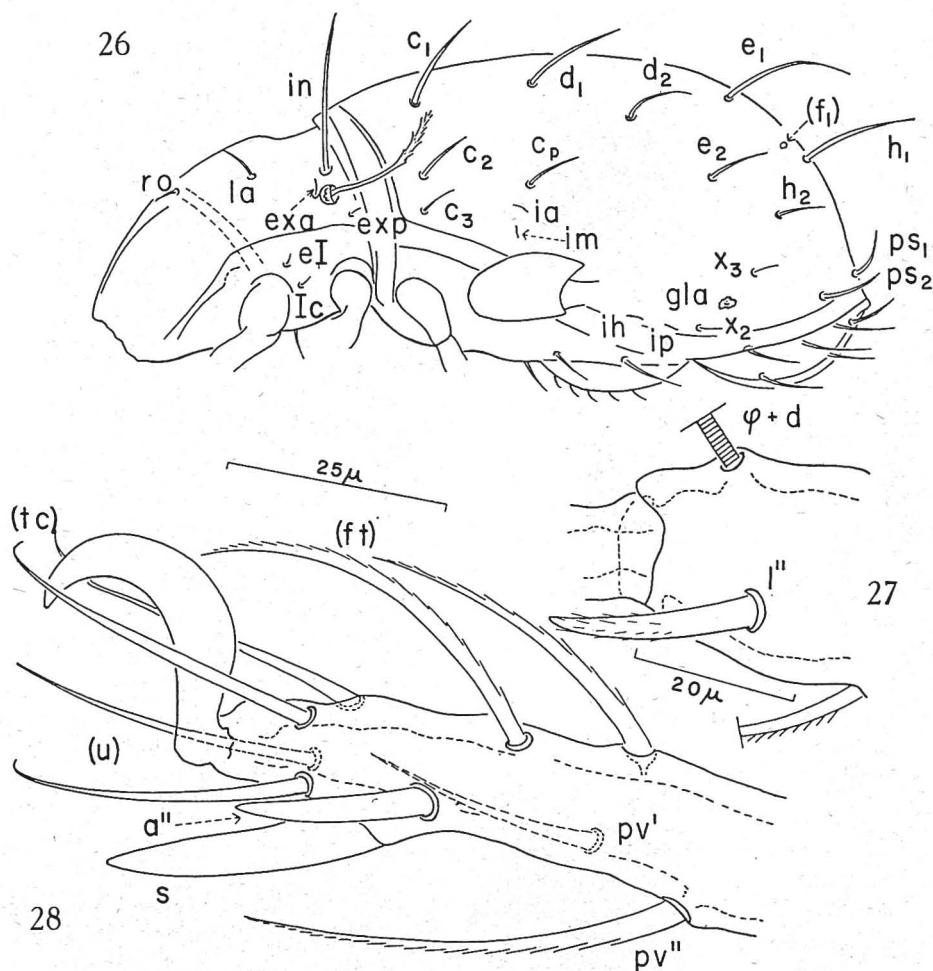


FIG. 26-28. — *Epilohmannia dimorpha* n. sp.

26 : Holotype, female, lateral view. 27 : Tibia IV, distal, paraxial. 28 : Tarsus IV, paraxial. Notations as in fig. 1-2.

Notogaster. — The chaetotaxy of this region shows the characteristic facies of the “*cylindrica*-group”. Setae f_1 are virtual; there are 14 pairs of true setae of which the pairs e_1 and h_1 are the longest (seta $c_1 = 50 \mu$; $e_1 = 70 \mu$). Setae x_2 and x_3 are very short in the holotype (they may be damaged!); these setae are

inserted in typical “*cylindrica*” positions (fig. 26). Aperture of lateral abdominal gland is located very close to ventro-lateral margin of notogaster. Fissures *ia*, *im*, *ih* and *ip* are all slit-like; *ia* and *im* are located close together near insertion of notogastral seta *cp*; *ih* and *ip* are located close to ventro-lateral margin of notogaster.

Gnathosoma. — As in *E. neotricha*.

Lateral region of podosoma. — Supracoxal spine (*e* I) is present between insertions of legs I and II (fig. 26).

