THE COCCIDÆ OF CUBA.*

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The material upon which this paper is based was procured by the writer during the years 1908 and 1909, while in the employ of the Cuban government as assistant in the Department of Vegetable Pathology of the Central Agricultural Experiment Station. A portion of it consists of duplicates presented him from the collection of the department and the remainder was collected by him personally.

The department collection had been accumulated from specimens sent in for determination and from miscellaneous lots brought in at various times by members of the staff. No careful, systematic collecting had been attempted, except during the time which Mr. Wm. T. Horne, chief of the department, had spent investigating the troubles of Citrus fruits of the Island and during his work on the bud-rot of cocoanuts. Both of these studies extended over a wide range of territory and, as a sharp lookout was maintained constantly for scale insects, the Coccid fauna of the various Citrus plants and of the cocoanut must be fairly well represented in the collection.

The collecting by the writer was done mainly in the vicinity of Santiago de las Vegas and of Havana. The latter locality offered exceptional opportunities because of two botanical gardens which were placed at his disposal—La Jardin Botanica de la Universidad de Habana and La Jardin Botanica del Instituto de la Segunda Ensenada de Cuba. Not only was the work of collecting facilitated by finding in a relatively small area a large number of named host plants, but it seemed little had been done on the part of the gardeners by way of combating the Coccids and, as a result, the field was an unusually rich one.

Two ends were sought in the collecting: To secure as many species as possible and to enlarge the list of known Coccid host-plants. Immediately after it was collected, the material was dried in a slightly warmed oven and treated with flake naphthalene, the former to prevent development of molds and the latter to repel insects. Both operations are important in tropical and semi-tropical Coccid collecting, the former being particularly so if the season of collecting is wet. Moreover,

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material collected during the dry season of the year is of better quality than that collected during the rainy season, since in the first case the specimens are much less likely to be filled with entomogeneous fungi. For study, the Diaspine specimens were prepared by two methods. Where possible, at least one slide was prepared by the chloroform method in order to preserve and bring out the pygidial fringe and slow method caustic-potash slides were used in the study of the internal characters.

ACKNOWLEDGMENTS.

This study was conducted under the tutelage of Dr. A. D. MacGillivray. To him the writer expresses his indebtedness. While residing in Cuba, several specimens were sent to Dr. C. L. Marlatt, for identification. These determinations have been of material assistance in checking the identification of others.

SCOPE OF THE WORK.

This paper deals mainly with the subfamilies Conchaspinæ and Diaspinæ, though a few species from other subfamilies are listed. Much material from the latter is on hand, still undetermined. Altogether, 368 lots of material were examined which yielded 36 species and 3 subspecies. One species and one subspecies are described as new to science. In working the material over, the writer felt some disappointment in the comparatively small number of species which it yielded. He expected at least as many as a collection of similar size from the Temperate Zone would contain. The explanation, however, lies in the fact that in our northern latitude, there is in reality both the Temperate and for the most part the Semi-tropical Zone to draw from; the latter because of the greenhouse and conservatory fauna, while in the South but one zone is available.

The arrangement of the species is in the order of their occurrence in Mrs. Fernald's "Catalogue of the Coccidæ of the World." On the final pages will be found tables for the differentiation of the species of *Conchaspis* and *Pseudischnaspis*.

ABBREVIATIONS.

In accrediting the collections the initials of the collector are used. Thus: W. T. H. = Wm. T. Horne, M. T. C. = Dr. Mel T. Cook, C. F. B. = C. F. Baker, W. A. P. = W. A. Page, J. W. S. = J. W. Stakley, S. P. S. = Sebastian Pla y Solarichs, E. W. H. = E. W. Halstead, J. S. H. = J. S. Houser.

Conchaspis angræci Ckll.

Host, Yucca gloriosa. *Locality,* Jardin Botanica del Instituto Segunda Ensenda de la Habana (Habana). *Date,* Feb. 2, 1909. *Collector,* J. S. H.

Asterolecanium bambusæ Bdv.

Host, Bambusa vulgaris. *Locality,* Rincon. *Date,* June 4, 1908. *Collector,* W. T. H.

Asterolecanium pustulans (Ckll).

Host, Fig. *Locality,* Santiago de las Vegas. *Dates,* May 18, 1905; July 22, 1908. *Collectors,* W. T. H., J. S. H.

Capulinia sallei Sign.

Host, unknown shrub. *Locality,* Lagoona Castellana, Santiago de las Vegas. *Date,* March 25, 1908. *Collector,* J. S. H. *Note.*—The present is the third time this insect has been taken. The first record is that of Signoret, 1874, when the species was described. The type material was taken on "Capulino" in Mexico. The insect was rediscovered May 27, 1897, by C. H. T. Townsend, on "Escobillo" in woods Arroyo San Isidro (near Frontera) Tobasco, Mexico. The material of the present record was taken infesting both leaves and branches of an unknown hardwood shrub, growing near a lagoon situated in the midst of a cattle range of several hundred acres.

