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NEW OR LITTLE KNOWN SCALE INSECTS
OF THE TRIBE ASPIDIOTINI, WITH A LIST OF
THE GENERA AND SPECIES
OF THE TRIBE OCCURRING IN JAPAN

(Homoptera, Coccoidea)

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Aspidiella phragmitis (TAKAHASHI)

Aspidiotus phragmitis TAKAHASHI (1931), Trans. Nat. Hist. Soc. Formosa, Vol. XXI, No. 112, p. 4; Ibid. (1933), Dep. Agr., Gov. Res. Inst. Formosa, Rep. No. 60, p. 54.

Aspidiotus miscanthii KUWANA (1931), Dobuts. Zasshi, Vol. xliii, Nos. 508-510, p. 169.

Aspidiotus mithcanthii KUWANA (1933) (sic), Minist. Agr. For., Dep. Agr., Sc. Bull. No. 3, p. 14.

Aspidiella phragmitis FERRIS (1941), Microent., Vol. 6, Part 2, p. 47.

Chortinaspis bilobis FERRIS (1955) (partim), Microent., Vol. 20, Part 2, p. 32.

Adult female. Body ovate or slightly pentagonal, attaining about 1.1 mm. in length. Prepygidial region membranous or tending to be slightly sclerotized along the margin. Pygidium subtriangular, well sclerotized, the margin being almost straight or slightly convex, and strongly crenulate. Perivulvar pores absent. Anus quite small, narrow, situated at caudal 1/3 of pygidium. Median lobes parallel or slightly divergent posteriorly, separated by a narrow space, robust and strongly projecting, quadrate, with the lateral sides straight, the apex being truncated and serrate weakly and irregularly or almost entire. Distinct basal scleroses of median lobes, robust, about as long as the lobes, and rounded at the anterior end. Second lobes much smaller, rounded apically, entire. Third lobes indicated by a slight projection of pygidial margin. Marginal spines present in median and lateral incisions of pygidium, well developed, mostly bifid apically, 2 between median lobes and also in the inner lateral incision, 3 in the outer lateral incision. A number of submarginal ducts on both faces of pygidium, slender and rather short, with the orifices subcircular or elliptical, and arranged rather in irregular rows on dorsum, scattered on ventrum; orifices of the posterior submarginal ducts surrounded by a strongly sclerotized rim. Some submarginal ducts opened on both faces of first to third abdominal segments, slightly smaller than pygidial ducts.

Scale. In female nearly circular, somewhat convex, and grayish brown; in male similar, but much smaller, elongate.

Specimens examined: a few adult females, Koniya, Amami-Ōsima, 19. V, 1957, S. TAKAGI leg., host—*Miscanthus* sp.

The writer fairly agrees with TAKAHASHI (1933)'s opinion that *Aspidiotus miscanthii* is a synonym of *Aspidiotus phragmitis*. FERRIS (1955) indicates that *A. miscanthii* is a synonym of *Chortinaspis bilobis* (MASKELL, 1898). However, judging from the redescription and figures of the latter given by FERRIS (1946, Microent., Vol. 11, Part 1, p. 38, fig. 16), the present scale seems to be a distinct species, differing from *C. bilobis* by the slightly more acute pygidium, the strongly crenulate pygidial margin and the robust basal sclerites of the median lobes. By having these characters this species is much similar to the species of *Aspidiella*; at least, it has nothing to do with the great majority including the type of the species of *Chortinaspis* FERRIS (1938).

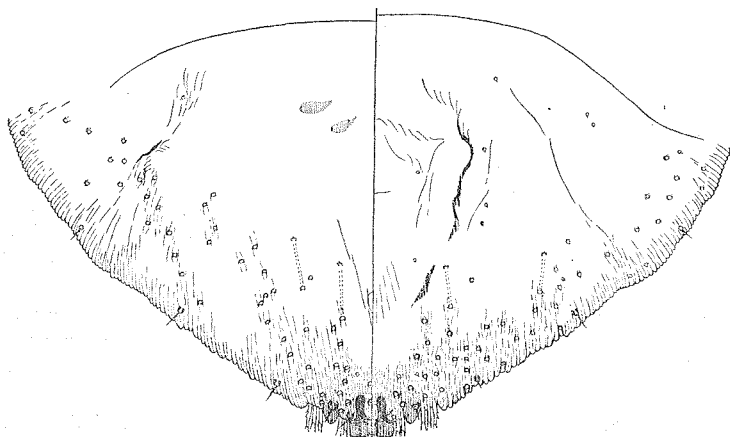


Fig. 1. *Aspidiella phragmitis* (TAKAHASHI).
Adult female: pygidium.

