

On a Collection of Coccidae and Aleuro- didae, chiefly African, in the Collection of the Berlin Zoological Museum.

By

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(Eingesandt im Juni 1910.)

With the exception of four species of coccidae collected at Yap, Karoline Is., and *one* species, collected at Guinée française, this collection was made in German East Africa. It comprises in all 39 species, of which 32 are members of the Coccidae and 7 of the Aleurodidae. Out of this total 16 species are new to science and also to the African continent; and there are two additional species that have not hitherto been recorded from this region.

Stictococcus dimorphus, Newstead¹⁾ is included in this memoir as one of the newly discovered species of Coccidae; but it has already been described elsewhere, owing to its recent occurrence in Uganda, as a Cacao pest. It is to Dr. Fülleborn, however, that we must attribute the original discovery of this very remarkable insect, in which the dimorphism in the larvae is very great and so far as one can ascertain absolutely unique.

I can add nothing regarding the bionomics of the insects comprised in this collection; but I wish here to tender to the Directors of the Berlin, Zoological Museum, my sincere thanks for giving me the opportunity of examining the material and also for their indulgence in allowing me to retain it for so long a time. I apologise for the unavoidable delay, occasioned by my absence abroad, and pressure of other official work which prevented an earlier examination of the material.

Monophlebus sp.

Habitat: Bulongwa und Tandalla D. Ost-Afrika, von Mission Wolff gesammelt. Dr. Fülleborn.

D. Ost-Afrika, Moschi, 1400 m, V. 1902, Merker S. J.-Nr. 1284/04.

Material insufficient for diagnostic purposes.

Icerya(?) **aegyptiaca** Douglas.

One example only, and this a female, is I think referable to this species; but the dorsum is so completely denuded of the characteristic waxen covering that it is impossible to definitely fix the species. The marginal appendages and the fixed ovisac are however identical with those found in *Icerya aegyptiaca*, but whether the morphological characters agree cannot be ascertained without sacrificing the external covering, and this I do not feel justified in doing seeing that the example is not my own.

Habitat: D. Ost-Afrika, Langenburg, März, April 1899, Dr. Fülleborn.

Icerya longisetosa n. sp. (Newstead).

Female, adult. Ovate, attenuated in front; colour in alcohol dull crimson; legs piceous. Dorsum clothed with white secretory matter, but so much damaged

¹⁾ Bulletin African Ent. Res. Committee Vol. I. p. 63 1910.

as to render a description of its formation impossible. Margin of body with a fringe of very long hairs; the longest being nearly equal to twice the length of the antenna or about two thirds the width of the body; those on the anterior and posterior margins are slightly the longest. Antennae of 9 segments, the terminal one being

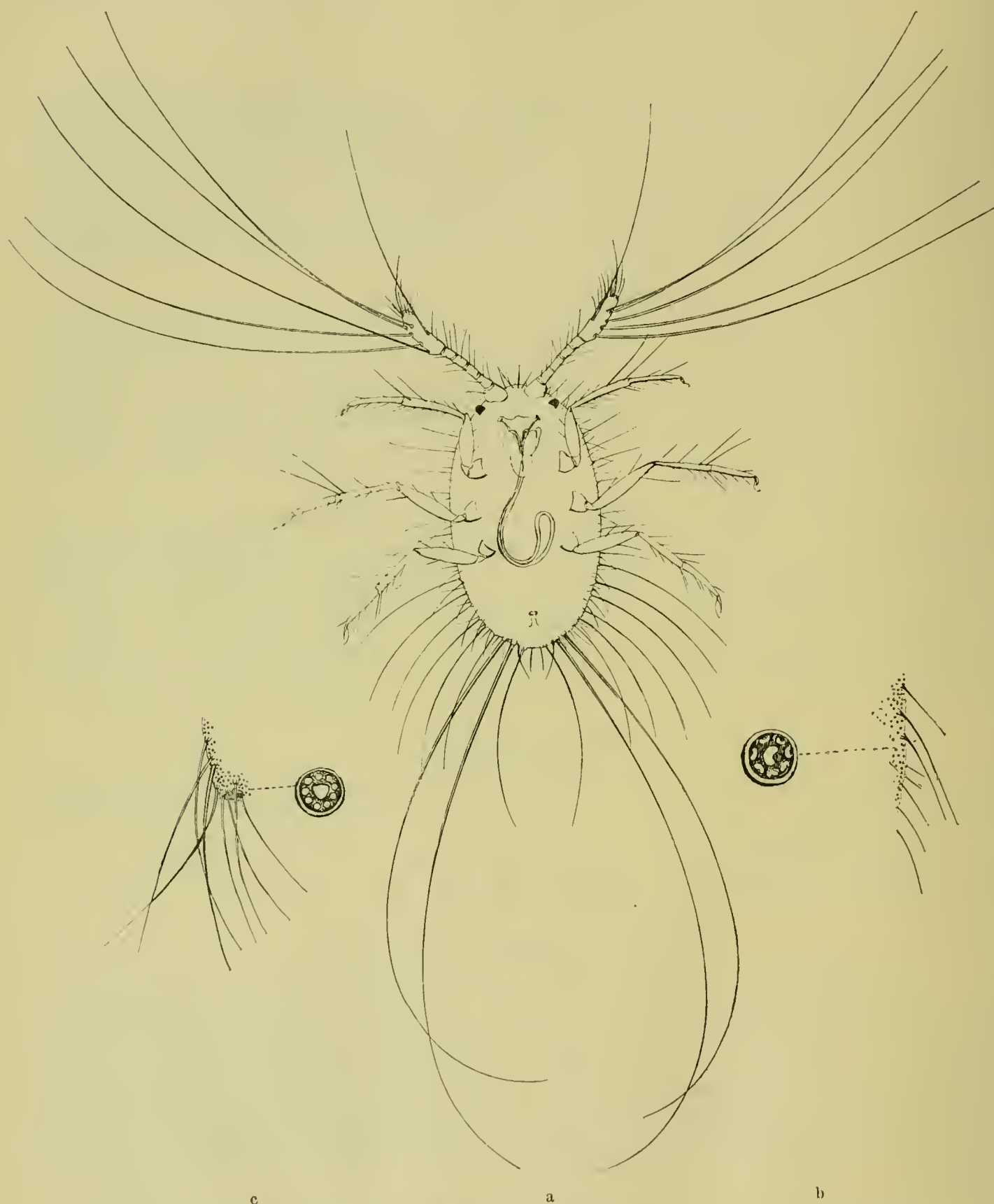


Fig. 1. a—c. *Iceya longisetosa*.

the longest and equal in length to the 7th and 8th together. Derm thickly and uniformly studded with circular spinnerets (fig. 1b) there are also a few widely separated hairs.

Larva (fig. 1a) ellipsoidal. Antennae of 6 segments; terminal segment much swollen, being almost as broad as the 1st, and equal in length to the 2nd,

3rd, 4th and 5th, it bears 6 long hairs, the longest being from three to three and a half times the length of the antenna, there is also an inner lateral group of fine short hairs, almost tuft-like, though distinctly separated. Eyes large and conical. Legs long, slender; tarsus a little shorter than the tibia; unguis dentate; digitules slightly dilated. Lateral margin of abdomen fringed with long hairs, those of the thoracic and cephalic areas much shorter; longest and stoutest anal hairs in two pairs, these are twice the length of the body, approximately. Derm with numerous circular spinnerets (Fig. 1c), and long fine hairs. Anal orifice resembling a miniature Actinarian with closed tentacles.

Habitat: D. Ost-Afrika, Amani, auf Acacia, 18. XI. 03, Prof. Vosseler S. G. Nr. 938/06.

These specimens were enclosed in the same jar as *Aspidoproctus armatus*, Newst, so that they were in all probability found living together upon the same tree.

The distinguishing features of this insect are the abnormally long anal and antennal hairs in the larva. The marginal hairs in the adult are also very long; but in this respect the insect differs very slightly from *Icerya aegyptiaca* Douglas.

Examples referable to *Icerya longisetosa* were received also from „British East Africa, Kibwezi (auf einem Steppenstrauch), Scheffler S. V., Nr. 345/07“, and from the same locality and by the same collector with the additional data „12. XII. 05, J.-Nr. 54/06“.

Icerya ? sp. (Jun.).

