

Studies on Scolytidae XII

The bark beetles of the tribe Ipini in Japan (Coleoptera)

by

Akira NOBUCHI⁽¹⁾

Summary : Nineteen species of the Japanese Ipini are recognized. Approximately two thousand eight hundred and ninety specimens were examined in this study. *Pityogenes japonicus* is described as new to science. *Ips kuniyoshii* and *I. tosaensis* are transferred to the genus *Orthotomicus*. Lectotype is designated for *Ips japonicus*. *Pityogenes bistri-dentatus* is recorded for the first time from the Far East. Keys for the separation of all known species are provided. Notes on host trees and geographical distribution of all species and illustrations of most species are included.

The tribe Ipini is cosmopolitan in distribution. The greatest concentration of species is in the Holarctic realm. Five genera and nineteen species occur in Japan.

Adults of this tribe are readily distinguished from other Japanese tribes of the subfamily Ipinæ by the following combination of characters. The eyes are not divided into two parts; the antennal funicle is five-segmented; the antennal club is oval in shape and has evident sutures; the pronotum is not marginate in the basal margin and strongly declivous on the anterior portion, and has short transverse asperities arranged in concentric rows on the anterior half; the metepisternum is distinctly visible for its entire length; the elytral declivity is concave or flattened and possesses two to five distinct teeth on each side; the meso- and metathoracic tibiae are abruptly narrowed apically and have a few widely-spaced coarse teeth; the proventriculus has well developed teeth and long marginal bristles on the anterior plate; the seminal trough is usually twisted or spiral.

All nineteen species in Japan are bark beetles, with a moderately polygamous social organization. The species generally are host specific, limiting their attacks to one or five genera of trees. Only one Japanese species, *Acanthotomicus spinosus*, attacks broad leaved trees; the remainder feed in coniferous trees, usually *Abies*, *Picea*, *Larix*, or *Pinus*. The hosts and distribution of Japanese species are given in Table 1. Males attack first, bore directly into the phloem-cambial region, and construct a nuptial chamber. Two to five females join the male in the nuptial chamber, copulation ensues, and each female then excavates an egg tunnel running obliquely or nearly parallel to the grain of the wood, depending upon the species. In general, eggs may be laid singly in niches along the gallery wall. Larvae start

Received January 28, 1974

(1) Forest Protection Division, Government Forest Experiment Station, Meguro, Tokyo

Table 1. Hosts and distribution

Species	Host trees												
	<i>Abies firma</i>	<i>A. homolepis</i>	<i>A. mariesii</i>	<i>A. sachalinensis</i>	<i>Pseudotsuga taxifolia</i>	<i>Tsuga sieboldii</i>	<i>Picea excelsa</i>	<i>P. glehnii</i>	<i>P. jezoensis</i>	<i>P. jezoensis</i> var. <i>hondoensis</i>	<i>Larix leptolepis</i>	<i>L. gmelini</i>	<i>Pinus banksiana</i>
<i>Pityogenes bistridentatus</i>													
<i>P. chalcographus</i>	○			○	○		○	●	●	○	○	○	○
<i>P. foveolatus</i>									○				
<i>P. japonicus</i>													
<i>P. seirindensis</i>				○				●	●				
<i>Pityokteines curvidens</i>	○	○	○	○									
<i>Orthotomicus angulatus</i>						○							
<i>O. golovjankoi</i>							○	●	●	●			
<i>O. kuniyoshii</i>													
<i>O. laricis</i>									○				
<i>O. proximus</i>									○				
<i>O. suturalis</i>										○	○		
<i>O. tosaensis</i>													
<i>Ips acuminatus</i>									○		○		
<i>I. cembrae</i>				○			○				●		
<i>I. duplicatus</i>													
<i>I. multidentatus</i>													
<i>I. typographus japonicus</i>				○			●	●	●	●			
<i>Acanthotomicus spinosus</i>													

Closed circles are sole hosts.

their tunnels from the egg niche, and work at more or less right angles to the parent gallery. Pupation occurs in enlarged cell at the end of the larval tunnels in the inner bark.

Economically, the bark beetles of the tribe are very important and contain some destructive species, such as *Ips typographus japonicus*, *I. cembrae*, *I. acuminatus*, and *Orthotomicus angulatus*, which are more destructive to our coniferous forests than any other bark beetles. They are usually secondary enemies but on occasion, the frequency varying with the species and conditions for rapid breeding, they increase to large numbers so that they attack standing green trees and become important primary enemies.

The first Japanese species of Ipini was described as *Tomicus angulatus* by EICHHOFF (1877)⁴⁾. BLANDFORD (1894)²⁾ described a new genus, *Acanthotomicus* for *A. spinulosus* and recorded a European species, *Tomicus cembrae* from Japan. NIJIMA (1905)¹⁶⁾ recorded *Tomicus typographus* from Japan which has been written as a new species under name *Ips japonicus* by himself (1909)¹⁷⁾. NIJIMA (1909)¹⁷⁾ recorded five Palearctic species, *Pityogenes chalcographus*, *Ips acuminatus*, *I. proximus*, *I. laricis*, and *I. curvidens*, with a key to their species. YANO (1924)²⁶⁾ described a new species, *Ips shinanoensis* from Honshu, which has been given as a junior

[illegible]

The tribe Ipini as treated here is a modification of BALACHOWSKY's concept¹⁾, and includes the following Japanese genera: *Pityogenes* BEDEL, *Pityokteines* FUCHS, *Orthotomicus* FERRARI, *Ips* DEGEER, and *Acanthotomicus* BLANDFORD. The present study is an attempt to make keys of all

known species occurring in Japan with their taxonomic and biological notes. It was undertaken because no revisional study is available to assist in the identification of Japanese species. Two thousand eight hundred and ninety-eight specimens of the *Ips* were examined during the course of this study, including the type of *Ips japonicus*. Seven specimens of *Pityogenes foveolatus* which bore the same data as the types, but not designated as paratypes were seen. The specimens used in this study are deposited in the Government Forest Experiment Station.

The author expresses his special appreciation to Prof. Dr. Motonori INOUE of Ebetsu City, and the late Keijiro TAKAHASHI for their help in examining and collecting materials.

Pityogenes BEDEL

Pityogenes BEDEL, 1888, Faune des coléoptères du bassin de la Seine, 6 : 397, 418; NIJIMA, 1909, Jour. Coll. Agr., Tohoku Imp. Univ., 3 : 145; FUCHS, 1911, Morphologische Studien über Borkenkäfer, p. 1; REITTER, 1913, Bestimmungstabelle der Borkenkäfer, p. 97; HOPKINS, 1914, Proc. U. S. Nat. Mus., 48 (2066) : 167; SWAINE, 1918, Canadian bark-beetles, 2 : 104; BLACKMAN, 1922, Mississippi Agr. Exp. Sta., Tech. Bull., 11 : 110; ESCHERICH, 1923, Die Forstinsekten Mitteleuropas, 2 : 483; SPESSIVTSEFF, 1925, Svensk Insektenfauna : Scolytidae, p. 182; MUNRO, 1926, For. Comm. Bull., 8 : 64; MURAYAMA, 1929, Jour. Chôsen Nat. Hist. Soc., 9 : 23; MURAYAMA, 1930, Ibid., 11 : 18; SCHEDL, 1932, Catalogus Coleopterorum regionis palaearcticae, F. 1644; KURENZOV, 1941, Короеды Дальнего Востока СССР, p. 201; BEAL & MASSEY, 1945, Duke Univ. School For. Bull., 10 : 138; BALACHOWSKY, 1949, Faune de France, 50 : 244; STARK, 1952, Фауна СССР, 31 : 372; DUFFY, 1953, Handbook for identification of British insect : Coleoptera, Scolytidae and Platypodidae, p. 15; NUNBERG, 1954, Klucze do oznaczania owadów Polski, 19 (99~100) : 71; MURAYAMA, 1954, Bull. Fac. Agr. Yamaguti Univ., 5 : 172; PFEFFER, 1955, Fauna CSR, 6 : 223; KRIVOLUTZKAJA, 1958, Короеды Острова Сахалина, p. 174; SCHEDL, 1962, Centrbl. ges. Forstw., 79 : 132; BRIGHT & STARK, 1973, Bull. Calif. Ins. Surv., 16 : 78.

This genus is characterized from other genera of the tribe occurring in Japan by the following combination of characters : The body is narrower and more elongate as opposed to the robust form of most species of the tribe; the antennal club is flattened and has sutures on both sides; the eyes are not emarginate in the anterior margin; the prosternum is very short and oblique in front of coxae; the prosternal process is very short and does not extend far between the fore coxae; the apical margin of the declivity approximates to the apical margin of the elytra.

Pityogenes is confined to coniferous forests of Hokkaido and the high mountains of northern Honshu. Adults of all species make a star-shaped gallery system which deeply engraves the wood.

Type species : —*Dermestes chalcographus* LINNÉ, original designation.

