

ON THE STRUCTURAL CHARACTERS OF THREE SPECIES  
OF COCCIDAE AFFECTING COCOA, RUBBER, AND  
OTHER PLANTS IN WESTERN AFRICA.

By

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WITH THREE TEXT FIGURES.

DURING the last two years several interesting collections of injurious insects from Western Africa have been placed at my disposal for verification and report, the larger portion of which belong to the family *Coccidae*, but there are also several other Orders of insects represented, and efforts are being made to publish a descriptive account of these insects, together with the available information as to the nature and extent of the injury caused by them. Unfortunately the time at my disposal for such extraordinary work is very limited, and it may be some time before the work will be completed. Meanwhile there are matters regarding some of the *Coccidae* which I wish to deal with at once, and these will form the subject matter of this communication. I wish, however, to offer my sincere thanks to Dr. L. Reh, of the Natural History Museum, Hamburg, for the material collected in the Cameroons; and to my colleague, Dr. Slater Jackson, for the great pains he has taken to collect specimens during his frequent but short visits to the West Coast of Africa.

***Stictococcus sjöstedti*,<sup>1</sup> Ckll.**

This curious insect was described by Cockerell in 1903 from material collected in the Cameroons by Dr. Sjöstedt, to whom the insect is dedicated. Cockerell was not, apparently, furnished with any particulars as regards the food-plant, and I can find no reference to such in any recent publication. In 1904 I received through Dr. Reh, of Hamburg, a number of specimens of this insect which were col-

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<sup>1</sup> Canadian Entom., 1903, vol. xxx, p. 64.

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lected by Dr. Winkler in the Botanic Gardens at Victoria, Cameroon, with the note that they were found infesting the young fruit of the Cocoa (*Theobroma cacao*), and were, for the most part, attached to the stalks of the pods,<sup>1</sup> sometimes completely covering them. Since that time Dr. Jackson has collected specimens on Cocoa and Rubber at Gaboon, in 1907; on Cocoa at Aburi, 10, iv. 06; on *Coffea*, sp. at Warri, viii. 07; and on an unknown plant at Koko Beach (Benin River), where it was extremely abundant, and was found infesting the small branches of some very tall trees. This insect is therefore fairly widely distributed along the west coast, and will in all probability be found in other localities where the cocoa is under cultivation, and also on other plants.

Cockerell (*l.c.*) established the genus *Stictococcus* for the inclusion of *S. sjöstedti*, and until quite recently the genus was a monotypic one. About a week since I described a second species,<sup>2</sup> from Kilimanjaro, E. Africa, which, strange to say, was also discovered by Dr. Sjöstedt, of the Zoological Museum, Stockholm, in 1905.

With such an abundance of material I have been enabled to make an extended examination of the female in all stages, and also to prepare the accompanying drawings illustrating the anatomical characters of this insect, none having hitherto been published. At the same time I find it necessary to enter more fully into the structural details than Cockerell has done, to somewhat extend the generic characters, and clear up some important discrepancies which I find on comparing my examples with the existing description. I find it necessary also to remove the insect from the position it now occupies in the classification of the *Coccidae*.

#### Genus *Stictococcus*, Ckll.

Canad. Ent., 1903, vol. xxxv, p. 64.

*Female*.—Anal orifice in the middle of the back, enclosed by a pair of transverse setiferous sclerites, not connected with the hind margin by a slit or groove. Legs and antennae present, the latter of 4-6 segments. Dorsum with or without secretory covering; smooth or spinose.

<sup>1</sup> Lord Mountmorres in his paper on "Maize, Cocoa and Rubber" (Liverpool University: Institute of Commercial Research in the Tropics, p. 22, 1907), says that these coccids "form scales all over the pods, and the red ants which live on these trees (cocoa) keep them in check." The coccid in question is *S. sjöstedti*. R.N.

<sup>2</sup> *Stictococcus multispinosus*, n. sp., distinguished by the dorsum being covered with long barbed spines, and a white mealy secretion divided by a broad marginal, and a medial black band. R.N.

*Larva with a spinose dorsum and long hairs at the margins and abdominal extremity. Anal orifice setiferous. Antennae of four segments. Anal lobes obsolete.*

The italics are mine; the remainder from Cockerell's description (*l.c.*).

The characters of the female antennae and also the dorsum are based upon the two known species; the remaining portion of the diagnosis upon *S. sjöstedti* alone.