Aspidiotus ophiopogonus KUWANA et MURAMATSU

Specimens examined: an adult female, Sumiyō, Amami-Ōsima, 16. V, 1957, S. TAKAGI leg., host—a species of Polypodiaceae.

This species has been known from *Ophiopogon*, *Festuca* and *Carex* which belong to Monocotyledoneae. It occurs also on a fern as mentioned above. Some scales were found on this host, attacking the rhizome which had hung on a cliff and been almost exposed.

Aspidiotus spinosus COMSTOCK

Specimens examined: a few adult females, Ao-Sima, Miyasaki-ken, Kyusyu, 25. V, 1957, S. TAKAGI leg., host—*Smilax stenopelata* A. GRAY.

Some scales were taken under the stipules of the above-mentioned host. This species has hitherto been unknown from Japan.

Chrysomphalus dictyospermi (MORGAN)

Specimens examined: a few adult females, Ao-Sima, Miyasaki-ken, Kyusyu, 25. V, 1957, S. TAKAGI leg., host—*Euonymus japonicus* THUNBERG; an adult female, Miyasaki, Miyasaki-ken, Kyusyu, 26. V, 1957, S. TAKAGI leg., host—*Enkianthus* sp.

This scale insect has been known as a greenhouse species. The present material may present the first authentic record of its outdoor occurrence in Japan.

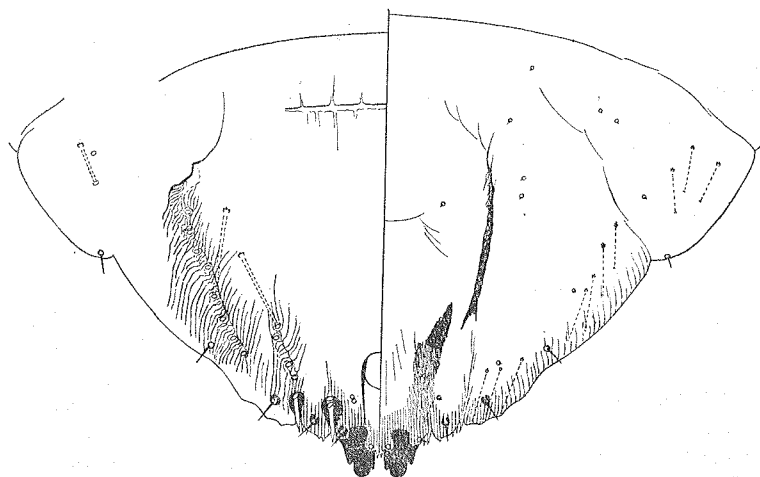


Fig. 2. *Diaspidiotus makii* (KUWANA).
Adult female: pygidium.

Diaspidiotus makii (KUWANA)

Aspidiotus makii KUWANA (1932), Phil. Jl. Sc., 48, no. i, p. 51; Ibid. (1933), Minist. Agr. For., Dep. Agr., Sc. Bull. No. 3, p. 13.

Diaspidiotus makii FERRIS (1941), Microent., Vol. 6, Part 2, p. 45.

