

THE MEALY-BUGS
(PSEUDOCOCCIDAE : HOMOPTERA)
DESCRIBED BY W. J. HALL, F. LAING AND
A. H. STRICKLAND
FROM THE ETHIOPIAN REGION

BY

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Commonwealth Institute of Entomology

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(PSEUDOCOCCIDAE : HOMOPTERA)
DESCRIBED BY W. J. HALL, F. LAING AND
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THIS paper is one of a series to describe and illustrate, where necessary, all the mealy-bugs of the Ethiopian Region. The work is being undertaken jointly by the writer and by Mr. G. De Lotto of the Department of Agriculture, Nairobi, Kenya. One paper has already appeared by De Lotto (1957) dealing with the species described by James from East Africa and another has been completed (Williams, 1958) on the species described by Maskell, Newstead, Cockerell and Green from the Ethiopian Region.

Altogether twenty-three species are herein discussed, of which eighteen are regarded as valid and of these, illustrations are given of fifteen. Excellent illustrations of the remaining three species have been given already by other authors and these will be mentioned in the appropriate places. The redescription in each case is based on the holotype and type material held in the British Museum (Natural History). Following the system in my earlier paper, no attempt will be made, in this instance, to erect new genera as the main purpose is to redescribe the species. A species will be placed in a different known genus, however, should this be thought necessary. The terms used are those in current use and are drawn mainly from Ferris (1950), Ezzatt & McConnell (1956) and Borkhsenius (1949). Although many of the species discussed are known from the original discovery only, a few have been collected in other localities in recent years. No attempt is made here to list all localities and hosts as it is hoped to incorporate this aspect in a final revision of the Pseudococcidae.

I am indebted to Mr. G. De Lotto for kindly comparing material of *Antonina indica panica* Hall with the related species described by Brain.

THE SPECIES DESCRIBED BY W. J. HALL

Hall described five mealy-bugs from Southern Rhodesia and two from South Africa. One of these, *Trionymus pterocauloni*, described from Southern Rhodesia, is here regarded as being identical with *T. sanguineus* James. Hall (1937) recorded *Trionymus masrensis* Hall from Southern Rhodesia but this material is not the same

as the type from Egypt. An interesting species described by Hall (1941) as *Molluscococcus fibrillae* from Southern Rhodesia and listed as a Pseudococcine form is here considered to belong to the family Dactylopiidae, recently defined by Ferris (1955a). Two species described from Egypt, *Antonina indica panica* and *Phenacoccus inermis* are discussed because the latter is here recorded from the Republic of the Sudan and the former was recorded by Hall (1937) from Southern Rhodesia.

Antonina indica panica Hall

Antonina indica var. *panica* Hall, 1925, *Bull. Minist. Agric. Egypt*, **64** : 6.

Antonina indica var. *panica* Hall, 1937, *Trans. R. ent. Soc. Lond.* **86** : 125.

Hall described this species from Egypt on *Panicum turgidum* and later recorded it from Theydon, Southern Rhodesia on the roots of *Eragrostis* sp. near *chalcantha*. It seems probable that it is the same as a species described by Brain from South Africa. Mr. De Lotto, who is reviewing the species described by Brain will deal with this question in a future paper.

Mirococcus inermis (Hall)

(Text-fig. 1)

Phenacoccus inermis Hall, 1925, *Bull. Minist. Agric. Egypt*, **64** : 7.

Mirococcus inermis (Hall), Borkhsenius, 1947, *Proc. Acad. Sci. Armen. S.S.R.* **7** : 142.

HABIT. Originally described by Hall from material collected near Helwan, Egypt, on the roots of *Cleome arabica*, *Cressa cretica*, *Frankenia pulverulenta* and *Zygophyllum simplex*. It has since been recorded throughout North Africa and Borkhsenius (1949) has recorded the species from Ukraine, Armenia, Azerbaijan, Uzbekistan and Tadzhikistan in the U.S.S.R. Material is at hand from the Ethiopian Region collected at Khartoum, Sudan on *Portulaca* sp. Hall gives the following description of the external appearance : " Naples-yellow in colour, covered somewhat sparsely but uniformly with white pulverulent secretory matter. Marginal filaments wanting. Skin delicate."

RECOGNITION CHARACTERS. The shape of the adult female varies considerably according to the age of the individual. In the young adult the shape is elongate-oval but later becomes more rounded and some specimens become globose ; older specimens attaining a length of 3.5 mm. Posterior end of body rounded, anal lobes obsolete. Antennae short, 9-segmented, the terminal segment rounded. Legs short and slender, with a denticle on the plantar surface of the claw. Circulus rather large. Ostioles poorly developed with three or four trilocular pores and an occasional seta on each lip. Anal ring with six setae which are slightly shorter than the diameter of the ring. The outer ring is composed of small pores giving the whole ring a narrow appearance. Cerarii absent. Dorsal setae all short and slender, not numerous. Multilocular disc pores distributed over dorsum, scattered on head and thorax but they occupy transverse rows on the abdomen. Tubular ducts small, of the oral collar type, present on the abdomen only where they are sparse and are arranged more or less in transverse rows, there being scarcely more than ten on any

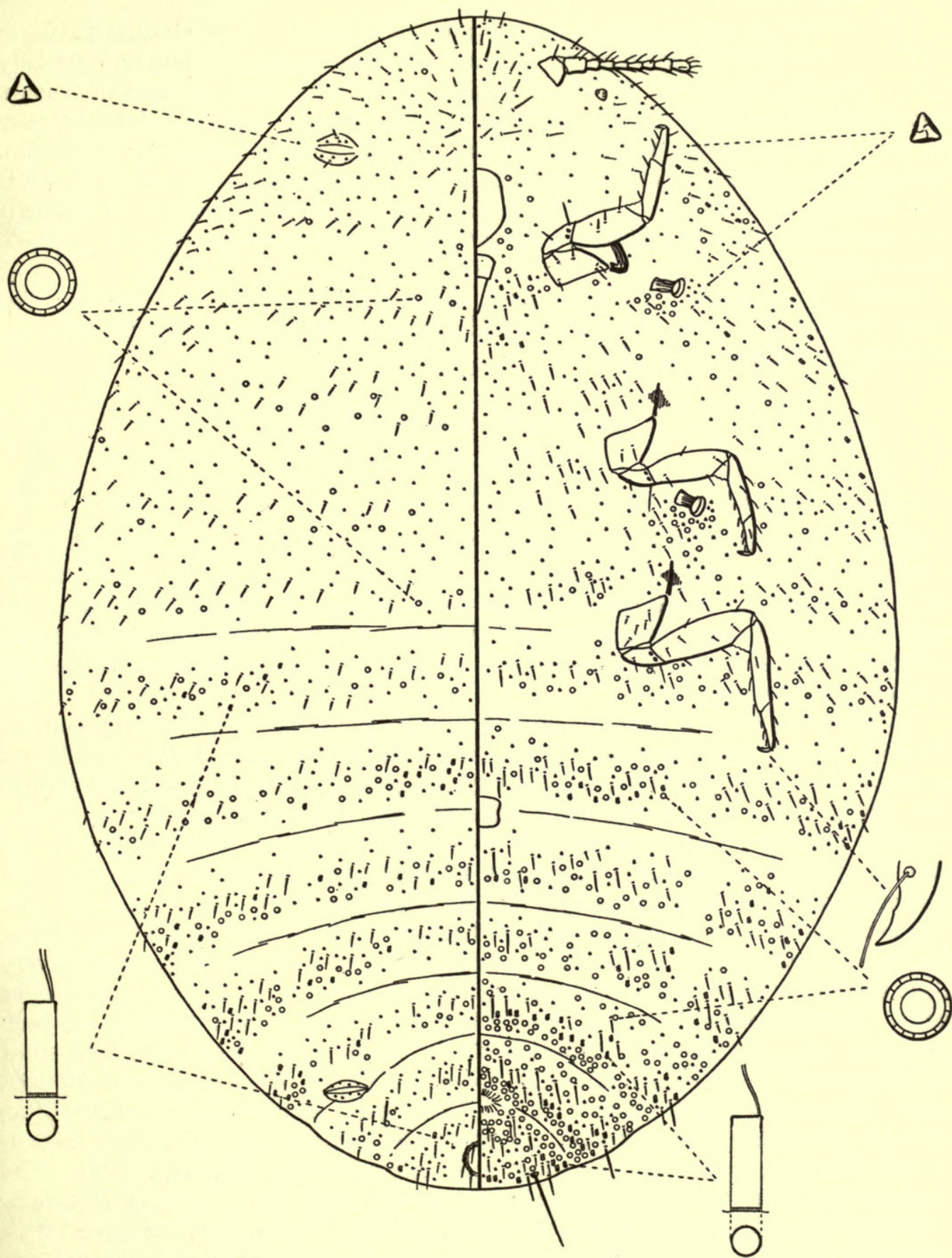


FIG. I.

one segment and usually less on the posterior segments. Trilocular pores few, evenly distributed.

Ventral surface with a pair of long, stout, apical setae. Ventral setae having a similar distribution to those on the dorsum but they tend to be longer, especially on the posterior segments. Multilocular disc pores scattered on the head and thorax but there is a noticeable group posterior to each spiracle. On the abdomen they lie in transverse rows and lateral groups and are more numerous than on the dorsum. Tubular ducts sparse on the thorax where they are present mainly on the margins and between the first legs. They form transverse rows on the abdominal segments and become more numerous posteriorly. Trilocular pores evenly but sparsely distributed.

NOTES. This species has been made the type of the genus *Mirococcus*. The total absence of cerarii, the 9-segmented antennae and the denticle on the claw serve to distinguish the species.

Octococcus pentziae Hall

(Text-fig. 2)

Octococcus pentziae Hall, 1939, *J. ent. Soc. S. Afr.* 2: 93.

HABIT. Described from Grootfontein School of Agriculture, Middelburg, Cape, South Africa on *Pentzia* sp. (Compositae). Hall gives the following description of the insect in life: "Adult female enclosed in a closely felted sac which is white or more often dirty white on account of extraneous matter which has become incorporated. The sac is broadly ovoid and convex, almost globular, with a small orifice towards one extremity."

RECOGNITION CHARACTERS. A small oval species rarely exceeding 1.5 mm. in length. Antennae 9-segmented. Legs long and slender with a few translucent pores on the hind coxae. Small conical setae are situated on the coxae, trochanters and tibiae of the second and third pairs of legs. Claw with a minute denticle. Circulus absent. Ostioles poorly developed, there being a posterior pair only, each of which is in the form of a narrow slit with sclerotized lips. Anal ring with six setae which are about one and a half times as long as the diameter of the ring. The anal ring is often located at a short distance from the apex of the body and as the cisanal setae are of similar size and shape to the anal ring setae and lie very close to the posterior end of the ring, the impression is given of a ring with eight setae. Cerarii confined to the two posterior segments. Anal lobe cerarii each composed of a pair of short conical setae accompanied by about four long stout blunt setae and two or three trilocular pores surrounded by an elongate sclerotized area. Penultimate cerarii each with two conical setae and two long auxiliary setae and with one or two trilocular pores, surrounded by a small oval area of sclerotization. Dorsal setae not numerous, of various sizes but all rather stout and blunt. The longer setae tend to be more numerous on the posterior abdominal segments. Dorsal multilocular disc pores absent. Tubular ducts of two sizes, the largest with an oral rim and with the duct of a large diameter. There is also another rim encircling the middle of the tube. These ducts are not numerous and occupy