In addition to the principal anatomical details which may be considered of generic importance there is also present on the venter a transverse slit<sup>1</sup> or fold, which leads apparently to a small pouch, as in certain Monophlebids, but owing to the nature of the chitin (no sections were cut) it is difficult, indeed almost impossible, to determine its true character. Cockerell described this insect as an aberrant genus of *Lecaniinae*, and Sanders<sup>2</sup> includes it in the same sub-family under the new name *Coccinae*. It seems to me, however, that the total absence of anal lobes, in all stages, precludes its retention in this group; though for the moment I am doubtful as to which of all the allied families it belongs; but provisionally I would place it after *Zylococcus*, in the sub-family *Margarodinae*, though the setiferous anal ring is, as far as I can trace, abnormal.

#### ***Stictococcus sjöstedti*, Ckll.**

*Female adult.*—Cockerell (*l.c.*) has fully described the external features of this insect; but there are some structural details which he has overlooked, and others that require elucidation. The antennae (Fig. 1) are as already described, but I find one or two faintly knobbed hairs on the apical segment. Legs about as long as the antennae; digitules to tarsi, normal. Mentum monomerous. Anal orifice (Fig. A 2) closed by two chitinised plates or sclerites, placed transversely or one in front of the other, the upper plate having a row of 6-7 spinose hairs and a pair of longer and stouter ones anterior to them; the lower plate has apparently six<sup>3</sup>; these plates are not, I think, analogous to the anal plates (modified anal lobes) in the *Lecaniinae*, as they are, as already stated, arranged transversely, though their function may be similar. Posterior pair of spiracles with *two channels* leading from them to the margin; anterior pair with one; spinnerets circular. Margin with a continuous series of closely arranged spines, one set bluntly

<sup>1</sup> Cockerell also mentions this organ.

<sup>2</sup> Catalogue of recently described *Coccidae*, Washington, 1906, p. 7.

<sup>3</sup> *S. multispinosus* has a similar arrangement, but the plates have fewer hairs.

serrated (Fig. A 3 *a*), the other curved and sharply serrated (Fig. A 3 *b*); and at long intervals between them are some single and very long stiff hairs (Fig. A 3 *c*). Dorsum with minute spines and small tubular spinnerets. Dorsal glands (Fig. A 4) large, irregular in form, but shaped somewhat like a campanulate flower, with the outer edge deeply and regularly divided, the chitin surrounding these organs much thickened; they occupy the positions indicated externally by the deep punctures which are filled with cereous matter.

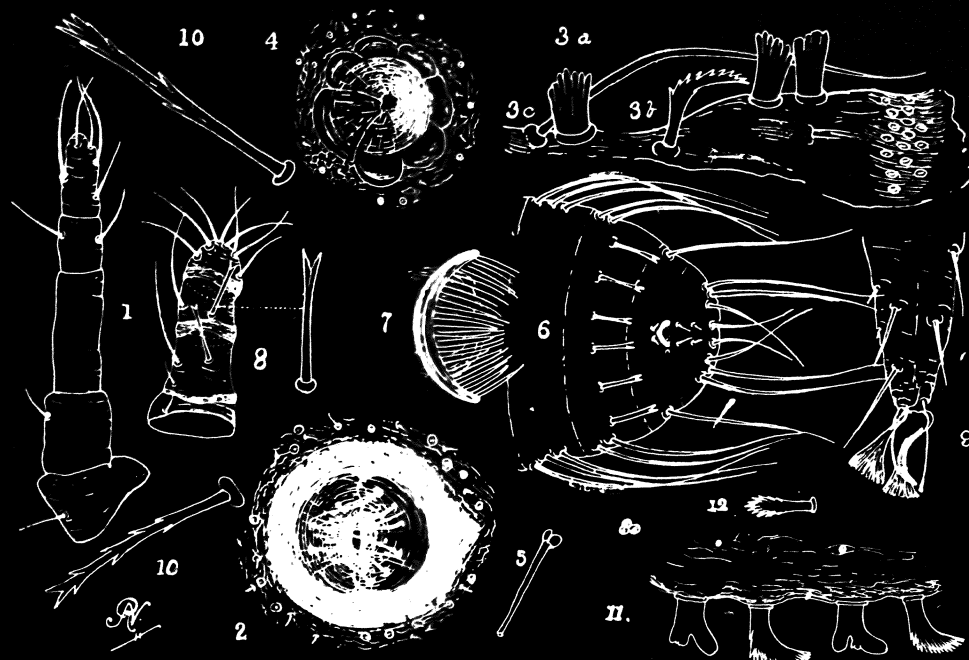


Fig. A.—1. Antenna of adult female; 2. anal orifice of adult female; 3 *a-c*. marginal spines of adult female; 4. dorsal glands of adult female; 5. tubular spinneret; 6. anal extremity of abdomen of larva; 7. anal orifice of larva; 8. antenna of larva; 9. tarsus of larva; 10 (*bis*). serrated spines; 11. marginal spines of second stage female; 12. submarginal spine of ditto. All greatly enlarged.

