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Scientific Bulletin No. 2.

March, 1931.

I. THE DIASPINE COCCIDAE OF JAPAN, VI

GENUS PHENACASPIS

BY

INOKICHI KUWANA

II. THE GENUS KERMES OF JAPAN

BY

INOKICHI KUWANA

TOKYO, JAPAN
1931

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第二號

- I. 日本産介殼蟲科デアスピ亞科ニ
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昭和六年三月

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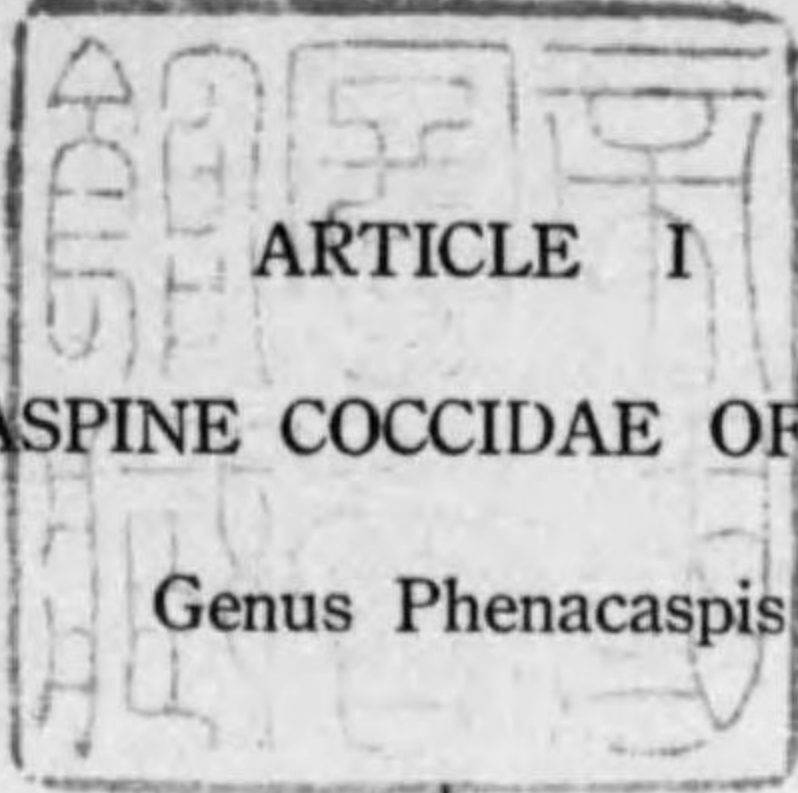
INOKICHI KUWANA

TOKYO, JAPAN



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ARTICLE I
THE DIASPINE COCCIDAE OF JAPAN, VI
Genus *Phenacaspis*

by
Inokichi Kuwana
Tokyo, Japan

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Genus *Phenacaspis* COOLEY AND COCKERELL.

This genus includes species of *Diaspinae* in which the scale of the female resembles that of the genus *Chionaspis*; elongate or broadly

Ministry of Agriculture and Forestry, Department of Agriculture, Tokyo, Japan;
Sci. Bull. No. 2.

round; white with the exuviae at the anterior extremity. The scale of the male is much smaller than that of the female; elongate, sides nearly parallel, and the exuvia at the anterior end, with two longitudinal grooves on the dorsal surface, causing one to three carinae, which vary in prominence in different species.

The pygidium of the female is similar to that of *Chionaspis*, but the median lobes are well separated, more or less sunken into the apical margin of the pygidium, and having their inner margins serrate or crenate and strongly divergent, leaving a distinct notch in the median line.

The species described herewith may be separated by the following key:

Key to Species.

- A. Median lobes rather narrow, the inner margins parallel at base and divergent less strongly.
 - a. Third lobes well developed *moni*.
 - b. Third lobes obsolete or not perceptibly developed.
 - a.' Median lobes widely apart *dilatata*.
 - b.' Median lobes not widely apart *fujicola*.
- B. Median lobes broader, strongly divergent from the bottom of the notch.
 - a. Median lobes very prominent and much produced. . . *quercus*.
 - b. Median lobes large but not so much produced.
 - a.' Marginal gland spines prominent; third lobe simple with a notch about middle *aucubae*.
 - b.' Marginal gland spines rather short; third lobe divided into two lobules *kentiae*.

1. *Phenacaspis aucubae* (COOLEY).

(Nom. Jap. Aoki no nagakaigaramushi.)

(Plate i, figs. a-f)

- 1897 *Chionaspis aucubae* Cooley; Can. Ent., xxix, p. 279.
- 1902 *Phenacaspis* " " in litt.
- 1903 " " " Fernald, Cat. Coc. World, p. 237.

Scale of female.—Female scale strongly broadened posteriorly and abruptly rounded at the extremity; moderately convex; thick and rather strong; opaque white. First exuvia pale yellow; the second yellowish brown to dark brown, with a reddish brown posterior margin, naked or slightly covered with a grayish secretion. A partial ventral scale at the anterior end.

Length 1.5–2.8 mm., width 1.5–2 mm. Length of exuviae .7–1 mm., width .5–.6 mm.

Scale of male.—Small, elongate, delicate, sides nearly parallel; median keel often not very distinct; exuvia pale straw in color. Length 1 mm., width .5 mm.

Body of female.—Adult female orange yellow in color; elongate in outline, broadest at abdominal region; segmentation distinct; intersegmental constriction pronounced, abdominal lobes prominent. Antennae a thickened disc, with a long curved hair. Anterior pair of spiracles with parastigmatic gland orifices in cluster; the posterior pair without the orifice. Mouth parts well developed, large; rostral loop not very long. Many round pores and short gland spines on the margin of free abdominal segments.

Pygidium of female.—Rather small, a little broader than long, not heavily chitinized. Median lobes moderate in size, much broader, curved, divergent, united at the base, with their inner margin distinctly serrate; second lobes rather large, bilobed, apices round, inner lobule much longer than the outer, and often projecting beyond the tip of the median lobes; third lobes broad and simple or with a notch on the outer margin,

sometimes rudimentary. Marginal gland spines arranged as follows: 1, 1, 1-3, 1-3, 3-5. Marginal pores prominent and arranged as follows: 1, 2, 2, 2. Between the bases of the median lobes is a pair of minute convergent spines; spines on dorsal side, around margin are much more prominent than on the ventral side. Anal opening small, round, much nearer to the base than the apex of pygidium. Dorsal gland orifices numerous, arranged as follows:

Row number	I	II	III	IV
Anterior group	-	2-6	3-6	4-6
Posterior group	-	-	6-8	5-9

Circumgenital gland orifices in five groups, number of orifices in each group as in the following examples:

9	6	15	9	9
25-26	20-20	22-25	23-23	19-17
27-21	26-23	28-28	24-27	20-16
14	13	10	12	7
25-23	25-28	23-23	21-21	15-14
28-30	28-32	24-17	29-27	20-20

Habitat. - Common in Japan, especially in Kiushu and Honshu, south of Tokyo. The host plants known to the writer at the present are as follows:

Aucuba japonica (aoki).

Diplmiphyllum macropodum (yuzuriha).

Ilex crenata (inutsuge).

Magnolia kobus (kobushi).

Merium odorum (kyochikuto).

Fatsia japonica (yatsude).

Trachelospermum asiaticum (teikakazura).

Viburnum odoratissimum (sangoju).

Yucca gloriosa (zimoran).

Notes. - Since the great disaster in September, 1923, the writer and his assistants have collected this scale on different hosts in different

parts of the Empire; however, the above study was made by the writer from the material on *Aucuba japonica*, collected by Mr. S. Aoki, in Hibiya Park, Tokyo City, Summer of 1927. This insect was found by the Late Mr. Alex. Craw of San Francisco, at his Quarantine work on *Aucuba japonica* from Japan and described by Prof. R. Cooley in 1897. Since then it has been collected by the writer and others in Japan on the same host.

2. *Phenacaspis dilatata* (GREEN).

(Nom. Jap. Nikuzuku no nagakaigaramushi.)

(Plate ii, figs. g-m)

1899 *Chionaspis dilatata* Green; Coc. Ceylon, Pt. ii, p. 148.

1902 *Phenacaspis* " " Cooley, in litt.

1903 " " " Fernald; Cat. Coc. World, p. 237.

Scale of female. - Elongate or broadly and roundly dilated, flattish, with vein-like surface markings. Snowy white; opaque, of rather stout texture. First exuvia pale; second exuvia dark reddish brown with opaque reddish brown margin, slightly covered with a waxy secretion.

Length 2.3-3 mm., width 1.5-1.7 mm. Length of exuviae 1-1.2 mm., width .5 mm.

Scale of male. - Elongate, sides nearly parallel, feebly keeled. Length .7-1.2 mm., width .5-.7 mm.

Body of female. - Body of adult female is pale yellow, pygidium orange yellow. Form oblong; segmentation distinct; thoracic region broadest. Each side of abdominal segment much produced, bears many round pores and conical gland spines. Antennae rather close together, with a short spine and fine hairs. Anterior spiracles with parastigmatic gland orifices in cluster; the posterior without the orifice. Mouth parts rather small but well formed.

Pygidium of female. - Rather small, not heavily chitinized, with a broad and deep median cleft, containing rather large divergent median lobes; their free edges distinctly serrate. Second lobes well

developed, divided, apice rounded, inner lobule not much extended beyond the median lobes. Third lobes obsolete. Marginal gland orifices arranged as follows: 1, 2, 2, 2. Marginal gland spines arranged as follows: 1, 1, 1, 1-2, 2-4. Spines normal. Anal orifice located cephalad of nearer the base than apice of pygidium. Dorsal gland orifices prominent, arranged as follows:

Row number	I	II	III	IV
Anterior	-	1-2	3-4	4
Posterior	-	1	4-6	5-7

Circumgenital gland orifices numerous, consisting of five groups; number of orifices in each group, as in the following examples:

6	5	6	5	7
15-15	15-18	16-13	13-13	18-17
21-22	24-23	21-22	19-22	30-27

Habitat. - Found on leaves of *Myristica fragrans* (nikuzuku) in Yokohama, collected by the writer, September 1925. Since then it has been found by the writer and his assistants on the same host in Angyo, Saitama-ken.

Notes. - The microscopic characters shown in this insect are somewhat differ from Professor Green's description in Coccidae of Ceylon Vol II, however, Dr. Harrold Morrison who kindly compared ours with the type material in Washington, informed the writer that our specimens appear to come close enough to specimens from the type material to be assigned to this species. So the writer is at present satisfied in placing under this species.

3. *Phenacaspis quercus* n. sp.

(Nom. Jap. Kashi no nagakaigarunushi.)

(Plate i, figs. g-1)

Scale of female. - Elongate or dilated, slightly convex, snowy white. First exuvia reddish brown; second exuvia orange in color with distinct dorsal longitudinal ridge, more or less covered with a gray-

ish secretion.

Length 1.7-2.5 mm., width 1-1.5 mm. Length of exuviae .7-1 mm., width .5-.6 mm.

Scale of male. - Snowy white, elongate, sides nearly parallel; dorsal keel not prominent. Exuvia pale yellow. Length 1.7 mm., width .5 mm.

Body of female. - Adult female yellowish with orange yellow abdominal end; elongate, segmentation distinct; broadest at metathoracic region. Antennae a thickened disc, with a long curved hair. Mouth parts rather small, rostral loop short. Anterior pair of spiracles with clustered parastigmatic gland orifices; the posterior pair with no orifices. Margin of abdominal segments with groups of oval pores, and short gland spines.

Pygidium of female. - Rather small and very broad, not heavily chitinized. Median lobes very prominent, strongly divergent, with their inner margin feebly serrate; second pair of lobes small, much shorter than the median lobes, divided into two lobules, of which the outer one is much smaller; third lobes wanting. A pair of much convergent spines between the bases of the median lobes, which are very pronounced. Marginal gland spines rather short, arranged as follows: 1, 1, 1, 2, 4. Marginal gland pores rather stout, arranged as follows: 1, 2, 2, 2. Anal opening round, much nearer to the base than the apex of the pygidium. Dorsal gland orifices numerous, number of orifice in each row variable, an example as showing in the figure. Circumgenital gland orifices in five groups, number of the orifices in each group as follows:

14	14	13	16	10
30-31	34-36	22-24	31-28	33-33
25-26	34-33	24-24	25-19	35-35

Habitat. - On *Quercus myrsinaefolia* (shirakashi). Collected by the Late Y. Tanaka, in Honmoku, Yokohama, April 1924.

Notes. - This new insect can be separated from any other species in Japan by a very large median lobes which are strongly divergent.

4. *Phenacaspis fujicola* n. sp.

(Nom. Jop. Fuji no nagakaigaramushi.)

