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KEY TO THE GENERA OF COCCIDAE IN JAPAN, WITH DESCRIPTIONS OF TWO NEW GENERA AND A LITTLE-KNOWN SPECIES

(Homoptera)

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In the family Coccidae of modern concept about 40 species under 12 genera are now known to occur in Japan excluding the Loochoo and Bonin Islands. These Japanese species have not been thoroughly dealt with systematically, and in the present paper an attempt has been made to prepare a key for distinguishing the genera, with descriptions of 2 new genera and a little-known species representing a new genus.

Key to the genera of Japan

(Adult female)

(1) Dorsum provided with numerous short stout truncate setae scattered almost over the whole surface, anal plates with a truncate discal seta, spiracular setae not differentiated, antennae and legs much reduced. . . . . *Eriopeltis* SIGNORET.

— Dorsum without such setae, anal plates without a truncate discal seta, spiracular setae various, antennae and legs well developed or small. . (2)

(2) Dorsum with short stout conical setae and minute tubular ducts along mid-dorsal line, and with many large tubular ducts and gland tubercles scattered almost over the whole surface, tubular ducts wanting on the venter, marginal setae spine-like; spiracular setae distinct, over 5, crowded in a cluster; tarsi free-articulated, ungual digitules stout, anal plates short, stout, with stout setae. . . . . *Metaceronema* n. g.

— Dorsum without stout conical setae, with or without tubular ducts; gland tubercles if present arranged on the submarginal area only, never scattered; tubular ducts present or wanting on the venter, spiracular setae, tarsi, and anal plates various. . . . . (3)

(3) Spiracular clefts very wide, with numerous stout spiracular setae scattered in a large cluster; anal plates elongate, rounded at the lateral side, elevated on a sclerotized, more or less produced part; triangular, quadrangular, oval, or irregular pores scattered on the body, the irregular pores with 2-4 loculi sometimes different in size. . . . . *Ceroplastes* GRAY.

— Spiracular clefts small or indistinct, without numerous stout spiracular

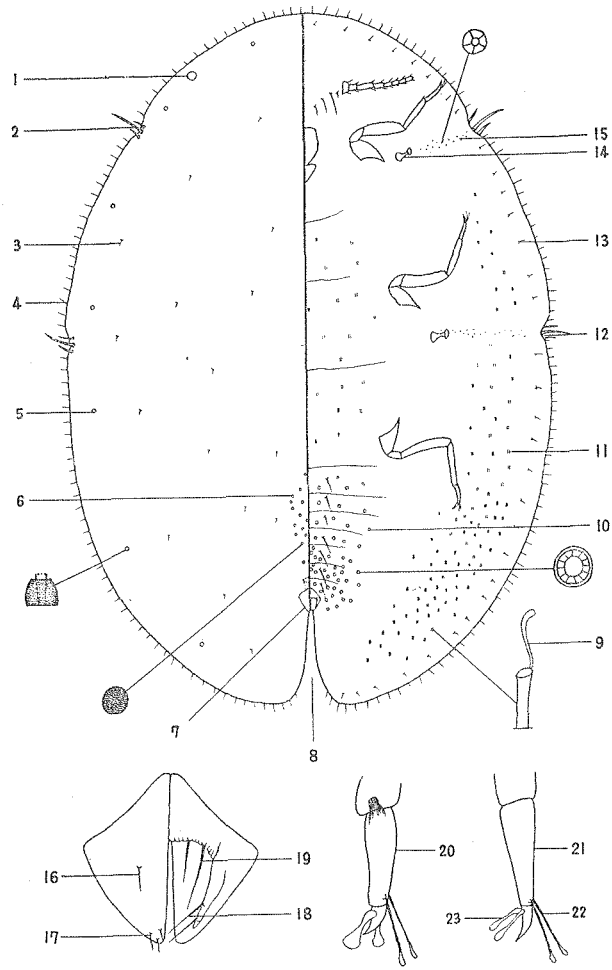

Fig. 1. Diagram illustrating terminology. (Adult female of Coccidae)

