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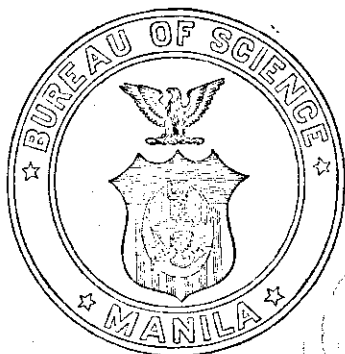
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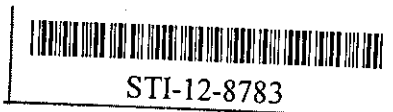
VOLUME XII
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WITH 19 PLATES AND 16 TEXT FIGURES



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THE PHILIPPINE
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D. GENERAL BIOLOGY, ETHNOLOGY,
AND ANTHROPOLOGY

VOL. XII

JANUARY, 1917

No. 1

COCCIDÆ OF THE PHILIPPINE ISLANDS¹

By ELIZABETH ROBINSON

SIX PLATES

This paper is intended to bring together all obtainable information concerning the known species and available specimens of Philippine Coccidæ. For the advantage of the general entomologist and the specialist in Coccidæ it was believed advisable to undertake a synoptic treatment of this family of Hemiptera. From the collections of Prof. C. F. Baker, which were sent to Prof. T. D. A. Cockerell, many species have been determined. It is evident that the available specimens represent only a few of the great number of Coccidæ to be found in the Philippine Islands. With few exceptions those studied have come from Luzon Island.

I take this opportunity to express my sincere thanks to those who have aided me—especially to Professor Cockerell, under whose direction the entire study has been made, and to Professor Baker for specimens and for a list of food plants and bibliographies of Philippine Coccidæ.

COCCIDÆ

*Synoptic table of the subfamilies.*²

a'. Adult female with legs (in known Philippine species).

b'. Anal ring of female hairless; legs present in all stages; ovisac cottony or waxy; mouth parts present in adult female. Eyes of male compound Monophlebinae.

¹ This paper was written as the author's major thesis, presented at the Colorado Agricultural College for the degree of master of arts.

² The Tachardiinae, or lac insects, will probably be found to occur in the Philippines. *Tachardia aurantiaca* Ckll. occurs in Java on *Citrus*, *Flacourtia*, and *Albizzia*.—COCKERELL.

- b². Anal ring with hairs.
- c¹. Female with posterior extremity cleft; anal orifice closed above by a pair of triangular plates; secretion of female appearing cottony, waxy, glassy, or horny..... Lecanilinæ.
- c². Female with no posterior cleft; no triangular anal plates; female usually with a mealy secretion..... Dactylopiinæ.
- a². Adult female without legs; scale covering adult composed partly of exuviae; abdomen terminating in a compound segment or plate; anal ring hairless Diaspinæ.

MONOPHLEBINÆ

Synoptic table of the genera.

- a¹. Adult female with a long posterior ovisac; male without lateral fleshy caudal processes *Icerya*.
- a². Adult female without a posterior ovisac; male with lateral fleshy caudal processes.
- b¹. Female antennæ 9-jointed; male with ten caudal appendages.. *Drosicha*.
- b². Female antennæ 6- or 7-jointed; male unknown..... *Monophlebulus*.
- b³. Female antennæ 11-jointed; male with six to eight caudal appendages *Llaveia*.

Genus ICERYA Signoret

Type, *Dorthisia seychellarum* Westwood.

Female soft with long, usually ribbed ovisac, varying in color; antennæ 11-jointed; skin with long scattered hairs and rounded spinnerets. Male without lateral fleshy caudal processes.

Synoptic table of the species.

- a¹. Antennæ of female with ten joints (Plate I, fig. 1); filaments numerous, ovisac not entirely covering the insect (Plate I, fig. 3)..... *Jacobsoni*.
- a². Antennæ of female with eleven joints (Plate I, figs. 4, 5); secretion densely covering the body.
- b¹. All the secretion white, filaments not numerous..... *candida*.
- b². Part of the secretion a bright yellow, body with many long filaments *seychellarum*.

Icerya jacobsoni Green.

Icerya jacobsoni GREEN, Tijdsch. voor Ent. (1912), 55, 316.

Adult female flat, oval, reddish orange, the color obscured by the white mealy secretion excepting in two lateral stripes where the color is exposed; margin with a series of 20 radiating, long, curved, white, waxy processes (Plate I, fig. 3); denuded insect 5 to 7 millimeters long. Antennæ 10-jointed, the four basal joints cylindrical, the next five subglobular, the terminal elongate-oval (Plate I, fig. 1). Legs well developed, moderately stout, tibia slightly shorter than femur and trochanter together, tarsus less than half as long as tibia, claw pointed, digitules

hairlike. Derm with numerous hairs and ceriferous glands (Plate I, fig. 2), varying in size and form on various parts of the body. Larvæ with more of the mealy secretion; antennæ 6-jointed. (From the original description.)

LUZON, Laguna, Los Baños (C. F. Baker), on *Leucosyke capitellata*.

Icerya candida Cockerell.

Icerya candida COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 128.

Adult female with ovisac not grooved, pure white, dense, a few glassy filaments, about 7 millimeters long. Antennæ dark red-brown, 11-jointed, joint four the shortest, eleven longest and slender, two and three subequal and longer than any between three and eleven (Plate I, fig. 4). Legs ordinary, dark reddish, anterior femora stout. Young with caudal bristles longer than the body; antennal club stout with very long bristles. (From the original description.)

LUZON, Manila (C. H. T. Townsend), on a cultivated tree.

Icerya seychellarum (Westwood).

Icerya seychellarum (WESTWOOD) FERNALD, Cat. Coccidæ of the World (1903), 27; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 128; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 428.

Adult female about 5 millimeters long, with ovisac smooth, entirely yellow or with edges spotted and anterior portion colored with yellow, filaments numerous. Antennæ dark brown, 11-jointed, joints four to nine very similar and beadlike, eleven the longest, of the others two and three the longest, all of the joints with numerous hairs (Plate I, fig. 5). Legs heavy, dark brown. Entire body with dense hairs.

LUZON, Tayabas, Lucban (Townsend), on *Rosa*; Laguna, Los Baños (Baker), on *Citrus decumana*, *Diospyros kaki*, and *Ficus minahassae*; Manila (Baker), on *Psidium guajava*.

Genus DROSICHA Walker

Type, *Drosicha contrahens* Walker.

Female soft, somewhat elongated, more or less hairy with cottony or powdery secretion; antennæ 9-jointed; no posterior ovisac. Male with ten abdominal processes.

Synoptic table of the species.

a ¹ . Only the male described	palavanica.
a ² . Only the female described.....	lichenoides.

Drosicha palavanica Cockerell.

Drosicha palavanica COCKERELL, Journ. Econ. Ent. (1916), 9, 235.

Length of male about 3.5 millimeters, exclusive of abdominal processes; wings nearly 5 millimeters long, black, with the usual venation and two hyaline lines; costal field dark sepia; head and thorax dark red, front and mesothorax black; antennæ black, with long black hairs, third joint with three nodes; legs black; abdomen almost as broad as long, red, strongly suffused with blackish dorsally, with ten red fleshy processes, successively longer caudad, each with long black hairs at end; the last processes are scarcely over 1 millimeter long.

PALAWAN, Puerto Princesa.

Drosicha lichenoides Cockerell.

Drosicha lichenoides COCKERELL, Journ. Econ. Ent. (1913), 6, 142.

Female about 12 millimeters long, 8.5 broad, 5 high, light reddish, strongly emarginate anteriorly, smooth above with segmentation distinct; legs and antennæ dark brown, antennæ about as long as anterior femur plus trochanter, 9-jointed, measured in microns: (1) 240, (2) 240, (3) 336, (4) to (8) each 320, (9) 590; femora stout, claws strongly curved; lateral margins of insect with very short dense hairs, but with occasional long slender hairs. (From the original description.)

LUZON, Laguna, Los Baños (*Baker*), on *Ficus nota*. This species also occurs on various other trees.

Genus MONOPHLEBULUS Cockerell

Type, *Monophlebulus fuscus* Maskell.

Characters similar to those of *Drosicha*; female antennæ 6- or 7-jointed.

Monophlebulus townsendi Cockerell.

Monophlebulus townsendi COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 127.

Female gray, flat, 9 millimeters long, 7.5 broad, about 3 high; the true color is dark reddish, the gray being due to the mealy secretion. Anal orifice small and round, hairless. Legs and antennæ black; legs very stout; antennæ about as long as femur and trochanter of middle leg, of six joints, three to six about equal, two short and stouter, one broader than long, the joints with coarse pale yellowish bristles. Middle of abdominal region concave beneath, sides densely covered with white cottony tomentum; cephalic margin emarginate, with long, coarse black

bristles. Mouth parts visible in the form of a dark projecting cone. (From the original description.)

LUZON, Batangas (Townsend).

Genus LLAVEIA Signoret

Type, *Coccus axin* Llave.

Characters similar to those of *Drosicha*; female antennæ 11-jointed; male with fleshy processes arranged along the sides of the abdomen.

Synoptic table of the species.

- α^1 . Male with base of wing and costal area bright red; abdomen with six processes sanguinea.
 α^2 . Areas of wing not red.
 b^1 . Abdomen of male with six processes; a large species..... benguetensis.
 b^2 . Abdomen with eight processes..... luzonica.

Llaveia sanguinea Cockerell.

Llaveia sanguinea COCKERELL, Can. Ent. (1915), 47, 344.

Male about 5 millimeters long, length of wings, about 7; antennæ rather thick, middle joints with three whorls of long reddish hairs; legs red, hairy; eyes dark red, very prominent on stout stalks; anterior part of thorax dull black, forming a lobe extending over the head, posterior to this the thorax is shining black with a broad, transverse reddish ochreous band, abdomen broad, red, with six long fleshy processes; penis long with a large raspberry-pink knob; wings ample, extreme base and costal region bright red. (From the original description.)

PALAWAN, Puerto Princesa (Baker).

Llaveia benguetensis Cockerell.

Llaveia benguetensis COCKERELL, Journ. Econ. Ent. (1916), 9, 235.

"Male.—Length 4.5 millimeters, exclusive of abdominal processes; wings about 7 millimeters long, black, with usual venation and two hyaline lines; costal field dark reddish brown; head and thorax black, the mesothorax shining, region just below wings dark red and dull; mesosternum enlarged, convex, polished black; eyes very prominent, constricted at base, placed at lower anterior corners of head; antennæ black with very long black hairs; third joint with three nodes; legs black; abdomen broad, dark red, with the dorsal region strongly suffused with black, apex deeply emarginate; six long fleshy abdominal processes, the first pair shorter than the others, which are subequal, and a little longer than the diameter of the abdomen."

LUZON, Benguet, Baguio (Baker 5341).

Llaveia luzonica Cockerell.

Llaveia luzonica COCKERELL, Bull. Am. Mus. Nat. Hist. (1914), 33, 334.

Male about 6 millimeters long, wings about 6.5 long; antennæ reddish black, in the middle of the antennæ are three nodules to a joint, each bearing a whorl of long black bristles; head mostly yellowish flesh-color, dark above bases of antennæ, occipital margin dusky; thorax pale carneous, dorsal region shining black, scutellum pale yellowish carneous, mesothorax black; abdomen broad, pink, with eight hairy plumbeous tails not equal in length to the diameter of the abdomen; legs dark castaneous; wings ample, black, with two light lines; lobes or lappets at the sides of the thorax anteriorly, extending from the occipital region to a short distance before the wings. (From the original description.)

LUZON, Laguna, Mount Maquiling and Los Baños (*Baker*).

DACTYLOPIINÆ

Genus **PSEUDOCOCCUS** Westwood

Type, *Dactylopius longispinus* Targioni Tozzetti.

Female with a mealy secretion; skin with spines and glands; legs and antennæ well developed in the adult.

Synoptic table of the species.

- a*¹. Female yellow after being boiled in KOH; tibia of hind leg three times as long as tarsus (Plate I, fig. 7)..... *virgatus*.
*a*². Not so; legs stout and short (Plate I, fig. 9).
*b*¹. Body crimson when boiled in KOH; pigment present especially in embryonic young *tayabanus*.
*b*². Body purple after being boiled in KOH..... *illacinus*.
*b*³. Body green when boiled in KOH..... *filamentosus*.

***Pseudococcus virgatus* (Cockerell).**

Pseudococcus virgatus (COCKERELL) FERNALD, Cat. Coccidae of the World (1903), 111; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 130; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 428.

Female covered by a cottony secretion with many glassy filaments; this occurs in matted areas, making it difficult to determine the amount on one individual. Female distinctly segmented, 4 to 5 millimeters long, broadly elongated. Legs twice as long as antennæ, hind tibia three times as long as tarsus, claw slender, simple (Plate I, fig. 7). Antennæ 8-jointed, joints two, three, and eight the longest, the other four subequal (Plate I, fig. 6). Anal ring with six long, slender hairs; two

rounded caudal areas laterad of anal ring each with two stout spines and one long spine.

LUZON, Laguna, Los Baños (*Baker*), on *Anona squamosa*, *Arachis hypogaea*, *Caesalpinia pulcherrima*, *Codiaeum variegatum*, *Coffea arabica*, *Graptophyllum*, *Solanum*, *Spondias*, and *Xanthosoma sagittifolium*.

Pseudococcus virgatus (Cockerell) variety.

Pseudococcus virgatus (COCKERELL) variety COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 130.

Secretion of female full of glassy filaments. Antennæ 8-jointed, measured in microns: (1) 50, (2) 63-65, (3) 70-72, (4) 37-42, (5) 40-45, (6) 45-47, (7) 45-47, (8) 100. This insect differs from typical *P. virgatus* in the characters of the antennæ, and while the antennæ resemble those of *P. kraunhiæ* Kuwana, the secretion is different. (From the original description.)

LUZON, Tayabas, Lucban (*Townsend*), on *Codiaeum variegatum*.

Pseudococcus tayabanus Cockerell.

Pseudococcus tayabanus COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 129.

Female covered with mealy secretion, distinctly segmented, when dry looking like minute specimens of commercial cochineal; oval when mounted; after boiling, the body shows much dull crimson pigment. Eyes well developed. Anal ring with six hairs placed in a wide square incision. Lateral margins of segments projecting, the points bearing spines; skin covered with round glands. Labium long and narrow. Legs stout, length in microns: Tibia, 125; tarsus, 75; claw simple and stout. Antennæ 8-jointed, measured in microns: (1) 50, (2) 50-62, (3) 50-52, (4) 25-27, (5) 33-40, (6) 40-45, (7) 37-40, (8) 87. Larva with longitudinal rows of bristles; six stout hairs on anal ring; claw long and simple; antennæ 6-jointed. (From the original description.)

LUZON, Tayabas, Lucban (*Townsend*), on *Theobroma cacao*.

Pseudococcus lilacinus Cockerell.

Pseudococcus lilacinus COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 128.

Female densely covered with white meal, globose. When mounted, subglobular; after boiling, the body appears lilac. Legs fairly stout, length in microns: Hind leg, femur and trochanter, 245; tibia, 150; tarsus, 70; claw stout and simple. Antennæ

8-jointed, length in microns: (1) 25-55, (2) 32-52, (3) 37-50, (4) 20-45, (5) 25-42, (6) 27-30, (7) 30, (8) 80. "In one instance, joint three measured 73, evidently being combined with four." (From the original description.)

LUZON, Tayabas, Lucban (*Townsend*), on *Citrus nobilis*.

Pseudococcus filamentosus (Cockerell).

Pseudococcus filamentosus (COCKERELL) FERNALD, Cat. Coccidae of the World (1903), 101; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 106.

Female subglobose, covered with dense white secretion. Mounted female 3.5 to 4 millimeters long, broad oval, green when boiled in KOH. Anal ring with six hairs. Skin with numerous, small, round glands. Legs stout, claw simple (Plate I, fig. 9). Antennæ 7-jointed, joint seven the longest, the others subequal, but five and six the shortest (Plate I, fig. 8).

MINDANAO, Tanghulan (*Baker*), on *Coffea arabica*.