(Plate ii, figs. a-f)

Scale of female.—White, thin and semi-transparent; form oblong, narrow in front, widest at middle portion, rounded behind, somewhat triangular in outline. First exuvia pale grayish yellow; second exuvia dark brown with yellowish end.

Length 2.5-3 mm., width 1.2-1.5 mm. Length of exuviae .7-1 mm., width .4-.5 mm.

Scale of male.—Snowy white, elongate, sides parallel; dorsal keel distinct. Length 1-1.2 mm., width .3-.5 mm.

Body of female.—Elongate, anterior end narrow, broadest at metathoracic region; segmentation distinct. Margin of each abdominal segment with group of round pores and short conical gland spines. Antennae with a long hair. Mouth parts large, well chitinized, rostral loop long. Both anterior and posterior pairs of spiracles with parastigmatic gland orifices in clusters.

Pygidium of female.—Small, rather elongate, median lobes small, long and narrow, the outer margin slightly concave, the apices round, inner margins parallel at the base, gradually diverging, jointed together at the base by a heavy chitinous thickening, finely serrate on inner margins. Second lobes well developed divided into lobules, the inner one very much larger and more prominent than the outer; third lobes not perceptibly developed; margin of the pygidium beyond the second lobes finely serrate. Marginal gland spines prominent, arranged as follows; 1, 1, 1, 1-2, 2-4. Marginal pores rather short, arranged as follows; 1, 2, 2, 1, 1; pore prominent as usual. Spines on the ventral side are much larger than that of the dorsal side. Anal opening large, much nearer the base than apice of the pygidium. Dorsal gland orifices arranged as follows:

Row number	I	II	III	IV
Anterior	-	1-2	2-4	2-4
Posterior	-	-	3-4	4-6

Circumgenital gland orifices in five groups, the number of orifices in each group as follows:

11	15	18
18-18	21-22	24-25
17-15	11-15	17-16

Habitat.—on the leaves of *Wistaria chinensis* var. *multiguga* (fuji). Angyo, Saitama-ken, collected by Mr. K. Miyasaki, September 1924. Since then the scale insect was found by Mr. Y. Tanaka in Kawasaki, Kanagawa-ken, in January 1925. It was also found by Mr. K. Tanaka in Atsuta, Aichi-ken, on the same plant in March 1925.

Notes.—Described from three females and many scales, from material obtained in Angyo. This species differs from other Japanese species of this genus; the pygidium is much narrower and the median lobes are small.

5. *Phenacaspis momi* n. sp.

(Nom. Jap. Momi no nagakaigaramushi.)

(Plate iii, figs. a-f)

Scale of female.—Snowy white, opaque, of rather stout texture; very broadly and roundly dilated, slightly convex. First exuvia pale yellow; second exuvia yellowish brown.

Length 2.1-2.5 mm., width 1.7-2 mm. Length of exuviae .7-1.1 mm., width .5 mm.

Scale of male.—unknown.

Body of female.—Elongate, abdominal region broadest. Antennae a thickened disc, with a long hair. Mouth parts large well formed, rostral loop rather long. Anterior spiracles with clustered parastigmatic gland orifices, the posterior without the orifice.

Pygidium of female.—Large, rather broad. Median lobes small,

outer margin slightly concave, inner margins parallel near the base, gradually diverging, the apices flatter rounded and strongly serrate. Second lobes consists of two lobules of which the inner lobule is much larger and the apices broadly rounded, the outer lobule is conical in form; third lobes well formed, broad, divided. A pair of minute convergent spines between the bases of the median lobes well shown. Spines on both dorsal and ventral sides normal. Marginal gland spines arranged as follows: 1, 1, 1, 1, 2. Marginal gland pores arranged as follows: 1, 2, 2, 2. Dorsal gland orifices arranged as follows:

Row number	I	II	III	IV
Anterior group	-	1-2	2-3	2-3
Posterior group	-	-	3-5	4-5

Anal opening large, round, much nearer to the base than the apice of the pygidium. Circumgenital gland orifices in five groups, anterior 8; anterior lateral 15-18, posterior lateral 20.

Habitat.—On leaves of *Abies firma* (momi), Mt. Hakko, Shizuoka-ken, collected by Mr. Juichi Kuwana, January 1924.

Notes.—Described from a single female and number of scales. The female scale resembles *Phenacaspis aucubae*, in general, but the shape of the lobes of the pygidium of the female are much different so one can separate these two forms by these characters at once.

6. *Phenacaspis kentiae* n. sp.

(Nom. Jap. *Kentia no nagakaigaramushi*.)

(Plate iii, figs. g-1)

Scale of Female.—White, slightly convex; irregular, but usually broadly round or much dilated behind, thick and often showing vein-like markings on the surface. First exuvia very pale straw; the second yellowish brown to dark brown with yellowish end, usually slightly covered with a grayish secretion. Ventral scale hardly developed.

Length 2.2 to 2.5 mm., width 1.5-2 mm. Length of exuviae 1 mm., width .4 mm.

Scale of male.—Small, elongate, sides parallel, keel distinct; exuvia pale straw. Length 1 mm., width .4 mm.

Body of female.—Elongate, anterior end narrow, broadest at the metathoracic region, segmentation distinct. Antennae with one long, curved hair. Mouth parts rather large, rostral loop short. Anterior pair of spiracles with clustered parastigmatic gland orifices; posterior pair without the orifice. Numerous round pores and short conical gland spines on the side of the abdominal segments.

Pygidium of female.—Rather small and narrow. Median lobes very broad and stout, widely separated, inner margins parallel at the base then strongly divergent, distinctly serrated, outer margins but slightly concave; second lobes divided into two lobules, narrow with round apices, the inner lobules much longer than the outer, but usually not exceeding the median lobes; third lobes well developed, divided, the inner lobule very broad, conical in form, the outer lobule short and conical. Marginal gland spines not prominent, arranged as follows: 1, 1, 1, 1, 2-3. Marginal gland pores slender, arranged as follows: 1, 2, 2, 2. Spines on dorsal surface much larger than those on the ventral. Dorsal gland orifices arranged as follows:

Row number	I	II	III	IV
Anterior	-	1-2	2-4	2-6
Posterior	-	-	4-6	5-8

Anal opening large, round, much nearer the base than apice of the pygidium. Circumgenital gland orifices in five groups, number of orifices in each group as follows:

	8	8	7	6
21-19	17-20	17-15	16-20	
31-31	25-24	20-21	25-20	

Habitat.—On *Kentia* and other plants in green houses. Collected by the writer in Yamamoto, Hyogo-ken, March, 1930.

Notes.—This new species resembles *Phenacaspis aucubae* in the shape of the female, but can be readily separated by the morphological differences in the female pygidium.

Species of the Genus *Phenacaspis* Recorded from
Japan, not Included in the Foregoing List.

Phenacaspis eugeniae (MASKELL).

- 1891 *Chionaspis eugeniae* MASKELL; N. Z. Trans., xxiv, p. 14.
1897 " " " " N. Z. Trans., xxix, p. 306.
1903 *Phenacaspis* " " Cooley, Can. Ent., xxxv,
p. 48.
1903 " " " " Fernald, Cat. Coc. World,
p. 238.

In one of Mr. W. M. Maskell's coccid papers, he said " This species seems to be widely distributed. The original specimens were Australian. I have had it since from China, Japan, and the Sandwich Islands, on many plants." The writer was unfortunately not able to obtain this species in Japan, although came across a species similar to Mr. Maskell's description, which all turned out to be *Phenacaspis aucubae* Cooley. The original description of Maskell is as follows:—

" *Chionaspis eugeniae*, sp. nov. Plate I, figs, 10-12. Female puparium white or somewhat yellow, elongated, pyriform, flatish; length about $\frac{1}{10}$ in. pellicles terminal, yellow, not large.

" Male puparium white, elongated, soft and cottony, often appearing like a small irregular mass of cotton, but in individuals of normal form a distinct carination is visible.

" Adult female elongated, yellow or brown; abdomen ending with a shallow median depression, the two median terminal lobes being represented by thickenings of the margin at the depression with serrated edges; four very small lobes can be in most cases detected at each side, but this depends on the position of the specimens; a short spiny hair at each side of the depression; one, larger, between the four small lobes, and two others at equal distances on each margin: four altogether on each side; and on each of the anterior

abdominal segments of four spines. Spinneret-groups five; upper group, 6-8 orifices; upper laterals, 10-18; lower laterals, 18-20. Several large single spinnerets.

" Adult male unknown.

" *Hab.*—In Australia on *Eugenia elliptica*, *Viburnum* sp., *Leptospermum laevigatum*, *Melaleuca civicifolia*, &c. Specimens sent by Mr. French. The female puparia seem identical on all these plants, excepting a slight variation in colour: the male puparia on *Melaleuca* are frequently very loose and fluffy, and Mr. French tells me that the plants look as if covered with snow.

" In the abdominal margin this species approaches *C. nyssae*, Comst., but differs in other characters."

Phenacaspis chinensis (COCKERELL).

- 1896 *Chionaspis chinensis* COCKERELL; Fifth Bien. Rep. Cal. Bd.
Hort., p. 37
1898 " " " " Maskell, N. Z. Trans.,
xxx, p. 231.
1903 *Phenacaspis* " " Cooley, Can. Ent.,
xxxv, p. 48.

This scale insect was first found by the Late Alex. Craw, San Francisco in his Quarantine work, on *Quercus* sp. from China, May 1896, and described by Prof. T. D. A. Cockerell, in the same year, as a new species. Since then it was reported from Japan by Mr. W. M. Maskell, who obtained the material from Mr. A. Koebele collected on *Quercus acuta*, Atami, Japan. The writer has as yet been unable to get this scale insect. Prof. Cockerell's original description is given in the following lines:

" *Female scale.*— $2\frac{2}{3}$ mm. long, $1\frac{2}{3}$ mm. broad, snow white, broad, flat; exuviae clear orange, second skin $\frac{2}{3}$ mm. long.

" *Female.*—Median lobes brownish, wide apart, even at the base diverging, low, little produced, the long inner margin crenate, second

and third lobes each represented by a pair of rounded lobules, of which the mesad is the larger. Between the lobes are long spine-like plates. Mesad of each lobule, at its base, is a very short saccular gland. A pair of these glands takes the place of the fourth lobe, which, however, is entirely obsolete, leaving the margin slightly crenate at that place. Cephalad of this is on the margin a spine, and further on a large spine-like plate, and still further a group of four large spine-like plates. The obsolete segments are marked by conspicuous rows of transversely elongate glands. Five groups of ventral glands, the lateral groups nearly touching. Median group of 9, cephalolaterals 17, caudolaterals about 25. Lateral margins of segments rounded not much produced.

"*Male scale*.—Small, ordinary, white, with no distinct keel; not fluffy; exuviae orange.

"Allied to *C. nyssae* and especially *C. eugeniae*. The species *nyssae*, *chinensis*, and *eugeniae*, though so widely separated geographically, from a natural group of the Genus."

Acknowledgments.

The writer's thanks are due to Professor E. E. Green of England and Dr. Harold Morrison of U. S. Bureau of Entomology, Washington, D. C., who kindly assisted in obtaining some of specimens for comparative study. The writer is also indebted to Messrs. S. Aoki and K. Muramatsu, who kindly assisted in laboratory preparation for the study.

Tokyo, Japan
August 15, 1930.

