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# ON THE FIVE SPECIES OF DENDROLIMUS, INJURIOUS TO CONIFERS IN JAPAN, WITH THEIR PARASITIC AND PREDACEOUS INSECTS.

By

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We have in Japan five species of *Dendrolimus*, which are injurious to the coniferous trees, of which *D. spectabilis* Btlr. and *D. punctatus* Wk. are exclusively injurious to pine trees, but the most injurious is *D. albolineatus* Mats. The last mentioned insect has done a tremendous damage in Saghalien during the past six years, especially on Abies, Picea, and Larix-species, and nearly one third of these conifers growing in the southern portion of the island were destroyed by this caterpillar. According to the authentic estimation we know that this insect caused the death of coniferous trees of the dimension not less than 2400 square kilometers and in cost not less than 600 million yen. At the same time the very insect caused also an extraordinary devastation in Kurile Islands, especially in Etorup and Kunashiri. According to the report of the Forest Experiment Station of the Hokkaido Government, the damage in the southern Kuriles reaches the dimension not less than 1000 square kilometers. A few years ago this insect was imported to the main island of Hokkaido from Saghalien or Kurile Islands, and now it is gradually increasing in number, and in near future it may become also a great enemy to the coniferous trees of Hokkaido, as it has been in Saghalien and Kurile Islands in the last few years. By the request of the Hokkaido Government I have studied this insect quite thoroughly and in this occasion I wish to publish the results of the investigation. The entomological position of this insect among its allies was not known yet in the scientifical world. So also the parasites

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of this insect remained totally unstudied. In December, 1924, S. Tabata[1] published a result of his study on this insect, but the systematic investigations were not touched upon. In November, 1924, Y. Aizawa[2] published also a report about the *Dendrolimus albolineatus* Mats. in Kurile Islands, but it did not give any scientifical information to us. In January, 1925, G. Takagi[3] published also the result of his investigation about the Pine-caterpillar (*Dendrolimus spectabilis* Btlr.) in Corea, but there remains much to be studied. In the course of our study on these *Dendrolimus*-caterpillars we found 33 *Hymenopterous*, 4 *Dipterous*, 4 *Rhynchopterous*, and 3 *Coleopterous* parasitic and predaceous insects, of which only the following 19 species have already been described:

1. *Spilichneumon oratorius* F.
2. *Amblyteles amatorius* Müll.
3. *Opheltes apicalis* Mats.
4. *Habronyx jozankeanus* Mats.
5. *Exochilum sachalinensis* Mats.
6. *Theronia japanica* Ash.
7. *Carcelia excisa* Fall.
8. *Carcelia gnava* Meig.
9. *Sarcophaga albiceps* Meig.
10. *Zicrona coerulea* L.
11. *Picromerus lewisi* Scott
12. *Harpactor leucospilus* Stål
13. *Calosoma chinense* Kby.
14. *Calosoma ogumae* Mats.
15. *Calosoma maximowiczi* Mor.
16. *Dahlbomia atra* F.
17. *Polistes chinensis* F.
18. *Vespa rufa sibirica* André
19. *Vespa japonica* Sauss.

The remaining 25 species are new to science and I shall describe them in this occasion. Messrs. F. Scriba, S. Kuwayama, G. Takagi, and S. Harada have sent me quite a large number of specimens for our study, to whom I am indebted much obligation.

1) Karafuto Kemushi ni kansuru Chosasho (The Investigation on the Coniferous-caterpillar in Saghalien, 1924).

2) Chishima Matsukareha ni kansusu Chosahokoku (The Report on the Investigation on the Coniferous-caterpillar in Kurile Islands, 1924).

3) Matsukemushi no Kujoho ni kansuru Shiken (Experiment about the exterminating Methods of the Pine-caterpillar-*Dendrolimus spectabilis* Btlr.).

## CLASSIFICATION OF THE SPECIES OF *DENDROLIMUS* INJURIOUS TO CONIFERS.

1. ♀. 2 spots of the submarginal spot-series, respectively in the 1st and 2nd interspaces obliquely placed and not parallel to the termen ..... 2.
– 2 spots of the submarginal spot-series, respectively in the 1st and 2nd interspaces perpendicularly placed and nearly parallel to the termen ..... 3.
2. All the lines on the primaries placed nearer to each other ..... ..... *punctatus* Wk.
– All the lines on the primaries placed widely separated ..... ..... *spectabilis* Btlr.
3. Apical branches of the antennae nearly as broad as the shaft ..... ..... *pini* L.
– Apical branches of the antennae much broader than the shaft ..... 4.
4. Antennal branches deeply black ..... *albolineatus* Mats.
– Antennal branches brown to yellowish brown ..... 5.
5. Postmedial line double, the space between the antemedial and postmedial lines much separated than the space between the postmedial and submarginal lines ..... *sibiricus* Tschetv.
– Postmedial line not double, the space between the antemedial and postmedial lines nearly as broadly separated as the space between the postmedial and submarginal lines ..... 6.
6. Termen of the primaries distinctly ampliated; expanse of the wings 90–100 mm. ..... *superans* Btlr.
– Termen of the primaries nearly straight; expanse of the wings 60–90 mm. ..... ..... *jezoensis* Mats.

## CLASSIFICATION OF THE MALE GENITAL ORGANS OF THE SPECIES OF *DENDROLIMUS* INJURIOUS TO CONIFERS.

1. Minor harpe at least one half the length of the major ..... 2.
– Minor harpe either small or lacking ..... 5.
2. Toothed part of the clasper (saccus) spindlical, nearly twice as long as broad ..... 3.
– Toothed part of the clasper linear, about four times as long as broad ..... 4.
3. Toothed part of the clasper strongly curved, occupying nearly the apical

one third of the chitinized portion; teeth strong ..... ..... *sibiricus* Tschetv. (pl. v, figs. 11, 12).

– Toothed part of the clasper not strongly curved, occupying nearly the apical one half of the chitinized portion; teeth not strong ..... ..... *superans* Btlr. (pl. v, figs. 7, 8).

4. Toothed part of the clasper occupies nearly $\frac{2}{3}$ of the chitinized portion; valval plate at the opposite side of the chitinized portion broadly emarginated ..... *jezoensis* Mats. (pl. v, figs. 9, 10).

– Toothed part of the clasper occupies nearly $\frac{1}{2}$ of the chitinized portion; valval plate on the opposite side of the chitinized portion deeply emarginated ..... *albolineatus* Mats. (pl. v, figs. 14, 15).

5. No trace of the minor harpe; chitinized portion of the clasper very narrow, with only one row of teeth, at the apex sharply pointed ..... ..... *punctatus* Wk. (pl. v, figs. 5, 6).

– Minor harpe distinct; chitinized portion of the clasper not very narrow ..... 5.

6. Minor harpe very short; the chitinized portion of the clasper at the distal end narrow and sharply pointed .... *spectabilis* Btlr. (pl. v, figs. 3, 4).

– Minor harpe nearly one fourth the length of the major, at the apex blunt and somewhat sinuated ..... *pini* L. (pl. v, figs. 1, 2).

## CLASSIFICATION OF THE *DENDROLIMUS*-LARVAE INJURIOUS TO CONIFERS.

1. Each segment of the body with a pair of black spatulate hair bundles ..... 2.

– Each segment of the body without a pair of black spatulate hair bundles ..... 3.

2. The 3rd, 4th, and 5th segments with golden yellow scales ..... ..... *punctatus* Wk.

– The 3rd, 4th, and 5th segments without golden yellow scales .... *pini* L.

3. Dorsal part of the body brown, marmorated with yellow; on the lateral sides lacking golden yellow scales ..... 4.

– Dorsal part of the body black, not marmorated with yellow; on the lateral sides with golden yellow scales ..... *spectabilis* Btlr.

4. Vertex with 2 longitudinal black stripes ..... *superans* Btlr.

– Vertex lacking longitudinal black stripes ..... 5.

5. Body testaceous brown, each segment covered with large spindle-shaped silky scales ..... *jezoensis* Mats.

– Body dark brown, covered with very narrow silky scales ..... ..... *albolineatus* Mats.
(The larva of *D. sibiricus* Tschetv. is not known to me).

1. Dendrolimus jezoensis Mats. (Pl. II, figs. 9 ♂, 10 ♀).

Dendrolimus jezoensis Mats., Applied Entom. Jap., p. 687, pl. XXXIX, fig. 4, pl. XL, fig. 1 (1917);– Thous. Ins. Jap. Addit. iv, p. 913, pl. LXVII, figs. 1 ♂, 2 ♀ (1921).

♂, ♀. Colour variable, being grey, yellowish brown, reddish brown, dark brown, etc.

♀. Closely allied to *D. superans* Btlr., but differs from it as follows:–

1. Antemedial line to primaries straight from the costa to the median vein, then becoming oblique, reaches the dorsal margin at the inner side of the discocellular spot.
2. Vein 9 to primaries opens at the costa and not reaches to the apex (as in *D. pini* L.).
3. Dorsal marking of each abdominal segment of the larva hexagonal, while in *D. superans* being smaller and subtriangular.

Length—♂, ♀, 29–33 mm.; exp. 66–84 mm.

Hab.—Hokkaido and Honshu.

This is very common in Hokkaido, but rare in Honshu, till now only one male being caught at Kamikochi in the Alpine regions of the Prov. Shinano. Genital organ of the male also allied to that of *D. superans* Btlr., but differs from it as follows:–

Toothed part of the clasper linear, about 4 times as long as broad, occupying nearly $\frac{2}{3}$ of the chitinized portion, while in *superans* Btlr. spindlical, occupying the apical one half of the chitinized portion and nearly twice as long as broad; valval plate much smaller, narrower, deeply emarginated at the proximal side of the toothed part, in the middle with a distinct obliquely raised ridge and at the distal side sharply pointed; excavation of the valval plate distinctly shallower than that of *superans* Btlr.

ab. brunneata Mats., Thous. Ins. Jap. Addit. IV, p. 13, pl. LXVIII, fig. 5. ♂; pl. LXX, fig. 8, ♀ (1921).

♂, ♀. Pale yellowish brown, transverse lines and termen reddish brown, submarginal line black, lined on the inner side with pale yellow.

Hab.—Hokkaido (Sapporo).

ab. nigrofasciata Mats., l. c. p. 914, pl. LXVIII, fig. 2, ♂, pl. LXX,

fig. 4, ♀.

♂, ♀. Closely allied to *brunneata* Mats., but all the transverse lines black and the discocellular spot indistinct.

Hab.—Hokkaido (Sapporo).

ab. tenuilinea Mats., l. c. p. 914, pl. LXVIII, fig. 3, ♂.

♂. Differs from ab. *nigrofasciata* Mats. in having very narrow ante- and postmedial lines as well as an indistinct testaceous discocellular spot.

Hab.—Hokkaido (Sapporo).

ab. obsoleta Mats., l. c. p. 914, pl. LXVIII, fig. 4, ♂.

♂. Primaries dark yellowish brown, transverse lines somewhat deeper in colour; the discocellular spot testaceous, being not very distinct.

Hab.—Hokkaido (Sapporo).

ab. pallescens Mats., l. c. p. 914, pl. LXVIII, fig. 2, ♂.

♂. Allied also to ab. *brunneata* Mats., but the primaries testaceous, the transverse lines pale brownish, the antemedial and submarginal lines on the inner side and the postmedial line on the outer side lined with white.

Hab.—Honshu (Iwate).

ab. nohirae Mats., l. c. p. 915, pl. LXVII, 10, ♂.

♂. Primaries pale yellowish brown, the discocellular spot silvery white, all the transverse lines black, with an wavy line between the postmedial and submarginal lines. Secondaries with two fuscous bands, but not very distinct.

Hab.—Hokkaido (Sapporo).

ab. isshikii Mats., l. c. p. 915, pl. LXVIII. fig. 1, ♂.

♂. Allied to *nohirae* Mats., but the primaries dull brown, the postmedial line broad, the submarginal line not very distinct. Underside of each wing with a broad fuscous medial band.

Hab.—Honshu (Kamikochi in the Prov. Shinano).

ab. olivacea Mats., l. c. p. 915, pl. LXVII, fig. 7, ♂, pl. LXX, fig. 7, ♀.

♂, ♀. Primaries greyish, with a light olivaceous shade, transverse lines darker, a spot on the inner side of the discocellular spot and the interspace between the postmedial and submarginal lines yellowish brown, the latter being outwardly lined with white.

Hab.—Hokkaido (Sapporo).

ab. infuscata Mats., l. c. p. 916, pl. LXVII, fig. 4, ♂.

♂. Primaries dark brown, transverse lines obsolete, in the middle

with a broad silky greyish brown band, submarginal line deeper in colour; a spot on the inner side of the discocellular spot and 3 large spots in the interspace between the postmedial and submarginal lines reddish brown.

Hab.—Hokkaido (Sapporo).

ab. aino Mats., l. c. p. 916, pl. LXVII, fig. 5, ♂.

♂. Allied to ab. *infuscata* Mats., but all the transverse lines distinct, the interspace between the postmedial and submarginal lines reddish brown, lacking the silky greyish brown medial band.

Hab.—Hokkaido (Sapporo).

ab. albofascia Mats., l. c. p. 916, pl. LXVII, fig. 8, ♂.

♂. Allied to *aino* Mats., but the interspace between the antemedial and postmedial lines white.

Hab.—Hokkaido (Sapporo).

ab. fusilineata Mats., l. c. p. 917, pl. LXVIII, fig. 9, ♂.

♂. Primaries greyish, in the cell with a fusiform longitudinal fuscous stripe, in the middle with a white discocellular spot, below it with a fuscous stripe parallel to the vein 2; postmedial line below the median vein indistinct, lined with white outwardly; termen broadly fuscous.

Hab.—Hokkaido (Sapporo).

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Larva (pl. II, fig. 11)—Also allied to that of *superans* Btlr., but differs from it as follows:–

Head at the sides of the epicranial suture with no fuscous stripe, scattering some brownish spots on the lateral sides; labrum in the middle more deeply emarginated. Body paler; the spindle-shaped scales much larger, yellowish white, while in *superans* Btlr. being narrower and of a silvery white colour: the horseshoe-marking on the back of each segment distinctly broader towards the hind margin, while in *superans* Btlr. subtriangularly narrowed; the subdorsal lines fuscous, double, the interspace of them being paler; the stigmatical line zigzac, the oblique stripe before the stigma black and more distinct than that of *superans* Btlr. Abdominal legs paler, lacking wedge-shaped markings and each with some few fuscous spots towards the apex. When full grown it measures about 85–92 mm.