Ventral region of podosoma. — Epimeral ridges are distinct on each side and do not join medially in holotype. The ends of the ridges are separate (fig. 23), and in this condition resemble those of *E. cylindrica*; the degree of chitination of these ridges varies in the paratypes. Coxisternal plates II are broadly contiguous; epimeral ridges II are slightly curved postero-medial, so that the plates are narrower paraxially than antiaxially. Coxisterna III are narrow plates; epimeral ridges III extend laterally in a straight line in holotype. Epimeral ridges IV slope gradually postero-lateral, describing a broad inverted V-shape. Coxisternal plates IV are narrower paraxially (where they are contiguous) than antiaxially. Coxisternal setal formula is (3 — 1 — 3 — 3); seta 3 *c* is humeral; seta 4 *b* is inserted at a level posterior to insertion of 4 *a*; seta 4 *c* is located near the insertion of leg IV (and is difficult to see as a result) at the same level as 4 *a*.

Genito-anal region. — Genital aperture is larger than anal aperture in holotype female (a female character). Each genital plate typically bears 8 genital setae arranged in a paraxial row of 5 and an antiaxial row of 3; one genital plate bears 9 setae in holotype. Each genital plate also bears a conspicuous transverse chitinated bar near posterior margin, and also has a shallow indentation in the rounded antero-lateral margin. The numbers of aggenital, adanal and anal setae are constant; there are 3 pairs in each case. Adanal fissure is a slit located close to antero-medial margin of anal aperture, and parallel to this. Anal fissure is located immediately anterior to the most anterior anal seta on each anal plate. The ovipositor is normal.

Legs. — Tarsal setal formula is (19 — 13 — 10 — 10). This differs from the previous two species in the presence of two additional antiaxial setae on tarsus I, one additional antiaxial seta on tarsus II, and the retention of seta *ft'* on tarsus IV (fig. 28). Tarsus IV bears 2 strongly thickened setae (*a''* and *s*); tibia IV bears a thickened seta as shown in fig. 27¹. The formula for solenidions is the same as that described above for *E. neotricha*. All tarsi are monodactyle. Trochanters III and IV each with a short dorsal spur distally.

1. Fig. 27 shows the extreme development of this character; the thickness of the seta is variable in paratypes.

Variations. — The degree of chitination of epimeral ridges I varies. The ridges may be continuous through a curved chitinated band, resembling the condition found in *E. styriaca* Schuster 1960. In several specimens the free end of each ridge is strongly recurved laterad; this condition is present in the allotype male (fig. 24).

Epimeral ridges III are slightly curved antero-mediad in some specimens; this condition is reminiscent of *E. cylindrica*.

Three paratypes resemble the holotype in possessing 9 genital setae on one plate, 8 on the other. One paratype bears 9 genital setae on each plate. Other paratypes are normal with 8 pairs of setae.

Description of allotype, male. — Length of body : 508.2 μ ; width of hysterosoma (at widest part) : 246.4 μ ; length of hysterosoma : 323.4 μ . Ventral view of allotype is shown in fig. 24.

Dorsal surface. — Entirely similar to the female.

Ventral surface — Genital aperture is appreciably smaller than anal aperture, and more nearly circular in shape than that of female. Each genital plate typically bears 8 setae (one plate bears 9 setae in allotype) and a transverse chitinated bar near posterior margin. The slope of epimeral ridges IV is less pronounced than in the female. The male organ has the normal structure. Other features of body and legs are similar to those described above for the female.

Distribution of *E. dimorpha* in Ghana. — Akuse (12 females, 8 males); Numia (3 females); Ofin Headwaters Reserve (1 female).

Remarks. — *E. dimorpha* resembles *E. cylindrica* in several respects. These include the form and distribution of setae and fissures on the notogaster, the position of the aperture of lateral abdominal gland, form of epimeral ridges, locations of anal and adanal fissures, number of genital setae and the presence of 2 thickened setae on tarsus IV. The two species can be distinguished by the form of the sensillus (filiform in *dimorpha*, spindle-shaped in *cylindrica*), by the presence or absence of seta *ft'* on tarsus IV (present in *dimorpha*, absent in *cylindrica*) and possibly by the presence of sexual dimorphism in *E. dimorpha*.

