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# SOME DIASPIDIDAE OF JAPAN

(HOMOPTERA : COCCOIDEA)

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Up to this point of time there have been enumerated 146 species\* of the Diaspididae belonging to 45 genera in Japan\*\*. Our further work has recently revealed many other species of various genera. In this paper are given 25 species and are proposed 2 new genera as listed below.

Species newly found in Japan.

- |                                      |                                     |
|--------------------------------------|-------------------------------------|
| 1. <i>Parlatoareopsis pyri</i> Marl. | 3. <i>Neopinnaspis harperi</i> McK. |
| 2. <i>Andaspis micropori</i> Borchs. | 4. <i>Kuwanaspis howardi</i> Cool.  |

New species.

- |  |  |
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| 1. <i>Parlatoria thujae</i> .            | 12. <i>Cynodontaspis edentata</i> .      |
| 2. <i>Parlatoareopsis tsugae</i> .       | 13. <i>Kuwanaspis tanzawensis</i> .      |
| 3. <i>P. sexlobatus</i> .                | 14. <i>Phenacaspis acer</i> .            |
| 4. <i>P. octolobatus</i> .               | 15. <i>Ph. latiloba</i> .                |
| 5. <i>Lepidosaphes chamaecyparidis</i> . | 16. <i>Ph. obovata</i> .                 |
| 6. <i>L. dorsalis</i> .                  | 17. <i>Aulacaspis kadsurae</i> .         |
| 7. <i>L. towadensis</i> .                | 18. <i>Clavaspidiotus abietis</i> .      |
| 8. <i>L. zelkovae</i> .                  | 19. <i>Abgrallaspis momicola</i> .       |
| 9. <i>Andaspis piceae</i> .              | 20. <i>Acanthaspidiotus borchsenii</i> . |
| 10. <i>A. tokyoensis</i> .               | 21. <i>Japaspidiotus cedricola</i> .     |
| 11. <i>A. recurrens</i> .                |  |

New genera.

- |                            |                           |
|----------------------------|---------------------------|
| 1. <i>Clavaspidiotus</i> . | 2. <i>Japaspidiotus</i> . |
|----------------------------|---------------------------|

The slides of the new species are in the collections of the Entomological Institute of the Hokkaido University and the Tokyo-to Agricultural Experiment Station.

One of the authors, Takagi, takes this opportunity of acknowledging his indebtedness to Prof. C. Watanabe, Hokkaido University, for his kind directions in various ways. The other author, Kawai, wishes to thank Mr. S. Motohashi and Mr. M. Nagasawa, both of the Tokyo-to Agricultural Experiment Station, for their kindness in permitting this work. Some specimens used here were collected in a survey supported by the Forestry Bureau of Japan.

Genus *Parlatoria* Targ., 1868

Morrison, U. S. Dept. of Agr., Misc. Publ. 344, 1939. McKenzie, Microent. 10 (2), 1945.

\* Greenhouse species are excluded.

\*\* Hokkaido, Honsyu, Sikoku, Kyusyu, with their neighbouring islets, and the island group of Amami, north Ryukyu.

Balachowsky, Act. Sci. Indust., Ent. Appl. 1202 (Les Cochenilles VII): 773, 1953; Ann. Mus. Roy. Cong. Belge, N.S. in-4, 4: 320, 1958.

Type-species: *Aspidiotus proteus* Curt.

***Parlatoria thujae***, n. sp. (Fig. 1; Pl. XVII, Fig. 23)

Body small in size, elongate-oval in shape. Pygidium rounded, with 3 pairs of lobes ( $L_1$ ,  $L_2$ ,  $L_3$ ) well sclerotized.  $L_1$  practically symmetric, flattened apically, with a faint notch on lateral or either side and with a marginal macroduct between them.  $L_2$  and  $L_3$  similar in shape to  $L_1$ , yet not notched on the mesal side,  $L_3$  evidently smaller.  $L_1$  to  $L_3$  each with a pair of slender basal paraphyses converging anteriorly. Fourth lobe reduced to a membranous process, much smaller than the adjacent gland spines. Marginal gland spines (plates) of the pygidium well developed and fimbriate; prepygidial marginal gland spines more or less tubercular, extending anteriorly to Abd. I. Submarginal gland spines (gland tubercles) few: 1 or 2 (or rarely 3) prespiraculars, 1 or 2 anterior spiraculars, 2-4 mesothoracics and 2-4 metathoracics. Submarginal macroducts comparatively few, 6-15 in a band extending anteriorly onto Abd. IV, III or II on each side. Perivulvar pores in 4 groups, 4-8 in the anterolateral group and 5-8 in the posterolateral. Antenna with a seta. Eye-spots or prosomatic tubercles present opposite the anterior spiracles, rounded. Anterior spiracle with 2 (1-4) disc pores; posterior spiracle with none. Granulations or scaly processes of the derm present lateroposteriorly to the mouth-parts. Derm pocket or a membranous invagination of derm absent between the posterior spiracle and body margin.

Tokyo on *Thuja standishi* (S. Kawai); Amagi-san, Sizuoka-ken, Wakayama Experiment Forest of the Hokkaido University, Wakayama-ken, and Siraga-yama, Kôti-ken, on *Chamaecyparis obtusa* (S. Takagi).

This species is very close to *P. piceae* Tak.,\* from which it is distinguished by having derm granulations posteriorly to the mouth-parts, by lacking derm pockets laterally to the posterior spiracles and by having fewer submarginal dorsal macroducts.

Genus ***Parlatoresopsis*** Lindgr., 1912

Ferris, Atlas IV-404, 1942. McKenzie, Microent. 10: 83, 1945. Balachowsky, Act. Sci. Indust., Ent. Appl. 1202 (Les Cochenilles VII): 827, 1953.

Type-species: *Chionaspis longispina* Newst.

***Parlatoresopsis pyri*** Marl., 1908 (Pl. XVII, Fig. 24)

McKenzie, Microent. 10: 84, 1945.

Tokyo on *Acer buergerianum*, *Cornus controversa*, *Ligustrum japonicum* and *Osmanthus fortunei* (S. Kawai).

This species has hitherto been known to occur in China and Manchuria.

***Parlatoresopsis tsugae***, n. sp. (Fig. 2; Pl. XVIII, Fig. 25)

Pygidium with 2 pairs of lobes ( $L_1$ ,  $L_2$ ) well developed, the 3rd ( $L_3$ ) quite small, but

\* This species was described from specimens collected on *Picea excelsa* in Sapporo and later recorded from *Picea pungens* at Yamabe, Hokkaido. Further specimens are received from the following localities and hosts: Sapporo on *Abies sachalinensis*; Tokyo on *Tsuga sieboldii*; and Sikoku (Omogo-kei; Yanase; Morigauti) on *Abies firma*, *Tsuga diversifolia* and *Tsuga sieboldii*.

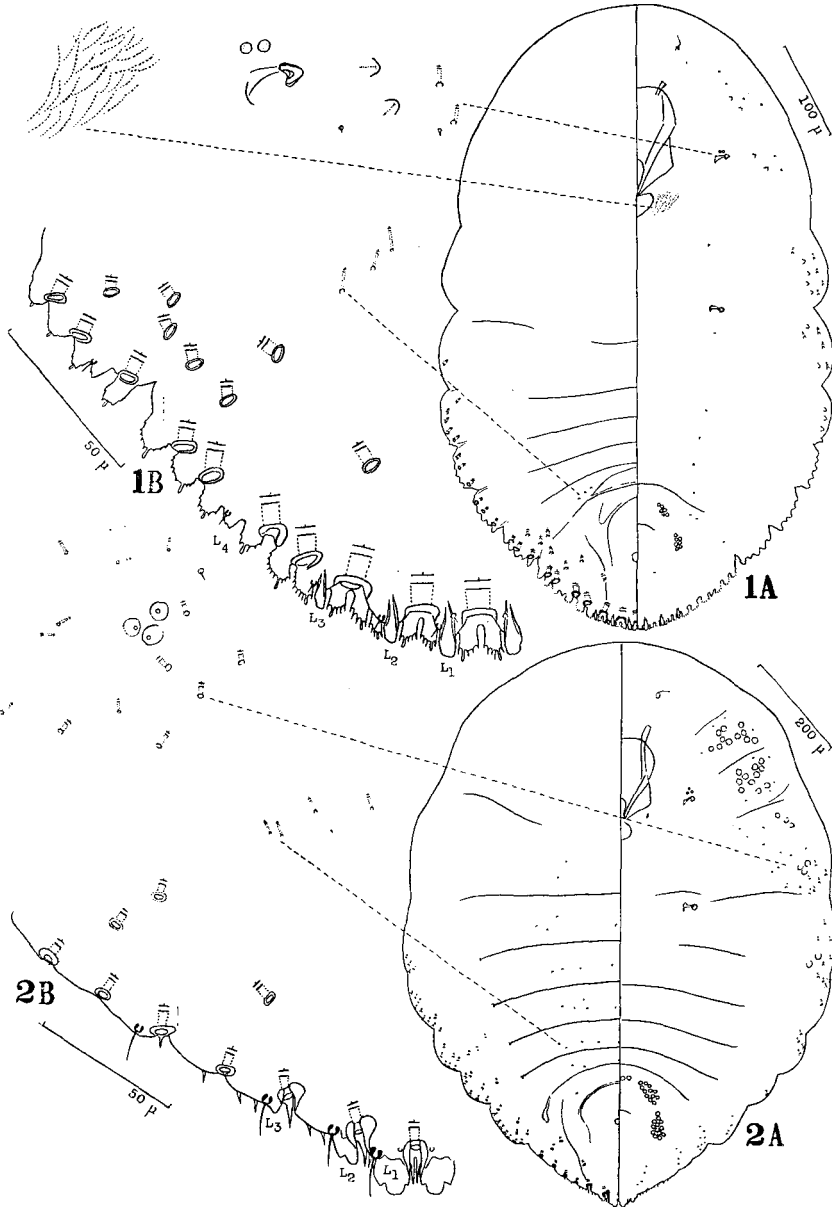


Fig. 1. *Parlatoria thujae*, n. sp.: body (A) and pygidial margin (B).

Fig. 2. *Parlatoreopsis tsugae*, n. sp.: body (A) and pygidial margin (B).

sclerotized.  $L_1$  once notched on either side, rounded apically.  $L_2$  smaller, with a lateral notch. Semilunate paraphyses associated with the marginal macroduct occurring between  $L_1$  and  $L_2$  and also with that between  $L_2$  and  $L_3$ . Marginal gland spines of the pygidium small and simple. Submarginal dorsal macroducts few on the pygidium, 2 or 3 (1-4) in number on each side. Submedian dorsal microducts scattered on the prepygidial segments anteriorly to the mesothoracic region. Gland tubercles (tubercular submarginal ventral gland spines of the cephalothorax) extremely variable in number in the specimens examined: abundant in some specimens (from Ogôti) as follows—8-17 prespiraculars, 9-16 anterior spiraculars, 5-10 mesothoracics, which are usually divided into 2, anterior and posterior, groups, and 2-4 metathoracics; few in the other specimens (from Amagisan)—2-5 prespiraculars, 1-6 anterior spiraculars, 0-3 mesothoracics and 0 on the metathorax. Perivulvar pores: 2-5 in the median group, 8-15 in the anterolateral and 9-16 in the posterolateral. Antenna with a seta. Anterior spiracle with 2-5 disc pores. Derm membraneous except for the pygidium.

Tokyo (Ogôti, Okutama) on *Tsuga diversifolia* (S. Kawai); Amagi-san, Sizuoka-ken, on *Tsuga sieboldii* (S. Kawai).

As described in the above diagnosis the material at hand include 2 forms, which are remarkably different in the number of the gland tubercles. In other characters, however, the two agree so closely that they may belong to the same species. This species is similar to *P. pyri*, from which it is easily distinguishable by having much fewer submarginal dorsal macroducts on the pygidium.