Foot-plant:

*Abies sachalinensis* Mast.
*Picea ajanensis* Fisch.

*Picea glehni* Mast.
*Picea excelsa* Link.
*Larix kaempferi* Sarg.

2. Dendrolimus albolineatus Mats. (pl. II, figs. 2, 3, 4).

Dendrolimus sibiricus albolineata Mats., Thous. Ins. Jap. Addit. IV, p. 918, pl. LXVIII, figs. 8, ♀, 10, ♂ (1921).

♂, ♀. Very closely allied to *D. jezoensis* Mats., and it is very difficult to distinguish from each other in the imaginal stage, but it is quite easy to distinguish them in the male genital organs and also in larvae. Toothed part of the clasper occupies nearly $\frac{1}{2}$ of the chitinized portion, in the middle longitudinally grooved and where are provided with 2 or 3 not toothed keels; at the base with a shallow emargination, while in *D. jezoensis* Mats. with a large semicircular emargination; harpe nearly the same, the minor one being nearly one half the length of the major. This resembles also *D. sibiricus* Tschetv., but quite easy to distinguish from each other in the male genital organs:

Toothed part of the clasper of *D. sibiricus* Tschetv. spindle-shaped, at the base of the shaft rightangularly geniculated, so that it is nearly parallel to the proximal side of the valval plate; teeth much stronger and much more in number; proximal side of the valval plate very narrowly emarginated.

Length—♂ 53–60 mm., ♀ 60–80 mm.

Hab.—Saghalien, Kuriles, Hokkaido (Soya).

ab. fusco-latifascia Mats., Thous. Ins. Jap. Addit. IV, p. 919, pl. LXVIII, fig. 7, ♂ (1921).

♂. Primaries with the interspace between the ante- and postmedial lines dark fuscous, and the interspace between the postmedial and submarginal lines with no brownish marking.

Hab.—Saghalien (Ichinosawa).

ab. nigribasalis Mats., l. c. p. 919, pl. LXVIII, fig. 8, ♂.

♂. Near ab. *fusco-latifascia* Mats., but the interspace between the ante- and postmedial lines greyish white, and the interspace between the antemedial line and the wing-base fuscous, with some greyish white scales.

Hab.—Saghalien (Ichinosawa).

ab. albida Mats., l. c. p. 920, pl. LXVIII, fig. 9, ♂.

♂. Near *nigribasalis* Mats., but the interspace between the antemedial

line and the wing-base whitish, in its middle with a fuscous marking; the interspace between the ante- and postmedial lines with more fuscous scales.

Hab.—Saghalien (Ichinosawa).

ab. brunneo-pallida Mats., l. c. p. 920, pl. LXIX, fig. 1, ♂.

♂. Primaries yellowish brown, transverse lines deeper in colour, submarginal line being not interrupted.

Hab.—Saghalien (Ichinosawa).

ab. **frequens** ab. nov.

♂, ♀. Primaries greyish pale brown, all the transverse lines black; the discocellular spot in the antemedial line; termen fuscous; near the middle between the postmedial and submarginal lines with a brownish band.

Hab.—Kuriles; Saghalien (Odomari, Ichinosawa); 6 (5 ♂, 1 ♀) specimens were collected in July and August by H. Kono and the author.

ab. **kiminensis** ab. nov.

Closely allied to ab. *frequens* Mats., but differs from it as follows:

♂. Primaries white, with a shade of olivaceous; the discocellular spot at the inner side of the antemedial line, the latter being geniculated at the median vein; the postmedial line wavy, much narrower below the median vein.

Hab.—Saghalien (Kiminai); one male specimen was collected on the 20th, July, 1924, by the author.

ab. **nigriscens** ab. nov. (pl. III, fig. 17, ♂).

♂, ♀. Primaries dark brown, all the transverse lines darker and broad; the discocellular spot conspicuous, in the antemedial line, the latter being distinct only below the median vein; the interspace between the postmedial and submarginal lines with a broad brownish band; submarginal line not interrupted.

Hab.—Saghalien (Ichinosawa); 3 (2 ♂, 1 ♀) specimens were collected on the 14th, August, 1923, by the author.

ab. **kurilensis** ab. nov. (pl. III, fig. 15, ♂).

♂, ♀. Primaries dark brown; antemedial line black, lined internally with a white band, which becomes narrower towards the dorsum; postmedial line black, strongly serrated, lined with white externally; submarginal line fuscous, not very distinct, defined inwardly in the interspaces 3, 6, 7, and 8 by white. In the female all the transverse lines somewhat obsolete.

Hab.—Kuriles (Chishima); 2 (1 ♂, 1 ♀) specimens were collected in July and August, 1922, by Y. Aizawa.

ab. **centro-pallida** ab. nov. (pl. III, fig. 11, ♂).

♂. Primaries yellowish brown, all the transverse lines black; dorsum at the base broadly black; antemedial line very broad, near its exterior border provided with a discocellular spot; postmedial line double, not serrated, the outer line being narrower and paler; submarginal line interrupted, lined internally with white; the interspace between the antemedial and postmedial lines paler than the ground colour.

Hab.—Saghalien (Ichinosawa); one male specimen was collected in August, 1924, by the author.

ab. **submarginata** ab. nov. (pl. III, fig. 16, ♂).

♂. Primaries dark brown, all the transverse lines fuscous; ante- and postmedial lines near each other and connected by a bar near the dorsum; postmedial line somewhat serrated externally and lined with white; submarginal line not interrupted, lined internally with white; the discocellular spot at the inner side of the antemedial line; the interspace between the postmedial and submarginal lines filled with yellow-brown.

Hab.—Saghalien (Ichinosawa); one male specimen was collected in August, 1924, by the author.

ab. **albata** ab. nov. (pl. III, fig. 8, ♀).

♂, ♀. Primaries grey, transverse lines black; the discocellular spot in the antemedial line; postmedial line lined outwardly with white, which becomes broader towards the costa; submarginal line black, broad, defined internally by a broad white line.

Hab.—Saghalien (Ichinosawa); numerous specimens were collected in August, 1924, by the author.

ab. **ichinosawana** ab. nov.

♂, ♀. Primaries fuscous, all the transverse lines black; antemedial and submarginal lines internally and postmedial line externally lined with white; the discocellular spot in the antemedial line conspicuous; the interspace between the postmedial and submarginal lines filled with dark brown.

Hab.—Saghalien (Ichinosawa); numerous specimens were collected in August, 1924, by the author.

ab. **centro-zonalis** ab. nov. (pl. III, fig. 18, ♂).

♂. Primaries yellowish brown, all the transverse lines fuscous; ante- and postmedial lines fusing together build a broad band in the disk,

which becomes broader towards the costa and at the outer side somewhat paler lined; the discocellular spot conspicuous, far apart on the inner side of the antemedial line; submarginal line interrupted, becoming very broad at the first and second interspaces.

Hab.—Saghalien (Ichinosawa); one male specimen was collected on the 14th, August, 1923, by the author.

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Larva (pl. II, fig. 4)—Dark brown; head reddish brown, opaque, at the occiput with two obsolete, short, fuscous stripes; clypeus in the middle with a fuscous spot; labrum shining, in the middle shallowly incised. Abdomen yellow, with numerous, minute, fuscous spots; cervical shield of the first segment reddish brown, on its sides marmorated with red, the 2nd and 3rd segments dorsally covered with very narrow silvery white scales, the 4th–12th segments dorsally with each 2 large silvery scaly spots and a diamond marking, the latter being larger at 6th–8th segments. Stigma yellowish, with black periphery. Thoracic legs except the bases black, abdominal legs yellowish, on the outer side with each a broad fuscous stripe, that of the spurial leg with 2 whitish stripes in it. Venter with a series of fuscous spots, which becomes smaller towards both ends. Full grown larva measures about 52 mm. In its young stage it resembles much that of *Dendrolimus pini* L.

Foot-plants.

*Larix dahurica* Turcz.
*Picea ajanensis* Fisch.
*P. glehni* Mast.
*P. excelsa* Lk.
*Abies sachalinensis* Schm.

Very rarely it eats the following pine trees:–

*Pinus funebris* Kom.
*P. taeda* L.
*P. koraiensis* S. et Z.
*P. pumila* Regel.
*P. strobus* L.
*P. silvestris* Lr.

3. Dendrolimus superans Btlr. (pl. II, figs. 6, 7, 8).
Odonestis superans Btlr., Ann. Mag. N. H. (4) XX, p. 481 (1877).

— Ill. Typ. Het. B. M., ii, p. 19, pl. XXVII, fig. 4 (1878).
? Eutricha dolosa Btlr., T. E. S. Lond., p. 16 (1881).
Eutricha fentoni Btlr., l. c. p. 17.
Eutricha zonata Btlr., l. c. p. 17.
Eutricha pini Leech, T. E. S. p. 109 (1899); Yano, Zool. Mag. Tokyo, p. 15, (1911); Niisima, Forest Ent., p. 221 (1913).
Bombyx pini Sasak., Ins. Inj. to Jap. Trees ii, p. 1 (1902).
Dendrolimus superans Kby., Cat. Lep. Het. i, p. 814 (1892); Grünb., in Seitz's Macrolep. ii, p. 172, pl. 28b (1911); Yano, Zool. Mag. Tokyo, p. 413 (1915); Nagano, Bull. Nawa Ent. Lab. ii, p. 20 (1917); Mats., Thous. Ins. Jap. Addit. iii, p. 911, pl. LXVI, figs. 2 ♂, 4 ♀ (1921).

♂, ♀. Very different in colour, but the typical colour mostly greyish brown. Primaries with the white discocellular spot always whithin the antemedial line; ante- and postmedial lines dark brown, submarginal line black, the interspace between the postmedial line and submarginal spot-series ferruginous; spots of the submarginal line in the interspaces 1 and 2 placed nearly in a perpendicular line built upon the dorsal margin.

Genital organ of the male resembles that of *jezoensis* Mats. Minor harpe nearly ½ the length of the major, toothed part of the clasper not strongly curved, occupying nearly the apical one half of the chitinized portion and about 2½ times as long as broad; valval plate deeply concave, in the middle with an oblique keel, on the side at the end of the chitinized portion distinctly emarginated, being nearly parallel with the other side, at the distal side somewhat longer produced than the toothed part.

Exp.—70–75 mm., 80–100 mm.

Hab.—Honshu, Kiushu, Tsushima.

ab. concolorata Mats., Thous. Ins. Jap. Addit. iii, p. 912, pl. LXVI, fig. 1 (1921).

♀. Primaries yellowish brown, with a silky luster; no marking; the discocellular spot obsolete.

Exp.—96 mm.

ab. dolosa Btlr.

Eutricha dolosa Btlr., T. E. S. Lond., p. 16 (1881). (pl. II, fig. 6, ♀).

♂, ♀. Primaries greyish brown; the discocellular spot conspicuous, antemedial, postmedial, and submarginal lines wavy, lined externally with white; the interspace between the postmedial and submarginal lines ferrugineous, lined externally with white.

Exp.— ♂ 75 mm., ♀ 90–100 mm.

ab. fentoni Btlr.

Eutricha fentoni Btlr., l. c. p. 17 (1881).

I have no specimen of this aberration, but it is almost probable that *fentoni* Btlr. belongs to *superans* Btlr., for there are not any such large specimens as 3 inches 2 lines in expanse of wings in the male of *spectabilis* Btlr. as Butler stated in his original diagnosis.

His original descriptions as follow:–

"Pale rosy ferrugineus; primaries with the base, a bisinuated stripe immediately beyond the cell, a second dentate-sinuate stripe half way between the latter and outer border, and the inner edge of the outer border dark ferruginous; outer border broad, and slightly darker ferruginous than the ground colour; an oblique lunate white disco-cellular spot upon a dark abbreviated streak; an interrupted diffused whitish stripe bounding the outer border internally; costal border of secondaries and body pale; antennae with greyish brown pectinations; under surface pale sandy reddish; wings crossed by a darker reddish streak just beyond the middle; an ill-difined discal series of darker spots; primaries with the basi-internal area creamy whitish and sericeous; expanse of wings, 3 inches 2 lines."

"Male." "Tokyo (Fenton)."

"Nearest to *E. superans*, male (*Odonestis superans*, Butl.), but evidently quite distinct."

ab. zonata Btlr.

Eutricha zonata Btlr., l. c. p. 17 (1881).

I have no specimen of this insect and owing to the same reason stated above, I guess that this specimen may be a aberration of *superans* Btlr. The original descriptions of Butler as follows:–

"Allied to the preceding (*superans* Btlr.) and to *Oe. segregata*; deep chocolate-red; primaries with a silvery white disco-cellular lunule; a broad piceous oblique central belt, bounded internally by a white bisinuated stripe, and externally by a dentate-sinuate white line, very sharply defined; a broad dark purplish brown external border, deeply sinuated internally, and partly edged with whitish as usual, disc between the central belt and the outer border ferruginous; wings below with the basal three fifths dark chocolate-brown, beyond which they are paler brown; expanse of wings 2 inches 10 lins."

"Male." "Tokyo (Fenton)."

ab. **scribæ** ab. nov. (pl. III, fig. 7, ♂).

♂. Primaries reddish brown, a broad central band greyish brown, not

shining, bounded by obsolete dark brown antemedial and postmedial lines; disk beyond the postmedial line ferruginous; submarginal line obsolete; the discocellular spot greyish.

Exp.—68—72 mm.

Hab.—Honshu (Hiroshima), Tsushima; 3 male specimens were collected in July, 1925, by F. Scriba.

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Larva (pl. II, fig. 7)—Head yellowish brown, epicranial suture paler, on each side with a black stripe, and on the lateral sides scattered with fuscous spots, some of them building longitudinal markings; clypeus in the middle and its periphery fuscous.

Antennae black, at the base testaceous; labrum testaceous brown, in the middle distinctly emarginated. Body greyish brown, with some obsolete, marmorated, fuscous and yellowish markings; cervical shield reddish brown, anterior part of the first segment with numerous, fuscous, longitudinal stripes; hair clusters of the 2nd and 3rd segments nearly the same with those of the foregoing species, all over the surface with numerous silvery scales; in each segment with a horseshoe-like darker marking, which becomes gradually narrower towards the hind margin; stigmatical line obsolete, darker; stigmata pale yellowish white, bounded by black; on the sides with long white hair, mixing some few black ones. Thoracic legs pitchy brown, at the base pale testaceous; abdominal legs concolorous with the body, on the outer side with each 2 fuscous wedge-shaped markings. Ventral stripe reddish brown, in each segment with an oblong fuscous spot; when full grown it measuses about 80 mm. in length.