Habitat: „Central-Afrika-Expedition 1907/8, Avakuli, 25. IV. 08“, auf einer alten Kiste gesammelt. Dr. Schubotz.

The specimens in all probability represent a new and undescribed species; but as they are all immature it is impossible to be quite sure as to whether they are so or not.

Perissopneumon zimmermanni n. sp. (Newstead).

Female, adult. Length 10—12; width 7—8,50 mm. Covered evenly with a fine granular layer of wax of an ochreous-white colour after immersion in alcohol. Ovate, slightly widened posteriorly. Margin rather thin; segmentation producing blunt tubercular projections; each projection carrying a short stout truncate waxen appendage, so that the margin presents a tooth-like appearance; sides above margin high and deeply concave; cephalic area with two strongly defined and slightly divergent ridges; thoracic area convex, segments forming strong ridges; abdominal area concave, each segment with a distinct raised tubercle, the series forming a distinctly serrated submarginal ridge. Colour terra-cotta red to dull crimson; legs and antennae unicolourous with body. „Secretionary flap“ over the rudimentary abdominal segments, greyish, but when ruptured the sublying material is smoky brown. Antennae normally of eleven segments of which the terminal one is much the longest; malformed examples are not infrequent, and in many cases the apical segments have disappeared entirely and appear in the preparations as if they had been arrested, from some cause or other, in development. Legs large and very setiferous; claws with one strong ventral spine. Thoracic stigmata very large; abdominal stigmata in seven pairs, the median posterior pair being separated by a little more than twice the diameter of the vaginal

orifice and posterior to the latter by three and a half times its diameter. Ventral derm covered with small slender spines interspersed with circular spinnerets. Dorsal derm covered with short tubular spinnerets and minute short spines, the former preponderating; the small area occupied by the atrophied abdominal segments, covered in life by the „secretionary flap“ (operculum), has the spines replaced with a few fine hairs, the rest of the integument being covered with circular spinnerets set in a distinct polygonal reticulation.

The young adult females have three oval-shaped rings of chitine, enclosing a thin clear membrane, on the ventral surface posterior to the sexual orifice; these are arranged transversely, the median one being much the larger. A similar character is found in *Walkeriana africana*, Newst. these structures, however, are not traceable in the adult females.

Habitat: D. Ost-Afrika, Lewa. VIII. 1902. Vom Stamm von *Manihot glaziovii*. Prof. A. Zimmermann leg. (Nr. 24).



Fig. 2. *Aspidoproctus maximus*. $\times 1$ (nat. size).

***Aspidoproctus maximus* n. sp. (Sanders MSS.) Newstead.**

Female adult (fig. 2). Castaneous when dry, pale yellowish brown to dark brown in alcohol. Ovate, slightly narrowed in front, convex above; more or less flat ventrally; dorsum with 3 rows of deep and rather widely separated pits arranged in zones and taking the contour of the margin; within the zones on the thoracic area are several other similar pits, and the cephalic area has two more or less distinct and slightly divergent carinae. Margin with a series of large white Eooth-like waxen appendages measuring on an average 3 mm in length; 29 of these appendages were present in one individual and this number may be taken as approximately correct; but they are rarely retained in old adults. Ventral (genital) orifice covered by an operculum or „secretionary flap“ (Newstead) as in *Aspidoproctus pertinax* Newst. Legs extremely short. Antennae broken away in the examples submitted. Dorsal epidermis thickly studded with circular spinnerets and large irregular ovate,

clear, glandular spaces resembling the glands in certain species of *Lecanium*; there are also numerous minute spines attached to disc-like bases; the gland-tracts corresponding to the pits in the non-macerated examples, are much more chitinised than the surrounding integument and are furnished with a number of circular spinnerets. Ventral epidermis clothed with rather long stout spines, interspersed with small circular spinnerets and large circular pores; besides these there are a number of minute compound glands surrounded by dark chitine, these are much more numerous in the abdominal region and are arranged more or less in lines radiating from the genital orifice towards the margin. Marginal gland tracts much larger than those either on the venter or dorsum.

Length of old adult¹⁾ 33 mm (= 1/16 inches),

Width of old adult 25 mm (= 1 inch),

Height of old adult 15 mm (= 1/2 inch).

Habitat: D. Ost-Afrika Langenburg, Dr. Fülleborn (Nr. 2).

These examples have been in my possession since 1907. Since this date I have also received a number of specimens from Salisbury Rhodesia. These latter were forwarded to me by Mr. C. O. Waterhouse of the British Museum for identification. Subsequently Mr. Jack, Assistant Entomologist, Cape of Good Hope, S. Africa, who visited my department recognised the insect as one which had been sent to their institution for identification. On returning to South Africa Mr. Jack called attention to the specimens in my possession and the Government Entomologist, Mr. Chas. P. Lounsbury, made the following communication: "I am told by Mr. Jack of this office that you have had specimens of the immense scale insect, which Sanders proposes to call *Lophococcus maximus*, in your possession for several years. Will you kindly let me have the localities you have recorded for the species? It is becoming pestiferous about Salisbury, Rhodesia, and I anticipate an enquiry as to its distribution". Dated, Cape Town, 14th August 1908. Again on the 14th of January 1909 I received a large consignment of this insect from the British South Africa Company together with the following communication:

„The Agricultural Department of Southern Rhodesia, at whose suggestion the specimens are sent to you, state that the first visible appearance of the scale is a fluffy ball, and that the whole ground around an affected tree is covered with these balls. The young scale emerges as a crawling object, and makes its way to the nearest tree. At this stage the ladybird²⁾ attacks it; but it soon grows so big that nothing touches it except small birds, which eat it in the soft pulpy state. The great diffusion of the scale is said to take place in or about December, and measures are now being taken for its suppression and eradication.

I am informed by the British Museum (Natural History) to which specimens of the scale have been sent, that it is called "*Lophococcus maximus*, Saunders M. S.", and that it is found chiefly on the M'sasa tree (*Bradjastagiu Randii*, Buteer).

To the best of my knowledge no description of this giant Coccid has yet been published by Sanders. I have ventured therefore to adopt, the MSS name given by

¹⁾ Examples received recently from Rhodesia are slightly larger through dried and slightly shrivelled.

²⁾ A Coccinellid beetle. R. N.

him to this insect, and to publish the diagnosis of the adult which has been drawn up from one of three examples which were collected by Dr. Fülleborn, to whom we must give the credit of the discovery of this very remarkable insect.

***Aspidoproctus armatus* n. sp. (Newstead).**

Female adult (fig. 3). Elongate, narrowed posteriorly; margin in front more or less truncate; sides broadly concave and deeply and coarsely punctate. Cephalic area sloping suddenly downwards the area defined by two widely separated and rounded ridges, most clearly defined towards the margin, each terminating with a short, stout, tooth-like waxen appendage; thoracic area with two large transverse ridges each bearing four large bluntly pointed processes: one lateral and two median; abdominal area flat, tapering more or less posteriorly; margin forming a distinct ridge along which are six small and bluntly pointed processes of which the first and last are the largest; margin with a series of blunt tooth like waxen appendages, many of which are bifid. The whole of the dorsum bears a thin coating of greyish granular wax, but is darker and more homogenous over the blunt processes. Venter flat or concave, mealy. Colour in alcohol dull crimson; venter terra-cotta red. Derm of venter thickly studded with short stout spines, scattered between them are numerous



Fig. 3. *Aspidoproctus armatus*. $\times 5$.

small circular spinnerets, and at greater intervals large, clear, circular glands; besides these there are also a number of large subcutaneous bell-shaped organs (? glandular) having a finely reticulated lip; the relatively small area protected by the secretory operculum almost covered with circular spinnerets, and arising from between them many slender hairs. Thoracic spiracles large. Antennae, of 10 segments of which the terminal one is much the longest.

Length 12—17 mm; width 8—12 mm; height 6—8 mm.

Habitat: D. Ost-Afrika, Amani. Au. Acacia, XL. 03. Prof. Vosseler S. G. Nr. 938/06.

Easily distinguished by the curious armature of the dorsum which gives the insect a very formidable appearance.

***Aspidoproctus pertinax*, Newstead.**

A single adult female associated with *Aspidoproctus maximus*.

The only information accompanying this specimen is „Langenburg, D. Ost-Afrika, Dr. Fülleborn, S. G.“ (Nr. 2.)