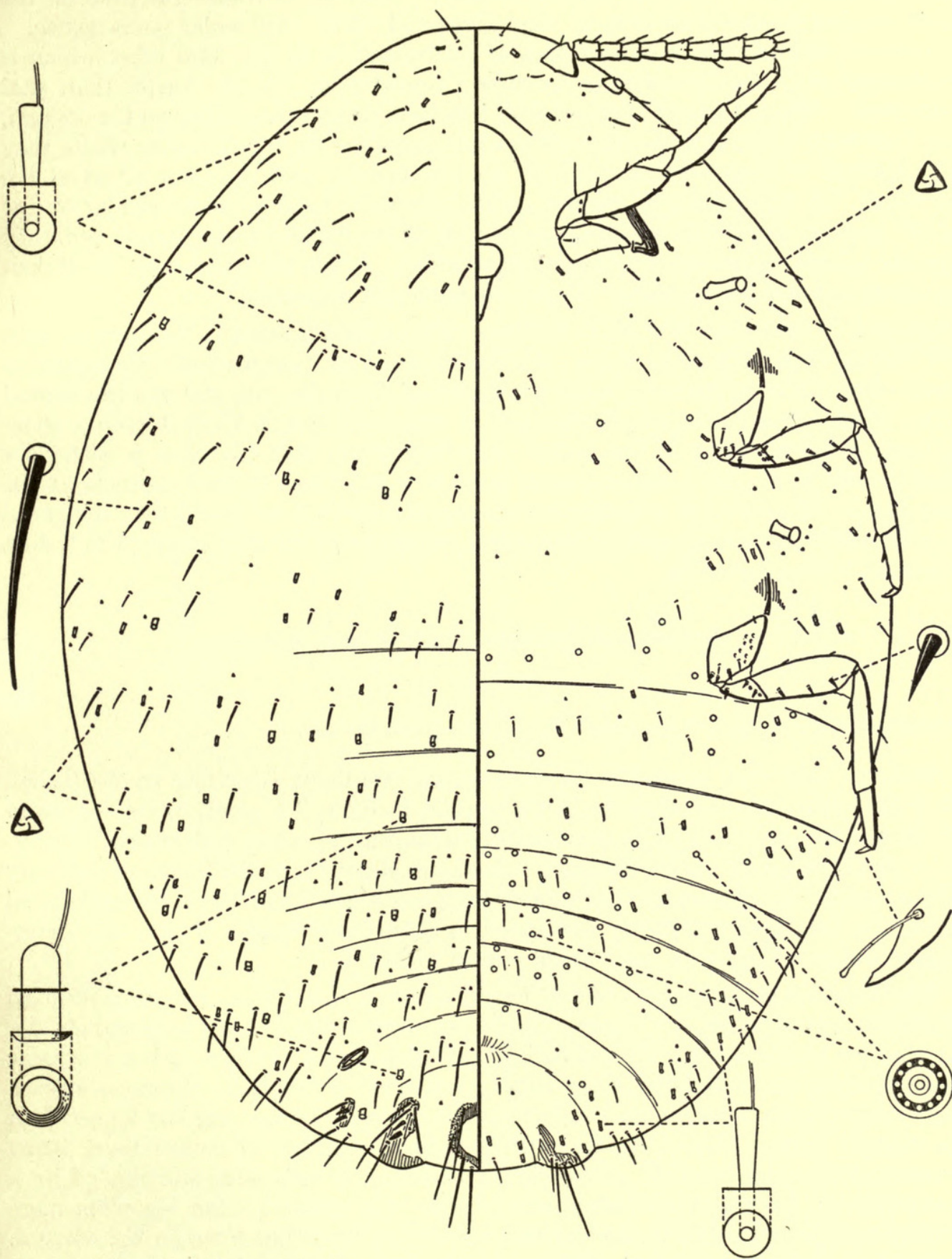


FIG. 2.

single transverse rows. The smaller type of duct is rather slender but has a wide flat oral rim which is not heavily sclerotized. They lie in transverse rows on the abdomen but become scattered on the thorax and head. Trilocular pores sparse.

Ventral surface with a curved area of sclerotization on the anal lobes which is continuous with the dorsal sclerotization. Apical setae slightly longer than anal ring setae. Ventral setae of various sizes but more slender than those on the dorsum, not numerous. Multilocular disc pores present mainly on the abdomen where they are situated in single transverse rows on the anterior and posterior edges of the segments. A few pores are located on the thorax. Tubular ducts similar to the small type on the dorsal surface, are present in no definite arrangement but they tend to occupy transverse rows on the abdomen. A few are present on the thorax especially around the margins. Trilocular pores not numerous.

NOTES. This species was made the type of the genus *Octococcus* Hall on the basis of the anal ring with eight setae. An examination of a number of specimens has shown that the two posterior setae are detached from the ring and are the cisanal setae which often lie on the dorsal surface when the ring is located even a short distance from the apex of the body. Hall has stated that the claw is without a denticle but in all the specimens seen there is a small but distinct denticle at the distal end. This is quite a distinctive species and there is no doubt that the genus is valid although another species *Puto africanus* Brain which Hall assigned to it does not seem to be congeneric.

***Paracoccus proteae* (Hall) (comb. nov.)**

(Text-fig. 3)

Pseudococcus proteae Hall, 1937, *Trans. R. ent. Soc. Lond.* 86 : 128.

HABIT. Described originally from Inyazura, Southern Rhodesia on *Protea* sp. Hall gave the following account of the species in life : " A small ovate species in which the brownish colour is obscured by a coating of white pulverulent matter. Four short and stout caudal filaments ; these are about $\frac{1}{3}$ of the length of the body of the insect. A few successively shorter marginal filaments occur on the abdominal segments, but these are poorly developed in some individuals. Ovisac of indeterminate shape. Eggs very pale brown almost yellow."

RECOGNITION CHARACTERS. Adult female ovate, a rather small species measuring approximately 2.5 mm. \times 1.5 mm. Antennae 8-segmented. Legs long and slender for the size of the insect. Dorsal ostioles well developed, the lips with a few setae and trilocular pores and the inner edges moderately sclerotized. Circulus absent. Anal ring with six setae, these longer than the diameter of the ring and longer than the cisanal setae. Dorsal surface with a reduced number of cerarii there being seven to nine pairs present. Each cerarius consists of two setae surrounded by a few trilocular pores and without auxiliary setae, the cerarian setae becoming more slender anteriorly so that the anteriormost resemble the other setae on the dorsum. Dorsal setae not numerous but all short and slender. Multilocular disc pores absent. Tubular ducts present of the oral rim type only, these arranged singly near the

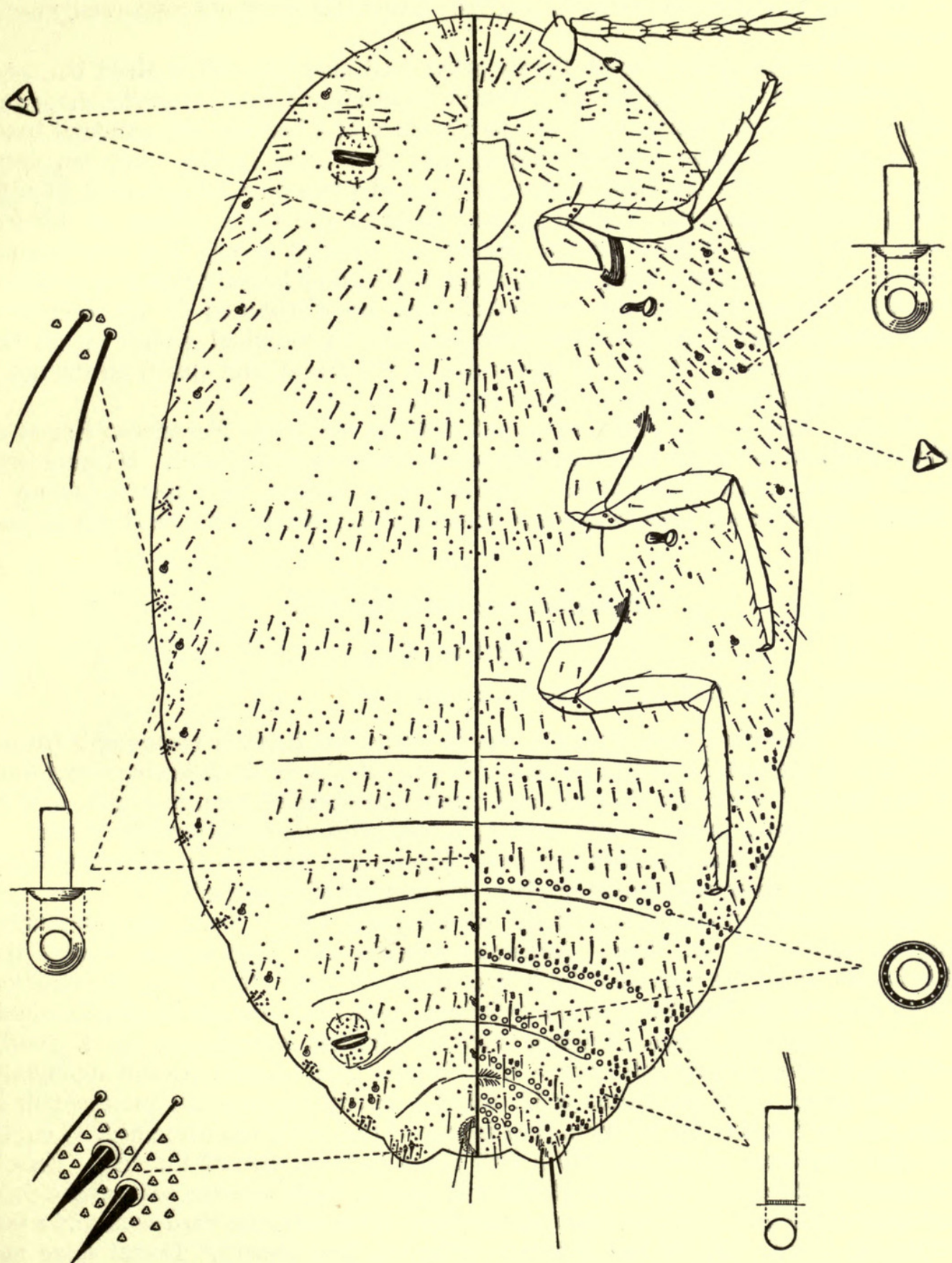


FIG. 3

margins of each segment except the last. The penultimate segment has usually a group of two or three. A single oral rim duct is usually situated in the mid-region of the fifth to eighth abdominal segments. Trilocular pores not numerous, evenly distributed.

Ventral surface with a small lightly sclerotized anal bar with a short bar seta. Apical setae detached from the bar. Ventral setae not numerous, of similar shape and size to those on the dorsum but on the abdomen and between the antennal bases there are longer setae present. Multilocular disc pores on the abdomen only, arranged in more or less single transverse rows at the posterior edges of the fourth and posterior segments. Ventral tubular ducts of two types. Some of the oral rim ducts similar to those on the dorsum are situated mainly in a submarginal zone on the thorax, there being usually a noticeable group lateral to the first spiracles. Smaller tubular ducts of the oral collar type are distributed on the prevulvar abdominal segments in transverse rows and also in marginal groups on all the abdominal segments. They are very sparse on the thorax and absent on the head. Trilocular pores not numerous, evenly distributed.

NOTES. This species seems to be referable to the genus *Paracoccus* Ezzatt & McConnell and belongs to the group with seven definite pairs of cerarii. It comes close to *P. solani* Ezzatt & McConnell described from Arizona both species lacking a circulus, but differs in possessing fewer dorsal oral rim ducts on the head and thorax.

Pseudococcus barleriae Hall

(Text-fig. 4)

Pseudococcus barleriae Hall, 1939, *J. ent. Soc. S. Afr.* 2 : 96.

HABIT. Described from Pretoria, South Africa on *Barleria macrostegia* (Acanthaceae), in the curled leaves at the end of twigs. Hall gives the following description of the habit : "Adult female small and rarely exceeding 1.5 mm. in length, oval in shape, pale brown in colour and sparsely coated with white pulverulent matter. No marginal or caudal filaments apparent. Eggs yellow and in some individuals they were observed to emerge joined together like a string of sausages."

RECOGNITION CHARACTERS. Body of mounted female oval and measuring approximately 1.5 mm. long. Antennae 7-segmented. Legs normal except the hind coxae which are noticeably large in comparison to the other coxae, the junction of the coxae to the derm being rather indistinct ; each hind coxa and tibia with a number of translucent pores. Circulus absent. Ostioles represented by a poorly developed posterior pair only, with a few trilocular pores on each lip and apparently without setae. Hall has stated in his original description that the anterior pair is also present but this has not been seen in any of the specimens examined. Length of anal ring setae about one and a half times the diameter of the ring. Cerarii confined to the anal lobes although there is often a single cerarian seta on the penultimate segment. Anal lobe cerarius composed of two medium sized setae and a few trilocular pores ; one or two auxiliary setae are also present. Dorsal setae not numerous, all short and slender. Multilocular disc pores arranged in single trans-