***Parlatoareopsis sexlobatus*, n. sp.** (Fig. 3; Pl. XVIII, Fig. 26)

Pygidium with 3 pairs of lobes ( $L_1$ ,  $L_2$ ,  $L_3$ ) well sclerotized and successively smaller, the 4th ( $L_4$ ) reduced, low and much less sclerotized.  $L_1$  rounded apically, with a deep subapical notch on either side.  $L_2$  and  $L_3$  with a deep subapical notch on the sloping lateral margin. Semilunate paraphyses associated with the marginal macroduct occurring between  $L_1$  and  $L_2$  and also with that between  $L_2$  and  $L_3$ . Marginal gland spines of the pygidium slender and not fimbriate between  $L_1$ ,  $L_1$  and  $L_2$  and also  $L_2$  and  $L_3$ ; those occurring laterally to  $L_3$  broad and tending to be fimbriate; prepygidial marginal gland spines extending anteriorly to Abd. I, more or less tubercular on anterior segments. Submarginal dorsal macroducts 16-25 in number on each side, forming a band extending anteriorly to Abd. I or II. Gland tubercles (tubercular submarginal ventral gland spines of the cephalothorax): 1-6 prespiraculars, 2-5 anterior spiraculars, 1-4 mesothoracics and 3-6 metathoracics. Antenna with a seta. Anterior spiracle with 3-6 disc pores. Granulations of the derm present just lateroposteriorly to the mouth-parts. Perivulvar pores normally in 4 groups, 9-16 in the anterolateral group and 7-14 in the posterolateral. Derm membraneous except for the pygidium.

Tokyo on *Ilex latifolia* and *Ilex pedunculosa* (S. Kawai); Idu-Ôsima on *Eurya japonica* (S. Kawai).

This species is readily distinguishable from *pyri* and *tsugae*, n. sp., by  $L_3$  well developed and from *octolobatus*, n. sp., by  $L_4$  reduced and not sclerotized. This species and *octolobatus* are very similar to certain species of *Parlatoria* (*cinerea* group of McKenzie), but referred to *Parlatoareopsis* by having semilunate paraphyses on the pygidium, although these paraphyses are not so remarkable as in the type-species of *Parlatoareopsis*.

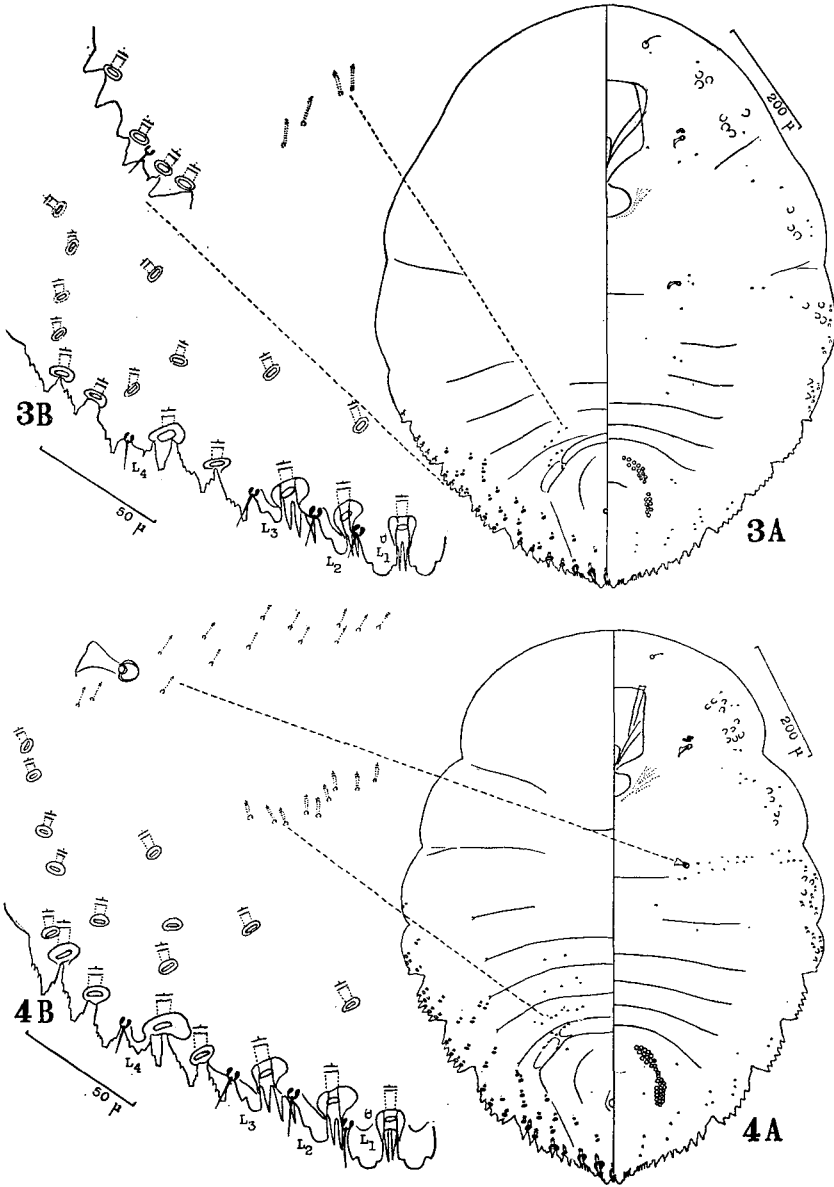


Fig. 3. *Parlatoreopsis sexlobatus*, n. sp.: body (A) and pygidial margin (B).

Fig. 4. *Parlatoreopsis octolobatus*, n. sp.: body (A) and pygidial margin (B).

***Parlatoareopsis octolobatus***, n. sp. (Fig. 4; Pl. XIX, Fig. 27)

Pygidium with 3 pairs of lobes ( $L_1, L_2, L_3$ ) well developed and successively smaller, the 4th ( $L_4$ ) also well sclerotized, angular.  $L_1$  rounded apically, with a deep subapical notch on either side.  $L_2$  and  $L_3$  with a deep subapical notch on the sloping lateral margin. Semilunate paraphyses associated with the marginal macroduct occurring between  $L_1$  and  $L_2$  and also with that between  $L_2$  and  $L_3$ . Marginal gland spines of the pygidium slender and simple between  $L_1, L_1$  and  $L_2$  and also  $L_2$  and  $L_3$ ; those occurring laterally to  $L_3$  broad and tending to be fimbriate; prepygidial marginal gland spines not fimbriate, extending as far as Abd. I. Submarginal dorsal macroducts present as far as Abd. I or II, 16-48 in number on each side. Gland tubercles (tubercular submarginal ventral gland spines of the cephalothorax): 2-9 prespiraculars, 2-7 anterior spiraculars, 2-6 mesothoracics and 2-4 metathoracics. Antenna with a seta. Anterior spiracle with 4-8 disc pores. Granulations of the derm present laterocaudally to the mouth-parts. Perivulvar pores present (1 or 2) or absent in the median group, the antero- and postero-lateral groups often fused into a lateral group of 31-48 pores. Submedian dorsal microducts rather abundant on the prepygidial abdomen. Ventral microducts in a transverse band between the posterior spiracle and body margin. Derm membranous except for the pygidium.

Tokyo (Takao-san) on *Cornus kousa* and an undetermined tree (S. Kawai); Amagi-san, Sizuoka-ken, on *Acer palmatum* (S. Kawai).

This species is quite close to *sexlobatus*, n. sp., but easily distinguishable from the latter by  $L_4$  well sclerotized. As stated in *sexlobatus* this species is very similar to the *cinerea* group of *Parlatoria*.

Genus ***Lepidosaphes*** Shim., 1868

Ferris, Atlas SI-70, 1937. Balachowsky, Les Cochenilles Paléarctiques de la Tribu des Diaspidini: 28, 1954.

Type-species: *Coccus conchiformis* Shim. (nec Gmel.) = *C. ulmi* L.

This genus was recently splitted into 10 genera by Borchsenius (1962 and 1963). Although we agree with him, and also with Balachowsky (1954), in the opinion that the members of the genus can be divided into groups which are defined by morphological and, to some degree, biogeographical characteristics, we have some doubt that these groups are treated as distinct genera in defiance of close affinities which may in all probability exist among them. Moreover, it appears to us that Borchsenius' division goes far beyond soundness, keeping closely related species apart in different groups. Withholding from the acceptance of Borchsenius' genera we use here the genus *Lepidosaphes* in the sense adopted by authors, Ferris, Balachowsky, Takahashi and others.

***Lepidosaphes chamaecyparidis***, n. sp. (Fig. 5)

Body small in size, free abdominal segments little lobed laterally. Pygidium trapezoidal, with 2 pairs of lobes ( $L_1, L_2$ ) well developed, the 3rd reduced to mere marginal serrations.  $L_1$  separated by the width of one of them, flatly rounded apically, without distinct notches or serrations.  $L_2$  large in comparison with  $L_1$ , the inner lobule as large as  $L_1$ , sloping on the apical margin, the outer lobule nearly as long as the inner and quite narrow. A pair of slender basal paraphyses on each of  $L_1$  and also on inner

lobule of  $L_2$ , convergent anteriorly. Dorsal macroducts not reduced in size; submedian macroducts 0-5 on Abd. II, 1-7 on III, 2-7 on IV, 1-3 on V and 1 or 2 on VI; submarginal macroducts sparse on the free abdominal segments, 1 or 2 on Abd. V. Gland spines: 3-8 on the metathorax, 3-14 on Abd. I and 2 or 3 on II tubercular; 2 on Abd. III-VI each; 2 between  $L_1$ , 2 between  $L_1$  and  $L_2$  and 1 laterally to  $L_2$  practically not surpassing the lobes. Perivulvar pores few, 3-8 in the median group, 2-6 in the anterolateral and 2-4 in the posterolateral. Antenna with 2 setae. Anterior spiracle with a disc pore, the posterior with none. Derm remaining membranous except for the pygidium.

Tokyo (Ogôti, S. Kawai) and Yanase, Sikoku (S. Takagi) on *Chamaecyparis obtusa*.

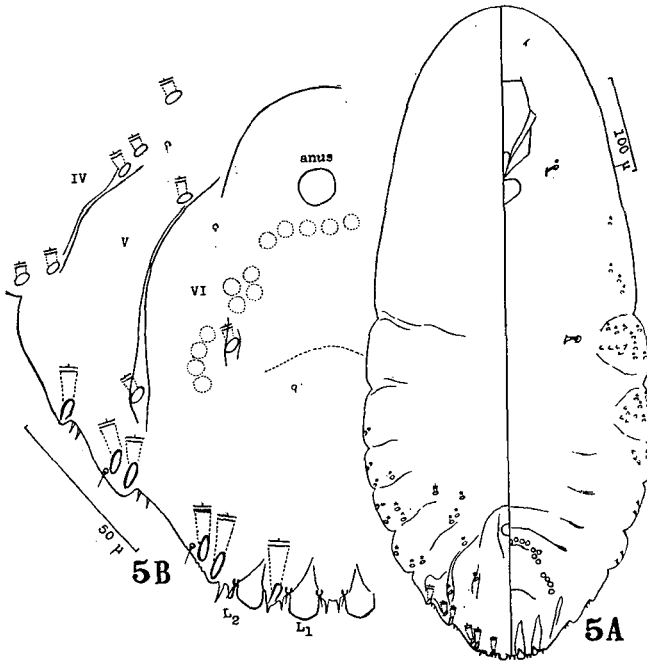


Fig. 5. *Lepidosaphes chamaecyparidis*, n. sp.:  
body (A) and pygidium (B).

This species comes close to *L. japonica* Kuw. and *L. maskelli* Ckll., but easily distinguishable from the latter two by  $L_2$  with the inner lobule quite large in comparison with  $L_1$  and with the outer lobule disproportionately narrow. The submedian dorsal macroducts are somewhat variable in number in the specimens at hand: in some specimens these ducts are quite few and lacking on Abd. II (example—1 or 3 on Abd. III, 2 on IV, 1 or 2 on V and 1 on VI), whereas in the rest more numerous and present on Abd. II-VI (example—4 on Abd. II, 7 on III, 6 on IV, 2 on V and 1 or 2 on VI). No other remarkable differences, however, have been found in the specimens.