Key to the species of *Pityogenes* in Japan

1. Elytral declivity oblique, beginning near middle of elytra (except female of *P. japonicus*), and with three compressed or conical teeth on each side, much larger in male. 2
- Elytral declivity abruptly declivous, with three fine and conical teeth on each side in female, and a larger hook-shaped tooth on each side in male. 4
2. In male first declivital tooth situated in middle of elytra; in female frons reticulate, mat,

- without impression, and covered with long incurved hairs in its margin; body length about 2.2 mm. *P. japonicus* sp. nov.
- In male first declivital tooth situated behind middle of elytra; in female frons granulate, shining, with a deep impression, and evenly covered with straight and short hairs. 3
3. Body large (2.2~2.7 mm); pronotum finely punctured at base; in female frons with an inverted U-shaped impression. *P. seirindensis* MURAYAMA
- Body small (1.8~2.2 mm); pronotum strongly punctured at base; in female frons with a circular impression. *P. chalcographus* (LINNÉ)
4. Body large (2.4~3.1 mm); striae on elytra slightly impressed; in female frons rather finely reticulate and almost opaque, with a deep circular fovea on upper side of middle, which is surrounded with very dense short hairs. *P. foveolatus* EGGERS
- Body small (2.0~2.4 mm); striae on elytra not impressed, at least on first and second striae; in female frons rather distinctly granulate, somewhat shining, without fovea. *P. bistridentatus* (EICHHOFF)

Pityogenes bistridentatus (EICHHOFF)

Tomicus bidentatus HERBST var. *bistridentatus* EICHHOFF, 1879, Ratio, descriptio, emendatio eorum Tomicinorum, p. 282.

Tomicus quadridens HARTIG var. *bistridentatus* : EICHHOFF, 1881, Die europäischen Borkenkäfer, p. 260.

Pityogenes quadridens HARTIG var. *bistridentatus* : REITTER, 1894, Bestimmungstabelle der Borkenkäfer, p. 79.

Tomicus bistridentatus : BARBEY, 1901, Les scolytides de l'Europe centrale, p. 99.

Ips (Pityogenes) bistridentatus : HAGEDORN, 1910, Coleopterorum Catalogus, 4 : 49; HAGEDORN, 1910, Genera Insectorum, 111 : 104.

Pityogenes bistridentatus : REITTER, 1913, Bestimmungstabelle der Borkenkäfer, p. 100; ESCHERICH, 1923, Die Forstinsekten Mitteleuropas, 2 : 552; SCHEDL, 1932, Catalogus Coleopterorum regionis palaearcticae, F. 1644; MURAYAMA, 1939, Ann. Zool. Japon., 18 : 141; MURAYAMA, 1940, Trans. Biol. Soc. Manchukuo, 3 (2) : 35; BALACHOWSKY, 1949, Faune de France, 50 : 249; STARK, 1952, Файна СССР, 31 : 389; SCHEDL, 1962, Centrbl. ges. Forstw., 79 : 152; CHARARAS, 1962, Scolytides des conifères, p. 358.

Pityogenes baicalicus EGGERS, 1933, Ent. Blätt., 29 : 49; SOKANOVSKY, 1960, Rev. d'Ent. l'URSS, 39 : 675, 677.

This species appears to be most closely related, within the Japanese fauna, to *P. foveolatus* but may be distinguished by its smaller size and by the lack of fovea on the frons in the female. A specimen from Mt. Apori which has been recorded as *P. foveolatus* EGGERS (Bull. Gov. For. Exp. Sta., 185 : 34, 1966), is recognized as this species after careful study. These beetles occur in the high mountains from Nagano to Hokkaido in Japan.

Hosts : *Pinus pentaphylla* MAYR and *P. pumila* REGEL.

Distribution : —Japan (Hokkaido and Honshu) and Europe.

One hundred and eight specimens from the following localities were examined. Hokkaido : Mt. Rausu, Mt. Apori, and Mt. Meakan. Akita : Hachimantai. Gunma : Mt. Hiuchi. Nagano : Mt. Yari. Europe.

Japanese name : —Futatsuno-kikuimushi.

Pityogenes chalcographus (LINNÉ)

Dermestes chalcographus LINNÉ, 1761, Fauna Suecica, 2 : 143.

Bostrichus chalcographus : FABRICIUS, 1801, Systema Eleutheratorum, 2 : 387; RATZBURG, 1837, Die Forstinsekten, 1 : 158.

Tomicus chalcographus : THOMSON, 1865, Scandinaviens Coleoptera, 7 : 367; EICHHOFF, 1879, Ratio, descriptio, emendatio eorum Tomicinorum, p. 277; EICHHOFF, Die europäischen Borkenkäfer, p. 249; BARBEY, 1901, Les scolytides de l'Europe centrale, p. 64.

Pityogenes chalcographus : BEDEL, 1888, Faune des coléoptères du bassin de la Seine, 6 : 400; REITTER, 1894, Bestimmungstabelle der Borkenkäfer, p. 77; NIJIMA, 1909, Jour. Coll. Agr., Tohoku Imp. Univ., 3 : 145; FUCHS, 1911, Morphologischen Studien über Borkenkäfer, 1 : 7; REITTER, 1913, Bestimmungstabelle der Borkenkäfer, p. 97; NIJIMA, 1913, Forest entomology, p. 150; APFELBECK, 1916, Centbl. ges. Forstw., 1916 : 433; SPESIVTSEFF, 1922, Medd. Stat. Skogsfant., 19 : 480; ESCHERICH, 1923, Die Forstinsekten Mitteleuropas, 2 : 595; MUNRO, 1926, For. Comm. Bull., 8 : 64; EGGERS, 1929, Wien. ent. Ztg., 49 : 42; MURAYAMA, 1929, Chôsen Sanrin Kaiho, 55 : 9; MURAYAMA, 1929, Jour. Chôsen Nat. Hist. Soc., 9 : 26; MURAYAMA, 1930, Ibid., 11 : 19; NUNBERG, 1930, Polsk. Pism. Ent., 1930 : 201; SCHEDL, 1932, Catalogus Coleopterorum regionis palaearcticae, F. 1644; SAALAS, 1932, Die Fichtenkäfer Finnlands, 2 : 562; TAMANUKI, 1933, Saghalien Centr. Exp. Sta., 2 (3) : 11; KÔNO, 1938, Ins. Mats., 12 : 65; KÔNO & TAMANUKI, 1939, Ibid., 13 : 94; MURAYAMA, 1939, Ann. Zool. Japon., 18 : 140; SAWAMOTO, 1940, Ins. Mats., 14 : 104; KURENZOV, 1941, Короеды Дальнего Востока СССР, p. 195; MURAYAMA, 1942, Trans. Biol. Soc. Manchoukuo, 5 : 74; MURAYAMA, 1950, Iconographia Insectorum Japonicorum, P. 1294; STARK, 1952, Фауна СССР, 31 : 377; INOUE, 1953, A detailed book of the forest insect control, 2 : 195; MURAYAMA, 1954, Bull. Fac. Agr. Yamaguti Univ., 5 : 172; PFEFFER, 1955, Faune CSR, 6 : 227; KABE, 1955, Studies on the galleries of bark-beetles and ambrosia-beetles in Japan, p. 57; KRIVOLUTZKAJA, 1956, Rev. d'Ent. l'URSS, 35 : 834; NISHIGUCHI, 1957, Misc. Infor. Tokyo Univ. For., 12 : 69, 77; KRIVOLUTZKAJA, 1958, Короеды Острова Сахалина, p. 174; NISHIGUCHI, 1959, Jour. Jap. For. Soc., 41 : 270; KABE, 1959, Nipponsan Kikuimushirui Shokkon Zusetsu, p. 152; KABE, 1960, On the hosts and habits of the Scolyted and Platypodid beetles in Japan, p. 44; NISHIGUCHI, 1960, Jour. Jap. For. Soc., 42 : 65; NISHIGUCHI, 1961, Ibid., 43 : 143, 144; SCHEDL, 1962, Centrbl. ges. Forstw., 79 : 136; CHARARAS, 1962, Scolytides des conifères, p. 326; KRIVOLUTZKAJA, 1965, Фауна Короедов Южных Курильских Островов, p. 239; NOBUCHI, 1966, Bull. Gov. For. Exp. Sta., 185 : 33; SCHEDL, 1967, Kontyû, 35 : 121.

Ips (Pityogenes) chalcographus : HAGEDORN, 1910, Coleopterorum Catalogus, 4 : 52; HAGEDORN, 1910, Genera Insectorum, 111 : 104.

Pityogenes (s. str.) *chalcographus* : BALACHOWSKY, 1949, Faune de France, 50 : 245.

A character of the frons in the female will immediately identify it, as mentioned in the key. The adults are also slightly smaller in size than those of other species, measuring from 1.8 to 2.2 mm in length. This species and *P. seirindensis*, together with more aggressive species *Ips typographus japonicus*, are at times very destructive to spruce forests in Hokkaido.

Hosts : —*Abies firma* SIEB. et ZUCC., *A. sachalinensis* FR. SCHM., *Pseudotsuga taxifolia* BRITT., *Picea excelsa* LK., *P. glehnii* MAST., *P. jezoensis* CARR., *P. jezoensis* CARR. var. *hondoensis* REHD., *Larix leptolepis* GORD., *L. gmelini* LEDEB., *Pinus banksiana* LAMB., *P. densiflora* SIEB. et ZUCC., *P. koraiensis* SIEB. et ZUCC., *P. pentaphylla* MAYR, *P. pumila* REGEL, *P. strobus* L., and *P. sylvestris* L.

Distribution : —Japan (Hokkaido and Honshu), Sakhalin, Kuril, Siberia, China (North

East), and Europe.

One hundred and forty-three specimens from the following localities were examined. Hokkaido : Rishiri, Takinoue, Souunkyo, Tomakomai, and Usu. Akita : Hachimantai. Gunma : Yunokoya. Sakhalin. Siberia. Korea. Europe.

Japanese name : —Hoshigata-kikuimushi.