The co-types were collected by H. B. M. Commissioner A. Sharpe, C. B., at Zomba, Central Africa in 1900¹⁾, and until recently this has remained the only known locality for this interesting coccid.

¹⁾ Newstead. Proc. Zool. Soc. Lond. 1900, Vol. LXII. p. 947, pl. LIX; figs 1—9.

Stictococcus dimorphus, Newstead.

Bull. African. Ent. Research Committee Vol. I. p. 63 figs 1, 2, London 1910.

Habitat: D. Ost-Afrika, Langenburg, 7. Mai 1899, Gebirge, bewaldet, 1200 m, Dr. Fülleborn.

Asterolecanium coffeae n. sp. (Newstead).

Puparium („test“) of young adult female. Golden yellow¹⁾, glassy; pyriform, being produced posteriorly into a distinct spout-like prominence; dorsum with a faint fusiform ridge; margin with a very long loose fringe of glassy filaments; there is also a median mane-like crest of equally long filaments extending along the whole length of the puparium, and between the crest and the marginal fringe many, more or less, isolated filaments; all the filaments are of a golden yellow colour.

Puparium of old adult female, without either fringe or dorsal crest of filaments; larger and more convex and the spout-like posterior more pronounced than in those of the young adults; the dorsal fusiform ridge is also less prominent anteriorly. Colour opaque greyish, finely vermiculated with obscure bottle-green markings. This

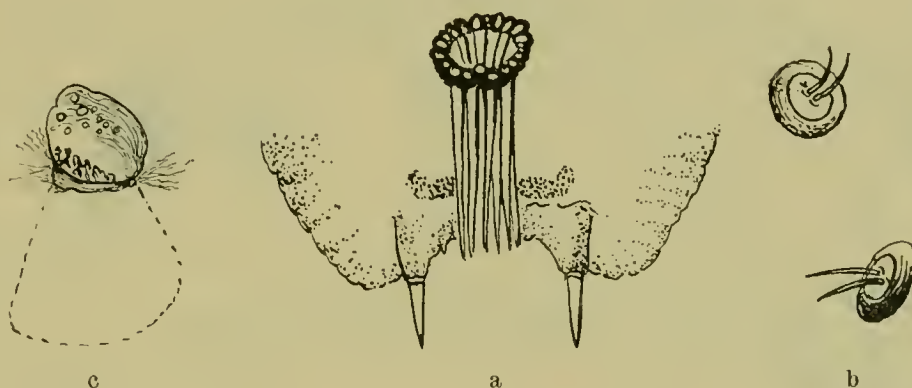


Fig. 4 a—c. *Asterolecanium coffeae*.

diagnosis is based upon a single specimen so that too much importance must not be attached to the characters here given.

Length of young adult puparia, inclusive of fringe, 1,50—2 mm.

Length of old adult puparium, 1,75 mm.

Adult female pyriform, posterior extremity (fig. 4a) suddenly narrowed and produced. Margin with two rows of figure-of-8 spinnerets and also a number of others arranged irregularly along the submarginal area; first marginal row placed closely together; second marginal row widely separated. Median dorsal figure-of-8 spinnerets in five rows; the median three placed rather closely together but somewhat irregular; those forming the outer lateral rows very widely separated. In addition to the 8-shaped spinnerets there is a distinct marginal row of circular ones: and numerous long tubular ones scattered over the whole of the dorsal surface.

Rudimentary antennae (fig. 4b) disc-like with two long curved spinose hairs. Anal lobes (fig. 4a) represented by a single long spine. Anal ring (orifice) with six long hairs. Mentum short and apparently monomerous. Spiracle (Fig. 4c) with a very large subcutaneous tube.

¹⁾ This description is based upon examples which had been dried after long emersion in alcohol, and applies to the puparium proper, and not to the colour produced by the sublying insect. R. N.

Length 1 mm.

Habitat: D. Ost-Afrika, Magrotto; August 1902, auf *Coffea arabica*. Prof. A. Zimmermann (Nr. 15).

The puparium of this interesting species closely resembles that of *Asterolecanium thesii* (Doug.) but it is easily distinguishable by the great length of the spout-like caudal projection; and also by the greater length of the marginal fringe. The female is also distinguishable by the five dorsal rows of figure-of-8 spinnerets. This insect does not moreover produce pits or depressions in the food-plant.

***Lecanium nyasae* n. sp. (Newstead).**

Female adult. Very elongate; front slightly produced; strongly wrinkled transversely; posterior margin broad and flat, with 3—4 clearly defined narrow ridges (carinae). Colour dark chocolate brown in alcohol, but when dry changing to a pale-brown, the dorsal area presenting innumerable minute blackish specks. Antennae (fig. 5 a) of eight segments, the fifth being slightly shorter than the fourth.

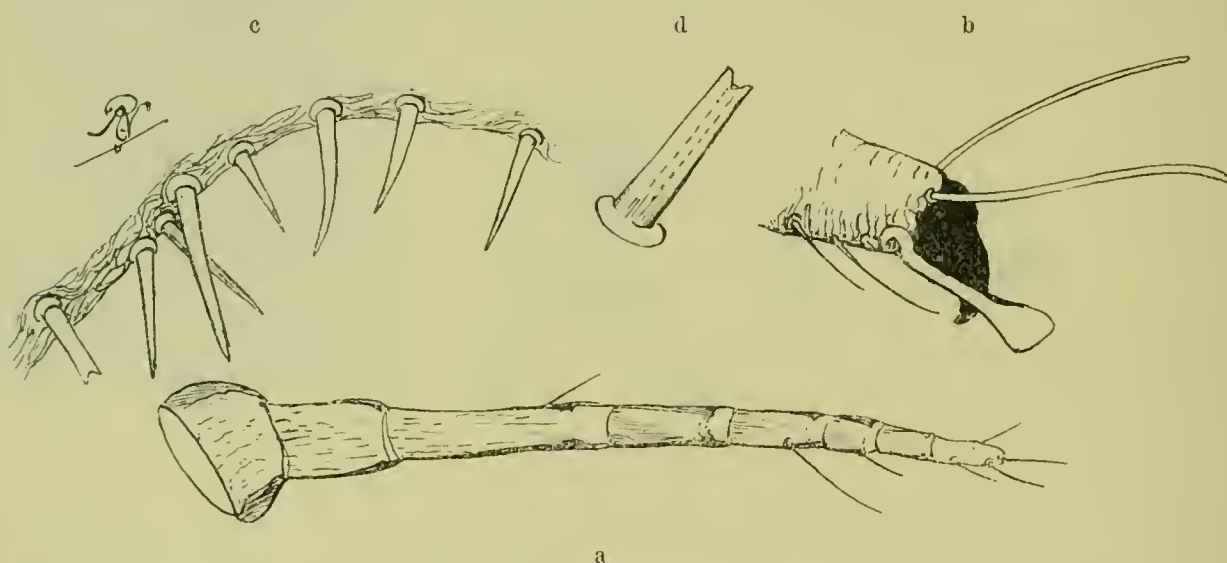


Fig. 5 a—d. *Lecanium nyasae*.

Legs normal; lower digitules (fig. 5 b) very broad. Stigmatic cleft (fig. 5 c) shallow; spines simple, straight; laterals less than half the length of the median spine. Marginal spines (fig. 5 d) short, stout, tips emarginate or divided so that they appear bidentate. Anal lobes (operculum) narrowed and rounded apically. Derm cells absent (There is no trace of these in the macerated examples); but there are innumerable spinnerets with minute pyriform subcutaneous tubes.

Length 7—7,50; width 4—4,25 mm.

Habitat: Nord-Nyassa, Rungwe-St. Utengule. 9/10. XII. 98. Fülleborn S. G.

This unusually large species belongs to the group of which *Lecanium longulum*, Doug. and *L. schini*, CKll. may be taken as types. It differs from these and also other allied species by the total absence of derm cells, the well marked character of the marginal spines, and the presence of very distinct marginal carinae.

***Lecanium (Eulecanium) tremae* n. sp. (Newstead).**

Female adult. Form hemispherical, slightly narrowed anteriorly; rarely with faint traces of H-shaped carinae; margin forming a very distinct rounded ridge; integument shining but with a few irregular shallow wrinkles or depressions, and in

well preserved examples there are also numerous small particles of white secretion scattered over the whole of the dorsum. Colour generally dark castaneous though a few examples are much paler. Examples crowded together on slender twigs are laterally compressed so that the width is considerably less than the length.