***Lepidosaphes dorsalis*, n. sp.** (Fig. 6; Pl. XIX, Fig. 28)

Body slender, the prosoma being as long as the postsoma. Free abdominal segments moderately lobed laterally. Pygidium trapezoidal, with 2 pairs of lobes ( $L_1$ ,  $L_2$ ) well

developed, the 3rd reduced to marginal serrations.  $L_1$  separated by the width of one of them, well convex apically, each with a rather faint notch on either side.  $L_2$ : inner lobule similar to  $L_1$  in shape, somewhat smaller than the latter, with a faint notch on the lateral side; outer lobule somewhat smaller than the inner, yet well developed. A pair of slender basal paraphyses on each of  $L_1$  and also on the inner lobule of  $L_2$ , convergent anteriorly. Dorsal macroducts a little reduced in size, abundant in a medio-submedian band across Abd. III and IV each, also extending mesally on Abd. II, sometimes forming a practically continuous row across the segment; 3-5 submedian and 1 or 2

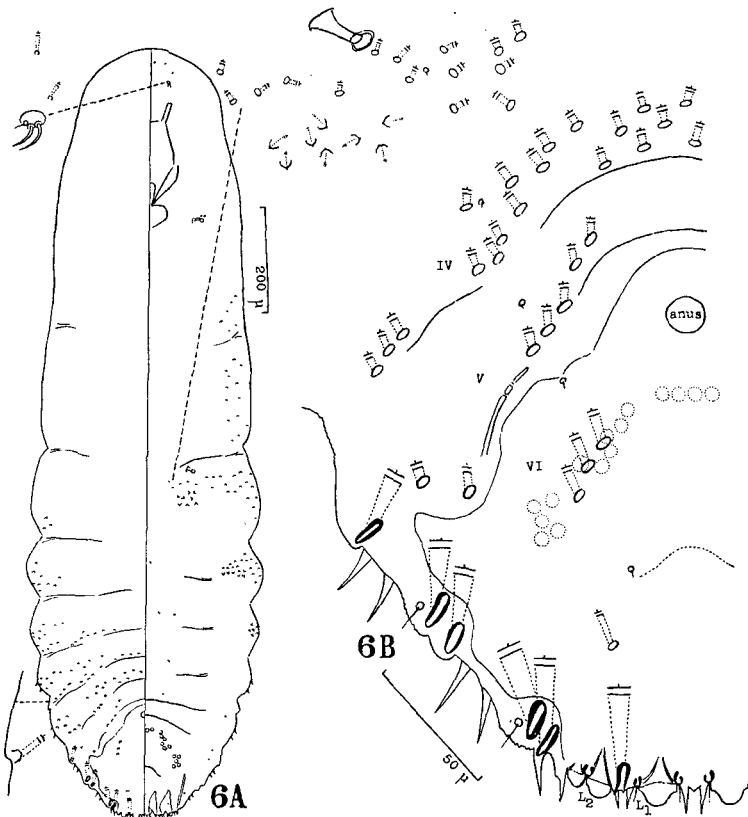


Fig. 6. *Lepidosaphes dorsalis*, n. sp.:  
body (A) and pygidium (B).

submarginal macroducts on Abd. V; 2 or 3 submedian macroducts on Abd. VI; a slender submarginal duct anteriorly to  $L_2$ . Abundant ventral macroducts scattered on the metathorax, extending mesally a little beyond the posterior spiracle, but not into the median region. Gland spines: 4-8 on the metathorax just posteriorly to the spiracle (in the submedian region) and 7-13 on Abd. I tubercular; 2-4 on Abd. II; 2 on Abd. III and IV each; pygidial spines in pairs, well developed. A low pore prominence towards the laterobasal corner of Abd. IV. Perivulvar pores not numerous, 2-5 in the median group, 4-8 in the anterolateral and 3-6 in the posterolateral. Antenna with 2 setae and a quite

fine, hair-like seta. Anterior spiracle normally with 2 disc pores. Derm membranous except for the pygidium.

Tokyo and Hatizyô-sima, Idu Islands, on *Ilex integra* (S. Kawai).

This species may be close to *L. noxia* McK., but disagrees with McKenzie's description and illustration of *noxia* as follows: antenna with 3 setae, of which one is quite fine; metathorax with gland spines (gland tubercles) situated in the submedian region; and the perivulvar pores fewer.

***Lepidosaphes towadensis*, n. sp. (Fig. 7)**

Body fusiform, tapering towards both ends. Pygidium with 2 pairs of lobes ( $L_1$ ,  $L_2$ ),

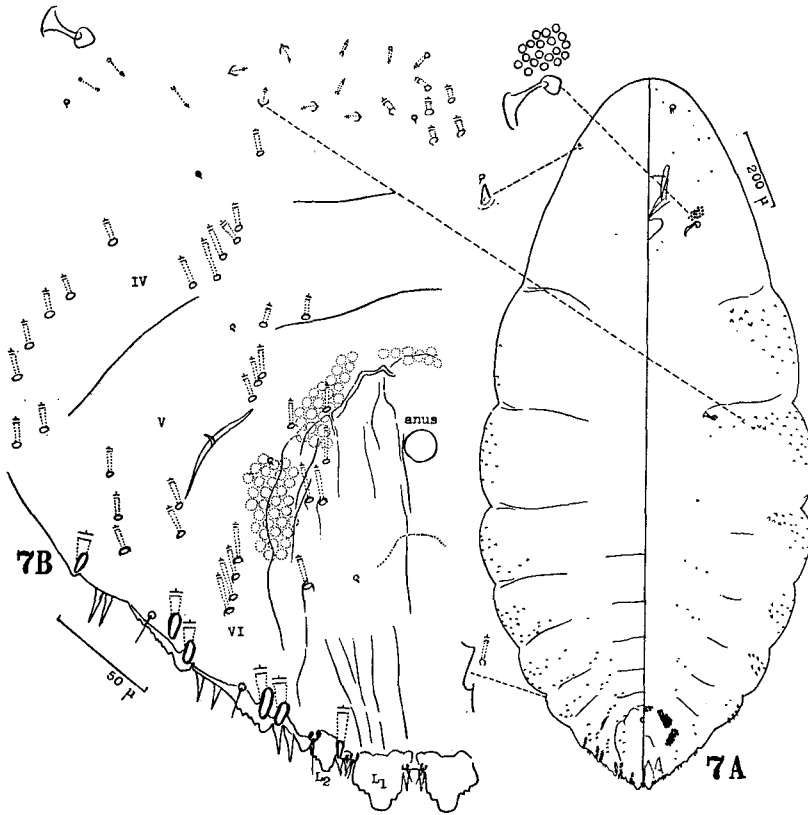


Fig. 7. *Lepidosaphes towadensis*, n. sp.: body (A) and pygidium (B).

the 3rd and 4th represented by sclerotized serrations.  $L_1$  prominent, set close, notched several times on either side.  $L_2$  much smaller, but the inner lobule well developed, similar in shape to  $L_1$ , the outer lobule small, conical in shape. Paraphyses absent on the pygidial lobes. Dorsal ducts reduced in size, slender, not in well-defined rows; 6-13 in the submedian to submarginal region on Abd. VI; submedian ducts 2-6 on Abd. III, 3-6 on IV and 3-5 on V; abundant submarginal ducts (both dorsal and ventral) strewn as far as the mesothorax. Gland spines: 3-6 on the mesothorax, 5-12 on the metathorax, 5-7 on Abd. I and 3-5 on II tubercular; 4-6 on Abd. III; 3-7 on Abd. IV; pygidial

gland spines in pairs, short. A low pore prominence present on the laterobasal corner of Abd. IV. Head with a small, thorn-like, sclerotized process (modified eye) on each side. Antenna with 3 setae. Anterior spiracle with a rather loose cluster of 17-24 disc pores. Perivulvar pores: 7 or 8 in the median group, 14-30 in the anterolateral and 26-39 in the posterolateral. Derm membranous except for the pygidium.

Towada, Aomori-ken, on *Acer japonicum* (S. Kawai); Amagi-san, Sizuoka-ken, on *Acer mono* (S. Kawai).

This species is close to *L. kurvacola* Kuw., from which it is readily distinguishable by lacking a lateral tubercle between Abd. I and II and also II and III.

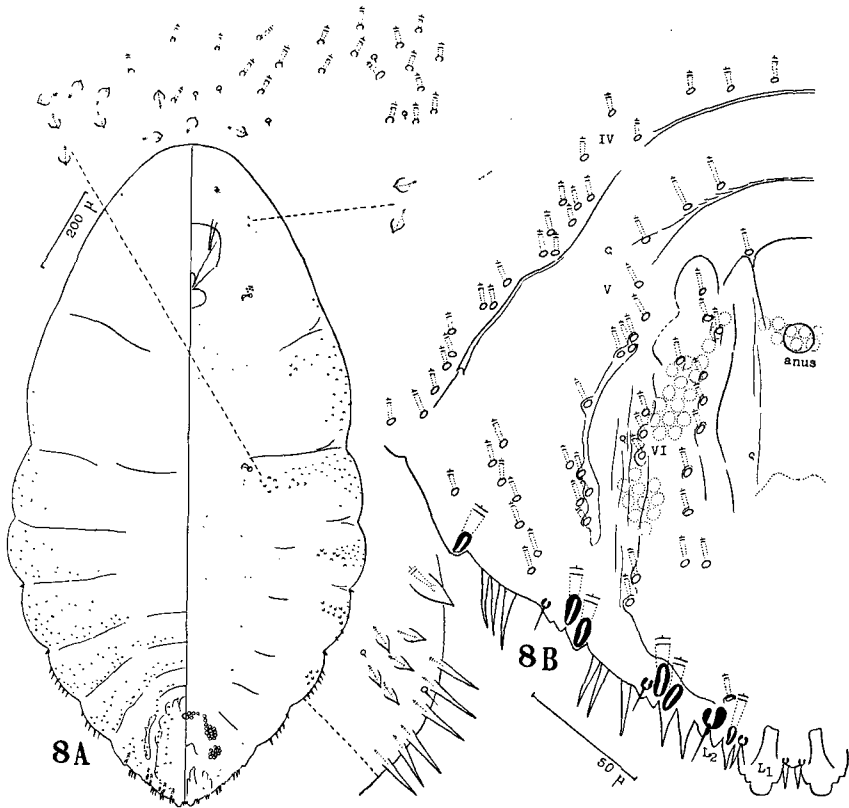


Fig. 8. *Lepidosaphes zelkovae*, n. sp.: body (A) and pygidium (B).

***Lepidosaphes zelkovae*, n. sp. (Fig. 8)**

Body fusiform, tapering towards both ends. Pygidium with the median lobes ( $L_1$ ) well developed and with the lateral lobes ( $L_2$ - $L_4$ ) much reduced.  $L_1$  set close, large, notched once on the inner side and twice on the outer side.  $L_2$  quite small, yet both lobules normally present and conical in shape.  $L_3$  and  $L_4$  represented by marginal sclerotizations. Dorsal macroducts reduced in size, slender, not in well-defined rows, abundant; extending mesally on Abd. III-V, forming practically continuous submedio-submarginal bands; 9-18 on Abd. VI in the submedian to submarginal region; 1 just

anteriorly to  $L_2$ . Ventral ducts abundant on the meso- and metathorax, on the latter segment extending mesally towards the posterior spiracle. Gland spines: 1 or 2 between the antenna and anterior spiracle, 2-6 in the mesothoracic region, 3-10 on the metathorax and 5-13 on Abd. I tubercular; 6-13 on Abd. II and 4-13 on III, some of them tubercular in the submarginal region, but the others elongate on the margin; 3-7 on Abd. IV and 2 or 3 on each of V and VI well developed. A sharply pointed, somewhat sclerotized tubercle between Abd. I and II, II and III and also III and IV, with a duct. Head with a quite small, sclerotized spot (eye) on each side. Antenna with 3 or 4 setae. Anterior spiracle with 4-7 disc pores. Perivulvar pores: 6-10 in the median group, 9-19 in the anterolateral and 8-16 in the posterolateral. Derm remaining membranous except for the pygidium.