Pityogenes foveolatus EGGER

Pityogenes foveolatus EGGER, 1926, Ent. Blätt., 22 : 137; SCHEDL, 1932, Catalogus Coleopterorum regionis palaearcticae, F. 1644; MURAYAMA, 1936, Tenthredo, 1 : 148; KURENZOV, 1941, Короеды Дальнего Востока СССР, p. 197; STARK, 1952, Фауна СССР, 31 : 385; INOUE, 1953, A detailed book of the forest insect control, 2 : 198; MURAYAMA, 1954, Bull. Fac. Agr. Yamaguti Univ., 5 : 172; KRIVOLUTZKAJA, 1958, Короеды Острова Сахалина, p. 175; KANE, 1959, Nipponzan Kikui-mushirui Shokkon Zusetsu, 2 : 198; KANE, 1960, On the hosts and habits of the Scolytid and Platypodid beetles in Japan, p. 45; KURENZOV, 1961, Rev. d'Ent. URSS, 40 : 601; SCHEDL, 1962, Centrbl. ges. Forstw., 79 : 142; KRIVOLUTZKAJA, 1965, Фауна Короедов Южных Курильских Островов, p. 239; NOBUCHI, 1966, Bull. Gov. For. Exp. Sta., 185 : 34.

This species is distinguished from *P. bistridentatus* by its larger size, and by the weakly impressed striae and elevated interstriae of the elytra. Females of this species are easily recognized by a very deep fovea of the frons. In addition, these two species are distinguished from other Japanese representatives of the genus by the presence of a large and hook-shaped tooth on each side of the elytral declivity in the male. This species usually occurs in the high mountains of Honshu and Hokkaido.

Hosts : —*Picea jezoensis* CARR. and *Pinus pumila* REGEL.

Distribution : —Japan (Hokkaido and Honshu), Sakhalin, Kuril, Siberia, and Kamtchatka.

Two hundred and seventy-one specimens from the following localities were examined. Hokkaido : Mt. Daisetsu. Iwate : Mt. Hayachine. Nagano : Takamishi and Ontake. Kuril : Etorofu.

Japanese name : —Ontake-kikuimushi.

Pityogenes japonicus sp. nov.

Body length about 2.2 mm, 2.68 times as long as wide; body colour reddish brown to black, strongly shining.

Female : Frons weakly convex, slightly elevated in median line, without fovea, minutely reticulate, sparsely covered with long setae, of which lateral ones incurved and longer than the others; eyes elongate, not emarginate in anterior margin. Antennal funicle five-segmented; club nearly circular. Pronotum about 1.13 times as long as wide, widest just before base, basal margin weakly rounded, lateral sides narrowing anteriorly, anterior margin moderately rounded, with indistinct several tubercles; upper surface convex, longitudinally elevated in middle of basal half, with a weak summit in middle, rather closely asperate between summit and anterior margin, distinctly punctured on posterior and lateral portions, and sparsely covered with hair-like setae. Scutellum semicircular; surface weakly convex, with a few punctures. Elytra 1.67 times as long as wide, lateral sides parallel in basal third and gradually narrowing posteriorly; upper surface strongly convex, striae not impressed,

with large punctures and fine hair-like setae, interstriae flattened, with a row of distinct punctures and long hair-like setae, the punctures as strong as those on striae; declivity oblique, deeply impressed along suture for posterior third of elytra, almost smooth and shining, with the suture narrowly elevated, with three conical tubercles on each lateral side, which have a long setae.

Male: Frons evenly convex, with an elongate tubercle in middle, closely granulate and finely reticulate, scantily hairy, but closely setigerous on outer apical angles. Pronotum with about twelve teeth in anterior margin. Elytra more impressed along suture, with striae punctures rather finer than those in female, with three large teeth on each side of declivity, the first tooth located in middle of elytral length, large, strongly widened at base, with a sharply pointed tubercle behind, which is curved backwards; the second tooth large, conical, with an externally curved spine and a long seta; the third tooth smaller than the others, with a distinct spine at apex; distance between first tooth and the second slightly longer than distance between the second and third; declivity more widely and deeply impressed.

Holotype: —Female, Mt. Hakkoda, Aomori, in *Pinus pumila* REGEL, August 5, 1964, K. TAKAHASHI leg.

Paratypes: —31 females and 5 males, the same as the Holotype.

This new species is somewhat allied to *P. chalcographus* and *P. seirindensis* MURAYAMA, but distinguished by the following characters: The declivital teeth are very large and pointed at apex, the first tooth is very long and located in the middle of the elytra in male; the frons has long white curved setae, no fovea, and is minutely reticulate in female; the punctures on the pronotum and elytral striae are distinct; the apical teeth of the proventriculus are long; the seminal trough is only twisted.

Host: —*Pinus pumila* REGEL.

Distribution: —Japan (Honshu).

Japanese name: —Nihon-hoshigata-kikuimushi.

Pityogenes seirindensis MURAYAMA

Pityogenes seirindensis MURAYAMA, 1929, Jour. Chôsen Nat. Hist. Soc., 9: 26, 30; MURAYAMA, 1930, Ibid., 11: 19; MURAYAMA, 1930, Chôsen Sanrin Kaiho, 59: 59; SCHEDL, 1932, Catalogus Coleopterorum regionis palaearcticae, F. 1644; KURENZOV, 1941, Короеды Дальнего Востока СССР, p. 199; STARK, 1952, Фауна СССР, 31: 380; INOUE, 1953, A detailed book of the forest insect control, 2: 197; MURAYAMA, 1954, Bull. Fac. Agr. Yamaguti Univ., 5: 201; KRIVOLUTZKAJA, 1956, Rev. d'Ent. l'URSS, 35: 834; KRIVOLUTZKAJA, 1958, Короеды Острова Сахалина, p. 175; KABE, 1959, Nipponzan Kikuimushirui Shokkon Zuzetsu, p. 152; KABE, 1960, On the hosts and habits of the Scolytid and Platypodid beetles in Japan, p. 45; NISHIGUCHI, 1960, Jour. Jap. For. Soc., 42: 65; SCHEDL, 1962, Centrbl. ges. Forstw., 79: 138; NAKANE et al., 1963, Iconographia Insectorum Japonicorum, 2: 383.

Pityogenes aizawai Kôno, 1938, Ins. Mats., 12: 69; Kôno, 1938, Hokkaido Sanrin Kaiho, 1938: 4; Kôno & TAMANUKI, 1939, Ins. Mats., 13: 94; STARK, 1952, Фауна СССР, 31: 381; INOUE, 1953, A detailed book of the forest insect control, 2: 197.

Pityogenes nitidus EGGER, 1941, Stettin. ent. Z., 102: 121; PFEFFER, 1946, Ent. Listy, 9: 113; SOKANOWSKY, 1954, Bull. Mosc. Naturf. ges. Biol., 59 (5): 19; SCHEDL, 1962, Beit. Ent., 12: 493.

This species is allied to *P. chalcographus*, but may be distinguished by the larger average

size, by the more distinct punctures on the pronotum and on the elytral striae, and by the shape of the frontal impression in female.

Hosts : — *Abies sachalinensis* FR. SCHM., *Picea glehnii* MAST., *P. jezoensis* CARR., and *Pinus silvestris* L.

Distribution : — Japan (Hokkaido), Sakhalin, Kuril, Siberia, and Korea.

Forty-five specimens from the following localities were examined. Hokkaido : Takinoue, Pyuka, Sounkyo, and Yamabe. Sakhalin :

Japanese name : — Seirindo-kikuimushi.

Genus *Pityokteines* FUCHS

Pityokteines FUCHS, 1911, Morphologische Studien über Borkenkäfer, p. 37; REITTER, 1913, Bestimmungstabelle der Borkenkäfer, p. 102; HOPKINS, 1914, Proc. U.S. Nat. Mus., 48 (2066) : 127; SWAINE, 1918, Canadian bark-beetles, 2 : 123; SCHEDL, 1932, Catalogus Coleopterorum regionis palaearcticae, F. 1645; DODGE, 1938, Univ. Minnesota Tech. Bull., 132 : 52; BALACHOWSKY, 1949, Faune de France, 50 : 254; STARK, 1952, Фауна СССР, 31 : 420; NUNBERG, 1954, Klucze do oznaczania owadów Polski, 19 (99~100) : 77; PFEFFER, 1955, Fauna ČSR, 6 : 233; BRIGHT & STARK, Bull. Calif. Ins. Surv., 16 : 80.

This genus is somewhat allied to *Ips* DEGEER, but may be distinguished by the following characters. The antennal club is obliquely cut; the striae punctures on the elytra becoming larger on posterior portion; the third tibial segment is as long as the second; the apical and ventral band of the elytra is narrow; the seventh tergite has no spiracle; in male the second tooth on the declivity is very robust and curved posteriorly; in female the frons has very dense patch of hairs.

From the Japanese fauna, a single species, *P. curvidens*, has been recorded by NIJIMA (1909).

Type species : — *Bostrichus curvidens* GERMER, (HOPKINS, 1914).

Pityokteines curvidens (GERMER)

Bostrichus curvidens GERMER, 1824, Insectorum species novae aut minus cognitae, descriptionibus illustratae, p. 462; RATZBURG, 1837, Die Forstinsekten, 1 : 156.

Tomicus curvidens : FERRARI, 1867, Die forst- und baumzuchtschädlichen Borkenkäfer, p. 43; EICHHOFF, 1879, Ratio, descriptio emendatio eorum Tomicinorum, p. 275; EICHHOFF, 1881, Die europäischen Borkenkäfer, p. 245.

Ips curvidens : BEDEL, 1888, Faune des coléoptères du bassin de la Seine, 6 : 85; REITTER, 1894, Bestimmungstabelle der Borkenkäfer, p. 85; NIJIMA, 1909, Jour. Coll. Agr., Tohoku Imp. Univ., 3 : 151; NIJIMA, 1913, Forest entomology, p. 149; ESCHERICH, 1923, Forstinsekten Mitteleuropas, 2 : 604; MURAYAMA, 1936, Tenthredo, 1 : 128; INOUE, 1953, A detailed book of the forest insect control, 2 : 208; MURAYAMA, 1954, Bull. Fac. Agr. Yamaguti Univ., 5 : 170; KABE, 1959, Nipponzan Kikuimushirui Shokkon Zusetsu, p. 142; KABE, 1960, On the hosts and habits of the Scolytid and Platypodid beetles from Japan, p. 142.