Legend of Figure 1. 1. Eye (usually indistinct or wanting). 2. Spiracular setae. 3. Dorsal seta. 4. Marginal seta. 5. Submarginal tubercle (gland tubercle). 6. Dorsal protuberant pore. 7. Anal plate. 8. Anal cleft. 9. Filament of tubular duct. 10. Multilocular pore. 11. Tubular duct. 12. Spiracular cleft. 13. Submarginal seta. 14. Anterior spiracle. 15. Quinquelocular pore. 16. Discal seta of anal plate. 17. Apical seta. 18. Subapical seta (ventral). 19. Fringe seta. 20. Tarsus (free-articulated). 21. Tarsus (not free-articulated, a sclerotic articular process sometimes present at base like fig. 20). 22. Tarsal digitule. 23. Ungual digitule.

setae in a large cluster; anal plates various, but never elevated on a produced part; triangular, quadrangular, oval, or irregular pores wanting. . . . . (4)

(4) Spiracular setae over 7, crowded in a cluster; marginal setae spine-like, tarsi not free-articulated, ungual digitules thin, venter with numerous tubular ducts, anal plates rounded at the lateral side. *Ericerus* WESTWOOD.

— Spiracular setae usually 3 or fewer, never over 7, sometimes not differentiated from the marginal setae; venter with or without tubular ducts; marginal setae, tarsi, and anal plates various. . . . . (5)

(5) Multilocular pores present on the dorsum and venter, dorsum with large tubular ducts which are a little smaller in diameter than the ventral ones; marginal setae spine-like, spiracular setae not differentiated, antennae and legs small, ungual digitules slender, anal plates with a discal seta. . . . . *Takahashia* COCKERELL.

— Multilocular pores present only on the venter, dorsal tubular ducts usually minute if present (large in *Luzulaspis* only), antennae and legs not much reduced; marginal setae, spiracular setae, and anal plates various. . (6)

(6) Body much elongated, narrow, parallel-sided; spiracular setae 2, dorsum with tubular ducts which are as large as the ventral ones, tarsi free-articulated, ungual digitules stout. . . . . *Luzulaspis* COCKERELL.

— Body usually not much elongated, spiracular setae usually 3 or not differentiated, dorsal tubular ducts minute if present, tarsi various. . . . (7)

(7) Anal plates long and narrow, over 3.5 times as long as wide, with the latero-anterior margin being much longer than the latero-posterior margin; anal cleft very long, over one-third the body length; tarsi not free-articulated, ungual digitules stout, marginal setae trichiform, spiracular setae distinct, 3; venter with many tubular ducts. . . . *Protopulvinaria* COCKERELL.

— Anal plates not so elongated, with the latero-anterior margin as long as, or shorter than, the latero-posterior margin; anal cleft not so long, sometimes short; ventral tubular ducts present or wanting; tarsi and marginal and spiracular setae various. . . . . (8)

(8) Venter without tubular ducts; multilocular pores not numerous, confined to the anal region only; tarsi not free-articulated, sometimes with a sclerotic articular process; ungual digitules stout, marginal setae trichiform, spiracular setae 3. . . . . *Coccus* LINNÉ.

— Venter with tubular ducts; multilocular pores widely present on the midregion of the venter of abdomen, sometimes distributed to the venter of thorax; spiracular and marginal setae and tarsi various. . . . . (9)

(9) Tarsi free-articulated, ungual digitules stout, much expanded distally and basally. . . . . (10)

— Tarsi not free-articulated, ungual digitules thin or a little stouter than the tarsal ones at the middle part, expanded apically. . . . . (11)

(10) Dorsum much convex, strongly sclerotized at maturity; anal plates with a discal seta. . . . . *Saissetia* DEPLANCHE.

— Dorsum not distinctly convex, not strongly sclerotized at maturity, anal plates without a discal seta. . . . . *Pulvinaria* TARGIONI.