Tokyo (Akisima; Tatikawa) on *Zelkova serrata* (S. Kawai).

This species is quite close to *L. kuwacola* Kuw., but differs from the latter by the eyes not produced into horn-like processes and by having 1 or 2 gland spines (gland tubercles) in the cephalo-prothoracic region between the antenna and anterior spiracle.

Genus *Andaspis* MacGill., 1921\*

Ferris & Rao, Microent. 17: 17, 1952. Williams, Bull. Brit. Mus. (N. H.), Ent. 15: 13, 1963.

Type-species: *Mytilaspis flava* var. *hawaiiensis* Mask.

*Andaspis micropori* Borchs., 1958 (Fig. 9; Pl. XX, Fig. 29)

Borchsenius, Acta Ent. Sin. 8: 173 & 178, 1958.

Pygidium with 2 pairs of lobes ( $L_1$ ,  $L_2$ ), the 3rd and 4th reduced to mere marginal serrations.  $L_1$  with a pyriform sclerosis arising at the outer basal angle and directed mesally.  $L_2$  quite reduced, yet each lobe represented by a small conical process; dorsal marginal seta on  $L_2$  with the alveolus thickened into a pyriform sclerosis on the inner side. Marginal macroducts of the pygidium: 1 between  $L_1$  and  $L_2$ , 2 laterally to  $L_2$  (on Abd. VI), 2 on Abd. V and 1 on IV. Dorsal ducts much reduced in size, a little larger than or practically as large as the ventral microducts; submedian ducts present (1 or 2) or absent on Abd. III, 2-6 on IV, 3-6 on V and 3-7 on VI; submarginal ducts present (1 or 2) or absent on Abd. V, 1 just anteriorly to  $L_2$ . Abundant ventral microducts in a band across the metathorax just posteriorly to the posterior spiracles. Gland spines absent or occasionally present (1 or 2) on the metathorax; 1-9 in a transverse submarginal row on Abd. I and 2-6 on II tubercular; 3-5 on Abd. III; 3 or 4 on Abd. IV; in pairs on the pygidium. A low, angular, yet little sclerotized, lateral tubercle present between Abd. I and II, II and III and also III and IV\*\*. Antenna with 2 setae.

\* This opportunity is taken to give records of 2 species of this genus, *A. kashicola* Takah. and *A. naracola* Tak. 1) *A. kashicola* was originally described from *Quercus glauca* and *Q. phillyraeoides* in Ôsaka and later recorded from *Castanea crenata* at Toyama and from *Alnus* sp. in Yamanasi-ken. Further specimens of this species were collected in Tokyo and Okayama-ken on various plants as follows: *Abies firma*, *Alnus hirsuta*, *Castanea crenata*, *Castanopsis cuspidata*, *Cytisus scoparius*, *Platanus orientalis*, *Quercus acuta*, *Q. acutissima*, *Q. glauca*, *Q. phillyraeoides*, *Q. salicina*, *Q. serrata* and *Styrax japonica*. 2) *A. naracola* was originally described from Hukuoka, Kyusyu, as a feeder of *Quercus serrata*. Further specimens were taken from Tokyo and Idu-Ôsima from *Castanopsis cuspidata* and *Quercus glauca*.

\*\* Perhaps owing to the membranous condition these lateral tubercles are often indistinct or indiscernible.

Anterior spiracle with 1-6 disc pores. Perivulvar pores: 4 in the median group, 6-9 in the anterolateral and 4 or 5 in the posterolateral. Derm membranous except for the pygidium.

Tokyo on *Callicarpa japonica*, *Ilex pedunculosa* and *Osmanthus fortunei* (S. Kawai).

This species was originally described from China as a feeder of *Litchi chinensis*. Except for the presence of the 2nd lobes, which are, however, very small and may be easily overlooked, the specimens at hand from *Callicarpa japonica* agree well with

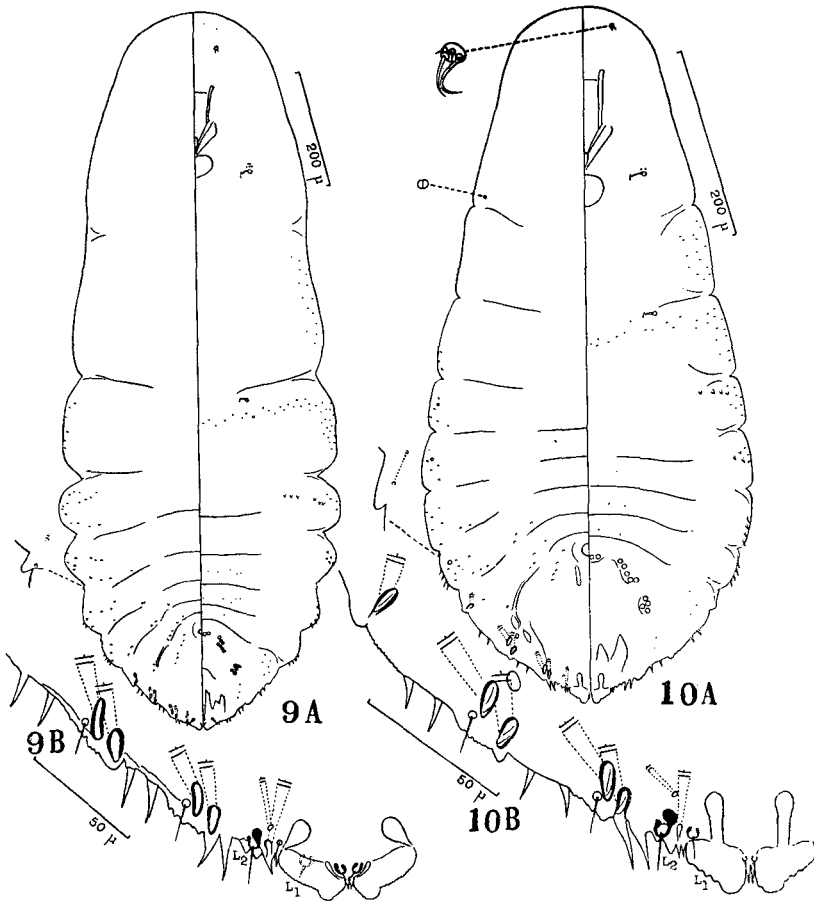


Fig. 9. *Andaspis micropori*: body (A) and pygidial margin (B).

Fig. 10. *Andaspis piceae*, n. sp.: body (A) and pygidial margin (B).

Borchsenius' description. The specimens collected on *Ilex pedunculosa* and *Osmanthus fortunei* represent a variegated form, differing from the type form mainly as follows: anterior spiracle with 1 or 2 disc pores (in the type form: with 3-6 pores); gland spines absent on the metathorax, 1-3 on Abd. I and 2 or 3 on Abd. II (in the type form: 1 or 2 gland spines at times discernible on the metathorax, 5-9 and 4-6 present on Abd. I and II respectively); submedian dorsal ducts 3 or 4 on Abd. VI and submarginal ones often absent on V (in the type form: submedian ducts 5-7 in number on Abd. VI and

1 or 2 submarginal ones always present on V).

*Andaspis piceae*, n. sp. (Fig. 10; Pl. XX, Fig. 30)

Pygidium with 2 pairs of lobes ( $L_1$ ,  $L_2$ ), the 3rd and 4th reduced to mere marginal serrations.  $L_1$  extending from the middle basal part onto the pygidium in a blunt sclerosis about as long as the lobe.  $L_2$  with the inner lobule quite small and conical; outer lobule reduced to a mere point or obsolete; dorsal marginal seta on  $L_2$  with the alveolus thickened into a robust sclerosis on the inner side. Marginal macroducts of the pygidium: 1 between  $L_1$  and  $L_2$ , 2 laterally to  $L_2$  (on Abd. VI), 2 on Abd. V and 1 on IV. Dorsal ducts much reduced in size, a little larger than or practically as large as the ventral microducts; submedian ducts 2 or 3 on Abd. IV, 4 or 5 on V and 3-6 towards the bottom of the pygidium (on Abd. VI); submarginal ducts 1 on Abd. V, 1 just anteriorly to  $L_2$ . Ventral microducts in a band across the metathorax just posteriorly to the spiracles. Gland spines absent on the metathorax; 3-6 on Abd. I tubercular; 3 or 4 on Abd. II-IV each; 2 or 3 on Abd. V; and in pairs on the further part of the pygidium. A membranous lateral tubercle present between Abd. III and IV, at times also between II and III, with a duct. A small submarginal dorsal boss on Abd. I, II and IV each and also between Abd. V and VI; a pair tightly appressed together on the prothorax\*. Antenna with 2 setae, sometimes also with 1 or 2 quite minute setae. Anterior spiracle with 1-3 disc pores. Perivulvar pores: 2-4 in the median group, 3-5 in each of the anterolateral and posterolateral. Derm membranous except for the pygidium.

Tokyo (Hussa, Nisitama) on *Picea* sp. (S. Kawai).

This species is similar to *A. naracola* Tak. in the characters of the apex of the pygidium, but easily distinguishable from the latter by having microducts between the posterior spiracles, by lacking dorsal ducts on Abd. VII, etc. It may be distinguishable from *A. dasi* Will. by lacking dorsal boss on Abd. III, by having fewer dorsal ducts on the pygidium, etc. It may be also close to *A. numerata* Brimbl., but judging from Brimblecombe's description, distinguishable from the latter by the pygidial dorsal ducts and perivulvar pores less numerous.

*Andaspis tokyoensis*, n. sp. (Fig. 11; Pl. XXI, Fig. 31)

Free segments of the body well lobed laterally. Head produced on each side into a low prominence. Pygidium with 2 pairs of lobes ( $L_1$ ,  $L_2$ ), the 3rd and 4th reduced to mere marginal serrations.  $L_1$  produced at the middle basal part onto the pygidium in a robust, knobbed sclerosis.  $L_2$  with the inner lobule well developed, its apical margin flatly rounded and minutely serrate; outer lobule reduced to a point; a robust sclerosis on the base of  $L_2$ . Marginal macroducts of the pygidium: 1 between  $L_1$  and  $L_2$ , 2 laterally to  $L_2$  (on Abd. VI), 2 on Abd. V and 1 on IV. Dorsal ducts much reduced in size, a little larger than the ventral microducts; submedian ducts 0-2 on Abd. III, 1-6 on IV, 3-5 on V and 2-4 towards the bottom of the pygidium (on Abd. VI); submarginal ducts absent on Abd. V, 1 just anteriorly to  $L_2$ . Ventral microducts lacking between the posterior spiracles. Gland spines: 1-4 on the metathorax and 4-7 on Abd. I tubercular; 3-6 on Abd. II; 4-6 on Abd. III; 2-5 on Abd. IV; and in pairs on the pygidium.

\* The bosses of the prothorax and basal 2 abdominal segments are so small that they may be easily overlooked; in some specimens they are not discernible.

A sclerotized spur-like process between Abd. I and II, II and III and also III and IV. Antenna with 2 setae. Anterior spiracle with 2 (1-3) disc pores. Perivulvar pores: 4-7 in the median group, 6-12 in the anterolateral and 4-13 in the posterolateral. Derm remaining membranous except for the pygidium.

Tokyo (Hutyû; Takao-san) on *Ilex pedunculosa*, *Pasania edulis*, *Quercus myrsinaefolia* and *Q. phillyraeoides* (S. Kawai).

This species is characterized by having scleroses on the bases of  $L_2$  like *A. halli* Rao, from which it is quite distinct by the robust basal scleroses of  $L_1$ , the paired marginal gland spines of the pygidium, etc.