I. KUWANA :

THE DIASPINE COCCIDAE OF JAPAN, VI

PLATE I

Explanation of Plate I

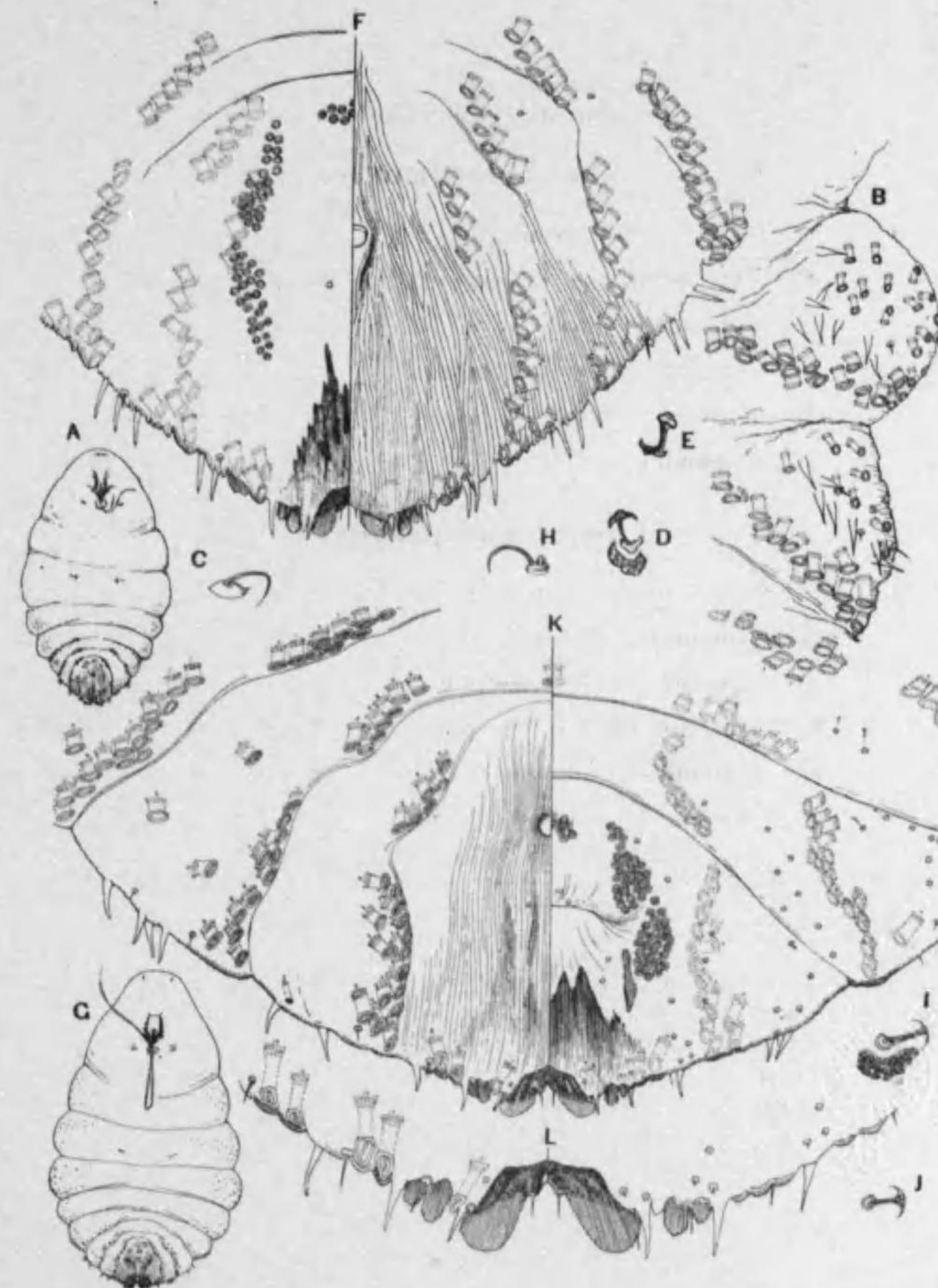
Phenacaspis aucubae

- A. Adult female (ventral view).
- B. Margin of free abdominal segments of same.
- C. Antenna of same.
- D. Anterior spiracle of same.
- E. Posterior spiracle of same.
- F. Pygidium of same.

Phenacaspis quercus

- G. Adult female (ventral view).
- H. Antenna of same.
- I. Anterior spiracle of same.
- J. Posterior spiracle of same.
- K. Pygidium of same.
- L. Margin of pygidium of same.

(All figures, more or less magnified.)



I. KUWANA:

THE DIASPINE COCCIDAE OF JAPAN, VI

PLATE II

Explanation of Plate II

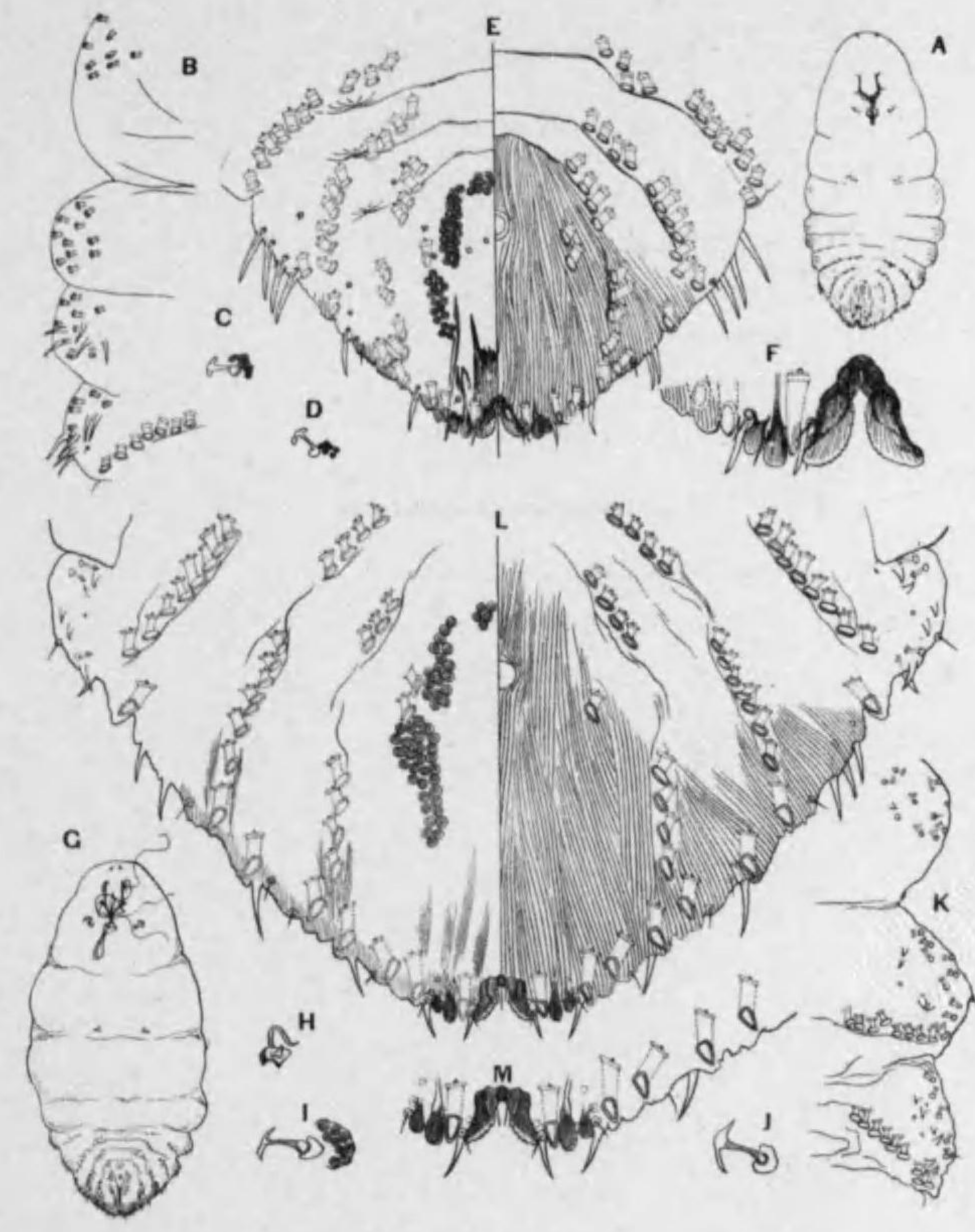
Phenacaspis fujicola

- A. Adult female (ventral view).
- B. Margin of free abdominal segments of same.
- C. Anterior spiracle of same.
- D. Posterior spiracle of same.
- E. Pygidium of same.
- F. Margin of pygidium of same.

Phenacaspis dilatata

- G. Adult female (ventral view).
- H. Antenna of same.
- I. Anterior spiracle of same.
- J. Posterior spiracle of same.
- K. Margin of free abdominal segments of same.
- L. Pygidium of same.
- M. Margin of pygidium of same.

(All figures, more or less magnified.)



I. KUWANA:

THE DIASPINE COCCIDAE OF JAPAN, VI

PLATE III

Explanation of Plate III

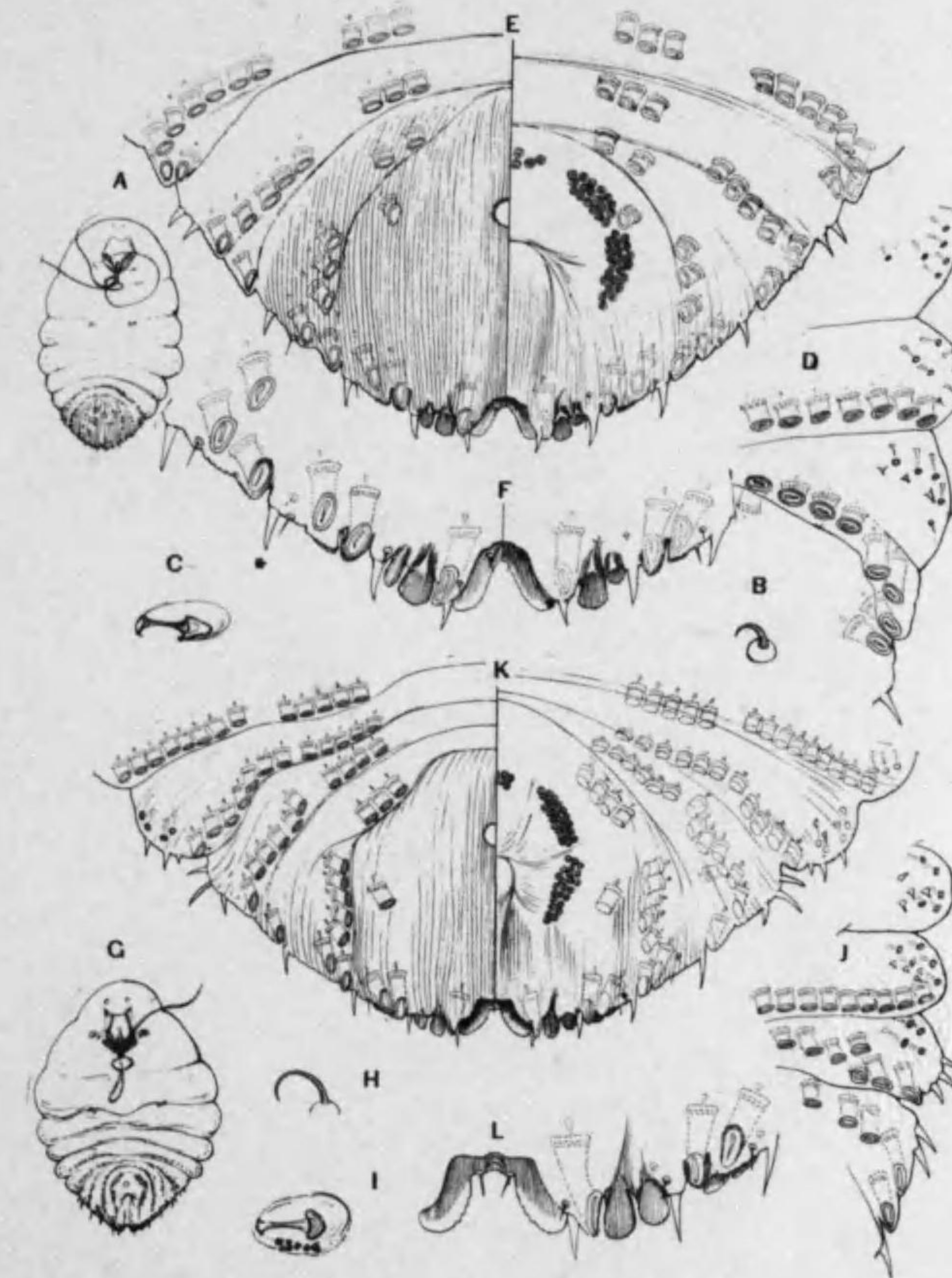
Phenacaspis momi

- A. Adult female (ventral view).
- B. Antenna of same.
- C. Posterior spiracle of same.
- D. Margin of free abdominal segments of same.
- E. Pygidium of same.
- F. Margin of pygidium of same.

Phenacaspis kentiae

- G. Adult female (ventral view).
- H. Antenna of same.
- I. Anterior spiracle of same.
- J. Margin of free abdominal segments of same.
- K. Pygidium of same.
- L. Margin of pygidium of same.

(All figures, more or less magnified.)



ARTICLE II.
THE GENUS KERMES OF JAPAN

by
Inokichi Kuwana
Tokyo, Japan

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Introduction.

In this paper are noted the Japanese species of the Genus *Kermes* of the family *Coccidae* that are known at present. They are five species in all, of which one is newly described here for the first time, the other four are redescribed from the material of females, together with the descriptions of the fresh newly hatched larvae of all the five species.

Ministry of Agriculture and Forestry, Department of Agriculture, Tokyo, Japan;
Sci. Bull. No. 2.