Hemispherical forms measure: Length 3,50, width 2,75—3 mm. The compressed forms 3,50—4,25 long and 2,25—3 mm wide. Antennae (fig. 6 a) of 8 segments, nearly equalling the length of the anterior pair of legs; the latter shorter than either the mid or posterior pair. Derm cells rounded and oval, small, but there is a group of much larger cells immediately in front of the anal orifice. Stigmatic spines (fig. 6 b) three, median spine more than twice the length of the lateral ones. Marginal hairs (fig. 6 c) minute: some are simple, others serrated. Marginal spinnerets minute. Anal

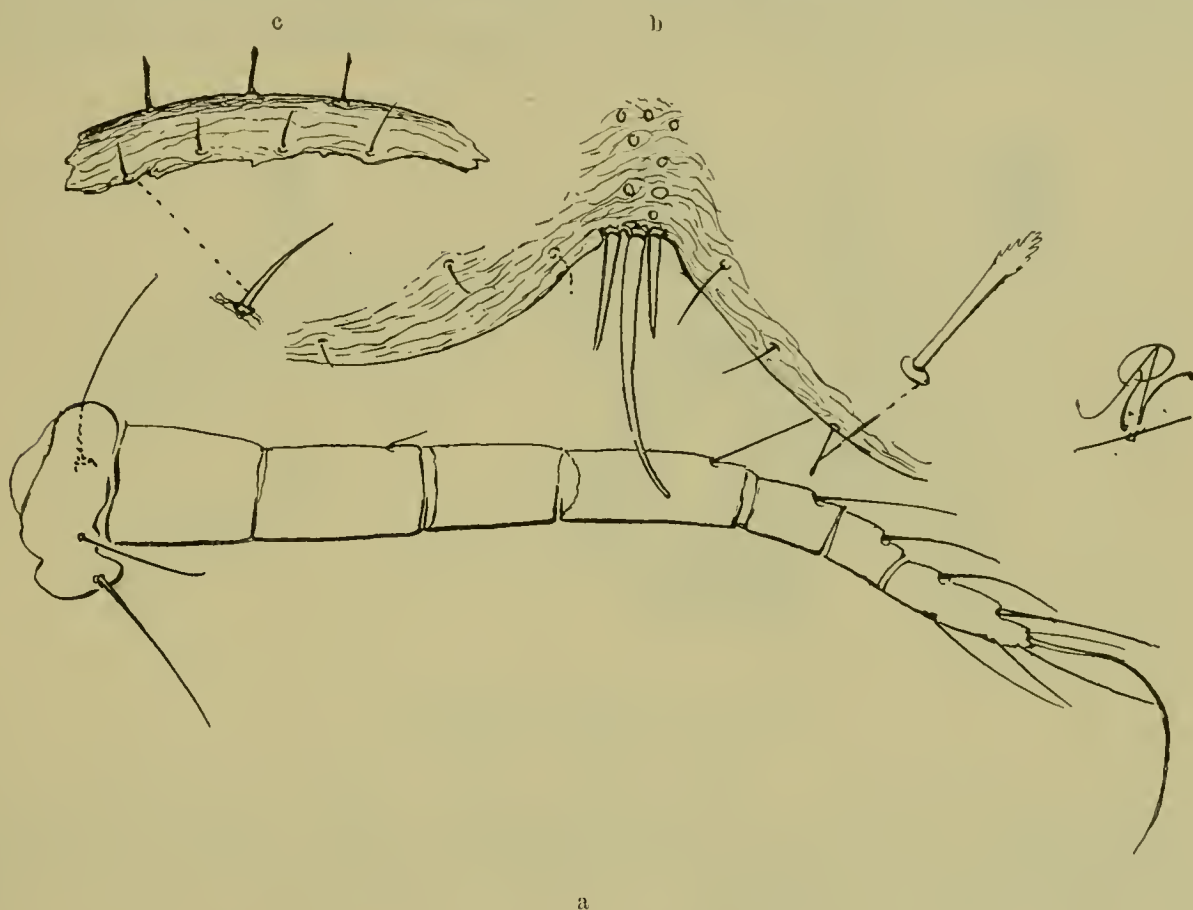


Fig. 6 a—c. *Lecanium tremae*.

lobes with the base and outer edge approximately equal; apices very obtuse. Genital spinnerets circular, and scattered between these are a number of short blunt conical spines.

Habitat: D. Ost-Afrika, Amani, Juni 1902, auf *Trema guineensis*, Prof. A. Zimmermann S. (Nr. 1).

This insect closely resembles *Lecanimum persicae* Var. *ribis*. Sign. et. Auct.; but is much less rugose, has a non-reticulated derm., eight segments to the antennae and is further distinguished by the blunt conical spines near the genital orifice.

***Lecanium (Saissetia) oleae* (Bernard).**

Several examples, all adult females. Many of them are damaged; and not a few are parasitized.

Habitat: D. Ost-Afrika, auf (Baum) in Muhesa-Amani, Sept. 1902, Prof. A. Zimmermann S. (Nr. 23).

Lecanium hesperidium (Linn.).

Habitat: D. Ost-Afrika, Dar es Salaam, April 1902. Auf *Terminalia catapa*. Prof. A. Zimmermann S. (Nr. 7).

Several females, all parasitized, and otherwise slightly damaged, present all the characteristics of this species.

D. Ost-Afrika, Amani. Fr. Hoffmannplantage, VI. 02. Auf *Coffea liberica*. Prof. A. Zimmermann S. (Nr. 20).

The females, of which there were several in various phases of development, all show very distinct marginal ridges especially so along the posterior border. These are somewhat abnormal, but the structural details are characteristic of *L. hesperidium*. A very large percentage are parasitized by Chalcidids, which in many cases had not emerged from the host though in most cases they were more or less perfect and ready, apparently, to escape.

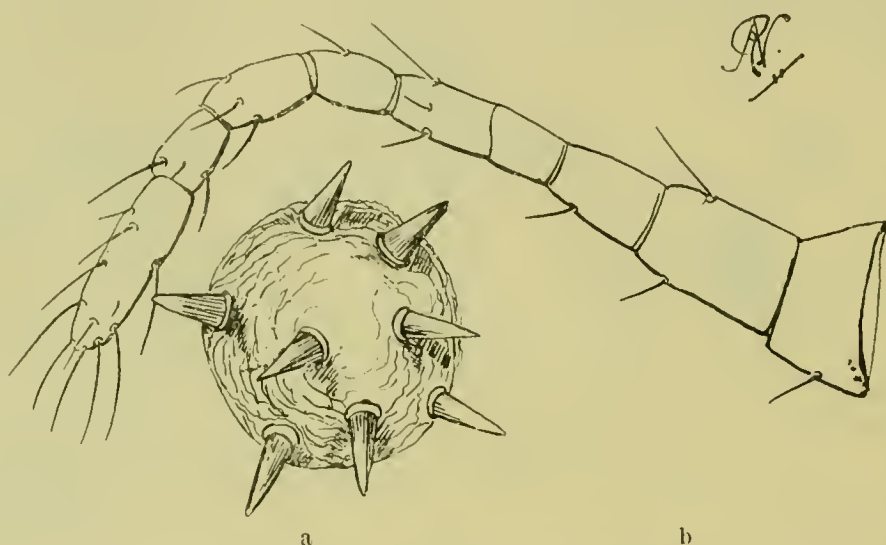


Fig. 7 a b. *Phenacoccus insolitus*.

Lecanium? sp.

Five examples, all females, are destroyed by a fungus; the body of the insect being completely replaced by hyphae.

Habitat: D. Ost-Afrika, Ngamba, 7./8. 1902. Auf *Albizia lebbek*. Prof. A. Zimmermann S. (Nr. 13).

Yap, Karolinen auf Cocos. Sander S. G. Material very poor condition.

Phenacoccus insolitus Green.

Habitat: Britisch Ost-Afrika, Kibwezi, 30. III. 07. Auf *Taberna montana*. G. Scheffler S. V. J.-Nr. 1459/07.

The distinctive feature of this insect are the curious spinose tubercles (fig. 7 a), a character which at once distinguishes it from any other known species of the genus.

Dactylopius (Pseudococcus) obtusus n. sp. (Newstead).

Female adult. Length 4, width 2,75 mm.