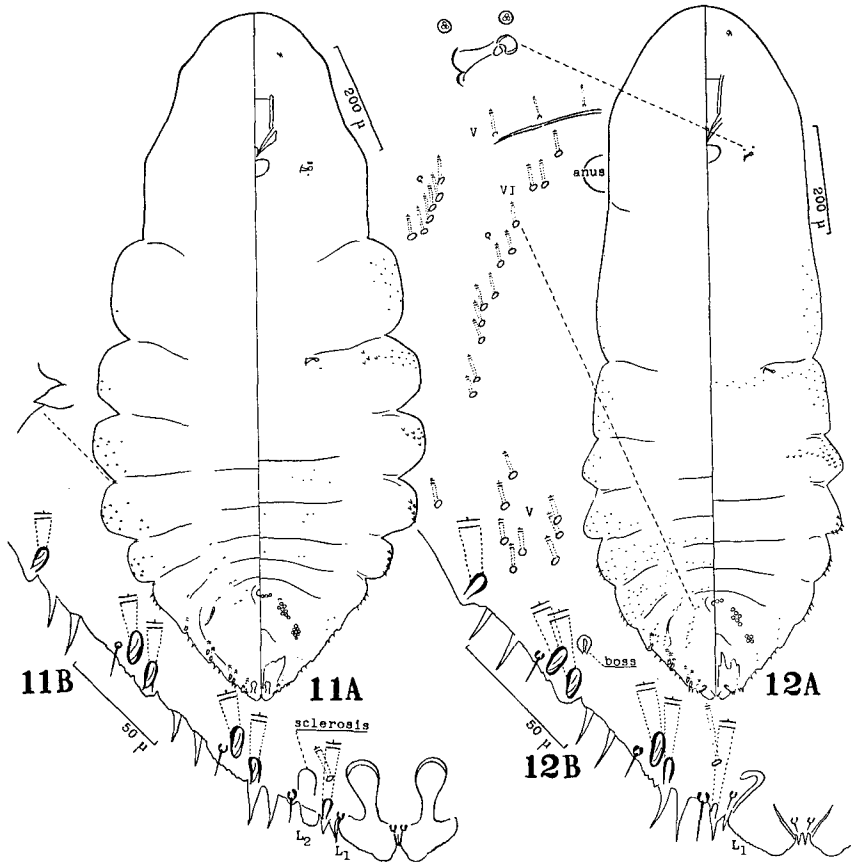


Fig. 11. *Andaspis tokyoensis*, n. sp.: body (A) and pygidial margin (B).

Fig. 12. *Andaspis recurrens*, n. sp.: body (A) and pygidial margin (B).

***Andaspis recurrens*, n. sp.** (Fig. 12; Pl. XXI, Fig. 32)

Free segments of the abdomen rather strongly lobed laterally. Pygidium with the median lobes ( $L_1$ ) alone present, the 2nd obsolete, the 3rd and 4th reduced to mere marginal serrations.  $L_1$  with scleroses (paraphyses) ( $P_1$ ,  $P_2$ ) arising at both basal angles:  $P_1$  (mesal ones) slender, divergent;  $P_2$  longer than  $P_1$ , convergent, then bent outwards. Marginal macroducts of the pygidium: 1 laterally to  $L_1$  (on Abd. VII), 2 on Abd. V

and VI each and 1 on IV. Dorsal ducts much reduced in size, a little larger than or practically as large as the ventral microducts, abundant across Abd. III-V; 11-14 in a long submedian row on Abd. VI; 1 just anteriorly to the segmental marginal seta of Abd. VII. Ventral microducts forming a transverse row across the metathorax just posteriorly to the spiracles. Gland spines absent on the thorax, 13-20 in a transverse submarginal band on Abd. I tubercular; 4-10 on Abd. II; 4 or 5 on Abd. III; 2-4 on Abd. IV; and in pairs on the pygidium. An annular submarginal dorsal boss between Abd. V and VI. Antenna with 2 or 3 setae. Anterior spiracle with 2 (or at times 3) disc pores set apart from each other. Perivulvar pores: 4 (3-6) in the median group, 5-8 in the anterolateral and 4 (or rarely 5 or 6) in the posterolateral. Derm remaining membranous except for the pygidium.

Idu-Ôsima and Hatizyô-sima, Idu Islands, on *Castanopsis cuspidata* (S. Kawai).

This species is unique by the shape of the paraphyses ( $P_2$ ) arising at the outer basal angles of  $L_1$ .

#### Genus *Cynodontaspis* Tak., 1962

Takagi, Ins. Mats. 25: 46, 1962.

Type-species: *C. piceae* Tak.

#### *Cynodontaspis edentata*, n. sp. (Fig. 13; Pl. XXII, Fig. 33)

Pygidium quite broad, rugged with small marginal dentations rather irregularly variable in shape; among these dentations the marginal pore prominences are rather produced and the median lobes ( $L_1$ ) broad and variously dentate, with a pair of spinous processes between them. Dorsal macroducts small, present as far as the mesothorax in the submarginal region; 4-8 submedian dorsal macroducts on Abd. IV and V each; 9-15 macroducts in a longitudinal submedio-submarginal row on Abd. VI. Ventral microducts abundant in submarginal groups as far as the mesothorax, extending mesally on Abd. III-VI and towards the posterior spiracles on the metathorax. An angular or tubercular process on the laterobasal corner of Abd. III and IV each, not sclerotized, with a duct. Perivulvar disc pores rather numerous, 8-10 in the median group, 11-20 in the anterolateral and 11-17 in the posterolateral. Anterior spiracle with 5-7 disc pores. Antenna with 2 short, rather stout setae and a quite fine seta. Derm membranous except for the pygidium.

Tokyo (Ogôti, Okutama) on *Abies firma* (S. Kawai).

Although this species differs from the type-species of the genus by the pygidial processes much less prominent, it agrees well with the latter in other main characters of generic value. It differs from the type-species also by the absence of submedian dorsal ducts on Abd. III and the numerous perivulvar disc pores.

#### Genus *Neopinnaspis* McK., 1949

McKenzie, Bull. Dept. Agric., St. Calif. 38: 123, 1949.

Type-species: *N. harperi* McK.

Ferris (1955, Microent. 20: 23) suppressed *Neopinnaspis* as a synonym of *Africaspis*, but we agree with McKenzie (1956, Bull. Calif. Ins. Survey 5: 133) in his view that *Neopinnaspis* is a good genus. This genus may be a Lepidosaphedine, having 6-segmented

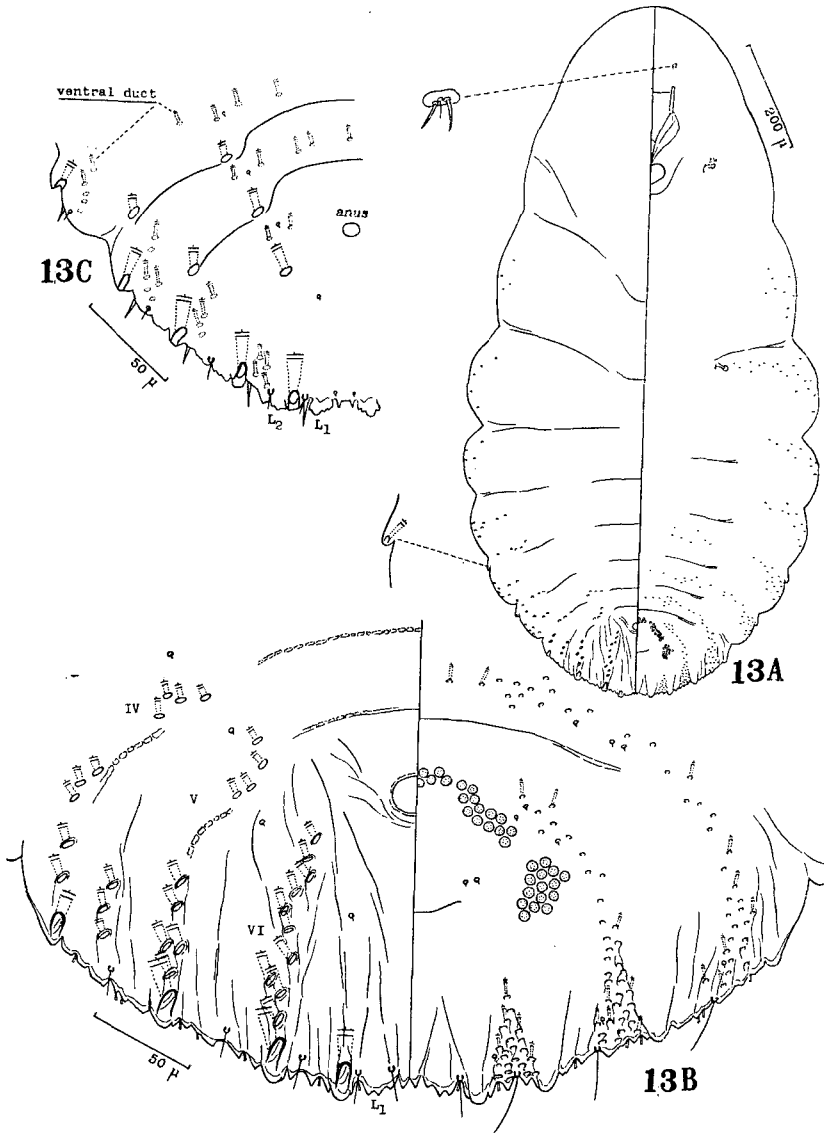


Fig. 13. *Cynodontaspis edentata*, n. sp.: body (A), pygidium (B) and pygidium of the 2nd exuvium (C).

antennae in the first stage larva as in many Lepidosaphedines, but we can not place it close to any of them owing to the fusion of the median and 2nd lobes, which is quite unusual. So far as represented by the few known species this genus may possibly be Asiatic in its origin.

***Neopinnaspis harperi*** McK., 1949 (Pl. XXII, Fig. 34)

McKenzie, loc. cit.

Tokyo on *Pasania edulis* (S. Kawai); Idu-Ôsima, Idu Islands, on *Ligustrum obtusifolium* (S. Kawai); Hatizyô-sima, Idu Islands, on *Castanopsis cuspidata* (S. Kawai).

This species has been known to occur in California on various kinds of host plants. The specimens at hand agree well with the original description.

Genus ***Kuwanaspis*** MacGill., 1921

Balachowsky, Les Cochenilles Paléarctiques de la Tribu des Diaspidini: 264, 1954.

Type-species: *Chionaspis hikosani* Kuw.

***Kuwanaspis howardi*** Cool., 1898 (Pl. XXIII, Fig. 35)

Ferris, Atlas IV-396, 1942. Balachowsky, loc. cit.: 272, 1954.

Tokyo (Tatikawa) on *Phyllostachys nigra* (S. Kawai).

This well-known species has hitherto been recorded widely in the world, but no authentic record of its occurrence has been given in Japan. The present specimens agree well with the recent descriptions of this species.

***Kuwanaspis tanzawensis***, n. sp. (Fig. 14; Pl. XXIII, Fig. 36)

Body elongate-fusiform, much prolonged in the mesothoracic region, broadest across the metathorax and Abd. I, tapering towards both ends, but less posteriorly. Pygidium with 2 pairs of lobes ( $L_1$ ,  $L_2$ ).  $L_1$  rounded apically, notched but often indistinctly.  $L_2$  with the inner lobule as large as  $L_1$  and similar to the latter in shape; outer lobule smaller, rather conical. Dorsal macroducts extending into the submedian region on Abd. III-VI, forming segmental rows along the posterior margins of the segments; also infrasegmental submarginal macroducts on these segments; 1-3 submarginal macroducts towards the apex of the pygidium (on Abd. VII). Ventral macroducts abundant in the submarginal region of the basal 2 abdominal segments. Gland spines present on all the prepygidial abdominal segments and pygidium; 2-4 on Abd. I; abundant (9-11) in a group on Abd. II, with a smaller group of 2-4 spines in the posterolateral corner of the segment; 5-7 on Abd. III. Ventral microducts scattered posteriorly to both pairs of spiracles and across the basal 2 abdominal segments. Antenna with 2 setae. Anterior spiracle with 11-15 disc pores in a compact cluster. Perivulvar pores lacking.

Tanzawa, Kanagawa-ken, on *Sasa* sp. (S. Kawai).

This species seems to be close to *K. bambusicola* Ckll., but may be distinguishable from the latter by the shape of the body, by the anterior spiracles with numerous disc pores, by having numerous gland spines on Abd. II, etc.