Foot-plant—*Tsuga sieboldi* Carr.

4. Dendrolimus spectabilis Btlr.

Odonestis spectabilis Btlr., Ann. Mag. N. H. (4) XX, p. 481 (1877); –Ill. Typ. Het. B. M., ii, p. 19, pl. XXVII, fig. 3 (1877).

Oeona segregata Btlr., Ann. Mag. N. H. (4) XX, p. 482 (1877).

Odonestis segregata Btlr., Ill. Typ. Het. B. M. ii, p. 20, pl. XXXI, figs. 6, 7 (1878).

Eutricha zonata Btlr., T. E. S. Lond. p. 17 (1881).

Eutricha remota Leech (nec. Walk.), Proc. Zool. Soc. Lond. p. 628 (1888).

Dendrolimus spectabilis Kby., Cat. Lep. Het. i, p. 814 (1892).

Gastropacha pini Mats. (nec. L.), Japanese Entom. p. 142 (1898); Injurious Ins. of Jap. p. 63 (1899).

Dendrolimus pini Leech (nec. L.), T. E. S. Lond. p. 109 (1899); Mats., Ill. Zeit. Ent. V, p. 345 (1900);—Cat. Insect. Jap. i, p. 46 (1905);—Syst. Entom., p. 280 (1907);—Thous. Ins. Jap. Suppl. i, p. 90, pl. XII, fig. 10 (1909); Dyar, Proc. U. S. N. M. XXVIII, p. 949 (1905); Nagano, Outline of Jap. Lep. p. 174, pl. iii, fig. 14 (1905).

Odonestis superans Pryer, Trans. Asiat. Soc. Jap., p. 51 (1886); Sasaki, Ins. Injurious to Jap. Trees, p. 86 (1901).

Dendrolimus remota Yano (nec. Wk.), Zool. Mag. Tokyo, p. 15 (1911); Niisima, Forest Entom., p. 218 (1913).

Dendrolimus segregatus Grünb., in Seitz's Macrolep. ii, p. 172, pl. 28b (1911); Yano, Zool. Mag. Tokyo, p. 413 (1915).

Dendrolimus remota segregata Maki (nec. Btlr.), Spec. Report of Forestry Exp. St. Formosa, i, p. 74, pl. XIII, Figs. 1, 2 (1914).

Dendrolimus superans spectabilis Grünb., in Seitz's Macrolep., ii, p. 172 (1911).

Dendrolimus spectabilis Nagano, Bull. Nawa Entom. Lab. Gifu, ii, p. 16, pl. 1. figs. 11–14; IV, figs. 8–11, 16–18 (1917); Mats., Thous. Ins. Jap. Addit. III, p. 920 (1921); Takagi, Rep. of Forest Exp. St. Corea, p. 3 (1925).

♂, ♀. Colour of primaries variable, namely greyish white to dark brown; transverse lines also variable, sometimes lacking them entirely; only the constant character is the submarginal spots in the interspaces 1 and 2 placed always in an oblique line. Antennae of the female distinctly shorter branched than that of the *D. superans, jezoensis*, etc. Expanse of the primaries variable, being ♂ 48–62 mm., ♀ 53–88 mm.

Genital organ of the male much differs from those of the congeneric species:—The minor harpe very small, as a wart-like protuberance at the base of the marjor harpe; the chitinized portion of the clasper evenly curved, the toothed part being narrow, with a few teeth especially on the upper ridge; valval plate opposite the chitinized portion broadly emarginated.

ab. fuscofascia Mats., Thous. Ins. Jap. Addit. IV, p. 921, pl. LXIX, fig. 6, ♂ (1921).

♂. Primaries yellowish brown, ante- and postmedial lines indistinct; submarginal line fuscous, broad, defined outwardly by a narrow white line; termen broadly greyish; the discocellular spot small, greyish. Secondaries paler.

Hab.—Honshu (Tokyo).

ab. lateritia Mats., l. c. p. 922, pl. LXIX, fig. 6, ♂ (pl. I, fig. 2, ♂).
♂, ♀. Closely allied to ab. *segregata* Btlr.
Primaries lateritious red, ante- and postmedial lines white, the interspace between these lines somewhat deeper in colour; submarginal line dark brown, on the inner side lined with white; the discocellular spot white, small; termen broadly greyish brown. Secondaries paler.
Hab.—Honshu (Tokyo); Chosen (Shakoji).

ab. nigrolineata Mats., l. c. p. 922, pl. LXX, fig. 3, ♀.
♀. Closely allied also to ab. *segregata* Btlr.
Primaries greyish white, all the transverse lines black, the interspace between the postmedial and submarginal lines concolorous and not filled with brown.
Hab.—Honshu (Tokyo).

ab. tenuifascia Mats., l. c. p. 923, pl. LXIX, fig. 8, ♂.
♂. Primaries brownish, with a golden luster; the discocellular spot small; no transverse line; in the middle with a broad purplish brown band, which is constricted at the first interspace, and curved inwardly near the costa and where becomes much broader than the rest. Secondaries more reddish than the primaries. Underside without any band.
Hab.—Honshu (Tokyo).

ab. latifascia Mats., l. c. p. 923, pl. LXIX, fig. 7, ♂.
♂. Closely allied to *tenuifascia* Mats., but the central purplish brown band much broader; submarginal line fuscous, but not distinct, being built of a spot-series; the interspace between the postmedial and submarginal lines with a golden luster.
Hab.—Hokkaido (Sapporo).

ab. hyacinthina Mats., l. c. p. 923, pl. LXIX, fig. 4, ♂.
♂. Primaries hyacinth-red, no transverse line, in a certain light deeper in colour in the disk. Underside without any band.
Hab.—Hokkaido (Sapporo).

ab. albomarginata Mats., l. c. p. 924, pl. LXX, fig. 5, ♀.
♀. Closely allied to ab. *bifascia* Grünb., but differs from the latter in having the broader greyish white termen, occupying nearly one third part of the wing; submarginal line not distinct, the interspace between the postmedial and submarginal lines with some pale brownish space; postmedial line at each vein with a sharper toothed marking.
Hab.—Hokkaido (Sapporo).

ab. segregata Btlr. (pl. I, fig. 1, ♀).

Oeona segregata Btlr., Ann. Mag. N. H. (4) XX, p. 482 (1877).

♀. Primaries chocolate brown, scattered with white scales; ante- and postmedial lines deeper in colour, the former internally and the latter externally lined with white; submarginal spot-series black, lined internally with white; the interspace between the postmedial line and submarginal spot-series filled with yellowish brown; termen with a series of darker brown spots. Secondaries paler.

Hab.—Honshu, Shikoku, Kiushu.

ab. cinerea Grünb.

Dendrolimus segregatus cinerea Grünb., in Seitz's Macrolepid. II, p. 172, pl. 28d (1911).

♀. Closely allied to ab. *nigrolineata* Mats., but differs from it as follows:

Primaries more paler, especially at the termen; ante- and postmedial lines dark grey instead of black; the dicocellular spot not very distinct.

Hab.—China (Tsingtau-Koshuwan); this may be found in some part of Japan, but I have not any specimen of this aberration.

ab. bifascia Grünb. (pl. III, figs. 2 ♂, 3 ♀).

Dendrolimus segregatus bifascia Grünb., in Seitz's Macrolepid. II, p. 172, pl. 28, c ♂, ♀ (1911).

♂, ♀. Primaries dark brown, ante- and postmedial lines white, submarginal line black, defined internally by white; interspace between the postmedial and submarginal lines filled with brown.

Hab.—Honshu, Chosen.

ab. **griseomarginalis** ab. nov.

Dendrolimus spectabilis bifascia Mats., Thous. Ins. Jap. Addit. IV, p. 921, Pl. LXX, fig. 1 (1921).

♀. Near ab. *bifascia* Grünb., but differs from it as follows:

Primaries at the termen broadly whity grey, with some purplish tinge; antemedial line obsolete, with a small discocellular spot on the innerside of it; submarginal line defined narrowly by white.

Hab.—Hokkaido (Sapporo), Honshu (Akita).

ab. **tokyonis** ab. nov. (pl. III, fig. 1 ♂).

♂. Primaries reddish brown; ante- and postmedial lines deep brown; submarginal spot-series dark brown, lined outwardly with white; the interspace between the postmedial and submarginal lines paler than

the ground colour.

Hab.—Honshu (Tokyo); one male specimen was collected in the middle of August, 1923, by the author at Shibuya.

ab. **hiroshimana** ab. nov. (pl. III, fig. 2, ♂).

♂. Primaries yellowish brown, ante- and postmedial lines whitish, filling this interspace with leaden brown; submarginal line fuscous, the interspace between the submarginal spot-series and the termen deep brown, being concolorous with the secondaries.

Hab.—Honshu (Hiroshima); numerous specimens were collected in July, 1925, by F. Scriba.

ab. **kononis** ab. nov. (pl. III, fig. 3, ♂).

♂. Primaries at the basal $\frac{1}{3}$ reddish brown, at the extreme base with a fuscous patch; ante- and postmedial lines whitish, the interspace being filled with dark grey, lined inwardly with a curved and outwardly with a sharply serrated fuscous band; submarginal spot-series obsolete, being concolorous with the termen, and the interspace between the submarginal and postmedial lines reddish brown.

Hab.—Honshu (Shimauchi in the Prov. Shinano); one male specimen was collected on the 13th, July, 1925, by H. Kono.

ab. **shakojiana** ab. nov. (pl. III, fig. 9, ♂).

♂. Closely allied to ab. *tricolor* Mats., but differs from it in having no white postmedial line.

Hab.—Chosen (Shakoji); two male specimens were collected on the 21st of July, 1922, by T. Uchida and S. Takano.

ab. **scribæ** ab. nov.

♀. Closely allied to ab. *nigrolineata* Mats., but differs from it as follows:

Primaries dark brown; ante- and postmedial lines white; submarginal spot-series black, lined internally with white.

Hab.—Tsushima, Chosen (Ryuzan); 4 female specimens were collected in July, 1925, by F. Scriba.

ab. **ryuzana** ab. nov. (pl. III, fig. 10 ♀).

♀. Primaries dark brown, with numerous greyish white scales; on the outside of the discocellular spot with a broad fuscous patch, which becomes broader at the costa; near the middle of the dorsum with a black spot encircled by a whity ring; submarginal spot-series black, internally lined with white.

Hab.—Chosen (Ryuzan); one female specimen was collected in

July, 1925, by F. Scriba.

ab. **ferruginea** ab. nov.

♀. Primaries ferruginous; postmedial line white, wavy, obsolete towards the costa; the interspace between the postmedial and submarginal lines paler; submarginal line black, lined internally with white; termen broadly fuscous, scattered with white scales.

Hab.—Hokkaido (Sapporo); numerous specimens were collected in July, 1920, by the author.

ab. **fallax** ab. nov. (pl. III, fig. 4, ♂).

♂. Dark brown, all the lines obsolete; a broad band at the inner side of the fuscous submarginal spot-series reddish brown.

Hab.—Chosen (Kazan); two male specimens were collected on the 19th of July, 1922, by T. Uchida aud S. Takano.

ab. **coreana** ab. nov. (pl. III, fig. 5, ♂).

♂. Differs from ab. *kononis* Mats. as follows:

The interspace between the ante- and postmedial lines dark brown; submarginal spot-series fuscous, lined externally with white.

Hab.—Chosen; 3 specimens were collected at Ryuzan (10, VIII, 1925) by F. Scriba and 1 specimen at Shakoji (19, VII, 1922) by T. Uchida and S. Takano.

ab **tricolor** ab. nov. (pl. III, 6, ♂).

♂. Dark brown; postmedial line whitish, submarginal spot-series black; the interspace between the postmedial and submarginal lines as well as the basal $\frac{1}{3}$ reddish brown.

Hab.—Chosen (Shakoji); 4 specimens were collected on the 21st of July, 1922, by T. Uchida and S. Takano.

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Larva (pl. I, fig. 4)—Head greyish brown, with white hair, scattering numerous fuscous spots; epicranial suture testaceous; clypeus in the middle with a black spot; labrum testaceous, in the middle shallowly emarginated. Body black, the first 3 segments testaceous, marmorated with fuscous; from the 3rd to the last segments covered with silvery white scales, those of the lateral sides being golden yellow; lateral projections with long white hair. The hair clusters of the 2nd and 3rd segments bluish black, mixing a few, long, stalked, spindle-shaped, black scales.

At the subdorsal part of each segment with a pair of long black hairbrush, mixing a few spindle-shaped scales. Thoracic legs black, at their

apices and bases testaceous. Abdomical legs testaceous, at the apices pale testaceous, with 3 wedge-shaped black spots externally; claws dark brown. At the segment 11 with a black protuberance, upon which are a few black hair and spindle-shaped scales. Stigmata pale testaceous, their peripheries being black. Full grown larva measures about 85 mm.

Hab.—Hokkaido, Honshu, Shikoku, Kiushu, Chosen, N. China, Manchuria, Siberia.

Foot-plants—All kinds of Pine trees.

5. Dendrolimus punctatus Wk. (pl. I, figs. 9♀, 10♂).

Oeona punctata Wk., List of Spec. Lep. Ins. Brit. Mus. VI, p. 1418 (1855).

Lasiocampa remota Wk., l. c. p. 1439.

Dendrolimus punctata Kby., Cat. Lep. Het. I, p. 813 (1892); Grünb.,—in Seitz's Macrolepid. II, p. 173 (1911); Mats., Thous. Ins. Jap. Addit. III, p. 924, pl. LXIX, 2♀, 3♂ (1921).

Dendrolimus remota Kby., l. c. p. 813; Grünb., l. c. p. 173.

Lebeda hebes Wk., l. c. p. 1462.

Odonestis abstersa Wk., l. c. XXXII, p. 553 (1865).

Odonestis sodalis Wk., l. c. p. 553.

Lasiocampa consimilis Wk., l. c. p. 562.

Lasiocampa innotata Wk., l. c. p. 1443.

Lebeda inconclusa Wk., l. c. p. 569.