Although some of the larvae of the Genus *Kermes* have been described, no one ever attempted to make a comparative study of them in order to remedy the defective classification of this group of insects by the adult females, owing to the difficulty of obtaining sufficient specific morphological characters in that stage. During 1930 the author has had the opportunity obtaining the first or newly hatched larvae of all the species of the Genus *Kermes* that has been recorded from Japan. In the course of this study it has become apparent that the most distinctive characters to separate the species are to be found in the form, numbers, and distribution of spines and hairs on the dermis of the body. The form of the wax pores may be of use. The characters of antennae and legs are undoubtedly worthy of some consideration, though probably of secondary importance. The writer gives herewith keys to larvae and adult females together with more detailed descriptions of our species, for the sake of convenience.

Finally the writer wishes to note that the larvae of all Japanese species of the Genus *Kermes* are similar in general structure, with well developed spines on the dermis of the body, however the caudal lobes are hardly recognizable. In this aspect our forms seem to approach *Kermes pubescens* Bogue in North America.

Genus *Kermes* BOITARD.

The body of the adult females are globular or reniform with a hard dull surface, appearing like galls and are usually found on Oaks. Rather large, varying three to ten millimeters in diameter; segmentation obscure or revealed by dark bands, or rows of dark spots or both. Anal ring without hairs. Larvae are long elliptical with a plainly segmented abdomen, usually deeply cleft at the posterior extremity, forming two anal lobes which bear each a long hair and one or more short ones. Anal ring with short hairs and body fringed with spines. Antennae are six-jointed. Legs are well developed; tarsi longer than tibia; knobbed digitules on tarsi and claws.

Five known species in Japan may be separated by the following keys:

Keys to Species.

Adult female.

- A. Globular or nearly circular in form when viewed from above.
 - a. Light brown with transverse narrow black bands, which are broken at intervals by somewhat larger round black dots. *mutsurensis*.
 - b. Chestnut brown with transverse black bands.
 - a'. Mounted with chaff-like larval skin. *miyasakii*.
 - b'. Not mounted with chaff-like larval skin.
 - a". Medium in size, usually less than 6 mm. in diameter. *narvae*.
 - b". Very large, usually 10 mm. or more in diameter. *vastus*.
- B. Reniform, usually wider than long, with shallow median groove. *nakagawae*.

Larva.

- A. Spines on dorsal side sharply pointed.
 - a. Ventral side without multilocular pores. *miyasakii*.
 - b. Ventral side with nine pairs of multilocular pores. *narvae*.
- B. Spines on dorsal side, tubercle-like or flat.
 - a. Spines tubercle-like; ventral side with two pairs of multilocular pores. *nakagawae*.
 - b. Spines flat, rod-like, not very large; ventral side with six pairs of multilocular pores. *vastus*.
 - c. Spines flat, spoon-like, very large; ventral side with nine pairs of multilocular pores. *mutsurensis*.

1. *Kermes miyasakii* KUWANA.

(Nom. Jap. Hime tamakaigaramushi.)

(Pl. iv, figs. 5, 5a; Pl. v, figs. 1-6; Pl. xi, fig. 5)

1907 *Kermes miyasakii* KUW.; Bull. Imp. Agr. Exp. Sta. Japan,
I, 2, p. 181.

1909 ,, ,, ,, U. S. D. A. B. E. T. s. 16, Pt.
iii, p. 36.

Eggs. - .33 mm. long, .18 mm. diameter. Elongate in outline; shiny, pale yellowish orange in color.

Newly hatched larva. - Specimens mounted on slides, about 39 mm. long, about .20 mm. broad. Color on hatching very pale yellow with antennae and legs pale yellow. Shape elongate, more or less narrowing towards both ends; abdominal segments well marked. Antennae six-jointed; formula 6, 3, 2, 5, 4, 1; rather stout; joint one broadest and shortest; joint six longest and slender; joints two to five approximately equal in diameter; all joints bearing hairs that increase in length towards the apex; joint one and two with three hairs; joints three and four with one hair; joint five with five hairs; joint six with three stout sensory spines, several long and three very long hairs at apex. Legs well developed, large and stout; three pairs similar; coxa very broad, bearing four fine hairs; trochanter with a distinct transverse fold, bearing one long and one short hairs; femur short, strongly convex on the outer margin, bearing but a few short hairs; tibia short and stout, about one half the length of tarsus, one rather long hair on about the middle of the anterior margin and two long spiny hairs at the apex of the inner margin; tarsus long, tapering towards the apex, bearing two spiny hairs on the inner margin and one on the outer; claw large, slender and curved, with a minute denticle on its inner surface near the tip; digitules on tarsus and claw, knobbed hairs. Mouth parts large, rostral loop long; mentum conical, dimerous. Thoracic spiracles conspicuous; the

anterior pairs each accompanied by two multilocular pores and two conical spines. Dermis dorsally with a complete marginal and median double row of stout, pointed spines, those on the margin much larger; ventrally with six hair-like spines, these in transverse segmental rows on the abdomen. Anal ring with six short hairs. Anal lobes not well developed, each bearing a long spiny hair and two short spines.

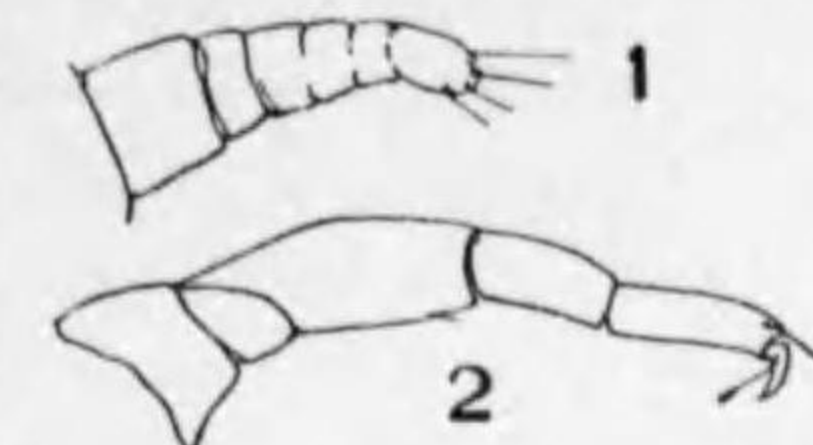


Fig. 1. *Kermes miyasakii*
1. Antenna.
2. Leg.

Adult female. - Variable in size, 3 to 4.3 mm. long, 3.7 to 5 mm. broad, 4 to 4.5 mm. high. Dark chestnut brown in color with transverse black bands; shiny, thinly covered with a grayish waxy secretion. Nearly globular in outline, mounted with chaff-like larval exuvia. Antennae rudimentary, short; usually composed of six joints; joint two longest, almost as long as the other joints together, each joint with a few fine hairs. Legs rudimentary; femur and tibia about the same length. Dorsal dermis with minute pores distributed as shown in the figure (Pl. xi. fig. 5).

Notes. - On *Quercus acutissima* (kunugi). Common about Tokyo City. The above descriptions of the larva and the adult female are made from the material collected by the writer in Nakano, Tokyo, May 18, 1930.

2. *Kermes nawae* KUWANA.

(Nom. Jap. Nawa tamakaigaramushi.)

(Pl. iv, figs. 1, 1a; Pl. v, figs. 1-7; Pl. vi, xi figs. 3)

1902 *Kermes nawae* KUW.; Proc. Cal. Acad. Sci., (3), iii, p. 46.

1903 ,, ,, ,, Fernald, Cat. Coc. World, p. 63.

Eggs. - Not observed.

Newly hatched larva. - Specimens mounted on slides, about .6 mm. long, .3 mm. broad. Elongate oval in outline, more or less acute at

both extremities. Color pale yellow with pale yellowish brown antennae and legs. Antennae stout, rather close together at anterior apex of body; consisting of six joints; formula 6, 1, 3, 2, (4, 5); joint one very broad, broader than long, other joints much narrower; joints one and two with two fine hairs; joints three and four with one fine hair; joint five with four hairs; joint six with two stout, curved sensory spines, three long and three very long hairs. Legs well developed, three pairs alike; coxa broad, bearing four fine hairs; trochanter with a distinct transverse fold, bearing one long and two short hairs; femur slightly shorter than tarsus, convex on both sides, bearing four fine hairs; tibia short, bearing two fine hairs near the apex of the outer margin and two strong hairs on the inner margin; tarsus tapering, about twice the length of the tibia, bearing four hairs, two each on outer and inner margins; digitules on tarsus and on claw, knobbed hairs. Mouth parts large; rostral loop long; mentum rather long, conical, dimerous. Thoracic spiracles of moderate size; each anterior pair with two multilocular pores within the atrium; accompanied by four multilocular pores and two conical spines. Dermis dorsally with a complete marginal and median double row of stout, pointed spines, those in the margin very conspicuous; ventrally with six rows of fine hair-like spines, transversely on the abdominal segments, these on the thoracic region fewer. Nine pairs of multilocular pores on the ventral side; five pairs on the abdominal segments, three pairs between the legs, and one pair anterior to the mouth parts. Anal ring with six short hairs. Anal lobes not well developed; each bearing one long stout hair and two short spines.

Adult female.—Variable in size, 5.75 to 6.7 mm. long, 5.5 to 7 mm. broad, 5.3 to 6.8 mm. high. Nearly circular in outline. Chestnut brown in color with transverse black bands; shiny, thinly covered with a white powdery secretion. When taken off, the insect leaves a white cottony substance on the host. Antennae and legs obsolescent. Antennae consist of five joints; joint two longest; terminal joint bearing

several rather long hairs; other joints with a few short hairs. Mouth parts larger, rostral loop long. Legs subequal; coxa short; tarsus tapering, longer than tibia; claw large, with a minute denticle on its inner margin near the apex; digitules knobbed. Dorsal skin with minute pores as shown in the figure (Pl. xi, fig. 3)

Notes.—The material for the foregoing descriptions was collected by Mr. T. Ishii, on *Castanea pubinervis* (kuri), near Oiso, Kanagawa-ken, June 10, 1930. This species was originally described by the

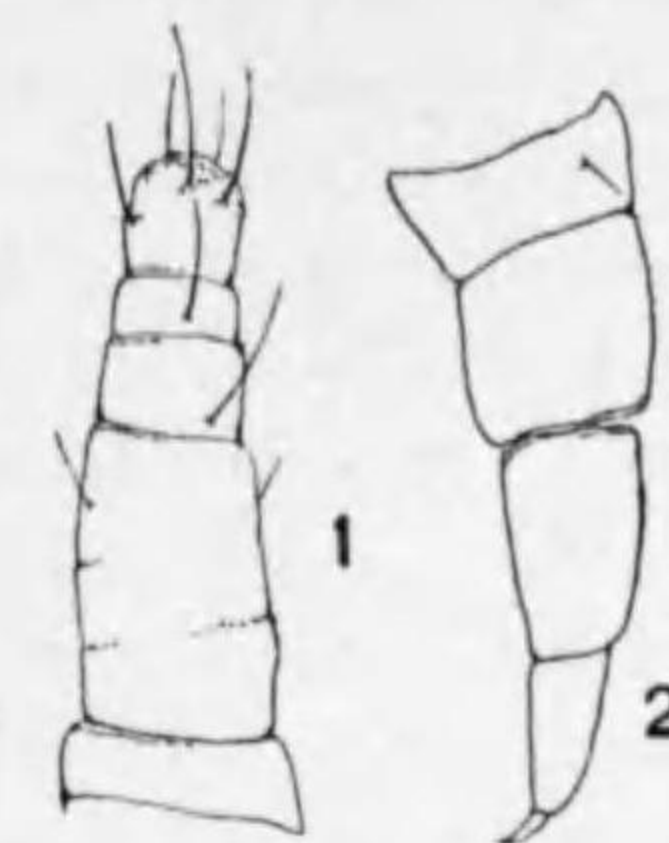


Fig. 2. *Kermes nawaе*
1. Antenna.
2. Leg.

writer, from material obtained from the Late Mr. Y. Nawa, who told him that the host plant is *Quercus serrata* (konara or nara), and collected in Fukui-ken. The writer has unsuccessfully attempted to get specimens from the original locality through Mr. T. Uchida of Agricultural school in that Ken.

3. *Kermes nakagawae* KUWANA.

(Nom. Jap. Nara no tamakaigaramushi)

(Pl. iv, figs. 4,4a; Pl. vii, figs. 1-6; Pl. viii, figs. 1-4; Pl. xi, fig. 1)

1902 *Kermes nakagawae* KUW.; Pro. Cal. Acad. Sci., (3), iii, p. 49.

1903 ,, ,, ,, Fernald, Cat. Coc. World, p. 63.

Eggs.—.32 mm. long, .20 mm. diameter. Elongate shape; highly polished. Pale lemon yellow in color.