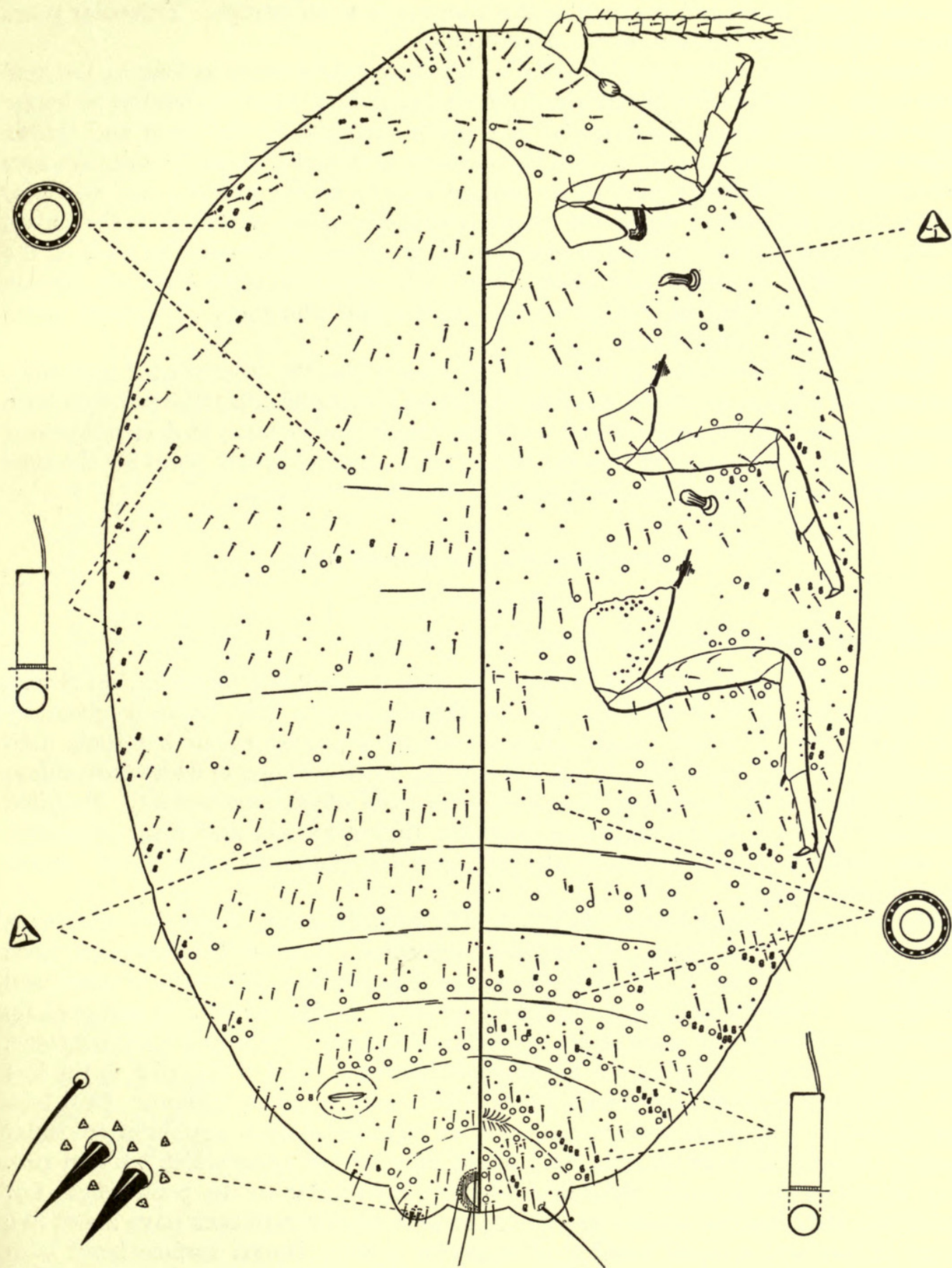


FIG. 4

verse rows at the posterior edges of the thoracic and abdominal segments. Dorsal tubular ducts, small and confined to the margins in small groups. Trilocular pores sparse following the pattern of the dorsal setae.

Ventral surface with a pair of apical setae, these nearly twice as long as the anal ring setae. Ventral setae rather sparse, short and slender but they tend to be longer than the dorsal setae. Multilocular disc pores scattered on the head and thorax where they are not numerous. On the anterior abdominal segments they are also scattered but posteriorly they lie in transverse rows on the anterior and posterior edges of the segments; there are about twenty-five pores posterior to the vulva. Tubular ducts, similar to those on the dorsum, are present in transverse rows on the three prevulvar segments and apart from a few scattered ducts they are mainly arranged in submarginal groups on the thorax and abdomen. Trilocular pores sparse but evenly distributed.

NOTES. The distinctive features of this species are the 7-segmented antennae, the reduced number of cerarii, the distribution of the multilocular disc pores on both the dorsal and ventral surfaces and the rather large hind coxae. It does not belong to the genus *Pseudococcus* as now defined but it is retained in this genus for the time being until further study has been made of the African species.

Pseudococcus mazoeensis Hall

(Text-fig. 5)

Pseudococcus mazoeensis Hall, 1937, *Trans. R. ent. Soc. Lond.* **86** : 127.

HABIT. This species was described from Mazoe, Southern Rhodesia, on *Acacia* sp. (Leguminosae) and *Zizyphus jujuba* (Rhamnaceae). The habit is given by Hall as follows: "Adult female, globose, usually brown in colour but some individuals show a tinge of pink. It has a somewhat dense covering of white pulverulent matter which in old specimens has often been worn off to some extent. Marginal filaments confined to the abdominal region; they are short and stout increasing in size towards the caudal extremity but even the caudal pair are short. Adult female viviparous."

RECOGNITION CHARACTERS. Adult female broadly oval, the older specimens attaining a length of 3 mm. Antennae 8-segmented. Legs rather short and stout with a few translucent pores on the hind coxae and tibiae. Circulus present, well developed. Ostioles large with the inner edges of the lips sclerotized and each lip with about three to six setae and a few trilocular pores. Anal ring with six setae, these about twice as long as the diameter of the ring. Cerarii confined to the last six abdominal segments, although there are sometimes seven present. Anal lobe cerarii usually composed of three conical setae surrounded by a number of trilocular pores. Penultimate cerarii each with about nine conical setae which vary in size. The cerarii of the seventh abdominal segment are similar to the penultimate but anteriorly they become smaller so that the anteriormost cerarii each have about five setae or less and a small number of trilocular pores. Dorsal surface beset with small slender setae. The only dorsal pores present are trilocular which are somewhat abundant, and also a few small circular disc pores.

Ventral surface with a faintly sclerotized anal lobe bar and a slender bar seta. The apical seta is detached from the bar and is about twice the length of the anal ring setae. There is apparently a pair of cisanal setae present which are nearly as long as the anal ring setae and also a shorter pair of obanal setae. Ventral setae rather numerous, of various sizes, mainly short and slender but they are generally longer than those on the dorsum. Multilocular disc pores on all segments posterior to the circulus. On the fifth and sixth segments they form single transverse rows but on the seventh and eighth segments they lie in double transverse rows and do not extend to the margins. Ventral tubular ducts of the oral collar type situated in transverse rows and lateral groups on the three prevulvar segments. On the fifth segment they form small lateral groups only and a few are present around the anal lobes. Trilocular pores evenly distributed, not so numerous as on dorsal surface. Small circular disc pores scattered.

NOTES. This species does not belong to the genus *Pseudococcus* as now understood and bears characters which link it with the genus *Cataenococcus* as recently described by Ferris (1955) and especially to *C. phoradendri* (Cockerell). It differs from all the known species of *Cataenococcus*, however, in having the anal ring located at the apex of the body instead of being set at about its own length from the apex of the body.

***Pseudococcus rhodesiensis* Hall**

(Text-fig. 6)

Pseudococcus rhodesiensis Hall, 1937, *Trans. R. ent. Soc. Lond.* 86 : 130.

HABIT. This species was described from South Marendellas, Southern Rhodesia on grass roots. Hall gave the following description of the habit : "Adult female ovate to elongate oval and pale to bright yellow in colour. The segmentation is distinct and the dermis is sparsely dusted with a little white pulverulent matter. No marginal or caudal filaments apparent. Later the female becomes enclosed in a cell of white fibres of indeterminate shape, the inside of which is comparatively smooth and matted."

RECOGNITION CHARACTERS. Adult female as mounted on the slide, elongate-oval measuring approximately 3.5 mm. long, the posterior end of the body rounded. Antennae very short with either six, seven or eight segments. Legs small in comparison to the size of the body, claws without a denticle. Circulus absent. Anterior and posterior ostioles absent. Anal ring with six setae, their lengths being nearly twice as long as the diameter of the ring. Outer ring of anal ring pores rather numerous, giving the ring a wide appearance. Spiracles with wide apodemal plates but without a crescentic band of pores on the spiracular opening. Cerarii represented by a single pair on the anal lobes each usually composed of a single short conical seta surrounded by a few long stout auxiliary setae but without trilocular pores. Dorsal setae not numerous of various lengths but all slender and not lanceolate. Apart from the group of long auxiliary setae surrounding each anal lobe cerarius there is another group on the margin of the penultimate segment. A few other long marginal setae are present on some of the other abdominal segments.

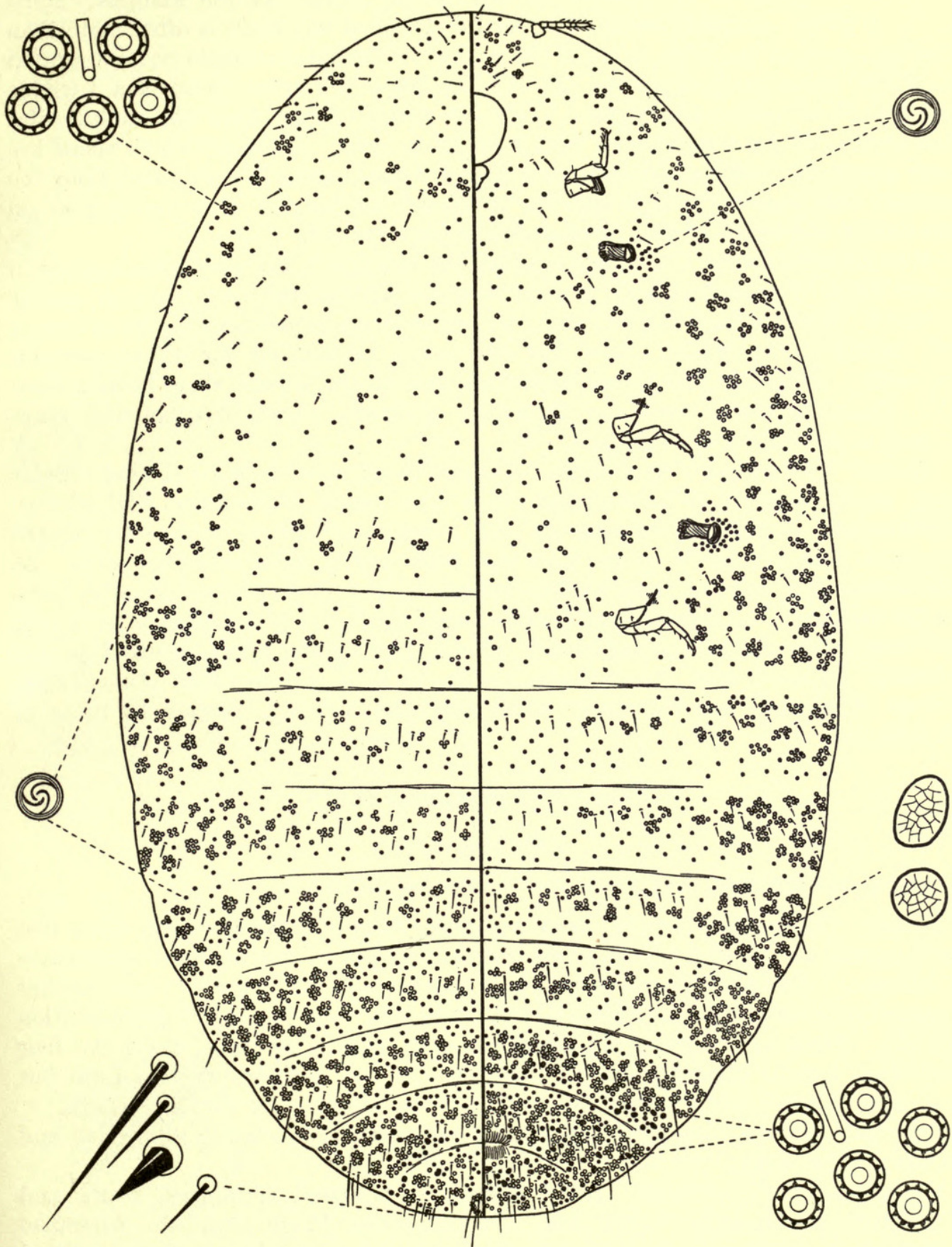


FIG. 6

Dorsal multilocular disc pores in groups of up to twelve; numerous across the abdominal segments but present on the thorax mainly on the margins. Each group of pores surrounds a small slender tubular duct but there is often more than one duct present probably because the groups are merged. Single pores are often scattered between the groups. On the last three segments there is a variable number of sieve-like disc pores. These are usually larger than the multilocular disc pores and the shape varies from circular to oval. Trilocular pores about the same size as the multilocular disc pores, always round; usually distributed along the anterior and posterior margins of the abdominal segments. They are sparser on the thorax and head. Small circular disc pores scattered.

Ventral surface with a few long setae on the margins of the abdominal segments. Other setae short and slender, not numerous. Multilocular disc pores in similar groups to those on the dorsal surface; numerous in transverse rows on the abdomen and around the margins. Sieve-like disc pores present on the three posterior segments. Trilocular pores more numerous than on the dorsum there being noticeable concentrations around the spiracular openings. Small circular disc pores present in no definite arrangement.

NOTES. The groups of multilocular disc pores each surrounding a slender tubular duct would suggest a relationship with the genus *Peliococcus* Borkhsenius. Nevertheless this genus belongs to the *Phenacoccus* series with 9-segmented antennae, with a denticle on the claw and with ventral quinquelocular pores. As *rhodesiensis* has none of these characters and as it possesses sieve-like disc pores on the abdomen and spiracles with rather wide apodemal plates it may be that it has some relationship, however remote, to the grass feeding genera centred around *Antonina* Signoret and *Antoninoides* Ferris. It is significant that *Antoninoides parrotti* (Cockerell) has extremely small antennae and legs similar to those of *rhodesiensis*.