E. dimorpha can be distinguished from *E. styriaca* Schuster by the presence of only 2 thickened setae on tarsus IV, the retention of seta *ft'* on this tarsus, the position of the anal fissure and possibly by the presence of sexual dimorphism.

***Epilohmannia pallida* n. sp. (fig. 29-31).**

Collected in Ghana : 56 adults (all females).

Measurements. — Average body length : 356.8 μ (range : 308.0 μ -415.8 μ). Average body width (measured at widest part of hysterosoma) : 150.7 μ (range : 123.2 μ -169.4 μ). Average length of hysterosoma : 216.6 μ (range : 194.8 μ -246.4 μ).

Type locality. — Dompim.

Description of holotype, female. — Length of body : $369.6\ \mu$; width of hysterosoma (at widest part) : $154.0\ \mu$; length of hysterosoma : $231.0\ \mu$. Ventral view of holotype is given in fig. 29, dorsal view of notogaster in fig. 30. Colour of body and legs is pale yellow-brown. The integumental microsculpture is not conspicuous ; larger surface depressions are irregularly scattered over body and are relatively smaller than those in the previous species.

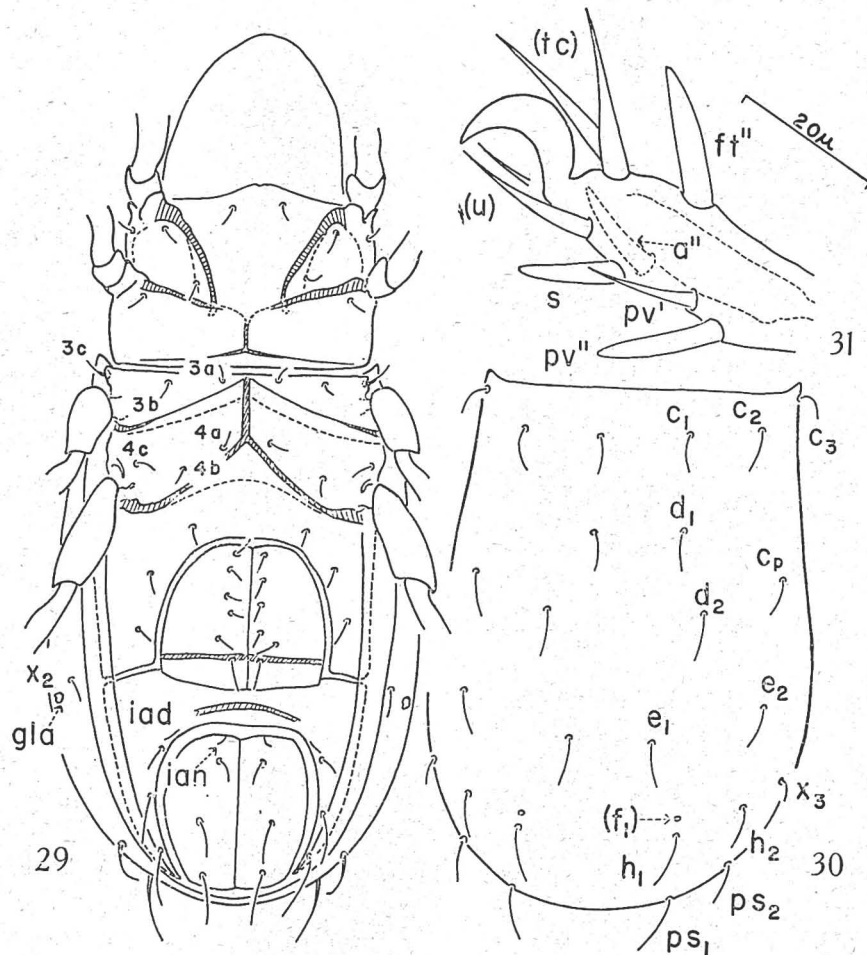


FIG. 29-31. — *Epilohmannia pallida* n. sp. Holotype, female.
29 : Ventral view. 30 : Notogaster, dorsal view. 31 : Tarsus IV, distal, antiaxial.
Notations as in fig. 1-2.

