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**NOTES ON LECANIUM, WITH A LIST OF THE
WEST INDIAN SPECIES.**

BY T. D. A. COCKERELL.

The Coccid genus *Lecanium* Illig. consists at the present time of about eighty nominal species, and is practically cosmopolitan. Signoret, in 1873, divided the genus into six series, some of which might be regarded as distinct genera or subgenera.

FIRST SERIES.

Consists of flat and often viviparous species, of which *L. hesperidum* L. may be taken as the type. The others are *L. acuminatum* Sign., *L. angustatum* Sign., *L. frenchii* Mask., *L. lauri* Boisd., *L. longulum* Dougl., *L. maculatum* Sign., *L. mangiferæ* Green, *L. minimum* Newst., *L. tessellatum* Sign., and *L. viride* Green. If this group were to receive a subgeneric name, *Calymnatus* Costa, 1827, is apparently available.*

(1.) **Lecanium hesperidum** (L.) Sign.—In January, 1892, Mr. W. Harris sent me, from Cinchona, Jamaica (5000 feet altitude), two little scales found on an orchid of the genus *Stelis*. They were in poor condition for examination, and the largest only 3 mm. long; color pale brownish. So far as could be made out, they were the young of *hesperidum*, but it is singular that, except for this instance, the species has never been found in Jamaica. [Since this was written I have found a single adult ♀ of *hesperidum*, with young, on the midrib of the upper side of a mango leaf, in Kingston.]

(2.) **Lecanium mangiferæ** Green.—Fairly common in Kingston, Jamaica, on *Mangifera* and *Jambosa*. First found by Mrs. Swainson. This species, which has also been found at Demerara, is easily recognized by the subtriangular shape and the branched hairs along the margin. Eggs are produced, but the young larvæ at first take shelter beneath the body of the parent.

* So far as I can gather from Signoret's work, it seems that *Calypticus* Costa was first applied in 1829 to *C. spumosos* Costa, which is *Pulvinaria vitis*. Therefore *Calypticus* is not properly a synonym of *Lecanium*, but might, according to very strict priority, be brought forward to replace *Pulvinaria*.

(3.) **Lecanium longulum** Dougl.—Mr. C. A. Barber sent me this from Antigua, where it infests pigeon-peas. Later, I found it abundantly, mixed with *L. oleæ*, on the branches of a tree in Kingston. The tree, which was not identified, has 3-foliolate leaves, the leaflets lanceolate, entire, pubescent above, beneath pale, with strong veins. I also have specimens received from Mr. Newstead, found on *Euphorbia* (under glass) in Cheshire, England. Many of the *Antigua* specimens show holes where parasites have escaped.

When the scales become dry, they curl up and change color. Such specimens might be referred to Signoret's second series, but on the whole, it seems best to place the species in the first series, having regard to all its characters. The following notes are additional to the information given by Douglas in his description :

Scale (Jamaican specimen) about 4 mm. long and 2 mm. wide, of the flattish type, but fairly convex, dorsum rounded, not keeled, shiny. Color, when alive, appearing dark grayish; when removed from the plant and seen with a lens, it has a very pale ground color, tinged with pinkish or yellowish, and much gray markings. To be more precise, there is a rather broad dorsal stripe of pinkish, bordered first by a pale yellow line on each side, which is broken up into spots, and outside that by a dark gray line. From the last run numerous blackish lines, radiating towards the margin, but not reaching it. There is, outside the dark gray line, a tendency to similar lines, which, crossing the radiating ones, produce a somewhat tessellated effect. The old scales become light brown.

The anal plates are brown, rather broad, so that together they form a square. Eyes dark purple.

The margins of the scale have simple hairs, rather longer than in some species; the marginal spines are peculiar, being sunk in squared incisions, from which they do not usually project. There are two spines in each incision (four pairs of spines in all), which are either short and equal, or one is longer than the other, and projects beyond the incision.

The posterior cleft is pinkish in fresh specimens; its sides are contiguous, but separate slightly after boiling in caustic soda. After boiling in soda the scale appears closely and conspicuously pitted with gland-spots.