Ips (s. str.) *curvidens* : HAGEDORN, 1910, Coleopterorum Catalogus, 4 : 52; HAGEDORN, 1910, Genera Insectorum, 111 : 104.

Pityokteines curvidens: FUCHS, 1911, Morphologische Studien über Borkenkäfer, p. 37; REITTER, 1913, Bestimmungstabelle der Borkenkäfer, p. 103; SCHEDL, 1932, Catalogus Coleopterorum regionis palaearcticae, F. 1645; PFEFFER, 1955, Fauna ČSR, 6 : 236; STARK, 1952, Фауна СССР, 31 : 420; CHARARAS, 1962, Scolytides des conifères, p. 258.

NIJIMA (1909) recorded this species from Japan, but until today no other record has been done. Only one specimen was found in NIJIMA collection that was collected in Sapporo. It is male that lacks both elytra. The author does not know of any other specimen collected in Japan.

Hosts: —*Abies firma* SIEB. et ZUCC., *A. homolepis* SIEB. et ZUCC., *A. mariesii* MAST., and *A. sachalinensis* FR. SCHM.

Distribution: —Japan (Hokkaido and Honshu) and Europe.

A specimen from Sapporo was examined.

Japanese name: —Kyokushi-kikuimushi.

Genus *Orthotomicus* FERRARI

Orthotomicus FERRARI, 1867, Die forst- und baumzuchtschädlichen Borkenkäfer, p. 44; REITTER, 1913, Bestimmungstabelle der Borkenkäfer, pp. 103, 108; HOPKINS, 1914, Proc. U. S. Nat. Mus., 48 (2066) : 126; SWAINE, 1918, Canadian bark-beetles, 2 : 121; BLACKMAN, 1922, Mississippi Agr. Exp. Sta., Tech. Bull., 11 : 115; SPESIVTSEFF, 1925, Svensk Insektfauna : Scolytidae, p. 189; SCHEDL, 1932, Catalogus Coleopterorum regionis palaearcticae, F. 1645; DODGE, 1938, Univ. Minnesota, Tech. Bull., 132 : 51; KURENZOV, 1941, Короеды Дальнего Востока СССР, p. 215; BEAL & MASSEY, 1945, Duke Univ. School For. Bull., 10 : 145; BALACHOWSKY, 1949, Faune de France, 50 : 268; STARK, 1952, Фауна СССР, 31 : 406; DUFFY, 1953, Handbook for identification of British insect : Scolytidae and Platypodidae, p. 16; NUNBERG, 1954, Klucze do oznaczania owadów Polski, 19 (99~100) : 79; PFEFFER, 1955, Fauna ČSR, 6 : 254; KRIVOLUTZKAJA, 1958, Короеды Острова Сахалина, p. 183; HOPPING, 1963, Can. Entomol., 95 : 61; BRIGHT & STARK, 1973, Bull. Calif. Ins. Serv., 16 : 82.

Neotomicus FUCHS, 1911, Morphologische Studien über Borkenkäfer, p. 38; HAGEDORN, 1910, Coleopterorum Catalogus, 4 : 47; HOPKINS, 1914, Proc. U. S. Nat. Mus., 48 (2066) : 145.

Japanese species of this genus are distinguished from those of *Ips* DEGEER by the following characters. The mentum is moderately elongate; the second segment of the antennal funicle is distinctly shorter than the first; the truncature of the club is usually strong; the elytral declivity is less strongly excavated, subvertical, and not or very narrowly explanate or raised towards apex; the last declivital tooth is usually displaced mesially, not on summit of the declivital margin; the seminal trough of the genitalia is undivided into two rods; the anterior plate of the proventriculus has the marginal bristles on its posterior end.

Type species: —*Bostrichus laricis* FABRICIUS, (HOPKINS, 1914).

Key to the species of *Orthotomicus* in Japan

1. Body robust, usually larger than 3.0 mm (with the exception of small specimens of *O. suturalis*); elytral declivity with bluntly pointed teeth on lateral sides, evenly elevated in apical margin. 2

- Body slender, smaller than 2.9 mm; elytral declivity with sharply pointed teeth on lateral sides, less elevated in middle of apical margin. 6
- 2. Sutures of antennal club procurved; in male second tooth on elytral declivity more strongly enlarged at base than the others. 3
- Sutures of antennal club nearly straight or incurved; in male second tooth on elytral declivity the same size as the others. 4
- 3. Elytral striae nearly as wide as interstriae in middle, declivity circular, without secondary tubercle on outside of first, third and fourth teeth; body length 3.0~3.8 mm; rare species in Japan. *O. proximus* (EICHHOFF)
- Elytral striae narrower than interstriae, declivity more elongate, with a secondary tubercle on each outside of first, third, and fourth declivital teeth in male; body length 3.1~3.6 mm; common species in southern Japan. *O. angulatus* (EICHHOFF)
- 4. In male distance between first and second teeth of elytral declivity less than distance between the first pair; in female second declivital tooth displaced mesially, not on summit of declivital margin. *O. suturalis* (GYLLENHAL)
- In both sexes distance between first and second teeth of elytral declivity greater than distance between the first pair, second tooth situated on summit of declivital margin. 5
- 5. Elytral striae slightly narrower than interstriae; distance between second and third teeth of elytral declivity 1.33 times as long as distance between the first and second; suture of declivity as high as apical margin; body length 3.3~3.8 mm. *O. golovjankoi* PJATNITZKY
- Elytral striae nearly as wide as interstriae; distance between second and third teeth of elytral declivity 1.75 times as long as distance between the first and second; suture of declivity lower than apical margin; body length 3.3~3.8 mm. *O. laricis* (FABRICIUS)
- 6. Elytral declivity with four teeth on each lateral margin, of which last tooth situated on summit of declivital margin; striae punctures large and less numerous; proventriculus without sutural teeth; body length 2.2 mm. *O. kuniyoshii* (NOBUCHI)
- Elytral declivity with three teeth on each lateral margin, of which last tooth displaced mesially, not on the summit of declivital margin; striae punctures small and more numerous; proventriculus with sutural teeth; body length 2.2~2.9 mm. *O. tosaensis* (MURAYAMA)

Orthotomicus angulatus (EICHHOFF)

Tomicus (*Cyrtotomicus*) *angulatus* EICHHOFF, 1875, Ann. Soc. Ent. Belg., 18 : 200.

Tomicus angulatus: EICHHOFF: 1877, Deutsch. ent. Z., 21 : 119; BLANDFORD, 1894, Trans. Ent. Soc. London, 1894 : 89.

Ips angulatus : MURAYAMA, 1934, Jour. Soc. Trop. Agr., Taihoku Imp. Univ., 6 : 505; EGGERS, 1944, Ent. Blätt., 40 : 143; MURAYAMA, 1948, Kontyû, 17 : 3; MURAYAMA, 1950, Iconographia Insectorum Japonicorum, p. 1294; INOUE, 1953, A detailed book of the forest insect control, 2 : 208; MURAYAMA, 1953, Trans. Shikoku Ent. Soc., 3 : 153; MURAYAMA, 1953, Bull. Fac. Agr. Yamaguti Univ., 4 : 13; MURAYAMA, 1954, Ibid., 5 : 170; MURAYAMA, 1954, Yamagutiken no Kikuimushi, 8 : 12; MURAYAMA, 1955, Bull. Fac. Agr. Yamaguti Univ., 6 : 99, 102; KABE, 1955, Studies on

the galleries of bark-beetles and ambrosia-beetles in Japan, p. 5; KABE, 1959, Nipponsan Kikuimushirui Shokkon Zuzetsu, p. 140; KABE, 1960, On the hosts and habits of Scolytid and Platypodid beetles in Japan, p. 39; MURAYAMA, 1961, Publ. Ent. Lab., Univ. Osaka Pref., 6 : 96, 109; MURAYAMA, 1961, Akitu, 10 : 25; MURAYAMA, 1965, Scolytid beetles from Niigata Prefecture, 2 : 24.

Ips (s. str.) *angulatus* : HAGEDORN, 1910, Coleopterorum Catalogus, 4 : 48; HAGEDORN, 1910, Genera Insectorum, 111 : 104.

Orthotomicus angulatus : SOKANOVSKY, 1959, Act. Ent. Sinica, 9 : 93; NOBUCHI, 1966, Bull. Goy. For. Exp. Sta., 185 : 37.

This species is very difficult to distinguish from *O. proximus*. The characters of the elytra, as given in the key, will immediately identify it. Some literature on *O. proximus* in Japan actually refer to *O. angulatus*. *O. angulatus* is probably the most common species of the genus in Japanese pine forests of southern Japan.

Hosts : —*Tsuga sieboldii* CARR., *Pinus densiflora* SIEB. et ZUCC., *P. luchuensis* MAYR, *P. pentaphylla* MAYR. var. *himekomatsu* KOIDZUMI, *P. thunbergii* PARL., *Cryptomeria japonica* D. DON, *Chamaecyparis obtusa* ENDL., and *Quercus gilva* BLUME. The last may be a mistake in host record.

Distribution : —Japan (Honshu, Shikoku, Kyushu, and Okinawa), China (Yunnan and Taiwan), and Cambodia.