LECANIINÆ

Synoptic table of the genera.

- a¹. Adult female triangular; cottony ovisac slightly developed, forming a fringe around the caudal margin (Plate II, fig. 1).... *Protospulvinaria*.
- a². Female oval or suboval in Philippine species.
- b¹. Female with a posterior ovisac; body more or less chitinous. *Pulvinaria*.
- b². Female without ovisac.
- c¹. Covering of female consisting of wax, often thick..... *Ceroplastes*.
- c². Female naked or covered by a film of secretion.
- d¹. Female with marginal fan-shaped scales (Plate II, fig. 13). *Paralecanium*.
- d². Not so.
- e¹. Ventral surface in abdominal region with groups of pores arranged in a semicircle (Plate II, fig. 14).... *Platylecanium*.
- e². Not so.
- f¹. Skin with polygonal areas containing pits; hard when mature; high convex or hemispherical (Plate II, figs. 18 and 19). *Saissetia*.
- f². Skin without polygonal areas containing pits; soft when mature; never high convex *Coccus*.

Genus PROTOPULVINARIA Cockerell

Type, *Protospulvinaria conveza* Hempel.

"Differs from *Lecanium* (*Coccus*) in the presence of a narrow fringe of cottony (cottonlike) secretion surrounding the female after oviposition. This fringe is not of the same nature as the ovisac of *Pulvinaria*, as it does not actually cover the eggs, which are all concealed beneath the body of the insect." (Green.)

Protopulvinaria longivalvata bakeri Cockerell.

Protopulvinaria longivalvata bakeri COCKERELL, Bull. Am. Mus. Nat. Hist. (1914), 33, 332.

Female scale 2.25 millimeters long, 1.75 millimeters broad, light ferruginous (Plate II, fig. 1); marginal spines few, rather stout, bent, small, and short; stigmatic spines in threes, one long, the others very short; anal plates greatly elongated, near the center of the body; legs ordinary; antennæ 8-jointed. The following measurements are in microns: Anterior leg, femur and trochanter, 130; tibia, 80; tarsus without claw, 45; antennæ (1) 28, (2) 48, (3) 33, (4) 28, (5) 23, (6) 18, (7) 23, (8) 48 (Plate II, fig. 3). Almost without cottony secretion. Male scale (Plate II, fig. 2). Typical *P. longivalvata* Green comes from Ceylon. (From the original description.)

LUZON, Laguna, Los Baños (*Baker*), on *Voacanga globosa*.

Genus PULVINARIA Targioni Tozzetti

Type, *Coccus vitis* Linnæus.

Female insect flat, oval or suboval, secreting an elongated ovisac which does not cover the insect, ovisac adherent to the plant; body becomes hard, without dorsal patches of secretion. Male scale elongate, waxy.

Synoptic table of the species.

- a¹. Female small, about 1,865 microns long..... tyleri.
- a². Female larger.
- b¹. Female antennæ of eight joints (Plate II, figs. 4 to 6).
- c¹. Marginal spines long and stout, more or less branched.... polygonata.
- c². Marginal spines numerous, blunt..... thespesiæ.
- c³. Marginal spines fewer, pointed psidii.
- b². Antennæ of less than eight joints psidii var. philippina.

Pulvinaria tyleri Cockerell.

Pulvinaria tyleri COCKERELL, Proc. Davenport Acad. Sci. (1905, 10, 132.

Female smallish, light brown, with a loose, shapeless, fluffy white ovisac; mounted female about 1,865 microns long; stigmatic spines in threes, the long one stout and about 60 microns long, the short ones about 15; marginal spines stout, not close together, simple or slightly bifid at the ends; legs ordinary, measurements of anterior leg in microns: Femur and trochanter, 220; tibia, 168; tarsus without claw, 92. Antennæ 8-jointed, measurements in microns: (1) 40, (2) 62, (3) 70, (4) 40, (5) 40, (6) 27, (7) 22, (8) 50. (From the original description.)

LUZON, Batangas (*Townsend*), on *Antigonon leptopus*.

Pulvinaria polygonata Cockerell.

Pulvinaria polygonata COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 131.

Female light brown, ovisac white, broad and fluffy, irregular in form; mounted female about 3 millimeters long and 2 millimeters broad; skin with irregular polygonal structures like some species of *Saissetia*; mouth parts small; marginal spines long, stout, more or less branched at the ends but not greatly broadened, stigmatal spines ordinary; anal plates together forming almost a square. Anterior leg measured in microns: Femur and trochanter, 215; tibia, 150; tarsus without claw, 75; claws hooked, their digitules fully twice their length. Antennæ measured in microns: (1) 50, (2) 52, (3) 75, (4) 57, (5) 50, (6) 30, (7) 30, (8) 50. (From the original description.)

LUZON, Manila (*Townsend*), on a cultivated tree.

Pulvinaria thespesiæ Green.

Pulvinaria thespesiæ GREEN, Coccidæ of Ceylon (1909), pt. 4, 259; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 427.

Female brownish yellow, when alive pale green, ovisac white, broad, fluffy, but not abundant; mounted female 3.5 to 4 millimeters long; mouth parts ordinary; anal plates heavy, elongated, triangular, six anal hairs reaching to posterior tips of plates; legs slightly longer than antennæ, claw denticulate. Antennæ 8-jointed, third joint the longest, second, third, fifth, and eighth subequal (Plate II, fig. 6); numerous truncate marginal spines with three smaller and one larger alternating; stigmatic area with six stout pointed spines (Plate II, fig. 7).

LUZON, Laguna, Los Baños (*Baker*), on *Codiaeum variegatum*.

Pulvinaria psidii Maskell.

Pulvinaria psidii MASKELL, FERNALD, Cat. Coccidae of the World (1903), 137; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 35, 427.

Female yellow, ovisac white, fluffy, irregular in form, often matted; mounted female about 2.5 to 3 millimeters long; anal plates triangular, anal ring with hairs reaching to posterior tips of anal plates; mouth parts ordinary; legs about twice as long as antennæ, femur usually broad; antennæ 8-jointed, three longest, two, three, five, and eight almost subequal (Plate II, fig. 4); a few pointed marginal spines; stigmatic area with spines in threes, median stout and three times as long as the other two (Plate II, fig. 5).

LUZON, Laguna, Los Baños (*Baker*), on *Antidesma bunius*, *Eugenia jambos*, *Ficus*, and *Psidium guajava*.

Pulvinaria psidii philippina Cockerell.

Pulvinaria psidii philippina COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 132.

Female scales and ovisacs matted together. Marginal hairs broad and flattened at ends, the margins of the flattened parts slightly fimbriated; tibia very long; antennæ 6-jointed, third joint twice as long as either two or three, joints two and five each with a very long bristle. "The long tibia, long third antennal joint, marginal hairs, long bristles on joints two and five of the antennæ, etc., all show this insect to be close to *P. ficus* Hempel and *P. psidii* Mask. The 6-jointed antennæ are distinctive, but may not be constant." (From the original description.)

LUZON, Tayabas, Lucena (*Townsend*), on *Ficus*.

Genus *CEROPLASTES* Gray

Type, *Ceroplastes janeirensis* Gray.

"Covering of female consisting of wax, often thick; no marginal fringe or radiating processes; a more or less developed caudal horn, visible on removing the wax." Secretion of male waxy. (From Cockerell.)

Ceroplastes gigas Cockerell.

Ceroplastes gigas COCKERELL, Bull. Am. Mus. Nat. Hist. (1914), 33, 331.

Scale on branch of tree; wax white and smooth. Female scale 17.5 millimeters long, 14.5 millimeters broad, about 12 millimeters high; wax not divided into plates; a deep median dorsal pit; at sides are two angular projections clasping the branch; wax about 5 millimeters thick. Adult female oval, about 7 millimeters long, chestnut red; antennæ and legs light ferruginous. Antennæ long and slender. Cephalic margin of female broadly rounded (Plate II, fig. 9), caudal margin trilobed (Plate II, fig. 8). (From the original description.)

LUZON, Laguna, Mount Maquiling (*Baker*), on an unknown shrub.

Genus *PARALECANIUM* Cockerell

Type, *Lecanium frenchii* Maskell.

Female flat or slightly convex, legs and antennæ slender, margin of body with fan-shaped scales.

Synoptic table of the species.

- a*¹. Adult female red-brown; antennæ 7-jointed; legs well developed (Plate II, fig. 10) luzonicum.
*a*². Adult female pale yellowish; antennæ 3-jointed; no legs (Plate II, fig. 11) cocophyllæ.

Paralecanium luzonicum Cockerell.

Paralecanium luzonicum COCKERELL, Bull. Am. Mus. Nat. Hist. (1914), 33, 333; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 428.

Female scale broad-oval, 4.5 millimeters long, red-brown; dorsal surface in folds and reticulations; ends of anal plates very sharp; stigmatic spines in threes, very stout, blunt, margin of stigmatic notch thickened; legs with tarsus longer than tibia. Anterior leg: Femur and trochanter, 130 microns; tibia, 68; tarsus, 75. Middle leg: Tibia, 73; tarsus, 105; claw digitules stout; antennæ 7-jointed, but with joints four to six more or less fused, measured in microns: (1) 23-25, (2) 23, (3) 63-70, (4) 30, (5) 25, (6) 30, (7) 33-38 (Plate II, fig. 10). Marginal plates transversely broad-oval, overlapping, margins entire. (From the original description.)

LUZON, Laguna, Los Baños (*Baker*), on *Plectronia viridis*; Mount Maquiling (*Baker*), on *Tetrastigma*.

Paralecanium cocophyllæ Banks.

Paralecanium cocophyllæ BANKS, Phil. Journ. Sci. (1906), 1, 235.

Adult female broad oval, 4 to 5 millimeters long, 3.5 to 4 millimeters broad; pale transparent yellow; dorsal surface minutely punctate and covered with a thin waxy substance in addition to waxy laminæ; regularly arranged suboval pores over entire dorsum. Stigmatic areas with three long, stout, blunt, curved spines not reaching the outer margin, margin with slightly overlapping scales (Plate II, fig. 13). Antennæ indistinctly 3-jointed (Plate II, figs. 11 and 12). Anal plates triangular, pointed. Minute spinnerets in four ill-defined groups on each side. Male scale 2.27 millimeters long, 1.20 millimeters broad; elongate oval; more convex than female. (From the original description.)

LUZON, Manila (*C. S. Banks*), on *Cocos nucifera*; Laguna, Mount Maquiling (*Baker*), on *Dillenia philippinensis*.

Genus PLATYLECANIUM Cockerell and Robinson

Type, *Neolecanium cribrigerum* C. and R.

Female flat, broad oval, without waxy covering; antennæ small or rudimentary; legs absent; ventral surface of abdominal region with groups of pores arranged in a semicircle in the center of which is the anal aperture; marginal bristles small and simple.

Platylecanium cribrigerum (Cockerell and Robinson).

Neolecanium cribrigerum COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 110.

Platylecanium cribrigerum COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 427.

Female flat, broad oval, about 4.25 millimeters long, 3.55 millimeters broad, no waxy or glassy covering, rich red-brown. Derm translucent brownish after boiling; posterior region with large, scattered, glandular processes, each shaped like an ink bottle and emitting a very short bristle (Plate II, fig. 17); in the abdominal region are six large patches, which are more strongly chitinized than the surrounding tissue and perforated with a number of small round gland orifices (Plate II, fig. 14), these patches are three on each side arranged in a semicircle in the middle of which are the anal plates (Plate II, fig. 15). Mouth very small. Antennæ rudimentary, without joints (Plate II, fig. 16). No legs. Margin with a few, very minute, simple bristles. Anal plates triangular, rounded at the ends, anal ring appearing moniliform.

LUZON, Laguna, Los Baños (*Baker*), on *Piper loheri*.

Genus **SAISSETIA** Deplanches

Type, *Lecanium hemisphæricum* Targioni Tozzetti.

Adult female high convex or hemispherical, hard when mature; skin with cell-like markings; legs and antennæ developed.

Synoptic table of the species.

- a^1 . Female usually black; distinctly carinate; the ridges H-shaped..... *oleæ*.
 a^2 . Not so; adults without carinæ.
 b^1 . Female approaching black; irregular polygonal derm areas (Plate II, fig. 19) *nigra*.
 b^2 . Female brown; smaller; very convex; oval gland orifices (Plate II, fig. 18) *hemisphærica*.

Saissetia oleæ (Bernard).

Saissetia oleæ (BERNARD) FERNALD, Cat. Coccidae of the World (1903), 205; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 130.

Adult female short ovate, high convex, carinæ forming a letter H, brownish black, shiny, rugose, 2.5 to 4 millimeters long, 1.5 to 3 millimeters wide, 1.5 to 2.5 millimeters high. Derm cells elongate, each inclosed in an irregular polygonal tessellation; antennæ of eight joints, three longest, six and seven shortest; legs little longer than antennæ; numerous small tubular spinnerets; three stigmatic spines, central one longest; marginal spines simple or flattened at apex.

Male scale elongate, glassy, divided into nine plates. The male is rarely seen.

LUZON, Tayabas, Lucban (*Townsend*), on *Gardenia* or *Jasminum*.

Saissetia nigra (Nietner).

Saissetia nigra (NIETNER) FERNALD, Cat. Coccidae of the World (1903), 204; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 130; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 427.

Female long oval to broad ovate, low convex, shining black, 3 to 4 millimeters long; marginal hairs small, simple, and those within the margin more or less divided; polygonal derm cells (Plate II, fig. 19); antennæ of seven joints, four the longest; legs slender, claws with long digitules.

"Male puparium transparent glassy; divided into nine plates, of which two are central and seven marginal." (Green.) Male with dark markings on thorax above.

LUZON, Manila (*Townsend*), on *Manihot utilissima*; Laguna, Los Baños (*Baker*), on *Eriodendron anfractuosum* and *Withania organifolia*.

Saissetia hemisphærica (Targioni Tozzetti).

Saissetia hemisphærica (TARGIONI TOZZETTI) FERNALD, Cat. Coccidae of the World (1903), 202.

Saissetia hemisphærica (TARGIONI TOZZETTI) COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 130; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 427.

Female insect hemispherical, ovate, highly convex, smooth and shining, light to red-brown, carinæ forming a letter H not retained in the adult, 2.25 to 4.25 millimeters long, 1 to 2.75 millimeters wide, 1.5 to 2 millimeters high. Dermis with numerous ovate, clear derm cells (Plate II, fig. 18); antennæ of eight joints, two, three, four, five, eight longest, six and seven equal in length; legs stout and longer than antennæ, claws with digitules; the marginal hairs flattened at apices and variously serrated, some simple; stigmatic spines all strong and blunt, central one longest; numerous tubular spinnerets.

Male scale narrow and elongated, carinate, divided into nine plates, 1.25 millimeters long. Male reddish, without dark markings on thorax above.

LUZON, Tayabas, Lucban (*Townsend*), on *Cycas circinalis* and other cultivated plants; Laguna, Los Baños (*Baker*), on *Anona muricata* and *Calanthe*.

Genus COCCUS Linnæus

Type, *Coccus hesperidum* Linnæus.

Adult female never high convex or hemispherical, more or less soft; oval; light in color; legs and antennæ well developed.

Synoptic table of the species.

- a¹. Female antennæ 6- or 7-jointed (Plate I, fig. 11).
 b¹. Female scale red-brown, quite flat, broad oval..... *diversipes*.
 b². Female scale pale green; moderately convex, oval, often asymmetrical.
viridis.
 a². Female antennæ 8-jointed (Plate I, fig. 10)..... *elongatus*.

Coccus elongatus (Signoret).

Coccus (?) *elongatus* (SIGNORET) FERNALD, Cat. Coccidae of the World (1903), 168.

Coccus longulus (DOUGLAS) FERNALD, Cat. Coccidae of the World (1903), 171; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 130.

Coccus elongatus COCKERELL and ROBINSON, Bull. Am. Mus Nat. Hist. (1915), 34, 428.