Trionymus inyazurae Hall

(Text-fig. 7)

Trionymus inyazurae Hall, 1937, *Trans. R. ent. Soc. Lond.* 86: 131.

HABIT. Originally described from Inyazura, Southern Rhodesia on grass just underground at the base of the aerial shoots. Hall notes the external appearance as follows: "Adult female ovate, pale brown to maroon, but the colour is somewhat obscured by a very fine and uniform film of white pulverulent matter. Segmentation distinct. There are no marginal filaments, and in the absence of these the four very short caudal filaments are readily seen. Ovisac of indeterminate form but composed of fibres that are capable of being drawn out to a considerable length.

Eggs pale brown. Young adult females are relatively elongate filling out and becoming more ovate later."

RECOGNITION CHARACTERS. Adult female in prepared specimens, ovate and measuring approximately 2.5 mm. long. Posterior edge of body rounded. Antennae 8-segmented. Legs normal, rather slender with a few translucent pores on hind coxae. Circulus absent. Anterior and posterior ostioles moderately developed,

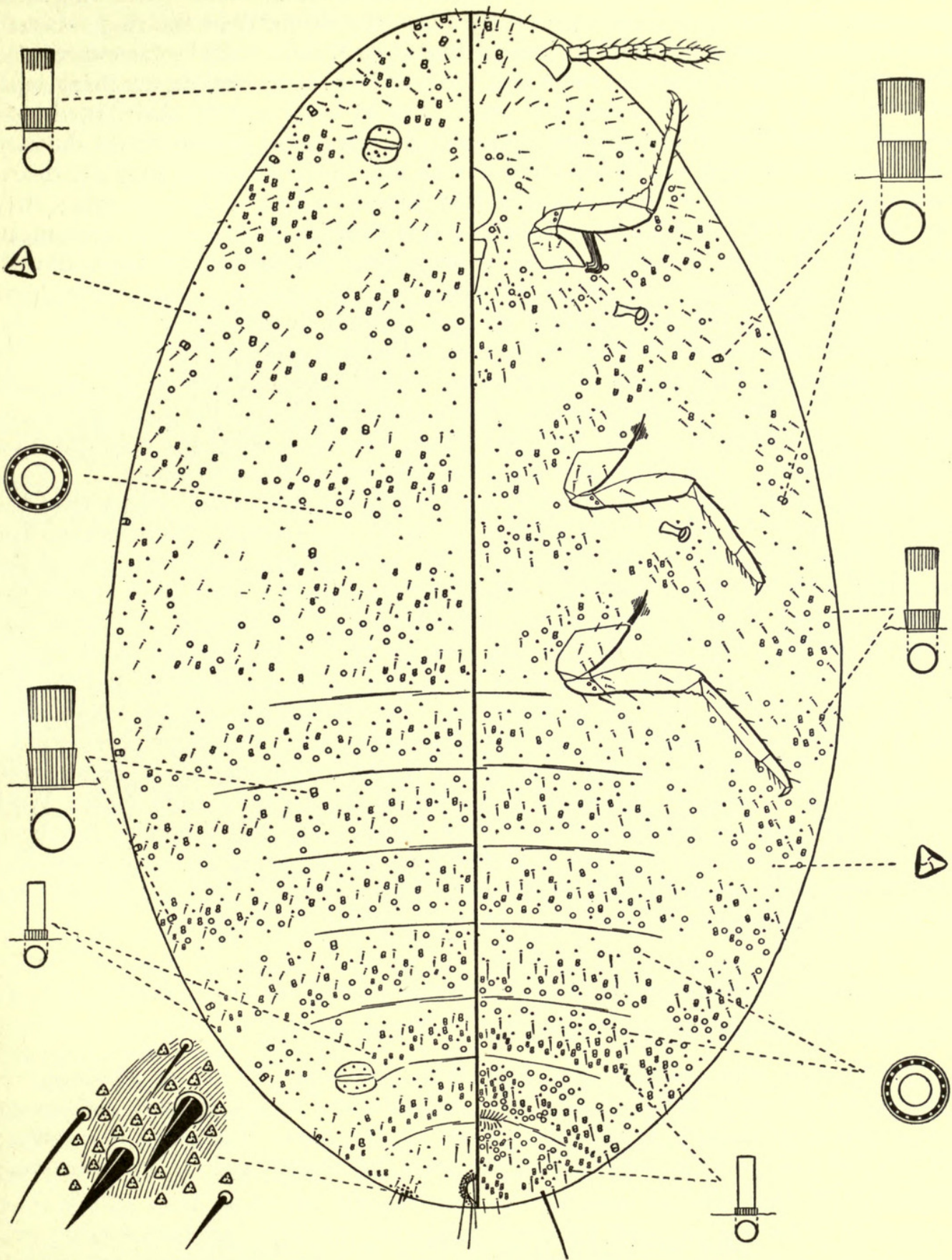


FIG. 7

the lips with a few trilocular pores but apparently without setae. Anal ring with six setae, the lengths of which are nearly twice the diameter of the ring. Cerarii confined to the anal lobes only, each consisting of two small conical setae surrounded by a small cluster of trilocular pores and three or four short, slender, auxiliary setae surrounded by a lightly sclerotized area. Dorsal setae evenly distributed, not numerous and all short and slender. Multilocular disc pores present on the dorsum, these rather scattered on the head and thorax but on the abdomen they are distributed in transverse rows at the anterior and posterior edges of the segments; they are absent on the last segment. Tubular ducts distributed over entire dorsum, of three sizes all of the oral collar type. A large type, few in number, is distributed mainly on the anterior head region and singly on the margins; other single ducts are present on the dorsum but these are not constant in number or position. An intermediate size present over entire dorsum, rather numerous and arranged more or less in transverse rows across the segments. Small tubular ducts on the last four segments only, these in transverse rows at the posterior edges of the segments except the last where there is a small marginal group, the latter being the only ducts on the last segment. Trilocular pores not numerous but evenly distributed.

Ventral surface with a pair of apical setae which are stouter and longer than the anal ring setae. Ventral setae similar to those on dorsum. Multilocular disc pores rather numerous on the abdomen at the anterior and posterior edges of the segments, becoming less numerous anteriorly on the thorax. They are sparse on the head. Tubular ducts of the same three sizes as those on the dorsum. An occasional duct of the large type is present on the margins and on the anterior head region. The intermediate size duct is the most numerous, these scattered on the thorax, but on the abdomen they lie in transverse rows and lateral groups. Numerous small tubular ducts confined to the last three segments. Trilocular pores sparse.

NOTES. This species does not seem to be a typical *Trionymus* but it bears a close similarity to *T. magnus* (Cockerell & Cockerell) known only from North West Mexico and recently redescribed by Ferris (1953). The latter species has been placed in *Trionymus* but it differs from *inyazurae* mainly in having a small circulus and 7-segmented antennae instead of 8-segmented antennae. It is significant that *inyazurae* is a grass-feeding species, as are most species of *Trionymus*.

***Trionymus pterocauloni* Hall = *Trionymus sanguineus* James (SYN. NOV.)**

Trionymus pterocauloni Hall, 1937, *Trans. R. ent. Soc. Lond.* 86 : 133.

This species was described by Hall from Salisbury, Southern Rhodesia on *Pterocaulon decurrens* and *Trifolium* sp. It is identical, however, with *Trionymus sanguineus* described by James (1936) to which the name *Trionymus pterocauloni* Hall is here sunk as a synonym. De Lotto (1957) has already redescribed *sanguineus* and given an illustration.

THE SPECIES DESCRIBED BY F. LAING

Seven species have been described from the Ethiopian Region by Laing at one time or another. Two names have been sunk as synonyms already and a further

name is synonymized herein. Ezzatt & McConnell (1956) have redescribed and illustrated *Planococcoides njalensis*. In the accompanying pages, illustrations and descriptions are given of *Heliococcus phaseoli*, *Pseudococcus hargreavesi* and *Pseudococcus ugandae*.

***Heliococcus phaseoli* (Laing)**

(Text-fig. 8)

Phenacoccus phaseoli Laing, 1929, *Ann. Mag. nat. Hist.* (10) 4: 475.

Heliococcus phaseoli (Laing), Goux, 1934, *Bull. soc. ent. Fr.* 39: 171.

HABIT. This species was described from Hill Station, Sierra Leone on dwarf beans. Laing was unable to give any description of the external appearance as the specimens were preserved in alcohol.

RECOGNITION CHARACTERS. Adult female ovate measuring approximately 3.5 mm. long. Anal lobes moderately sclerotized on the dorsal surface. Antennae 9-segmented. Legs stout and long, with a denticle on the claw. Circulus rather large and wide. Ostioles moderately developed, each lip with about two setae and a few trilocular pores. Anal ring with six setae, these being slightly longer than the diameter of the ring. Cerarii numbering thirteen pairs and borne at the apices of small membranous tubercles. There is a cerarius on the margin of each abdominal segment and the remaining cerarii are situated evenly on the margins of the thorax and head. Each cerarius composed of a pair of lanceolate setae surrounded by a few trilocular pores. Dorsal surface with minute lanceolate setae which are quite sparse. Dorsal multilocular disc pores numerous, in definite transverse rows on all abdominal segments except the last, on the three thoracic segments and one row on the head. Crateriform ducts present in transverse rows, these being of three sizes. There are two pairs of large crateriform ducts on the anal lobes, each duct having three or four setae around the base of the duct prominence. Intermediate sized crateriform ducts are situated mainly in groups of two or three around the margins and an occasional duct is present in the mid-region. These ducts have three, or occasionally four, setae around the base of the duct prominence. Small crateriform ducts each with a single seta at the base of the duct prominence are present in single transverse rows on the abdomen whilst on the head and thorax they form irregular rows. A few small tubular ducts of the oral collar type are present in marginal groups on the seventh and eighth segments. Trilocular pores not numerous, evenly distributed.

Ventral surface with a pair of long apical setae accompanied by two shorter setae. In some specimens there is a small area of faint sclerotization near each apical seta but this is indistinct. Ventral setae of various sizes, there being some long setae especially in the mid-region interspersed with shorter setae. Minute lanceolate setae similar to those on the dorsum are located around the margins. Multilocular disc pores numerous. On the abdominal segments they occupy dense transverse rows at the anterior and posterior edges of the segments and on the head and thorax they form irregular rows. Quinquelocular pores sparse, there being a few between the transverse rows of multilocular disc pores on the abdomen and groups between

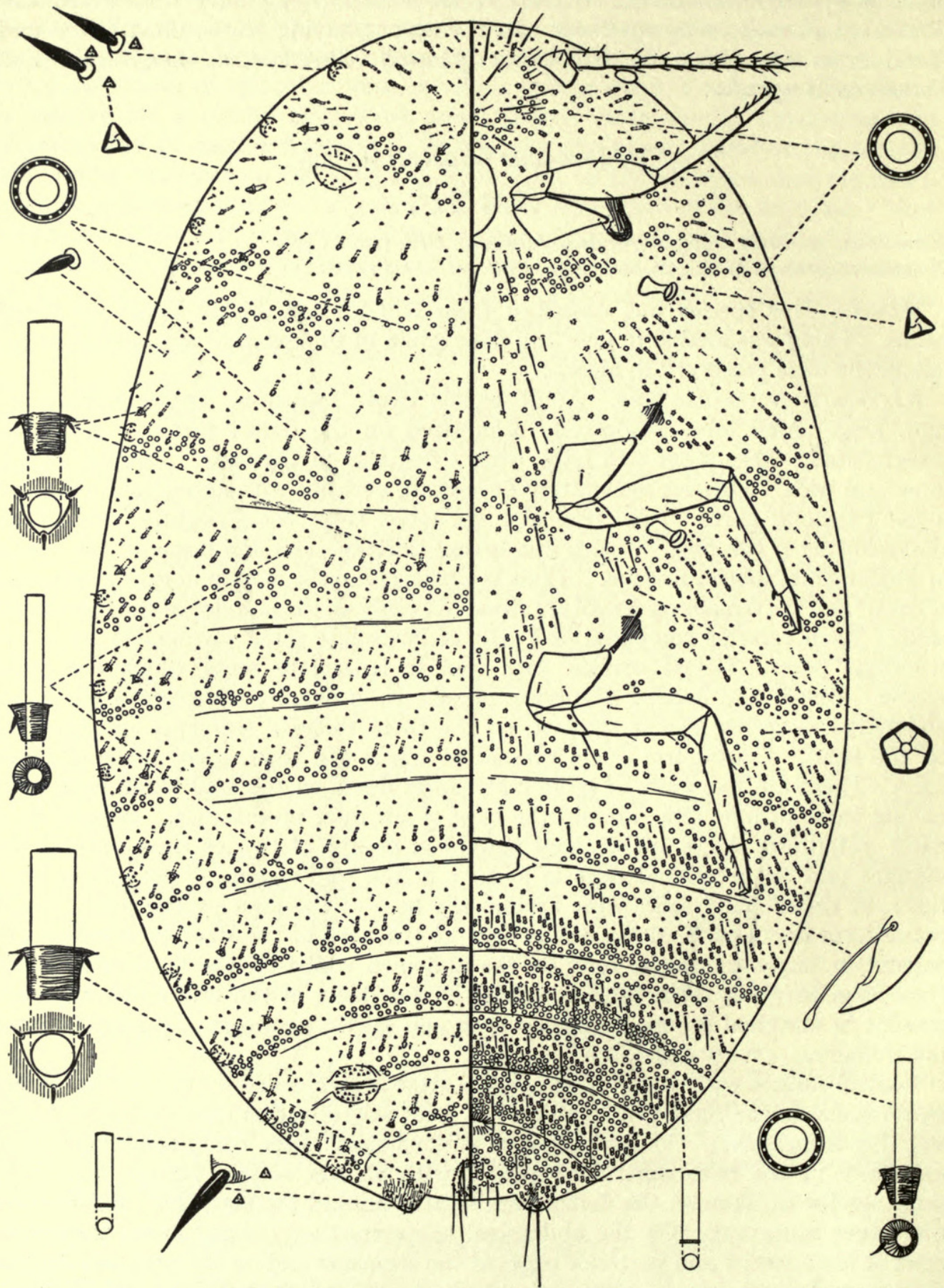


FIG. 8

the coxae. Small crateriform ducts similar to the small type on the dorsal surface are distributed around the margins but they are not numerous. There are noticeable groups posterior to each spiracle. Small oral collar tubular ducts in transverse rows between the rows of multilocular disc pores on the abdomen. They are fairly numerous on the posterior segments but become fewer anteriorly; a few are present between the coxae. Trilocular pores sparse.