So unusual was the appearance of the insect that Prof. W. W. Froggatt, entomologist of Australia, who was with the writer at the time, was not even certain it was a Coccid. Later it was identified by Dr. Marlatt. The most striking characteristic of the insect is the long, white filaments which spring from the dorsum. In time these become wound and matted about the twigs and leaves, at first sight conveying the impression that a bird had been flying with a bit of cotton twine and the latter had become lodged and tangled on the twig.

Pulvinaria psidii Mask.

Host, Unknown wild plant. *Locality,* Calabazar. *Date,* May 3, 1908. *Collector,* W. T. H.

Ceroplastes cerripidiformis Comst.

Host, Wild shrub. *Locality,* Santiago de las Vegas. *Date,* May 18, 1905. *Collector,* W. T. H.

Coccus mangiferæ (Green).

Host, Mango. *Locality*, Santiago de las Vegas. *Date*, April 22, 1908. *Collector*, W. T. H.

Saissetia oleæ (Bern).

Host, Enterolobium cyclocarpum. *Locality*, Santiago de las Vegas. *Date*, December, 1906. *Collector*, W. T. H.

Chionaspis citri Comst.

Host, Citrus sp. Orange, French Lemon, Sweet Orange, Grape Fruit. *Localities*, Santiago de las Vegas, Buenaventina, Ciego d' Avila, Cristo, Ceballos, Herraduria, Bahia Honda, Camaguey. *Dates*, April 13, 1905. Aug. 31, 1906. Sept. 13, 1905. March 6, 1906. Dec. 25, 1907. Feb. 16, 1907. Dec. 11, 1907. *Collectors*, W. T. H., W. A. P., J. W. S. *Notes.*—A survey of all the material at hand shows that this species is variable, the principal differences being in the number and placing of the plates. In Comstock's description (p. 102, Cornell University Report, 1883), he says there is one plate near the penultinate segment (of abdomen). In these specimens there are two and three plates in this position. These specimens sometimes have two plates in one or several of the positions laterad of each lobe as against Comstock's one. In some of the specimens there are bifurcate instead of simple plates. All this material has two large marginal pores laterad of the fourth incision, disagreeing with Comstock's figure in which only one is shown.

Howardia biclavis Comst.

Hosts, Cestrum diurnum Lin., Leucæna glauca Beuth., Hæmelia potens Jaco., Licuma nervosa A. C., Sapote, Magon, Cinnamonicum zeylanicum Breyn., Salix Bablionica L., Melicocca bijuga L., "Artea," Ficus carica L., Jatropha hastata., Meringa pterigosperma Gærtn., Egg plant, Tangarine, Canistel, Camito, Solanum cellicarpæfolium Kth., Leguminous liana Temerind 834, Malvaceous shrub, Ficus sp., Deheraimia cubensis Mez., Solanum verbasafolium L., Lantana sp., Maclura tinctoria Don., Sapindus saponaria L., Composite shrub, Carbonicella, "Diamela" Avocado, Malpighia punicifolia C., Mammea americana L., Jassamine, Calophyllum calaba Jacq., Ficus pertussa, "Anon," Guazuma tomentosa Sw., Athœa officinalis L., "Caymito" Fig., Eucalyptus, Psychatria. *Local-*

ities, Jardin Botanica del Instituto Segundo Ensenado de Cuba (Habana), Jardin Botanica de la Universidad de Habana (Habana), Santiago de las Vegas. *Dates*, Jan. 27, 1909; Feb. 2, 1909; Oct. 11, 1908; Oct. 21, 1908; Feb. 8, 1909; Feb. 16, 1909. *Collectors*, W. T. H., J. S. H., M. T. C. *Note*.—The so-called setæ of Comstock's description are dorsal wax pores.

Howardia biclavis detecta Mask.

Host, Spanish pear. *Locality*, Jardin Botanica de la Universidad de Habana, (Habana). *Date*, Jan. 27, 1909. *Collector*, J. S. H. *Note*.—Although the mounted insects resemble true *biclavis* Comst. in every respect, the specimens are placed under the variety *detecta* Mask. because the scale is not covered with bark. This according to Maskell differentiates the two. The bark of Spanish pear is very hard and smooth, so that it would seem almost impossible for a scale to mine beneath it; hence, it is the belief of the writer that the mining habit of *biclavis* Comst. is regulated by the food plant upon which it occurs and that the variety *detecta* Mask. is not valid. Further evidence on the point is brought out by an examination of a series of infested plants grading from those with soft and corky or flaky bark to those with a hard leathery sort. The insects are almost entirely hidden when they occur on the soft or flaky-barked sorts and that the quantity of covering gradually decreases as the opposite extreme is approached.

Diaspis boisduvalii Sign.