Adult female. Body oval. Prepygidial segments membraneous. Pygidium almost rounded. Perivulvar pores absent. Paragenital folds slender and much elongate, their posterior ends extending slightly beyond anterior extremities of apical aliform scleroses of pygidium. Anus circular, quite large, removed from apex of pygidium by a little more than the diameter. Anal furrow broad, thickly sclerotized along the lateral margins. Median lobes parallel, distinctly separated, strongly projecting, robust, rounded apically, with a distinct notch on each side, the outer notch being quite deep and situated slightly anteriorly

than the inner one. Second lobes rudimentary, bearing 1 or 2 minute dentations. Marginal spines in median and lateral incisions of pygidium; median pair of the spines much small, the lateral spines slender, 2 in the inner incision, and 3 in the outer incision. Paraphyses in lateral incisions of pygidium, fusiform, well developed in the inner incision. Dorsal macroducts slender, and few; orifices of the ducts small and oval, arranged as follows: 2 orifices in incision between median and second lobes, 5 submarginal ones in a single oblique row between sixth and seventh abdominal segments, 6-8 in a single oblique row between fifth and sixth abdominal segments, this row attaining laterobasal scar of pygidium. Submarginal dorsal macroducts on fourth abdominal segment, few in number. A few pleural macroducts on first to third abdominal segments and even on metathorax, much shorter than pygidial macroducts.

Scale. In female irregularly circular, white, with the first exuvium subcentral and orange yellow; in male smaller and slightly elongate.

Specimens examined: an adult female, Koniya, Amami-Ōshima, 19. V, 1957, S. TAKAGI leg., host—*Pinus* sp.

Many scales of the male and a few ones of the female were collected on the leaves of the host.

This species is quite similar to *Diaspidiotus coniferarum* (COCKERELL, 1898) in having the large anus, the strongly projecting median lobes, in lacking perivulvar pores, etc. However, it differs from the latter by the presence of the prepygidial macroducts, and also by that the pygidial dorsal macroducts are slightly fewer than in the latter and arranged in 3 single rows on each side.

Hypaspidiotus phaneraspis sp. nov.

Adult female. Body oval, with pygidium protruding, attaining about 1.5 mm. in length. Prepygidial derm membraneous. Antennal tubercles quite minute, with a slender long seta. Second and third abdominal segments with a few pleural macroducts which are much shorter than pygidial macroducts. Anus oval, slightly larger in longitudinal diameter than length of median lobe, situated nearly at caudal 1/3 of pygidium. Perivulvar pores in 4 groups, 7-11 pores in the anterior group, and 5-8 in the posterior. Lobes in 3 pairs, parallel, well developed, and similar in shape. Median lobes set close, separated by a narrow space, robust, about as long as wide, broadly rounded apically and slightly narrowed basally, with a notch on each side, the inner notch being weak. Second lobes similar to the median, but slightly smaller, more or less strongly notched once on the outer side. Third lobes somewhat smaller, but also well developed, with a deep notch on the outer side alone. Marginal spines scarcely extending beyond lobes; interlobar spines slender, fringed apically, 2 spines between median lobes and also between the median and second, and 3 between the second and third; 7 or 8 spines beyond third lobe on fifth and sixth abdominal segments, robust and serrate, with 1 or 2 elongate slender processes at the inner apical angle, the anterior spines being more or less rudimentary. Pygidial dorsal macroducts long, with the orifice oval; a marginal macroduct opened in each interlobar space, the

median marginal macroduct being slightly shorter than distance between anus and bases of median lobes; about 25-35 submarginal macroducts opened in 3 irregularly double or triple rows on each side of pygidium. A pair of paraphyses in interlobar spaces, short and slender, enclosing orifice of each marginal macroduct, components of each pair being continuous at their anterior ends through a slender connecting yoke.

Scale. In female rounded, thin and flat, pale in colour; in male smaller.

Holo- and Paratypes: 5 adult females, Koniya and Nase, Amami-Ōshima, 17. and 20. V, 1957, S. TAKAGI leg., host—*Quercus* sp. The holotype and 2 paratypes are deposited in the collection of the Entomological Institute, Hokkaido University, 1 paratype is in Dr. R. TAKAHASHI's collection, and the other paratype is in the British Museum (Natural History), London.