Segmentation strongly pronounced. Antennae (fig. 8) of 9 segments; proximal end of last segment narrower than distal end of the penultimate; all the segments with very long fine hairs; 7th and 8th each with a strong curved spine near the

articulations; 9th with two similar spines near the apex, the rest of the apical hairs considerably shorter than those on the remaining segments. Marginal spines (fig. 8). truncated forming large conspicuous groups on the thoracic and abdominal segments, but coalescing in front from the insertion of the anterior pair of spiracles. Anal orifice with the normal number of hairs; surrounding this organ is a conspicuous fold in the integument presenting a ring-like boundary within which are 10 similar long hairs. Legs normal, hairs extremely fine and very long.

Embryo larva: Hairs to anal lobes about two thirds the length of the body; legs and antennae furnished with very long hairs.

Habitat: D. Ost-Afrika, Tanga, XII. 04. Auf *Baobabrinde*. Prof. Vosseler S. G. Nr. 938/06.

The marked features of this coccid are its obtuse form, the spinose character of the antennae, the curious arrangement of the spinose hairs outside the anal orifice;

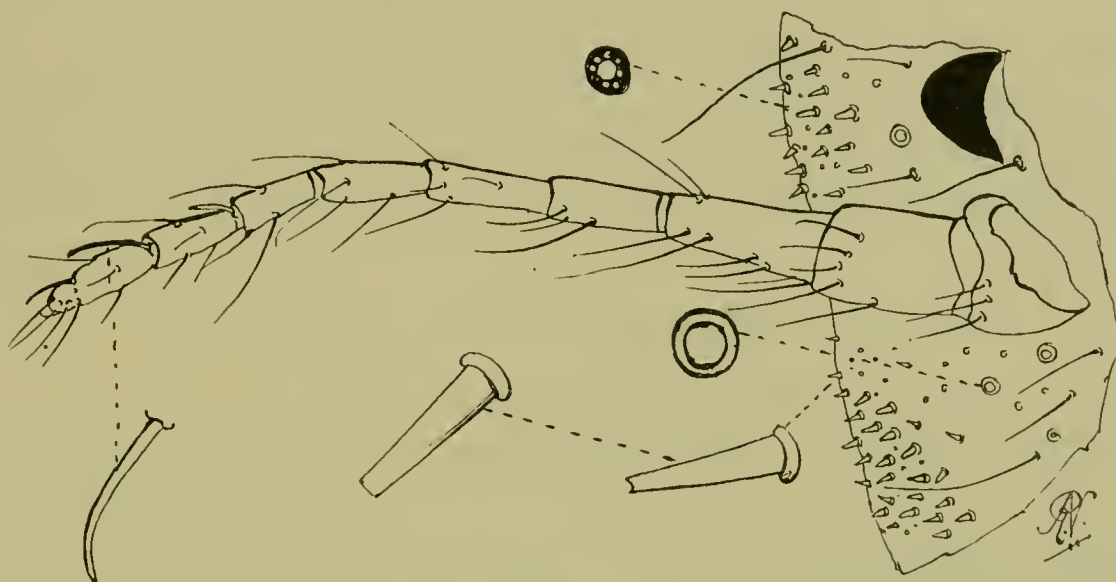


Fig. 8. *Dactylopius obtusus*.

and the truncated marginal spines. One cannot, unfortunately give any details regarding the cereous external covering, as this had completely disappeared in the alcohol; but its morphological characters are sufficiently diagnostic to give it specific rank.

***Dactylopius (Pseudococcus) longispinus*, Targ. Tozz.**

Habitat: D. Ost-Afrika, Kissaki, Landschaft K'hutu, October 1898, Botaniker Goetze S.

A large colony of females in various stages on the leaves and stem of an unnamed plant.

The specimens are all denuded, but although the external characters are wanting the structural details agree with those of typical *D. longispinus*. Sanders considers that there is no reason why Linnacu's name *adonidum* should be discarded in favour of *longipinus* Targ.

I have no objection to such a change, but for economic purpose I consider it advisable to retain the latter name for all agricultural purposes seeing that it has been in use for so long a time.

Dactylopius (Pseudococcus) virgatus var. **madagascariensis** Newst.

Habitat: D. Ost-Afrika, Sissima, 7. I. 95 an Blättern und Blüten von *Jatropha Cuccas*. A. Karasek S. V. 898/05.

No outer covering present.

Britisch Ost-Afrika, Simba, 20. IX. 1906, Scheffler S. V. J.-Nr. 345/07, Liste Nr. 177 („dicke, rote, weißbestäubte Blattläuse“).

Yap, West Karolinen Sander S. G.

Dactylopius (Pseudococcus)? sp.

Habitat: Yap, Karolinen, auf Cocos. Sander G.

Material insufficient and also unsuitable for diagnostic purposes. The examples consisted of a few females and one male.

Pulvinaria psidii Maskell.

Habitat: D. Ost-Afrika, Dar es Salaam, April 1902, auf *Capsicum annum*. Prof. Zimmermann S. (Nr. 8).

Several adult females. The females of this species closely resemble those of *Pulvinaria floccifera*, Westwood; but they are distinguishable from the latter by the divided and serrated marginal spines and also by the much shorter ovisac.

Ceroplastes subsphaericus n. sp. (Newstead).

Test of old adult females thin, divided into large lateral plates with nuclear centres; dorsum forming a large hemisphaerical or dome-shaped mass, at the sides of which the wax is so thin that the dark colour of the insect shows through.

Length 6, height 5 mm.

Adult female denuded of the test. subspheroid with a faint submedian constriction; caudal process rudimentary, conical. Integument horny; dark, shining, castaneous; sides irregularly punctate. Outline of Venter more or less circular. Antennae of 7 segments; a paratized example has only 5 segments. Stigmatic clefts with a group of large pointed spines, surrounded by numerous conical ones. Legs normal. Derm cells small circular, outline not clearly defined, and in the centre of nearly all of them is seated a minute spine.

Length 4,75, height 4,50 mm.

Habitat: D. Ost-Afrika, Ngambo, 27. VI. 02. Auf *Albizia lebbek*, Prof. A. Zimmermann S. (Nr. 25).

The tests of all the individuals were more or less imperfect; but the marginal plates were well marked in several individuals. There was no trace of colour in any of them, and if present in freshly collected specimens it had been removed by the alcohol in which they were preserved. In its external form it somewhat resembles *Ceroplastes cistudiformis* (Townsend MSS) Cockerell, but the test is much more rounded dorsally and laterally. The adult female when denuded of the wax is distinguishable by its sub-spheroid form, its height being nearly equal to its diameter; the base of attachment is also considerably less than the greatest diameter of the body. Nearly all the examples had been attacked by the larva of a chalcidid parasite: measuring 1 mm in length.

Ceroplastes rusci (Linn.) Signoret.

The examples submitted for examination are all old adults, with the waxen test forming an homogenous layer. The isolated examples are more or less hemisphaerical in shape, and when denuded of wax the female presents the following characteristics: Colour pale yellowish brown, region of the anal orifice piceous or black. Dorsal region more or less hemisphaerical surrounded by a deep depression or groove, and with a minute tubercle, generally present, in the middle of the back. Margin broadly convex and generally so constricted as to form three bitateral and one anterior lobes or gibbosities, there is, however, no clypeate extension in front as in *C. africanus* and other allied species. Signoret's figure¹⁾ (1a) of the denuded female is misleading as it represents the lateral gibbosities as distinct and widely separated hemisphaerical bodies or tubercles, whereas these should be almost contiguous. The anal organs do not moreover project in such a marked degree as he has shown.

After maceration in potash the integument becomes quite flaccid and transparent with the exception of a relatively small patch surrounding the rudimentary caudal extension which is highly chitinised and remains opaque after long maceration. Apart from these discrepancies, the specimens agree best with the characteristics of *C. rusci* (Linn.) Signoret, and I do not feel that I have erred in referring the examples to this species.

Habitat: D. Ost-Afrika, ohne näheren Fundort, Emin Pascha, 1891.

Ceroplastes ceriferus, Anderson.

Habitat: D. Ost-Afrika, Magrotto, VIII, 1902. Auf *Coffea arabica*. Prof. A. Zimmermann (Nr. 27).

Half a dozen, more or less, denuded females, all preserved in alcohol. The specimens are all undersized but do not otherwise, as far as I can trace, differ from typical examples from India.