♀. Antennae with short branches, at the apical $\frac{1}{3}$ being the longest. Primaries pale testaceous to greyish brown, mostly with 5 lines, namely an antemedial, a medial, a double postmedial, and a submarginal, the last being interrupted into a dark brown spot-series; spots in the interspaces 1 and 2 being placed obliquely to the perpendicular line built upon the hind margin; the space between the postmedial and submarginal lines mostly paler. Termen broadly ampliated. The discocellular spot very small, sometimes wanting.

♂. Genital organ of the male entirely differs from those of the congeneric species of this group:

Minor harpe entirely wanting; chitinized portion of the clasper very narrow, with only one row of small teeth along the curved border, at the proximal side being not emarginated; valval plate opposite the toothed part in the middle deeply emarginated, distally acutely pointed; at the proximal side somewhat rightangularly excavated and at

the diagonal opposite side of the toothed part acutely produced.

ab. **baibarana** n. ab. (pl. III, fig. 13, ♂).

♂. Primaries hyacinth brown, all the lines mostly obsolete; the interspace between the postmedial and submarginal lines paler; submarginal line broken into a blackish spot-series; medial and terminal regions with a purplish shade as in *D. spectabilis hyacinthina* Mats.

Length of the body 20–27 mm.; exp. 38–50 mm.

Hab.—Formosa (Taihoku, Horisha); numerous specimens were collected by Dr. T. Shiraki and R. Saito.

ab. **kantozana** n. ab. (pl. III, fig. 12, ♂).

♂. Primaries hyacinth brown, antemedial, postmedial, and submarginal lines white, wavy; the discocellular spot conspicuous; underside with a fuscous band, that of the secondaries lined with white externally.

Hab.—Formosa (Kantozan near Horisha); one male specimen was collected on the 24th, August, 1924, by R. Saito.

ab. **pallidiola** n. ab. (pl. III, fig. 14, ♂).

♂. ♀. Primaries greyish brown, beyond the cell with a large pale patch; all the lines dark brown, the interspace between the postmedial line and submarginal spot-series reddish brown; the cell spot very small.

Hab.—Formosa (Horisha); 2 (1 ♂, 1 ♀) specimens were collected in July and August by R. Saito aud T. Uchida at Baibara.

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Larva (pl. I, fig. 11)—Head reddish brown and concolorously pubescent; epicranial suture paler, along which on each side is a fuscous stripe, scattering some fuscous spots on the lateral borders, and some of them altogether building 2 or 3 longitudinal stripes; clypeus black; labrum very shallowly emarginated in the middle; antennae brown. Cervical shield reddish brown, with 2 conspicuous dark stripes, which end anteriorly in some long black hair. Body testaceous brown, marmorated with black; the hair clusters in the second and third segments purplish dark brown, the interspace of which is pubescent with long white hair; from the 3rd to the last segments covered dorsally with narrow silvery white scales, those of the 3rd, 4th, 5th, and 6th with some golden yellow scales; the 6th, 7th, 8th, and 8th segments on the subdorsal regions with each pair of long stalked, spaturated, bluish black scale clusters; each segment dorsally black, but as it covered with white scales, its ground colour being not conspicuous; subdorsal stripes paler; stigmatical line broad, black, interrupt-

ed at the junctures; some long white hair on the lateral protuberances above the legs. Thoracic legs black, each at the apex yellowish brown; abdominal legs brown, in the middle with a wedge-shaped black spot, which is lined on both sides with pale yellow; ventral spot-series fuscous. When full grown it measures about 62 mm.

Foot-plants.

*Pinus armandi* Franch.
*P. formosana* Hay.
*P. massoniana* Lamb.
*P. parviflora* S. et Z.

## THE FOLLOWING HYMENOPTEROUS INSECTS WERE REARED FROM THE SPECIES OF *DENDROLIMUS* INJURIOUS TO CONIFEROUS PLANTS IN JAPAN.

### Fam. Ichneumonidæ.
### Subfam. Ichneumoninæ.

1. Spilichneumon oratorius F. (pl. IV, fig. 7, ♂).
Ichneumon oratorius F., Ent. Syst. Vol. 2, p. 138 (1793).
Amblyteles oratorius Wesm., Tent. Disp. Ichn. Belg. p. 116, (1844); Berth., Ann. Soc. Ent. Fr. p. 649. (1895); Schmied., Opusc. Ichn. p. 187 (1902); Morl., British Ichn. Vol. I, p. 201 (1903); Uchida, Journ. Soc. Agr. For. Sapporo, p. 210 (1925).
Spiloteles (Spilichneumon) oratorius Berth., Gen. Ins. Fasc. 18, p. 53 (1904).
Ichneumon (Stenichneumon) albizonellus Mats., Thous. Ins. Jap. Suppl. IV, p. 92, pl. XLVI, fig. 10 (1912).
Host—*Dendrolimus albolineatus* Mats. and *D. spectabilis* Btlr.
This may be parasitic also to the other congeneric species as *D. superans*, *D. jezoensis*, etc.
Hab.—Saghalien, Hokkaido, Honshu, Kiushu.

2. Amblyteles amatorius Müll. (pl. IV, fig. 6, ♂)
Ichneumon amatorius Müll., Prodr. p. 151 (1776); F., Ent. Syst. Vol. 2, p. 139 (1785).
Ichneumon laboratorius F., Piez. p. 142 (1804).
Physcoteles (Amblyteles) amatorius Berth., Gen. Ins. Fasc. 18, p. 52 (1904).

Ichneumon (Stenichneumon) naibuchianus Mats., Thous. Ins. Jap. Suppl. IV, p. 106, pl. XLVII, fig. 10, ♂ (1912).

Amblyteles amatorius Uchida, Jour. Soc. Agr. For. Sapporo, p. 212 (1925).

Host—*Dendrolimus albolineatus* Mats.

Hab.—Saghalien (Toyohara, Konuma, Ichinosawa, Shimizu, Noda, Naibuchi). This was reared from the larva of *D. albolineatus* Mats. by T. Uchida.

## Subfam. Cryptinæ.

3. **Mesostenus matsukemushi** sp. nov. (pl. IV, fig. 9, ♀).

♀. Black, shining. Antennae dark brown, distinctly longer than the body, 7-9 joints being paler. Palpi brownish. Face sparsely punctulate, with fine pale greyish hair; scape very finely punctulate; occiput just behind the lateral ocelli aciculated. Thorax rugosely punctulate and especially on the sides aciculated; scutellum impunctulate on each side, with a strongly curved keel and on its outer side being rugosely wrinkled; metanotum on the horizontal part with one medial and two external areae, on the declivity with no keel, and strongly wrinkled. Wings hyaline, a large patch in the middle and a small spot at the inner side of the nervellus fuscous; veins and pterostigma dark brown. Abdomen mostly impunctulate, only the anterior part of the 2nd and 3rd segments longitudinally aciculated; penultimate segment at the hind margin narrowly pale yellowish; ovipositor reddish brown, nearly $\frac{1}{2}$ the length of the abdomen. Legs black, tibiae and tarsi mostly dark brown; a small ring near the base of each hindfemur and hindtibia, and the anterior tibia as well as the larger part of the same femur at the apex yellowish.

Length—6,5 mm.; exp. 18 mm.

Host—*Dendrolimus jezoensis* Mats.

Hab.—Hokkaido.

S. Tabata has reared a somewhat similar parasite from *D. albolineatus* Mats., and figured it in his report p. 109 (l. c.), but the author's species differs somewhat from that species.

4. **Hemiteles dendrolimusi** sp. nov.

♀. Shining black. Antennae somewhat longer than the thorax, towards the apex gradually thicker, dark brown, the 2nd to 4th joints being dirty yellow. Face very finely punctulate, with very fine greyish

hair; mandibles yellowish, towards the apices brown; palpi pale yellowish; vertex above the scape on each side roundly excavated. Thorax impunctulate, parasidial grooves distinct; metanotum with 2 long curved transverse ridges. Tegulae pale yellowish. Wings hyaline, iridescent, pterostigma and veins dark yellow, areolets open exteriorly. Abdomen long, impunctulate, towards the apex with very fine pale greyish hair; postpetiolus very fine longitudinally aciculated and on each side at the apex yellowish; 2nd segment at the base with 2 small pits, on each humeral angle with a yellowish speck, and in the disk with an obsolete reddish spot; ovipositor nearly $\frac{1}{2}$ the length of the abdomen, beneath except the apex yellowish. Legs orange yellow, hind tibia on both ends dark brownish, each tarsus towards the apex infuscated.

Length—3,5 mm.; exp. 6 mm.

Host—*Dendrolimus albolineatus* Mats.

Hab.—Saghalien; one female specimen was reared from this caterpillar on the 29th of September, 1921, by S. Kuwayama. This is somewhat allied to *H. fulvipes* Grav. from Europe, which is one of the parasites of the European *D. pini* L.

5. **Pezomachus dendrolimusi** sp. nov. (pl. IV, fig. 19, ♀).

♀. Dark brown. Antennae yellowish, all the junctures, the apex and base of the scape, infuscated. Head nearly cubical, somewhat broader than the length, very fine shagreened, and with very minute pale greyish hair; palpi and the anterior margin of the labrum brownish. Teglae, the larger part of the pronotum, and the hind margin of the first abdominal segment yellowish. Meso- and metanotum not broader than the height, shagreened, the latter with a narrow transverse ridge at the declivity. Abdomen long oval, nearly as long as the thorax, shining, with very fine sparse hair, being very fine aciculated; each segment except the first with very narrow yellowish hind margin. Vagina brownish, as long as the first segment. Legs brownish, all the joints yellowish.

Length—2,5 mm.

Host—*Dendrolimus albolineatus* Mats.

Hab.—Saghalien; one female specimen was reared from this caterpillar by S. Kuwayama at the Ozawa Forest Experiment Station (Saghalien). This resembles somewhat *P. agilis* Grav. from Europe.

## Subfam. Ophioninæ.

6. Opheltes apicalis Mats. (pl. IV, fig. 1, ♀).

Astiphromma apicalis Mats., Thous. Ins. Jap. Suppl. IV, p. 112, pl. XLVII, fig. 14, ♀ (1912).

Host—*Dendrolimus albolineatus* Mats.

Hab.—Kuriles, Saghalien, Hokkaido, Honshu, Tsushima, Kiushu, Chosen; S. Harada has reared this insect from the cocoon of *D. albolineatus* Mats. from Kuriles. This is so common in Saghalien as well as in Hokkaido, as to make the author to think that the insect may be one of the most important parasite of the *Dendrolimus*-species.

7. **Exochilum dendrolimusi** sp. nov. (pl. IV, fig. 2, ♀).

♀. Closely resembles *E. circumflexum* L. from Europe, but differs from it as follows:

Face, clypeus, labrum, mandible in the middle, margins of the eyes, a spot at the scape as well as at the 2nd joint of antennae, safron yellow. Palpi whitish, mandible brownish. Antennae reddish brown, 3 first joints black, the 4th being black at the base on its back. Thorax black, no yellowish marking, with short pale yellowish pubescence; scutellum yellow, a triangular spot at the base black, with a brownish spot at the apex. Wings pale amber yellow, veins brownish, pterostigma pale fulvous. Legs yellow, coxae black, those of the fore and middle coxae yellowish beneath, the posterior femur and tibia on each apex being fuscous. Abdomen reddish brown, the 1st segment except both ends, a longitudial stripe on the back of the 2nd and 3rd segments, black.

Length—28 mm.; exp. 33 mm.

Host—*Dendrolimus albolineatus* Mats.

Hab.—Kurile Islands; one male specimen was reared from one of the caterpillar of *Dendrolimus albolineatus* Mats. by S. Kuwayama.

8. **Exochilum laricis** sp. nov. (pl. IV, fig. 3, ♀).

♀. Closely allied to *E. dendrolimusi* Mats., but it is much smaller. Body black. Antennae except the bases yellowish brown. Face coarsely punctulate, with 3 longitudinal yellowish stripes, that of the middle being broader, shorter, and infuscated near the apex; labrum

and mandibles, the latter excepting both ends, yellow. Palpi pale yellowish. Thorax with short fulvous hair, being coarsely punctulated. Scutellum safron yellow, with no fuscous marking. Wings pale amber yellow, veins fulvous, pterostigma pale yellowish. Legs yellow, coxae, except a pale yellowish spot near each apex exteriorly, shining black, while the apices of the hind femora and tibiae being pitchy brown. Abdomen yellow, a longitudinal stripe on its back of the 2nd segment, a lateral stripe, which becomes narrower towards the base and extends from the 4th to 5th, and 2 apical joints except the venter (which is yellow), black. Terebra distinctly longer than the last 2 abdominal segments.

Length—15 mm.; exp. 20 mm.

Host—*Dendrolimus albolineatus* Mats.

Hab.—Hokkaido (Soya).

One female specimen was bred from this caterpillar.

9. Exochilum sachalinensis Mats. (pl. IV, fig. 4 ♀).

Habronyx sachalinensis Mats., Thous. Ins. Jap. Suppl. Vol. IV, p. 117, pl. LXVIII, fig. 6, ♀ (1912).

♀. Black, coarsely punctulate, with short fulvous hair. Antennae, abdomen, and legs reddish brown, antennae towards the apices and the tarsi fulvous, the hind tarsi being paler than the others. Fore head (including clypeus and labrum) and mandibles yellow, the latter at the apices being fuscous. Palpi pale yellowish. Thorax coarsely punctulate and fine reticulated. Wings pale amber yellow, veins fuscous, costa and pterostigma fulvous. The 2nd abdominal segment on its back with a longitudinal black stripe, the apical 3 segments nearly of the same breadth. The middle tarsus on its apical half dark yellow, the hind tibia at the apex infuscated.

Length—25 mm.; exp. 35 mm.

Terebra shorter than the last 2 abdominal segments.

Host—*Dendrolimus albolineatus* Mats.

Hab.—Saghalien, Hokkaido.

This was bred from the cocoon of *Dendrolimus albolineatus* Mats. S. Tabata reports that this parasite is also very useful as *Habronyx matsukemushii* Mats. in destroying *Dendrolimus albolineatus* Mats.

10. **Habronyx matsukemushii** sp. nov. (pl. IV, fig. 5, ♀).