NOTES. Goux (1934) included this species in the genus *Helicococcus* Sulc on the basis of the crateriform pores. It seems to belong to this genus although the type species has eighteen pairs of cerarii whilst *phaseoli* has only thirteen pairs. Borkhsenius (1949), however, has described a number of species with two to eighteen pairs of cerarii and it seems that the number can be variable.

***Paraputo ritchiei* Laing = *Paraputo anomala* (Newstead)**

Paraputo ritchiei Laing, 1929, *Ann. Mag. nat. Hist.* (10) 4 : 473.

In an earlier paper of this series (Williams, 1958) it has been established that this species is identical with *Paraputo anomala* (Newstead) to which the name *ritchiei* was sunk as a synonym.

***Planococcoides njalensis* (Laing)**

Pseudococcus njalensis Laing, 1929, *Ann. Mag. nat. Hist.* (10) 4 : 472.

Pseudococcus exitiabilis Laing, 1944, *Bull. ent. Res.* 35 : 91.

Pseudococcus njalensis Laing, Hall, 1945, *Bull. ent. Res.* 36 : 305.

Planococcoides njalensis (Laing), Ezzatt & McConnell, 1956, *Univ. Maryland Agric. Exp. Sta. Bull.* A—84 : 55.

Laing described *njalensis* in 1929 from Sierra Leone and in 1944 described *exitiabilis* from Gold Coast. It has been shown by Hall (1945) that the latter name is a synonym of *njalensis* and that the species is extremely variable. Great interest has been shown in this species in recent years as it is a vector of the "Swollen Shoot" virus disease of cacao. It is probably widespread throughout West Africa and the reader is referred to the paper by Hall who discussed its distribution and host records. Ezzatt & McConnell (1956) have recently made it the type species of the genus *Planococcoides* and have given an excellent illustration.

***Pseudococcus bukobensis* Laing = *Pseudococcus hargreavesi* Laing**

An examination of type material of *Pseudococcus bukobensis* Laing described in 1929 has shown that it is identical with *Pseudococcus hargreavesi* Laing described in 1925 and the synonymy is given in the discussion of the latter species.

***Pseudococcus exitiabilis* Laing = *Pseudococcus njalensis* (Laing)**

As previously stated this species has been shown by Hall (1945) to be the same as *njalensis* and it is listed here purely for reference.

Pseudococcus hargreavesi Laing

(Text-fig. 9)

Pseudococcus hargreavesi Laing, 1925, *Bull. ent. Res.* **16** : 52.*Pseudococcus bukobensis* Laing, 1929, *Ann. Mag. nat. Hist.* (10) **4** : 471 (SYN. NOV.).

HABIT. Described originally from Kampala, Uganda on *Bauhinia* sp. and again under *P. bukobensis* from Bukoba, Tanganyika Territory on coffee. In neither case is there any description of the insect in life due to the specimens having been preserved in alcohol.

RECOGNITION CHARACTERS. Body of adult female oval, attaining a length of 4 mm. Antennae 8-segmented. Legs long and slender without a denticle on the claw, hind coxae and tibiae with a few translucent pores. Circulus present. Ostioles moderately developed, with the inner edges of the lips slightly sclerotized and with two or three setae and a few trilocular pores on each lip. Anal ring with six setae which are nearly twice as long as the diameter of the ring. Spiracles with a rather short, broad, apodemal plate. Cerarii numbering eighteen pairs. Anal lobe cerarii each with about seven conical setae of various sizes, with a few trilocular pores and one or two auxiliary setae surrounded by a characteristic sclerotized area. Penultimate cerarii similar to anal lobe cerarii each surrounded by a smaller area of sclerotization. The anterior cerarii are each composed of a few conical setae, there being rarely less than four setae and sometimes as many as seven but their numbers vary in different specimens. Dorsal surface with minute lanceolate setae which are not numerous. Trilocular pores accompany these setae in definite areas only there being thus some areas devoid of pores and setae as illustrated. A few tubular ducts of the oral collar type are usually scattered on the thorax.

Ventral surface of anal lobes each with a small sclerotized anal bar and a long slender bar seta. The apical seta is detached from the bar and is stouter and longer than the anal ring setae. Ventral setae not lanceolate, mainly long and slender but not numerous. Multilocular disc pores present on all segments posterior to the circulus, situated in the mid-region in transverse rows. On the fifth and sixth segments they form single rows at the posterior edges and on the seventh and eighth segments they form double rows. There are a few pores on the anterior edge of the seventh segment and a more or less double row on the anterior edge of the eighth segment. They are numerous between the anal lobes. Tubular ducts in transverse rows on the fourth to eighth abdominal segments and in marginal groups from the thorax to the anal lobes. Trilocular pores sparse.

NOTES. an examination of type material of *Pseudococcus bukobensis* Laing has shown that it is the same as *P. hargreavesi* Laing and the former name is here sunk as a synonym. This is a distinctive species which seems to belong to the tribe Planococcini as defined by Ezzatt & McConnell (1956). The dorsal setae are typically lanceolate resembling those of the *Phenacoccus* series, nevertheless the antennae are 8-segmented and there is no denticle on the claw.

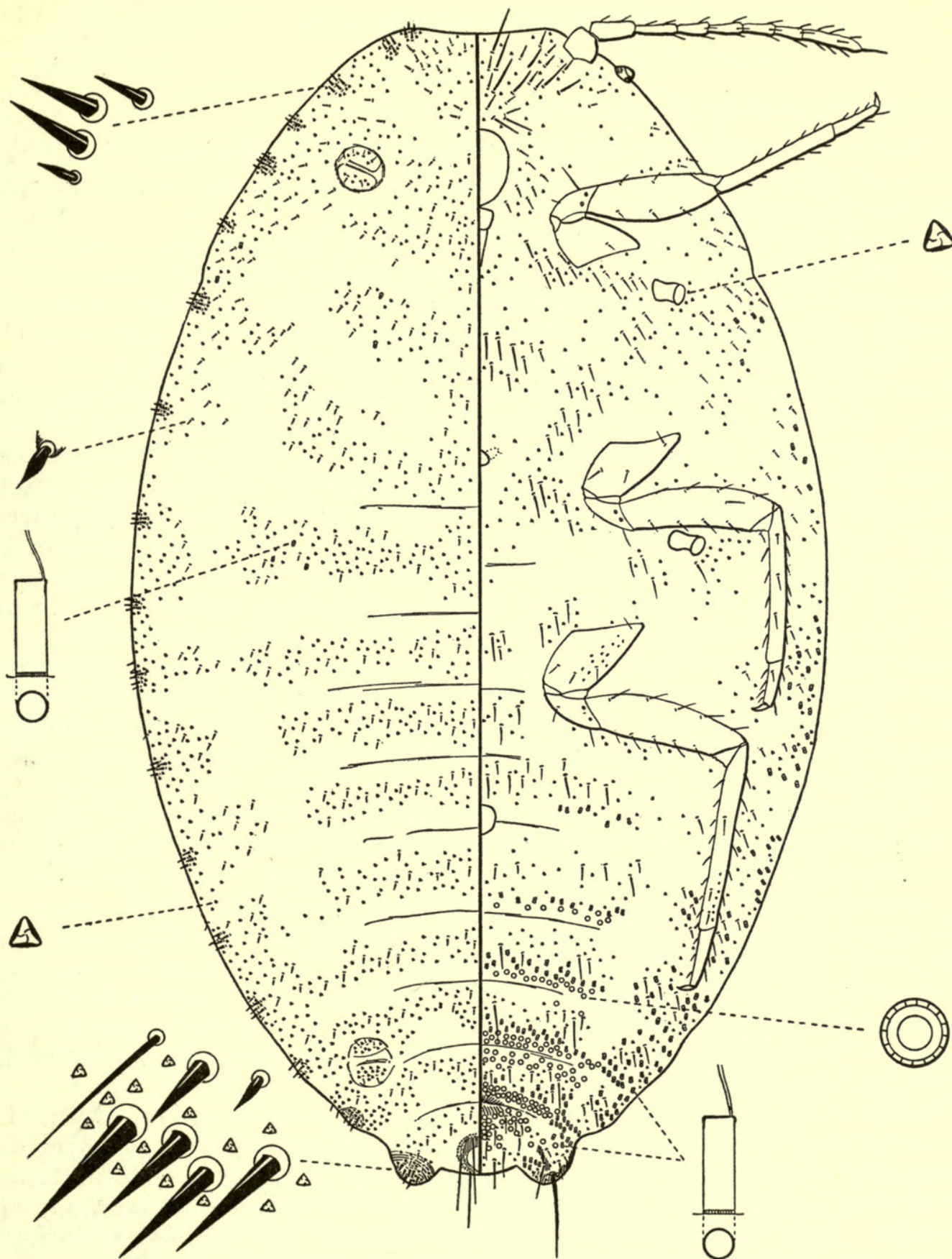


FIG. 9

Pseudococcus ugandae Laing

(Text-fig. 10)

Pseudococcus ugandae Laing, 1925, *Bull. ent. Res.* 16 : 53.

HABIT. Described from Kakumiro, Uganda on *Grevillea robusta*. Laing has given no indication of the external covering, presumably because his type material had been preserved in alcohol.

RECOGNITION CHARACTERS. Adult female broadly oval, attaining a length of 3.5 mm. Anal lobes rather small, the dorsal surface sclerotized. Antennae 9-segmented. Legs slender, claw without a denticle. Circulus moderately developed. Ostioles present, the inner edges of the lips slightly sclerotized and the lips with a few trilocular pores and rarely with setae. Anal ring with six setae which are about twice as long as the diameter of the ring. Cerarii on the five posterior segments only. Anal lobe cerarii each with a pair of conical setae surrounded by a few trilocular pores and two auxiliary setae. Anterior cerarii similar to those on anal lobes, with a few trilocular pores, but the two anteriormost cerarii are each usually composed of one seta which is smaller than the other cerarian setae. Dorsal surface with slender setae of moderate length but not numerous. Dorsal multilocular disc pores absent. Tubular ducts of three sizes. Large tubular ducts present, of the oral rim type, distributed mainly in marginal groups of two or three or even five on the posterior segments, there being also a few on the mid-region of the thorax. These large ducts are often in pairs and are thus easily noticeable. An intermediate size tubular duct with an oral rim is distributed sparsely over the dorsum mainly in irregular transverse rows. Small tubular ducts of the oral collar type are present among the intermediate type but they are not numerous. Trilocular pores sparse, evenly distributed.

Ventral surface with a pair of long stout apical setae which are longer than the anal ring setae. There is a wide sclerotized anal bar continuous with the dorsal sclerotization of each anal lobe, bearing a pair of long setae. Other ventral setae of moderate length and similar to those on the dorsum. Multilocular disc pores on all segments posterior to the circulus. On the fifth segment they occupy a double transverse row on the posterior edge. Posteriorly they are numerous in transverse rows at the anterior and posterior edges of the segments. Small tubular ducts each with an oral collar, not numerous, distributed mainly in irregular transverse rows between the multilocular disc pores on the abdomen ; anteriorly they are scattered. Trilocular pores sparse.

NOTES. This species does not belong to the genus *Pseudococcus* as now understood. It seems to have close affinities to *Phenacoccus hirsutus* Green in possessing 9-segmented antennae, only five pairs of cerarii and with numerous oral rim ducts. In *hirsutus* there are large oral rim ducts on the ventral surface which are absent in *ugandae*. Laing has stated in his original description that the antennae are 8-segmented and that there is an obscure division across the eighth segment suggesting a tendency to a 9-segmented form. In all the specimens seen the antennae are distinctly 9-segmented.