Female pale yellow, slightly convex, very elongated, transversely arched, slightly ridged when dry, 4 to 5 millimeters long, 2 to 2.5 millimeters broad; surface marked by oval derm cells like *S. hemisphærica*; anal plates broadly triangular; legs ordinary, slightly longer than antennæ; antennæ 8-jointed, three the longest, two, four, five, and eight subequal (Plate I, fig. 10); marginal hairs slender and pointed.

According to Sanders, *C. elongatus* and *C. longulus* cannot be separated. A slight variation may be found in the antennæ; otherwise the species seem to be the same.

LUZON, Tayabas, Lucban (*Townsend*), on *Codiaeum variegatum*; Laguna, Los Baños (*Baker*), on *Anona squamosa*.

Coccus diversipes Cockerell.

Coccus diversipes COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 130.

Female scale flat, broad-oval, anterior end narrowest, about 2.5 millimeters long, 2 millimeters broad; light reddish brown; surface marked with many large polygonal areas within which are one or more small areas of the same general form; regions between these with numerous gland spots which appear black; anal plates long and narrow; anterior legs ordinary, middle and hind legs very slender and elongated with large coxæ; antennæ 6-jointed, measured in microns: (1) 30, (2) 37, (3) 97, (4) 27-30, (5) 25-27, (6) 55 (Plate II, fig. 21); marginal

hairs strongly fimbriate or branched. Apparently joints three and four are more or less united in some specimens, since 7-jointed specimens have been found in the type material. (From the original description.)

LUZON, Tayabas, Lucban (*Townsend*), on *Asplenium nidus*.

Coccus viridis (Green).

Coccus viridis (GREEN) FERNALD, Cat. Coccidae of the World (1903), 174; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 428.

Adult female bright pale green, oval, often asymmetrical, moderately convex, skin soft, 2.5 to 3.25 millimeters long, 1.5 to 2 millimeters broad; stigmatic clefts small and inconspicuous, three stigmatic spines stout and pointed, median twice as long as the other two; margin with short curved hairs divided at the ends; antennæ 7-jointed (Plate I, fig. 12); legs moderately stout, claw stout and curved; plates of anal opening triangular, concave, anal ring with eight hairs. Female ovoviparous. "Male unknown in any state." (Green.)

LUZON, Laguna, Los Baños (*Baker*), on *Antidesma bunius*, *Citrus decumana*, *Citrus nobilis*, *Gardenia florida*, and *Strychnos nuxvomica*.

DIASPINÆ

Synoptic table of the genera.

- a¹. Caudal margin of female with a single, entire, median lobe (Plate III, fig. 1) *Odonaspis*.
- a². Caudal margin with at least two median lobes (Plate IV, fig. 6).
- b¹. Median lobes of caudal margin divergent and serrate on the inner edges (Plate III, figs. 3, 5, and 18).
- c¹. Adult female inclosed in the enlarged second secretion; one exuvia at narrow end, little of true scale present (Plate III, fig. 4).
Florinia.
- c². Not so, more than one exuvia at narrow end (Plate III, figs. 9, 12, and 14).
- d¹. Exuviae of scale within the margin, scale always circular; second stage female with the scale shaped as in *Phenacaspis* (Plate III, figs. 9, 10, and 12) *Aulacaspis*.*
- d². Exuviae marginal, outline of scale subcircular, pyriform, or elongated (Plate III, figs. 12 and 14) *Phenacaspis*.*
- b². Not so.
- e¹. Female with slender, elongated, chitinous processes extending inward from bases of lobes (Plate IV, figs. 1 and 3) *Chrysomphalus*.
- e². Chitinous processes short or absent, or if longer, clubbed.
- f¹. Entire margin of adult female deeply incised, with lobes between the incisions (Plate IV, fig. 7) *Schizaspis*.
- f². Entire margin without such incisions.
- g¹. Two rows of isolated pores near caudal margin of female (Plate IV, fig. 9) *Parlatoria*.

- g*². Not so.
- h*¹. Female with a deep constriction between thorax and abdomen (Plate IV, fig. 13)..... *Selenaspis*id.
- h*². Not so.
- i*¹. Female scale circular or nearly so (Plate V, figs. 4 and 9).
- j*¹. Female scale with exuvia at or near the center; caudal margin often with a single pair of lobes (Plate V, figs. 1, 4, and 7)..... *Aspidiotus*.
- j*². Female scale with exuvia sublateral or lateral; caudal margin with three or four pairs of lobes, caudal area often with a reticulated portion (Plate IV, fig. 9).
Pseudaonidia.*
- i*². Female scale always elongate (Plate V, fig. 12; Plate VI, fig. 8).
- k*¹. Median lobes separated, usually with spines between; female scale mytiliform (Plate V, figs. 13 and 14).
Lepidosaphes.
- k*². Median lobes usually close together (Plate VI, figs. 7 and 14).
- l*¹. Male scale white, differing from that of female; median lobes darker than others, margins dentate or crenulate (Plate VI, figs. 6, 9, and 10).... *Hemichionaspis*.*
- l*². Male and female scales usually brown; median lobes no darker than others, notched (Plate VI, figs. 11, 13, and 14) *Pinnaspis*.*

* The particular characters of *Phenacaspis* and *Aulacaspis* seem to establish few differences between the two genera; the scales of the species of *Phenacaspis* are difficult to distinguish from those of *Aulacaspis*; there are few differences in the characters of the females.

The distinctions between *Aspidiotus* and *Pseudaonidia* are inadequate for an accurate determination. One acquainted with the species of each genus can recognize the differences, but the contrasting characters are not definite.

A difference based upon the caudal margins might suffice to separate *Hemichionaspis* and *Pinnaspis*; the scales of the two genera are confusing. Lindinger places *Hemichionaspis* as a synonym of *Pinnaspis*.

Genus ODONASPIS Leonardi

Type, *Aspidiotus secreta* Cockerell.

Female scale circular, often elongated. Adult female with a single or no lobe on the caudal margin; circumgenital glands grouped in various ways; anal orifice often far from the end.

Odonaspis schizostachyi Cockerell and Robinson.

Odonaspis schizostachyi COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1914), 33, 327.

Female scale circular, little over 1 millimeter in diameter, dull white, first skin pale yellow. Adult female round; caudal margin with a large median lobe free from indentations, second and third lobes each bilobed, third much lower than second, both without indentations; two spinelike plates laterad of

median and second lobes; the base of the second lobe is prolonged cephalad into a fingerlike process continuous with a striated band terminating at the anal plate (Plate III, fig. 1). The lateral margins indented, marking five sutures along which are single rows of minute quadrate scales with serrate apical margins (Plate III, fig. 2). Circumgenital glands in two groups, each of about 150 orifices.

LUZON, Laguna, Los Baños (*Baker*), on *Schizostachyum acutiflorum*. The colonies of this scale are usually completely covered by the thick, felted, brown masses of a fungus, *Septobasidium bakeri* Patouillard.

Genus FIORINIA Targioni Tozzetti

Type, *Diaspis fioriniæ* Targioni Tozzetti.

Female scale with second exuvia covering the female; scale narrow at anterior end, widens and the sides are parallel, first skin at cephalic end. Scale of male similar to that of female, smaller.

Synoptic table of the species.

- a*¹. Median lobes of caudal margin prominent, second and third pairs smaller; posterior lateral circumgenital glands connected by a line of glands (Plate III, fig. 3)..... *fioriniæ*.
*a*². Median lobes prominent, without distinct additional lobes, margin with triangular projections; circumgenital glands in five distinct groups; second stage female with caudal margin similar to that of *F. fioriniæ* (Plate III, figs. 5 and 6)..... *phantasma*.

Fiorinia fioriniæ (Targioni Tozzetti).

Fiorinia fioriniæ (TARGIONI TOZZETTI) FERNALD, Cat. Coccidae of the World (1903), 246; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 426.

Female scale elongated, 1 millimeter long, 0.25 millimeter wide, sides slightly curved; second skin inclosing adult, yellowish brown, exuvia at anterior end pale yellow (Plate III, fig. 4). Adult female with abdominal segments contracted during gestation (Plate III, fig. 7); median lobes of caudal margin widely divergent, regularly and finely serrate on inner margins, second and third pairs each of two lobules, margins rounded and entire (Plate III, fig. 3). Circumgenital glands in five groups, median and anterior laterals confluent, made up of 25 to 30 orifices, posterior laterals of 12 to 17 orifices.

Adult male unknown. (Newstead.)

LUZON, Laguna, Los Baños (*Baker*), on *Celtis philippinensis*.

Fiorinia phantasma Cockerell and Robinson.

Fiorinia phantasma COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 108.

Female scale elongate, about 1.25 millimeters long, pale grayish ochreous; first skin elongate-oval, extending beyond anterior end. Adult female with abdominal segments contracted during gestation; median lobes widely divergent, inner margin with four to six teeth; no distinct additional lobes, but the margin with triangular projections; two spines laterad of median lobes (Plate III, fig. 5). Circumgenital glands: Posterior laterals of 10 to 13 orifices; anterior laterals, 10; median, 5. Second stage female not unlike *F. fioriniæ* (Plate III, fig. 6).

Male scale white, sides parallel, broad, with pale yellowish first skin.

LUZON, Laguna, Mount Maquiling (*Baker*), on *Machilus* (by mistake recorded as *Neolitsea*).

Genus AULACASPIS Cockerell

Type, *Aspidiotus rosæ* Bouché.

Scale of female pyriform or subcircular, exuviae terminal at the margin or slightly within it. Median lobes of caudal area divergent and serrulate. Male scale white, carinate.

Aulacaspis rosæ (Bouché).

Aulacaspis rosæ (BOUCHÉ) FERNALD, Cat. Coccidae of the World (1903), 236; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 134.

Female scale subcircular, convex, 2 to 2.5 millimeters in diameter, opaque white, exuviae lateral to subcentral, yellow to brown (Plate III, fig. 9). Adult female broadly pyriform, anterior segments pronounced; median lobes of caudal margin long, widely divergent, inner margins finely dentate, apex rounded, two short spines between the median lobes, two similar spines on the surface of each; a spinelike plate and pointed glandular process laterad of median lobes; second pair of lobes of two short and rounded lobules with margins entire, followed by a spinelike plate; third pair of lobes similar to the second (Plate III, fig. 8). Circumgenital glands: Median, 11 to 33 orifices; anterior laterals, 17 to 40; posterior laterals, 14 to 40. Three rows of dorsal, tubular spinnerets on each side.

Male scale 1 millimeter long, white, tricarinate, exuvia yellow to brown.

LUZON, Tayabas, Lucban (*Townsend*), on *Rosa*.

Genus PHENACASPIS Cooley and Cockerell

Type, *Chionaspis nyssae* Comstock.

"Scale of female elongated, with the exuviae at the anterior extremity, white. Scale of male much smaller than that of female; elongated with the sides nearly parallel. Pygidium with the terminal pair of lobes more or less sunken into the body, and having their inner edges serrate or crenate, and strongly divergent leaving a notch on the median line. The color and shape of the scales of the two sexes, together with the median notch of the pygidium are the essential characters of the genus." (Cooley.)

Synoptic table of the species.

- α^1 . Caudal margin of female with one pair of lateral lobes (Plate III, fig. 11) *inday*.
 According to the available literature, the median lobes are distinguishable, but second and third lobes are indicated by prominences *eugeniae*.
- α^2 . Caudal margin with two pairs of lateral lobes (Plate III, fig. 13).
 b^1 . Female scale transparent and thin.
 c^1 . Female scale circular; groups of lateral circumgenital glands contiguous and almost confluent *mischocarp*.
 c^2 . Female scale elongate; groups of glands distinctly separate.
 b^2 . Female scale opaque.
 d^1 . Female scale nearly 3 millimeters in diameter; thorax enlarged and lobed (Plate III, fig. 16) *thoracica*.
 d^2 . Female scale not more than 2 millimeters in diameter; thorax not enlarged *pallida*.

Phenacaspis inday (Banks).

Chionaspis candida (not of Green) BANKS, Phil. Journ. Sci. (1906), 1, 222, Pl. 4, figs. 1-5.

Chionaspis inday BANKS, Phil. Journ. Sci. (1906), 1, 787; SANDERS, Bull. U. S. Dept. Agr., Bur. Ent., Tech. Ser. (1909), No. 16, pt. 3, 48.

Female scale elongate-oval, widened posteriorly, about 2.5 millimeters long, 1.20 millimeters broad, white, exuviae pale (Plate V, fig. 12). Adult female with abdominal segments lobed; median lobes of caudal margin divergent, minutely dentate, followed by a spinelike plate and a low triangular plate; two lobules of second lobes low and rounded, followed by a spinelike plate (Plate III, fig. 11). Circumgenital glands with median group of 8 orifices, anterior laterals of 14 to 19, posterior laterals of 14 to 16. Male scale white woolly, carinae scarcely definable; about 1 millimeter long. (From the original description.)

This is very similar to *P. dilatata* Green; it may be separable on account of the difference in shape of male and female scales; the median lobes of *P. inday* (Banks) are longer and more divergent. It is probable that this species should be considered as belonging to *Phenacaspis* rather than to *Chionaspis*.

LUZON, Manila (*Banks*), on *Cocos nucifera*; Laguna, Los Baños (*Baker*), on *Mangifera indica*.

Phenacaspis eugenixæ (Maskell).

Phenacaspis eugenixæ (MASKELL) FERNALD, Cat. Coccidae of the World (1903), 238; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 134.

Female scale elongate-oval, about 0.75 millimeter in diameter, white. Caudal margin of adult female with divergent median lobes, edges serrate; a spinelike plate laterad of these lobes, two other lobes represented by broad prominences, each bearing a spine. Circumgenital glands with median group of 6 to 8 orifices, anterior laterals of 16 to 18, posterior laterals of 18 to 20.

LUZON, Manila (*Townsend*), on a palm.

This species has not been definitely recorded from the Philippine Islands. Cockerell remarks that a specimen collected by Townsend "seems to be *P. eugenixæ*."

Phenacaspis mischocarpi Cockerell and Robinson.

Phenacaspis mischocarpi COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1914), 33, 328.

Female scale circular, about 1.75 millimeters in diameter, dull white, exuvixæ lateral, pale orange, projecting beyond the margin of the scale (Plate III, fig. 14). Female elongated, broadened anteriorly, conspicuously segmented; caudal margin with median lobes strongly divergent, serrulate on inner margins; second and third lobes each of two separate rounded lobules; a spinelike plate and triangular projection laterad of median and second lobes, a heavy spinelike plate laterad of third lobes, three others on the margin beyond; margin beyond the lobes irregularly dentate and with four incisions having thickened edges (Plate III, fig. 13). Circumgenital glands with median group of 8 or 9 orifices, lateral groups each of 16 or 17 orifices, the anterior and posterior groups contiguous, almost confluent.

Male scale about 1 millimeter long, tricarinate, exuvia pale yellow.

LUZON, Laguna, Los Baños (*Baker*), on *Mischocarpus fuscescens*.

Phenacaspis pellucida sp. nov.

Female scale slightly elongated, about 2 millimeters long, or 1.5 millimeters in diameter, white, transparent, and thin, showing the shriveled insect beneath; exuvia terminal; yellow to brown, second skin broad-oval, first skin projecting beyond scale. Adult female pale yellow, almost colorless, oval, broadest across the middle; abdominal segments apparent; caudal area with median lobes slightly darker, moderately divergent, rounded, with six to eight teeth on the inner edges, not produced to level of other lobes; second and third lobes each composed of two rounded lobules; a pointed glandular process laterad of median and second lobes; a well-developed spinelike plate laterad of each lobe; margin beyond lobes serrate with an incision and a spinelike plate (Plate III, fig. 15). Circumgenital glands with median group of 7 or 8 orifices, anterior laterals of 19 or 20, posterior laterals of 11 to 16. A few dorsal tubular spinnerets.

Male scale white, sides parallel, distinctly tricarinate, exuvia pale yellow; about 1 millimeter long.

LUZON, Laguna, Los Baños (*Baker*), October, 1915, on *Macarranga tanarius*.