♂. Dark brown, face, mandible, and cheek (except the hind margin)

safron yellow. Antennae reddish brown, towards the apices somewhat paler, scapes yellow, on the back fuscous. Mandible at the apex infuscated. Palpi pale yellowish. Vertex coarsely punctulate, on each side with a yellowish stripe. Thorax rugosely punctulate, with fine fulvous hair. Scutellum with 4 indistinct longitudinal keels. Margins of the pro- and mesothorax rufous. Wings pale amber yellow, veins dark brown, a large part of the recurrent nerve and a small part of the anterior vein of the discoidal cell near the apex whitish; stigma and the outer costal vein pale fulvous. Legs yellowish, the hind leg except the tarsus reddish brown, the apex of the same tibia being infuscated; the hind coxa at the base pitchy brown. Abdomen reddish brown, the 2nd segment on its back with a longitudinal black stripe.

Length—28 mm.; exp. 36 mm.

Host—*Dendrolimus albolineatus* Mats.

Hab.—Kurile Islands; 2 male specimens were reared from this caterpillar. This is also reported from Saghalien as a parasite of the same caterpillar by F. Tabata, and who estimates the parasitic value of this *Ichneumon* upon the *D. albolineatus* Mats. to be about 4.5 %.

11. Habronyx jozankeanus Mats.

Habronyx jozankeanus Mats., Thous. Ins. Jap. Suppl. Vol. IV, p. 118, pl. XLVIII, fig. 8, ♀ (1912).

Host—*Dendrolimus jezoensis* Mats.

Hab.—Hokkaido, very common. This is not known yet as a parasite of *D. albolineatus* Mats., but it may most probably attack the latter, if it be established in Hokkaido.

12. **Mesochorus kuwayamæ** sp. nov.

♀. Head citron yellow, the ocellar region and occiput pitchy brown, with very fine pale greyish hair, face being rugosely punctulate. Antennae longer than the body, brownish, 2 basal joints yellowish. Palpi whitish, mandible at the apex dark brown. Prothorax yellowish; mesonotum black, sparsely fine punctulate, 2 yellowish stripes in the parasidial grooves, with very fine pale yellowish hair; tegulae yellow. Scutellum and metanotum impunctulate, the latter distinctly areolated; area supromedia pentagonal, area basalis with one longitudinal keel, areae externa and dentipara hexagonal, and with each numerous narrow transverse ridges. Wings hyaline, veins and ptero-

gtigma dark brown, areolet nearly rhomboidal. Abdomen pitchy brown, impunctulate, petiole on each side near the base with a yellowish patch, a large triangular patch at the apex of the 2nd and a quadrate patch at the base of the 3rd segment yellow, both uniting with each other building an oval marking; seen from above abdomen the broadest in the middle and seen from the sides clavate at the tip; venter mostly yellowish, with a longitudinal keel in the middle. Vagina yellow, nearly as long as the last 3 segments. Legs yellow, the hind femur except both ends and the hind tibia on both sides dark brown, the hind tarsi being somewhat infuscated.

Length—6 mm.; exp. 10 mm.

Host—*Dendrolimus albolineatus* Mats.

Hab.—Saghalien; one female specimen was reared from this caterpillar at the Ozawa Forest Experiment Station by S. Kuwayama.

13. **Casinaria takagii** sp. nov. (pl. IV, fig. 13, ♀).

Casinaria atrata Takag. (nec Morl.), Chosen Ringyo-Shikenjo Hokoku (Dendrological Report of Corea), vol. II, p. 38, pl. IV, fig. 1, ♀ (1925). Resembles somewhat *D. atrata* Morl., but differs from it as follows:

♀. Dull black, not shining, covered with very minute silvery white hair. Antennae towards the apex dark brown, the first joint at the extreme apex fulvous. Vertex fine, face rugosely and shallowly, punctulate. Mandible sulpher yellow, at the base and its teeth at the apices brownish. Both palpi yellowish white. Thorax rugosely punctulate; tegulae yellowish; metanotum distinctly areolated, basal area triangular, areola subpentagonal, the posterior area semioval, sinuated at the anterior border, the external areae large, the dentiparal areae of nearly an equilateral triangle. Scutellum roundly elevated. Abdomen black, the ventral keel sulpher yellow, thyridii, the 2nd segment at the apex, the 3rd except the apex at the dorsum, and the 4th to the last segments laterally, reddish yellow; very fine punctulate. Legs dull black; tarsi, tibiae, and femora of the anterior legs yellowish; tarsi, tibiae, and the tips of the femora of the middle legs yellow; tarsi, tibiae, and the tips of the femora of the posterior legs reddish yellow.

Lengs—9 mm.; exp. 17 mm.

Host—*Dendrolimus spectabilis* Btlr.

Hab.—Chosen (Keijo); many specimens were reared from this caterpillar by Goroku Takagi, and sent me for identifica-

tion. The same author mentions this insect in his report as *Casinaria atrata* Morl., but the description of it which is written in the Fauna of British India, Hymenoptera, III, p. 476 (1913), differs much from that of the Corea, especially on the coloration of legs. This is one of the most important insects in Corea, in destroying the caterpillar of *Dendrolimus spectabilis* Btlr., which is yearly giving much damage to the Corean pine trees.

## Subfam. Pimplinæ.

14. Theronia japonica Ash. (pl. IV, fig. 10, ♂), Proc. U. S. A. Nat. Mus. Vol. XXX, p. 181 (1906); Mats., Thous. Ins. Jap. Suppl. IV, p. 146, pl. LI, fig. 7 (1917); Uchida, Jour. Soc. Agr. For. Sapporo, XVI, p. 507 (1925).

    Hosts—

    1. *Dendrolimus albolineatus* Mats.
    2. *D. spectabilis* Btlr.
    3. *Aporia crataegi* L.
    4. *Clania minuscula* Btlr.
    5. *Malacosoma neustria testacea* Motsch.
    6. *Pieris rapae* L.
    7. *Urapteryx maculicaudaria* Motsch.

15. **Pimpla** (Apechthis) **dendrolimusi** sp. nov. (pl. IV, fig. 8, ♀).

    ♀. Black. Antennae brownish, beneath yellow, at each joint narrowly infuscated; scapes black. Face along the eye margin with a yellow stripe, which is broken at the emargination of the eye; sparsely punctulate, in the middle with an indistinct longitudinal low keel. Maxillary palpi pale yellowish; labial palpi, except the apical joint which is pale yellow, fuscous. Thorax shining, pro- and metathorax impunctulate, metathorax on the sides rugosely punctulate, with fine pale hair. Wings hyaline, with a light shade of yellow, veins and pterostigma fuscous, only the costal vein and a spot at the outside of the pterostigma fulvous. Legs reddish yellow, only the anterior coxa at the base black; the hind tibia at the base fuscous, on its lower part with a pale yellowish ring, which is accompanied by a fuscous spot downwardly; the hind tarsus fuscous, at the base of each joint yellowish. Abdomen rugosely punctulate, with short pale greyish

hair, the 1st segment on each side with 2 strong keels, which diverge towards the end; the 2nd segment at the base on each side with a shining groove; 2nd to 4th segments at the anterior and posterior borders with each a shallow transverse impression. Ovipositor shining reddish brown, somewhat longer than $\frac{1}{2}$ the length of the abdomen.

Length—13 mm.; exp. 25 mm.

Host—*Dendrolimus spectabilis* Btlr.

Hab.—Hokkaido (Sapporo); one female was bred from *Dendrolimus spectabilis* Btlr. This insect may attack also the caterpillar of *D. albolineatus* Mats. This comes near *P. bermuthi* Htg., which is one of the parasites of *D. pini* L. in Europe.

16. **Pimpla** (Eremochila) **jezoensis** sp. nov. (pl. IV, fig. 11 ♀).

♀. Black. Palpi yellow, labrum yellowish brown. Face below the antennal scrobes with a L-like yellowish cross-bar, being all over the surface sparsely punctulate, and pale fulvous pubescent. Antennae densely short pubescent, robust, shorter than a half of the body length; a space of vertex between the antennae somewhat excavated and shining. Eyes nacked. Thorax shining, greyish pubescent, no trace of notauli, and very fine punctulate. Tegulae yellow. Scutellum and metanotum sparsely punctulate, the latter at the base with 2 low longitudinal keels, the space between these keels and the posterior margin being shining and impunctulate; stigma round and small. Wings hyaline, somewhat infuscated, pterostigma black, veins mostly dark brown. Legs yellowish, femora and coxae mostly reddish yellow, the hind tibia at the apical half and the same tarsi, except the base, fuscous. Abdomen shining black, rugosely punctulate except the hind margin of each segment; the first segment at the base with 2 short longitudinal keels, the space between these keels shining and impunctulate; gastrocoeli quite deep, at the hind margin of each segment shining and impunctulate. Terebra 5,5 mm., valvulae strongly black pubescent.

Length of the body 9 mm.

Host—*Dendrolimus jezoensis* Mats.

Hab.—Sapporo; one female specimen was reared from this caterpillar by the author.

17. **Pimpla** (Pimpla) **spectabilis** sp. nov. (pl. IV, fig. 12, ♀).

♀. Black. Both palpi yellow. Antennae fulvous, back, scapes, and

all the joints fuscous, towards the apex somewhat thickened. Head shining, face with very short whity hair, fine punctulate. Eyes at the outside of the antennal scrobes distinctly emarginated. Thorax shallowly punctulate, with fine short whity hair, no trace of notauli. Pleurae shining, impunctulate. Tegulae yellowish. Scutellum scarcely punctulate. Metathorax with 2 longitudinal keels, shining, its stigma large, oval. Wings hyaline, except the apex with a shade of fulvous; pterostigma fulvous, veins mostly dark brown. Anterior legs yellow, the middle and posterior legs reddish, apices of the coxae, the trochanter, base of the middle tibia, and the tarsi mostly yellowish, the hind tibia black, near the base with a whitish ring, occupying nearly $\frac{1}{3}$ of the length; the same tarsi black, with white rings. Abdomen punctulate, the hind margin of each segment narrowly reddish brown, at the base somewhat rugosely punctulate; terebra 2,5 mm. in length and straight throughout.

Length—8–10 mm.

Host—*Dendrolimus spectabilis* Btlr.

Hab.—Chosen (Keijo); numerous specimens were reared by G. Takagi from this caterpillar. This resembles somewhat *P. laothoe* Cam.

## Subfam. Triphoninæ.

18. **Chorinaeus dendrolimusi** sp. nov.

♀. Chestnut brown, shining, impunctulate. Head somewhat broader than the thorax; clypeus, mandible, and palpi pale yellowish, the 2nd at the tip being brownish. Face on the sides scarcely punctulate. Antennae brown, scape and pedicel yellowish, the former as broad and twice as long as the pedicel. Metathorax towards the apex with a curved transverse keel. Wings hyaline, hair, pterostigma, and veins testaceous. Abdomen fuscous, 2–3 segments yellowish, linear, the 1st and 2nd segments rough, with 2 longitudinal keels, the 3rd longitudinally aciculated, the rest impunctulate and becoming broader towards the apex. Legs yellow, the hind coxae strongly elongated.

Length—2 mm.

Host—*Dendrolimus albolineatus* Mats.

Hab.—Kurile Islands; 3 female specimens were reared from the cocoon of this insect from Etorup by S. Harada.

## Fam. Braconidæ.

19. **Apanteles dendrolimusi** sp. nov. (pl. IV, fig. 16, ♀).
Closely allied to *A. fulvipes* Halid. from Europe, but differs from it as follows:

♂, ♀. Palpi whitish, face fine punctulate and longitudinally aciculated, all coxae black, at each apex being paler. Thorax with very short, fine, greyish white hair. The 1st abdominal segment nearly twice as long as the breadth, not narrowed towards the apex, rugosely punctulate except at the middle, where it is somewhat elevated and shining. The 2nd segment rugosely punctulate and some of its punctures being fused with each other. The 3rd segment shallowly punctulate, with a yellowish spot on each side. Terebra short, valvula ventralis surpassing somewhat the anus. Spurs of the hind tibiae longer than $\frac{1}{2}$ the length of the metatarsus.

Length—3 mm.; exp. 5 mm.

Host—*Dendrolimus albolineatus* Mats.

Hab.—Kuriles, Saghalien, Hokkaido.

This resembles also *A. japonicus* Ash., but differs from it in having somewhat a larger size, black coxae, and 3 rugosely punctulated basal segments of the abdomen. This is one of the most useful parasites of this caterpillar in Saghalien as well as in Kurile Islands.

S. Tabata estimates the average parasitic value of this insect upon *D. albolineatus* Mats. in Saghalien to be 83,7 %. Their white cocoons are made on the sides of the caterpillar itself or directly at the branches of the food plants. This was reared also from the congeneric species in Hokkaido. Prof. Y. Niisima collected many cocoons of this insect from Kurile Islands and liberated them in the forest of Soya-district, where *D. albolineatus* Mats. has become established, having been either imported or migrated from Saghalien.

20. **Phanomeris dendrolimusi** sp. nov. (pl. IV, fig. 14, ♀).

♀. Head, metanotum, and abdomen black, with very fine greyish white hair. Head rugosely punctulate, labrum and mandible yellowish brown, the former being roundish excavated, the latter at the apices brownish. Palpi dark brown, at the joints and apices fulvous. Vertex at the antennal scrobes deeply excavated, impunctulate, with very large ocelli. Antennae dark brown. Thorax except the metanotum reddish brown, very fine punctulate, mesonotum in the

middle excavated oblongly, with 3 distinct notauli, the middle one being incomplete. Metanotum with 3 longitudinal keels, the lateral 2 running along the obsolete stigma; pro- and mesopleurae with some fuscous patches. Wings hyaline, with a faint fuscous tinge, veins and pterostigma fuscous. Abdomen rugosely punctulate, the 1st segment with 3 keels as on the metanotum, the 1st suturiform articulation distinct, which at the following segments is indistinct; a longitudinal keel from the base to the middle of the 3rd segment; terebra dark brown, very short, somewhat surpassing the anus. Legs dark brown, the 2nd trochanter, bases of the femora, the calcars, tibiae, and tarsi reddish brown, tibiae at the apices being blackish.

Length—11 mm.; exp. 29 mm.

Host—*Dendrolimus albolineatus* Mats.

Hab.—Kurile Islands; one female specimen came out from this caterpillar.

S. Tabata enumerates this parasite from Saghalien in his report p. 107 (l. c.), and says that it is not uncommon there.

21. **Phamoneris spectabilis** sp. nov. (pl. IV, fig. 15, ♀).