Four hundred and twenty-seven specimens from the following localities were examined. Akita : Iwate : Kōma. Chiba : Kujukuri. Tokyo : Miyakejima, Asakawa, Takao, and Setagaya. Kyoto : Ushiozan and Shimogamo. Nara. Hyogo : Mayasan and Awaji. Tottori. Kochi : Nagahara. Ehime. Kumamoto : Amakusa. Nagasaki. Kagoshima : Ikeda, Satamisaki, and Yakushima. Okinawa : Honto (Yona and Nago) and Ishigaki (Izumi). Cambodia.

Japanese name : Matsuno-tsuno-kikuimushi.

Orthotomicus golovjankoi PIATNITZKY

Ips laricis : NIJIMA, 1909, Jour. Coll. Agr., Tohoku Imp. Univ., 3 : (nec. FABRICIUS).

Orthotomicus golovjankoi PIATNITZKY, 1930, Ent. Blätt., 26 : 179; SCHEDL, 1932, Catalogus Coleopterorum regionis palaearcticae, F. 1643; Kōno, 1938, Ins. Mats., 12 : 70; Kōno, 1938, Hokkaido Sanrin Kaiho, 1938 : 4; Kōno & TAMANUKI, 1939, Ins. Mats., 13 : 95; SAWAMOTO, 1940, Ins. Mats., 14 : 147; KURENZOV, 1941, Короеды Дальнего Востока СССР, p. 211; STARK, 1952, Фауна СССР, 31 : 418; INOUE, 1953, A detailed book of the forest insect control, 2 : 209; NISHIGUCHI, 1959, Jour. Jap. For. Soc., 41 : 270; NISHIGUCHI, 1961, Ibid., 43 : 143; SCHEDL, 1967, Kontyû, 35 : 121; NOBUCHI, 1968, Trans. 79th Meet. Jap. For. Soc., p. 213.

Ips golovjankoi : MURAYAMA, 1965, Scolytid beetles from Niigata Prefecture, Japan, 2 : 24.

Orthotomicus golovjankoi : SCHEDL, 1953, Ent. Blätt., 49 : 22.

Orthotomicus golovjankoi : KABE, 1955, Studies on the galleries of bark-beetles and ambrosia-beetles in Japan, p. 58; KABE, 1959, Nipponsan Kikuimushirui Shokkon Zuzetsu, p. 150; KABE, 1960, On the hosts and habits of the Scolytid and Platypodid beetles in Japan, p. 43.

This species is closely allied to *O. laricis*, but is readily distinguished by its robust body, by the narrower elytral striae, and by the structure of the elytral declivity.

Hosts : —*Picea excelsa* LK., *P. glehnii* MAST., *P. jezoensis* CARR., *P. jezoensis* CARR. var. *hondoensis* REHD., *Pinus densiflora* SIEB. et ZUCC., *P. koraiensis* SIEB. et ZUCC., and *P. thunbergii*

PARL.

Distribution: —Japan (Hokkaido and Honshu), Sakhalin, Siberia, and China (North East).
 One hundred and ninety-four specimens from the following localities were examined.
 Hokkaido: Meakan, Ashoro, Yamabe, Yukomanbetsu, Sapporo, Zyozankei, Shinohtaki, and
 Gamushi. Gunma: Manza. Saitama: Karisakatoge. Yamanashi: Mt. Fuji. Siberia.

Japanese name: —Golovjanko-kikuimushi (Golovijanko-kikuimushi).

Orthotomicus kuniyoshii (NOBUCHI) comb. nov.

Ips kuniyoshii NOBUCHI, 1959, Bull. Gov. For. Exp. Sta., 185: 23.

This species is closely allied to *O. tosaensis* but distinguished by the large and less numerous stria punctures, by the number of the declivital teeth, by the absence of sutural teeth of the proventriculus, and by the more southern distribution. The species has hitherto been found only in Okinawa.

Host: —*Pinus luchuensis* MAYR.

Distribution: —Japan (Okinawa).

Japanese name: —Kuniyoshi-kikuimushi.

Orthotomicus laricis (FABRICIUS)

Bostrichus laricis FABRICIUS, 1792, Entomologiae systematicae, 1: 365; GYLLENHAL, 1827, Insecta suecia descripta, 3: 354; RATZBURG, 1837, Die Forstinsekten, 1: 155.

Tomicus laricis: FERRARI, 1867, Die forst- und baumzuchtschädlichen Borkenkäfer, p. 43; THOMSON, 1865, Scandinaviens Coleoptera, 7: 365; EICHHOFF, 1879, Ratio, descriptio, emendatio eorum Tomicinorum, p. 266; EICHHOFF, 1881, Die europäischen Borkenkäfer, p. 239; BARBEY, 1901, Les scolytides de l'Europe centrale, p. 90.

Ips laricis: BEDEL, 1888, Faune des coléoptères du bassin de la Seine, 6: 401, 417; REITTER, 1894, Bestimmungstabelle der Borkenkäfer, p. 84; NIJIMA, 1909, Jour. Coll. Agr., Tohoku Imp. Univ., 3: 150; NIJIMA, 1913, Forest entomology, p. 148; Spessivtzeff, 1922, Medd. Stat. Skogs-fanst., 19: 486; ESCHERICH, 1923, Die Forstinsekten Mitteleuropas, 2: 542; SAALAS, 1923, Die Fichtenkäfer Finnlands, 2: 608; MURAYAMA, 1929, Chôsen Sanrin Kaiho, 55: 18; MURAYAMA, 1929, Jour. Chôsen Nat. Hist. Soc., 9: 26; MURAYAMA, 1930, Ibid., 11: 20; MURAYAMA, 1937, Tenthredo, 1: 375; MURAYAMA, 1939, Ann. Zool. Japon., 18: 142; MURAYAMA, 1940, Ibid., 16: 235; KURENZOV, 1941, Короеды Дальнего Востока СССР, p. 212; MURAYAMA, 1942, Trans. Biol. Soc. Manchoukuo, 5: 75; INOUE, 1953, A detailed book of the forest insect control, 2: 208; MURAYAMA, 1965, Scolytid beetles from Niigata Prefecture, 2: 24.

Orthotomicus laricis: REITTER, 1913, Bestimmungstabelle der Borkenkäfer, p. 110; SCHEDL, 1932, Catalogus Coleopterorum regionis palaearcticae, F. 1645; STARK, 1952, Фауна СССР, 31: 417; PFEFFER, 1955, Fauna CSR, 6: 258; KRIVOLUTZKAJA, 1956, Rev. d'Ent. l'URSS, 35: 837; KRIVOLUTZKAJA, 1958, Короеды Острова Сахалина, p. 183; KURENZOV, 1961, Rev. d'Ent. l'URSS, 40: 601; CHARARAS, 1962, Scolytides des conifères, p. 365; KRIVOLUTZKAJA, 1965, Фауна Короедов Южных Курильских Островов, p. 241; SCHEDL, 1967, Kontyû, 35: 121.

Ips (s. str.) *laricis*: HAGEDORN, 1910, Coleopterorum Catalogus, 4: 55; HAGEDORN, 1910, Genera Insectorum, 111: 105.

Ips (Orthotomicus) laricis : MUNRO, 1926, For. Comm. Bull., 8 : 70.

This species is closely allied to *O. suturalis*, but may differ in the deeply impressed and roundly oval declivity and in declivital teeth as mentioned in the key. This rare species in Japan is not considered of economic importance.

Hosts : —*Picea jezoensis* CARR., *Pinus densiflora* SIEB. et ZUCC., and *P. koraiensis* SIEB. et ZUCC.

Distribution : —Japan (Hokkaido and Honshu), Sakhalin, Siberia, Kamtchatka, Korea, China (North East), and Europe.

Thirty-six specimens from Europe were examined.

Japanese name : —Karamatsu-kikuimushi.

Orthotomicus proximus (EICHHOFF)

Tomicus proximus EICHHOFF, 1867, Berl. ent. Z., 11 : 403; EICHHOFF, 1879, Ratio, descriptio, emendatio eorum Tomicinorum, p. 262; EICHHOFF, 1881, Die europäischen Borkenkäfer, p. 235.

Ips proximus : REITTER, 1894, Bestimmungstabelle der Borkenkäfer, p. 84; TREDL, 1907, Ent. Blätt., 3 : 16; NIJIMA, 1909, Jour. Coll. Agr., Tohoku Imp. Univ., 3 : 149; NIJIMA, 1910, Trans. Sapporo Nat. Hist. Soc., 3 : 11; NIJIMA, 1913, Forest entomology, p. 147, SPESIVTSEFF, 1922, Medd. Stat. Skogsfan., 19 : 486; ESCHERICH, 1923, Die Forstinsekten Mitteleuropas, 2 : 543; SAALAS, 1923, Die Fichtenkäfer Finnlands, 2 : 605; MURAYAMA, 1929, Chôsen Sanrin Kaiho, 37 : 45; MURAYAMA, 1929, Jour. Chôsen Nat. Hist. Soc., 9 : 25; MURAYAMA, 1930, Ibid., 11 : 20; MURAYAMA, 1934, Ann. Zool. Japon., 14 : 299; MURAYAMA, 1936, Tenthredo, 1 : 128; MURAYAMA, 1937, Ibid., 1 : 375; MURAYAMA, 1949, Matsumushi, 3 : 102; INOUE, 1953, A detailed book of the forest insect control, 2 : 208; MURAYAMA, 1953, Trans. Shikoku Ent. Soc., 3 : 153; MURAYAMA, 1953, Bull. Fac. Agr. Yamaguti Univ., 4 : 14; MURAYAMA, 1954, Ibid., 5 : 171; MURAYAMA, 1955, Ibid., 6 : 99; KABE, 1955, Studies on the galleries of bark-beetles and ambrosia-beetles in Japan, p. 52; MURAYAMA, 1959, Nipponzan Kikuimushirui Shokkon Zuzetsu, p. 144; KABE, 1960, On the hosts and habits of the Scolytid and Platypodid beetles in Japan, p. 41; SCHEDL, 1960, Ent. Blätt., 56 : 172; MURAYAMA, 1961, Publ. Ent. Lab., Univ. Osaka Pref., 6 : 96; MURAYAMA, 1965, Scolytid beetles from Niigata Prefecture, 2 : 24.