Genus ***Phenacaspis*** Cool. & Ckll., 1903

Ferris, Microent. 20 (3), 1955, and 21 (1), 1956.

Type-species: *Chionaspis nyssae* Comst.

In this paper is adopted Ferris' opinion on the taxonomic treatment of this genus, although we have some doubt about the generic position of the Japanese members\*. In most of these species occurs the dimorphism discovered by Takahashi (1952; 1953): the form occurring mainly on the leaves of host has the median lobes sunken into the pygidium (leaf-infesting form), whereas the other form occurring mainly on the bark of the woody parts has the median lobes more or less produced beyond the apex of the pygidium (bark-infesting form\*\*). Other characters may be also different between the 2

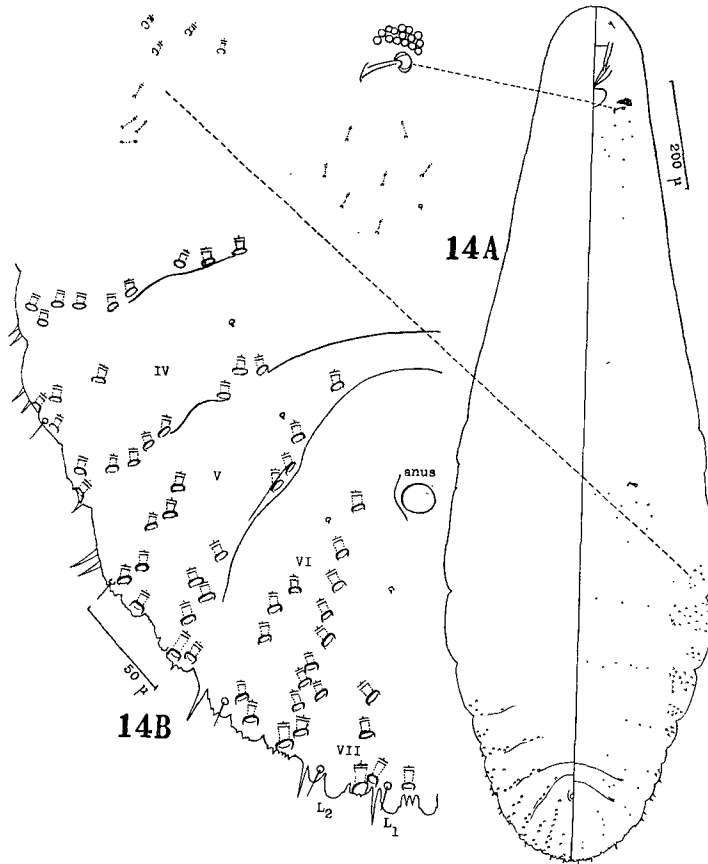


Fig. 14. *Kurvanaspis tanzarwensi*, n. sp.:  
body (A) and pygidium (B).

forms. It is needed to revise many south Asian species referred to *Phenacaspis* from the view point of Takahashi's dimorphism.

\* Takagi (1961) states that most of the species referred to his "*Phenacaspis*-group" have 5-segmented antennae in the 1st stage. Examinations on further material have revealed that some species of *Phenacaspis* of Japan and Formosa have 6-segmented antennae. It is here suggested that the genus in the current composition may be heterogenous.

\*\* Takagi (1961) used for this form the term "branch-infesting form".

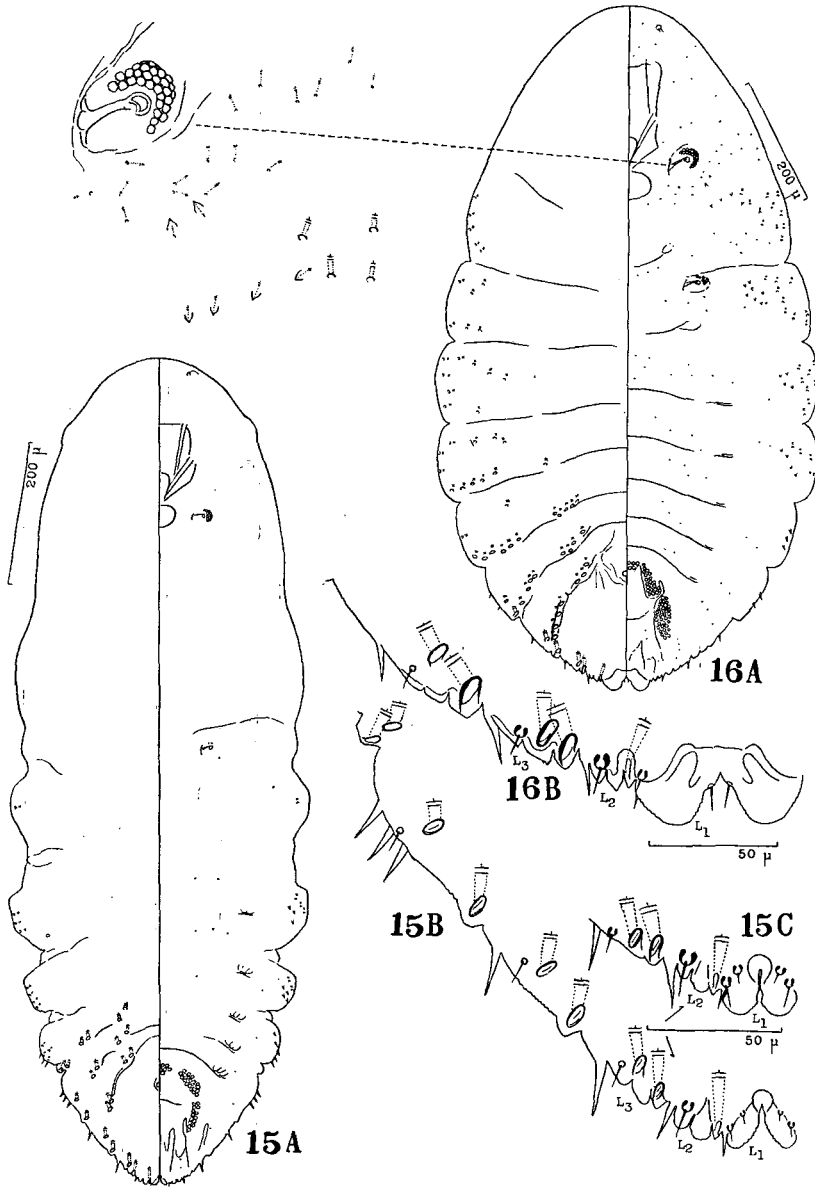


Fig. 15. *Phenacaspis acer*, n. sp.: body (A), pygidial margin of leaf-infesting form (B) and pygidial margin of bark-infesting form (C).

Fig. 16. *Phenacaspis latiloba*, n. sp.: body (A) and pygidial margin of bark-infesting form (B).

***Phenacaspis acer***, n. sp. (Fig. 15; Pl. XXIV, Fig. 37, 38)

Body narrowly fusiform or practically parallel-sided. Pygidium with 3 pairs of lobes ( $L_1, L_2, L_3$ ).  $L_1$  moderate in size, lacking a pair of setae between them; in the leaf-infesting form sunken in the apex of the pygidium, forming an incision, divergent and serrate; in the bark-infesting form parallel, set close, robust, rounded apically and serrate subapically.  $L_2$  well developed, the inner lobule rounded apically, with a pair of slender basal paraphyses, the outer lobule a little smaller.  $L_3$  somewhat reduced in size, even obsolete in the bark-infesting form. Dorsal macroducts few, forming segmental rows on Abd. III-V, absent on Abd. VI: submedian ducts 1-4 on Abd. III, 2-4 on IV and 2 or 3 on V; submarginal macroducts 3-7 on Abd. III (including 2 in the posterolateral corner of the segment), 3-5 on IV and 1-3 on V. Pleural macroducts smaller and few, scattered on the free abdominal segments and metathorax. Gland spines absent on the metathorax, 1-4 on Abd. I, 4 or 5 on II, 4-6 on III, 2-4 on IV. Antenna with a seta. Eye-spot on a marginal prominence. Anterior spiracle with 6-14 disc pores in a compact cluster; posterior spiracle with 2-4. Perivulvar pores: 8-12 in the median group, 14-24 in the anterolateral and 12-19 in the posterolateral.

Tokyo and Amagi-san, Sizuoka-ken, on *Acer palmatum* (S. Kawai).

This species is quite close to *Phenacaspis sozanica* Takah. (= *Chionaspis sozanica*), which occurs in Formosa on *Acer*, but distinguished by lacking submedian dorsal macroducts on Abd. VI.

***Phenacaspis latiloba***, n. sp. (Fig. 16; Pl. XXV, Fig. 39)

Body robust, fusiform, the free segments little lobed laterally. Pygidium broad, with 2 pairs of lobes ( $L_1, L_2$ ) well developed, the 3rd reduced to low, angular processes.  $L_1$  prominent, quite robust, rounded and minutely serrate, with a pair of setae between them.  $L_2$  with both lobules pointed apically. Dorsal macroducts: about 5 or 6 in the submarginal row of Abd. II-IV each; 2-4 in the submarginal row of Abd. V; submedian macroducts 0-2 on Abd. II, 2-6 on III, 3-6 on IV and 2-4 on V. Scattered submarginal macroducts more or less smaller on the meso- and metathorax and basal 2 abdominal segments. Gland spines: 4-6 posteriorly to the anterior spiracle; 4-8 on the metathorax; 2-5 on Abd. I-III each; 2 on Abd. IV. Ventral microducts abundant on the prosoma. Antenna with a short seta. Anterior spiracle with a number of disc pores in a compact cluster, the posterior with a smaller cluster. Perivulvar pores numerous, 8-13 in the median group, 17-28 in the anterolateral and 16-33 in the posterolateral.

Tokyo and Tanzawa, Kanagawa-ken, on *Carpinus laxiflora* (S. Kawai).

In this species is known only the bark-infesting form. This species is quite close to *P. celtis* Kuw., but distinguished by having numerous gland spines on the prosoma (in *celtis* gland spines are quite few on the prosoma).

***Phenacaspis obovata***, n. sp. (Fig. 17; Pl. XXV, Fig. 40)

Body robust, the prosoma swollen into a rounded mass and wider than the postsoma. Pygidium with 2 pairs of lobes ( $L_1, L_2$ ) well developed, the 3rd reduced to low processes.  $L_1$  moderate in size, lacking a pair of setae between them; in the leaf-infesting form wholly sunken in the pygidium, divergent and serrate; in the bark-infesting form more or less produced and parallel, notched several times on each side.  $L_2$  with the lobules rounded or rather pointed apically. Dorsal macroducts in well-defined segmental rows;