The antennæ are described and figured by Douglas ("Ent. Mo. Mag.," 1887, p. 97). It appears to me that there are eight joints, as described by Douglas, although Maskell's *L. chirimolix*, which is

supposed to be the same, has only seven joints. It seems possible that *L. chirimolia*, although abandoned by its author (Tr. N. Z. Inst. 1890, p. 16) is a valid species after all. The legs are not described by Douglas. The femur is about one-third longer than tibia; tibia not twice as long as tarsus. Tarsal knobbed hairs long and stout; claw short and thick. Femoro-tibial and tibio-tarsal joints dark. Hairs arise from the distal ends of the coxa and trochanter, the trochanteric one being the longer.

The eggs are oval, as in other species.

(4.) **Lecanium tessellatum** Sign.—A very remarkable species, found hitherto in hot-houses in Europe, on a palm (*Carysta*). Some time ago Mrs. Swainson brought me some lignum-vitæ leaves, gathered in Kingston, Jamaica, which I then put by. Turning them over later, I was surprised to find a curious flat *Lecanium*, which agrees well with Signoret's *tessellatum*. This example, 5 mm. long and 4 mm. broad, was spoiled by a parasite, which had escaped through a small hole. On Dec. 29, 1892, I was so fortunate as to find another scale, also on a lignum-vitæ leaf, at Mr. Gardner's residence in Kingston. This latter specimen was not parasitized, and on removing it from the leaf, it was interesting to see a crowd of young larvæ, which, on being exposed to the light, scattered in all directions.

The following descriptive notes are intended to supplement those given by Signoret:

Female scale flat, very slightly convex, broad-oval or shield shaped, shiny, dark chestnut-brown, strongly rugose under a lens. The tessellations are as given by Signoret; ten sutures could be counted along the margin. The posterior cleft is about two-fifths total length of scale, its sides contiguous. Anal plates together forming nearly a square; margin of scale slightly granulose, but no distinct hairs; no lateral spines; substance of scale sparsely pitted with gland-dots.

Legs slender, tarsus very little over one-half length of tibia; tibia not much shorter than femur; two hairs spring from the distal end of coxa, and apparently two from the trochanter. A young individual on a leaf is flat, oval, whitish, with fine radiating grooves. This example is less than 2 mm. long.

Larva pale orange, but nearly colorless by transmitted light; shape long oval, legs extending far beyond body. Last joint of antenna with some long hairs. Tibia a *little* longer than tarsus; digitules of claw curved, slender, ordinary; clubbed hairs of tarsus

peculiar, both long, but the upper one filiform, with no distinct knob, the lower stout and longer, with a very distinct knob.

The posterior cleft of the larva is widely squared for its hindmost half; and from it spring two cylindrical tubercles; not extending beyond its mouth, bearing each a long straight hair—the usual caudal filaments. Between these tubercles is a pair of hooked organs, the hooks pointing away from the central line. This arrangement in the larva is interesting, and deserves further study.

SECOND SERIES.

This series consists of convex elongated (or at least not hemispherical) species, which have been classed together for convenience, but do not appear to form a natural group. They are *L. assimile* Newst., *L. begoniæ* Dougl., *L. berberidis* Schr., *L. elongatum* Sign., *L. fitchii* Sign., *L. genistæ* Sign., *L. juglandis* Bouch., *L. mori* Sign., *L. persicæ* Fab., *L. piceæ* Schr., *L. pruinatum* Coquill., *L. sallei* Sign., and one or two others. *L. persicæ* is very near to some species referred to the third series; it is not confined to the peach, for although I have it from Isleworth, England, on peach (Q. Manville Fenn), what seems to be the same thing is received from Meissen, Saxony (C. F. Schaufuss), where it was found on *Vitis vinifera* and *Spiræa*.

(5.) **Lecanium begoniæ** Dougl.—Mr. C. A. Barber sent me from Antigua some leaves of *Terminalia catappa*, on which were many specimens of a *Lecanium*. I was at first inclined to consider it a new species, but it is so near to *L. begoniæ* (of which I have Demerara specimens, sent by Mr. Newstead) that I now doubt whether it is even a distinct variety.