Newly hatched larva.—Specimens mounted on slides, about .43 mm. long, .21 mm. broad. Pale brown in color with antennae and legs paler. Elongate in outline, slightly tapering towards both extremities; abdominal segments well marked. Antennae six-jointed; formula 6, 1, 2, 3, 5, 4; stout; joint one very broad; joint six longest and slender; joints

two to five subequal in diameter; all joints bearing hairs that increase in length towards the apex; joint six with two stout sensory spines, several long and three very long hairs. Legs stout, well developed; three pairs subequal; coxa very broad, with four fine hairs; trochanter bearing one short and one long hairs; femur stout, bearing four hairs; tibia much shorter than tarsus, bearing three rather long hairs near the apex; tarsus tapering, with long hairs; claw large, curved; digitules on tarsus and claw knobbed. Mouth parts well formed but not very large; rostral loop long; mentum conical, dimerous. Thoracic spiracles round, the anterior pair each with three multilocular pores within the atrium, accompanied by two multilocular pores and two truncate spines. Dermis dorsally with a complete marginal and median double row of tubercle-like spines; ventrally with fine hair-like spines, these in eight longitudinal rows on the abdominal region; the spines on the margin are much stronger. Two pairs of multilocular pores between the anterior and median legs. Anal ring with six short hairs, Anal lobes not well developed; each bearing one very long hair and three spines.

Adult female.—About 2.8 to 5 mm. long, about 4 to 6 mm. broad, about 2.6 to 4 mm. high. Dark chestnut brown in color with five or more black transverse bands. Shiny, slightly covered with a grayish white waxy secretion. Usually broader than long, with a shallow median longitudinal groove; in this groove near the base a round protrusion which usually has a grayish chaff on each side. Antennae rudimentary, about .85 mm. in length; usually three-jointed, but often six; in the former case joint three much the longest, in the latter all joints subequal in length. Legs vestigial, only three parts being apparent; tibia and tarsus about equal in length; claw long, curved; digitules on the base of claw knobbed. Dorsal dermis thick, sparsely distributed with small round pores as shown in the figure (Pl. xi, fig. 1); ventral dermis with numerous minute, round pores around the margin as usual.

Pupa, male.—1.56 mm. long, .9 mm. broad. Color of abdomen reddish brown; thorax dark brown; antennae and legs pale yellow. Broadly oblong in outline and stout; head and thorax together much longer than abdomen. Wing pads broad, reaching beyond hind coxa. Antennae large, ten-jointed; all joints subequal in length and in diameter, annulated with white; without hairs. Legs large and stout; tarsus a little more than one-third the length of the tibia, with vestigial claw; with no hair. Abdominal segments distinct, narrowing towards the posterior end. Style short and stout, conical in shape.

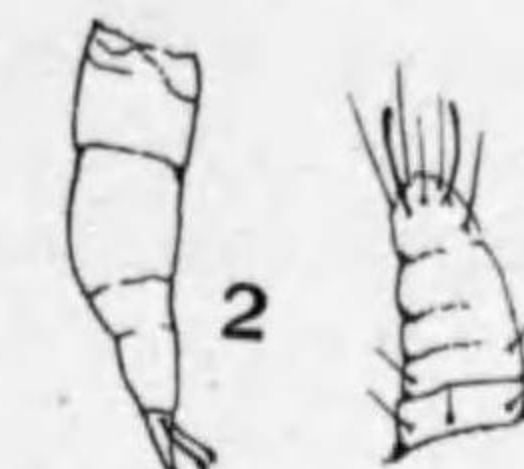


Fig. 3. *Kermes nakagawae*
1. Antenna
2. Leg

Adult male.—Body, 2.14 mm. long, .63 mm. broad across the thorax; wing 1.37 mm. long, .54 mm. broad, 3.37 mm. expanse; style .56 mm. long. Color of body pale brown; antennae and legs paler. Head nearly round with five pairs of eyes. Antennae ten-jointed; joint one short and stout; joint two a little longer than one, but much narrower; joint three longest; remaining joints diminishing in length and diameter towards the apex; all joints bearing numerous irregularly distributed fine hairs; apex of the distal joint bearing three rather long knobbed hairs. Front pair of wings cinereous, with irregularly reticulate surface; discoidal vein with one distinct branch; hind wings very small, club-shaped, bearing a slender hook at the apex. Legs long and slender, three pairs alike, bearing numerous irregularly distributed fine hairs; femur shorter than tibia; tarsus short, about one third the length of the tibia; claw strong, curved; both pairs of digitules long, filiform, and knobbed apically, the tarsal pair longest. Abdomen slender, tapering towards the caudal extremity; short fine hairs scattered over integument; penultimate segment with two long filaments, one on each side, which are much longer than the body. Style rather long, pointed.

Notes.—On *Quercus serrata*. One generation a year, passes the

winter in larval stage. The male appears about the later part of April, meets with the female and soon dies. After copulation the body of the female gradually becomes swollen and secretes a large amount of honeydew, where attended by ants and flies. The female lays her eggs on the under side of the body about later part of May, and the young larvae hatch about the middle of June. The cocoon of the male is white, woolly and oval in shape.

The foregoing description of this insect was made from the material collected by the writer on *Quercus serrata*, in Nakano, near Tokyo City, May 18, 1930. Mr. K. Muramatsu obtained the material on the same host from Nagoya Park, which was collected by him, May 11, 1930. Mr. T. Mayeda of Yokohama city and Mr. K. Sakai of Nishigahara near Tokyo City have sent specimens to the writer, which were also on the same host. The type locality of this scale insect is Nishigahara, Tokyo, and the host plant is *Quercus serrata*. Although carefully searched for, the writer was not able to find this insect on any other plant except *Quercus serrata* in the type locality, and he is now inclined to think that the name of "*Quercus serrata* (kunugi)" as host of this scale in the original description (Pro. Cal. Acad. iii, (3), p. 49, 1902) should be changed, for the host was likely misidentified at that time.

4. *Kermes vastus* KUWANA.

(Nom. Jap. *Ō tamakaigaramushi*.)

(Pl. iv, fig. 2; Pl. ix, figs. 1-6; Pl. xi, fig. 2)

1907 *Kermes vastus* KUW.; Bull. Imp. Agr. Exp. Sta. Japan,
i, 2, p. 181.

1909 ,, ,, ,, U. S. D. A. B. E. T. S. 16, Pt.
iii, p. 39.

Eggs.—About .41 mm. long, about .23 mm. diameter. Elongate in shape, highly polished. Pale yellowish orange in color.

Newly hatched larva.—Specimens mounted on slides, about .56 mm.

long, about .26 mm. broad. Brownish orange in color with antennae and legs pale orange yellow. Elongate, narrowing towards both ends; segmentation distinct. Antennae six-jointed; formula 6, 1, 2, 3, 5, 4; joint one stout; joint six longest and slender; joint two a little shorter than one; joints three to five subequal in length; joint one bearing three hairs; joints two and three bearing two hairs; joint four bearing one hair; joint five bearing five hairs, joint six bearing two stout sensory spines, three long and three very long hairs. Legs stout, well developed; coxa broad, bearing four fine hairs; trochanter with a well marked transverse fold, bearing one very long hair; femur very large, almost twice the length of the tibia, outer edge very convex, bearing three fine hairs; tibia short, bearing three short hairs near apice; tarsus tapering, slightly shorter than the femur, with two long hairs on the outer edge and three on the inner; claw large, curved; digitules on tarsus and on claw long, filiform and knobbed, the tarsal pair much the longer. Mouth parts large; rostral loop long; mentum conical, dimerous. Thoracic spiracles not conspicuous; the anterior pair with two multilocular pores within the atrium, accompanied with two conical spines and two circular disk pores. Dormis dorsally with complete series of stout rod-like spines on the margin, spines of the same nature in two longitudinal rows on the median region, a pair of similar spines between the median rows of the meso- and meta-thorax; ventrally with fine hair-like spines, these in eight longitudinal rows on abdomen, those on the cephalothoracic region are not quite regular. Six pairs of multilocular pores on the ventral side, two pairs on the abdomen, two pairs between the legs and one pair anterior to the mouth parts. Anal ring with six short hairs. Anal lobes hardly noticeable, each bearing one very long hair and three rod-like flat spines.

Adult female.—About 8 to 10.5 mm. long, about 8.9 to 10.2 mm. broad, 8.12 to 10 mm. high. Dark chestnut brown in color, with black transverse irregular bands; shiny, covered with a white powdery

waxy secretion. Globular in shape, with minute shallow depressions on the surface; sometimes showing a very slight longitudinal groove on the meson. When taken off from the host the insect leaves behind a little cottony white secretion. Antennae degenerate, very short; number of joints variable, those with seven joint, joint two longest; joints six and seven subequal and shortest. Legs small, three pairs alike; coxa very short; femur slightly longer than the tibia; tarsus shorter than the tibia, tapering; claw short and curved; digitules not well observed. Dorsal dermis with numerous minute pores distributed as shown in the figure (Pl. xi, fig. 2).

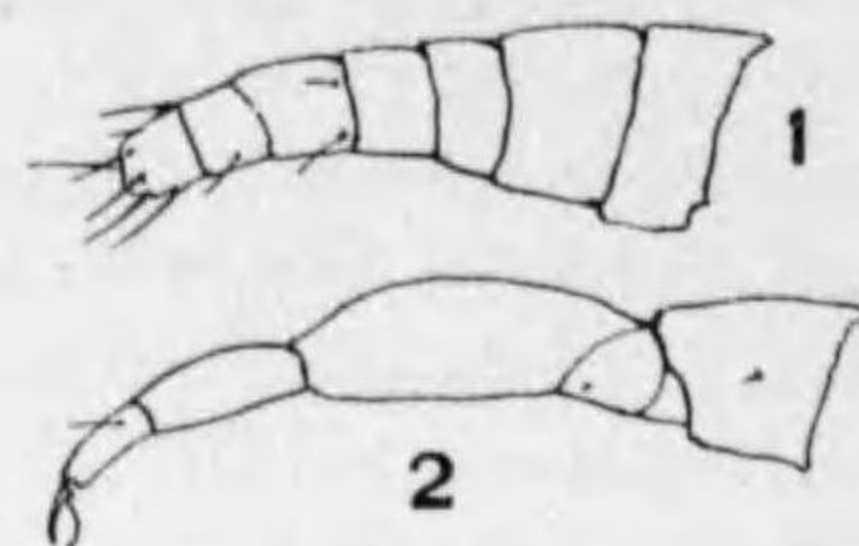


Fig. 4. *Kermes vastus*
1. Antenna
2. Leg

Notes.—On *Quercus acutissima*, collected by the writer, Nakano, near Tokyo City, May 15, 1930. The type locality of this species is Nishigahara, and was previously collected by Mr. T. Okasaki and others about Tokyo City. It was also found in Kanagawa and Saitama-ken. This scale as *Kermes nazvae* is often attacked by a weevil, *Brachytarsus kuwanai* Yuasa.

5. *Kermes mutsurensis* n. sp.

(Nom. Jap. Mutsure tamakaigaramushi.)

(Pl. iv, fig. 3; Pl. x, figs. 1-7; Pl. xi, fig. 4)

Eggs.—.37 to .44 mm. long, .17 to .19 mm. diameter. Oval in shape; highly polished. Color pale yellowish brown.

Newly hatched larva.—Specimens mounted on slides, about .51 mm. long, .26 mm. broad. Pale brown in color, with antennae and legs paler. Elongate in outline, gradually tapering towards both extremities; segmentation distinct. Antennae large, six-jointed; formula 6, 3, 2, 5, 1, 4; joint one broad; other joints subequal in diameter and much narrower; joints one and two bearing three fine hairs; joint three

bearing two hairs; joint four bearing one hair; joint five bearing four rather long hairs; joint six bearing three stout sensory spines, three long and two or three very long hairs. Three pairs of legs stout and alike; coxa large, bearing three fine hairs; trochanter with a well marked transverse fold, bearing one short and one very long hairs; femur very broad, slightly longer than the tarsus, bearing one short hair; tibia about half the length of the tarsus bearing a single short hair on the apical end of the inner edge; tarsus tapering, with three rather long hairs, one on the outer and two on the inner margin; claw long and curved; digitules on tarsus and on claw fine hairs, knobbed apically, the tarsal pair much the longer. Mouth parts large; rostral loop long; mentum conical, dimerous. Thoracic spiracles pronounced; the anterior pair of spiracles much nearer to the margin, two disk pores within the atrium; two capitate spines and two multilocular pores immediately adjoining it. Dermis, dorsally with a complete series of large flat spoon-like spines; spines of the same nature in two longitudinal rows on the median region, a pair of similar spines between the median rows on the thorax; ventrally with fine hair-like spines, these in eight longitudinal rows on the abdomen, those on the thoracic region not quite regular. Nine pairs of multilocular pores on the ventral side, five pairs on the abdomen, three pairs between the legs, and one pair on front of the mouth parts. Anal ring with six short hairs. Anal lobes not well marked; each lobe bearing one very long hair and three flat spines.