Host, Coconut. *Locality*, Baracoa. *Dates*, March 22, 1907; June 14, 1907. *Collector*, W .T. H. *Note*.—The writer is unable to place these specimens in any other species than *D. boisduvalii* Sign., though the insects at hand differ in several respects from it. The lateral margin of the median lobes is not attached to the body along its entire length, but the tip of the lobe is free. See Comstock (Report of Cornell University 1883, p. 87). In these specimens there is a distinct triangular projection between the median pair of lobes which is not figured by either Comstock or Newstead. The spines vary from Comstock's description; the second pair instead of being mesad of the plate between the first and second lobes is situated upon the median margin of the broad plate bearing the opening of the large dorsal wax pore between the first and second lobes. In his Monograph of the

British Coccids, (p. 154, Vol. I), Newstead states, "A long plate immediately follows the first three pairs of lobes." In my specimens there is a spine between the first and second lobes—not a plate.

Diaspis pentagona Targ.

Hosts, Peach, Ipomæa antillans. *Localities*, Tacajo, Calabazar. *Dates*, April 12, 1905; May 3, 1908. *Collectors*, M. T. C., W. T. H. *Note.*—This material does not agree perfectly with Newstead's figure, Monograph of the British Coccidæ, (Vol. I, p. 447). The mesal portion of the second pair of lobes is subequal in Newstead's figure while in these specimens it is much longer. These specimens usually have a trifurcate plate laterad of the second pair of lobes, where Newstead figures an ordinary plate; also these specimens have one to two pectinæ in the fourth position, while Newstead figures three.

Hemichionaspis aspidistræ Sign.

Hosts, Citrus trifoliata, Royal Palm, Wild legume. *Locality*, Santiago de las Vegas. *Collectors*, W. T. H., J. S. H. *Dates*, Nov. 16, 1908; Sept. 24, 1907.

Hemichionaspis minor (Mask).

Hosts, Lupiter, "Malba rosa," Melicocca bijuga L., Artea, Enterolobium cyclocarpum (Sw.) Gr., Wild trailing vine, Hibiscus sabodariffa, Sida carpinifolia, Tree cotton, Hennequin, Hibiscus, Citrus trifoliata, Plum, Bauhinia sp., Melina sp., Solanum verbasafolium L., Yucca gloriosa, Thumbergia grandiflora, "Sterculia," Mimosa asperata, Cajanus inducis Spr., Lonchocarpus latifolius, Althæa officinalis, Faberna, and Peach. *Localities*, Jardin Botanica del Instituto Segunda Ensenada de la Habana (Habana), Jardin Botanica de la Universidad de Habana (Habana), Habana, Santiago de las Vegas, Herraduria. *Dates*, Jan. 27, 1909; Dec., 1906; Dec. 17, 1907; Oct. 16, 1906; Feb. 16, 1907; March 15, 1908; Sept., 1906; Feb. 15, 1907; June 3, 1907; July 22, 1908; Oct. 11, 1908; Feb. 2, 1909; July 20, 1908; Feb. 16, 1909; Feb. 19, 1907. *Collectors*, J. S. H., W. T. H., M. T. C., C. F. B.

Aspidiotus cocotiphagus Mar.

Hosts, Cycas revoluta, Coconut, Phœnix Palm, Palm, Citrus trifoliata, Honeysuckle, Anone, Royal Palm. *Localities*, Jardin

Botanica de la Universidad de Habana, (Habana), Santiago de las Vegas, Jardin Botanica del Segundo Ensenanda de Habana, (Habana). Santiago de Cuba. *Dates*, Jan. 27, 1909; June 4, 1908; Aug., 1904; Feb. 2, 1909; July 20, 1908; Sept. 24, 1907; May 13, 1908; Nov. 16, 1908. *Collectors*, J. S. H., W. T. H., S. P. S.

Aspidiotus subsimilis var **anonæ** n. vr.

Hosts, Milliflores verbenacia, Cinnamonicum zeylanicum Breyn, Maclura tinctoria Don., Rose, Spondias purpurea, Lonchocarpus latifolius Kth., Magnolia grandiflora, Faberna. (Anona sp., Mangifera cambodiana and Loquat—Records of Dr. C. L. Marlatt, Bur. Ent. U. S. D. A. See note following description.) *Localities*, Jardin Botanica de la Universidad de Habana (Habana), Jardin Botanica del Instituto Segunda Ensenada de la Habana (Habana). *Dates*, 1907; Jan. 27, 1909; Feb. 21, 1909; 1910. *Collectors*, J. S. H., W. T. H., (E. R. Sasscer. See note following description.)