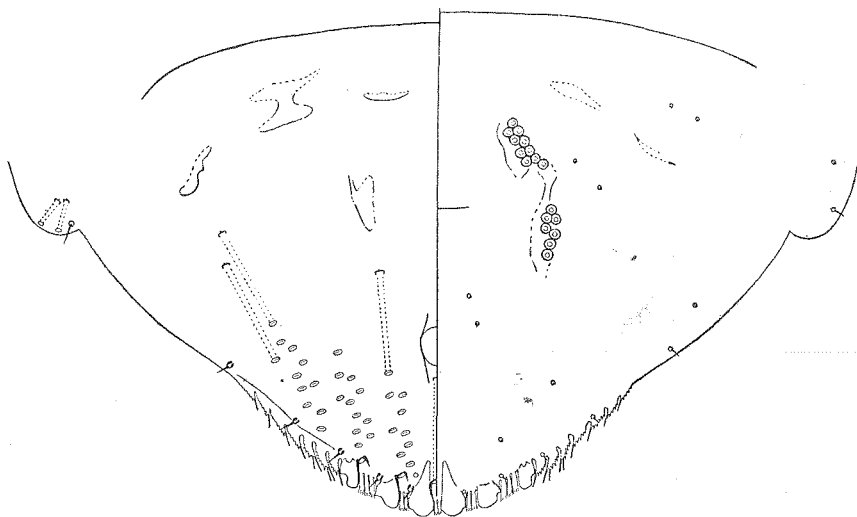


Fig. 3. *Hypaspidiotus phaneraspis* sp. nov.
Adult female: pygidium.

This species occurs on the under surface of the leaves, but is not mining like *Hypaspidiotus jordani*.

The present species is distinguishable from *H. jordani* by the pygidial lobes rounded apically, the presence of the median marginal macroduct on the pygidium, and the less developed paraphyses.

By having the rounded pygidial lobes, this species is much similar to the species referred to *Metaspidiotus*, but it is definitely a member of *Hypaspidiotus* by having paraphyses and also by that the marginal setae of the pygidium are of usual form and not lanceolate.

Morganella longispina (MORGAN)

Specimens examined: 9 adult females, Nase, Amami-Ōshima, 20. V, 1957, S. TAKAGI leg., host—*Elaeagnus* sp.

This species has been recently recorded by TAKAHASHI and TACHIKAWA (1956, Trans. Shikoku Ent. Soc., Vol. 5, Pars 1-2, p. 15) for the first time in Japan, being collected on *Ficus Carica* L. After KUWANA (1931, Jour. Plant Prot., Vol. XVIII, No. 2, p. 5) it occurs also in the South-Sea Islands, infesting citrons.

Quadraspidiotus cryptoxanthus (COCKERELL)

Aspidiotus cryptoxanthus COCKERELL (1900), Psyche, IX, p. 71; KUWANA (1933), Minist. Agr. For., Dep. Agr., Sc. Bull. No. 3, p. 6.

Quadraspidiotus cryptoxanthus FERRIS (1941), Microent., Vol. 6, Part 2, p. 42.

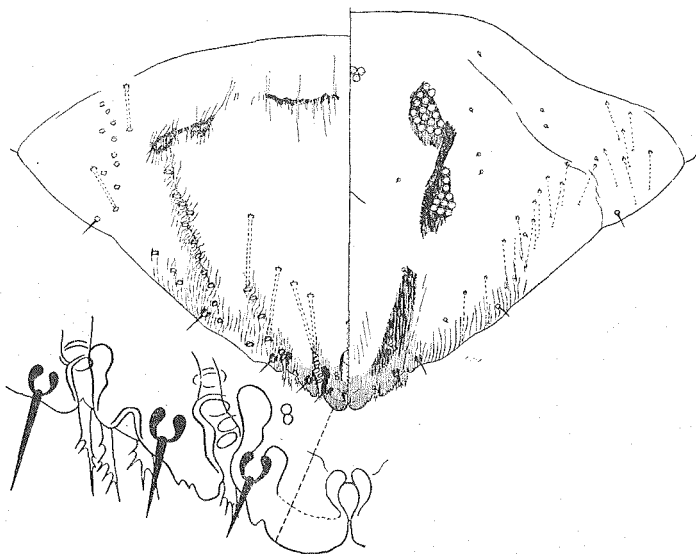


Fig. 4. *Quadraspidiotus cryptoxanthus* (COCKERELL).
Adult female: pygidium.