Orthotomicus proximus : REITTER, 1913, Bestimmungstabelle der Borkenkäfer, p. 109; SCHEDL, 1932, Catalogus Coleopterorum regionis palaearcticae, F. 1645; KURENZOV, 1941, Короеды Дальнего Востока СССР, p. 213; BALACHOWSKY, 1949, Faune de France, 50 : 273; STARK, 1952, Фауна СССР, 31 : 411; PFEFFER, 1955, Fauna ČSR, 6 : 259; CHARARAS, 1962, Scolytides des conifères, p. 371; NOBUCHI, 1966, Bull. Gov. For. Exp. Sta., 185 : 37; SCHEDL, 1969, Kontyû, 37 : 205.

Ips (s. str.) *proximus* : HAGEDORN, 1910, Coleopterorum Catalogus regionis palaearcticae, 4 : 58; HAGEDORN, 1910, Genera Insectorum, 111 : 105.

This species is very closely allied to *O. angulatus*, but may be distinguished by the large and shallow punctures on the elytral striae, by the absence of tubercle on the outside of the first and third declivital teeth, and by the shape of the elytral declivity. These two species are distinguished from other species of this genus by the procurved sutures on the antennal club and by the strongly sinuate apical margin of the elytral declivity. There are some Japanese specimens labelled as "*Ips proximus* EICHHOFF, nach NIJIMA" in NIJIMA collection. They are *O. angulatus* and *O. golovjankoi*.

Hosts : —*Picea jezoensis* CARR., *Pinus densiflora* SIEB. et ZUCC., *P. koraiensis* SIEB. et ZUCC., *P. thunbergii* PARL., and *P. pentaphylla* MAYR.

Distribution : —Japan (Hokkaido, Honshu, Shikoku, and Kyushu), Siberia, Korea, China (Fukien), Europe.

Eight specimens from the following localities were examined. Siberia. Korea. Europe.

Japanese name : —Matsukawano-kikuimushi.

Orthotomicus suturalis (GYLLENHAL)

Bostrichus suturalis GYLLENHAL, 1827, Insecta suecia descripta, 4 : 622; RATZBURG, 1837, Die Forstinsekten, 1 : 155.

Tomicus suturalis : EICHHOFF, 1879, Ratio, descriptio eorum Tomicinorum, p. 270; EICHHOFF, 1881, Die europäischen Borkenkäfer, p. 242.

Ips suturalis : REITTER, 1894, Bestimmungstabelle der Borkenkäfer, p. 83; TRÉDL, 1907, Ent. Blätt., 3 : 16; SPESSIVTSEFF, 1922, Medd. Stat. Skogsfanst., 19 : 485; ESCHERICH, 1923, Die Forstinsekten Mitteleuropas, 2 : 543; SAALAS, 1923, Die Fichtenkäfer Finnlands, 2 : 610; MURAYAMA, 1937, Tenthredo, 1 : 372; MURAYAMA, 1948, Kontyû, 17 : 3; INOUE, 1953, A detailed book of the forest insect control, 2 : 208; MURAYAMA, 1953, Bull. Fac. Agr. Yamaguti Univ., 4 : 15; MURAYAMA, 1954, Ibid., 5 : 171; KABE, 1959, Nipponsan Kikuimushirui Shokkon Zusetsu, p. 144; KABE, 1960, On the hosts and habits of the Scolytid and Platypodid beetles in Japan, p. 42; MURAYAMA, 1965, Scolytid-beetles from Niigata Prefecture, 2 : 25.

Orthotomicus suturalis : REITTER, 1913, Bestimmungstabelle der Borkenkäfer, pp. 108, 110; SCHEDL, 1932, Catalogus Coleopterorum regionis palaearcticae, F. 1645; KURENZOV, 1941, Короеды Дальнего Востока СССР, p. 214; BALACHOWSKY, 1949, Faune de France, 50 : 272; STARK, 1952, Фауна СССР, 31 : 414; PFEFFER, Fauna ČSR, 6 : 260; KRIVOLUTZKAJA, 1956, Rev. d'Ent. l'URSS, 35 : 836; KRIVOLUTZKAJA, 1958, Короеды Острова Сахалина, p. 184; CHARARAS, 1962, Scolytides des conifères, p. 369; KRIVOLUTZKAJA, 1965, Фауна Короедов Южных Курильских Островов, p. 241; NOBUCHI, 1966, Bull. Gov. For. Exp. Sta., 185 : 38; SCHEDL, 1967, Kontyû, 35 : 121.

Ips (s. str.) *suturalis* : HAGEDORN, 1910, Coleopterorum Catalogus, 4 : 59; HAGEDORN, 1910, Genera Insectorum, 111 : 106.

Ips (*Orthotomicus*) *suturalis* : MUNRO, 1926, For. Comm. Bull., 8 : 70.

The declivital characters given in the key should serve to separate the adults of this species from those of *O. laricis*. Females of this species can be recognized from those of other species by the declivital teeth which are displaced mesially. This species is rather common in larch forests in Japan.

Hosts : —*Picea jezoensis* CARR. var. *hondoensis* REHD., *Larix leptolepis* GORD., *Pinus densiflora* SIEB. et ZUCC., *P. koraiensis* SIEB. et ZUCC., and *P. pumila* REGEL.

Distribution : —Japan (Hokkaido and Honshu), Siberia, Korea, China (North East), and Europe.

Two hundred and one specimens from the following localities were examined. Hokkaido : Akaigawa. Gunma : Marunuma. Yamanashi : Mt. Fuji and Kôfu. Nagano : Nagano city, Nakabusa, Tomohara, Mt. Nyugasa, and Kiso. Siberia. Europe.

Japanese name : —Honsun-kikuimushi (Tatenohoshigata-kikuimushi).

Orthotomicus tosaensis (MURAYAMA) comb. nov.

Ips tosaensis MURAYAMA, 1950, Trans. Shikoku Ent. Soc., 1: 52; MURAYAMA, 1952, Bull. Fac. Agr. Yamaguti Univ., 3: 20; MURAYAMA, 1953, Ibid., 4: 14; MURAYAMA, 1953, Trans. Shikoku Ent. Soc., 3: 154; INOUE, 1953, A detailed book of the forest insect control, 2: 208; MURAYAMA, 1954, Bull. Fac. Agr. Yamaguti Univ., 5: 171; MURAYAMA, 1954, Ibid., 6: 102; KABE, 1955, Studies on the galleries of bark-beetles and ambrosia-beetles in Japan, p. 52; KABE, 1957, Nipponzan Kikuimushirui Shokkon Zusetsu, p. 146; KABE, 1960, On the hosts and habits of the Scolytid and Platypodid beetles in Japan, p. 43; MURAYAMA, 1961, Publ. Ent. Lab., Univ. Osaka Pref., 6: 96; NOBUCHI, 1966, Bull. Gov. For. Exp. Sta., 185: 36.

This species is more closely allied to *O. kuniyoshii* than to other known Japanese species on this genus, but can be readily distinguished by the comparatively dense stria punctures on the elytra, by the presence of three teeth on each lateral margin of the declivity, by the last tooth of the declivity, which is displaced mesially, not on the summit of the declivital margin, and the distribution. From *O. starki*, this species is distinguished by its larger body, by the more deeply excavate declivity, and by the large declivital teeth. In southern Japan, this species is rather common along the coast but is rare inland. Adults usually attack pine on the tops and limbs of dead, dying, or suppressed trees. The gallery is very peculiar and consists of a large central chamber from which usually three long straight egg galleries are formed.

Hosts: —*Pinus densiflora* SIEB. et Zucc., and *P. thunbergii* PARL.

Distribution: —Japan (Honshu, Shikoku, and Kyushu).

One hundred and forty-three specimens from the following localities were examined. Ibaragi: Mito. Chiba: Kiyoshumi. Tokyo: Setagaya and Meguro. Saitama: Sidasan. Shizuoka: Yuihara and Yokokawa. Wakayama: Shionomisaki and Shingû. Kôchi: Katsurahama. Fukuoka: Nishikoen.

Japanese name: —Tosa-kikuimushi.