Description.—Scale of Female: 1 to 1.9 mm. in diameter; irregularly circular; thin; tough; slightly convex; very inconspicuous, due in part to the fact that the insect is partly mining in its habit as particles of thin bark usually extend over the scale; dorsal shed skin conspicuous; located on bark of host; no dot and ring present. Scale of Male: Not known. Adult Female: Length ranges from 0.8 mm. to 1 mm. and width from 0.8 mm. to 1.1 mm., usually wider than long, type specimen 1 mm. wide, 1.12 mm. long, yellow, of usual form, circumgenital pores wanting. Nearest *A. subsimilis* Ckll. and *A. coursetiæ* Mar. Anal Plate: In shape rather sharply triangular, retracted within the scale body, two broad chitinized areas extending from the posterior tip well up into the pygidium where they gradually disperse. One pair of lobes placed close together, broader at base, usually notched on both sides near the tip, tip rounded; chitinized processes equal to two-fifths the length of the lobe extending up into the pygidium from the mesal portion of the base of each lobe and from the opposite of each lobe is a similar process but lacking a little of being half as long as the preceding. Incisions between median lobes shallow, second and third incisions shallow also; lateral margins of second and third incisions bordered by strongly chitinized thickened processes; mesal process of second incision greatly elongated and abruptly terminating in a globular swelling or club; lateral processes about one-third as long and only slightly swollen; chitinous processes of third incision sub-equal, slightly swollen anteriorally and both usually curved laterad. Plates small, simple, inconspicuous, one arising from each side of the mouth of the second incision, two mesad and two laterad of the third incision; of the two last mentioned the outer one is very weak and slender; two or three additional plates on the pygidial margin. Spines strong, prominent; a single spine laterad of each of the lobes, two laterad of each of the second and third incisions and two about midway of the pygidial margin. Anal opening slightly caudad of the knobs of the chitinous processes of the second incisions, about two-thirds as large as a single knob. Genital opening about nine times the length of the lobes above them. Three rows of dorsal pores of from seven to nine pores each, extending up into the pygidium at an acute angle to the pygidial margin.

Note.—It was the original intention of the writer to describe this as a new species; indeed, this was done in manuscript form as it appears above. In December, 1916, Dr. Marlatt kindly granted him access to the Coccid collection of the Bureau of Entomology, and during this study it developed that an identical species was known under the manuscript name of *A. subsimilis* var. *anonæ* in the Bureau's collection. Upon learning of the writer's material, Dr. Marlatt generously insisted that their material be included with his and published. The collection records of the Bureau's material were:

1. On Anone sp. Lima, Peru, 1909, E. R. Sasscer.
2. On Mangifera acambodiana, Miami, Fla., 1910, E. R. Sasscer.
3. On Loquat, Miami, Fla., 1910, E. R. Sasscer.

The following are Dr. Marlatt's manuscript notes:

"*Aspidiotus subsimilis* Ckll. Is very closely allied to *coursetiæ* sp. nov., the latter perhaps not deserving more than varietal rank. It is readily distinguished from the *ancylus* group of species, to which it is closely allied, by the elongated and knobbed character of the inner chitinous thickening or paraphysis of the first incision, resembling in this respect somewhat *Aspidiotus ulmi* Johnson.

"Some material showing a slight divergence from the type was collected in the Department greenhouses by Mr. Sasscer on *Anona* sp. imported from Lima, Peru. This form is more chitinized than the type material of *subsimilis*, the knobbed paraphyses are a little longer, and the anal orifice a little more remote from tip. When a larger acquaintance with *subsimilis* is gained by future collections and study, this variety will very probably be found to fall within the variation of the species. For the present, however, it may be designated as *subsimilis* var. *anonæ*."

Type and paratypes in the collection of the Bureau of Entomology U. S., Department of Agriculture, Washington, D. C. Entomology, U. S. Paratypes and cotypes in writer's collection.

Aspidiotus cyanophylli Sign.

Hosts, Rose, Psidium guiava, Anone. *Locality*, Santiago de las Vegas. *Dates*, Oct. 10, 1906; Oct. 11, 1908; Sept. 18, 1907. *Collectors*, W. T. H., J. S. H.

Aspidiotus destructor Sign.

Host, Coconut. *Locality*, Santiago de las Vegas. *Date*, August, 1904. *Collector*, W. T. H.

Aspidiotus fabernii n. sp.

Host, Faberna. *Locality*, Jardin Botanica del Instituto Segunda Ensenada de la Habana (Habana). *Date*, Jan. 27, 1909. *Collector*, J. S. H.

Description.—Scale of Female: 1.25 mm. in diameter, strongly convex, usually circular though sometimes slightly elongate; exuviæ central, covered, but the granular covering easily rubbed off, leaving exposed the yellow or orange exuviæ; ventral scale white, conspicuous; the scales are piled one upon another giving the bark the appearance of bearing scattered nodules. Adult Female: About 1 mm. long and 0.93 mm. wide; pygidium broadly triangular; three pairs of lobes, median broader than long, prominent, lateral margin usually entire though sometimes notched, apices rounded, nearly touching; second pair of lobes slightly less than half as broad and long as median, usually entire though sometimes notched apically; third pair of lobes small, pointed, inconspicuous, usually a rudimentary fourth lobe and if so, low and rounded; second and third incisions with thickened edges; chitinized median portion of each incision longer and stouter than the lateral portion; a very minute plate between the first and second and two between the second and third pairs of lobes; on the pygidial margin laterad of the third pair of lobes are five prominent bifurcate pectinæ strongly swollen at the base and usually a simple plate; counting laterad the first three pectinæ are similar, equidistant and are between the third and rudimentary fourth lobes; the fourth and fifth pectinæ are slightly smaller than the first three and are located laterad of the rudimentary fourth lobes; the bifurcate pectinæ are very characteristic, being greatly broadened at the base and the points of the fork usually diverge strongly, but sometimes both curve mesad; the remaining simple plate is located on the pygidial margin at a distance from the fifth pectina a little greater than that between the third and fourth pectinæ; it has the same swollen base characteristic of the pectinæ but it is not bifurcate at the tip; there is a dorsal and a ventral spine laterad of each pair of lobes including the rudimentary fourth and one about the middle of the pygidial margin; the spines laterad of the median lobes are weak and subequal in length to the median lobes; the spines of the second, third and fourth positions increase gradually in size until they attain a length equal to twice that of the pectinæ; the spines of the fifth position are about equal to those of the second; the anal opening is four or five times its own width cephalad of the base of the median lobes and the vaginal opening is nearly twice this distance cephalad of the base of the lobes; circumgenital pores are wanting.