Prodorsum. — Rostral setae inserted on same level in holotype (and also in paratypes examined) ; these setae are delicate structures about $15\ \mu$ long. Lamellar setae are $20-25\ \mu$ long, curving mediad over surface of prodorsum. Each inter-lamellar seta stands erect from its insertion near base of pseudostigma ; these setae

are $40\ \mu$ long (slightly shorter than sensillus), barbed distally. Sensillus has a barbed, fusiform head. Anterior exopseudostigmatic seta is inserted antero-lateral to pseudostigma; this seta is longer and more conspicuously barbed than posterior one which is inserted postero-lateral to pseudostigma.

Notogaster. — Dorsal setae are appreciably shorter than those of the previous species described above (fig. 30); thus seta $c_2 = 25\ \mu$; posterior notogastral setae are somewhat longer than anterior setae, although the difference is slight. Setae f_1 are virtual; there are 14 pairs of strongly curved, distinctly barbed, true setae, having the normal “*cylindrica*” characteristics; setae x_2 and x_3 are inserted as in *E. gigantea* (see SCHUSTER, 1960, fig. 7 a). Aperture of lateral abdominal gland is relatively small, rounded, located near ventro-lateral margin of notogaster. Notogastral fissures are present but not conspicuous; fissures *ia* and *im* are situated close together near the lateral margin of notogaster, remote from insertion of seta *cp*.

Lateral region of podosoma. — Supracoxal spine is present in the usual place between insertion of legs I and II.

Ventral region of podosoma. — Epimeral ridges I do not join medially, but are broadly separated as in *E. cylindrica*; the free end of each ridge extends to epimeral ridges II in the holotype, as shown in fig. 29. As a result of this arrangement the hystero-stome is trapezoidal rather than triangular in shape, and coxisternal plates I are not contiguous at any point. Epimeral ridges II have a slight postero-mediad slope, so that coxisternal plates II are narrower paraxially than anti-axially. Epimeral ridges III are strongly curved antero-mediad; coxisternal plates III are triangular in shape, with the apex of the triangle directed mediad; the two plates are contiguous only at the junction of these two apices. Epimeral ridges IV are strongly curved antero-mediad (they are roughly parallel to epimeral ridges III), joining in a sternal ridge. Apodemes III and IV are distinct. Coxisternal setal formula is (3 — 1 — 3 — 3); setae 3 *c* is inserted on a chitinised projection in the humeral region; seta 4 *c* is inserted on a similar projection between the insertions of legs III and IV; seta 4 *b* is located postero-lateral to 4 *a*.

Genito-anal region. — Genital aperture is as large as anal aperture, trapezoidal in shape; genital plates only very weakly indented antero-laterally. Genital setae are short; holotype with 6 setae on each plate (the number is variable in paratypes), consisting of 5 setae in a paraxial row and a single seta displaced a short distance lateral to this row. A transverse chitinised ridge is present near the posterior margin of each genital plate. The number of aggenital, adanal and anal setae is constant; there are 3 pairs in each case. Anterior margin of adanal plate with a curved chitinised thickening. Adanal fissure almost parallel to rim of anal aperture, located immediately anterior to most anterior adanal seta; anal fissure located immediately anterior to most anterior anal seta on each anal plate. The ovipositor is normal.

Gnathosoma. — Details of this region resemble those described above for *E. neotricha*.

Legs. — Trochanters III and IV each with a conspicuous dorsal spur. Tarsal setal formula for legs I-IV is expressed (15 — 11 — 10 — 9) ; setae (*pl*) are lacking on tarsus I ; an additional seta *Ad'* is present paraxially ; the famulus is a small conical projection on this tarsus. The additional seta is not present on tarsus II. Seta *a'* is lacking on tarsus III. Tarsus IV (fig. 31) bears 4 greatly thickened setae, namely *ft''*, *a''*, *s* and *pv''* ; setae (*tc*), (*u*) and *pv'* are normal, although their bases are broadly thickened ; seta *ft'* is lacking on tarsus IV. All tarsi are monodactyle, the claw being small and strongly curved. In other respects (e.g. distribution of solenidions, fissures) the legs resemble those of *E. neotricha* and the other species described above.