All of the species listed in the above table having three pairs of lobes resemble *Phenacaspis varicosa* Green in the general characters of the caudal margin. However, *P. pellucida* seems to be distinct owing to its thin, transparent, and smaller scale. The same characters distinguish it from *P. chinensis* Ckll. The male scales and circular female scales of *P. latissima* Ckll., the oval pores of *P. strobilanthis* Green, and the very large lobes of *P. megaloba* Green, respectively, differentiate them from this species.

Phenacaspis thoracica sp. nov.

Female scale circular, 2.5 to 2.75 millimeters in diameter, flat, opaque, white; exuvia yellow, first skin scarcely projecting beyond the margin, second skin broad-oval. Adult female brownish, elongated, thorax protruding, with lateral prominences, abdomen regularly and conspicuously segmented (Plate III, fig. 16); on each side of the mouth a gland with oval pores; median lobes of caudal margin divergent, rounded, finely dentate on inner sides, produced to level of other lobes, very little darker; second and third pairs of lobes each composed of two rounded lobules; a pointed glandular process laterad of median and second lobes; a well-developed, spinelike plate laterad of each lobe; margin beyond dentate, resembling *P. mischocarpi* (Plate III,

fig. 17). Circumgenital glands with median groups of 9 or 10 orifices, anterior laterals of 18 to 21, posterior laterals of 17 to 26. A few dorsal tubular spinnerets in rows.

Male scale white, sides parallel, distinctly tricarinate, exuvia pale yellow; 1 millimeter long.

LUZON, Laguna, Los Baños (*Baker*), December, 1915, on *Morinda bracteata*.

The caudal area of *P. thoracica* resembles that of *P. varicosa* Green, but the scale lacks the ridges of *P. varicosa* Green. The peculiar shape of the female seems to differentiate this species from similar species, such as *P. chinensis* Ckll. and *P. latissima* Ckll.

Phenacaspis pallida sp. nov.

Female scale circular, white and opaque, slightly convex, occasionally with a few irregular raised lines, 1.75 millimeters in diameter; marginal exuviæ pale yellow, second skin broad-oval. Adult female elongate, broadened anteriorly; yellowish brown; often with base of abdomen contracted within the thorax; abdominal segments well defined; median lobes of caudal area widely divergent, serrate, little darker than the others, not produced to level of other lobes; second and third pairs of lobes each composed of two separate rounded lobules; a pointed glandular process laterad of median and second lobes; a well-developed spinelike plate laterad of each lobe; margin beyond serrate with four widely separated, short incisions and three spinelike plates (Plate III, fig. 18). Circumgenital glands with median group of 12 orifices, anterior laterals of 22 or 23, posterior laterals of 14 to 16. A few dorsal tubular spinnerets present.

Male scale white suffused with brown, sides parallel, a single median carina, about 0.75 millimeter long.

LUZON, Laguna, Los Baños (*Baker*), March, 1915, on *Litsea*.

Although the caudal margin of *Phenacaspis pallida* resembles that of *P. varicosa* Green, the smaller size and inconspicuous and occasional ridges of the female scale seem to differentiate it. This species has the general characters of *P. latissima* Ckll., which is larger; and of *P. chinensis* Ckll., the scale of which has a different form and orange exuviæ.

Genus CHRYSOMPHALUS Ashmead

Type, *Coccus áonidum* Linnæus.

Female scale circular, exuviæ nearly central; last segment of the female with three pairs of well-developed lobes, with elongated thickenings of the body wall terminating at the bases of the lobes; circumgenital glands present.

Synoptic table of the species.

- a¹. Adult female with abdomen contracted within the body, thorax extending back in a large rounded lobe on each side, which projects beyond the extremity of the abdomen (Plate IV, fig. 2) *aurantii*.
 a². Caudal margin slightly or not at all contracted within the body.
 b¹. Dorsal thickenings of caudal margin shorter than median lobes (Plate IV, fig. 3)..... *pedroniformis*.
 b². Not so.
 c¹. Lobes of caudal margin notched on outer edges; circumgenital glands with anterior lateral groups of 4 to 8 orifices, posterior lateral groups of 2 to 4 orifices; male scale similar to female (Plate IV, fig. 4)..... *aonidum*.
 c². Caudal lobes with a single notch or tricuspid; circumgenital glands more numerous; male scale paler than female (Plate IV, fig. 5).
 rossii.

Chrysomphalus pedroniformis Cockerell and Robinson.

Crysomphalus pedroniformis COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 107, 427.

Female scale circular or oval, 1.75 millimeters in diameter, slightly convex, dull pale reddish brown; exuviae central to sublateral, darker than rest of scale, first skin appearing as a more or less golden boss. Adult female almost circular, at period of gestation abdomen partly contracted within the body; median and second lobes of caudal margin with a notch on each side or second lobes may lack the inner notch, third lobes with a single notch on the outer edge; fringed plates between the lobes; a short spine laterad of each lobe (Plate IV, fig. 3). Circumgenital glands with anterior lateral group of 5 to 8 orifices, posterior lateral group of 3 to 5. Dorsal pores in two rows on each side.

Male scale elongate-oval, pale with darker exuvia.

LUZON, Bataan (*Mackie*), on *Eriodendron anfractuosum*; Laguna, Los Baños (*Baker*), on *Vitis vinifera*.

Malenotti³ considers this too near to *Aspidiotus orientalis* News. to be regarded as a distinct species. Lindinger has regarded *A. orientalis* as a *Chrysomphalus*.

Chrysomphalus aurantii (Maskell).

Chrysomphalus aurantii (MASKELL) FERNALD, Cat. Coccidae of the World (1903), 287; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 134.

Female scale circular, flat, about 1.5 millimeters in diameter; yellowish brown, exuviae central, yellow, dull or shining. Female when fully developed with thorax extending backward in a

³ *Redia* (1916), 11, 326.

rounded lobe on each side, projecting beyond extremity of abdomen (Plate IV, fig. 2). Caudal margin with three pairs of well-developed lobes, median lobes notched on each side, second lobes similar, third lobes with a single notch on the outer edge; laterad of each lobe and between median lobes are deeply fringed plates slightly longer than the lobes (Plate IV, fig. 1). Two groups of tubular spinnerets; four irregular rows of dorsal pores.

Male scale oblong; same color and texture as female; 0.75 millimeter long.

LUZON, Manila (*Townsend*), on *Artocarpus*; Laguna, Mount Maquiling (*Baker*), on *Astronia*.

Chrysomphalus aonidum (Linnæus).

Chrysomphalus aonidum (LINNÆUS) FERNALD, Cat. Coccidae of the World (1903), 286; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 134; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 427.

Chrysomphalus propsimus BANKS, Phil. Journ. Sci. (1906), 1, 230.

Female scale circular, about 2 millimeters in diameter, slightly convex, reddish or grayish brown to black; exuvixæ nearly central, yellow to dark brown. Adult female nearly circular; caudal margin with three pairs of well-developed lobes all notched on the outer edges, median lobes slightly notched on the inner edges; fringed plates between each lobe (Plate IV, fig. 4). Circumgenital glands with anterior lateral groups of 4 to 8 orifices, posterior lateral of 2 to 4. Two double irregular rows of dorsal pores. Male scale ovate, of same color and texture as female; 1 millimeter long.

LUZON, Manila (*Townsend*), on *Artocarpus* and on a palm, (*Banks*), on *Cocos nucifera*; Laguna, Mount Maquiling (*Baker*), on a climbing aroid; Los Baños (*Baker*), on *Arenga saccharifera*, *Citrus nobilis*, *Cocos nucifera*, and *Garcinia*.

Chrysomphalus rossi (Maskell).

Chrysomphalus rossi (MASKELL) FERNALD, Cat. Coccidae of the World (1903), 293; COCKERELL, Proc. Acad. Nat. Sci. Phila. (1899), 274; Proc. Davenport Acad. Sci. (1905), 10, 134.

Female scale circular or irregularly oblong, 2 to 2.5 millimeters in diameter, slightly convex, dull red-brown to black; exuvixæ central, yellow, often appearing darker than rest of the scale. Caudal margin of female with three pairs of lobes, each with a notch on the outer edge or obscurely trilobed; fringed plates between each lobe, only slightly longer than lobes (Plate IV, fig. 5). Circumgenital glands with anterior laterals of 9 to 12

orifices, posterior laterals of 8 or 9. Numerous filiform tubular spinnerets.

LUZON, Tayabas, Lucban (*Townsend*), on *Arenga saccharifera* and *Cycas circinalis*; Manila, on an orchid quarantined by Mr. A. Craw at San Francisco.

This was the first coccid to be recorded from the Philippine Islands.

Genus SCHIZASPIS Cockerell and Robinson

Type, *Schizaspis lobata* Cockerell and Robinson.

Female scale small, almost circular, flattened; exuviae large. Adult with margins deeply incised, lobed between the incisions; no circumgenital glands; anal orifice large, near hind end; lobes and fringed plates well developed. Immature female oval, not lobed at sides. Male scale elongate, but not parallel-sided, white with yellow terminal exuviae, not keeled.

Schizaspis lobata Cockerell and Robinson.

Schizaspis lobata Cockerell and Robinson, Bull. Am. Mus. Nat. Hist. (1915), 34, 423.

Female scale nearly circular, about 0.75 millimeter in diameter, flat, yellowish brown, surface beaded with prominences in concentric rows; exuviae sublateral or central, dull golden yellow. Adult female about 0.5 millimeter in diameter, circular, with seven deep constrictions, the margin between them convex (Plate IV, fig. 7); caudal margin with median lobes stout, having three almost equal notches, second lobes prominent, round projections shorter than the median lobes; between the median lobes two fringed plates, laterad of these lobes a spine and two fringed plates, laterad of the second lobes a fringed plate and a series of spinelike plates, a short spine tips the second lobe (Plate IV, fig. 6). Anal orifice large, not far from hind end.

Male scale nearly 1 millimeter long, white with yellow exuvia.

LUZON, Laguna, Los Baños (*Baker*), on *Ficus nota*.

Genus PARLATORIA Targioni Tozzetti

Type, *Coccus ziziphus* Lucas.

"Species of which the scale of the female is long, narrow at the base, then enlarging suddenly; the exuviae of a rounded oval form. The margin of the anal segment is indented and presents in each notch some platelike scales. On the upper side near the margin are two rows of isolated pores. The scale of the

male of the same color as that of the female and much smaller." (Comstock.)

Synoptic table of the species.

- α^1 . Female scale black..... ziziphus.
 α^2 . Not so.
 b^1 . Adult female elongated; caudal margin without a rudimentary fourth lobe (Plate IV, fig. 9)..... proteus.
 b^2 . Adult female circular or subcircular.
 c^1 . Female scale slate-colored; fourth lobe of caudal margin dentate with a sharp terminal cusp (Plate IV, fig. 10)..... greenl.
 c^2 . Female scale light yellow; rudimentary lobe a pointed prominence of body wall bearing a spine (Plate IV, fig. 11)..... pergandit.

Parlatoria ziziphus (Lucas).

Parlatoria ziziphus (LUCAS) FERNALD, Cat. Coccidae of the World (1903), 322; SASSCER, Journ. Econ. Ent. (1913), 6, 218.

Parlatoria zizyphus COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 426.

Female scale elongate-oval, 1.75 millimeters long, 0.75 millimeter wide, black, exuviae at anterior margin. Female insect oval; caudal margin with four pairs of lobes, first three pairs subequal and slightly tricuspid, fourth lobes narrow and pointed; fringed plates between the lobes (Plate IV, fig. 8). Margin with short tubular spinnerets. Four groups of circumgenital glands, anterior laterals of 6 or 7 orifices, posterior laterals of 8 to 10.

Male scale white, exuvia black; 1 millimeter long.

LUZON, Laguna, Los Baños (*Baker*), on *Citrus decumana*.

Recorded by Sasscer on *Citrus* cuttings from the Philippine Islands.

Parlatoria proteus (Curtis).

Parlatoria proteus (CURTIS) FERNALD, Cat. Coccidae of the World (1903), 320; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 134.

Female scale elongate-oval, 1 to 1.75 millimeters long, 0.50 to 0.75 millimeter broad, convex, greenish yellow to grayish brown; exuviae at anterior margin dark yellow, second skin yellow to brown. Adult female oval; caudal margin with three pairs of lobes similar to those of *P. ziziphus*, plates between the lobes also similar, no rudimentary fourth lobes (Plate IV, fig. 9). Circumgenital glands in four groups, anterior laterals 7, posterior laterals 4.

Male scale elongate, sides parallel, 1 millimeter long, resembles female scale in color and texture.

LUZON, Manila (*Townsend*), on *Eugenia malaccensis*.

Parlatoria greeni Banks.

Parlatoria greeni BANKS, Phil. Journ. Sci. (1906), 1, 231.

Female scale broad-oval, 1.35 to 1.65 millimeters long, pale to dark slate; exuviae at anterior end yellow. Female broadly elliptical; three pairs of lobes on margin similar to those of *P. ziziphus*, rudimentary fourth lobes, distinct dentate projection half the length of the other lobes. Fringed plates between the lobes (Plate IV, fig. 10). Posterior lateral circumgenital glands of 5 orifices, anterior laterals of 6. Male scale 0.87 millimeter long, 0.26 millimeter wide, sides parallel, carinate, white. (From the original description.)

LUZON, Manila (*Banks*), on *Cocos nucifera*.

Parlatoria pergandii Comstock.

Parlatoria pergandii COMSTOCK, FERNALD, Cat. Coccidae of the World (1903), 319; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 134; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 426.

Female scale circular to elongate, 1 to 1.75 millimeters long, pale red-brown; exuviae brown or yellow. Adult female broadly oval; caudal margin with three pairs of lobes and fringed plates similar to those of *P. ziziphus*; fourth pair broad and flat, bearing a spine (Plate IV, fig. 11). Circumgenital glands with anterior laterals of 6 orifices, posterior laterals of 5.

Male scale similar to *P. proteus*; scale brown, exuvia yellow.

LUZON, Manila (*Townsend*), on an aloelike plant; Laguna, Los Baños (*Baker*), on *Celtis philippinensis*.

Genus SELENASPIDUS Cockerell

Type, *Aspidiotus articulatus* Morgan.

Female scale flat, almost circular; exuviae central or subcentral; female with a deep constriction between cephalothorax and abdomen.

Selenaspidus articulatus (Morgan).

Selenaspidus articulatus (MORGAN) FERNALD, Cat. Coccidae of the World (1903), 284.

Pseudaonidia articulatus (MORGAN) SASSCER, Journ. Econ. Ent. (1916), 9, 218.

Female scale pale brown or yellow-brown, flat, almost circular, 2 to 2.25 millimeters in diameter; exuviae central to subcentral, yellow. Adult female with a marked division between thorax and abdomen (Plate IV, fig. 13); caudal area with median lobes rectangular, outer margins faintly notched, second pair broader,

margin sloping with a slight notch or bidentate; two bifurcate plates between lobes, palmate plates laterad of second lobes, beyond these is a conspicuous spiny process (Plate IV, fig. 12). Dorsal tubular spinnerets about 55 on each side. Circumgenital glands in two lateral groups each of 6 to 8 orifices. [From Newstead, Monograph of British Coccidæ (1905), 1, 127.]

Found on citrus cuttings, Philippine Islands.

Genus ASPIDIOTUS Bouché

Type, *Chermes hederæ* Vallot.

Scale of female circular or nearly so, exuviae at or near the center, scale of male somewhat elongated with larval skin at one side of center or near one edge. Caudal margin of female varies. *Hemiberlesia* Leonard, a subgenus, includes those species in which the second and third pairs of caudal lobes are smaller or absent and the anal opening is very large. The type of *Hemiberlesia* is *Aspidiotus rapax* Comstock.

Synoptic table of the species.