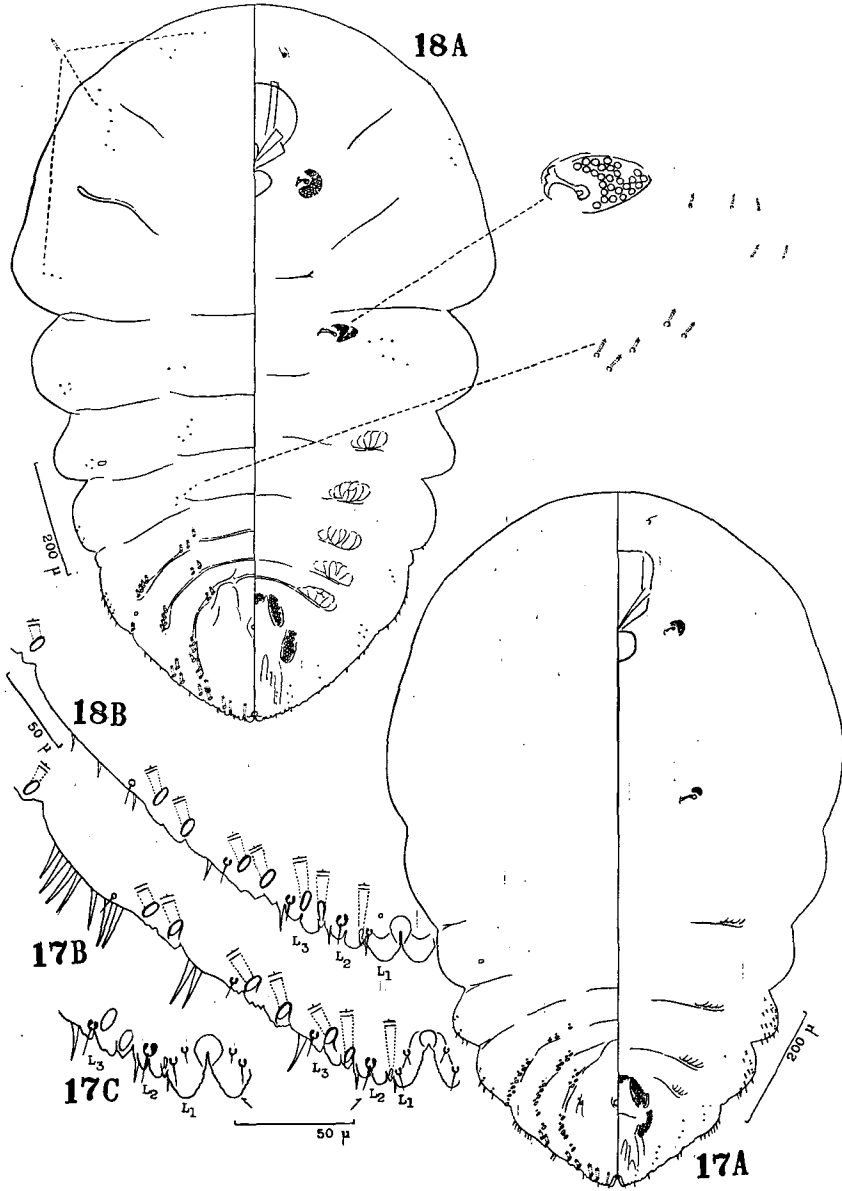


Fig. 17. *Phenacaspis obovata*, n. sp.: body (A), pygidial margin of leaf-infesting form (B) and pygidial margin of bark-infesting form (C).

Fig. 18. *Aulacaspis kadsurae*, n. sp.: body (A) and pygidial margin (B).

submedian macroducts usually 2-4 on Abd. III-V each, 0-2 on VI; submarginal macroducts usually 4-8 on Abd. III and IV each, 2-7 on V. Pleural macroducts much smaller and quite few on Abd. II and III. Gland spines absent on the thorax and Abd. I, variable in number on Abd. II-IV: 5-16 on Abd. II, 4-11 on III and 2-8 on IV. A small, sclerotized, submarginal dorsal boss between Abd. III and IV, another much larger but not sclerotized on Abd. I. Antenna with a seta. Anterior spiracle with a compact cluster of numerous disc pores, the posterior with a much smaller cluster. Perivulvar pores numerous, 9-18 in the median group, 17-29 in the anterolateral and 13-25 in the posterolateral. Derm membranous except for the pygidium, at most weakly sclerotized marginally on the prosoma.

Idu-Ôsima on *Machilus japonica* (S. Kawai).

In the shape of the body and some other characters this species is much similar to the members of *Aulacaspis*, but it is tentatively referred to *Phenacaspis* exclusively owing to the presence of dimorphism.

Genus *Aulacaspis* Ckll., 1893

Scott, Microent. 17 (2), 1952.

Type-species: *Aspidiotus rosae* Bouché.

Many species (*rosae* and others) of the genus have the median lobes practically wholly sunken into the apex of the pygidium and divergent, whereas certain species (*difficilis*; *fulleri*; *kadsurae*, n. sp.; *madiunensis*; *projecta*; *robusta*; *takarai*) have the median lobes wholly produced at the apex of the pygidium, parallel and rounded or rather conical in shape. We have, however, no doubt that all these species should be referred to the single genus, since they have congeneric characters.

*Aulacaspis kadsurae*, n. sp. (Fig. 18; Pl. XXVI, Fig. 41, 42)

Body robust, of the shape characteristic of the genus, the prosoma being prominently swollen into a rounded mass; prosomatic tubercles low. Pygidium well sclerotized, rather rounded, with 3 pairs of lobes ( $L_1, L_2, L_3$ ).  $L_1$  wholly produced, parallel, robust, rounded apically.  $L_2$  and  $L_3$  with the inner lobule more or less expanded apically, and with the outer lobule smaller but distinct. Dorsal macroducts about 1-4 in the submedian region and 4-6 in the submarginal region on Abd. III-V each, absent or present (1) in the submedian region on Abd. VI. Pleural macroducts much smaller and few on Abd. II and III. Submedian dorsal microducts scattered on basal 2 abdominal segments and metathorax. Gland spines small and slender, absent on the thorax and Abd. I; 2 or 3 on Abd. II, 3-5 on Abd. III; 3 or 4 on Abd. IV; single on the succeeding segments. Antenna with a seta. Anterior spiracle with a compact cluster of numerous disc pores, the posterior with a smaller, rather loose cluster. A submarginal dorsal boss on Abd. I and also between Abd. III and IV. Perivulvar pores numerous in 5 groups. Derm sclerotized at maturity in the prosoma and laterally in the free abdominal segments.

Tokyo (Takao-san; Ogôti, Okutama) on *Kadsura japonica* and *Schisandra nigra* (S. Kawai); Wakayama Experiment Forest of the Hokkaido University, Wakayama-ken, and Siraga-yama and Morigauti, Kôti-ken, on *Kadsura japonica* (S. Takagi).

This species is close to *A. projecta* Tak.,\* from which it is readily distinguishable

\* This species was originally described from an undetermined plant. Further specimens were collected at the type locality (Kurikara) on *Styrax japonica*; in Idu-Ôsima, Idu Islands, on *Styrax japonica* and *Cornus controversa*; and in Tokyo (Okutama) on *Cornus kousa*.

by having fewer dorsal macroducts.

Genus *Clavaspidiotus*, n. g.

Type-species: *C. abietis*, n. sp.

Body pyriform. Pygidium little rounded, yet not acute, with 3 pairs of well-developed lobes ( $L_1, L_2, L_3$ ), the 4th ( $L_4$ ) reduced to an angular, sclerotized process. Mesal 3 pairs of lobes rounded apically, notched laterally, with an appearance of convergence towards the apex of the pygidium;  $L_1$  largest, separated by a narrow space between them,  $L_2$  and  $L_3$  successively reduced in size. Marginal spines (plates) well developed, 2 between  $L_1$  and also between  $L_1$  and  $L_2$ , 3 between  $L_2$  and  $L_3$ , all these spines being slender; 3 between  $L_3$  and  $L_4$  robust, each with 2 slender processes arising at both apical angles. Paraphyses or marginal scleroses well developed, arising at the inner ( $P_1$ ) and outer ( $P_{2a}$ ) basal angles of  $L_1$ , at the inner basal angle of  $L_2$  ( $P_{2b}$ ), in the interspace between  $L_2$  and  $L_3$  ( $P_{3a}$ ) and at the inner basal angle of  $L_3$  ( $P_{3b}$ );  $P_{2a}$  well extending to the level of the anal opening;  $P_1$  and  $P_{2b}$  about half as long as  $P_{2a}$ . Dorsal macroducts of the pygidium long and slender, with the orifices elliptical and arranged mainly in 3 rows on each side. Anal opening situated near the apex of the pygidium, its longitudinal diameter about equal to the length of  $L_1$ . Genital opening situated about the centre of the pygidium, without perivulvar disc pores. Both spiracles without disc pores. Derm membranous except for the pygidium.

This genus comes close to *Quadraspidiotus* MacG. and *Clavaspis* MacG., but, so far as their type-species are concerned, differs from the latter two as follows: Differs from *Quadraspidiotus* by the presence of  $L_4$ , the 3 apically bifid marginal spines between  $L_3$  and  $L_4$  and the extreme development of  $P_{2a}$ ; Differs from *Clavaspis* by the less acute pygidium, the presence of the lateral lobes ( $L_2, L_3, L_4$ ) and the 3 apically bifid marginal spines between  $L_3$  and  $L_4$ . *Aspidiotus tayabanus* Ckll. and *Quadraspidiotus cryptus* Ferris may be referable to the new genus. Certain other species of *Quadraspidiotus* (*perniciosus* Comst.; *macroporanus* Tak.; *paraphyses* Tak.) have unmistakable similarities to *C. abietis*, n. sp., but are retained for a while in *Quadraspidiotus* mainly owing to the absence of  $L_4$ .

*Clavaspidiotus abietis*, n. sp. (Fig. 19; Pl. XXVII, Fig. 43)

Paraphyses:  $P_1$  slightly curved mesally;  $P_{2a}$  knobbed apically,  $P_{2b}$  also more or less swollen apically;  $P_{3a}$  and  $P_{3b}$  often minuscule. Dorsal macroducts: 1 opened between the bases of  $L_1$ ; 2 or 3 between  $P_{2a}$  and  $P_{2b}$  (in the intersegmental furrow of Abd. VII/VIII); 4-7 in an oblique, single row arising between  $P_{3a}$  and  $P_{3b}$  (Abd. VI/VII); 1 near the margin on Abd. VI; 3-6 in an oblique, single row arising at the inner basal angle of  $L_4$  (Abd. V/VI); and 1 near the margin on Abd. V. Prepygidial macroducts much shorter, 8-12 along the body margin anteriorly to the prosomatic tubercle. Prosomatic tubercle opposite the posterior spiracle, small, sclerotized and pointed. Antenna with a single seta.

Tokyo and Tusima. Okayama-ken, on *Abies firma* (S. Kawai).

This species is very close to *C. cryptus* Ferris (= *Quadraspidiotus cryptus*), which was described as a *Juniperus*-feeder from Yunnan, China. It may be distinguishable from the latter mainly by the knobbed paraphysis ( $P_{2a}$ ).

Genus *Abgrallaspis* Balach., 1948

Balachowsky, Act. Sci. Indust., Ent. Appl. 1054 (Les Cochenilles IV): 306, 1948; Ann. Mus. R. Congo Belge, N. S. in-4, 3: 14, 1956. Davidson, Ann. Ent. Soc. Amer. 57: 638, 1964.

Type-species: *Aspidiotus cyanophylli* Sign.

*Abgrallaspis momicola*, n. sp. (Fig. 20; Pl. XXVII, Fig. 44)

Body pyriform. Pygidium broad, with 3 pairs of lobes ( $L_1, L_2, L_3$ ) all sclerotized.  $L_1$  practically parallel or rather convergent, each with a subapical notch on either side, and with a robust basal sclerosis, the interspace about 1/3 width of one of them, with a pair of simple spines.  $L_2$  much smaller, low, assymmetric and convergent.  $L_3$  small, pointed. A pair of short, robust paraphyses between  $L_1$  and  $L_2$ , bordering the intersegmental furrow between Abd. VII and VIII. Dorsal macroducts of the pygidium: 3 in a short row in the intersegmental furrow between Abd. VII and VIII; 1 at the outer basal angle of  $L_2$ ; 5 or 6 in a row arising just mesally to  $L_3$  (Abd. VI/VII); usually 1 near the margin and usually 2 in the submarginal region on Abd. VI; 5-9 in a row in the intersegmental furrow between Abd. V and VI, the row attaining the laterobasal sclerosis of the pygidium; several macroducts mingled with microducts on Abd. V. Prepygidial macroducts much shorter, 15-23 along the body margin anteriorly onto the metathorax. Antenna with a seta. Prosomatic tubercles present nearly opposite the anterior spiracles, sclerotized. Granulations or scaly processes of the derm present lateroposteriorly to the mouth-parts and between the posterior spiracles. Anal opening about as long as  $L_1$  in longitudinal diameter, apart from the apex of the pygidium by a distance equal to the diameter. Perivulvar pores absent. Derm remaining membranous except for the pygidium.

Tokyo (Ogôti, Okutama) and Amagi-san, Sizuoka-ken, on *Abies firma* (S. Kawai).

In this species  $L_1$  and  $L_2$  are convergent and robust paraphyses are present on the pygidium. By these characters it is somewhat similar to members of *Quadraspidotus*, but is placed in *Abgrallaspis* on account of the anal opening, which is comparatively large and situated near the apex of the pygidium, and the presence of marginal spines laterally to  $L_3$ .