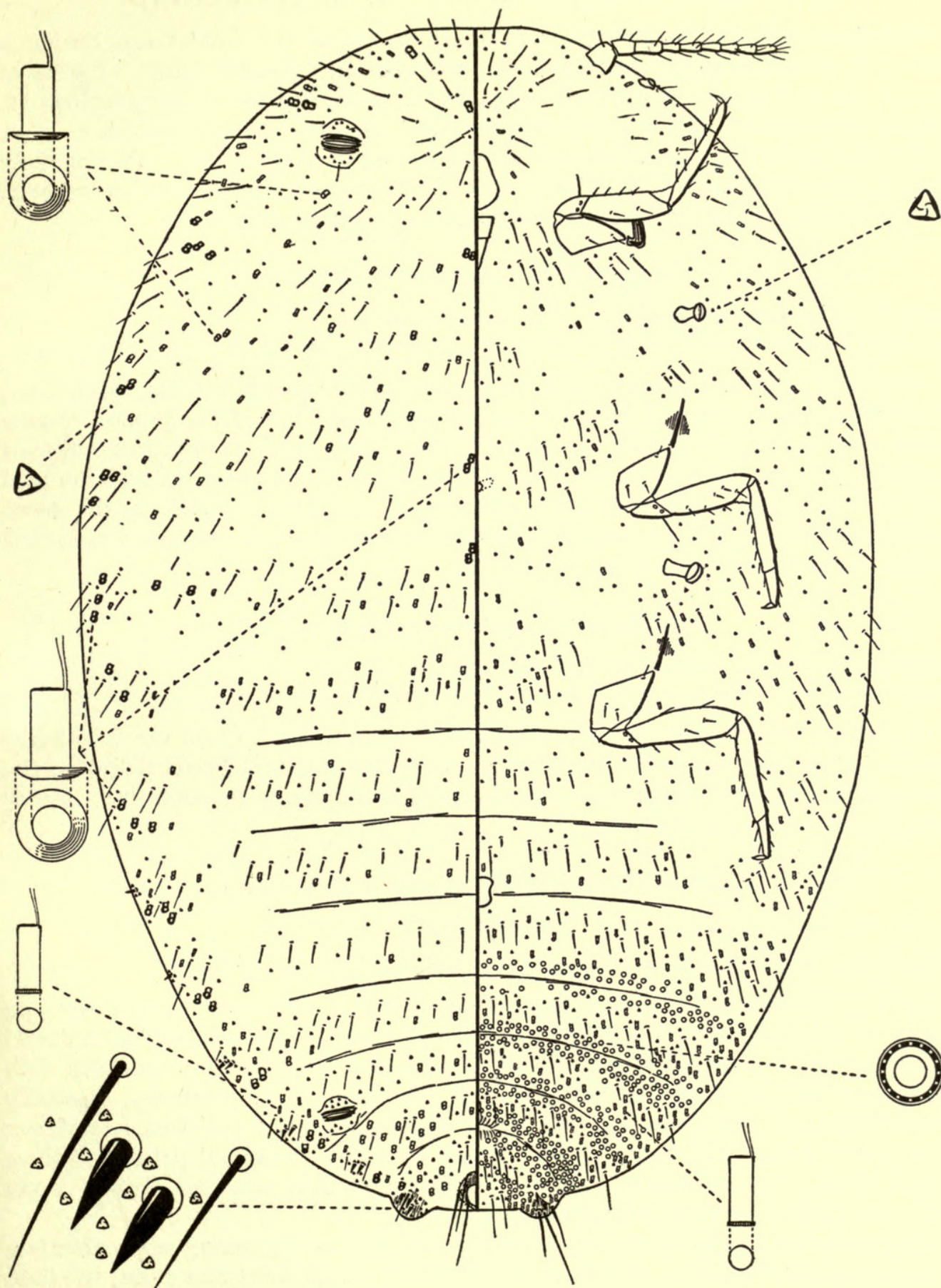


FIG. 10

THE SPECIES DESCRIBED BY A. H. STRICKLAND

Strickland collected some important scale insects in the Gold Coast during a period of research into the vectors of the virus causing " Swollen Shoot " disease of cacao. In two papers, Strickland (1947, 1947*a*) described seven new mealy-bugs, mainly from cacao. These are very interesting and give some indication of what might be expected after further intensive collecting in West Africa. Two of these species have been adequately redescribed and illustrated recently by other workers. The remaining five species are redescribed in the following pages.

Cataenococcus loranthe (Strickland)

Farinococcus loranthe Strickland, 1947, *Bull. ent. Res.* **38** : 515.

Catenococcus loranthe (Strickland), Balachowsky, 1954, *Rev. Path vég.* **33** : 247 (mis-spelling).

Strickland described this species in the genus *Farinococcus* from Tafo, Gold Coast, on *Loranthus bangwensis* attended by an undetermined ant of the genus *Crematogaster*. Ferris (1955) erected the genus *Cataenococcus* with *Dactylopius olivaceus* Cockerell as type, mainly on the basis of the 8-segmented antennae and the anal ring with six to ten setae. Balachowsky (1954) has placed *loranthe* in the genus *Cataenococcus* and given an excellent illustration from specimens collected in French Guinea on *Rhizophora racemosa*.

Delococcus tafoensis (Strickland)

Formicococcus tafoensis Strickland, 1947, *Bull. ent. Res.* **38** : 513.

Delococcus tafoensis (Strickland), Ferris, 1955, *Microentomology*, **20** : 5.

Originally described from Tafo, Eastern Province, Gold Coast on *Theobroma cacao*. It has been made the type of the genus *Delococcus* by Ferris (1955) on the basis of the 6-segmented antennae and the numerous setae on the anal ring. Ferris has also illustrated this species.

Planococcus celtis (Strickland) (*comb. nov.*)

(Text-fig. 11)

Pseudococcus celtis Strickland, 1947, *Proc. R. ent. Soc. Lond.* (B) **16** : 154.

HABIT. Described originally from Tafo, Eastern Province, Gold Coast, on *Celtis* sp. (Urticaceae). The habit has been described by Strickland as follows: "Oval to sub-circular in shape, completely covered dorsally and ventrally with white wax, thinner along the intersegmental membranes, and ventrally, especially around the beak and coxae. With seventeen or eighteen pairs of stout lateral wax filaments, the anal pair being slightly longer than the abdominal pairs, and these longer than those anteriorly placed. No dorsal median wax-free stripe. Body colour when wax removed, a dull lemon yellow."

RECOGNITION CHARACTERS. A broadly oval species measuring approximately 2 mm. long on the slide. Antennae 8-segmented. Legs short and stout, the hind legs with some translucent pores on the coxa and tibia. Circulus present, normal for

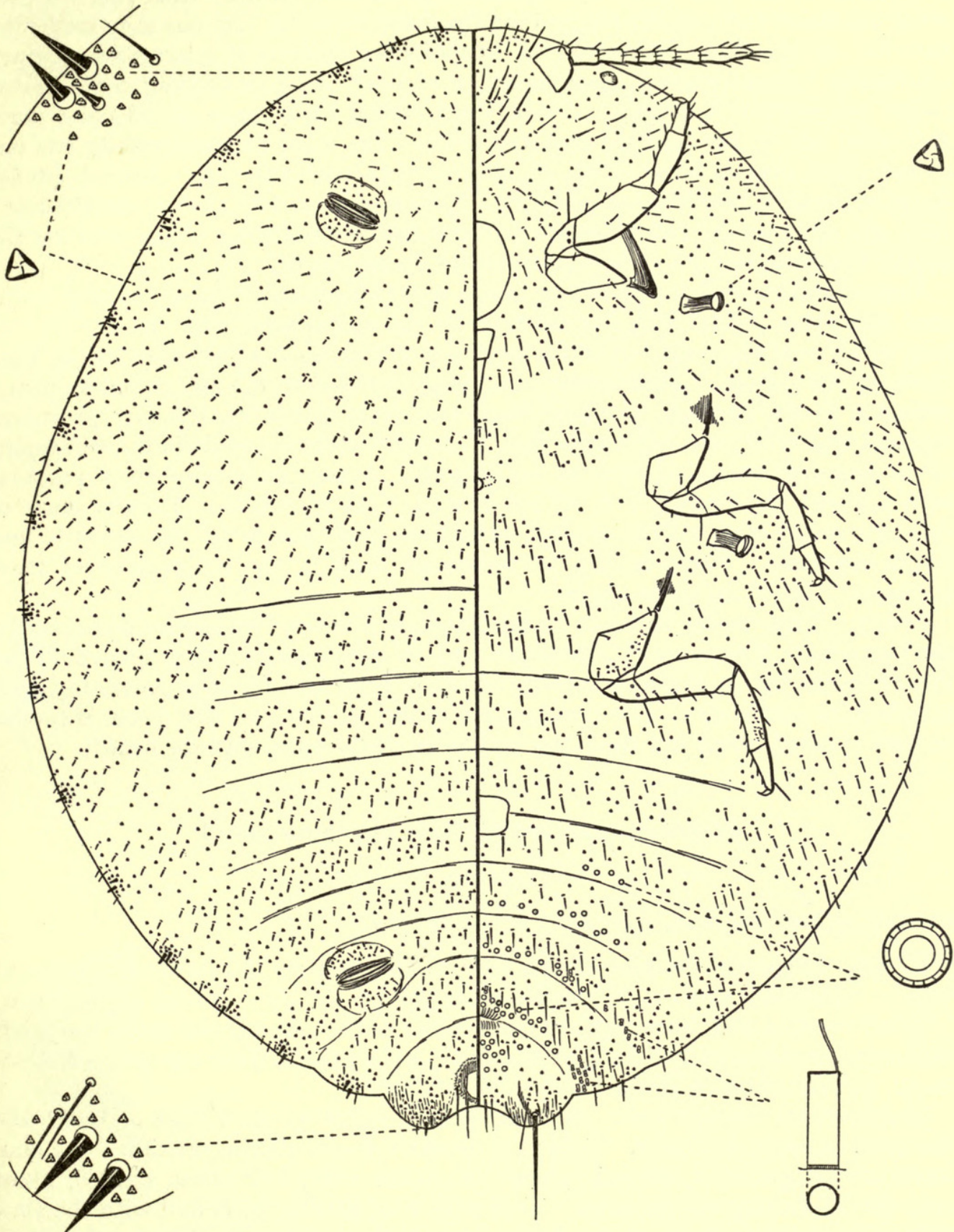


FIG. II

the genus. Ostioles well developed with the inner edges of the lips sclerotized and with about seven setae and a few trilocular pores on each lip. Anal ring with six setae which are only slightly longer than the diameter of the ring but they are longer than the cisanal setae. Dorsal surface of anal lobes moderately sclerotized. Cerarii numbering eighteen pairs. Each cerarius composed of a pair of stout conical setae which are pointed or flagellate distally, surrounded by a group of trilocular pores and often one or two slender auxiliary setae. The third cerarius usually has one or two extra conical setae which are smaller than the main pair. Dorsal tubular ducts and multilocular disc pores absent. Trilocular pores with an even distribution; there are often one or two trilocular pores at the bases of some of the setae on the thorax but these are not to be confused with dorsal cerarii.

Ventral surface with a pair of long apical setae which are over twice as long as the anal ring setae. Anal lobe bar reaching to the apical seta, with the bar seta as long as an anal ring seta. Ventral setae not numerous but generally longer than those on the dorsum. Multilocular disc pores confined to the abdominal segments posterior to the circulus, in single transverse rows except on the first prevulvar segment where they are in a double row. They are situated mainly in the mid-region of the segments but often reach to the margins. Approximate numbers of pores on each segment as follows: V 8, VI 22, VII 22, VIII 28, IX 20. Tubular ducts of the oral collar type mainly present in submarginal groups on the seventh and eighth segments. There is also an occasional duct in the mid-regions of these segments. Trilocular pores sparse.

NOTES. This species seems to be intermediate between two species described by De Lotto from Kenya as *P. rotundatus* and *P. subukiaensis*. It is related to the former species by the cerarii possessing auxiliary setae but differs in possessing more multilocular disc pores. The arrangement of the multilocular disc pores is similar to that of *subukiaensis* but the latter has no auxiliary setae with the cerarii.

***Rhizoecus spelaea* (Strickland) (*comb. nov.*)**

(Text-fig. 12)

Coccidella spelaea Strickland, 1947, *Bull. ent. Res.* 38 : 502.

HABIT. Originally described from Tafo, Gold Coast on the roots of *Theobroma cacao*. Strickland gives the following description of the external appearance: "Covered with a thin layer of finely particulate white wax, thinner along the inter-segmental membranes and around the beak and coxae. With one pair of short, stout, wax filaments on the last abdominal segment."