The scales are abundant on the leaves; along the midrib on the upper side, but below more numerous, and scattered; twenty-two out of thirty-five on the under side of one leaf show holes where parasites have escaped. The parasite is a Chalcidid, with a large and thick tibial spur; femur and tibia brown; tarsus whitish; stigmal vein rather long, bifurcate at end; post-marginal about as long as stigmal.

Female scale rather over one-eighth inch long, broad-oval seen from above, moderately convex; ends flatter than sides, so that the outline seen from the side is pyramidal, while seen from one end it is rounded. Scale shiny, somewhat granulose, especially at sides, so dark brown as to appear black when adult, though some are obvi-

ously brown. In outline, color and texture, these Antigua scales exactly resemble the Demerara *begoniæ*, but my specimens of the latter are smaller, and have a rather more pronounced anal notch.

The structure of the scale is noteworthy, consisting of distinct oblong plates, each having in its centre a circular gland-spot. This is only seen by transmitted light.

On the *Terminalia* leaves from Antigua were also plenty of *L. oleæ* Bern.

(6.) **Lecanium assimile** Newst., var. *amaryllidis*, n. var.—In numbers on the leaves of *Amaryllis*, sp., in Antigua, sent by Mr. C. A. Barber. Scale about 3 mm. long, or less; black, with a pale margin, or red-brown. The pale margin is finely striate-plicate; the black portion is shiny, examined by transmitted light it appears brown.

Derm with scattered gland-dots. Sides of posterior cleft contiguous, the cleft short, not nearly twice as long (counting from tip of anal plates to margin) as length of anal plates. Anal plates pale, long wedge-shaped, the two posterior angles of the triangle much greater than the anterior one. Margin with but few hairs, these small, slender, with a slight tendency to be knobbed; marginal spines single, each in a deep squared incision, beyond the mouth of which it does not project.

Tibia about one-fourth longer than tarsus; femur about one-fourth longer than tibia; distal end of tibia with two hairs, one short, the other rather long.

Antennæ with apparently eight joints; third joint longest, but fourth almost as long, second next longest; then fifth, sixth and eighth subequal; then first; then seventh. It is difficult to make out the joints, as some of them show constrictions, or "false joints," but I think the statement here given is correct. There is a hair on first joint, one at end of fourth, one at end of fifth, and at end of sixth, and several on the eighth.

This is very likely a distinct species, but nearly all of Mr. Newstead's short description of *assimile* will apply to it. *L. assimile*, has 7-jointed antennæ, and the hairs on them seem to be disposed differently. The slight difference in the stated proportions of tibia and tarsus, and in the size of the scales, cannot count for much.

Several specimens of *amaryllidis* show holes where parasites have escaped.

THIRD SERIES.

Consists of hemispherical species, with the skin more less tessellated, living on trees and shrubs in North America and Europe. About twenty-six species are considered valid, but several of these are very closely allied. I have been able to examine the following :

L. æsculi Koll., Ince, Cheshire (Newstead).

L. distinguendum Dougl., Delamere Forest, Cheshire (Newstead). One of these has been parasitized.

L. pyri Schr., Isleworth, Middlesex (Q. M. Fenn).

L. ribis Fitch, Norfolk (Newstead). On *Ribes rubrum* Meissen, Saxony, July, 1892 (C. F. Schaufuss). I think this species has not yet been recorded from Germany.

L. rosarum Snell., on *Rosa centifolia* Meissen, Saxony (Schaufuss); also what I take to be the same species on *Prunus domestica* Meissen (Schaufuss).

L. tiliæ L., on *Tilia grandifolia*, Oberblasewitz, 1890 (Schaufuss). This species, *æsculi*, and *ulmi*, are very much alike. Although it was two years since the Oberblasewitz scales were collected, I found, on crushing a scale for examination, a very small colorless mite, alive and walking about! Could it have been with the scale all this time, or do these mites breed in old scales?