Adult female.—About 4.8 to 6 mm. long, about 3.2 to 6.6 mm. broad, about 3.3 to 5 mm. high. Varying in shape, but usually globular or hemispherical. Pale yellowish brown in color with transverse narrow blackish bands, which are

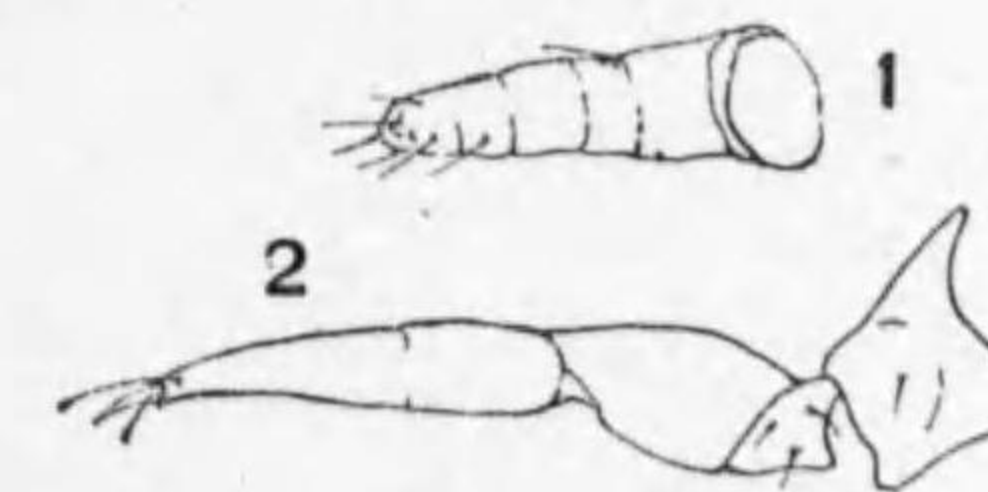


Fig. 5. *Kermes mutsurensis*
1. Antenna
2. Leg

broken at intervals by somewhat larger round blackdots. Shiny, slightly covered with a grayish waxy secretion. When taken off, the insect leaves a little white waxy secretion. Antennae small, six-jointed; joint five longest. Mouth parts large; rostral loop long. Legs well formed, but small; three pairs alike; tarsus slightly longer than tibia; claw large, curved; digitules not observed. Dorsal skin with a number of small pores as shown in the figure (PL. xi, fig. 4).

Host.—*Pasania edulis* (matebashii).

Locality.—Mutsure, a small island near Moji city.

Notes.—The first specimens of this new scale insect was collected by the writer in July 24, 1924, but the material was not sufficient for study. Mr. K. Muramatsu obtained quite a few specimens with the help of Mr. S. Imai, May 9, 1930, and the above description was made from this last material.

This new insect resembles *Kermes baciformis* Leonardi, in the shape of the dorsal spine of the newly hatched larva, but the arrangement is quite different.

Corrections to the Host names of the Genus *Kermes* in Japan.

In the writer's former works on Japanese Coccidae, the names of the host plants of the Genus *Kermes* are somewhat in a tangle; and he is, now, to behave honourably and correct the errors herewith.

In "Coccidae of Japan", published in 1902, in the Proceeding of the California Academy of Sciences, (3), iii, page 50, the writer stated that the scale insect on *Rhamnus japonica*, var *genuina* (kuro-umemodoki), collected by Mr. S. Onuki in Nagano-ken, as *Kermes nawae*, which was an error. After careful examination, it became apparent that what he has referred to *Kermes nawae* was not that species, but a new *Lecanium*, which had been afterward described by him under the name *Lecanium kunoensis*. From the above

fact the name of *Rhamnus japonica* var. *genuina* should be dropped from the list of the host plants of this insect. On the same page, line 18 from the bottom (*nara*) should be (*konara or nara*); on page 49, line 17 from the bottom *Quercus serrata* (*kunugi*) and *Quercus sp.* read *Quercus serrata* (*konara or nara*).

In "A synoptical list of Coccidae of Japan with descriptions of thirteen new species" published in 1907, in Bulletin Vol. i, no. 2, of the Imperial Agricultural Experiment Station, Tokyo, page 181 line 7 and 19 from the bottom *Quercus glandurifera* read *Quercus acutissima* (*kunugi*).

Acknowledgments.

The writer's thanks are due to the individual collectors mentioned in the notes and descriptions, but he is more especially indebted to Messes. S. Aoki, K. Muramatsu and K. Tanaka, who kindly assisted in laboratory preparation for the study. The writer is also greatly indebted to Professor E. E. Green of England, who kindly assisted in obtaining some of the European specimens for comparative study. Some of the figures were redrawn by Mr. N. Mizushima, famous artist on scientific subjects, under direction of the writer.

Tokyo, Japan,
October 18, 1930.

I. KUWANA :

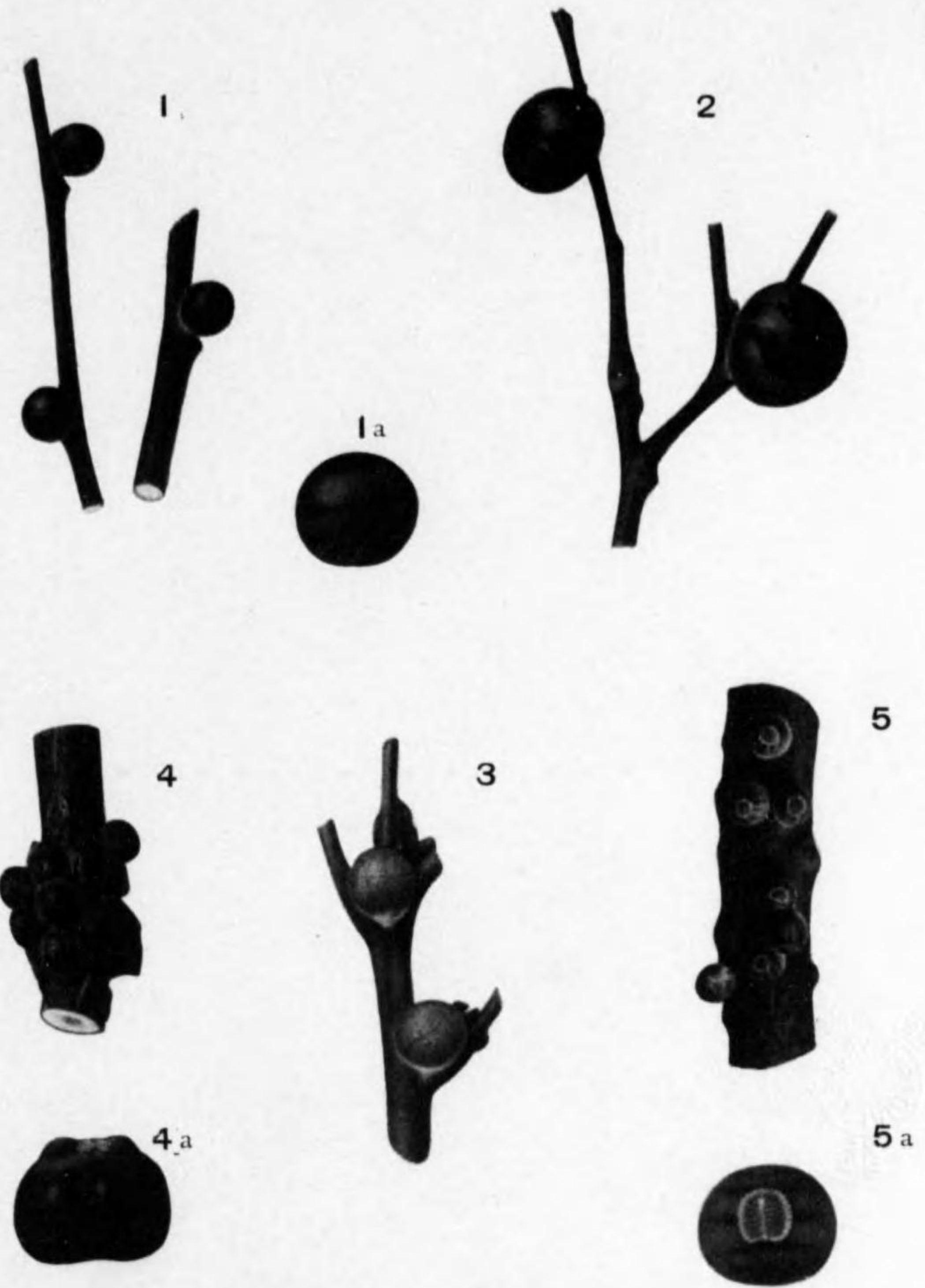
THE GENUS KERMES OF JAPAN

PLATE IV

Explanation of Plate IV

- 1, 1a. *Kermes nawaae* (female).
- 2. " *vastus* (female).
- 3. " *mitsurensis* (female).
- 4, 4a. " *nakagawae* (female).
- 5, 5a. " *miyasakii* (female).

(All figures, more or less magnified.)



I. KUWANA :

THE GENUS KERMES OF JAPAN

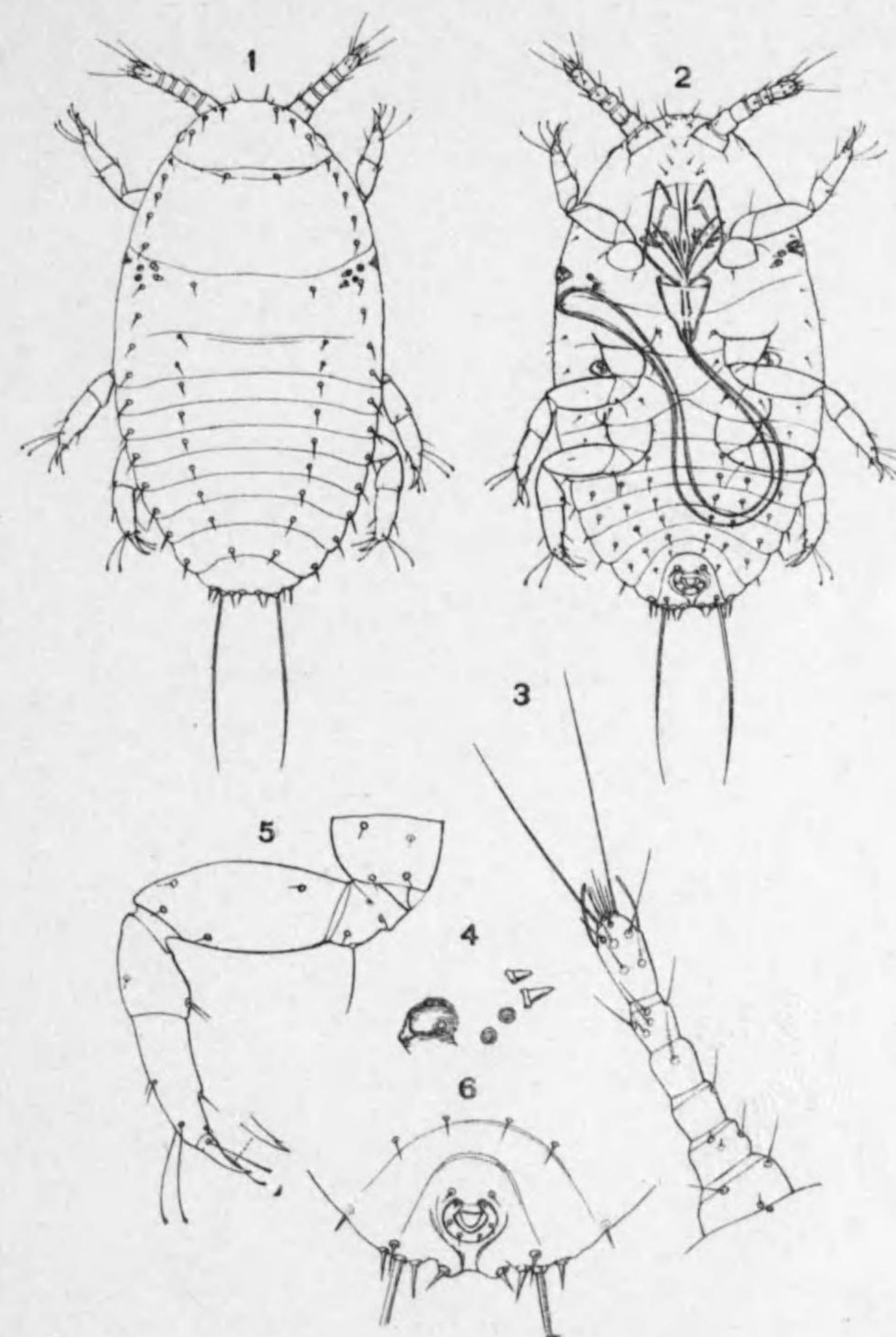
PLATE V

Explanation of Plate V

Kermes miyasakii

1. Newly hatched larva (dorsal view).
2. Same (ventral view).
3. Antenna of same.
4. Stigma of same.
5. Hind leg of same.
6. Caudal end of same.