Much resembles *P. dendrolimusi* Mats., but differs from it as follows:

♀. Body much smaller, being 8 mm. in the length and 14 mm. in the wing expanse. Head reddish brown, antennae blak, at the base narrowly reddish. Face very fine and shallowly punctulate. Mandibles yellow, at the apices fuscous. Mesonotum not oblongly excavated. Metapleura at the hind border with a fuscous patch. Metanotum regularly punctulate. The first and second suturiform articulations somewhat distinct, the first, and the base of the second segment being longitudinally aciculated, the 4th and 5th segments very fine punctulate. Legs dark brown, the upper junctions of the femora and the base of each tarsal joint reddish brown.

Host—*Dendrolimus spectabilis* Btlr.

Hab.—Chosen (Keijo); numerous specimens were reared from this caterpiller by G. Takagi at the Dendrological Experiment Station in Keijo.

## Fam. Chalcidæ.

## Subfam. Toryminæ.

22. **Monodontomerus spectabilis** sp. nov.

♂, ♀. Body metallic green, shagreened; mesothorax dark, with very

fine whitish grey hair; abdomen polished, shining, the 3rd, 4th, and 5th segments laterally with very fine white hair and very fine shagreened. Antennae black, scape and pedicellus metallic green, flagellum 8-jointed. Palpi, and mandibles except the apices, yellowish. Occiput in the middle somewhat excavated. Eyes very fine pubescent. Notauli distinct, quite deep. Scutellum at the apex polished, and separated from the main part by a transverse groove. Wings subhyaline, with fine short brownish hair; subcostal, marginal, postmarginal, and radius yellowish brown; the radius being surrounded by a brownish cloud; near the hind margin with a trace of two obsolete longitudinal veins; spectrum (just below the marginal vein) quite long. Legs metallic green; the anterior trochanter, femur, tibia, and tarsi brownish yellow; the femur beneath near the base with a shade of metallic green; all tibiae and tarsi, apices of femora, and the trochanter yellowish; claws fuscous. In the female terebra nearly as long as the abdomen, dark brown, at the base yellowish, with very fine black hair all over the surface.

Length—♂ 2,5–3 mm.; 3,5–4 mm.

Host—*Dendrolimus spectabilis* Btlr.

Hab.—Chosen (Keijo); numerous specimens were reared from the cocoons of *D. spectabilis* Btlr. by G. Takagi. By the estimation of the named author the parasitic value of this insect is about 39 %, and 1–11 individuals of the parasite being found in one host.

## Subfam. Pteromalinæ.

23. **Pteromalus dendrolimusi** sp. nov.

♀. Metallic green. Antennae 13 jointed, with 2 annelli, the apical 3 joints enlarged, altogether being conical, dirty yellow, beneath pale yellowish, each joint being somewhat infuscated. Head broader than the thorax, strongly punctulate. Mandible pale yellowish, with 3 teeth of dark brown. Metanotum short, in the middle with a longitudinal keel, on the sides somewhat aciculated. Wings hyaline, no marking; postmarginal nerve distinctly longer than the radius; spectrum not very large. Abdomen oval, depressed, somewhat longer than the thorax, the basal $\frac{2}{3}$ yellowish, the apical 2 joints being dark purplish. Legs pale yellowish.

Length—3,5 mm.; exp. 7 mm.

Host—*Dendrolimus albolineatus* Mats.

Hab.—Saghalien; one female specimen was reared from this caterpillar at Ozawa Forest Experiment Station.

This resembles somewhat *P. pini* Hart. from Europe, but it differs much in size and punctulation.

24. **Pteromalus matsukemushii** sp. nov.

♂. Metallic green, with some golden luster. Antennae brownish yellow, scape citron yellow, 13 jointed, with 3 annelli, the last 3 joints infuscated, which is altogether conical. Head seen from above rectangular, distinctly broader than the thorax, strongly punctulate; metanotum with a middle and a transverse keel, on the sides very shallowly punctulate. Wings hyaline, spectrum at the base large, at the innerside of radius with a fuscous spot, postmarginal nerve distinctly longer than the radius. Abdomen shorter than the thorax, black, with a purplish luster, the 2nd segment being yellowish. Legs pale brownish yellow, the anterior pair being paler, coxae metallic green.

Length—2 mm.; exp. 4.5 mm.

Host—*Dendrolimus albolineatus* Mats.

Hab.—Saghalien; one male specimen was reared from this caterpillar at Ozawa Forest Experiment Station by S. Kuwayama.

According to the description of S. Tabata, p. 101 (l. c.), this may be one of the secondary parasites of *Apanteles dendrolimusi* Mats., which is very beneficial for us as a parasite to this caterpiller.

25. **Pteromalus matsuyadorii** sp. nov.

♂. Dark green, strongly punctulate. Antennae yellowish, flagellum brownish yellow, towards the apex attenuated, with very fine pale greyish hair; 2 annelli, the first joint of flagellum being longer than any other joints. Head broader than the thorax, quadrate, seen from front being roundish; clypeus impunctulate; pronotum with much larger punctuation than those of the mesonotum; metanotum punctulate as on the scutellum, with a longitudinal keel, which is interrupted in the middle, and the lateral keels somewhat incurved. Stigma of the metathorax long oval. Wings hyaline, radius somewhat curved, being a little shorter than the postmarginal; spectrum not very large; tegulae yellowish brown. Abdomen shining, impunctulate, the 2nd segment in the middle with a yellowish band. Legs yellow, coxae dark green, the hind femur in the middle above somewhat infuscated.

Length—2,2 mm.; exp. 4 mm.

Host—*Dendrolimus albolineatus* Mats.

Hab.—Saghalien; one male specimen was reared from this caterpillar at Ozawa Forest Experiment Station by S. Kuwayama.

26. **Pteromalus kuwayamæ** sp. nov.

Closely allied to *P. matsuyadorii* Mats., but differs from it as follows:

♂. Body dark green, with some golden luster. Antennae fuscous, scape and the apex of the first joint of flagellum yellowish. Clypeus punctulate as on the face, at the frontal margin somewhat excavated. Pronotum as fine punctulate as on the mesonotum, metanotum in the middle with a longitudinal keel, on each side being obliquely aciculated, and the lateral keels angulated at the middle. Radius straight, postmarginal much longer than the radius; spectrum large. Abdomen at the apex pointed, without any yellowish band at the 2nd segment. Hind femur above not infuscated, the apices of all tarsi dark brown.

Length—3 mm.; exp. 5,5 mm.

Host—*Dendrolimus albolineatus* Mats.

Hab.—Saghalien; one male specimen was reared from this caterpillar at Ozawa Forest Experiment Station by S. Kuwayama.

27. **Holcaerus** (?) **dendrolimusi** sp. nov.

♂, ♀. Black, somewhat shining. Face along the eyes very fine reticulated, at the middle, and the cheeks polished. Antennae dark brown,pedicel yellowish, in the male 12 jointed, in the female 11 jointed, the annelli being indistinct; in the male the 3rd and 4th joints of the flagellum longer than the pedicel, the following 6 joints globular, the apical one being much larger and of a conical shape; in the female the 4 apical joints much enlarged, being conical at the tip. Clypeus somewhat excavated. Thorax sparsely punctulate, with a few white hair. Scutellum along the hind margin with a row of small punctulation, at the disk scarcely punctulate. Metathorax irregularly punctulate and wrinkled, with a small roundish stigma in a furrow. Wing subhyaline, with a light yellowish shade throughout, marginal nerve somewhat as long as the radius, postmarginal nearly twice as long as the radius. Abdomen shining, polished, the 1st segment in the middle and at the base grooved, with each a row of short longitudinal ridges; the 2nd segment very large, at the end of abdomen broadly trun-

cated. Legs black, tips of femora, both ends of tibiae, and the tarsi yellowish.

Length—♂ 1,2 mm.; ♀ 1,5 mm.

Host—*Dendrolimus albolineatus* Mats.

Hab.—Saghalien; many specimens were reared from the eggs of this insect at Toyohara and Ozawa by S. Kuwayama.

## Subfam. Encyrtinæ.

28. **Encyrtus pinicolus** sp. nov.

♀. Dark green, shining. Vertex shagreened, sparsely punctulate, face bluish green, impunctulate. Antennae 13 jointed, with 2 annelli, scape dark greenish, flagellum yellowish brown, the apical 3 joints enlarged and altogether being of an oval shape. Thorax shagreened, sparsely punctulate; scutellum greenish blue, metanotum with many fine hair. Marginal nerve very short, radius somewhat curved, nearly as long as the postmarginal, stigma somewhat infuscated; costa near the base with 6 long hair. Abdomen oval, metallic dark brown, shorter than the head and thorax together, impunctulate, above deeply excavated, with 4 longitudinal furrows, beneath convex. Legs dark brown, the anterior coxae dark green, trochanter, apices of femora and tibiae, as well as the tarsi mostly yellowish; the last joint of each tarsus infuscated. Ovipositer very short, projecting very little beyond the end of abdomen.

Length—1,2 mm.

Host—*Dendrolimus albolineatus* Mats.

Hab.—Saghalien and Kurile Islands; many specimens were reared from the eggs of this moth by S. Kuwayama and S. Harada.

According to S. Tabata's observation, this species came out from the egg of this insect and generally one to 4 individuals being parasitic on one egg.

## Subfam. Trichogramminæ.

29. **Tricnogramma dendrolimusi** sp. nov.

♂, ♀. Body pale tectaceous, shining, impunctulate, compound eyes red, abdomen in the middle somewhat infuscated. Antennae pale yellowish, short, scape as long as the following 3 joints united, hatchet-shaped, the apical joint nearly as long as the scape, but being distinctly robuster and in the male strongly pubescent. Legs pale

yellowish, immaculate, claws fuscous. Wings hyaline, reflecting a very light shade of testaceous, with about 18 delicate hair-lines; veins testaceous, radius somewhat shorter than the marginal, being a little curved downwardly; abdomen sessile, ovate, nearly as long as the head and thorax united, flat above, convex beneath, conically pointed at the apex; ovipositer slightly projecting beyond the tip of abdomen.

Length—0,4-0,5 mm.

Hosts—*Dendrolimus albolineatus* Mats. and *D. spectabilis* Btlr.

Hab.—Saghalien; numerous specimens were reared from the eggs at Toyohara and Ozawa by S. Kuwayama.

According to S. Tabata's observation, the average number of this insect in one egg is about 20 (p. 96, l. c.).

## Fam. Tachinidæ.

30. Carcelia excisa Fall. (pl. IV, fig. 18, ♀).

Tachina excisa Fall., Dipt. Suec. Musc. p. 32, n. 67 (1820).

Hosts—*Dendrolimus jezoensis* Mats., *D. albolineatus* Mats., and *D. spectabilis* Btlr.

Hab.—Kuriles, Saghalien, Hokkaido, and Honshu.

This is one of the most beneficial parasites to the *Dendrolimus*-species in Japan as well as in Saghalien. It always comes out from the cocoon.

In Europe it is also known as a parasite to the following Lepidopterous insects:—

*Abrostola tripartita* Hufn.
*A. triplasia* L.
*Arctia caja* L.
*A. hebe* L.
*A. villica* L.
*Buppalus piniarus* L.
*Callimorpha dominula* L.
*Cucullia scrophulariae* Cap.
*Dasychira pudibunda* L.
*Endromis versicolora* L.
*Hyloicus pini* L.
*Lymantria dispar* L.
*L. monacha* L.
*Malacosoma neustria* L.
*Malacosoma castrensis* L.
*Orygia antiqua* L.
*Phragmatobia fuliginosa* L.
*Pterostoma palpina* L.
*Pygaera curtula* L.
*Saturnia pyri* Schiff.
*Stilpnotia salicis* L.
*Thalpochares pannonica* Frr.
*Thaumetopoea processionea* L.
*Sphinx ligustri* L.

31. Carcelia gnava Meig. (pl. IV, fig. 20, ♀).
Tachina gnava Meig., Syst. Beschr. Eur. Dipt. IV, p. 330, n. 156 (1824).
Hosts—*Dendrolimus spectabilis* Btlr., *D. jezoensis* Mats., and *Popillia japonica* Newm.
Hab.—Hokkaido and Honshu.
This is not so common as *C. excisa* Fall., but it is rather plentiful upon *Popillia japonica* Newm.
The following hosts of this insect are known from Europe:—
1. *Malacosoma neustria* L.
2. *Orygia antiqua* L.
3. *Stilpnotia salicis* L.

32. **Echynomyia dendrolimusi** sp. nov. (pl. IV, fig. 21, ♀).
♀. Head opaque, golden yellow pruinose except the brownish frontal vitta; ocellar bristles small, directed forwards; postorbital bristles directed backwards; 2 rows of frontal bristles, the outer one being directed forwards, the inner one extending to the basal fourth of the 2nd antennal joint; bristly hair of the front black, the finer hair of the face, the cheeks, and occiput golden yellow. Antennae yellow, the 2nd joint with short black bristles, the 3rd joint on its apical $\frac{1}{2}$ somewhat brownish; arista dark brown, at the base somewhat paler. Palpi yellowish, conically pointed at the apices; proboscis fuscous, labella yellowish. Thorax dark brown, humeral region yellowish brown, the anterior border somewhat brownish pruinose, with 2 short black stripes; all hair of the thorax directed backwards. Scutellum amber yellow, with a row of strong macrochaetae. Wings infuscated, at the base, and the space from the costa to the opening of the 1st longitudinal vein, as well as the squamae yellow. Abdomen reddish brown, in the middle with a broad black stripe, which is narrower towards the apex; at each hind margin of the 2nd and 3rd segments with a row of strong macrochaetae, at the apex of the 4th segment with numerous macrochaetae.
Length—17 mm.; exp. 25 mm.
Host—*Dendrolimus albolineatus* Mats.
Hab.—Kurile Islands; one female specimen was reared from the cocoon, which was brought from Oshidomari by S. Harada.

## Fam. Sarcophagidæ.

33. Sarcophaga albiceps Meig. (pl. IV, fig. 17, ♀).
Sarcophaga albiceps Meig., Syst. Beschr. Eur. Dipt. V. p. n. 122, 8

(1826).

Host—*Dendrolimus albolineatus* Mats.

Hab.—Saghalien.

S. Tabata enumerates two species of *Sarcophaga*, which are parasitic on *D. albolineatus* Mats. According to his description, the *Sarcophaga* sp. ? in page 122 (l. c.), corresponds to this species. He says that this is one of the most important parasites of *D. albolineatus* Mats. This insect is known also in Europe as the parasite* to *Dendrolimus pini* L. and *Oryctes nasicornis* L. In Europe *Sarcophaga affinis* Fall. is also known as the parasite to the same caterpillar. The latter may have been an inhabitant of Saghalien and it might have done a good work to exterminate the caterpillar of *D. albolineatus* Mats.