Relationship.—This species is nearest *A. diffinis* but differs from it particularly in the number, shape and position of the pectinæ and the number and size of the spines as well as in other characters. Type and paratypes in the collection of the Bureau of Entomology, U. S. Department of Agriculture, Washington, D. C. Paratypes in writer's collection.

Aspidiotus hederæ (Vall).

Hosts, Anone, Magnolia grandiflora, Pandano utes H. de G., Guava, Coconut, Manoca Palm, Citrus trifoliata, Avocado (leaf). *Localities*, Santiago de las Vegas, Jardin Botanica de la Universidad de Habana (Habana), Baracoa. *Dates*, Oct. 23, 1908; Jan. 27, 1909; Feb. 27, 1907; May 14, 1907; March 17, 1907; Sept. 18, 1907; Oct. 16, 1907; Nov. 13, 1906; Oct. 19, 1907; Feb. 19, 1909; Sept. 27, 1907. *Collectors*, J. S. H., W. T. H.

Aspidiotus lataniæ Sign.

Hosts, Peach, Milliflores verbenacia, Lupiter, Cinnamomum zeylanicum Breyn, Salix Bablyonica L., Laurel de Espana, Ficus carica L., Citrus sp., Enterolobium cyclocarpum (Sw) Gr., Antigonum leptopus Hed., Cultivated fig, Cherry, Wild Legume, Clerodendron fragrans L., Wild Guava, Dricina terminalis, Coconut, Hibiscus, Yucca gloriosa, Small honeysuckle, Satlfergia sissoa, Loguat, Avocado, Lonchocarpus latifolius Kth. Spomea purpurea Lam. *Localities*, Santiago de las Vegas, Jardin Botanica de la Universidad de Habana (Habana), Jardin Botanica del Segundo Ensenada de Cuba (Habana), San Cristobal, San Antonio de las Banas. *Dates*, Jan. 31, 1909; Jan. 27, 1909; Feb. 2, 1909; Oct. 10, 1907; Dec., 1906; June 12, 1908; July 22, 1908; May 12, 1906; Oct. 15, 1906; Oct. 11, 1908; July 29, 1908; Oct. 23, 1908; July 29, 1908; Oct. 10, 1906; Sept. 24, 1907; June 13, 1908; Feb. 16, 1909; Feb. 11, 1909; Feb. 8, 1909; June 16, 1906. Collectors, J. S. H., W. T. H. E. W. H.

Notes.—It is generally considered that *A. lataniæ* has one pair of lobes, but in the greater part of this material the second and third pairs are developed into sharply pointed, small triangular processes which it seems should be called lobes. According to various descriptions there should be plates between the median pair of lobes, and these specimens agree for the most part in this respect, but some have one pectina and one plate in this position, while others have two pectinæ. The number of circumgenital pores also seems quite variable. Most of this material in this respect runs below the numbers usually attributed to this species.

Aspidiotus palme Morg and Ckll.

Host, Magnolia grandiflora. *Locality,* Jardin Botanica de la Universidad de Habana. *Date,* Jan. 27, 1909. *Collector,* J. S. H.

Aspidiotus sacchari Ckll.

Hosts, Panicum molle, Coix lacryma L. *Localities,* Banes, Jardin Botanica del Instituto Segunda Ensenada de la Habana (Habana). *Dates,* Aug. 23, 1907; Feb. 2, 1909. *Collectors,* W. T. H., J. S. H.

Aspidiotus spinosus Comst.

Hosts, Cinnamomum zeylanicum Breyn. *Locality,* Jardin Botanica del Segundo Ensenada de Cuba. *Date,* Jan. 27, 1909. *Collector,* J. S. H.

Pseudaonidia tesserata (de Charm).

Hosts, "Ciduela," Leucæna glauca Beuth. *Localities,* Santiago de las Vegas, Jardin Botanica del Instituto Segunda Ensenada de la Habana (Habana). *Dates,* Jan. 27, 1909; Feb. 18, 1909. *Collector,* J. S. H. *Note.*—In de Charmoy's description, (Pro. Societie Amicale Scientifique de Mauritius, 1889, p. 23), he states that the second pair of lobes is shorter than the third, while in this material the third is shorter than the second.