RECOGNITION CHARACTERS. An oval species, widest on the thorax and with the abdomen tapering gradually. Length as mounted on the slide approximately 2 mm. Antennae 6-segmented, strongly geniculate, there being four stout, curved, blunt setae on the two apical segments. Legs with long slender claws and with the claw digitules reduced to small slender setae. Circuli three in number being rather large for the genus, each having a reticulated surface. The anterior circulus lying between the hind coxae and the other two circuli on the two posterior segments; the middle

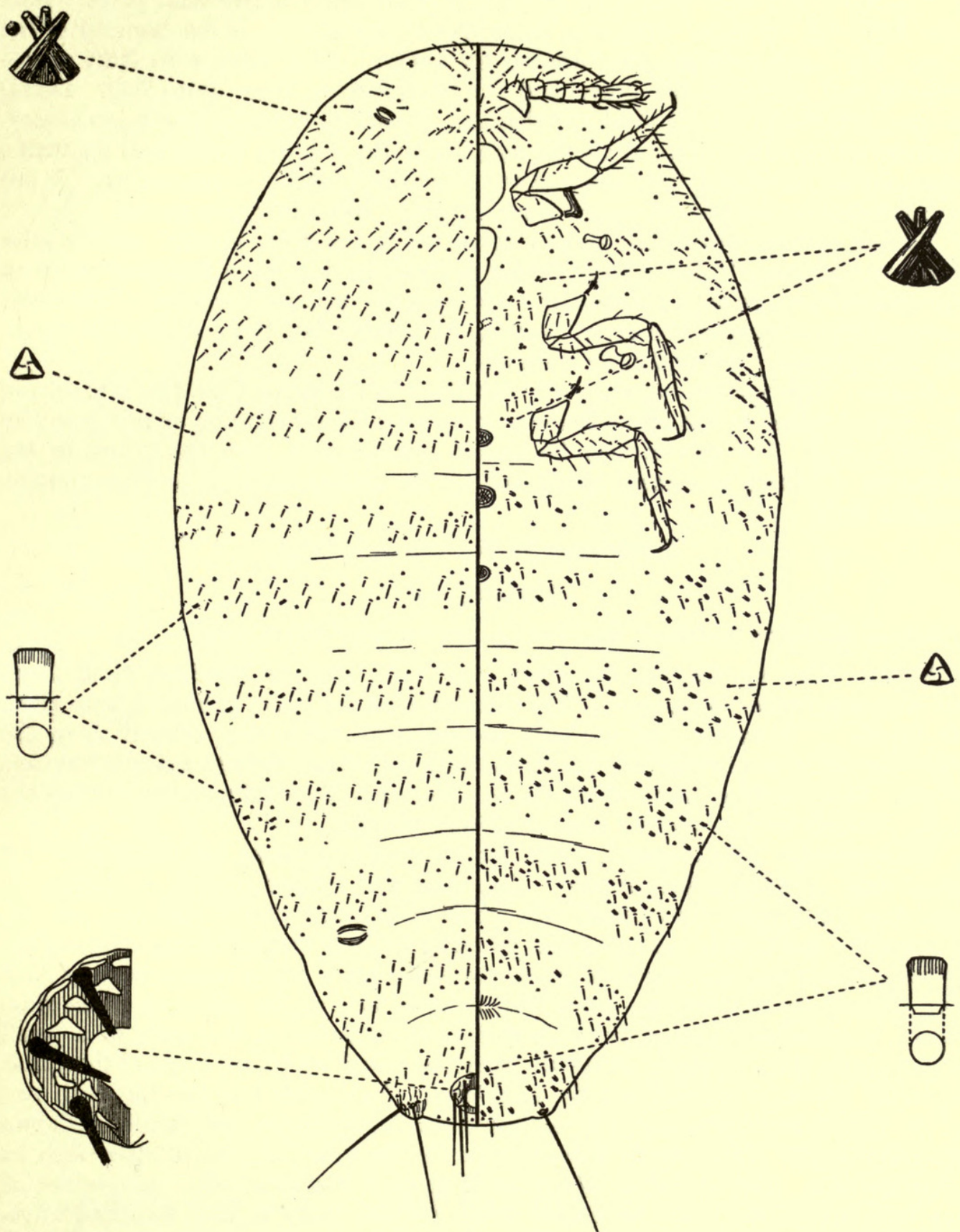


FIG. 12

circulus being the largest and the posterior circulus the smallest. Dorsal ostioles poorly developed with sclerotized lips but without setae or trilocular pores. Anal ring wide with irregular oval pores, setae about twice as long as the diameter of the ring. Eyes and cephalic plate apparently absent. Anal lobes with faint sclerotization and each with two dorsal and one ventral setae, these quite long. Dorsal surface with few setae, all short and slender. Dorsal multilocular disc pores absent. Tubular ducts often situated on the margins of the anterior abdominal segments, these rather small and their shape being somewhat difficult to determine. A few tritubular pores are present on the head margin. Trilocular pores sparse.

Ventral surface with small slender setae which are quite sparse. Multilocular disc pores absent. Tubular ducts similar to those on dorsum in transverse rows on the abdomen where they are more numerous on the anterior segments. Tritubular pores situated between the coxae, varying in number but there are usually about six pairs present. Trilocular pores sparse.

NOTES. This species was originally described in the genus *Coccidella* Hambleton but is here placed in the genus *Rhizoecus* following the redefinition of this genus by Ferris (1953). The species may be readily distinguished from the others in the genus by the three prominent circuli and by the arrangement of the characteristic tubular ducts.

***Tylococcus boafoensis* Strickland**

(Text-fig. 13)

Tylococcus boafoensis Strickland, 1947, *Proc. R. ent. Soc. Lond.* (B) 16 : 151.

HABIT. This species was described from Tafo, Eastern Province, Gold Coast on *Musanga smithii* (Moraceae). The description of the insect in life has been given as follows: "Elongate oval in shape, covered with white wax, thinner along the intersegmental membranes and around the beak and coxae, without a dorsal wax-free stripe. With eighteen pairs of lateral wax filaments, the anal pair longer than the rest. Body colour, when wax removed, light yellow."

RECOGNITION CHARACTERS. Adult female oval measuring approximately 1.5 mm. long. Antennae 8-segmented. Legs long and slender without a denticle on the claw, hind coxae and tibiae with a few translucent pores. Circulus present, moderately developed. Anterior and posterior ostioles with the inner edges of the lips sclerotized and each lip with one or two setae and a few trilocular pores. Anal ring with six setae which are more than twice as long as the diameter of the ring. Cerarii numbering eighteen pairs, each cerarius situated at the apex of a small slightly sclerotized tubercle, except the anal lobe cerarii which are borne at the apices of larger tubercles representing the anal lobes. Each anal lobe cerarius with two stout, conical setae surrounded by a cluster of trilocular pores and usually with two auxiliary setae. The anterior cerarii similar to the anal lobe cerarii often with an auxiliary seta. Dorsal surface with a small number of slender setae many of which are very noticeable by having one to four trilocular pores at their bases and thus resembling dorsal cerarii. These setae are, however, much more slender than the cerarian setae. Dorsal multilocular disc pores and tubular ducts absent. Trilocular pores sparse.

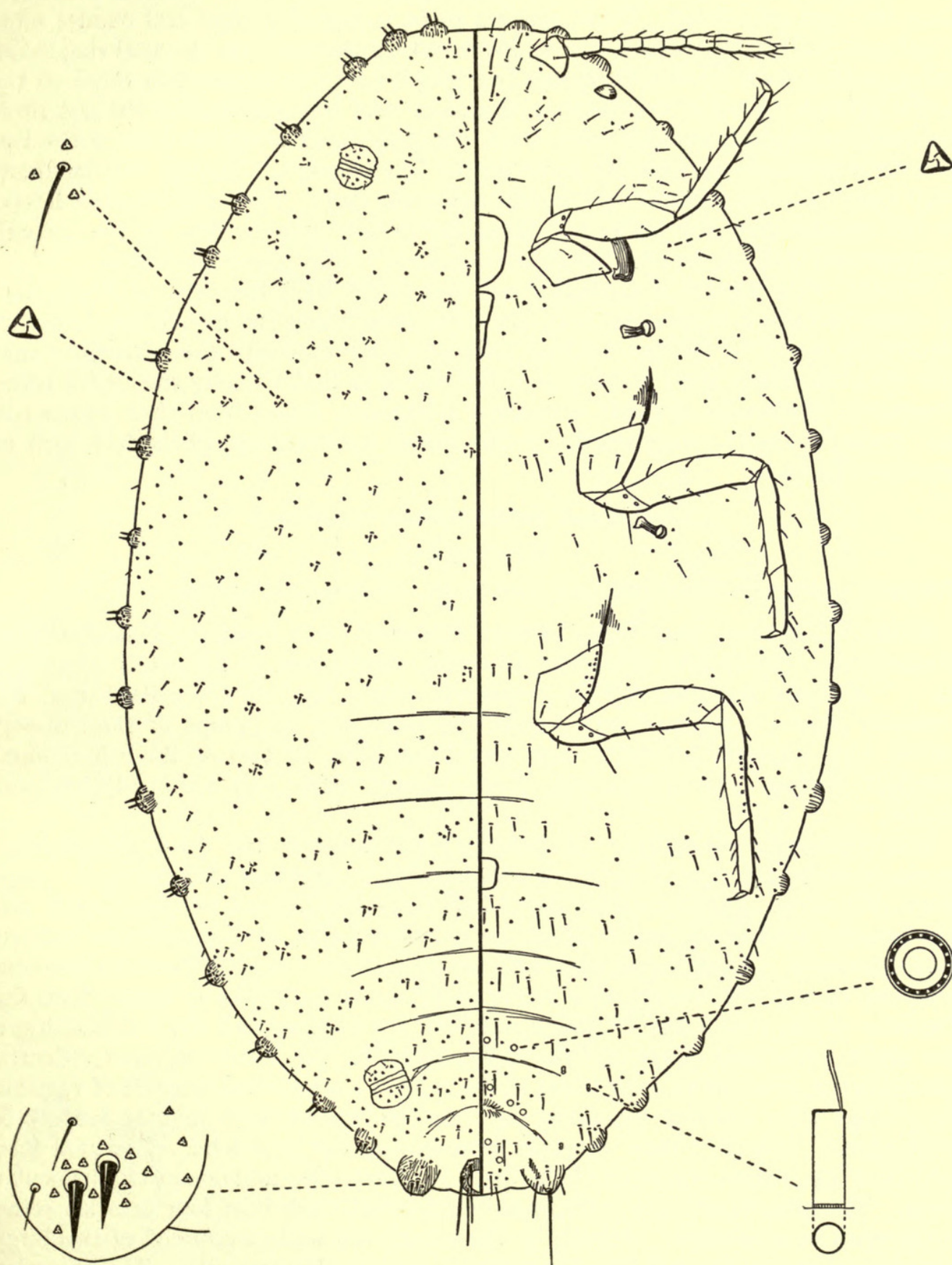


FIG. 13

Ventral surface with a small sclerotized anal lobe bar with a bar seta shorter than the anal ring setae. The apical seta is detached from the anal lobe bar and is longer than the anal ring setae. There appears to be a pair of cisanal and obanal setae which are roughly of similar shape and size but are shorter than the anal ring setae. Other ventral setae short and slender but they tend to be longer than those on the dorsal surface. Ventral multilocular disc pores very few, confined to the last three segments in single transverse rows, there being but four to six on each of the two prevulvar segments and one to three on the last segment. Ventral tubular ducts very sparse on the seventh and eighth segments only. They are situated lateral to the multilocular disc pores and there are usually four or five on the seventh segment and three or four on the eighth segment. Trilocular pores sparse.

NOTES. This species is certainly not congeneric with the type of *Tylococcus*. It seems to have a connection with the tribe Planococcini as defined by Ezzatt & McConnell (1956) by having eighteen pairs of cerarii and with the sclerotized anal lobe bars but differs from all species so far placed in that tribe by the cerarii being situated at the apices of small sclerotized tubercles. Apart from these characters the species is easily recognizable by the sparse microscopical characters such as setae and pores.

***Tylococcus malacanthae* Strickland**

(Text-fig. 14)

Tylococcus malacanthae Strickland, 1947, *Proc. R. ent. Soc. Lond.* (B) 16 : 149.

HABIT. Described from Tafo, Eastern Province, Gold Coast on *Malacantha* sp. (Sapotaceae). Strickland gives the following description of the adult female in life: "Anterior segments lightly powdered with a fine, dusty, yellow wax, the posterior segments nude of wax. With eighteen pairs of groups of thin, glossy, yellow wax filaments laterally, each group consisting of two or three individual filaments issuing from a cerarius. Body colour, when wax removed, ochreous yellow."