(All figures, more or less magnified.)



I. KUWANA :

THE GENUS KERMES OF JAPAN

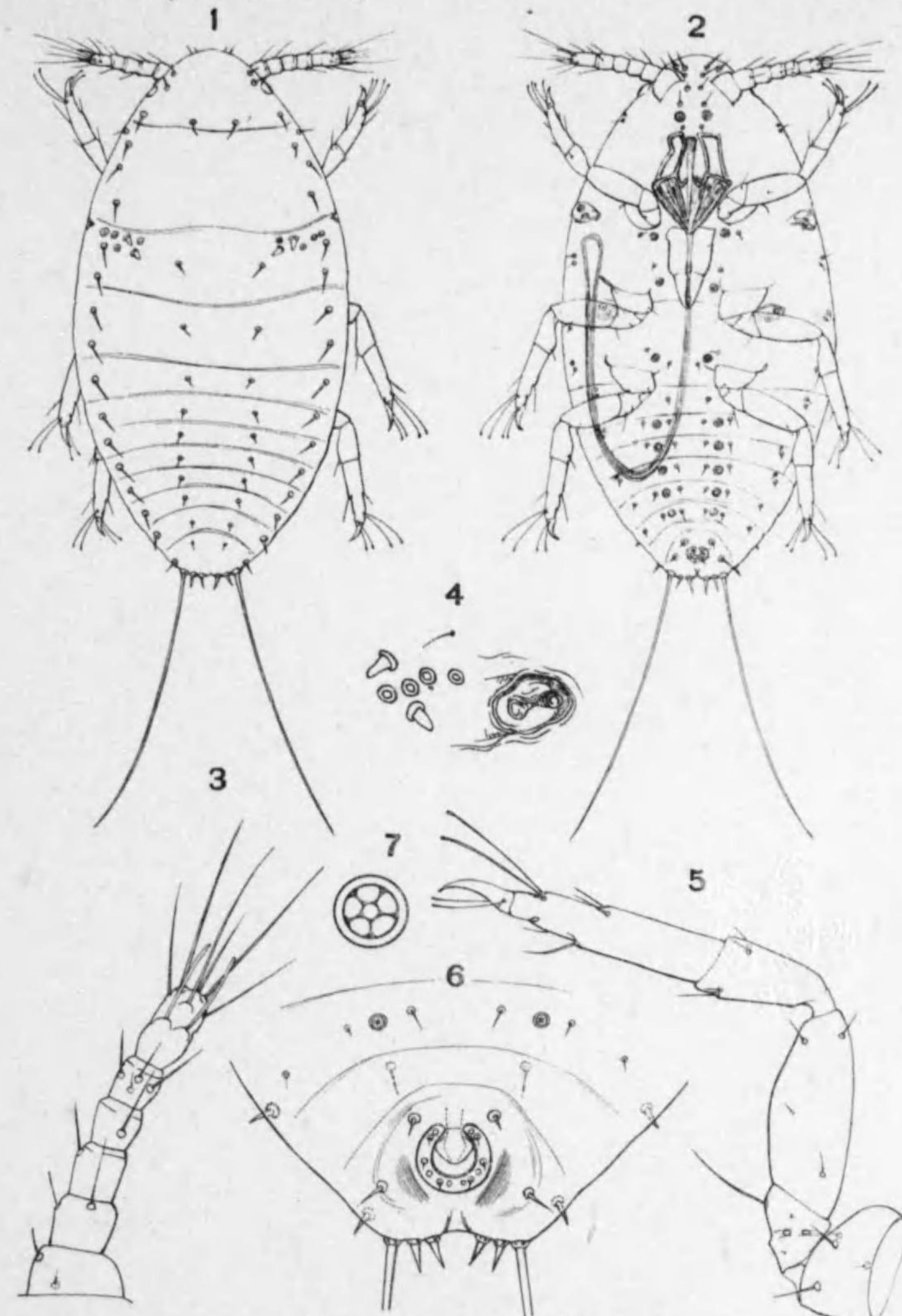
PLATE VI

Explanation of Plate VI

Kermes nawae

1. Newly hatched larva (dorsal view).
2. Same (ventral view).
3. Antenna of same.
4. Stigma of same.
5. Hind leg of same.
6. Caudal end of same.
7. Desk pore on ventral side of same.

(All figures, more or less magnified.)



I. KUWANA :

THE GENUS KERMES OF JAPAN

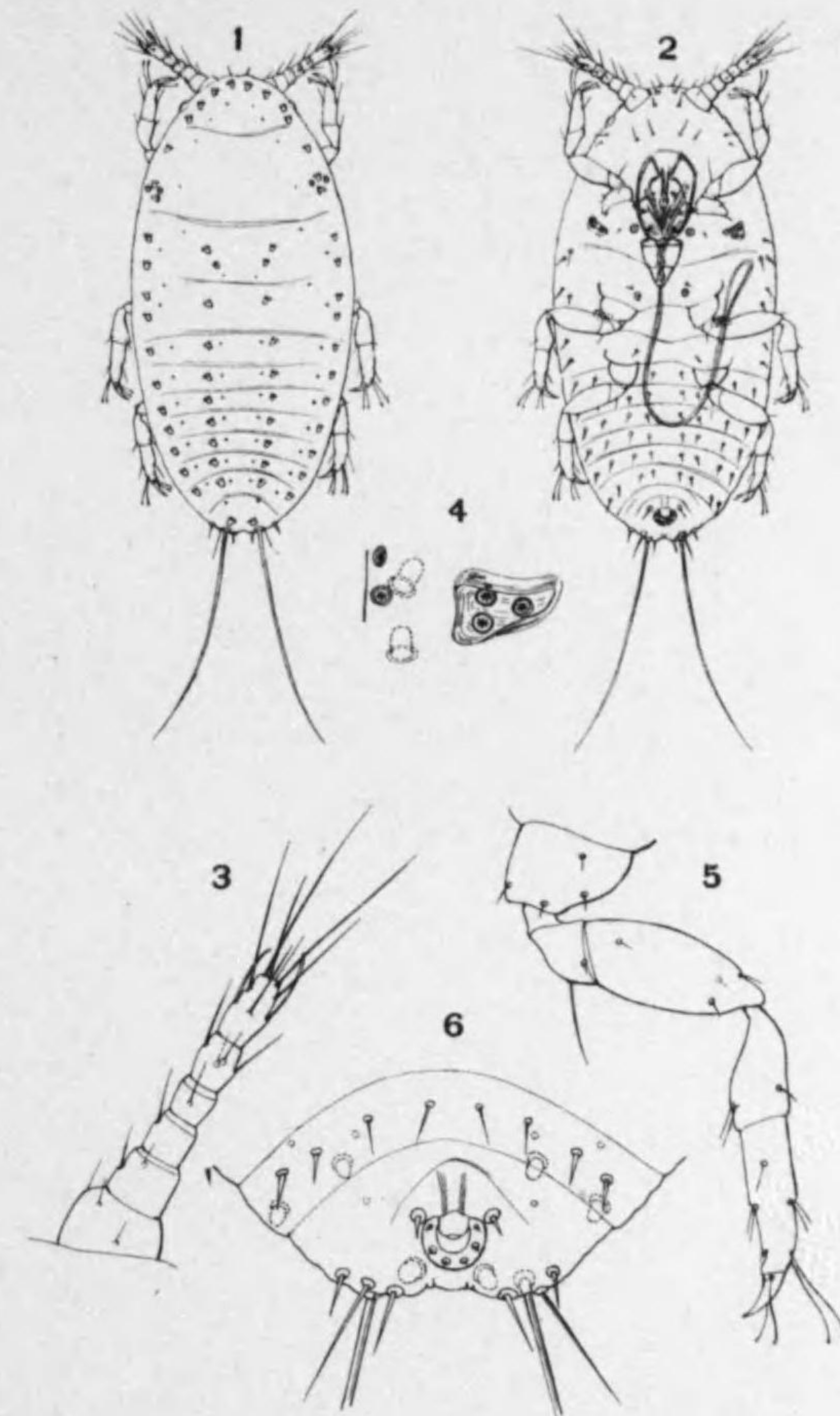
PLATE VII

Explanation of Plate. VII

Kermes nakagawae

1. Newly hatched larva (dorsal view).
2. Same (ventral view).
3. Antenna of same.
4. Stigma of same.
5. Hind leg of same.
6. Caudal end of same.

(All figures, more or less magnified.)



I. KUWANA :

THE GENUS KERMES OF JAPAN

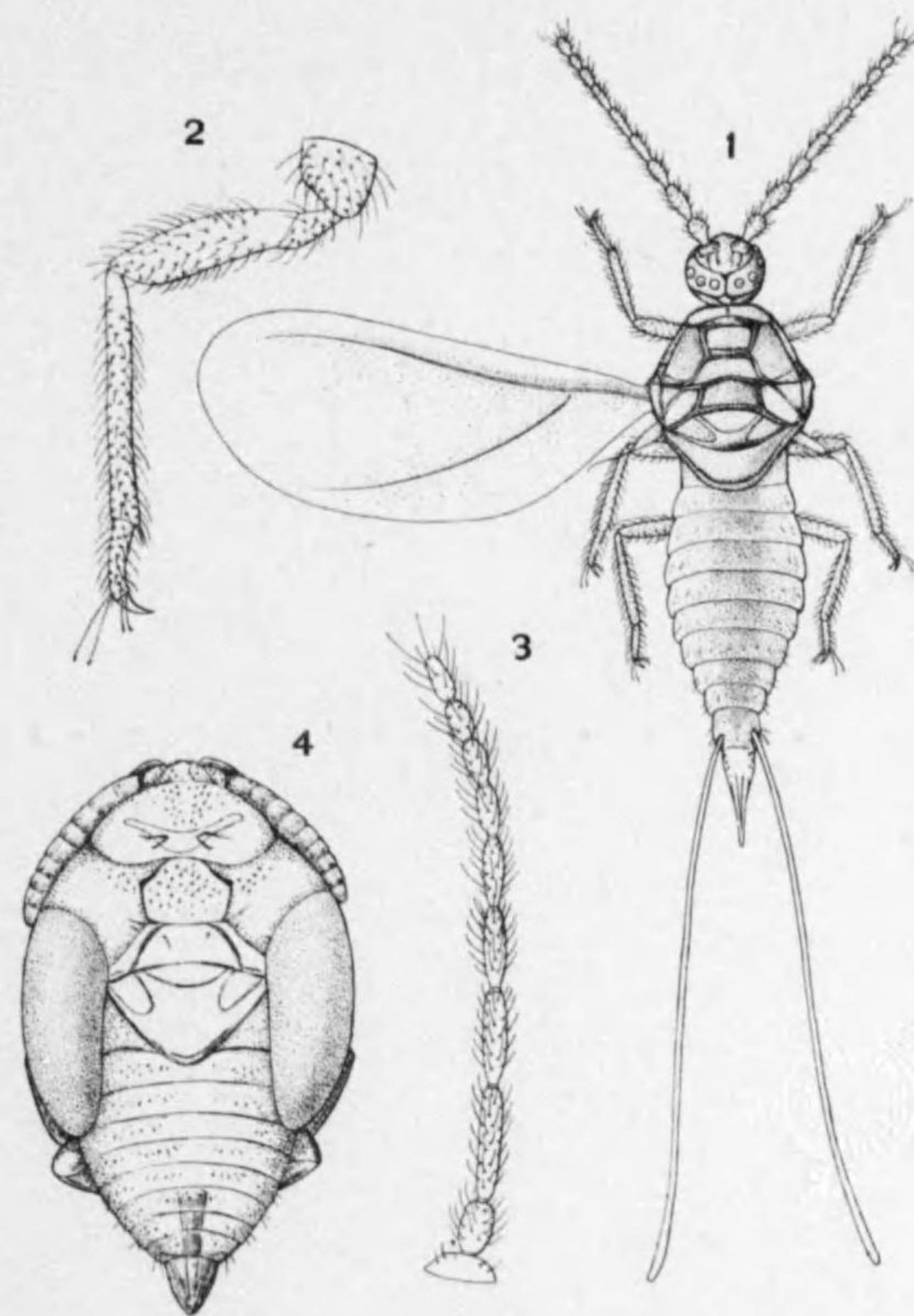
PLATE VIII

Explanation of Plate VIII

Kermes nakagawae

1. Adult male (dorsal view).
2. Hind leg of same.
3. Antenna of same.
4. Pupa of same.

(All figures, more or less magnified.)