Selenaspidus articulatus (Morg).

Hosts, Phœnix dactylifera L., Lime, Orange, Small White Honeysuckle, Bergamota, Sweet Orange, French Mandarin, Lemon, Sour Sop, Palm, Laurel nobilis, Maclura tinctoria Don., Anone, Satsuma Orange, Tangerine, Grape Fruit, Muchlenbeckia platyctoda M., Calophyllum calaba Jacq., Laurel de la Yndia, "Sidra" (Citrus sp), Magnolia grandiflora, Caymito.

Localities, Jardin Botanica de la Habana (Habana), Ciego d'Avila, Santiago de las Vegas, Cristo, Bahia Honda, Sætia, Jardin Botanica del Segunda Ensenada de la Habana (Habana). *Dates*, Jan. 27, 1909; Sept. 7, 1905; Sept. 13, 1905; Sept. 5, 1905; Jan. 13, 1906; Feb. 2, 1908; Jan. 12, 1908; May 5, 1907; July 22, 1908; Sept. 24, 1907. *Collectors*, J. S. H., W. T. H., W. A. P., E. W. H.

Chrysomphalus aonidum Lin.

Hosts, Cycas revoluta, Grape fruit, Lime, Rose, Orange, Sour Orange, Sweet Orange, Citrus sp., Lemon, Coconut, Bergamonta, Zamia pumila, Dracinia terminalis, Martinezia caryotæfolia Hg. B., Anone, "Hennequin," Citrus trifoliata, Ficus religiosa, Mammea, americana, Colophyllum coloba Jacq., Citrus decumana Lin., "Laurel de la Yndia," "Sidra," Magnolia grandiflora Lin., Pandano utes H. de G. *Localities*, Jardin Botanica de la Universidad de la Habana (Habana), Santiago de las Vegas, Ciego D' Avila, Alquizar, Guantanamo, Mazorra, Mariel, Consolacion del Sur, Jardin Botanica del Instituto Segunda Ensenada de la Habana (Habana), Ladd Farm Santiago de las Vegas. *Dates*, Jan. 27, 1909; July 21, 1908; Sept. 7, 1905; Dec. 3, 1905; Oct. 15, 1906; July 27, 1906; Feb. 9, 1905; Dec. 11, 1905; Dec. 3, 1904; Feb. 10, 1905; July 18, 1904; Sept. 7, 1905; Feb. 19, 1905; Sept. 13, 1905; Nov. 3, 1905; Oct. 11, 1908; Feb. 2, 1909; Dec. 1, 1901; July 10, 1908; Feb. 16, 1909. *Collectors*, J. S. H., W. T. H.

Aonidiella calurus (Ckll).

Hosts, Calapenæ (Sydney), Mammea americana. *Localities*, Santiago de las Vegas, Jardin Botanica del Instituto Segunda Ensenada de la Habana (Habana). *Dates*, Feb. 16, 1909; Feb. 2, 1909. *Collector*, J. S. H.

Chrysomphalus dictyospermi (Morg).

Hosts, Misparo, Citrus sp., Cinnamomum zeylanicum Breyn., Melicocca bijuga L., Avocado, Rose, Royal palm, Mango, "Ciduella." *Localities*, Jardin Botanica de la Universidad de Habana (Habana), Jardin Botanica del Instituto Segunda Ensenada de la Habana (Habana), Santiago de las Vegas, Santiago de Cuba. *Dates*, Jan. 27, 1909; May 22, 1908; Oct. 17, 1907; July 21, 1908; Sept. 24, 1907; April 22, 1908; July 20, 1908; Nov. 16, 1908; Sept. 24, 1907; Feb. 8, 1909; Feb.

18, 1909. *Collectors*, J. S. H., W. T. H. *Note.*—This is quite a variable species, the principal point of variation being in the so-called "candle-flame" like projections on the pectinæ.

Pseudischnaspis alienus (Newstead).

Hosts, Milliflores verbenacia, Cassia obtusifolia L., Salix Bablionica L., Grevillea robusta, Yucca gloriosa, Clerodendron, Muehlenbeckia platyclada M., Rose. *Localities*, Jardin Botanica de la Universidad de Habana (Habana), Jardin Botanica del Instituto Segunda Ensenada de la Habana (Habana), Santiago de las Vegas. *Dates*, Jan. 27, 1909; Oct. 11, 1908; Feb. 2, 1909. *Collector*, J. S. H.

Odonaspis secreta (Ckll).

Host, Paral grass. *Locality*, Aquacati. *Date*, Dec. 16, 1908. *Collector*, J. S. H. *Note.*—These specimens agree well with the description of *O. secreta* excepting as to the arrangement of the circumgenital pores. In these specimens the anterior laterals are joined by a large median group thus forming an almost perfect horseshoe. In this respect they correspond with Maskell's relegated variety *lobulatus*.

Pseudoparlatoria parlatorioides Comst.