L. ulmi L., Ince, Cheshire (Newstead).

The group represented by the third series is distinct enough to receive a subgeneric name, and may be called *Eulecanium*, taking *L. tiliæ* as the type.

FOURTH AND FIFTH SERIES.

So far as I know the species of these two series, they are strictly of one group, the only difference being that in the fifth series the characteristic ridges are seen in the adults, while in the fourth series they are only well seen in young scales. Mr. Ashmead named the group *Bernardia*, taking *L. oleæ* as the type; in a letter to the U. S. Department of Agriculture, I changed this name to *Neobernardia*, on account of preoccupation in botany, but concerning this, see "Journ. Inst. Jamaica," 1892, p. 142. It appears, however, that the name *Saissetia* was formerly used for *L. coffeæ* (see "Zool. Record" for 1865), and if it can now be taken up, it has priority.

(7.) **Lecanium depressum** Targ.—Mr. Barber has sent a scale from Antigua which I think may be referred to this species, though it is possibly distinct. He found it on garden *Hibiscus*, the double and single red varieties, and remarks that it is enormously fertile.

Female scale—long. 4, lat. 2, alt. $1\frac{1}{2}$ mm. Dark chocolate-brown, elongate, convex, very shiny, somewhat obscurely transversely ridged, margin granulose, not crenulate. An old scale is pale brown, very finely reticulate all over with red-brown. The young are brown, dorsally keeled, and strongly transversely ridged.

A young specimen examined had unbranched hairs around the margin, and very long spines at the lateral incisions. Color after boiling in soda, transparent, with central parts, legs, etc., red-brown. Eyes twice as far from base of antennæ as from margin; caudal filaments nearly straight, slightly curved outwards.

(8.) **L. oleæ** Bern.—Very common in Kingston, Jamaica, on various trees and shrubs; also sent from Antigua by Mr. Barber. It varies in color from black to brown; on March 8, 1892, Dr. Strachan sent me a branch of *Ficus carica*, gathered in Kingston, covered with *L. oleæ*, all of them brown. Perhaps the name *testudo* Curtis, which cannot well represent a distinct species, may be used for this brown form.

(9.) **L. hemisphæricum** Targ.—Very common and destructive in Kingston, Jamaica, especially on creepers. Mr. A. Fowler brought me a fruit of *Anona muricata* almost entirely covered by this species, and presenting a most singular appearance. It also occurs at Cinchona, 5000 feet altitude, on *Dendrophthora cypressoides* (W. Fawcett); at Port Antonio, on *Chrysanthemum* (A. J. Hopwood); and elsewhere. In Antigua, Mr. Barber finds it a "terrible pest to variegated *Eranthemum*," and sends also a pale variety of it, which he found on *Salvia*. I noticed that very young scales from Antigua, on *Eranthemum*, were pale with three conspicuous transverse pinkish bands.

Mr. Caracciolo records this scale from Trinidad, where it is found on guava.

(10.) **L. filicum** Boid.—On various ferns at Manchester Cottage, Kingston, Jamaica.

Adult scale brown, like *hemisphæricum*, but immature specimens longer and white. Margin of scale with clubbed hairs. The edge of the scale orange-brown by transmitted light, appears crowded with black dots; these seem to extend more or less all over the scale.

Lateral spines distinct, twice as long as the hairs. There is a slight tendency to have ridges, as in *oleæ*, but in the adult this fades away, leaving the sides of the scale obscurely furrowed.

With a lens the surface of the scale is seen to be covered with minute pale dots. There are pale dots at intervals along the lines of the ridges.

There can be no reasonable doubt that this is *filicum*, but in many particulars it resembles *L. clypeatum* Dougl., which must be very closely allied.

SIXTH SERIES.

I have studied none of the species of this series. Mr. Crawford appears to have used the name *Cryptes* in MS. for *L. baccatum* (see Maskell, Tr. N. Z. Inst., 1891, p. 21), and perhaps, if necessary, this could be brought forward for use in a subgeneric sense.

Kingston, Jamaica, Dec. 31, 1892.