Genus *Ips* DEGEER

Ips DEGEER, 1775, Mém. pour servir à l'hist. des insectes, 5: 190; BEDEL, 1888, Faune des coléoptères du bassin de la Seine, 6: 417, 400; REITTER, 1894, Bestimmungstabelle der Borkenkäfer, p. 80; TRÉDEL, 1907, Ent. Blätt., 3: 15; NŌJIMA, 1909, Jour. Coll. Agr., Tohoku Imp. Univ., 3: 146; HAGEDORN, 1910, Coleopterorum Catalogus, 4: 47; HAGEDORN, 1910, Genera Insectorum, 111: 101; REITTER, 1913, Bestimmungstabelle der Borkenkäfer, p. 103; HOPKINS, 1914, Proc. U. S. Nat. Mus., 48 (2066): 124; SWAINE, 1918, Canadian bark-beetles, 2: 107; BLACKMAN, 1922, Mississippi Agr. Exp. Sta., Techn. Bull., 11: 111; ESCHERICH, 1923, Forstinsekten Mitteleuropas, 2: 484; SPESSIVTSEFF, 1925, Svensk Insektfauna: Scolytidae, p. 186; MUNRO, 1926, For. Comm. Bull., 8: 67; MURAYAMA, 1929, Jour. Chôsen Nat. Hist. Soc., 9: 22; MURAYAMA, 1930, Ibid., 11: 18; SCHEDL, 1932, Catalogus Coleopterorum regionis palaearticae, F. 1644; DODGE, 1938, Univ. Minnesota Tech. Bull., 132: 47; KURENZOV, 1941, Короеды Дальнего Востока СССР, p. 210; BEAL & MASSEY, 1945, Duke Univ. School For. Bull. 10: 140; BALACHOWSKY, 1949, Faune de France, 50: 260; SCHEDL, 1950, Mitt. forstl. Bundesver. Mariabrunn, 46: 67; STARK, 1952, Фауна

CCCP, 31 : 393; DUFFY, 1953, Handbooks for identification of British insect : Scolytidae and Platypodidae, p. 16; MURAYAMA, 1953, Bull. Fac. Agr. Yamaguti Univ., 4 : 13; MURAYAMA, 1954, Ibid., 5 : 167; NUNBERG, 1954, Klucze do oznaczania owadów Polski, 19 (99~100) : 83; PFEFFER, 1955, Fauna ČSR, 6 : 238; KRIVOLUTZKAJA, 1958, Короеды Острова Сахалина, p. 177; HOPPING, 1963, Can. Entomol., 95 : 61, 508; SCHEDL, 1964, Reichenbachia, Mus. Tierk. Dresden, 2 (57) : 218; BRIGHT & STARK, 1973, Bull. Calif. Ins. Serv., 16 : 82.

This genus is allied to *Orthotomicus* FERRARI, but distinguished by the following characters : The mentum is slender; the second segment of the antennal funicle is as long as or slightly shorter than the first; the antennal club is flattened; the elytral declivity is strongly excavated and obliquely sloping; the concavity of the declivity is separated from the apical margin of the elytra by the strongly produced, horizontal, plate-like, and acute apical margin of the declivity; the declivital teeth are situated on summit of the declivital margin; the seminal trough is divided into two rods; the proventricular plates have the marginal bristles from anterior margin to posterior end of the anterior plate.

All Japanese species of this genus are confined to coniferous trees.

Type species : —*Dermestes typographus* LINNÉ.

Key to the species of *Ips* in Japan

1. Elytral declivity with more than twelve teeth on each lateral margin; body length 2.4 mm. *I. multidentatus* MURAYAMA
- Elytral declivity with three or four teeth on each lateral margin. 2
2. Elytral declivity with four teeth on each lateral margin. 3
- Elytral declivity with three teeth on each lateral margin; body length 2.8~3.8 mm. *I. acuminatus* (GYLLENHAL)
3. Body larger than 4.2 mm; distance between first and second declivital teeth almost equal to distance between the second and third. 4
- Body small (3.5~4.0 mm); distance between first and second declivital teeth longer than distance between the second and third *I. duplicatus* (SAHLBERG)
4. Elytral interstriae impunctate; elytral declivity almost glabrous, except its lateral sides; body length 4.2~5.2 mm. *I. typographus japonicus* NIJIMA
- Elytral interstriae punctured; elytral declivity covered with long hairs; body length 4.3~6.2 mm. *I. cembrae* (HEER)

Ips acuminatus (GYLLENHAL)

Bostrichus acuminatus GYLLENHAL, 1827, Insecta suecia descripta, 4 : 620; RATZBURG, 1837, Die Forstinsekten, 1 : 155.

Tomicus acuminatus : THOMSON, 1865, Scandinaviens Coleoptera, 7 : 303; FERRARI, 1867, Die forst- und baumzuchtshädlichen Borkenkäfer, 43; EICHHOFF, 1879, Ratio, descriptio, emendatio eorum Tomicinorum, p. 220; EICHHOFF, 1881, Die europäischen Borkenkäfer, p. 231; BARBEY, 1901, Les scolytides de l'Europe centrale, p. 88.

Ips acuminatus REITTER, 1895, Bestimmungstabelle der Borkenkäfer, p. 82; NIJIMA, 1909, Jour. Coll. Agr., Tohoku Imp. Univ., 3 : 149; NIJIMA, 1910, Trans. Sapporo Nat. Hist. Soc., 3 : 11;

NIJIMA, 1913, Forest entomology, p. 147; REITTER, 1913, Bestimmungstabelle der Borkenkäfer, p. 108; SPESSIVTSEFF, 1922, Medd. Stat. Skongsanst., 19 : 489; SAALAS, 1923, Die Fichtenkäfer Finnlands, 2 : 597; ESCHERICH, 1923, Forstinsekten Mitteleuropas, 2 : 530; MUNRO, 1926, For. Comm. Bull. 8 : 69; MURAYAMA, 1929, Chôsen Sanrin Kaiho, 47 : 45; MURAYAMA, 1929, Jour. Chôsen Nat. Hist. Soc., 9 : 24; MURAYAMA, 1930, Ibid., 11 : 20; SCHEDL, 1932, Catalogus Coleopterorum regionis palaearcticae, F. 1644; MURAYAMA, 1937, Tenthredo, 1 : 374; MURAYAMA, 1939, Ann. Zool. Japon., 18 : 141; MURAYAMA, 1940, Ibid., 19 : 234; MURAYAMA, 1940, Trans. Biol. Soc. Manchoukuo, 3 : 35; KURENZOV, 1941, Короеды Дальнего Востока СССР, p. 201; MURAYAMA, 1942, Ibid., 5 : 76; BALACHOWSKY, 1949, Faune de France, 50 : 262; MURAYAMA, 1950, Iconographia Insectorum Japonicorum, p. 1293; SCHEDL, 1950, Mitt. forstl. Bundesvers. Mariabrunn, 46 : 73; Stark, 1952, Фауна СССР, 31 : 394; INOUE, 1953, A detailed book of the forest insect control, 2 : 201; SCHEDL, 1953, Ent. Blätt., 49 : 22; MURAYAMA, 1954, Yamagutiken no Kikuimushi, p. 7; MURAYAMA, 1954, Bull. Fac. Agr. Yamaguti Univ., 5 : 169; MURAYAMA, 1955, Ibid., 6 : 104; PFEFFER, 1955, ČSR, 6 : 252; KABE, 1955, Studies on the galleries of bark-beetles and ambrosia-beetles in Japan, p. 50; KABE, 1959, Nipponzan Kikuimushirui Shokkon Zuzetsu, p. 138; KABE, 1960, On the hosts and habits of Scolytid and Platypodid beetles in Japan, p. 38; MURAYAMA, 1961, Akitu, 10 : 25; CHARARAS, 1926, Scolytides des conifères, p. 214; NAKANE et al., 1963, Iconographia Insectorum Japonicorum, 2 : 388; MURAYAMA, 1965, Scolytid beetles from Niigata Prefecture, 2 : 24; NOBUCHI, 1966, Bull. Gov. For. Exp. Sta., 185 : 34.

Ips (s. str.) *acuminatus* : HAGEDORN, 1910, Coleopterorum Catalogus, 4 : 48; HAGEDORN, 1910, Genera Insectorum, 111 : 103.

The characters of the elytral armature, as given in the key, will immediately identify it. This is a common species of the genus in the red pine regions of northern Honshu and usually attacks weakened or prostrate trees although it has been regarded as primary killer of pines.

Hosts : —*Picea jezoensis* CARR., *Larix leptolepis* GORD., *Pinus densiflora* SIEB. et ZUCC., *P. koraiensis* SIEB. et ZUCC., *P. pentaphylla* MAYR, and *P. pentaphylla* MAYR var. *himekomatsu* KOIDZUMI.

Distribution : —Japan (Hokkaido, Honshu, and Shikoku), Sakhalin, Siberia, China, and Korea.

Seventy-four specimens from the following localities were examined. Hokkaido : Gamushi and Hakodate. Iwate : Morioka. Nagano : Utsukushigahara. Yamanashi : Daibosatsutôge. Nara : Yoshino. Hyogo : Kobe. Kôchi. Siberia. Europe.

Japanese name : —Matsuno-mutsaba-kikuimushi.

Ips cembrae (HEER)

Bostrichus cembrae HEER, 1836, Observations entomologicae, p. 28; REDTENBACHER, 1874, Fauna Austriaca, Die Käfer, 3 : 378; RATZBURG, 1837, Die Forstinsekten, 1 : 188.

Tomicus cembrae : FERRARI, 1867, Die forst- und baumzuchtschädlichen Borkenkäfer, p. 42; EICHHOFF, 1879, Ratio, descriptio, emendatio eorum Tomicinorum, p. 234; EICHHOFF, Die europäischen Borkenkäfer, 214; BLANDFORD, 1894, Trans. Ent. Soc. London, 1894 : 89; BARBEY, 1901, Les scolytides de l'Europe centrale, p. 82.