## THE PREDACEOUS INSECTS, WHICH ARE BENEFICIAL TO EXTERMINATE *DENDROLIMUS ALBOLINEATUS* MATS. IN SAGHALIEN AND KURILE ISLANDS.

### Order Rhynchota.

### Fam. Pentatomidæ.

### Subfam. Asopinæ.

34. Zicrona coerulea L.

Cimex coeruleus L., Syst. Nat. l. p. 722 (1758).

This is very beneficial on account of sucking the blood of the caterpillars and causing the immediate death. Its larvae are gregarious and also predaceous; head and thorax are indigo blue, but the abdomen is crimson red, with a series of dark bluish spots along the central and lateral lines; antennae and legs are dark brown. This is also distributed throghout the palaearctic subregions as Europe, Caucassus, Turkestan, Siberia, Mongoria, and China.

35. Picromerus lewisi Scott

Picromerus lewisi Scott, Ann. M. N. Hist. p. 293 (1874).

This is also a predaceous as the foregoing species, being more common than that. In Hokkaido this insect is very beneficial in killing different kinds of caterpillars, which are injurious to forestry.

This is also distributed in China.

* Becker, Bessi, Kertész und Stein-Katalog der Palaearktischen Dipteren I, p. 470 (1907).

## Fam. Reduviidæ.

36. Harpactor leucospilus Stål
Reduvius leucospilus Stål, Öfv. V. A. Förh. p. 203 (1850).
This is one of the most common *Reduvids* in Hokkaido as well as in Saghalien. It is found mostly upon the coniferous trees as *Abies sachalinensis* Schm. and *Picea ajanensis* Fisch. It is also distributed throughout Galicia, Siberia, and Sitka. In the Amur it is said to be very common.

37. **Nabis kurilensis** sp. nov. (pl. IV, fig. 23, ♀).
♀. Black, with very fine pale greyish hair. Antennae yellow, both ends of the first joint being somewhat infuscated (other part defect). Head subcylindrical, impunctulate, and opaque. Rostrum long, reaches beyond the middle coxae, yellow, at the base being infuscated. Collum shining, on the sides yellowish brown; pronotum near the anterior margin and at the middle transversely grooved, the posterior margin shallowly punctulated. Scutellum in the middle somewhat excavated. Wings very short, somewhat longer than the scutellum, dark brown, with 2 longitudinal veins, at the costa and tip being somewhat paler. Abdomen oblong, on each side with a series of yellowish spots. Legs yellow, the anterior femur except the tip black; tips of the middle and hind femora, the tibia on both ends, as well as the tarsi at the bases, blackish.

Length—11 mm.

Hab.—Kurile Islands; one female specimen was collected in Etorup by S. Kuwayama.

## Order Coleoptera.

## Fam. Carabidæ.

38. Calosoma chinense Kby.
Calosoma chinense Kby., Trans. Linn. Soc. Zool. XII, p. 379 (1818).

Hab.—Saghalien; common all over the Island.

This is a very beneficial insect in Hokkaido, being a great killer of the larvae of *Barathra mamestrae* L., which is one of the most injurious insects in Hokkaido.

39. Calosoma ogumae Mats.
Calosoma ogumae Mats., Journ. Coll. Agr. Sapporo, IV, pt. 1, p. 109

(1911).

Hab.—Saghalien; this is not common in this island, and it is reported by S. Tabata in p. 132 (l. c.), as a predaceous insect on the caterpillar of *Dendrolimus albolineatus* Mats., but it may be *C. chinense* Kby. instead of that species.

40. Calosoma maximowiczi Mor.

Calosoma maximowiczi Mor., Beiträge Käf. Fauna Yesso, p. 20, taf. 1, fig. 7 (1863).

Hab.—Kurile Islands; one female specimen was collected by S. Kuwayama in Etorup.

This is also quite common in Hokkaido and its larvae are very beneficial in devouring *Dendrolimus* as well as other caterpillars.

## Order Hymenoptera.

### Fam. Sphegidæ.

41. Dahlbomia atra F. (pl. IV, fig. 22, ♀).

Sphex atra F., Entom. Syst. IV, p. 459, n. 18 & 91 (1794).

Hab.—Kurile Islands; one female specimen was collected in Etorup by S. Kuwayama.

This is not rare also in the northern Japan.

### Fam. Vespidæ.

42. Polistes chinensis F.

Vespa chinensis F., Entom. Syst. II, p. 261 n. 29 (1804).

Hab.—Kurile Islands; one female specimen has been collected in Etorup by S. Kuwayama.

This is also distributed throughout Japan, China, and Siberia.

43. Vespa rufa sibirica André

Vespa rufa sibirica André, Sp. Hym. Eur. p. 20 (1884).

Hab.—Saghalien; very common every where.

This is also distributed in Hokkaido and Siberia.

44. Vespa japonica Sauss.

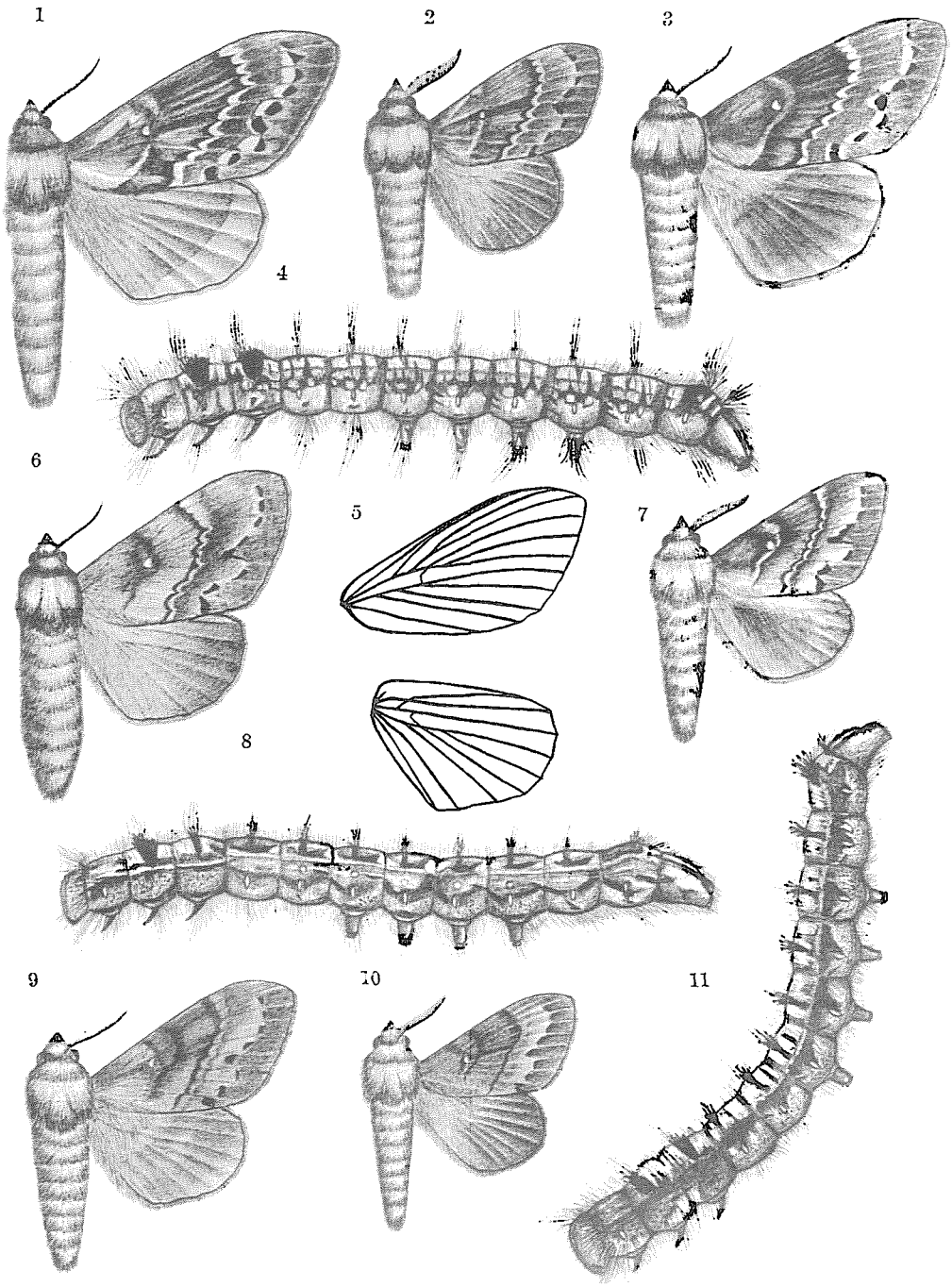
Vespa japonica Sauss., Rev. et Mag. Zool. X. p. 261 (1858).

Hab.—Saghalien; common every where.

This is also common in Japan and Amurland.

## Explanation of Plate I.

1. *Dendrolimus spectabilis segregata* Btlr. ♀
2. *Dendrolimus spectabilis bifascia* Grünb. ♂
3. *Dendrolimus spectabilis bifascia* Grünb. ♀
4. do., larva.
5. do., venations of the right wings.
6. *Dendrolimus pini* L. ♀
7. do., ♂
8. do., larva.
9. *Dendrolimus punctatus* Wk. ♀
10. do., ♂
11. do., larva.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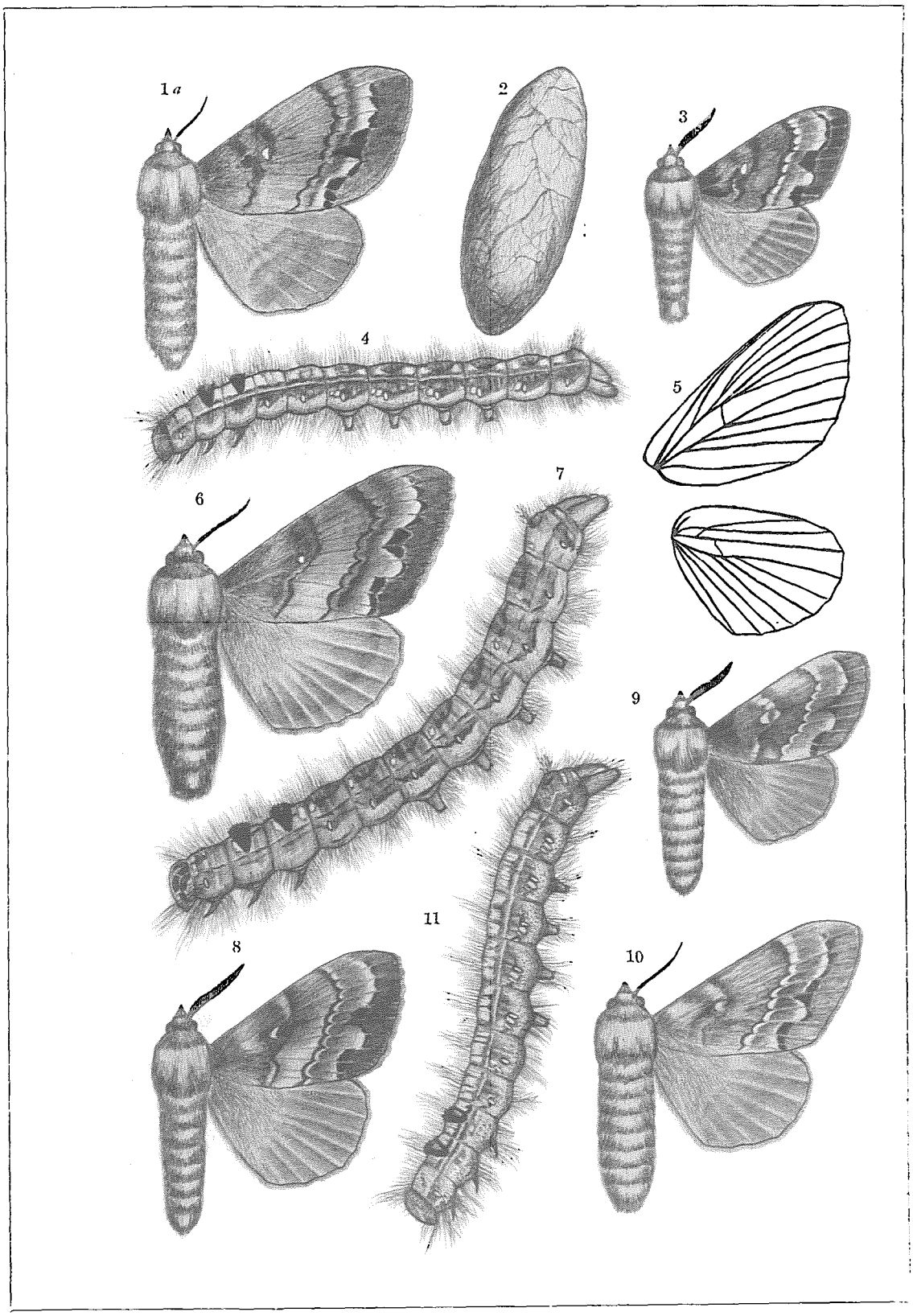
## Explanation of Plate II.