- a¹. Circumgenital glands present.
- b¹. Caudal margin of female similar to that of *A. rapax* (Plate V, figs. 1 and 7); scale translucent white or gray.
- c¹. Female scale circular, exuviae dark brown to black..... *cydoniæ*.
- c². Female scale similar to *A. cydoniæ*, exuviae yellow to green, slightly lateral *cydoniæ greenii*.
- c³. Female scale slightly elongated, clear yellow to creamy white, central exuviae large and yellow..... *lataniæ*.
- b². Caudal margin not so.
- d¹. Median lobes of caudal margin more than twice as large as others; cephalad of median lobes a conspicuous thickening about as long as the lobes (Plate V, fig. 2)..... *coryphæ*.
- d². Not so; female scale transparent white or yellow.
- e¹. Adult female circular; caudal margin with four pairs of lobes often distinguishable (Plate V, fig. 3)..... *destructor*.*
- e². Adult female pyriform; caudal margin with three pairs of lobes, each set on a projection of the margin (Plate V, fig. 5).
translucens.*
- a². Circumgenital glands absent.
- f¹. Female scale flat, dark ferruginous, second lobes of caudal margin similar to, but smaller than, median lobes (Plate V, fig. 6).
tayabanus.
- f². Female scale convex, gray or yellowish; only median lobes well developed (Plate V, fig. 7)..... *rapax*.

* The difficulties in separating *Aspidiotus destructor* and *A. translucens* are obvious. Ettore Malenotti, in a recent paper, concludes that they are extremes of variation of a single species, which is to be called *A. destructor*. It appears that E. E. Green is of the same opinion.

Aspidiotus cydoniæ Comstock.

Aspidiotus cydoniæ COMSTOCK, FERNALD, Cat. Coccidae of the World (1903), 256.

Female scale circular, 1.5 millimeters in diameter, convex, gray; exuviæ subcentral, marked by a brown spot. Adult female circular; median lobes of caudal margin with a notch on each side, second and third lobes represented by thickenings of the body wall or slight projections; simple plates between median lobes, five fringed plates laterad of these lobes; short spines laterad of the lobes and thickenings (Plate V, fig. 1). Circumgenital glands with anterior laterals of 8 or 9 orifices, posterior laterals of 5 to 7.

LUZON, Laguna, Los Baños (C. F. Baker and F. Muir), on *Blumea balsamifera* and *Hibiscus mutabilis*.

Aspidiotus cydoniæ var. greenii Cockerell.

Aspidiotus cydoniæ var. *greenii* COCKERELL, FERNALD, Cat. Coccidae of the World (1903), 256; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 427.

Very similar to *Aspidiotus cydoniæ* in characters of the female and color of female scale, but the exuviæ differ; however, the exuviæ are similar to those of *A. lataniæ*. The three are so much alike that they may be no more than varieties.

LUZON, Laguna, Los Baños (Baker), on *Achras sapota* and *Chrysanthemum*.

Aspidiotus lataniæ Signoret.

Aspidiotus lataniæ SIGNORET, FERNALD, Cat. Coccidae of the World (1903), 266; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 133.

Female scale circular, 2 millimeters in diameter, flat; exuviæ cream white, densely coated, but a yellow spot in the center of each scale. Median lobes of caudal margin large and prominent, notched on each side, notch on inner side often imperceptible; two deep incisions on each side with conspicuous, thickened chitinous rim; laterad of each thickening a pointed glandular process; two spines between the median lobes, fringed spines laterad of median lobes. Circumgenital glands with anterior laterals of 3 orifices, posterior laterals of 6 or 7 orifices. In every respect the characters of the caudal margin agree with those of *A. cydoniæ*. (From Green and from the original description of Signoret.)

LUZON, Tayabas, Lucban (Townsend), on "cabbage." (Cabbage palm?)

Aspidiotus coryphæ Cockerell and Robinson.

Aspidiotus coryphæ COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 425.

Female scale circular, nearly 2 millimeters in diameter, flat, dull white or pale ochreous, exuviae sublateral, first skin exposed. Adult female pyriform, caudal margin with median lobes large and prominent, almost contiguous, rounded apically with a single notch on the outer edges, second and third lobes small and transparent, notched like the median lobes; a small fringed plate between median lobes, two fringed plates laterad of second lobes, three fringed plates between second and third lobes, six similar plates beyond third lobes; the usual spines at bases of lobes. A conspicuous thickening cephalad of each median lobe (Plate V, fig. 2). Anal orifice pyriform, pointed anteriorly. Circumgenital glands with anterior laterals of 7 to 9 orifices, posterior laterals of 6 to 8 orifices.

LUZON, Laguna, Los Baños (*Baker*), on *Corypha elata*.

Aspidiotus destructor Signoret.

Aspidiotus destructor SIGNORET, FERNALD, Cat. Coccidae of the World (1903), 257; BANKS, Phil. Journ. Sci. (1906), 1, 218.

Female scale circular, flat, 1.5 millimeters in diameter, yellowish or whitish; exuviae large, central, yellow (Plate V, fig. 4). Adult female circular; caudal margin with three pairs of lobes, often a fourth present, median lobes tricuspid or bicuspid, second and third lobes bicuspid, all nearly equal in length or with median pair slightly shorter; fringed plates between the lobes or beyond the third lobes (Plate V, fig. 3). Circumgenital glands with posterior laterals of 4 to 6 orifices, anterior laterals of 7 to 12. Filiform tubular spinnerets.

Male scale oblongate-oval, pale translucent, central exuvia darker yellowish.

LUZON, Laguna, Los Baños (*Baker*), on *Cocos nucifera*, *Eugenia calubcob*, *Mangifera indica*, and *Mangifera verticillata*.

Aspidiotus translucens Cockerell.

Aspidiotus simillimus translucens COCKERELL, FERNALD, Cat. Coccidae of the World (1903), 278; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 133.

Aspidiotus translucens COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 106, 427.

Female scale circular, flat, 1.5 millimeters in diameter, yellowish white; exuviae nearly central, pale yellow. Adult female pyriform; caudal margin with six prominent lobes, median obscurely tricuspid, not so long as the second, second

and third slender, transparent, contracted at the base, notched on the outer edges; each lobe situated on a pointed prominence of the body wall; two slightly divided plates between median lobes, deeply notched plates laterad of the other lobes; a small spine at base of each lobe (Plate V, fig. 5). Circumgenital glands with anterior laterals of 6 to 11 orifices, posterior laterals of 4 to 6 orifices. Filiform tubular spinnerets present.

Male scale similar to female, smaller, oval, 1 millimeter long, 0.75 millimeter broad.

LUZON, Laguna, Los Baños (*Baker*), on *Anona squamosa*, *Aleurites moluccana*, *Carica papaya*, *Cocos nucifera*, *Codiaeum variegatum*, *Dioscorea alata*, *Mangifera indica*, *Musa sapientum*, *Psidium araca*, *Spondias*, *Tamarindus indica*; Bataan, Lamao (*Baker*), on *Phoenix dactylifera*; Tayabas, Lucban (*Townsend*), on coconut seedling.

Aspidiotus tayabanus Cockerell.

Aspidiotus tayabanus COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 133.

Female scale flat, dark ferruginous, exuvizæ marked by a dot and ring in gray or yellowish white, second skin orange-ferruginous. Female reniform; median lobes of caudal margin large and elongated, the inner edges almost contiguous, apex rounded, outer edge with a strong notch; second lobes similar, but smaller and more pointed; spines large; beyond the second lobes are two pointed projections followed by three large, broad, strap-shaped plates slightly notched. Cephalad of the first and second lobes are two long club-shaped glands (Plate V, fig. 6). Dorsal pores small and few in number. (From the original description.)

LUZON, Tayabas, Lucban (*Townsend*), on *Gardenia* or *Jasminum*.

This is by no means a typical *Aspidiotus*.

Aspidiotus rapax Comstock.

Aspidiotus rapax COMSTOCK, FERNALD, Cat. Coccidae of the World (1903), 276; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 427.

Female scale and adult insect indistinguishable from *A. cydoniæ*. Female insect only differs from *A. cydoniæ* in the absence of circumgenital glands. The thickenings of the caudal margin do not take the form of definite projections (Plate V, fig. 7).

LUZON, Manila market (*Baker*), on oranges (*Citrus aurantium*) from southern California.

Genus PSEUDAONIDIA Cockerell

Type, *Aspidiotus duplex* Cockerell.

Female scale moderately convex, subcircular, brownish black; caudal margin with three or four pairs of lobes, median lobes heavier, others narrower, fringed plates between the lobes; with or without a tessellated patch.

Synoptic table of the species.

- a¹. Fourth lobes of caudal margin slightly developed (Plate V, fig. 8).
obsita.
- a². Fourth lobes well developed (Plate V, figs. 10 and 11).
 - b¹. Caudal area with a reticulated patch, median lobes little darker than the others (Plate V, fig. 10)..... trilobitiformis.
 - b². Caudal area without a reticulated patch, median lobes darker and heavier than the others (Plate V, fig. 11)..... circuliginis.

Pseudaonidia obsita Cockerell and Robinson.

Pseudaonidia obsita COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 109.

Female scale circular, about 2.5 millimeters in diameter, slightly convex, appearing brownish black, but the true color is brownish pink; exuvizæ yellowish fulvous, sublateral. Occasionally the scales are white. Adult female somewhat oval, segments distinct, abdomen with a large reticulated patch. Caudal margin with three pairs of lobes and a fourth rudimentary; median pair dark, notched on each side, slightly shorter than the others; second and third pairs pale, elongate, with a notch on the outer side; fourth lobes indicated by a subangular projection; squames between the lobes bidentate; a spine laterad of second and third lobes (Plate V, fig. 8). Circumgenital glands with anterior laterals of 27 to 29 orifices, posterior laterals of 33.

Male scale broad-oval, about 1.5 millimeters long, dull brownish pink, with pale orange first skin at one end.

LUZON, Laguna, Los Baños (*Baker*), on *Ficus caudatifolia*.

Pseudaonidia trilobitiformis (Green).

Pseudaonidia trilobitiformis (GREEN) FERNALD, Cat. Coccidæ of the World (1903), 284; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 134.

Female scale usually semicircular, 3 to 4.5 millimeters in diameter, almost flat, pale reddish brown; exuvizæ yellow (Plate V, fig. 9). Female insect hard and horny with transverse striated lines, oblong, segments well defined; caudal margin with eight obscurely tricuspid lobes, median stoutest but often not

so long as the others. Plates between the lobes deeply fringed, little longer than the lobes. On dorsal surface an extensive reticulated patch, spaces of irregular size and shape (Plate V, fig. 10). Circumgenital glands with anterior laterals of 21 to 24 orifices, posterior laterals of 16 to 27. Tubular spinnerets present. (From Green.)

LUZON, Manila (*Townsend*), on *Artocarpus*.

Pseudaonidia circuliginis (Green).

Aspidiotus circuliginis GREEN, Ent. Mont. Mag. (1904), 40, 208.

Pseudaonidia circuliginis COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 426.

Female scale nearly circular, 2.75 millimeters in diameter, black, exuviae yellow. Female insect also circular; median lobes of caudal margin notched on each side, heavy and dark, second and third lobes transparent and elongate, similarly notched, fourth lobes represented by a heavy projection of the body wall; narrow bidentate plates between the lobes (Plate V, fig. 11). Circumgenital glands in two confluent groups each of 30 to 33 orifices. A continuous thickened rim cephalad of the caudal lobes.

LUZON, Laguna, Los Baños (*Baker*), on *Corypha elata*.

Genus LEPIDOSAPHES Shimer

Type, *Coccus ulmi* Linnæus.

Female scale long, narrow, and usually curved. Caudal margin of female with heavy median lobes and second and third lobes consisting of two lobules; circumgenital glands usually present. Male scale resembles female in form and texture, not carinate.

Synoptic table of the species.

- a*¹. Female scale yellowish green or greenish yellow; exuviae orange, with a dark red longitudinal stripe..... *rubrovittatus*.
*a*². Female scale darker, grayish brown to red-brown.
*b*¹. Female scale broadened posteriorly.
*b*². Female scale broadest across middle, often curved, uniform light brown..... *lasianthi*.
*c*¹. Female without circumgenital glands.
*d*¹. Median lobes smaller than second pair (Plate VI, fig. 1).
luzonica.
*d*². Median lobes larger than second pair (Plate VI, fig. 2)..... *ixoræ*.
*c*². Female with circumgenital glands.
*e*¹. Female scale 3 to 4 millimeters long; median lobes of caudal margin entire, each forming a low semicircle (Plate VI, fig. 3).
coccull.

e. Female scale smaller; median lobes lobed on each side.

f. Median and second lobes of caudal area low and broad; female scale 2.5 to 2.75 millimeters long (Plate VI, fig. 4).. mcgregori.

f. Median and second lobes prominent; female scale 1.8 to 2 millimeters long (Plate VI, fig. 5)..... unicolor.

Lepidosaphes rubrovittatus Cockerell.

Lepidosaphes rubrovittatus COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 135.

Lepidosaphes (Mytilaspis) fasciata GREEN, Journ. Econ. Biol. (1911), 6, 31, fig.

Female scale slender-elongate (Plate V, fig. 12), a peculiar greenish yellow; exuviae dull orange with a dark red longitudinal stripe down the middle of each skin. Adult female with three lateral segments produced; median lobes of caudal margin striate, slightly notched on each side, somewhat crenulate; third lobes rudimentary and scarcely noticeable; plates all spinelike and simple (Plate V, fig. 13). Circumgenital glands forming a letter V, median group of 3 orifices, anterior laterals of 7 to 8, posterior laterals of 4. Dorsal glands conspicuous, marginal oval gland orifices distinct. (From the original description.)

LUZON, Manila (*Townsend*), on *Eugenia malaccensis*.

Lepidosaphes lasianthi (Green).

Lepidosaphes lasianthi (GREEN) FERNALD, Cat. Coccidae of the World (1903), 310.

Female scale pyriform, often curved, 2 to 2.75 millimeters long, 1 to 1.25 millimeters wide, uniform light brown; exuviae anterior, yellow. Adult female about 1 millimeter long, 0.5 millimeter wide; abdominal segments with prominent lobes; caudal margin with median lobes widely separated, broad, sloping to a blunt point, two spinelike plates between median lobes, a spinelike plate and pointed glandular process laterad of median lobes, second lobes rounded and slightly notched on the outer sides, followed by two spinelike plates (Plate V, fig. 14). Circumgenital glands with anterior laterals of 4 orifices, posterior laterals of 6, median of 4; according to some authorities the median and anterior laterals are confluent. A few dorsal tubular spinnerets present.

LUZON, Laguna, Los Baños (*Baker*), on *Codiaeum variegatum*.

Lepidosaphes luzonica sp. nov.

Female scale brownish white or very pale brown, about 2 millimeters long, broadly elongated, slightly convex; exuviae light reddish brown. Adult female pale yellow; at period of gesta-

tion dark brown; abdominal segments bearing spinelike plates; broadened posteriorly. Caudal margin with small lobes; median lobes far apart, the interval occupied by two minute triangular projections; second lobes prominent, about three times as long as the median and similarly notched on each edge, with a low rounded or pointed projection on each side; two short and one long spinelike plate laterad of median lobes, second lobes followed by spinelike plates, varying in length and from two to three in number; notches of lobes vary; edge beyond carinate; caudal margin thickened cephalad of lobes (Plate VI, fig. 1). Circumgenital glands absent. A few dorsal pores near margin.

Male scale about 1.75 millimeters long, white, not carinate, sides nearly parallel; exuvia pale yellow; often occur in irregular masses.

LUZON, Benguet, Baguio (*Baker, 1900*), on *Ficus*.

The caudal margin resembles that of *Chionaspis colemani* Kuw., but the latter has circumgenital glands. The female scale is similar to *L. albus* Ckll., but the caudal margins are entirely different.

Lepidosaphes ixoræ Cockerell and Robinson.

Lepidosaphes ixoræ COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 425.

Female scale broadly elongate, somewhat convex, often curved, about 3.5 millimeters long, the surface with ridges diverging from a center near the exuviæ; exuviæ orange. Adult female elongate-oval, abdominal segments produced; laterally, bearing spines; median lobes broad, sloping to a blunt point, the edges minutely dentate; second lobes of two shorter rounded lobules, the first similar to the median lobes, slightly notched on each side, the second simple; third pair of lobes short and rounded; two spines and two spinelike plates between median lobes, two spinelike plates laterad of median lobes and three laterad of second and third lobes; basal margins of lobes thickened (Plate VI, fig. 2). Dorsal glands prominent.