Habitat: „Nyassa-See, Wiedhafen, 28. I. bis 5. II. 99. Dr. Fülleborn S. G.“

There was but one female, and this a young adult, presenting all the external characters of *C. ceriferus*. The name of the food-plant is not given.

Ceroplastes egbarum, Cockerell.

Habitat: D. Ost-Afrika, Ngambo, 6. VIII. 02, auf *Albizia lebbek*. Prof. A. Zimmermann (Nr. 26).

One unusually large female of this species.

Aspidotus destructor Sign.

D. Ost-Afrika, Kiboteni, 27. IX. 04. A. Karasek S. J.-Nr. 1363/04.

D. Ost-Afrika, Buschirihof, 29. LX. 1902. Auf *Musa*. Prof. A. Zimmermann S. (Nr. 22).

D. Ost-Afrika, Amani, V. 1902. Auf *Piper subpeltatum*. Prof. A. Zimmermann S. (Nr. 14).

A few examples chiefly females and these in very poor condition.

¹⁾ Essai, Plate IX. Coccides.

D. Ost-Afrika, Dar es Salaam, April 1902. Auf *Agave mexicana*. Prof. A. Zimmermann S. (Nr. 12).

Material in very poor condition, the puparia being for the most part destroyed by a predatory insect of some kind possibly a coccinellid larva though no examples were submitted. Associated with these was a single female, of *Aspidiotus trilobitiformis* Green.

Togo, XI. 1904, auf *Sarcocephalus sambucinus* (Winterbolt) K. Sch. Var., Dr. Busse. The puparia practically covered the leaves of the food-plant.

Yab, West Karolinen, Sander S. G.

Three leaves of *Calophyllum inophyllum* were partly covered with the remains of the female puparia; all, however, in very poor condition, and in most cases nothing but traces of the ventral pellicle left. The only fassible interpretation possible is that the puparia had been destroyed by some predaceous insect and possibly a coccinellid larva. A few larvae of a species of *Dactylopius* (*Pseudococcus* sp.) were also associated with the Diaspids.

Yap, West Karolinen, Sander G. „Bericht vom 7. Juni 1903, Nr. 250.“

The leaves (? Cocos) submitted were practically covered with the puparia of this common and widely distributed coccid.

***Aspidiotus hederæ* (Vall.) (= *A. nerii* Bouché.).**

Habitat: D. Ost-Afrika, Dar es Salaam, April 1902. Auf *Nerium oleander*. Prof. A. Zimmermann S. (Nr. 10).

The leaves of the food plant (*Nerium oleander*) were completely covered with the puparia of the young adult females together with a number of those of the male also.

***Aspidiotus (Chrysomphalus) aurantii* Maskell.**

Attacked by a remarkable fungus (*Microcera* sp.) which is certainly primary and not secondary.

I have met with the same fungus attacking various species of African Diaspinae (*Ischnaspis filiformis*, Doug. and *Aspidiotus* spp.) In the first instance, now several years ago, whole colonies of coccids infesting coffee in British Central Africa were destroyed by this fungus, the hyphae of which had penetrated every portion of the insect, replacing all its tissues as well as its secretory covering. It may be easily recognised when fresh, by its pale orange-crimson colour and the curious tassel-like growths beyond the margin of the scale. It undoubtedly keeps down these insects and may eventually prove of great benefit in checking the spread of these pests.

Habitat: D. Ost-Afrika, Magrotto, Aug. 1902. „Theeblätter mit Cocciden, zum Teil durch Pilz getötet.“ Prof. A. Zimmermann.

Several examples of both ♂ and ♀ puparia, the latter chiefly immature:

D. Ost-Afrika, Dar es Salaam, April 1902. Auf *Citrus* sp. Prof. A. Zimmermann.

***Aspidiotus trilobitiformis* Green.**

Habitat: D. Ost-Afrika, Dar es Salaam, April 1902. Auf *Citrus* sp. Prof. A. Zimmermann S. (Nr. 5).

The male puparia of a species of *Chionaspis* and also examples of *Mytilaspis citricola* were associated with these specimens.

D. Ost-Afrika, Dar es Salaam, April 1902. Prof. A. Zimmermann.

A very few examples, all females, and in rather poor Condition.

D. Ost-Afrika, Dar es Salaam, April 1902. Auf *Nerium oleander*. Prof. A. Zimmermann S. (Nr. 9).

The puparia of these examples are quite typical in colour though in a few instances the immature specimens are pale in colour or almost white.

A single female was also found associated with *Aspidiotus destructor* Sign. from the same locality, but the food plant in this instance was *Agave mexicana*. Prof. A. Zimmermann S. (Nr. 12).

D. Ost-Afrika, Dar es Salaam. Auf *Mangifera* sp. IV. 02. Prof. A. Zimmermann S.

A few females only.

Chionaspis lutea n. sp. (Newstead).

Puparium of male. Smooth and flat, without any trace of carinae.

Puparium of female. Narrowly pyriform, sometimes slightly curved; exuviae and secretionary portion yellow, thin and semitransparent, revealing the sublying effete skins. Length 1,50—1,75 mm.

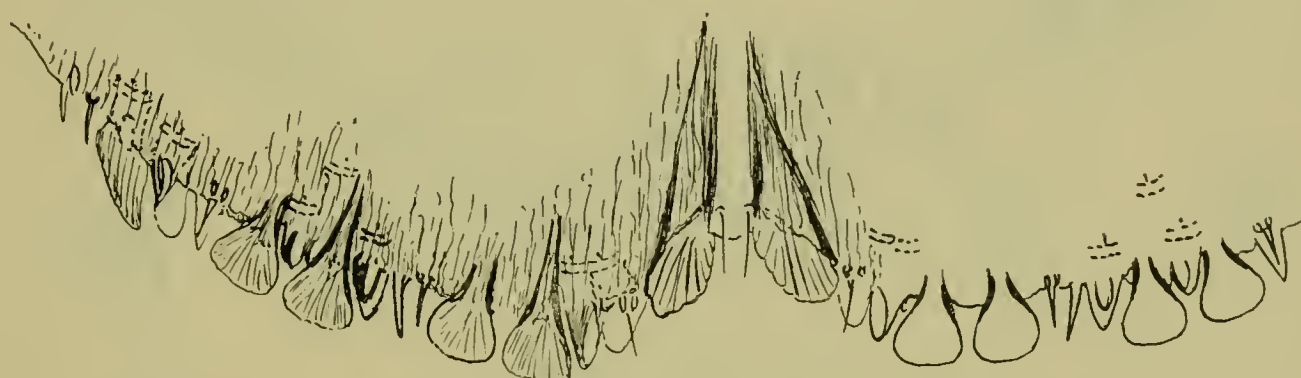


Fig. 9. *Chionaspis lutea*.

Female adult. Shape normal. Free abdominal segments protuberant. Antennae with a strongly curved and bifurcated spine. Pygidium (fig. 9, fringe) with two bilateral and one anterior groups of circumgenital glands; formula of two examples:

7	8
12—10	14—11
8—11	10—10.

Median lobes much the longest; deeply recessed, inner free margin coarsely serrate; second and third pairs of lobes duplex, broad and strongly dilated, these are slightly longer than any of the other marginal appendages. Squames small; those between the lobes are more or less rudimentary and lobate in form: there is a similar one just beyond the third pair of lobes and immediately anterior to this a very broad but also very short one with an irregularly and faintly serrated edge. Spines all short and rather strong; one median pair; one immediately lateral to each pair of lobes and one or more towards the base. Sexual orifice opposite the lower lateral groups of circumgenital glands. Dorsal pores on abdominal segments small, and few in number; those at the margin of the pygidium as indicated in the figure.

Habitat: D. Ost-Afrika, Amani, auf Urwaldpflanze, zum Teil mit Pilz. Aug. 1902. Prof. A. Zimmermann S. (Nr. 16).

This insect is nearly related to certain Indian species (*C. flava* Green and *C. litzeae* Green) but it is distinguished chiefly by the absence of long spinose squames on the pygidium, and the broader duplex lobes.

***Chionaspis nudata* n. sp. (Newstead).**

Puparium of female thick, opaque, dull white; mytiliform, highly convex, coarsely and irregularly striate; evaviae yellow.

Length 2,50—2,75 mm.

Puparium of male white, flat, and non-carinated.