Hosts, Carica papaya, Acalyphia tricolor Hartul, "Sidra" (Citrus sp.). *Localities*, Santiago de las Vegas, Jardin Botanica del Instituto Segunda Ensenada de la Habana (Habana), Jardin Botanica de la Universidad de Habana (Habana). *Dates*, Oct. 29, 1906; Feb. 2, 1909; Jan. 27, 1909. *Collectors*, W. T. H., J. S. H. *Note.*—These specimens have three to eight median circumgenital pores, thus disagreeing with Comstock's description. Comstock's types have no pores in this position. The fishtail is a little more pronounced in Comstock's material than in this.

Lepidosaphes beckii (Newm).

Hosts, Citrus sp., Grape Fruit, Orange, Lemon, Tangerine, Tangerine Fruit, Passion Vine, Citrus trifoliata, Citurs decumana L., "Sidra" (Citrus sp.), Guava, Avocado. *Localities*, Jardin Botanica de la Universidad de Habana (Habana). Pinar del Rio, Santiago del las Vegas, Artemesia, San Cristobal, Rincon, Ceballos, Sætia, Bahia Honda, Alquizar, Banes, Mazorra, Mariel, Consolacion del Sur, Jardin Botanica del Instituto Segundo Ensenada de Cuba (Habana), Taco Taco, Baracoa. *Dates*, Jan. 27, 1909; Dec. 7, 1904; Aug. 26, 1905; Feb. 6, 1906; Nov. 8, 1905; Aug. 4, 1904; Sept. 7, 1905; March 6, 1906; March 5, 1907; July 18, 1904; March 2, 1906; Feb. 14, 1906; Nov. 26, 1905; Sept. 7, 1905; Dec. 3, 1905; Oct. 10, 1907; March, 1906; Feb. 9, 1905; April 14, 1905; Dec. 3, 1904; Feb. 10, 1905; Feb. 19, 1905; Nov. 3, 1905; June 3, 1907; March 22, 1905; Sept. 27, 1907; July 20, 1908; Feb. 2, 1909; July 21, 1908. *Collectors*, J. S. H., M. T. C., W. T. H. *Note.*—Although this species is undoubtedly the true *L. beckii* (Newm), a number of variations have been found which may be worthy of note. In Newstead's description, (Monograph of the British Coccidæ, Vol. I, p. 204), he records from five to seven pores of the median group of the circumgenitals and these are in a single concave series. One specimen, No. 186, has only three median pores grouped—not in a single concave series. One specimen, No. 262, has only six pores of the posterior lateral group, disagreeing with Newstead who reports seven to eleven.

Lepidosaphes flava hawaiiensis (Mask).

Host, Malpighia punicifolia L. *Locality*, Jardin Botanica de la Universidad de la Habana (Habana). *Date*, Jan. 27, 1909. *Collector*, J. S. H.

Lepidosaphes gloverii (Pack).

Hosts, Tangerine, Grape Fruit, Citrus sp., Lemon, "Lemoncelli." *Localities*, Ceballos, Santiago de las Vegas, San Cristobal, Taco Taco, Jardin de la Universidad de Habana (Habana), Sætia. *Dates*, March 6, 1906; July 18, 1904; March 2, 1906; Feb. 14, 1906; Nov. 8, 1906; Sept. 7, 1905; Nov. 22, 1905; Jan. 27, 1909; March 1, 1909. *Collectors*, W. T. H., J. S. H.

Ischnaspis longirostris (Sign).

Hosts, Royal palm, Honeysuckle. *Locality*, Santiago de las Vegas. *Date*, Sept. 24, 1907. *Collector*, W. T. H.

Parlatoria pergandii Comst.

Hosts, Citrus sp., Grape Fruit, Tangerine Fruit, Orange. *Localities*, Taco Taco, Sætia, Santiago de las Vegas. *Dates*, Nov. 22, 1905; Sept. 7, 1905; Feb. 11, 1909; Feb. 14, 1906. *Collectors*, W. T. H., J. S. H. *Note.*—This material agrees closely with Comstock's description and figure, (Report of the United States Department of Agriculture, 1880, p. 227), with the exception that the specimens have a seta upon both the ventral and lateral aspects of the median pair of lobes, whereas Comstock gives one on the dorsum only. The material at hand has well-developed pectinæ laterad of the fifth pair of lobes and these are not shown perfectly in Comstock's figure. Newstead (Pl. XXXII, Fig. 2, Monograph of the British Coccidæ), illustrates the fourth lobe as trifurcate. This is believed to be an error.

Species of *Conchaspis* Ckll.