Male scale nearly 2 millimeters long, rather broad, similar in texture to the female scale.

LUZON, Laguna, Los Baños (*Baker*), on *Ixora coccinea*.

Lepidosaphes cocculi (Green).

Lepidosaphes cocculi (GREEN) FERNALD, Cat. Coccidae of the World (1903), 307; COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 135.

Female scale long and narrowly broadened posteriorly, 3 to 4 millimeters long, 0.75 millimeter broad, dark purple-brown, marked by curved lines of growth; ventral scale pitted; exuviæ

yellow. Adult female with abdominal segments marked by prominent lateral lobes; caudal margin with two broad semicircular lobes separated by two spinelike plates and followed by two spinelike plates, two lobules of the second lobes rounded and entire, followed by two spinelike plates (Plate V, fig. 4). Dorsal tubular spinnerets absent or inconspicuous. Circumgenital glands in five groups; median of 5 or 6 orifices, anterior laterals of 8 to 13, posterior laterals of 6 to 8.

Male scale similar to female, smaller.

LUZON, Manila (*Townsend*), on a palm; Laguna, Los Baños (*Baker*), on *Erythrolalum scandens*.

Lepidosaphes mcgregori Banks.

Lepidosaphes mcgregori BANKS, Phil. Journ. Sci. (1906), 1, 233.

Female scale long and narrow, diverging posteriorly, 2.5 millimeters long, 0.75 millimeter broad, clear red-brown, exuviae yellow. Adult female elongate; median lobes of caudal margin low and broad with crenulate surface, rounded, lobed on each side; second pair with two lobules, somewhat flat, margins entire; two spinelike plates between median lobes, two laterad of second lobes (Plate VI, fig. 4). Dorsal pores irregular. Circumgenital glands with median group of 4 orifices, anterior laterals of 6, posterior laterals of 5 or 6. Male scale with anterior portions pale yellow-brown, posterior and lateral margins narrowly white, 1.45 millimeters long, 0.35 millimeter wide. (From the original description.)

LUZON, Manila (*Banks*), on *Cocos nucifera*.

Lepidosaphes unicolor Banks.

Lepidosaphes unicolor BANKS, Phil. Journ. Sci. (1906) 1, 234.

Female scale 1.8 millimeters long, 0.5 millimeter broad, sides nearly parallel; dark red, including the exuviae. Caudal margin of adult female with median lobes similar to those of *L. mcgregori*, but not so flat; second pair rounded; fringed spinelike plates between median lobes and laterad of the others (Plate VI, fig. 5). Circumgenital glands scarcely separable into groups, 24 orifices in all, median 4 orifices somewhat distinct. (From the original description.)

LUZON, Manila (*Banks*), on *Cocos nucifera*.

Genus **HEMICHIONASPIS** Cockerell

Type, *Chionaspis aspidistræ* Signoret.

Female scale pyriform or elongated and narrow. Female insect broadened posteriorly, conspicuously segmented. Caudal

area with one, two, or three pairs of lobes; median lobes with inner edges straight, parallel, and close together, often crenate and darker than the others; additional lobes of two lobules. Circumgenital glands always present. Male scale elongated, carinate.

Synoptic table of the species.

<i>a</i> ¹ . Female scale very narrow, almost linear; rich red-brown.....	<i>uvaria</i> .
<i>a</i> ² . Female scale elongate, broadened posteriorly, varying to almost circular.	
<i>b</i> ¹ . Caudal margin of female with second pair of lobes rudimentary (Plate VI, fig. 7).....	<i>townsendi</i> .
<i>b</i> ² . Caudal margin with second pair of lobes long and narrow (Plate VI, fig. 10).....	<i>aspidistra</i> .

Hemichionaspis uvaria Cockerell and Robinson.

Hemichionaspis uvaria COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1914), 33, 330.

Female scale very narrow, almost linear, about 1.5 millimeters long, rich red-brown, exuviae paler and yellowish. Female greatly elongated, sides not prominently lobed, yellowish, turning green when boiled in KOH; median lobes of caudal area large and dark, together forming a semicircle, margins crenate or dentate with six small teeth; second lobes represented by two small lobules, the first rounded and the second pointed; beyond this a rudimentary prominence behind a spine; laterad of the spine a large spinelike plate; remainder of the margin divided into two or three flattened lobules, beyond which is a spinelike plate (Plate VI, fig. 6). Circumgenital glands with anterior and posterior laterals each of about 8 orifices, median of 4.

Male scale about 0.5 millimeter long, white, parallel-sided, with a slight median keel, larval skin pale orange-fulvous.

LUZON, Laguna, Los Baños (*Baker*), on *Uvaria* sp.

Hemichionaspis townsendi Cockerell.

Hemichionaspis townsendi COCKERELL, Proc. Davenport Acad. Sci. (1905), 10, 135.

Female scale pyriform, rather broad, varying to nearly circular, light grayish to yellowish, exuviae a little yellowish. Female insect rather short, four large rounded prominences on each side, light yellowish with some blue pigment after boiling; median lobes contiguous, low and broad with four crenulations formed by three notches, the first being very deep and strong; second lobes rudimentary, scarcely rising above the general margin; first squames small and spinelike, the others (three single ones at rather long intervals and then a pair) very large and long (Plate VI, fig. 7). Circumgenital glands with median group of

about 16 orifices, anterior laterals of 19 to 20, posterior laterals of 25. Dorsal glands not numerous. Male scale white, bluntly tricarinate, exuvia pale yellowish. (From the original description.)

LUZON, Tayabas, Lucban (*Townsend*), on *Gossypium*.

Hemichionaspis aspidistræ (Signoret).

Hemichionaspis aspidistræ (SIGNORET) FERNALD, Cat. Coccidae of the World (1903), 239; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1914), 33, 328, fig. 3; (1915), 34, 107.

Female scale elongated, broadened posteriorly, 1.8 to 2.6 millimeters long, 0.75 millimeter wide, yellowish brown to brown, exuviæ slightly brighter than the scale, whole scale often very thin. Female with abdominal segments prominent; caudal margin with first pair of lobes contiguous, with three distinct notches on the outer edge; second pair of lobes long and narrow, spatulate; a spinelike plate and glandular process laterad of median lobes (Plate VI, fig. 10). Circumgenital glands with median group of 5 to 15 orifices, anterior laterals of 15 to 22, posterior laterals of 17 to 23. Very few dorsal pores.

Male scale white, sides parallel, carinate, exuvia yellow, 1 to 1.3 millimeters long (Plate V, fig. 9). (From Cooley.)

LUZON, Laguna, Los Baños (*Baker*), on *Erythrolalum scandens*; Benguet, Baguio (*Baker*), on *Piper*.

Genus PINNASPIS Cockerell

Type, *Aspidiodus buxi* Bouché.

Shape of female scale varies, being broadened posteriorly or across the middle or curved; second exuviæ very large; caudal margin with two pairs of lobes, circumgenital glands present. Male scale similar to female.

Synoptic table of the species.

- a¹. Median lobes prominent, rounded apically with deep notches on outer sides, double second lobes shaped like the blade of an ax (Plate VI, fig. 13) siphonodontis.
- a². Median lobes with two deep notches on outer sides, second lobes similarly notched (Plate VI, fig. 14) buxi.

Pinnaspis siphonodontis Cockerell and Robinson.

Pinnaspis siphonodontis COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1915), 34, 110.

Female mytiliform, rather narrow, about 1.5 millimeters long, pale red-brown, somewhat translucent, shrunken female appearing as a dark spot. Female elongated; abdominal segments distinct, produced laterally into tubercles, caudal area with

median lobes prominent, almost contiguous, rounded apically with a deep notch on the outer edges, laterad of these is a spine-like plate, then a pointed projection; two lobules of second lobe shaped like the blade of an ax, also followed by a spinelike plate and a pointed projection; remainder of margin serrate with a few spinelike plates (Plate VI, fig. 13). Circumgenital glands with median group of 4 orifices, anterior laterals of 10, posterior laterals of 9 to 11.

Male scale about 0.5 millimeter long, parallel-sided, strongly tricarinate, brown (Plate V, fig. 18). A specimen of *P. siphonodontis* has been determined in which the male scale is white. It might be possible to have a male scale with a white variety.

LUZON, Laguna, Los Baños (*Baker*), on *Celtis philippinensis*, *Sandoricum koetjape*, and *Siphonodon celastrineus*.

Pinnaspis buxi (Bouché).

Pinnaspis buxi (BOUCHÉ) FERNALD, Cat. Coccidae of the World (1903), 242; COCKERELL and ROBINSON, Bull. Am. Mus. Nat. Hist. (1914), 33, 329.

Female scale elongate, only slightly broadened posteriorly, often curved, 2 to 2.5 millimeters long, light brown, exuviae somewhat lighter. Adult female oval; median lobes of caudal margin with three terminal notches, sides parallel and almost contiguous, followed by a spine and a narrow glandular process, second lobe with the first lobule similar to the median lobes, second lobule rounded, followed by a glandular process and a spinelike plate (Plate VI, fig. 14). Circumgenital glands with anterior laterals of 9 to 10 orifices, posterior laterals of 10 to 12.

LUZON, Laguna, Los Baños (*Baker*), on *Homalonema philippinensis*.

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<i>Achras sapota</i> Linn.	<i>Arachis hypogaea</i> Linn.
<i>Aspidiotus cydoniæ</i> var. <i>greenii</i> Ckll.	<i>Pseudococcus virgatus</i> (Ckll.).
<i>Aleurites moluccana</i> (Linn.) Willd.	<i>Arenga saccharifera</i> Labill.
<i>Aspidiotus translucens</i> Ckll.	<i>Chrysomphalus aurantii</i> (Mask.).
<i>Anona muricata</i> Linn.	<i>Chrysomphalus rossi</i> (Mask.).
<i>Saissetia hemisphærica</i> (Targ.).	<i>Artocarpus</i> sp.
<i>Anona squamosa</i> Linn.	<i>Chrysomphalus aonidum</i> (Linn.).
<i>Aspidiotus translucens</i> Ckll.	<i>Chrysomphalus aurantii</i> (Mask.).
<i>Coccus elongatus</i> (Sign.).	<i>Pseudoaonidia trilobitiformis</i> (Green).
<i>Pseudococcus virgatus</i> (Ckll.).	<i>Asplenium nidus</i> Linn.
<i>Antidesma bunius</i> (Linn.) Spreng.	<i>Coccus diversipes</i> Ckll.
<i>Coccus viridis</i> (Green).	<i>Astronia</i> sp.
<i>Pulvinaria psidii</i> Mask.	<i>Chrysomphalus aurantii</i> (Mask.).
<i>Antigonon leptopus</i> Hook. and Arn.	<i>Blumea balsamifera</i> (Linn.) DC.
<i>Pulvinaria tyleri</i> Ckll.	<i>Aspidiotus cydoniæ</i> Comst.

- Caesalpinia pulcherrima* (Linn.) Sw.
Pseudococcus virgatus (Ckll.).
Calanthe sp.
Saissetia hemisphærica (Targ.).
Carica papaya Linn.
Aspidiotus translucens Ckll.
Celtis philippensis Blanco.
Fiorinia florinæ (Targ.).
Parlatoria pergandii Comst.
Pinaspis siphonodontis Ckll.
 and Rob.
Chrysanthemum indicum Linn.
Aspidiotus cydoniæ var. *greenii*
 Ckll.
Citrus sp.
Selenaspidium articulatus Morg.
Citrus aurantium Linn. (in market,
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Aspidiotus rapax Comst.
Citrus decumana Murr.
Coccus viridis (Green).
Icerya seychellarum (Westw.).
Parlatoria ziziphus (Lucas).
Citrus nobilis Lour.
Chrysomphalus aonidum (Linn.).
Coccus viridis (Green).
Pseudococcus lilacinus Ckll.
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Aspidiotus translucens Ckll.
Chrysomphalus aonidum (Linn.).
Lepidosaphes mcgregori Banks.
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Paralecanium cocophyllæ Banks.
Parlatoria greeni Banks.
Phenacaspis inday Banks.
Codiaeum variegatum (Linn.) Blume.
Aspidiotus translucens Ckll.
Coccus elongatus (Sign.).
Lepidosaphes lasianthi (Green).
Pseudococcus virgatus (Ckll.).
Pulvinaria thespesiæ Green.
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Pseudococcus *filamentosus*
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Pseudococcus virgatus (Ckll.).
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Aspidiotus coryphæ Ckll. and
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Pseudaonidia *curculiginis*
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- Cycas circinalis* Linn.
Chrysomphalus rossi (Mask.).
Saissetia hemisphærica (Targ.).
Dillenia philippinensis Rolfe.
Paralecanium cocophyllæ Banks.
Dioscorea alata Linn.
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Diospyros kaki Linn.
Icerya seychellarum (Westw.).
Eriodendron anfractuosum DC.
 (= *Ceiba pentandra* Gaertn.)
Chrysomphalus pedroniformis
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Saissetia nigra (Nietn.).
Erythralium scandens Baill.
Hemichionaspis aspidistræ Sign.
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Pulvinaria psidii philippina Ckll.
Ficus caudatifolia Warb.
Pseudaonidia obsita Ckll. and
 Rob.
Ficus minahassæ Miq.
Icerya seychellarum (Westw.).
Ficus nota (Blanco) Merr.
Drosicha lichenoides Ckll.
Schizaspis lobata Ckll. and Rob.
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Chrysomphalus aonidum (Linn.).
Gardenia florida Linn.
Coccus viridis (Green).
Gossypium sp.
Hemichionaspis townsendi Ckll.
Graptophyllum hortense Nees.
 [= *G. pictum* (Linn.) Griff.].
Pseudococcus virgatus (Ckll.).
Hibiscus mutabilis Linn.
Aspidiotus cydoniæ Comst.
Homalonema philippinensis Engl.
Pinaspis buzi (Bouché).
Ixora coccinea Linn.
Lepidosaphes ixoræ Ckll. and
 Rob.

- Leucosyke capitellata* Wedd.
Icerya jacobsoni Green.
Litsea sp.
Phenacaspis pallida Rob.
Macaranga tanarius (Linn.) Muell.-Arg.
Phenacaspis pellucida Rob.
Machilus sp.
Fiorinia phantasma Ckll. and Rob.
Mangifera indica Linn.
Aspidiotus destructor Sign.
Aspidiotus translucens Ckll.
Phenacaspis inday Banks.
Mangifera verticillata C. B. Rob.
Aspidiotus destructor Sign.
Manihot utilisima Pohl.
Saissetia nigra (Nietn.).
Mischocarpus fuscescens Blume.
Phenacaspis mischocarpi Ckll. and Rob.
Morinda bracteata Roxb.
Phenacaspis thoracica Rob.
Musa sapientum Linn.
Aspidiotus translucens Ckll.
Phoenix dactylifera Linn.
Aspidiotus translucens Ckll.
Piper sp.
Hemichionaspis aspidistræ Sign.
Piper loheri C. DC.
Platylecanium oribrigerum Ckll. and Rob.
Electronia viridis Merr.
Paralecanium luzonicum Ckll.
Psidium araca Raddi.
Aspidiotus translucens Ckll.
Psidium guajava Linn.
Icerya seychellarum (Westw.).
Pulvinaria psidii Mask.
Rosa sp.
Aulacaspis rosæ (Bouché).
Sandoricum koetjape (Burn. f.) Merr.
Pinnaspis siphonodontis Ckll. and Rob.
Schizostachyum acutiflorum Munro.
Odonaspis schizostachyi Ckll. and Rob.
Siphonodon celastrineus Griff.
Pinnaspis siphonodontis Ckll. and Rob.
Solanum sp.
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Strychnos nux-vomica Linn.
Coccus viridis (Green).
Tamarindus indica Linn.
Aspidiotus translucens Ckll.
Tetrastigma.
Paralecanium luzonicum Ckll.
Theobroma cacao Linn.
Pseudococcus tayabanus Ckll.
Uvaria sp.
Hemichionaspis uvariæ Ckll. and Rob.
Vitis vinifera Linn.
Chrysomphalus pedroniformis Ckll. and Rob.
Voacanga globosa (Blanco) Merr.
Protopulvinaria longivalvata bakeri Ckll.
Withania origanifolia Pail. and Bois.
Saissetia nigra (Nietn.).
Xanthosoma sagittifolium Schott.
Pseudococcus virgatus (Ckll.).