Female adult, rather elongate, widest in the region of the free abdominal segments. Pygidium not very clearly defined, the cuticle being soft and flaccidlike that of the other portions of the body; dorsal pores forming two distinct broad bands; these are succeeded by two similar bands on the two succeeding abdominal segments; there are also similar groups of pores on the remaining segments but

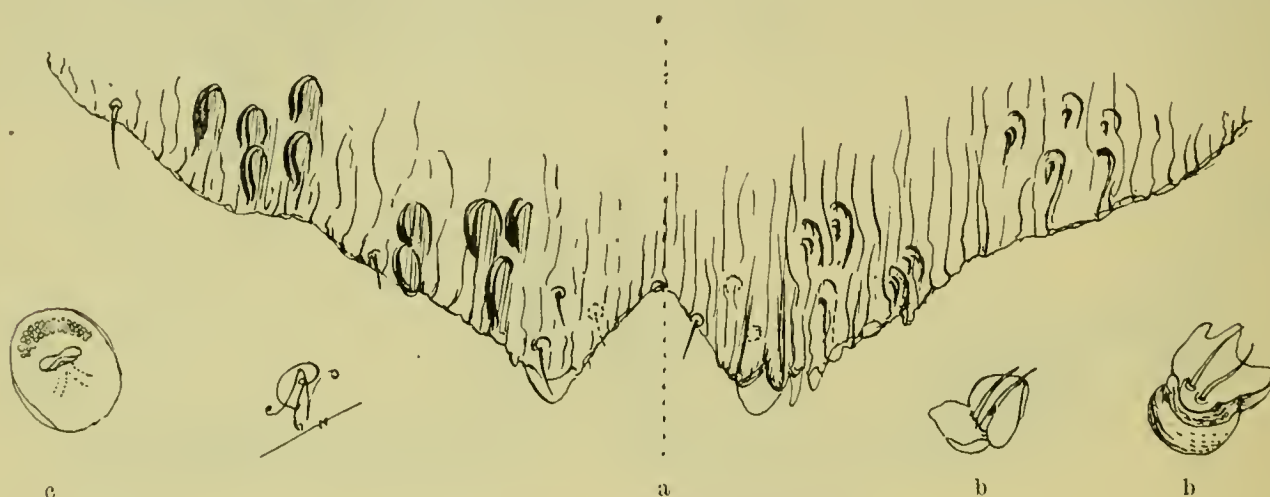


Fig. 10 a—c. *Chionaspis nudata*.

they are fewer in number and gradually diminish as they approach the thoracic area. Circumgenital glands in five narrowly separated groups, formula of one example:

26

19—22

32—44.

The lower lateral groups are the largest.

Margin of pygidium (fig. 10a) simple; the median pair of lobes rudimentary, the rest either obsolete or also quite rudimentary; there is a single rudimentary squama immediately lateral of the median lobes, and in some examples one or two small ones towards the base of the pygidium; spines minute, but there are two stronger ones on the dorsal surface within the margin, just anterior to each of the median lobes. Anal orifice near the anterior group of circumgenital glands. Genital orifice below the former. Antennae (fig. 10bb) with two spines arising from between a bivalve-like outer process or shield of chitine, one of the valves being bluntly bidentate; this is a very remarkable structure and no two examples appear alike owing evidently to the different positions which they assume by the pressure of the covering-glass. All the stigmata (fig. 10c) surrounded by a more or less circular fold of the integument: parastigmatic glands compact, forming a more or less crescentic group.

Habitat: D. Ost-Afrika, nördl. vom Nyassa-See, 2400 m, 20. X. 99, W. Goetze S. At the present moment I have no further details concerning this insect.

Chionaspis striata, Newst. is nearly related to *C. nudata*, but the second pair of lobes in the former species are broad and very distinct and there also are other well marked differences.

It also bears a striking resemblance to Greens *C. simplex*¹⁾ in the morphological characters of the margin of the pygidium; but this species possesses seven groups of circumgenital glands, in which respect it is quite unique.

***Chionaspis Bussii*, n. sp. (Newstead).**

Puparium of female. Narrowly elongate, sides parallel behind the second pellicle; margin broadly flattened. Colour dusky ochreous to pale ochreous brown.

Length 2,50—3 mm. Width 50—175 mm.

Female adult. Very long and narrow; length four to four and a half times greater than the width. Rudimentary antennae with one or two spines; the normal number is in all probability two. Thoracic stigmata: anterior pair opposite the mentum and not far distant from it; posterior pair separated from the former by at least

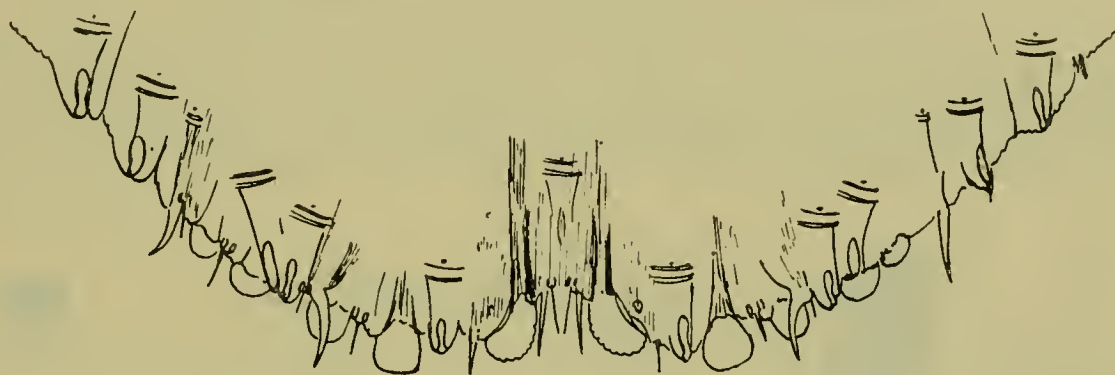


Fig. 11. *Chionaspis Bussii*.

three and a fourth times the width between the anterior pair; parastigmatic glands apparently absent. Spiniform squames presents on the last two free abdominal segments. Pygidium with five groups of circumgenital glands; formula of 3 examples:

$$\begin{array}{ccc} 2 & 1 & 2 \\ \frac{7}{3} & \frac{7}{4} & \frac{7}{4} \end{array} \quad \begin{array}{cc} & 6 \\ \frac{7}{4} & \frac{6}{4} \end{array} \quad \begin{array}{cc} & 7 \\ \frac{7}{4} & \frac{7}{4} \end{array}$$

Anal orifice just below the anterior group of glands. Position of vaginal orifice doubtful. Dorsal pores absent from the middle area; but there are 10—11 near the margin, all of which are much smaller than the marginal ones. Margin of pygidium (fig. 11) with three pairs of well developed lobes; second and third pair duplex and somewhat wedge-shaped, the upper lobule of each being the smallest. Squames spiniform; there is a single one immediately anterior to all of the lobes; the second one lying almost transversely across the upper lobule of the second pair of lobes. Median pair of spines nearly equal in length to the median lobes.

The morphological characters of this insect are in many respects like those of *Chionaspis acuminata*, Green²⁾. It is distinguishable from Greens species by the

¹⁾ Coccidae of Ceylon, p. 160.

²⁾ Coccidae of Ceylon, p. 136, 1899.

puparium of the female having no „median longitudinal ridge“, by the entire absence of dorsal pores to the mid area of the pygidium; the much longer spines between the median lobes and the unusual transverse position of the spine-like process over the upper lobule of the second pair of duplex lobes.

Habitat: „Auf *Macrolobium* sp. Guinee Francaise VI. 1902. Chevalier Lig. Coll. Dr. Busse.“

Mytilaspis citricola, Packard (= ***Lepidosaphes beckii***. (Newm.); Fernald, Catalogue). Coccidae of the World. P. 303 [1903].

Habitat: D. Ost-Afrika, Dar es Salaam, April 1902. Auf *Citrus* sp. Prof. A. Zimmermann (Nr. 5).

Two females in company with *Aspidiotus trilobitiformis* Green.

D. Ost-Afrika, Dar es Salaam. Auf *Citrus* sp. April 1902. Prof. A. Zimmermann S. (Nr. 3).

The leaves of the food-plant (*Citrus* sp.) were, as is usually the case, covered with both male and female puparia.