(11) Dorsum prominently reticulated almost over the whole surface, with a very minute pore at the center of each polygonal area; marginal setae not spine-like, frayed; tarsi sometimes with a sclerotic articular process, ungual digitules a little stouter than the tarsal ones, distinctly capitate; claws without a minute denticle. . . . . *Parasaissetia* n. g.

— Dorsum not reticulated over the whole surface, without a pore at the center of each polygonal area if reticulations present around the anal plates; marginal setae usually spine-like, never frayed; tarsi without a sclerotic articular process, ungual digitules usually thin, capitate or not; claws sometimes with a minute denticle. . . . . *Lecanium* ILLIGER.

Parasaissetia n. g.

Adult female: Antennae well developed. Legs well developed, tarsi slender, tapering, not free-articulated, with or without a sclerotic articular process; ungual digitules a little stouter than the tarsal ones, much expanded apically. Spiracular clefts small. Spiracular setae distinct, 3. Marginal setae not spine-like, frayed. Quinquelocular pores present between the spiracle and spiracular cleft. Anal plates triangular, not much elongated, with or without a discal seta. Dorsum strongly sclerotized at maturity, distinctly reticulated almost over the whole surface, with a minute pore at the center of each polygonal area. Dorsal setae minute, few. Tubular ducts numerous on the venter. Multilocular pores widely present on the midregion of the venter of abdomen.

Genotype: *Saissetia nigra* NIETNER.

Saissetia hemisphaerica TARGIONI, the genotype of *Saissetia*, is closely related to *Pulvinaria*, with the dermal structure of the young adult being not distinguishable from that genus. *Saissetia nigra* NIETNER, on the other hand, seems to be more related to *Lecanium* than to *Pulvinaria* and differs from *Saissetia* in the structures of tarsi, the ungual digitules being not so stout, and in the dorsum reticulated almost over the whole surface. *Saissetia oleae* BERNARD is also to be transferred to this new genus.

In this connection it is added that *Takahashia citricola* KUWANA, with which *Pulvinaria marginata* FERRIS from China seems to be identical, is to be included in *Saissetia*, though referred to *Pulvinaria* by FERRIS (1922).

Parasaissetia nigra (NIETNER)

A well known species and well illustrated and described by FERRIS in the "Insects of Hawaii", V (1948) by ZIMMERMAN. This species is known to occur afield in the southern part of Kyushu, Japan, and is common in the Loochoo Islands. *Lecanium pseudonigrum* KUWANA and *Lecanium sideroxylum* KUWANA described from the Bonin Islands are synonyms of this species.

Metaceronema n. g.

Adult female: Antennae well developed. Legs well developed, tarsi free-articulated, with a sclerotic articular process, ungual digitules stout. Spiracular clefts small, not sclerotized, with over 5 distinct spiracular setae crowded in a cluster. Marginal setae spine-like. Quinquelocular pores present in a band between the spiracle and the spiracular cleft. Anal plates short, stout, surrounding the anal opening, with stout setae, lacking a discal seta. Dorsum not sclerotized, with a pair of series of short stout conical setae along mid-dorsal line, these setae with the basal one-third invaginated into the body; many gland tubercles scattered over the dorsum; dorsal tubular ducts of 2 types, minute ducts present along the series of mid-dorsal conical setae, large ducts numerous over the dorsum; these tubular ducts wanting on the venter. Multilocular pores distributed on the midregion of the venter of abdomen only.

Genotype: *Ceronema japonica* MASKELL.

Distinguished from *Ceronema* MASKELL by the spiracular clefts without a sclerotic plate, the dorsum not sclerotized, and by the presence of mid-dorsal conical setae and scattered gland tubercles. Resembles *Mallococcus* MASKELL in possessing invaginated conical setae, but differs chiefly in the conical setae arranged only along the mid-dorsal line, the dorsum lacking 8-shaped pores, but with scattered gland tubercles, and in the spiracular setae being many and crowded.

Metaceronema japonica (MASKELL)

Ceronema japonica MASKELL, Trans. New Zealand Inst., XXX, p. 235 (1898); MORRISON, Proc. U. S. Nat. Mus., LX, p. 62 (1922).