Ventral derm with many short spines, those at the margin much the longest, forming an almost complete series just below the marginal spines; spinnerets circular, scattered, except near the margin, where they form little groups of three.

*Female third stage*.—Ovate, flat, dusky ochreous. Antennae of only example seen asymmetrical; one of five segments, the other of six; relative length of segments similar to those in the adult. Legs as in the adult. Structure and arrangement of the marginal spines as

in the adult, but the broad digitate forms are placed much more closely together, so that, in some places, they slightly overlap each other. Derm above almost covered with circular spinnerets and minute spines. Anal orifice resembling that of the adult, and, like it, also placed in the centre of the dorsum.

*Female second stage.*—Very short ovate, or sub-circular. Antennae of five or six segments, short; possessing divided spines as in the larva. Margin with a fringe of two forms of spines (Fig. A 11), arranged alternately, one form being dilated and curved backwards with the outer edge finely serrate, the other with two or more lobate extensions: there is also a sub-marginal series of smaller serrated spines (Fig. A 12). Anal orifice with the outer ring, as in the adult; within the ring is the true orifice, which has its distal or anterior half chitinised, and bears on its inner edge a fringe of fine and closely-set hairs (? 50), pointing backwards and partly closing the orifice; attached to the outer margin of the inner ring, laterally, are four (two on either side) long spines, and above these, between the true orifice, on the clear and thinner derm, anteriorly, are two more similar but much longer spines, which reach beyond the posterior margin of the outer ring.

*Embryo larva* (taken from the body of the parent) elongate. Dorsum with six rows of spines (Fig. A 6) dilated and divided at the ends; ventrally there are also two rows of divided spines similar to those on the dorsum, but smaller; margin of abdominal segments (see Fig. A 6) with long spinose hairs. Anal segment (Fig. A 6) without lobes. Anal orifice (Fig. A 7) with a semicircle of chitin, the inner or lower edge of which is fringed with long and extremely delicate hairs.<sup>1</sup> Antennae (Fig. A 8) of four segments, of which the second and third are nearly equal in length and much the longest; the first and fourth segments together equalling the third in length; articulations of all the segments are indicated by strongly chitinised bands; there are two or three short hairs on the first and second segments, one or two very long spinose hairs on the second and third, each segment also bears a single long spine slightly dilated and divided at the end; and the apical one bears six or seven long spinose hairs. Rostrum and monomerous mentum minute; legs rather long, stout, spinose; digitules to tarsi absent; those of the claw (Fig. A 9) broadly dilated with fine lines radiating from its base; claw strong, with a deep ventral channel, in which lies a knobbed hair of the form usually met with on the tarsi of most members of the *Coccidae*.

<sup>1</sup> Visible only under a  $\frac{1}{12}$  oil immersion lens.

Cockerell's description of the larva applies undoubtedly to the second stage female, and is, so far as it goes, accurate, though much too brief and incomplete.