Adult female. Body oval. Prepygidial segments membraneous. Pygidium subtriangular, with the margin nearly straight. Perivulvar pores in 5 groups, few in the median group, rather numerous in the lateral groups. Anus circular, small, and quite close to apex of pygidium. Median lobes of pygidium crowded together, without spines between, projecting, quite stout, broadly rounded, with a notch on the outer side. Second lobes strongly convergent, much smaller than median lobes, but well developed, with 1 or 2 notches on the outer side. Third lobes indicated by a slight prominence or almost obsolete. Marginal spines in

lateral incisions of pygidium, fimbriate or almost entire, 1 in the inner incision, and 3 in the outer incision. Paraphyses: a pair of paraphyses at inner bases of median lobes, rather short, curved; a pair of paraphyses in each lateral incision of pygidium, inner paraphysis of each pair being robust, more or less strongly swollen at the anterior part. Dorsal macroducts of pygidium slender, with the orifices oval and surrounded by a more or less chitinized rim, arranged as follows: a marginal duct opened in median paraphyses, the duct extending far anteriorly beyond anus; a few ducts opened in inner lateral incision of pygidium; a duct opened at outer base of second lobe; 3-9 ducts opened in a single oblique row between sixth and seventh abdominal segments; a few ducts on sixth abdominal segment, their orifices being situated near margin of pygidium; 9-16 ducts opened in a single oblique row between fifth and sixth abdominal segments, the row extending to laterobasal scar of pygidium; a few submarginal ducts on fifth abdominal segment. Numerous dorsal macroducts on third and fourth abdominal segments, arranged in irregular submarginal rows. Some small submarginal ducts on dorsum of prepygidial segments; similar submedian dorsal ducts on prepygidial abdominal segments.

Scale. In female circular, somewhat convex; in male smaller, slightly elongate, and gray.

Specimens examined; 5 adult females, Ōnuma, Hokkaido, 17. X, 1955, S. TAKAGI leg., host—*Quercus serrata* THUNBERG; an adult female, Aikawa, Sado, 21. X, 1956, S. TAKAGI leg., host—*Castanea crenata* SIEBOLD et ZUCCARINI.

Many scales of the male and some ones of the female were taken on the twigs of the host at Ōnuma.

By having the strongly convergent lobes, this species resembles *Quadraspidiotus socialis* (HOKE, 1927), a *Quercus*-infesting scale, and *Quadraspidiotus forbesi* (JOHNSON, 1896). It differs from the latter two chiefly by having numerous submarginal macroducts on the third and fourth abdominal segments.

Quadraspidiotus williamsi sp. nov.

Adult female. Body subcircular or pyriform, attaining 1.3 mm. in length. Prepygidial segments membraneous. Rudimentary prosomatic tubercles. Pygidium rounded. Perivulvar pores in 5 groups; 3-7 pores in the median group, 7-15 in the laterocephalic, and 5-14 in the laterocaudal. Anus circular or oval, smaller in diameter than length of median lobes, and removed from bases of the lobes by 2-5 times the diameter. Median lobes set close, stout, parallel or somewhat divergent posteriorly on the inner margins, broadly rounded apically, occasionally almost entire, but usually distinctly notched once on the outer side, and sometimes faintly notched once subapically on the inner side. A pair of remarkable scleroses at inner bases of median lobes, elongate. Second lobes quite small, with the apex pointed and slightly bent laterad, sloping on the outer side, bearing 1 or 2 minute lateral dentations; or sometimes the lobes in a somewhat modified form, slightly more projecting and becoming slightly more robust, with the apex rounded, and with a weak outer notch. Third lobes almost obsolete

or represented by a slight rounded prominence. Pygidial marginal spines well developed, simple or divided apically; 2 spines between median lobes and also in incision between median and second lobes, and 3 in the next incision. Paraphyses slender or more or less fusiform, present in lateral incisions of pygidium, the outer lateral pair being usually shorter than the inner lateral; elements in each pair of paraphyses subequal in size. Dorsal macroducts of pygidium slender; orifices of the ducts more or less sclerotized on the rim, and arranged as follows: 1, sometimes 2, between median lobes, with the duct not extending as far as anus, 4-7 between median and second lobes, 1 at outer base of second lobe, 5-11 in a row between seventh and sixth abdominal segments, 2-6 on sixth abdominal