Lichtensia japonica KUWANA, Jl. New York Ent. Soc., XVII, p. 152 (1909).

Adult female: Body oval, not sclerotized, slightly convex dorsally, covered with whitish secretions. Antennae long, 8-segmented. Legs long, tarsi similar to *Pulvinaria*, stout, free-articulated, with a sclerotic articular process; ungual digitules stout, expanded at the apex. Stigmatic clefts distinct, wanting a sclerotic plate, with 2 or 3 very large and 5 – 7 short spiracular setae in a cluster, these setae bluntly pointed or rounded apically, the large ones stout, about twice or more times as long as the short ones, and one of which is a little shorter. Marginal setae spine-like, slender, conical, distinctly tapering, acutely pointed, rather long, nearly as large as the short spiracular setae, densely arranged in a row, about 30 – 35 between the spiracular clefts on each side, scarcely longer at the hind end of body. Spiracles long and slender at the stalk. Spiracular quinquelocular pores numerous, the band 5 pores wide near the body margin, 3 or 4 pores wide at the middle part. Anal plates stout, blunt and rounded at the base, bent laterad and broadly rounded at the lateral margin, blunt at the apex, with the latero-anterior margin a little longer than the latero-posterior margin, with 4 long stout setae on the distal half of mesal margin and 2 long subapical setae; fringe setae 2 on each side. Anal ring with 6 large setae. Anal cleft

rather short, with a long marginal seta on each side, numerous granulations present along the cleft. Dorsum with some minute slender stiff setae scattered; many short stout conical setae present in a pair of longitudinal rows along mid-dorsal line at the center of dorsum, the rows distinctly apart from the anal plates; these setae much expanded basally, acutely pointed, distinctly longer than wide, less than half the length of marginal setae, over 25 in each row, with the basal one-third invaginated into the body; many gland tubercles scattered over the dorsum, forming irregular blanks, these tubercles absent on the mid-dorsal line, present in an irregular row along each row of conical setae, distinctly smaller in diameter than the conical setae, as large in diameter as the basal part of marginal seta, as large as the multilocular pores on the venter, about 10 posterior to the level of anal plates on each side; many minute tubular ducts scattered along (laterad of) each row of conical setae, these ducts shorter than the diameter of the conical setae, about thrice as long as wide, somewhat tapering, without a filament discernible; numerous much larger tubular ducts scattered over the dorsum, forming many small irregular blanks, these ducts with a wide thickened wall at the cup, and a slender filament. Tubular ducts wanting on the venter. Multilocular pores many in a genital cluster and in a transverse row in front, a few in a row on the preceding segment. Venter with some long fine setae, 2 pairs of quite long setae in front of anal ring, a pair on the head much longer than the marginal setae. Body about 2 mm. long.

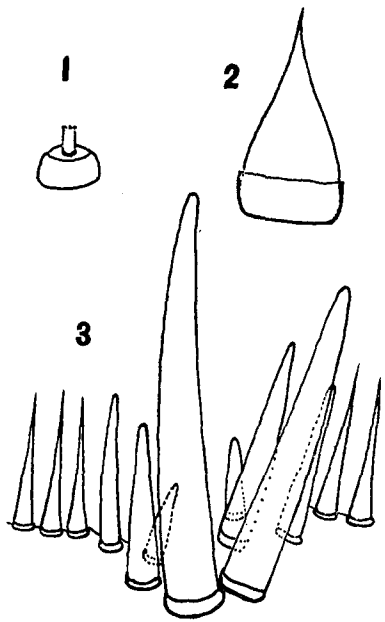

Fig. 2. *Metaceronema japonica* (MASKELL).
Adult female.
(1) Gland tubercle.
(2) Median conical seta on dorsum.
(3) Spiracular setae and marginal setae.

Host plants: *Ilex crenata, Ilex integra, Thea japonica.*

Tokyo, some specimens taken by the writer (II. 1950).