EXPLANATION OF TERMS APPLIED TO COCCIDÆ

- ANAL CLEFT. Incision extending from caudal margin to anal orifice.
 ANAL ORIFICE. Caudal opening of the alimentary canal (Plate IV, fig. 6; Plate V, fig. 2).
 ANAL PLATE. Chitinous process around or near anal orifice (Plate II, fig. 15).
 ANAL RING. Chitinous ring inclosing anal orifice (Plate II, fig. 15).
 CARINA (Æ). Ridges on male or female scale (Plate VI, figs. 9 and 11).
 CARINATE. Having carinæ.
 CAUDAL AREA. Region near the posterior margin, also called the pygidium.
 CERIFEROUS GLANDS. Glands of the caudal area, the pores of which open in chitinous rings (Plate I, fig. 2).

- CIRCUMGENITAL GLAND.** A gland that furnishes the secretion for covering the eggs. It discharges by a group of circular openings around the genital aperture (Plate VI, fig. 4).
- DIGITULES.** Projections on tarsus or claw, appearing as knobbed or broadly dilated hairs.
- DORSAL PORES.** Oval orifices on dorsal surface, often in rows through which substance secreted for scale is discharged (Plate IV, fig. 4).
- EXUVIA (Æ).** Integumenta of larva and pupa, which are molted and incorporated in the scale (Plate V, figs. 4, 9, and 12).
- KEELED.** Carinate.
- LOBES.** Divisions of the caudal area occurring in pairs, often described as being bilobed, bidentate, bicuspid; terminal pair known as median, others number laterally from median (Plate IV, fig. 11).
- LOBULES.** Divided lobes (Plate VI, figs. 5, 10, and 13).
- PLATES.** Projections arising without a base, in a circle; described as bidentate, notched, fringed (Plate V, figs. 3 and 11).
- SCALE.** Shieldlike covering of insect, composed of adult secretion and exuviae (Plate V, figs. 4, 9, and 12).
- SPINE.** Projection arising from a base within a circle (Plate III, fig. 3).
- SPINELIKE PLATE.** Plate similar to a spine, arising as a plate (Plate III, figs. 1 and 18).
- SQUAME.** Name often applied to a spinelike plate.
- STIGMATIC AREA.** Region of breathing pore; stigmatic spines often found here (Plate II, figs. 5, 7, and 13).
- TUBULAR SPINNERETS.** A series of cylindrical or infundibuliform glands, opening by dorsal pores.

ILLUSTRATIONS

PLATE I

- FIGS. 1 to 3. *Icerya jacobsoni* Green, 1, antenna of female, $\times 53$; 2, ceriferous glands of female; 3, adult female, dorsal view. (From Green.)
- FIG. 4. *Icerya candida* Cockerell, antenna of female, $\times 75$.
5. *Icerya seychellarum* (Westwood), antenna of female, $\times 75$.
- FIGS. 6 and 7. *Pseudococcus virgatus* (Cockerell), 6, antenna of female, $\times 75$; 7, hind leg of female, $\times 38$.
- 8 and 9. *Pseudococcus filamentosus* (Cockerell), 8, antenna of female, $\times 135$; 9, fore leg of female, $\times 75$.
- FIG. 10. *Coccus elongatus* (Signoret), antenna of female, $\times 150$.
11. *Coccus diversipes* Cockerell, antenna of female, $\times 150$.
12. *Coccus viridis* (Green), antenna of female, $\times 150$.

PLATE II

- FIGS. 1 to 3. *Protopulvinaria longivalvata bakeri* Cockerell, 1, scale of female; 2, scale of male; 3, antenna of female. (From Cockerell.)
- 4 and 5. *Pulvinaria psidii* Maskell, 4, antenna of female, $\times 195$; 5, stigmatic area of female.
- 6 and 7. *Pulvinaria thespesiae* Green, 6, antenna of female, $\times 98$; 7, stigmatic area of female.
- 8 and 9. *Ceroplastes gigas* Cockerell, 8, caudal margin of female; 9, cephalic margin of female. (From Cockerell.)
- FIG. 10. *Paralecanium luzonicum* Cockerell, antenna of female, $\times 195$.
- FIGS. 11 to 13. *Paralecanium cocophyllæ* Banks, 11, antenna of female (from Banks); 12, antenna of female, $\times 195$; 13, marginal plates and stigmatic area of female (from Banks).
- 14 to 17. *Platylecanium cribrigerum* Cockerell and Robinson, 14, compound cribriform plates of female; 15, anal plates and ring of female; 16, antenna of female; 17, dermal processes of female.
- FIG. 18. *Saissetia hemisphærica* (Targioni Tozzetti), dermal pores of female.
19. *Saissetia nigra* (Nietner), dermal pores of female.

PLATE III

- FIGS. 1 and 2. *Odonaspis schizostachyi* Cockerell and Robinson, 1, caudal margin of female; 2, scales on adult female.
- 3 and 4. *Fiorinia fiorinæ* (Targioni Tozzetti), 3, caudal margin of female (from Cooley); 4, scale of female (after Newstead).

- FIGS. 5 to 7. *Fiorinia phantasma* Cockerell and Robinson, 5, caudal margin of female; 6, caudal margin of second stage female; 7, adult female at period of gestation.
- 8 to 10. *Aulacaspis rosæ* (Bouché), 8, caudal margin of female; 9, female scale (after Newstead); 10, scale of second stage female (after Newstead).
- 11 and 12. *Phenacaspis inday* (Banks), 11, caudal margin of female; 12, female scale. (After Banks.)
- 13 and 14. *Phenacaspis mischocarp*i Cockerell and Robinson, 13, caudal margin of female; 14, female scale.
- FIG. 15. *Phenacaspis pellucida* sp. nov., caudal margin of female.
- FIGS. 16 and 17. *Phenacaspis thoracica* sp. nov., 16, adult female; 17, caudal margin of female.
- FIG. 18. *Phenacaspis pallida* sp. nov., caudal margin of female.

PLATE IV

- FIGS. 1 and 2. *Chrysomphalus aurantii* (Maskell), 1, caudal margin of female; 2, adult female.
- FIG. 3. *Chrysomphalus pedroniformis* Cockerell and Robinson, caudal margin of female.
4. *Chrysomphalus aonidum* (Linnæus), caudal margin of female.
5. *Chrysomphalus rossi* (Maskell), caudal margin of female.
- FIGS. 6 and 7. *Schizaspis lobata* Cockerell and Robinson, 6, caudal margin of female; 7, adult female.
- FIG. 8. *Parlatoria ziziphus* (Lucas), caudal margin of female.
9. *Parlatoria proteus* (Curtis), caudal margin of female (from Palmer).
10. *Parlatoria greeni* Banks, caudal margin of female (from Banks).
11. *Parlatoria pergandii* Comstock, caudal margin of female.
- FIGS. 12 and 13. *Selenaspis articulatus* (Morgan), 12, caudal margin of female; 13, adult female. (From Newstead.)

PLATE V

- FIG. 1. *Aspidiotus cydoniæ* Comstock, caudal margin of female (after Comstock).
2. *Aspidiotus coryphæ* Cockerell and Robinson, caudal margin of female.
- FIGS. 3 and 4. *Aspidiotus destructor* Signoret, 3, caudal margin of female; 4, female scale (from Banks).
- FIG. 5. *Aspidiotus translucens* Cockerell, caudal margin of female (after Green).
6. *Aspidiotus tayabanus* Cockerell, caudal margin of female (from Cockerell).
7. *Aspidiotus rapax* Comstock, caudal margin of female (after Comstock).
8. *Pseudaonidia obsita* Cockerell and Robinson, caudal margin of female.
- FIGS. 9 and 10. *Pseudaonidia trilobitiformis* (Green), 9, female scale; 10, caudal margin of female. (After Green.)

- FIG. 11. *Pseudaonidia circuliginis* (Green), caudal margin of female.
- FIGS. 12 and 13. *Lepidosaphes rubrovittatus* Cockerell, 12, female scale; 13, caudal margin of female. (From Cockerell.)
- FIG. 14. *Lepidosaphes lasianthi* (Green), caudal margin of female.

PLATE VI

- FIG. 1. *Lepidosaphes luzonica* sp. nov., caudal margin of female.
2. *Lepidosaphes izoræ* Cockerell and Robinson, caudal margin of female.
3. *Lepidosaphes cocculi* (Green) caudal margin of female.
4. *Lepidosaphes mcgregori* Banks, caudal margin of female (after Banks).
5. *Lepidosaphes unicolor* Banks, caudal margin of female (after Banks).
6. *Hemichionaspis uvariæ* Cockerell and Robinson, caudal margin of female.
7. *Hemichionaspis townsendi* Cockerell, caudal margin of female.
- FIGS. 8 to 10. *Hemichionaspis aspidistræ* (Signoret), 8, female scale; 9, male scale; 10, caudal margin of female.
- FIGS. 11 to 13. *Pinnaspis siphonodontis* Cockerell and Robinson, 11, white male scale; 12, brown male scale; 13, caudal margin of female.
- FIG. 14. *Pinnaspis buzi* (Bouché), caudal margin of female (after Comstock).

[Vol. XI, Sec. D, No. 5, of this Journal was issued January 3, 1917; No. 6 was issued March 22, 1917.]

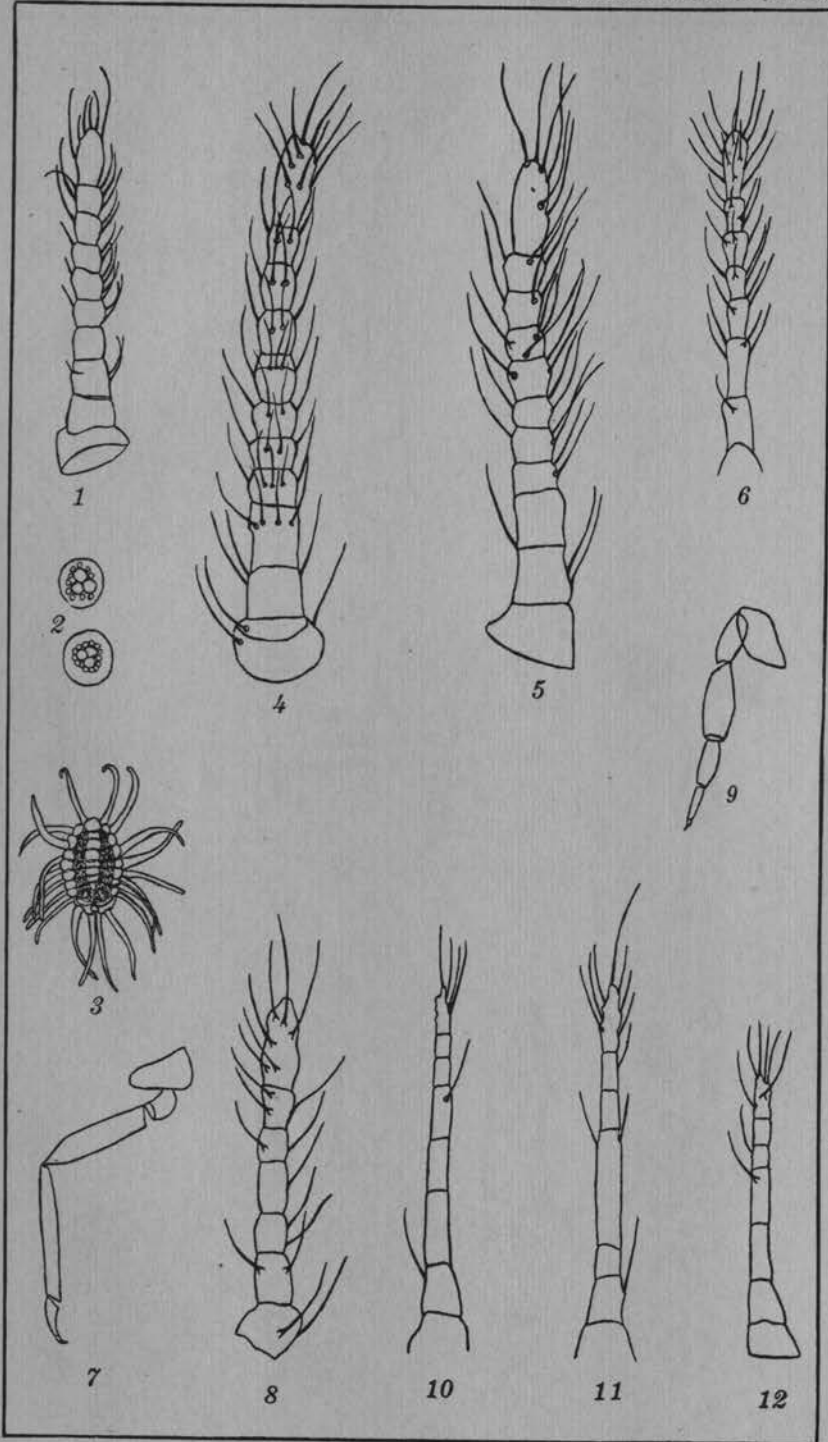


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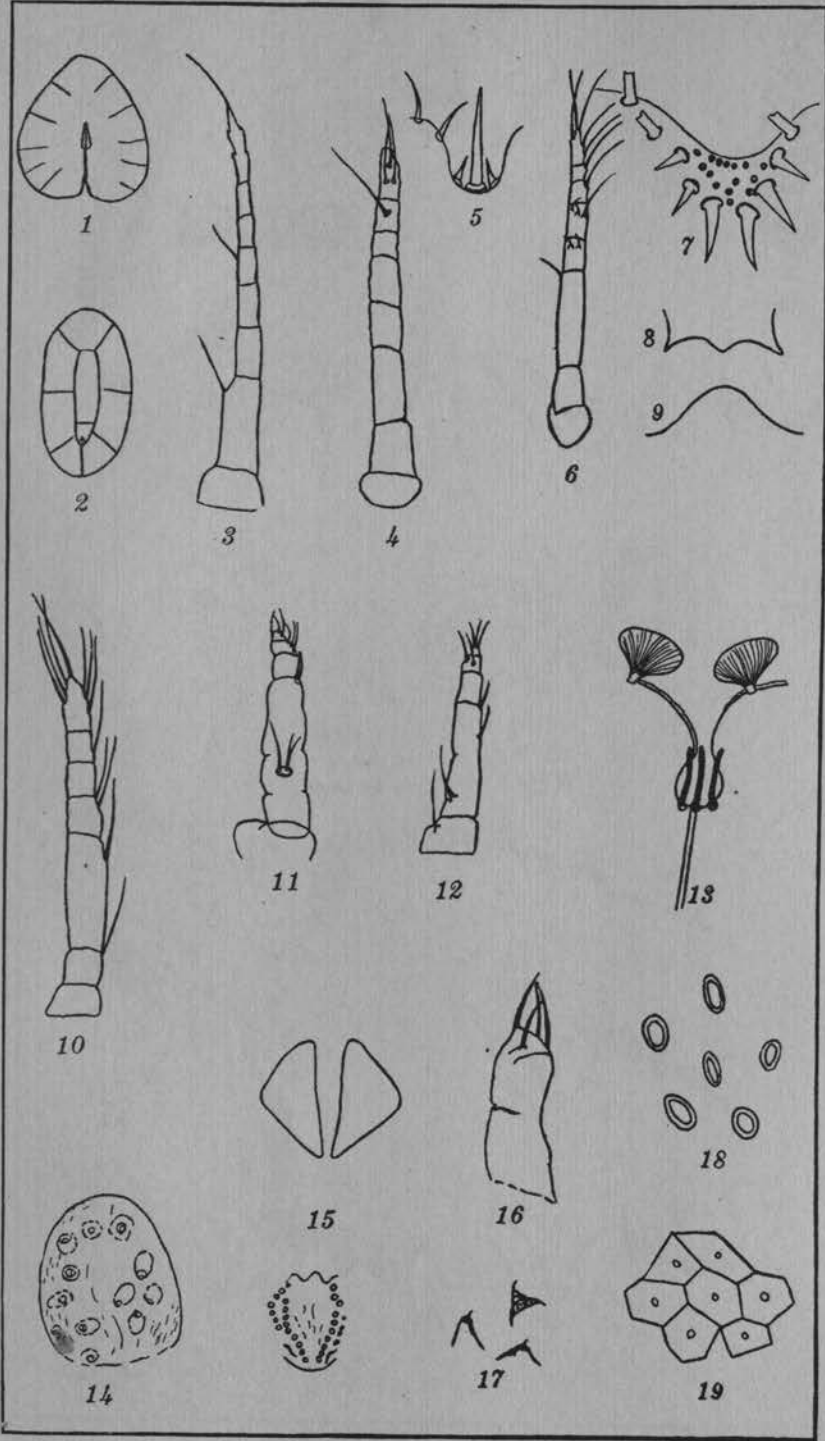