I. KUWANA :

THE GENUS KERMES OF JAPAN

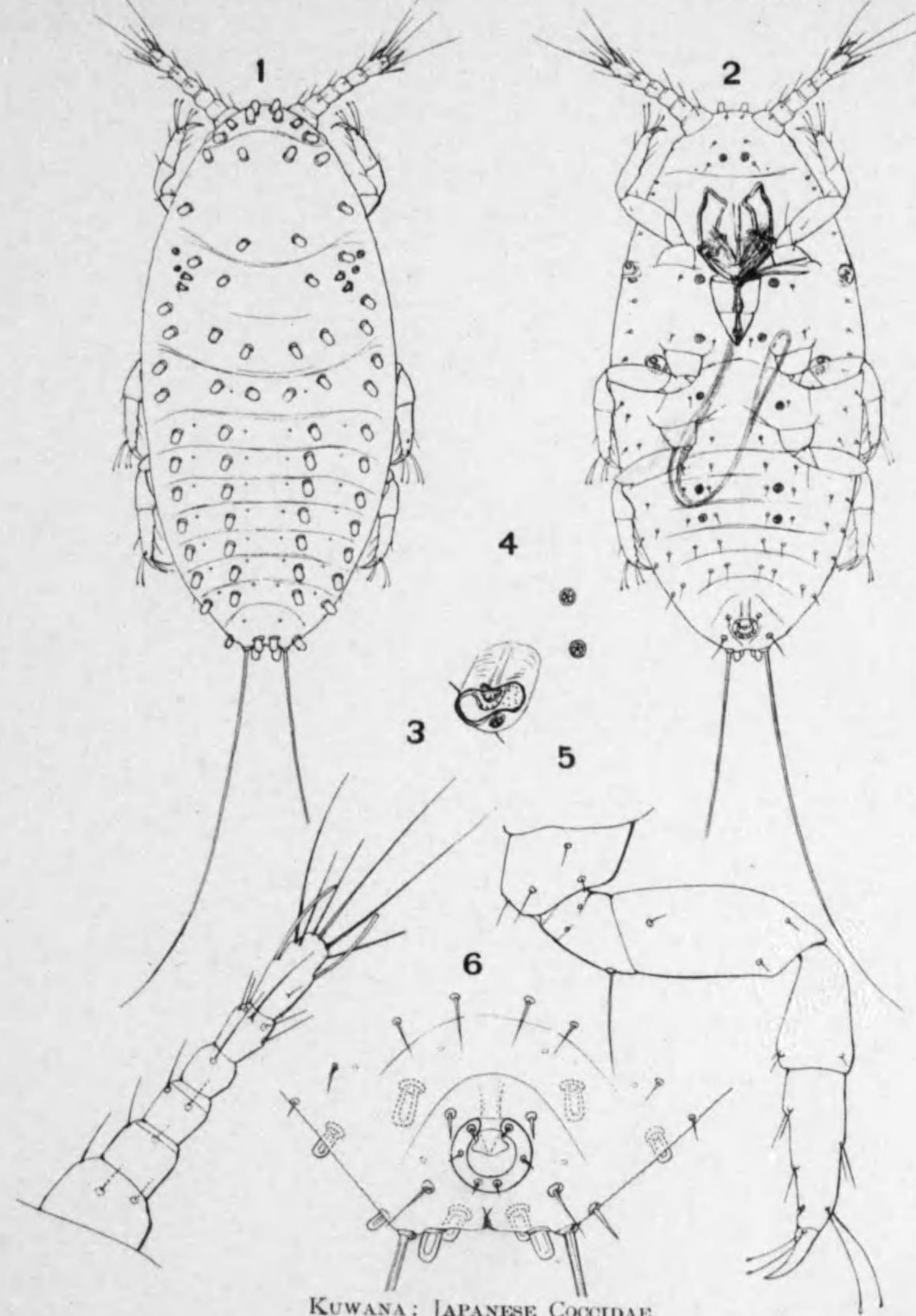
PLATE IX

Explanation of Plate IX

Kermes vastus

1. Newly hatched larva (dorsal view).
2. Same (ventral view).
3. Antenna of same.
4. Stigma of same.
5. Hind leg of same.
6. Caudal end of same.

(All figures, more or less magnified.)



I. KUWANA :

THE GENUS KERMES OF JAPAN

PLATE X

Explanation of Plate X

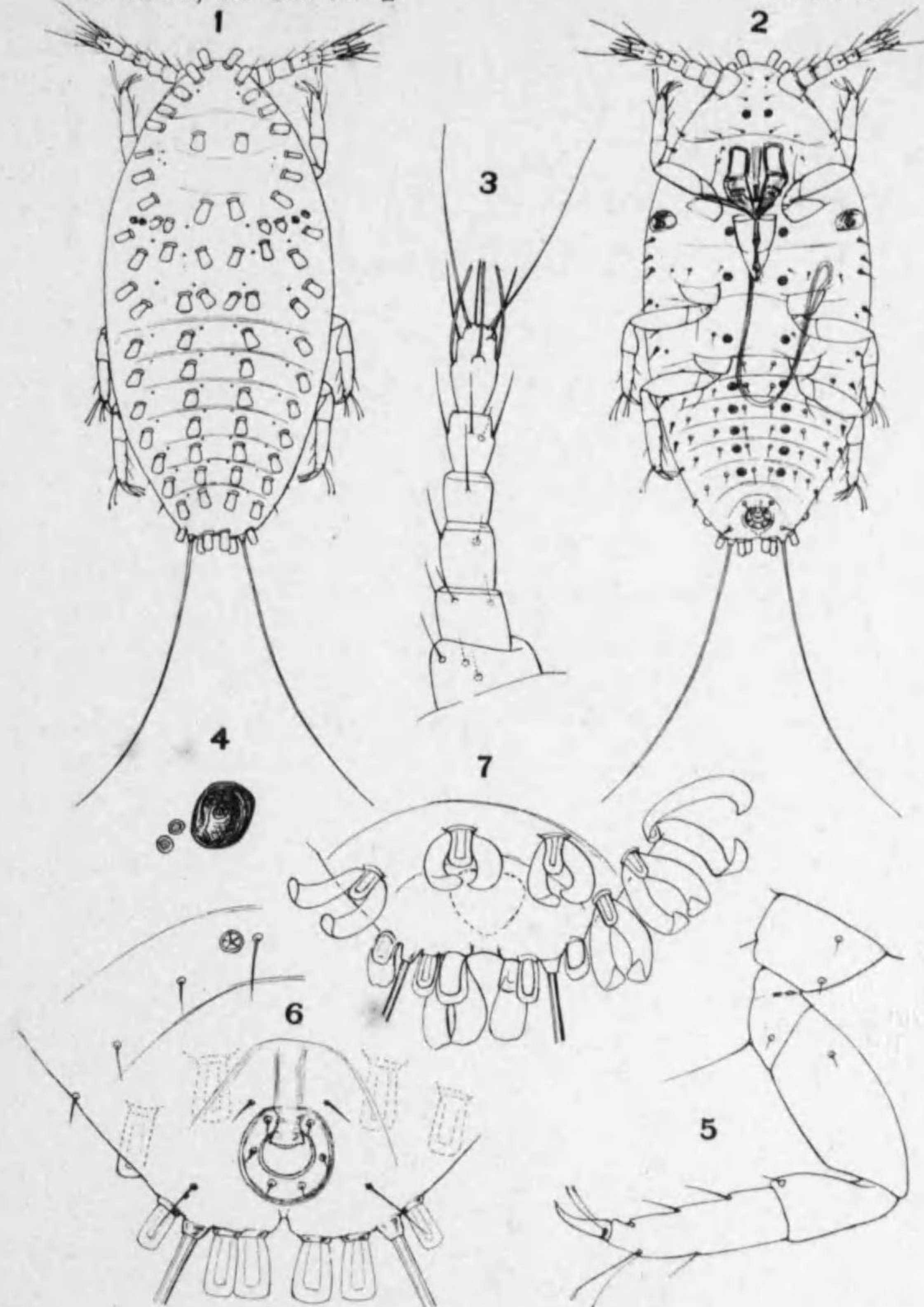
Kermes mutsurensis

1. Newly hatched larva (dorsal view).
2. Same (ventral view).
3. Antenna of same.
4. Stigma of same.
5. Hind leg of same.
6. Caudal end of same.
7. Spines with secretion same.

(All figures, more or less magnified.)

M. A. F., Sci. Bul. No. 2.

PLATE X.



KUWANA: JAPANESE COCCIDAE

I. KUWANA:

THE GENUS KERMES OF JAPAN

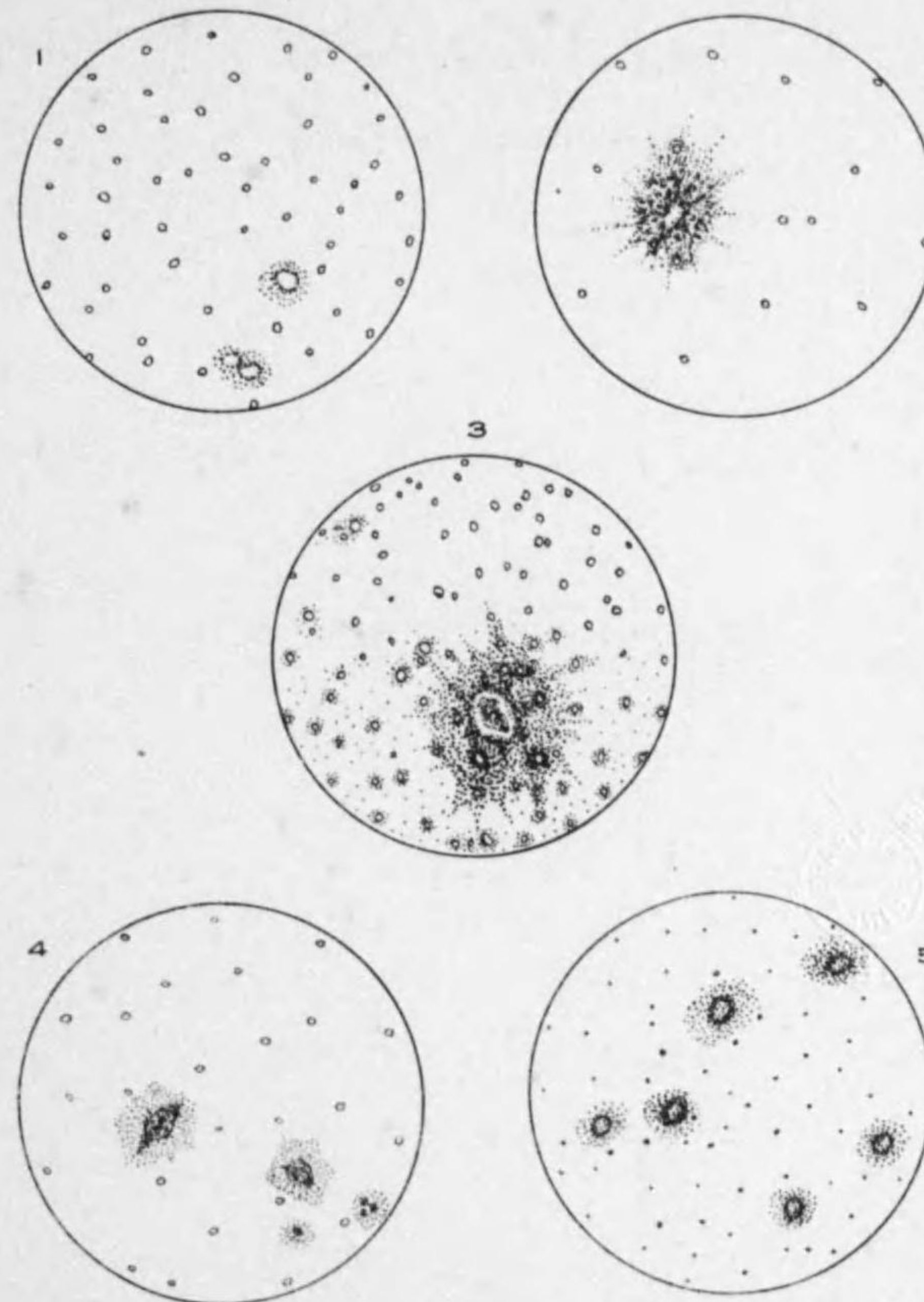
PLATE XI

Explanation of Plate XI

Derm marking of female

1. *Kermes nakagawae*.
2. „ *vastus*.
3. „ *nawae*.
4. „ *mutsurensis*.
5. „ *miyasakii*.

(All figures, magnified in same proportion)



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