Genus *Acanthaspidotus* Borchs. & Will., 1963

Borchsenius & Williams, Bull. Brit. Mus. (N.H.), Ent. 13: 381, 1963.

Type-species: *Aspidiotus pustulans* Green.

*Acanthaspidotus borchsenii*, n. sp. (Fig. 21; Pl. XXVIII, Fig. 45)

Body nearly circular or rather pyriform. Pygidium with 3 pairs of lobes ( $L_1, L_2, L_3$ ).  $L_1$  large, slightly convergent or practically parallel, separated by a quite narrow space, each with a subapical notch on either side, and with a basal sclerosis about as long as the lobe.  $L_2$  much smaller than  $L_1$ , without notches.  $L_3$  quite small, pointed, at times much reduced in size or replaced by a spine. Interlobar marginal spines fimbriate apically, but 6 spines laterally to  $L_3$  not. Marginal setae of Abd. VII (on  $L_2$ ), both dorsal and ventral, prominently thickened, but the others not. Dorsal macroducts of the pygidium 15-27 in number on each side, forming 2 oblique rows sometimes fused

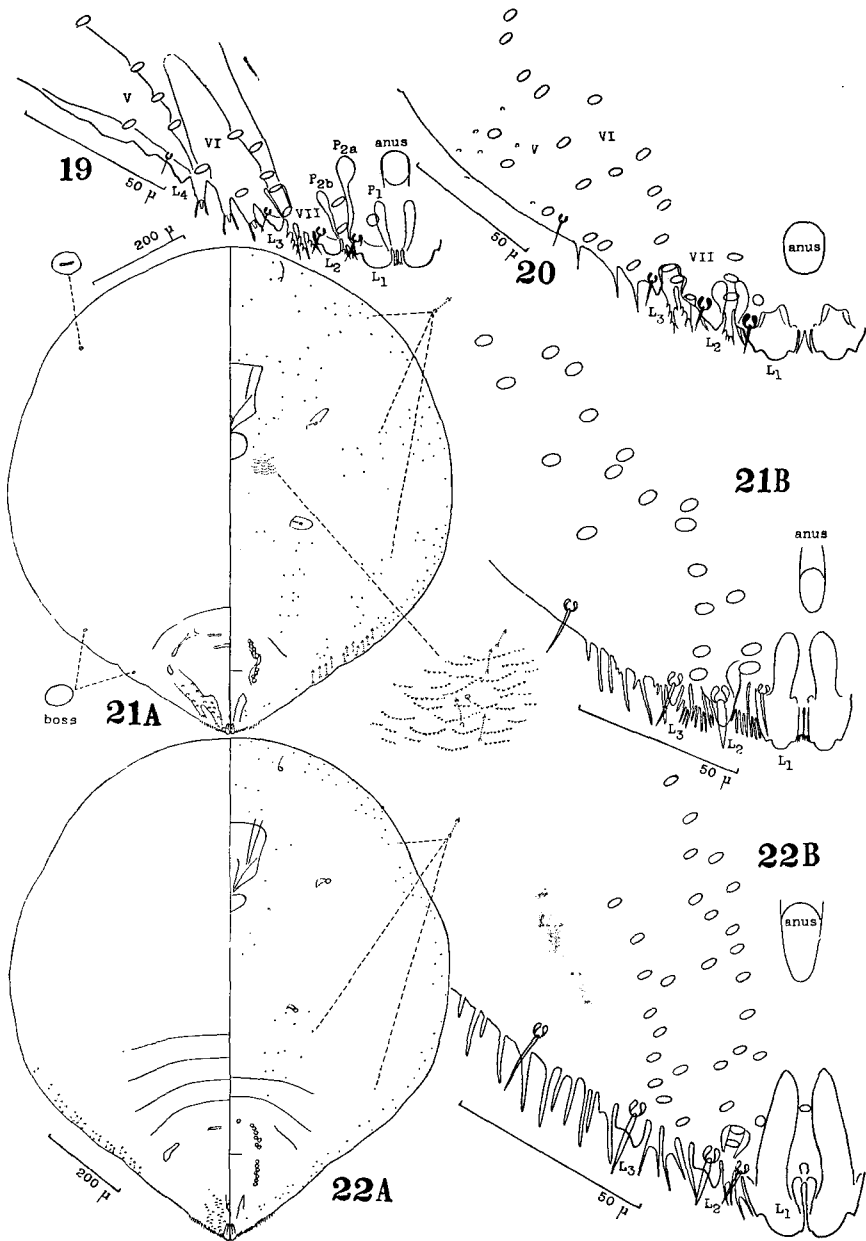


Fig. 19. *Clavaspidiotus abietis*, n. sp.: pygidial margin.  
Fig. 20. *Abgrallaspis momicola*, n. sp.: pygidial margin.  
Fig. 21. *Acanthaspidiotus borchsenii*, n. sp.: body (A) and pygidial margin (B).  
Fig. 22. *Japaspidiotus cedricola*, n. sp.: body (A) and pygidial margin (B).

into a broad band. Prepygidial macroducts much shorter, 6-13 along the body margin of Abd. II and III. Anal opening elliptical, about as long as  $L_1$  in longitudinal diameter, removed twice the diameter from the apex of the pygidium. Perivulvar pores few, 3-8 in number in each of the anterolateral and posterolateral groups. Microducts abundant on the prepygidial ventrum. Derm membranous except for the pygidium.

Tokyo on *Platanus orientalis*; Irô-saki, Idu Peninsula, on *Ligustrum obtusifolium*; Hatizyô-sima, Idu Islands, on *Hydrangea macrophylla*, *Hydrangea involucrata* and *Boehmeria tricuspis* (S. Kawai).

Although this species deviates from the type-species of the genus by the fact that the thickness of the marginal setae takes place only on Abd. VII, we believe that it is rightly referred to the genus. The shape of the lateral lobes ( $L_2$ ,  $L_3$ ) and the fewer dorsal macroducts of the pygidium may be also useful in distinguishing it from the type-species. We wish to name this species in honour of the late Prof. N. S. Borchsenius.

#### Genus *Japaspidiotus*, n. g.

Type-species: *J. cedricola*, n. sp.

Body pyriform. Pygidium little rounded, rather acute, with 3 pairs of lobes ( $L_1$ ,  $L_2$ ,  $L_3$ ).  $L_1$  large, set quite close on their whole mesal margins, lacking marginal spines between them, each with a prominent basal sclerosis and with a lateral notch.  $L_2$  and  $L_3$  much smaller than  $L_1$ . Marginal spines (plates) simple or bifurcate, 2 between  $L_1$  and  $L_2$ , 3 between  $L_2$  and  $L_3$ , a series laterally to  $L_3$  extending beyond the marginal setae of Abd. V. Marginal setae, both dorsal and ventral, of Abd. VI and VII thickened. Marginal scleroses (paraphyses) not developed. Dorsal macroducts of the pygidium slender, not much elongate, with the orifices elliptical and forming longitudinal rows towards the apex of the pygidium. Anal opening towards the apex of the pygidium. Perivulvar disc pores present. Both spiracles without disc pores. Derm remaining membranous except for the pygidium.

This genus is close to *Acanthaspidiotus* Borchs. & Will., from which it is distinguished by  $L_1$  set close and lacking spines between them, the arrangement of the dorsal macroducts of the pygidium and the acute pygidium.

#### *Japaspidiotus cedricola*, n. sp. (Fig. 22; Pl. XXVIII, Fig. 46)

$L_1$  with an appearance of convergence, the basal sclerosis longer than  $L_1$ .  $L_2$  deeply incised laterally, pointed apically.  $L_3$  similar in shape to  $L_2$ , practically as large as or even a little larger than the latter. Dorsal macroducts of the pygidium: 13-20 in an irregularly double or triple row arising between  $L_1$  and  $L_2$  and extending beyond the anal opening; 5-12 in a shorter row arising between  $L_2$  and  $L_3$  (2 or 3 further macroducts are seen laterally to this row in certain specimens). Prepygidial macroducts much shorter; 19-34 along the body margin on Abd. I-III. Ventral microducts abundant along the body margin. Anal opening elliptical, about as long as  $L_1$  in longitudinal diameter, removed more than twice the diameter from the apex of the pygidium. Perivulvar pores present (1-5) or absent in the median group, 7-11 in the anterolateral and 4-10 in the posterolateral.

Tokyo (Akisima; Ogôti, Okutama) on *Cedrus deodara* and *Tsuga diversifolia* (S. Kawai); Simazima, Nagano-ken, on *Pinus densiflora* (S. Kawai).

In the specimens collected on *Cedrus deodara* at Akisima and on *Pinus densiflora*

at Simazima the dorsal macroducts of the pygidium form 2 longitudinal rows on each side, whereas in those collected on *Tsuga diversifolia* at Ogôti 2 or 3 further macroducts are seen forming the 3rd row on either side. We have, however, found no other distinct differences between the 2 forms, which may be variants of the same species. It is possible that this species is identical with *Aspidiotus corticis-pini* Lindgr., 1909 (type-species of *Unaspidiotus* MacG., 1921), but we can not certify this identity.

### Explanation of plates

All the figures except Fig. 42 show pygidia; Fig. 42 shows a whole body.

PI. XVII. Fig. 23: *Parlatoria thujae*; Fig. 24: *Parlatoreopsis pyri*.

PI. XVIII. Fig. 25: *Parlatoreopsis tsugae*; Fig. 26: *P. sexlobatus*.

PI. XIX. Fig. 27: *Parlatoreopsis octolobatus*; Fig. 28: *Lepidosaphes dorsalis*.

PI. XX. Fig. 29: *Andaspis micropori*; Fig. 30: *A. piceae*.

PI. XXI. Fig. 31: *Andaspis tokyoensis*; Fig. 32: *A. recurrens*.

PI. XXII. Fig. 33: *Cynodontaspis edentata*; Fig. 34: *Neopinnaspis harperi*.

PI. XXIII. Fig. 35: *Kuwanaspis howardi*; Fig. 36: *K. tanzawensis*.

PI. XXIV. Fig. 37: *Phenacaspis acer*, leaf-infesting form; Fig. 38: same, bark-infesting form.

PI. XXV. Fig. 39: *Phenacaspis latiloba*, bark-infesting form; Fig. 40: *Ph. obovata*, bark-infesting form.

PI. XXVI. Fig. 41, 42: *Aulacaspis kadsurae*.

PI. XXVII. Fig. 43: *Clavaspidiotus abietis*; Fig. 44: *Abgrallaspis momicola*.

PI. XXVIII. Fig. 45: *Acanthaspidiotus borchsenii*; Fig. 46: *Japaspidiotus cedricola*.

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## RECORDS OF SOME PINNASPIS-SPECIES OF JAPAN

By SADAŌ TAKAGI

### *Pinnaspis juniperi* Takahashi

Takahashi, Ann. Zool. Jap. 29: 57, 1956. Ōsaka, on *Juniperus rigida*.

Imabari, Sikoku, on *Juniperus* sp. (S. Takagi).

### *Pinnaspis boehmeriae* Takahashi

Takahashi, Trans. Shikoku Ent. Soc. 5: 105, 1957. Kōya-san, Rokkō-san and Mino, on *Boehmeria spicata*, *Liriope graminifolia* and *Synurus palmatopinnatifidus* (= *S. palmatopinnatifolia*).

Takagi, Ins. Mats. 24: 72, 1961. Rokkō-san, on *Boehmeria japonica* and *Cirsium spicatum*; Hiko-san, on *Boehmeria spicata*.

Tokyo (Okutama), on *Boehmeria tricuspis* and *Rubus crataegifolius* (S. Kawai); Siraga-yama, Sikoku, on *Boehmeria nipponivea* (S. Takagi).

### *Pinnaspis chamaecyparidis* Takagi

Takagi, Ins. Mats. 24: 72, 1961. Toyama-ken, on *Chamaecyparis obtusa*.

Tokyo and Idu-Ōsima, on *Chamaecyparis obtusa* and *Cryptomeria japonica* (S. Kawai).