***Aleurodes marginata* n. sp. (Newstead).**

Puparium elongate without secretion of any kind: black, surface highly polished; margin flat; dorsal area rounded or depressed; median dorsal ridge to abdominal area segmented. Ventral flange (fig. 12a) unusually broad; marginal papillae spinose

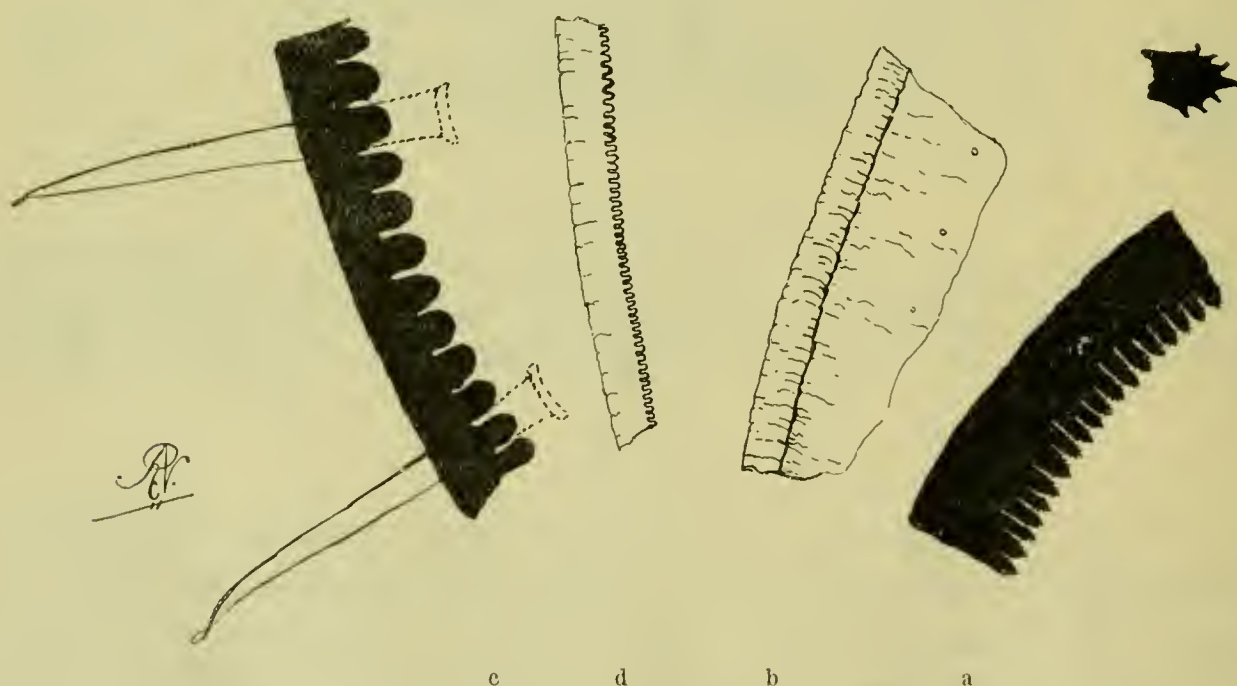


Fig. 12 a–d. *Aleurodes marginala* (a); *A. zimmermanni* (b); *A. citricola* (c); *A. filicicola* (a).

and laterally dentate. Dorsal spines in three pairs, the first one placed in the middle of the cephalic area, the second pair immediately in front of the abdominal segments, the remaining pair immediately anterior to the vasiform orifice: the first and second pairs are widely separated. Rudimentary leg-sheaths visible on venter when the chitine has been rendered sufficiently transparent by maceration. Vasiform orifice almost circular with the anterior margin truncate.

Habitat: D. Ost-Afrika. Sigithal bei Amani, auf Urwaldbaum, 4. VIII. 1902. Prof. A. Zimmermann S. (Nr. 17).

The distinctive features of the puparium are the very broad ventral flange and the remarkable dentate appendages. The examples were not very numerous, and associated with them were many coccids belonging to the Diaspinae all of which were destroyed by a fungus.

***Aleurodes zimmermanni* n. sp. (Newstead).**

Puparium elongate ovate, flat; segmentation of abdominal and thoracic areas distinct; margin broad and irregularly grooved or wrinkled; pale yellow or colourless, translucent or almost glass-like. Marginal fringe vertical, very thin, evenly striate, and glass like; it is also very fragile and is imperfect in all of the examples submitted. No ventral flange. Margin (fig. 12b) with a number of tubular spinnerets; caudal setae short; one or two very small marginal spines are present and there are traces of the attachments of others which had been broken away in the process of mounting; so that in all probability they are more or less continuous, though not conspicuous all round the margin. Vasiform orifice short and somewhat cordate. Length 50—75 mm.

Habitat: D. Ost-Afrika, Amani, Sept. 1902. Auf *Acanthaceae*. Prof. A. Zimmermann S. (Nr. 19).

Each puparium is surrounded by a little compact group of the exuviae of the larvae and eggs giving the leaves a very curious and striking appearance under the microscope.

***Aleurodes citricola*, n. sp. (Newstead).**

Puparium elongate ovate; black and slightly glossy when free from exuviae of previous moults. Dorsum may or may not be keeled; with one bilateral, subdorsal row of large spines, and one submarginal row; the latter projecting beyond the secretionary margin, in some instances; these spines are generally laden at the tips with irregular nodules of almost colourless secretion. Marginal fringe broad, white, and practically homogenous. In most cases the dorsum is partly hidden by the exuviae of the previous moult, these are paler in colour than the puparium of the adult, but they are free from secretionary matter. Ventral margin or flange (fig. 12c) very narrow, inner edge deeply crenulated, but the crenulations are generally rendered obscure by the density of the chitine; though in some instances portions of the flange become flattened out so that the crenulations appear external. Structure of the vasiform orifice doubtful as owing to the opacity of the integument it is not possible to determine its characteristics.

Length, exclusive of fringe, 1 mm.

Ovum narrowly reniform or almost crescentic, peduncle very short; pale ochreous or straw-coloured, when empty.

Habitat: D. Ost-Afrika, Dar es Salaam, April 1902. Auf *Citrus* sp. Prof. A. Zimmermann S. (Nr. 2).

The puparia occurred in large, overcrowded, colonies appearing to the unaided eye as patches of soot-like deposit upon the under surface of the leaves. They were associated with the Coccid *Aspidiotus aurantii* Mask., chiefly young forms of the female.

Aleurodes filicicola n. sp. (Newstead).

Puparium ellipsoidal, flat; without secretion of any kind; black, with a relatively broad margin of pale smoky-brown merging into the blackish area. Dorsal hairs very slender, their position indicated by minute pale dots; of these there are for submedian rows and one submarginal, six rows in all. Margin with a few short slender spines; outer edge faintly and irregularly crenulated; inner edge of ventral „flange“ (fig. 12d) deeply and regularly crenulated, with the incisions deep and acute; caudal setae in a single pair. Vasiform orifice sub-pyriform; operculum filling the posterior third; lingula with the basal portion bilobed and furnished with two, possibly four, short spines, not reaching beyond the orifice; the form of the operculum and especially also that of the lingula varies considerably, so that too much importance must not be attached to these characters.

Habitat: D. Ost-Afrika, Sigithal bei Amani, 4. VIII. 02. Auf Farnkraut; zum Teil mit Pilz. Prof. A. Zimmermann S. (Nr. 18).

This insect belongs to that section of the genus in which the puparium is without waxy secretion of any kind; its distinguishing features also being the short ingula, and the minute dorsal hairs. A large percentage of the insect were destroyed by a white fungus.

Aleurodes spp.

Habitat: D. Ost-Afrika, Amani, IX. 1902. Auf Axanthacee. Prof. A. Zimmermann S. (Nr. 19).

Larvae and eggs only. Material insufficient for diagnostic purposes.

Habitat: Auf *Ricinus*. D. Ost-Afrika. Angup. 30. XII. 04. F.-Nr. 1363/04. A. Karasek S.

Larvae and ova only submitted for examination. The material is, therefore, insufficient for diagnostic purposes.

Habitat: D. Ost-Afrika, Tangata, IX. 1902. Auf *Tamarindus indica*. Prof. A. Zimmermann S.

Material insufficient for diagnostic purposes.

Many large black puparia of a species of *Aleurodes* were found in the glass jar containing the examples of *Stictococcus dimorphus*, Newst. The external fringe had been so completely destroyed in the alcohol as to render it quite impossible to determine the insect.

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