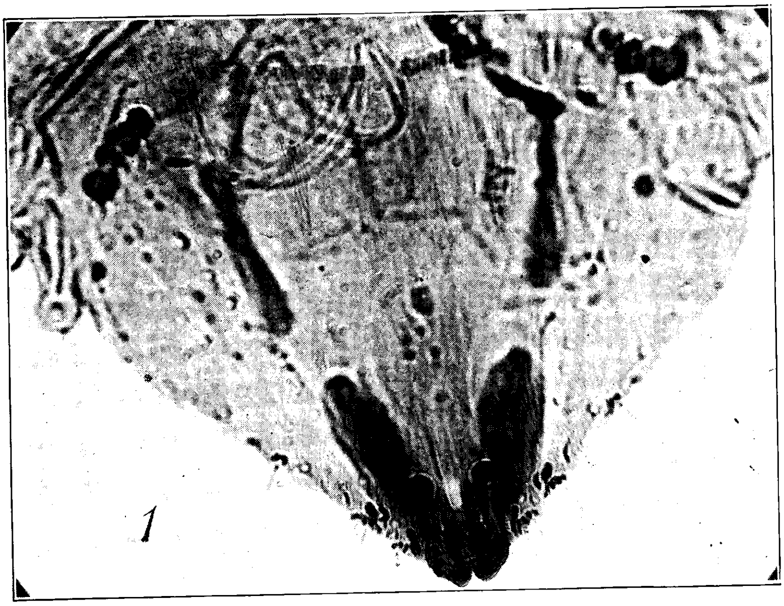
A. Antennæ of adult female with six segments.............. *C. Newsteadi* Ckll.
AA. Antennæ of adult female with less than six segments.
B. Antennæ of adult female with five segments.. *C. fluminensis* Hemp.
BB. Antennæ of adult with less than five segments.
C. Antennæ of adult female with four segments, body gradually narrowed caudad of thorax.
D. Body of adult female purplish red, scale conical with apex normal............................ *C. angræci* Ckll.
DD. Body of adult female colorless, except the brown pygidium, scale conical, apex to one side.. *C. angræci hibisci* Ckll.
CC. Antennæ of adult female with three segments, body abruptly narrowed caudad of the thorax................ *C. socialis* Green.

Species of *Pseudischnaspis* Hemp.

A. Large dorsal gland orifices of each side in two rows running parallel with the pygidial margin. Club shaped paraphyses in five pairs, the first pair small, arising from the inner margin of the median pair of lobes, four large ones beyond.
B. Circumgenital pores in four groups, anterior laterals of seven each and posterior laterals of eight each. Five distinct serrations and some indistinct ones lateral of the third pair of lobes.. *P. bowreyi* (Ckll).
BB. Circumgenital pores in five groups, median two anterior laterals five and posterior laterals three. Three distinct serrations laterad of the third pair of lobes......................... *P. longissima* (Ckll).
AA. Large dorsal gland orifices of each side not arranged in two rows running parallel with the pygidial margin. Paraphyses in six pairs.
B. A single bifurcate plate in each of the incisions, one laterad of the third pair of lobes and two simple plates on the pygidial margin. Tips of bifurcate plates recurved and points rounded. Second, fifth and sixth pairs of paraphyses longest. First, third and fourth pairs less than one-half the length of the others......... *P. alienus* (Newst).
BB. A single bifurcate plate between the median pairs of lobes, two trifurcate plates in the second and third incisions and a trifurcate plate laterad of the third lobe. No plates on pygidial margin. Bifurcate and trifurcate plates with points triangular and tips acute. Second and fifth pairs of paraphyses longest, fourth and sixth about two-thirds their length, and first and third less than one-half the length of the longest.. *P. linearis* Hemp.

EXPLANATION OF PLATE XVIII.

1. Anal plate of Aspidiotus subsimilis var. anonæ n. var. Greatly enlarged (original).
2. Anal plate of Aspidotus farbernii n. sp. Greatly enlarged (photograph by E. R. Sasscer).



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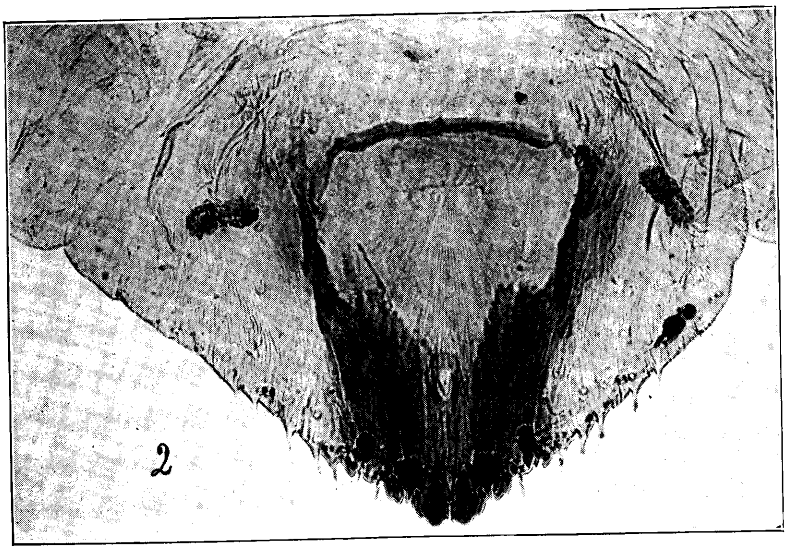

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J. S. Houser