Variations. — Number of genital setae varies from 6 to 8 pairs in paratypes, with 7 pairs being typical. When 8 pairs are present, these are arranged in two longitudinal rows on each plate, namely a paraxial row with 5 setae and an antiaxial row with 3 setae. Reduction of this number to 7 or 6 affects setae in the antiaxial row progressively from anterior to posterior. Thus when only 7 setae are present, the most anterior seta in the antiaxial row is lacking ; when only 6 setae are present (as in holotype), the anterior and middle setae in the antiaxial row are lacking. The posterior seta in the antiaxial row is located much nearer the mid-line in those specimens which have only 6 setae on each genital plate.

Position of anterior exopseudostigmatic seta is slightly variable, being located either antero-lateral to pseudostigma (as in holotype) or directly anterior to pseudostigma.

Anal fissure is frequently oriented parallel to long axis of body, and not oblique as in holotype ; this fissure is also indistinct in some paratypes.

Epimeral ridges I show some variation ; they invariably have a steep slope, but their posterior limits may not extend back as far as epimeral ridges II.

Distribution of *E. pallida* in Ghana. — Dompim (25 females) ; Esuboni Forest Reserve (20 females) ; Somanya (5 females) ; Shai Hills (3 females) ; Awura (1 female) ; Nsawam (2 mi N. on Bunso Rd.) (1 female) ; Accra-Senchi Rd. (37 mi.) (1 female).

Remarks. — *E. pallida* shows remarkable similarity to *E. cylindrica* (= *E. szanisloi* sensu Schuster) in its general morphological features. The identity is even closer when the Ghana species is compared with *E. cylindrica* form *minima* (= *E. szanisloi* form *minima* sensu SCHUSTER). Points of similarity include body size, form of the sensillus, dorsal chaetotaxy, form of epimeral ridges, positions of adanal and anal fissures and the presence of 4 strongly thickened setae on tarsus IV. The two species may be distinguished on the basis of the distribution of the thickened setae on tarsus IV. In *E. cylindrica* form *minima* these setae are *a''*, *s* and (*pv*) (or *k*₁, *k*₂, *k*₃, *k*₄ using SCHUSTER's notation) ; in *E. pallida* the thickened setae

are *ft''*, *a''*, *s* and *pv''*. This chaetotaxy is constant in all specimens of *E. pallida* I have examined from Ghana.

Comparison with other forms collected in Africa is desirable but, as indicated earlier, this is not possible from the literature available. SCHUSTER (1960) reports on 5 specimens collected in North Africa which he tentatively regards as conspecific with *E. szanisloi*; in these specimens setae (*pv*) on tarsus IV appear to be normal. These specimens then are not identical to those from Ghana herein described as *E. pallida*, and may resemble more closely the European forms.

REFERENCES

- BALOGH (J.), 1958. — Oribatides nouvelles de l'Afrique tropicale. *Rev. Zool. Bot. Afr.*, 58 : 1-34.
- BERLESE (A.), 1916. — Centuria seconda di Acari nuovi. *Redia*, 12 : 125-177.
- GRANDJEAN (F.), 1953. — Essai de classification des Oribates (Acariens). *Bull. Soc. Zool. Fr.*, 78 : 421-446.
- GRANDJEAN (F.), 1958. — *Perlohmanna dissimilis* (Hewitt) (Acarien, Oribate). *Mém. Mus Nat. Hist. Nat.* (n. s.) sér. A, *Zoologie*, 16 : 57-119.
- HAMMEN (L. van der), 1959. — Berlese's primitive oribatid mites. *Zool. Verh.*, 40 : 1-93.
- OUDEMANS (A. C.), 1917. — Notizen über Acari, 25. Reihe. (Trombidiidae, Oribatidae, Phthiracaridae). *Arch. Naturg.*, 82 : 1-84.
- SCHUSTER (R.), 1960. — Über die Morphologie und Artengliederung der Gattung *Epi-lohmanna* Berlese 1917; (Ac., Oribatei). *Zool. Anz.*, 165 : 197-213.
- SELLNICK (M.), 1931. — Zoologische Forschungsreise nach den Jonischen Inseln und dem Peloponnes. *Sitzber. Osterr. Akad. Wiss. Wien*, 1, 9 : 693-776.
- WALLWORK (J. A.), 1960. — Some Oribatei from Ghana. I. Sampling localities. *Acarologia*, 2, 3 : 368-388.
-