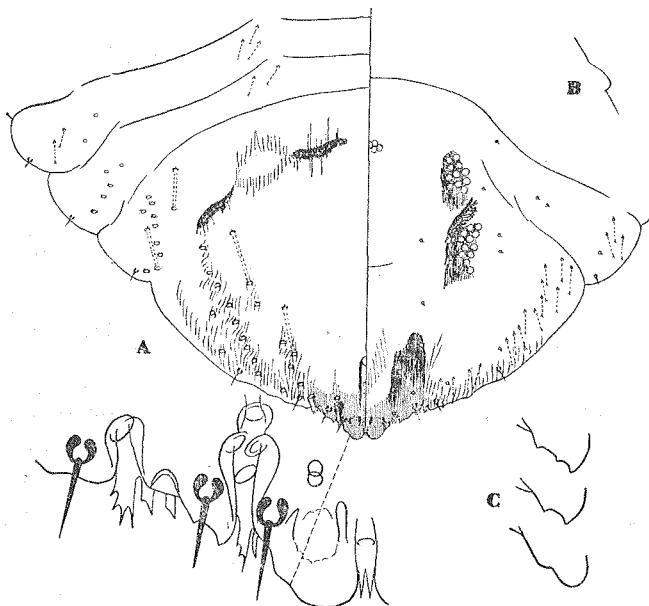


Fig. 5. *Quadraspidiotus williamsi* sp. nov.
Adult female: A, pygidium; B, prosomatic tubercle;
C, second lobes.

segment, 1 or 2 orifices of this group being located almost marginally, 8-13 in a single or partly irregularly double or triple row between sixth and fifth abdominal segments, this series attaining laterobasal scar of pygidium, and 1-5 on fifth abdominal segment. Submarginal macroducts on fourth abdominal segment, 5-11 in number. Prepygidial submarginal dorsal macroducts: 3-10 on third abdominal segment, and 1-4 on the second. Pygidial microducts loosely clustered on fifth and sixth abdominal segments, most of them being opened submarginally

on ventrum, the other ones being opened marginally and often protruding beyond margin of pygidium. Prepygidial submarginal microducts on first to fourth abdominal segments and thoracic region, opened ventrally on third and fourth abdominal segments and dorsally on the other segments.

Scale. In female circular, somewhat convex, dark gray; in male smaller and slightly elongate.

Holotype: adult female, Sapporo, Hokkaido, 23. V, 1956, S. TAKAGI leg., host—a species of Rosaceae. Paratypes: 18 adult females, Sapporo, Hokkaido, 23. V, 1956, S. TAKAGI leg., host—a species of Rosaceae; 2 adult females, Sapporo, Hokkaido, 7. VIII, 1955, S. TAKAGI leg., host—*Syringa vulgaris* LAMARCK; 4 adult females, Kawayu, Hokkaido, 14. VI, 1956, S. TAKAGI leg., host—*Ledum palustre* L. All the types are deposited in the collection of the Entomological Institute, Hokkaido University.

This species is dedicated to Dr. D. J. WILLIAMS who has given the writer kind advice. After him, this species is close to *Quadraspidotus alma-atensis* BORCHSENIUS (1935). Judging from the redescription and figures of the latter species given by BALACHOWSKY (1950, Actual. Sc. Indust., 1087, p. 470, pl. L), the present scale insect differs from *Q. alma-atensis* chiefly by the following characters:—

- 1). The inner basal scleroses of the median lobes are well developed, remarkable.
- 2). The second lobes are not quadrate, with the outer side sloping.
- 3). The prepygidial dorsal macroducts are present on the second and third abdominal segments, and represented only by the submarginal series.

The second lobes of this species are usually quite small, with the apex pointed, but in a few individuals among the examined specimens the lobes are becoming slightly more projecting, and in an extreme case, they are rather robust, the apex being rounded.