RECOGNITION CHARACTERS. A broadly oval species, the largest measuring approximately 2.5 mm. long \times 1.5 mm. wide. Antennae 8-segmented. Legs short and stout. Circulus large, dumb-bell shaped. Ostioles well developed, the lips heavily sclerotized and bearing an occasional seta but apparently without trilocular pores. Anal ring set at a distance of about one and a half times its diameter from the apex of the body; with six setae which are only slightly longer than the diameter of the ring. The ring is surrounded by a sclerotized band containing a few short setae and trilocular pores belonging to the ninth segment. Cerarii numbering eighteen pairs, each borne at the apex of a sclerotized tubercle of variable size. Anal lobe cerarius consisting of three prominent and slightly lanceolate setae at the apex of a large tubercle representing the anal lobe. The anal lobe tubercle is the largest and bears about three auxiliary setae and one or two trilocular pores. The penultimate and antepenultimate cerarii each bear four cerarian setae at the apex of a tubercle. Anteriorly the cerarii are each composed of two large setae except the ocular cerarius which usually contains but one seta. The tubercles become smaller anteriorly but the frontal cerarius is often large and lies on the ventral

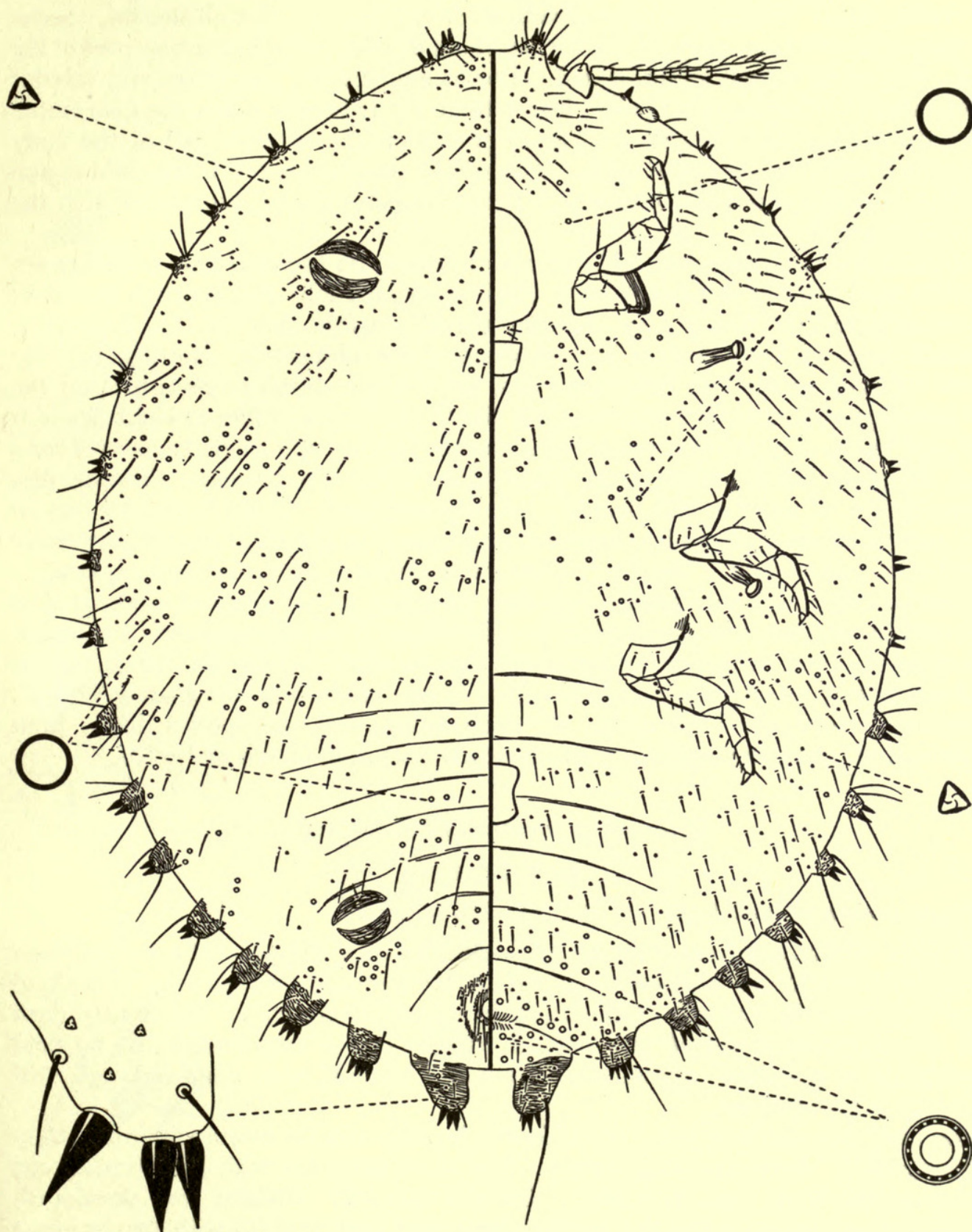


FIG. 14

surface. Each tubercle bears from one to five extremely long setae and one or two trilocular pores; occasionally there is also a circular disc pore either on the dorsal or ventral side. Dorsal setae not numerous, of various sizes, but all slender. Some of these setae are very long and become flagellate distally; on the anterior part of the body they form groups as illustrated. Dorsal multilocular disc pores and tubular ducts absent. Circular disc pores, larger than the trilocular pores are distributed over the surface and they lie in definite groups on the anterior half of the body associated with the groups of setae. Posteriorly there are a few in the mid-region of each segment and a few laterally. Trilocular pores sparse, associated with the groups of setae.

Ventral surface with a pair of long, apical setae. As the anal lobe tubercles are heavily sclerotized it is possible that there is an anal lobe bar which is masked; an examination of young adult females would possibly show if this is correct. Ventral setae of various sizes but all slender, not numerous. Multilocular disc pores confined to the last three segments, there being eleven to seventeen on the seventh segment, nine to thirteen on the eighth segment and five to eight between the anal lobes. On the two prevulvar segments they occupy single transverse rows and altogether there are scarcely more than thirty-five present. Circular disc pores similar to those on the dorsum, sparsely scattered. There is usually one on the margin of each abdominal segment and others in marginal groups anteriorly and between the coxae. Ventral tubular ducts absent. Trilocular pores sparse.

NOTES. Although this species has close affinities to the genus *Tylococcus* it is not certain whether it is congeneric. It differs from *T. madagascariensis* Newstead, the type of genus, in possessing numerous circular disc pores on the dorsal surface and very long setae with flagellate ends. These characters are shared with *T. westwoodi* Strickland, a discussion of which follows but the species differs from *westwoodi* in possessing eighteen pairs of cerarii instead of eleven or twelve.

Tylococcus westwoodi Strickland

(Text-fig. 15)

Tylococcus westwoodi Strickland, 1947, *Bull. ent. Res.* 38 : 510.

HABIT. Described from Atikpale, Eastern Province, Gold Coast on *Theobroma cacao* attended by an undetermined ant of the genus *Crematogaster*. Strickland gave the following account of the adult female: "Body colour apparently dark red, but material preserved two days in alcohol before examination, so no field description is possible. Specimens with a few strands of a dark red wax still adhering to the dorsum."

RECOGNITION CHARACTERS. Adult female broadly oval measuring approximately 1.5 mm. long. Antennae 8-segmented. Legs short and stout with a few translucent pores on the hind coxa and tibia. Circulus present. Ostioles well developed, with the inner edges of the lips heavily sclerotized and each lip with two or three long setae and three or four trilocular pores. Anal ring lying about one and a half times its diameter from the apex of the abdomen, with six setae which are only a little longer than the diameter of the ring. Cerarii numbering eleven or twelve pairs.

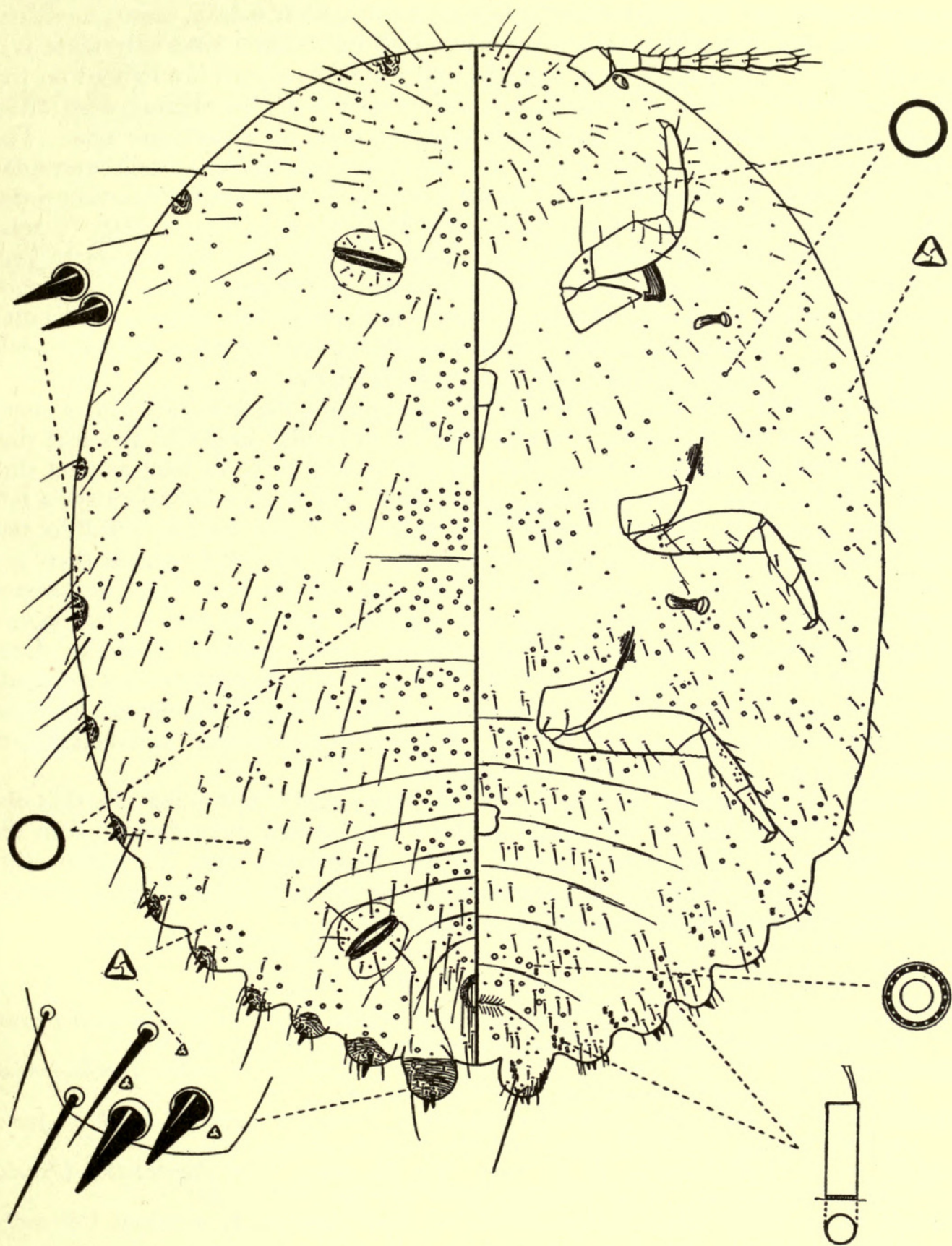


FIG. 15

Anal lobe cerarii each composed of two stout conical setae which are blunt at the apices, surrounded by about three trilocular pores and two long, stout, auxiliary setae. The anal lobes form prominent sclerotized tubercles. Anteriorly there is a pair of cerarii to each abdominal segment and the other cerarii are located on the thorax and head. Most of these cerarii are composed of two conical setae often of unequal size but some of the anterior cerarii may have only one seta. The posterior cerarii are borne at the apices of poorly developed tubercles and the anterior cerarii are each surrounded by a circular sclerotized area bearing an occasional trilocular pore and one or two auxiliary setae, these often extremely long. Dorsal setae of various lengths, mainly slender. Many of these setae are extremely long with the distal end flagellate, present on the margins and irregularly over the surface especially on the head and thorax. Dorsal multilocular disc pores and tubular ducts absent. Circular disc pores numerous in mid-regional groups on each segment. They become scattered laterally. Trilocular pores sparse.

Ventral surface with the anal lobes sclerotized on the margins and with a small sclerotized anal lobe bar and a bar seta which is of similar length to the anal ring setae. Apical seta detached from the anal bar, nearly twice as long as anal ring setae. Ventral setae of various sizes mainly short and slender but there are a few long setae around the margins similar to those on the dorsal surface. Multilocular disc pores confined to the four posterior segments. On the sixth segment there are usually one or two, on the seventh and eighth segments there are single transverse rows of about six pores and on the last segment there are one or two pores. Altogether there are scarcely more than twenty pores present. Tubular ducts distributed mainly in marginal groups on the fourth to eighth abdominal segments but others may be present on the mid-region of the abdominal segments. Circular disc pores not so numerous as on dorsum; they are rather scattered and do not form definite groups. Trilocular pores not numerous.

NOTES. All the species seen appear to be young adults and it may be that the marginal tubercles bearing the cerarii at the apices become more developed in the older specimens. This species seems to be congeneric with *T. malacanthae* Strickland, already discussed, in possessing numerous dorsal circular disc pores and extremely long setae with the distal ends flagellate.

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