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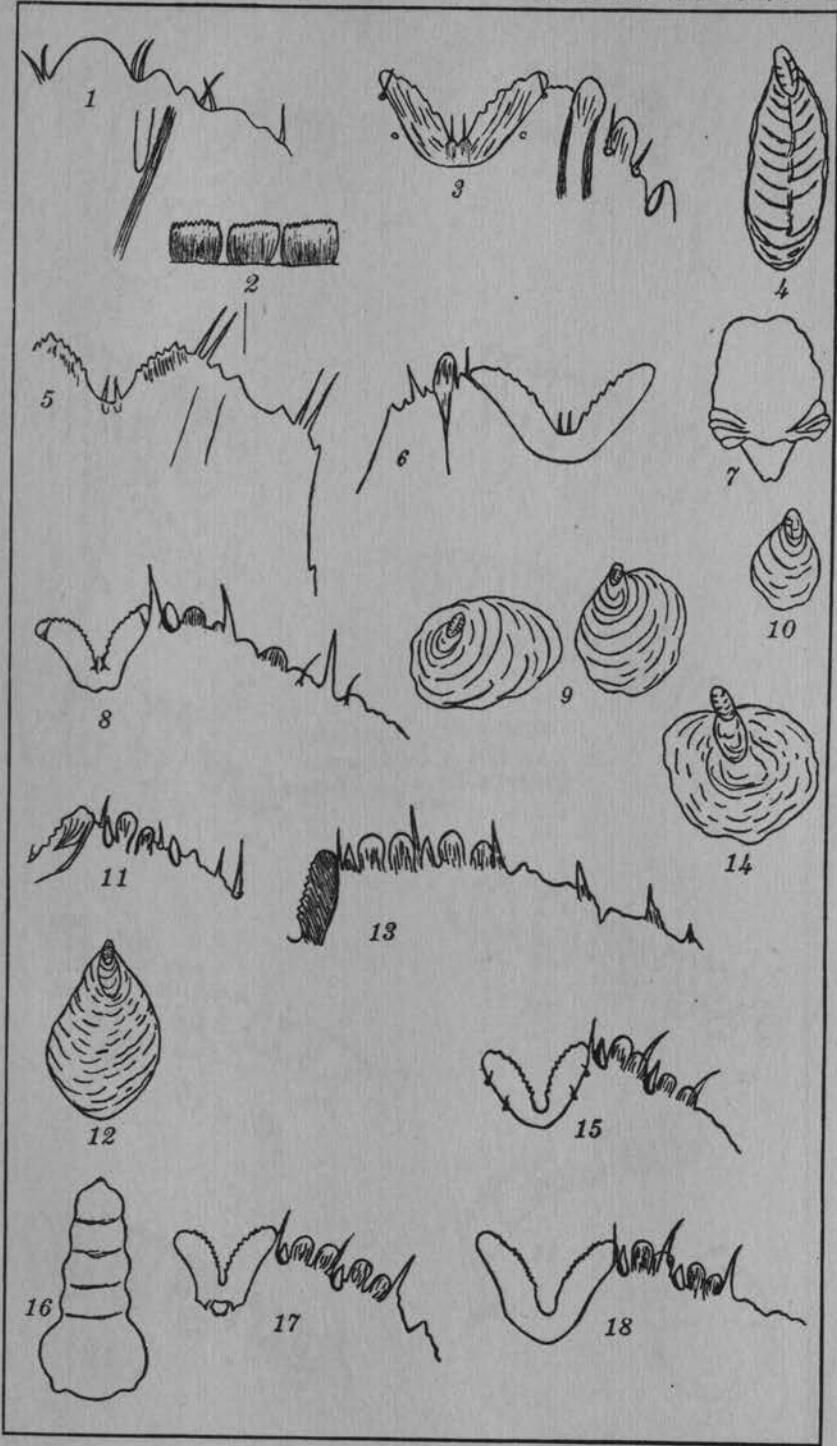


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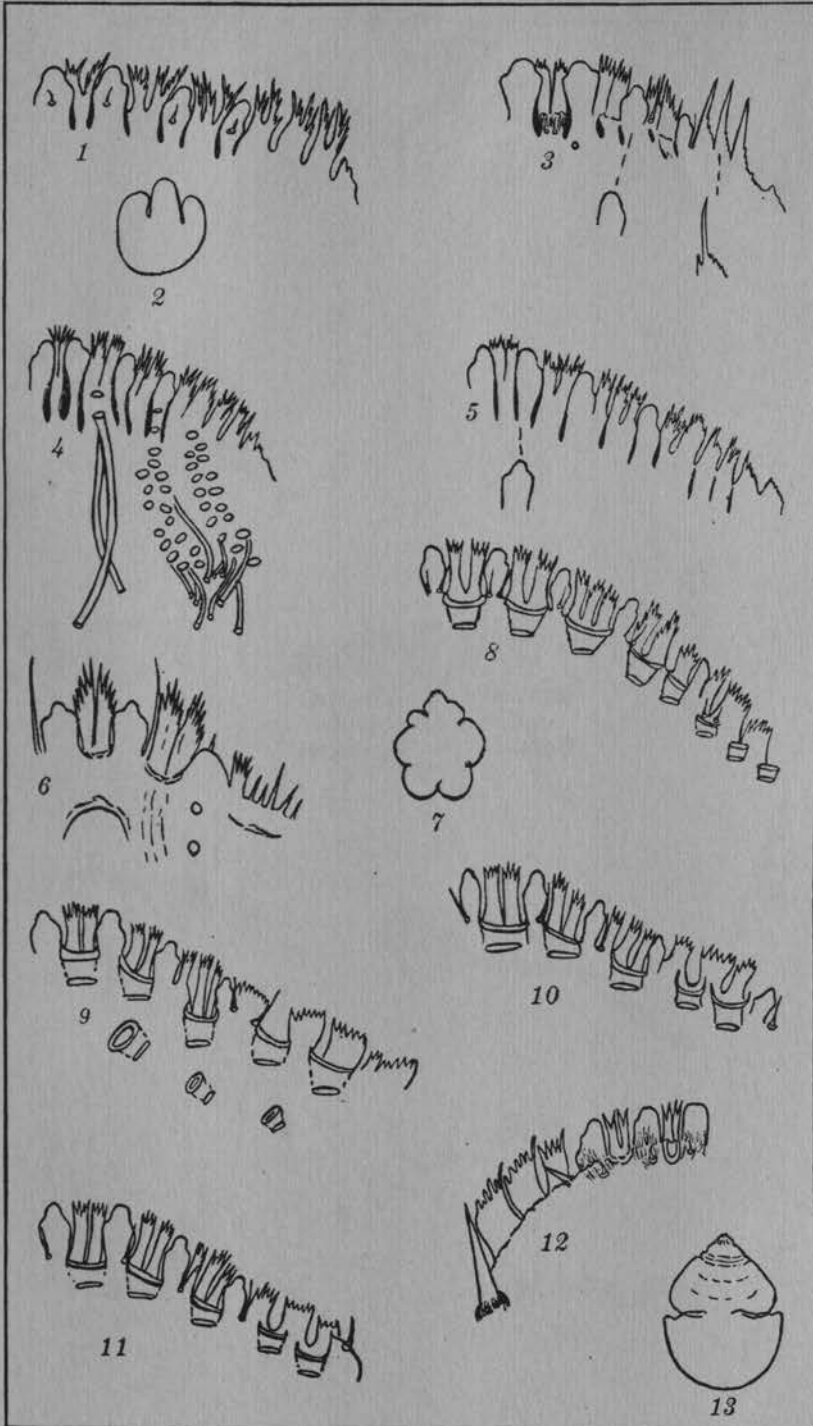


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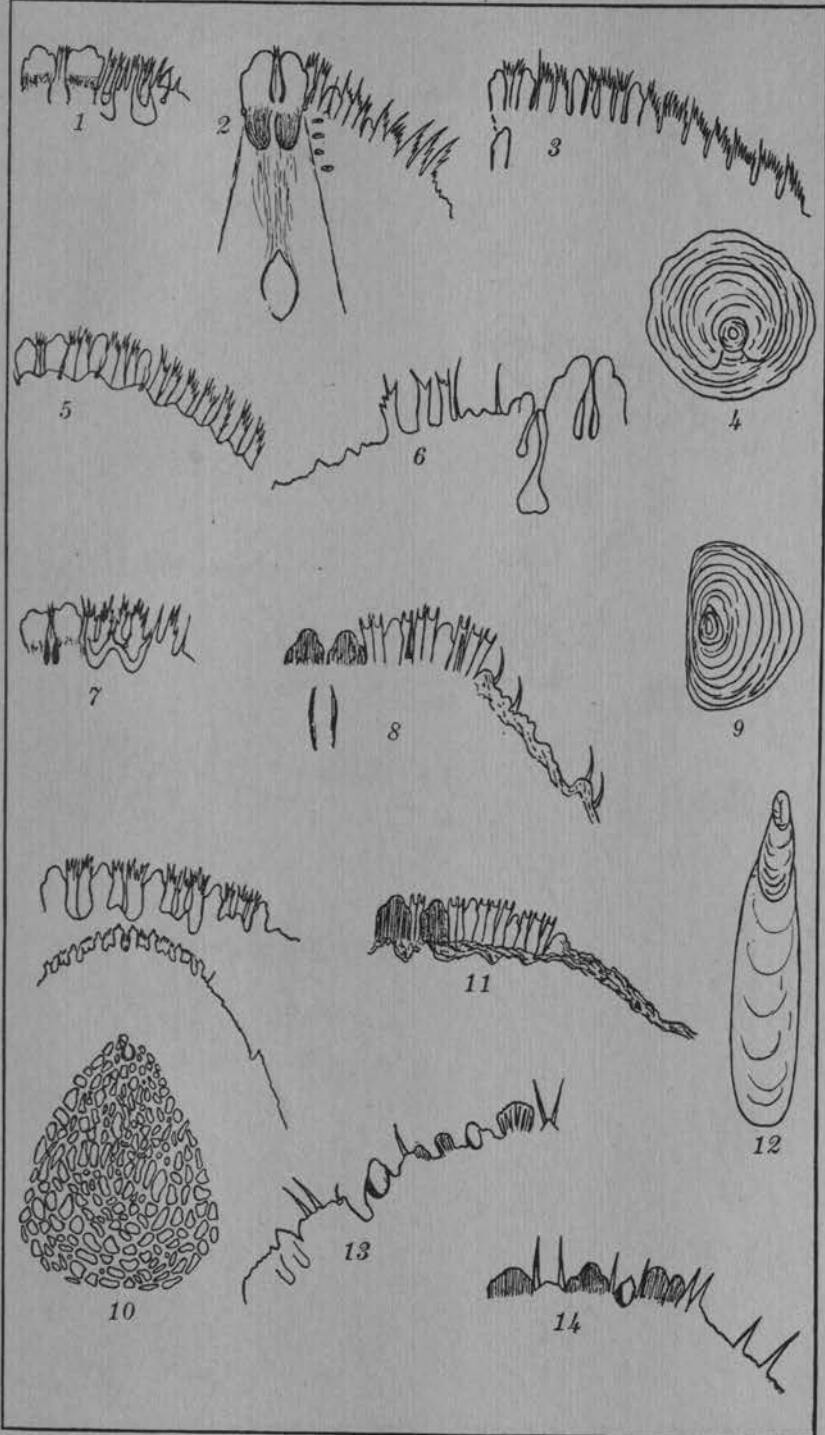


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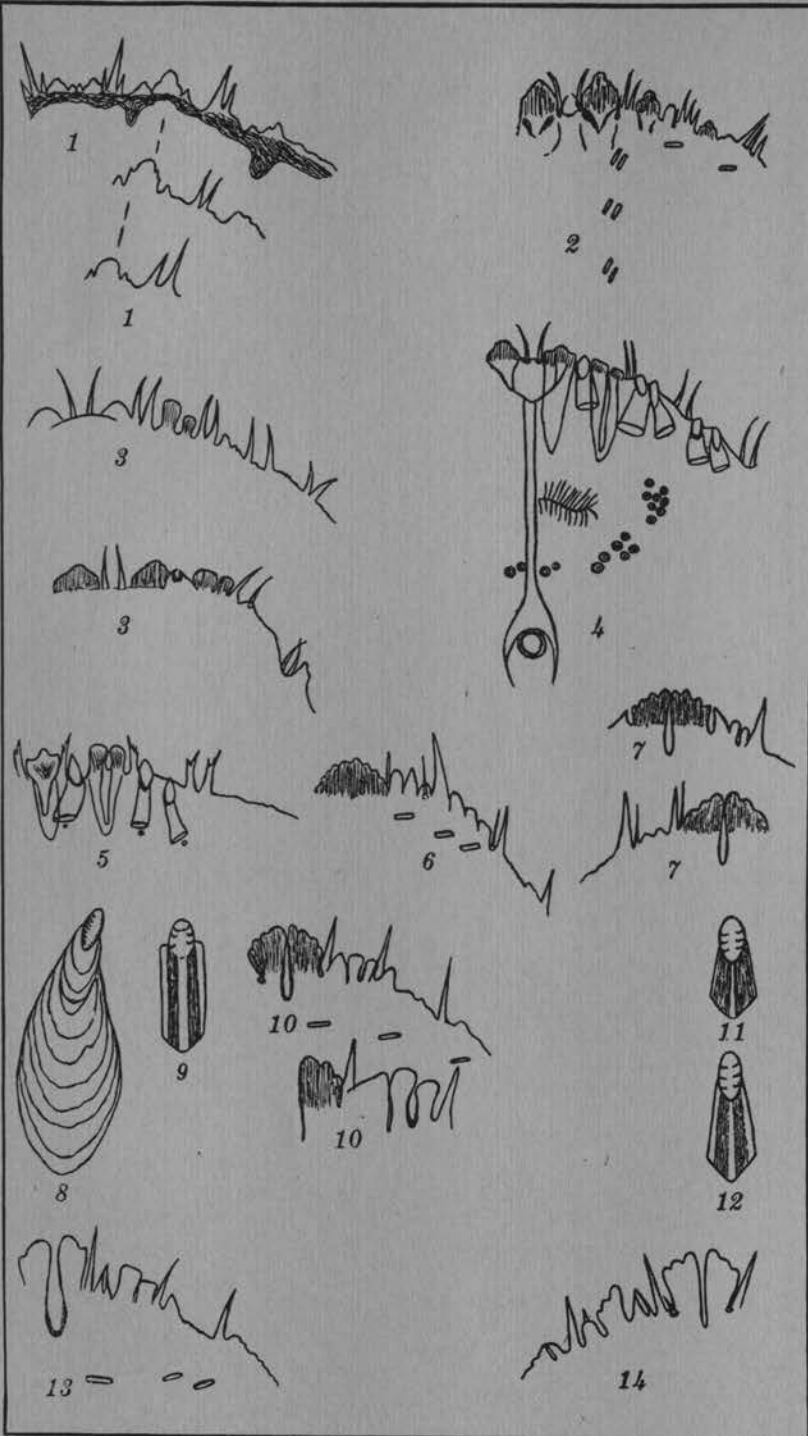


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