LIST OF THE GENERA AND SPECIES OF THE TRIBE ASPIDIOTINI OCCURRING IN JAPAN*

I. *Abgrallaspis* BALACHOWSKY (1948)

1. *Abgrallaspis cyanophylli* (SIGNORET, 1869)
2. *Abgrallaspis degenerata* (LEONARDI, 1896)

II. *Aonidiella* BERLESE et LEONARDI (1895)

3. *Aonidiella aurantii* (MASKELL, 1878)
4. *Aonidiella citrina* (COQUILLET, 1891)

* This list presents the scale insects of the tribe Aspidiotini which are authentically known to live in the field in the Archipelago of Japan including Hokkaido, Honsyu, Sikoku and Kyusyu with their neighbourings and also the Amami Islands.

5. *Aonidiella messengeri* MCKENZIE (1953)
6. *Aonidiella taxus* LEONARDI (1906)

III. *Aspidiella* LEONARDI (1898)

7. *Aspidiella phragmitis* (TAKAHASHI, 1931)
= *Aspidiotus miscanthii* KUWANA (1931)

IV. *Aspidiotus* BOUCHÉ (1833)

8. *Aspidiotus cryptomeriae* KUWANA (1902)
9. *Aspidiotus destructor* SIGNORET (1869)
10. *Aspidiotus ophiopogonus* KUWANA et MURAMATSU (1932)
11. *Aspidiotus spinosus* COMSTOCK (1883)

V. *Chrysomphalus* ASHMEAD (1880)

12. *Chrysomphalus bifasciculatus* FERRIS (1933)
13. *Chrysomphalus dictyospermi* (MORGAN, 1889)

VI. *Diaonidia* TAKAHASHI (1956)

14. *Diaonidia yabunikkei* (KUWANA, 1933)

VII. *Diaspidiotus* LEONARDI (1898)

15. *Diaspidiotus kuwanai* TAKAHASHI (1952)
16. *Diaspidiotus maki* (KUWANA, 1932)
17. *Diaspidiotus naracola* TAKAGI (1956)
18. *Diaspidiotus spiraspinae* TAKAGI (1956)

VIII. *Hemiberlesia* COCKERELL (1897)

19. *Hemiberlesia lataniae* (SIGNORET, 1869)

IX. *Hypaspidiotus* TAKAHASHI (1956)

20. *Hypaspidiotus jordani* (KUWANA, 1902)
21. *Hypaspidiotus phaneraspis* TAKAGI, sp. nov.

X. *Lindingaspis* MACGILLIVRAY (1921)

22. *Lindingaspis setiger* (MASKELL, 1897)

XI. *Metaspidiotus* TAKAGI (1957)

23. *Metaspidiotus multipori* (TAKAHASHI, 1956)
24. *Metaspidiotus stauntoniae* (TAKAHASHI, 1933)

XII. *Morganella* COCKERELL (1897)

25. *Morganella longispina* (MORGAN, 1889)

XIII. *Pseudaonidia* COCKERELL (1897)

26. *Pseudaonidia duplex* (COCKERELL, 1896)

- 27. *Pseudaonidia paeoniae* (COCKERELL, 1899)
- 28. *Pseudaonidia trilobitiformis* (GREEN, 1896)

XIV. *Quadraspidiotus* MACGILLIVRAY (1921)

- 29. *Quadraspidiotus cryptoxanthus* (COCKERELL, 1900)
- 30. *Quadraspidiotus macroporatus* TAKAGI (1956)
- 31. *Quadraspidiotus paraphyses* TAKAGI (1956)
- 32. *Quadraspidiotus perniciosus* (COMSTOCK, 1881)
- 33. *Quadraspidiotus williamsi* TAKAGI, sp. nov.

XV. *Temnaspidotus* MACGILLIVRAY (1921)

- 34. *Temnaspidotus japonicus* TAKAGI (1957)

XVI. *Tsugaspidiotus* TAKAHASHI et TAKAGI (1957)

- 35. *Tsugaspidiotus pseudomeyeri* (KUWANA, 1932)
- 36. *Tsugaspidiotus tsugae* (MARLATT, 1911)

In conclusion the writer wishes to acknowledge his indebtedness to Prof. Dr. T. UCHIDA and Prof. Dr. C. WATANABE for their continuous guidance. His gratitude is also due to Prof. Dr. R. TAKAHASHI who most kindly gives him helpful advice on various aspects. Last but not least his sincere acknowledgment is expressed to Dr. D. J. WILLIAMS for his kind advice.