1. *Dendrolimus sibiricus* Tschetv. ♀
2. Cocoon of *Dendrolimus albolineatus* Mats.
3. do., ♂
4. do., larva.
5. do., venations of the right wings.
6. *Dendrolimus superans dolosa* Btlr. ♀
7. do., larva.
8. do., ♂
9. *Dendrolimus jezoensis* Mats. ♂
10. do., ♀
11. do., larva.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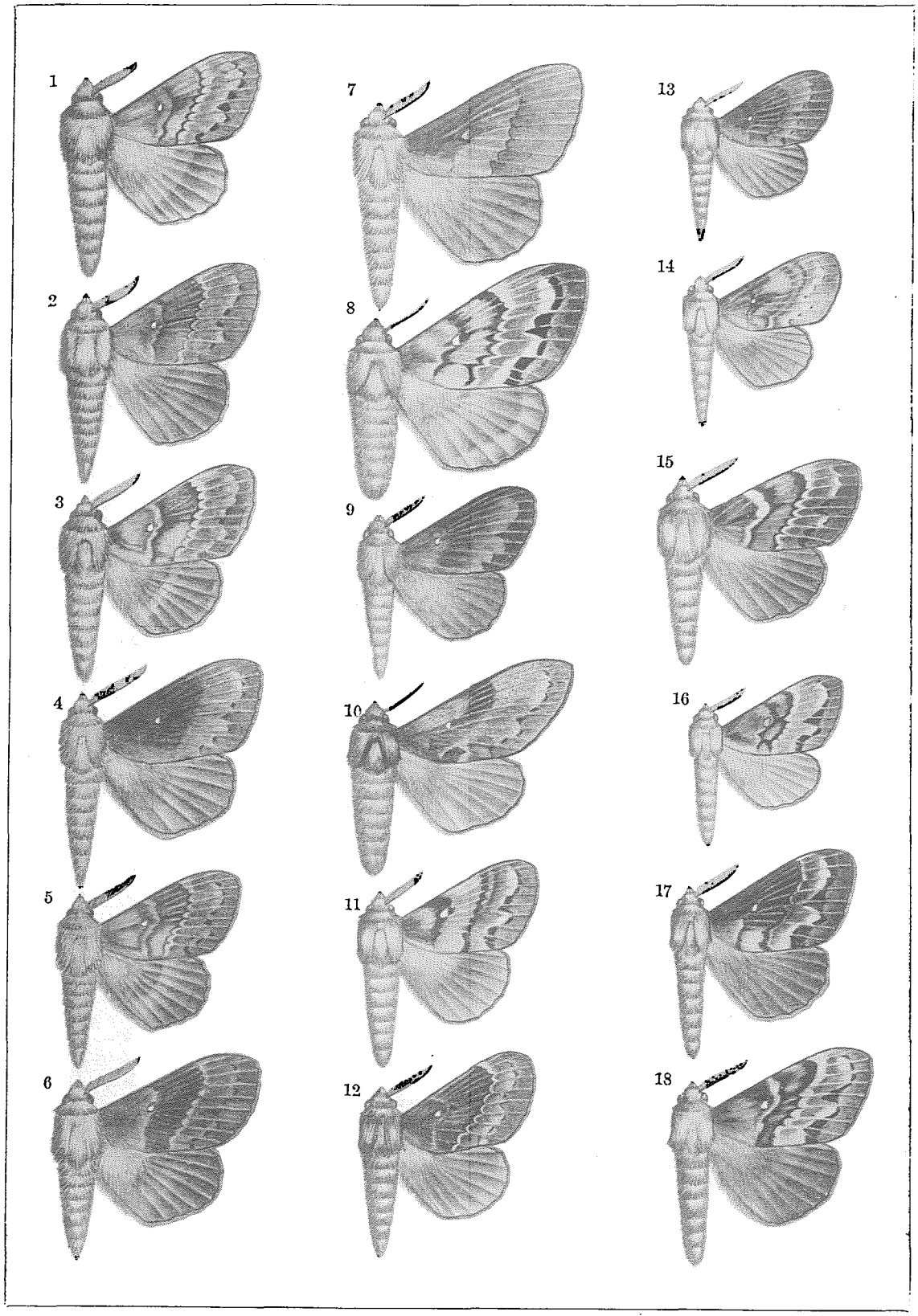
## Explanation of Plate III.

1. *Dendrolimus spectabilis tokyonis* Mats. (ab. nov.) ♂
2. do., ab. *hiroshimana* Mats. (ab. nov.) ♂
3. do., ab. *kononis* Mats. (ab. nov.) ♂
4. do., ab. *fallax* Mats. (ab. nov.) ♂
5. do., ab. *coreana* Mats. (ab. nov.) ♂
6. do., ab. *tricolor* Mats. (ab. nov.) ♂
7. *Dendrolimus superans scribae* Mats. (ab. nov.) ♂
8. *D. albolineatus albata* Mats. (ab. nov.) ♀
9. *D. spectabilis shakojiana* Mats. (ab. nov.) ♂
10. do., ab. *ryuzana* Mats. (ab. nov.) ♀
11. *Dendrolimus albolineatus centro-pallida* Mats. (ab. nov.) ♂
12. *D. punctatus kantozana* Mats. (ab. nov.) ♂
13. do., ab. *baibarana* Mats. (ab. nov.) ♂
14. do., ab. *pallidiola* Mats. (ab. nov.) ♂
15. *Dendrolimus albolineatus kurilensis* Mats. (ab. nov.) ♂
16. *D. spectabilis submarginata* Mats. (ab. nov.) ♂
17. *D. albolineatus nigriscens* Mats. (ab. nov.) ♂
18. *D. spectabilis centro-zonalis* Mats. (ab. nov.) ♂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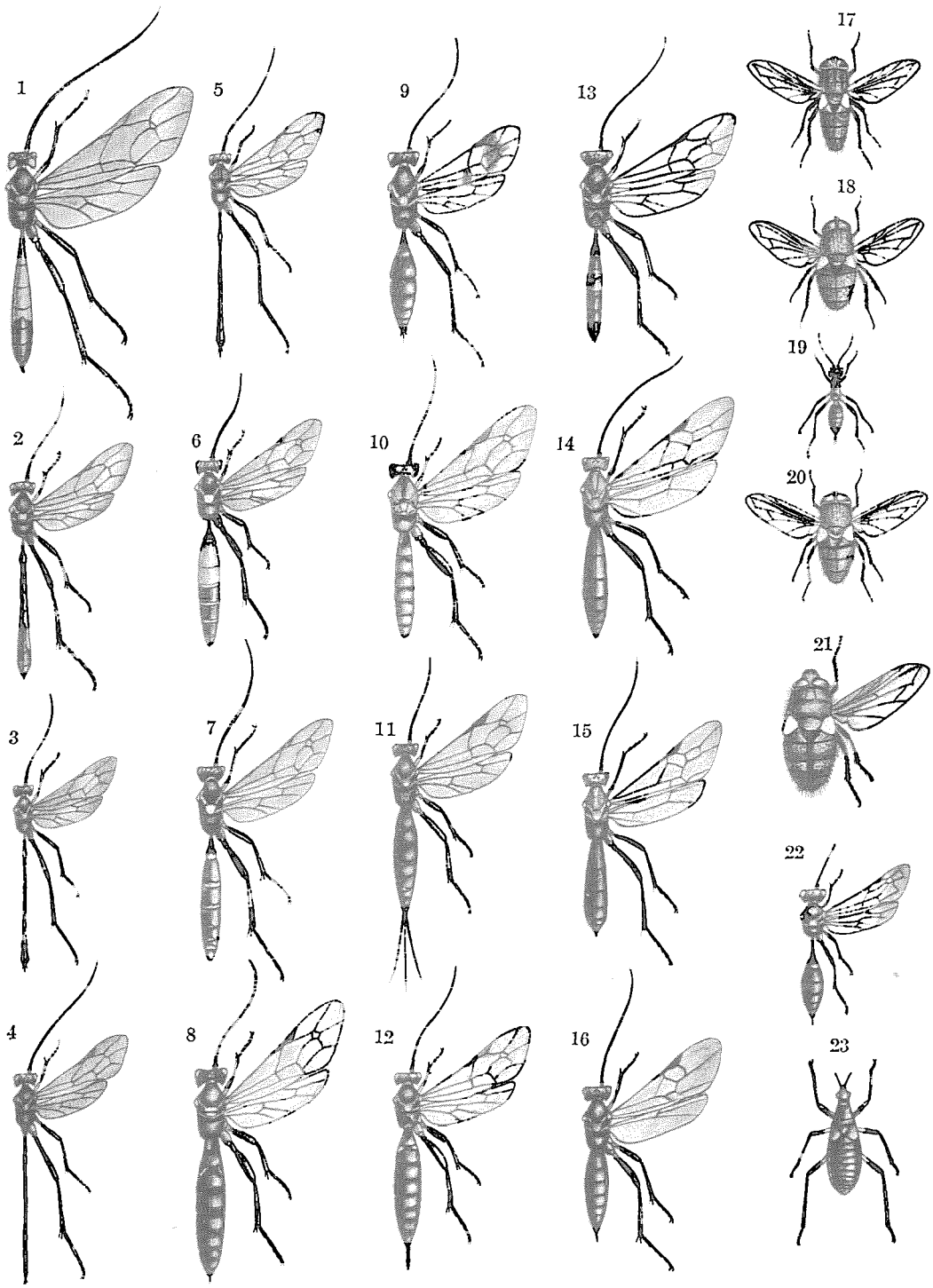
## Explanation of Plate IV.

1. *Opheltes apicalis* Mats. ♀
2. *Exochilum dendrolimusi* Mats. (sp. nov.) ♂
3. *Exochilum laricis* Mats. (sp. nov.) ♀
4. *Exochilum sachalinensis* Mats. ♀
5. *Habronyx matsukemushii* Mats. (sp. nov.) ♀
6. *Amblyteles amatorium* Müll. ♂
7. *Spilichueumon oratorius* F. ♂
8. *Pimpla* (Apechthis) *dendrolimusi* Mats. (sp. nov.) ♀
9. *Mesostenus matsukemusii* Mats. (sp. nov.) ♀
10. *Theronia japonica* Ash. ♂
11. *Pimpla* (Eremochila) *jezoensis* Mats. (sp. nov.) ♀
12. *Pimpla* (Pimpla) *spectabilis* Mats. (sp. nov.) ♀
13. *Casinaria takagii* Mats. (sp. nov.) ♀
14. *Phanomeris dendrolimusi* Mats. (sp. nov.) ♀
15. *Phanomeris spectabilis* Mats. (sp. nov.) ♀
16. *Apanteles dendrolimusi* Mats. (sp. nov.) ♀
17. *Sarcophaga albiceps* Meig. ♀
18. *Carcelia excisa* Fall. ♀
19. *Pezomachus dendrolimusi* Mats. (sp. nov.) ♀
20. *Carcelia gnava* Meig. ♀
21. *Echinomyia dendrolimusi* Mats. ♀
22. *Dahlbomia atra* F. ♀
23. *Nabis kurilensis* Mats. ♀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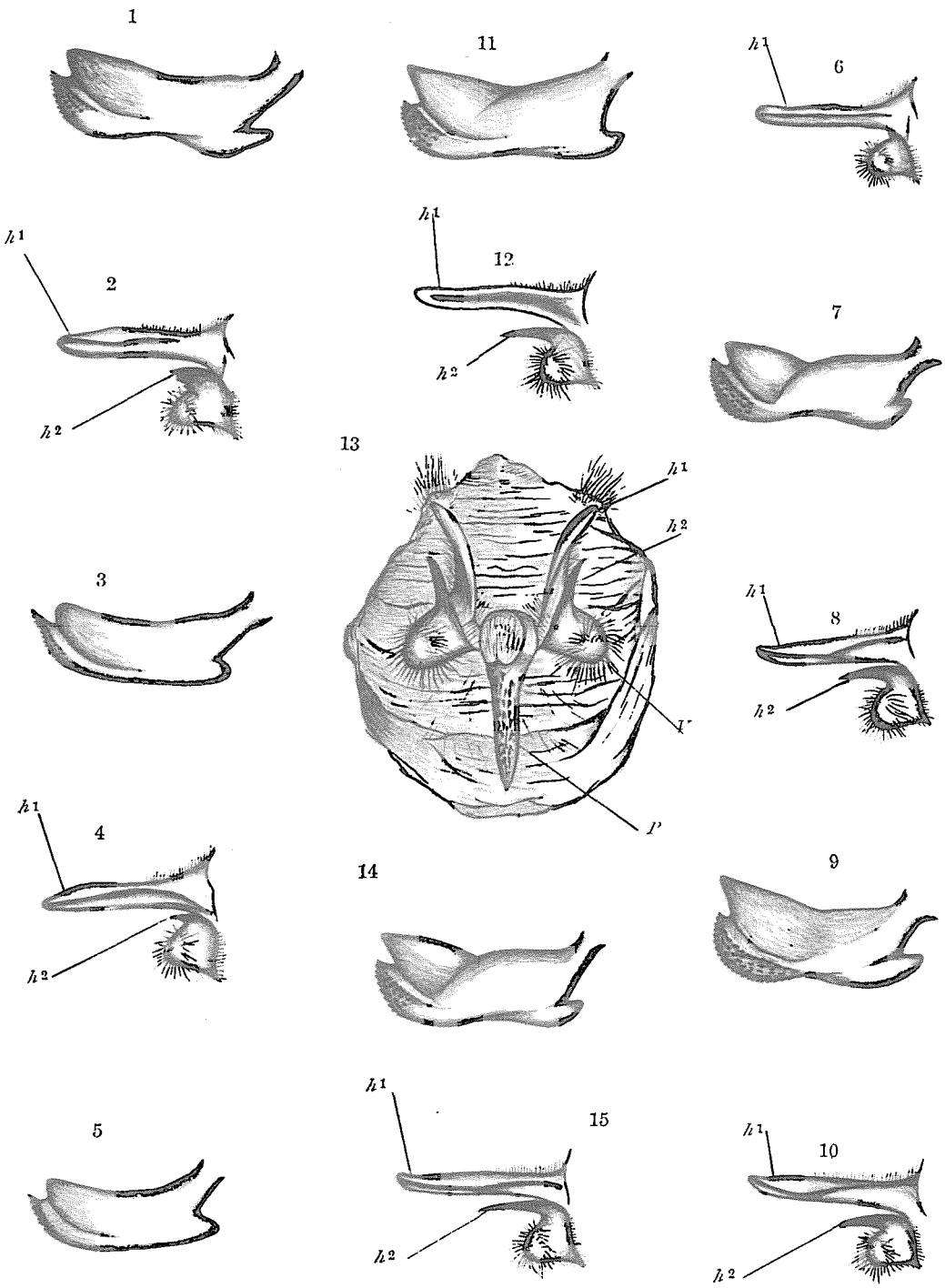
## Explanation of Plate V.

1. Clasper of the male genital organ of *Dendrolimus pini* L.
2. do., harpe; $h^1$-major harpe, $h^2$-minor harpe, v-valva.
3. Clasper of the male genital organ of *Dendrolimus spectabilis* Btlr.
4. do., harpe.
5. Clasper of the male genital organ of *Dendrolimus punctatus* Wk.
6. do., harpe.
7. Clasper of the male genital organ of *D. superans* Btlr.
8. do., harpe.
9. Clasper of the male genital organ of *D. jezoensis* Mats.
10. do., harpe.
11. Clasper of the male genital organ of *D. sibiricus* Tschetv.
12. do., harpe.
13. Male genital organ of *D. jezoensis* Mats.; p-penis, $h^1$-major harpe, $h^2$-minor harpe, v-valva.
14. Clasper of the male genital organ of *D. albolineatus* Mats.
15. do., harpe.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