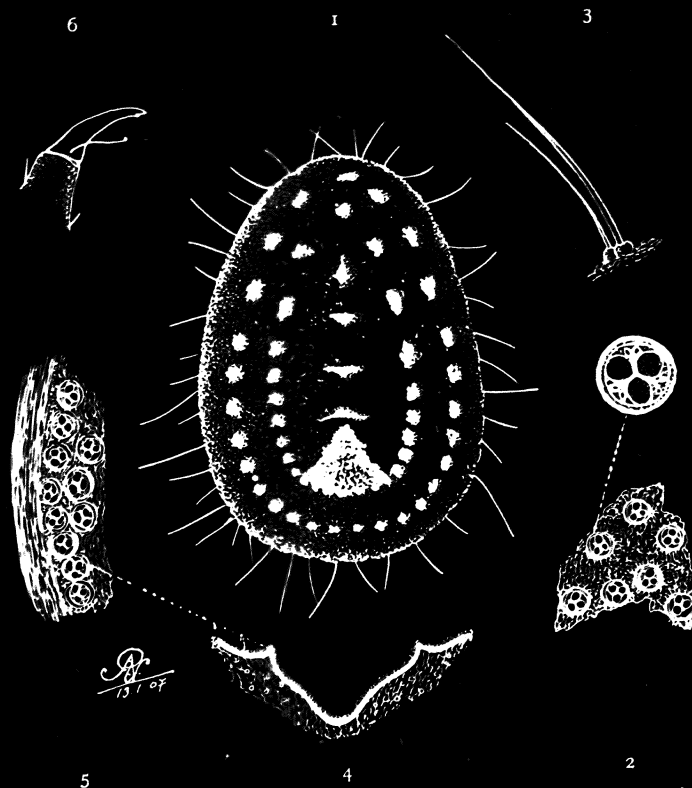


Fig. B.—1. Adult female, dorsal; 2. spinnerets of dorsum; 3. double hairs of do.; 4. margin of ? marsupium; 5. spinnerets on inner edge of do.; 6. claw of the larva. All greatly enlarged.

**Palaeococcus theobromae. n. sp.**

*Adult Female*.—(Fig. B 1) ovate, but widened posteriorly. Dorsum almost flat; covered with densely felted and finely pitted bright sulphur-yellow secretion, with the exception of a double series of spots, following the contour of the margin, and a median series more irregular in outline, all of which appear as blackish depressions in the secretion. Margin crenulated, especially beneath, with numerous long outstanding hairs. Antennae not very highly chitinised, of nine segments, tapering slightly as far as the 8th inclusive; 9th much broader than the preceding segment, and is also the longest; 2nd and 3rd equal, cylindrical, but shorter than the 9th; 4th to 8th, inclusive,

of the derm-cells. Form normal. Antennae (Fig. C 1) of eight segments, the third being much the longest; last four subequal; there is a very long hair on the third and fifth, the one on the former the longest. Legs (Fig. C 2) stout; trochanter about one-third the length of the femur, with a very long apical hair; digitules to claws and tarsi normal. Derm with very small inconspicuous glands. Marginal spines short, closely set, truncate, the ends often notched. Stigmatic cleft (Fig. C 3) with pointed spines and two large tubercles, the latter longer than the longest spine.

Length, 6.25-7 mm.; width, 4-4.75 mm.

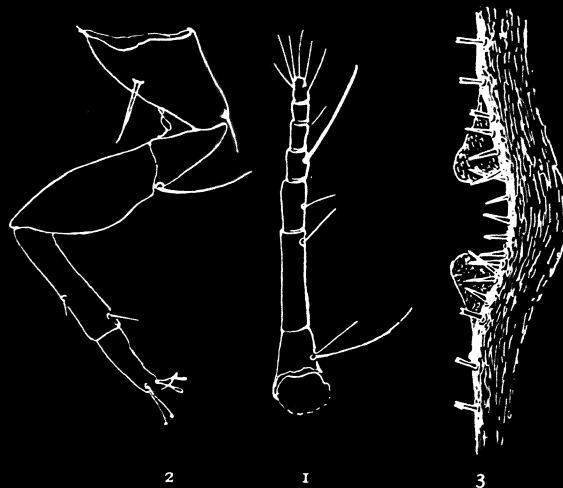


Fig. C.—1. Antenna of adult female; 2. leg of adult female; 3. stigmal cleft with tubercles and spines, of ditto. All greatly enlarged.

*Male puparium*, white stained with brown. Normal in shape, but thick, and unusually wax-like in appearance; dorsal plate with one large central, white, wax-like felted spot and several (3-4) brownish tubercles immediately beyond it.

Length, 2.25 mm.

Male unknown.

*Habitat*.—On Cacao, Royal Botanic Gardens, Calabar (February 1.07); and on *Ficus*, sp., at Dakar (October 3.07).

Allied to *Pulvinaria maxima*, Green; but may be readily distinguished by the unusual length and texture of the ovisac; by the presence of two large tubercles at the margin of the stigmatic clefts, and the great length of the trochantae.

The insect, for the most part, fixes itself upon the smaller branches of its food-plant, and as the ovisacs are only slightly raised above the bark they appear, even on close examination, remarkably like a white fungoid growth. The resemblance is so striking that I was at first completely deceived. Dr. Jackson informs me that he also, at first, mistook the ovisacs for white mould. Only three examples were found on the Cacao, but they were abundant on *Ficus*. Many of the ovisacs had been partly destroyed by predaceous insects, presumably; and Dr. Jackson informs me that on paying a second visit to the *Ficus* tree, after an interval of a few weeks, he found that all the coccids had disappeared. The colonies were visited by numbers of ants; but no coccinellids or other predaceous insects were seen near the coccids.

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