Ips cembrae : REITTER, 1894, Bestimmungstabelle der Borkenkäfer, p. 80; NIJIMA, 1910, Trans. Sapporo Nat. Hist. Soc., 3 : 111; NIJIMA, 1913, Forest entomology, p. 145; REITTER, 1913, Bestimmungstabelle der Borkenkäfer, pp. 105, 106; ESCHERICH, 1923, Die Forstinsekten Mit-

- teleuropas, 2 : 614; MURAYAMA, 1929, Jour. Chôsen Nat. Hist. Soc., 9 : 24; MURAYAMA, 1930, Ibid., 11 : 30; MURAYAMA, 1930, Chôsen Sanrin Kaiho, 59 : 62; SCHEDL, 1930, Coleopterorum Catalogus regionis palaearcticae, F. 1644; MURAYAMA, 1936, Tenthredo, 1 : 129; MURAYAMA, 1937, Ibid., 1 : 374; MURAYAMA, 1939, Ann. Zool. Japan., 18 : 141; MURAYAMA, 1940, Ibid., 19 : 234; SAWAMOTO, 1940, Ins. Mats., 14 : 106; BALACHOWSKY, 1949, Fune de France, 50 : 267; SCHEDL, 1950, Mitt. forstl. Bundesver. Mariabrunn, 46 : 83; STARK, 1952, Фауна СССР, 31 : 406; INOUE, 1953, A detailed book of the forest insect control, 2 : 198; SCHEDL, 1953, Ent. Blätt., 49 : 22; MURAYAMA, 1954, Bull. Fac. Agr. Yamaguti Univ., 5 : 170; MURAYAMA, 1955, Ibid., 6 : 104; PFEFFER, 1955, Fauna ČSR, 6 : 248; NISHIGUCHI, 1959, Jour. Jap. For. Soc., 41 : 271; NISHIGUCHI, 1960, Misc. Infor., Tokyo Univ. For., 12 : 69; KABE, 1959, Nipponzan Kikuimushirui Shokkon Zusetsu, p. 142; KABE, 1960, On the hosts and habits of Scolytid and Platypodid beetles in Japan, p. 40; MURAYAMA, 1961, Akitu, 10 : 25; CHARARAS, 1962, Scolytides des conifères, p. 206; NAKANE et al., 1963, Iconographia Insectorum Japonicorum, 2 : 383; MURAYAMA, 1965, Scolytid beetles from Niigata Prefecture, 2 : 24; NOBUCHI, 1966, Bull. Gov. For. Exp. Sta., 185 : 35; SCHEDL, 1967, Kontyû, 35 : 121.
- Ips (Tomicus) cembrae* : HAGEDORN, 1904, Bull. Mus. Hist. Nat. Paris, 1904 : 122; HAYDEN, 1909, Ent. Blätt., 5 : 161.
- Ips* (s. str.) *cembrae* : HAGEDORN, 1910, Coleopterorum Catalogus, 4 : 51; HAGEDORN, 1910, Genera Insectorum, 111 : 104.
- Tomicus subelongatus* MOTSCHULSKY, 1860, Schrenks Reise, 2 : 155.
- Ips subelongatus* : REITTER, 1894, Bestimmungstabelle der Borkenkäfer, p. 81; REITTER, 1913, Ibid., p. 106; SCHEDL, 1932, Coleopterorum Catalogus regionis palaearcticae, F. 1645; KURENZOV, 1941, Короеды Дальнего Востока СССР, p. 204; STARK, 1952, Фауна СССР, 31 : 40, 51; KRIVOLUTZKAJA, 1956, Rev. d'Ent. l'URSS, 35 : 835; KRIVOLUTZKAJA, 1958, Короеды Острова Сахалина, p. 178; KRIVOLUTZKAJA, 1965, Фауна Короедов Южных Курильских Островов, p. 240.
- Ips shinanoensis* YANO, 1924, Karamatsu no Senkôchû ni Kanshuru Chôsa, p. 2; NIJIMA, 1928, Zôtei Shinrin Hogogaku, 1 : 270.

This is the largest species of *Ips* DEGEER occurring in Japan, measuring from 4.3 to 6.2 mm in length. Among Japanese species, this species is most similar to *I. typographus japonicus* but its shorter elytra and the impunctate interstriae of the elytra will distinguished it from this species.

This is one of the most destructive species in larch forests of Honshu and Hokkaido. The beetles were accidentally introduced into Hokkaido from Honshu about thirty years ago.

Hosts : —*Abies sachalinensis* FR. SCHM., *Picea excelsa* LK., *Larix leptolepis* GORD., *Pinus densiflora* SIEB. et ZUCC., *P. koraiensis* SIEB. et ZUCC., *P. sylvestris* L., and *P. strobus* L.

Distribution : —Japan (Hokkaido and Honshu), Sakhalin, Kuril, Siberia, China (North East and Taiwan), Korea and Europe.

Five hundred and seventy-three specimens from the following localities were examined. Hokkaido : Tôbetsu, Horonai, and Sapporo. Aomori : Hakkoda. Gunma : Sugenuma, Kirizumi, and Konsei. Nagano : Komoro, Nakabusa, Mt. Nyugasa, and Takanishi. Saitama : Karisakatôge. Siberia. Korea. Europe.

Japanese name : —Karamatsu-yatsuba-kikuimushi (Matsuno-ohkikuimushi and Karamatsu-ohkikuimushi).

Ips duplicatus (SAHLBERG)

Bostrichus duplicatus SAHLBERG, 1836, Dissertatio entomological insecta Fennica enumerans, 1 : 144.

Ips duplicatus : REITTER, 1894, Bestimmungstabelle der Borkenkäfer, p. 81; TRÉDL, 1907, Ent. Blätt., 3 : 15; REITTER, 1913, Bestimmungstabelle der Borkenkäfer, p. 107; SPESIVTSEFF, 1922, Medd. Stat. Skogsfan., 19 : 483; SAALAS, 1923, Fichtenkäfer Finnlands, 2 : 600; ESCHERICH, 1923, Forstinsekten Mitteleuropas, 2 : 594; SCHEDL, 1932, Catalogus Coleopterorum regionis palaearcticae, F. 1644; KURENZOV, 1941, Короеды Дальнего Востока СССР, p. 203; MURAYAMA, 1942, Trans. Biol. Soc. Manchoukuo, 5 : 75; BALACHOWSKY, 1949, Faune de France, 50 : 265; SCHEDL, 1950, Mitt. forstl. Bundesver. Mariabrunn, 46 : 76; STARK, 1952, Фауна СССР, 31 : 398; PFEFFER, 1955, Fauna CSR, 6 : 251; KRIVOLUTZKAJA, 1956, Rev. d'Ent. l'URSS, 35 : 835; KRIVOLUTZKAJA, 1958, Короеды Острова Сахалина, p. 178; CHARARAS, 1962, Scolytides des conifères, p. 217; MURAYAMA, 1965, Scolytid beetles from Niigata Prefecture, 2 : 24; SCHEDL, 1967, Kontyû, 35 : 121.

Tomicus duplicatus : JUDEICH & NITSCHKE, 1895, Lehrbuch der mitteleuropäischen Forstinsektenkunde, 1 : 498.

Ips (s. str.) *duplicatus* : HAGEDORN, 1910, Coleopterorum Catalogus, 4 : 53; HAGEDORN, 1910, Genera Insectorum, 111 : 104.

Among Japanese species, this is most similar to *I. acuminatus*, but may be easily distinguished by its slightly larger body and by having four teeth on each lateral margin of the elytral declivity. MURAYAMA (1965) has recorded this species from Japan, but the author has not seen any other specimens from the Japanese forest. It is obviously introduced into Japan from Siberia.

Host : —*Pinus densiflora* SIEB. et ZUCC.

Distribution : —Japan (Honshu), Sakhalin, Siberia, China (North East), and Europe.

Twenty-three specimens from Siberia and Europe were examined.

Japanese name : —Ôha-kikuimushi.

Ips multidentatus MURAYAMA

Ips multidentatus MURAYAMA, 1953, Bull. Fac. Agr. Yamaguti Univ., 4 : 35; MURAYAMA, 1954, Ibid., 5 : 171; MURAYAMA, Yamagutiken on Kikuimushi, p. 9; KABE, 1959, Nipponsan Kikuimushirui Shokkon Zuzetsu, p. 142; NOBUCHI, 1966, Bull. Gov. For. Exp. Sta., 185 : 35.

This species is readily distinguished from other Japanese representatives of the genus by the presence of about twelve teeth on each lateral margin of the elytral declivity.

Host : —*Pinus densiflora* SIEB. et ZUCC.

Distribution : —Japan (Honshu, Shikoku, and Kyushu).

Japanese name : —Matsuno-toge-kikuimushi.

Ips typographus japonicus NIJIMA

Tomicus typographus : NIJIMA, 1905, Mitt. jap. forstl. Ges., 1905 : 270.

Ips typographus : MURAYAMA, 1937, Tentheredo, 1 : 375; MURAYAMA, 1954, Bull. Fac. Agr. Yamaguti Univ., 5 : 171; KABE, 1955, Studies on the galleries of bark-beetles and ambrosia-beetles in Japan,

p. 57; NISHIGUCHI, 1961, Jour. Jap. For. Soc., 43 : 143; NOBUCHI, 1966, Bull. Gov. For. Exp. Sta., 185 : 36.

Ips japonicus NIJIMA, 1909, Jour. Coll. Agr., Tohoku Imp. Univ., 3 : 147; NIJIMA, 1910, Trans. Sapporo Nat. Hist. Soc., 3 : 2; NIJIMA, 1913, Forest entomology, p. 144; NIJIMA, 1930, Karafuto Sanrinkai, 1930 : 8; TAMANUKI, 1931, Jour. Jap. For. Soc., 14 : 323; SCHEDL, 1932, Coleopterorum Catalogus regionis palaearcticae, F. 1645; TAMANUKI, 1933, Saghalien Centr. Exp. Sta., 1933 : 9; MURAYAMA, 1937, Tenthredo, 1 : 373; KÔNO, 1938, Hokkaido Sanrin Kaihō, 1934 : 4; SCHEDL, 1950, Mitt. forstl. Bundesver. Mariabrunn, 46 : 81.

Ips (s. str.) *japonicus* : HAGEDORN, 1910, Genera Insectorum, 111 : 106.

Ips typographus LINNÉ f. *japonicus* : KÔNO & TAMANUKI, 1939, Ins. Mats., 13 : 95; MURAYAMA, 1950, Iconographia Insectorum Japonicorum, p. 1294; INOUE, 1953, A detailed book of the forest insect control, 2 : 202; KRIVOLUTZKAJA, 1956, Rev. d'Ent. l'URSS, 35 : 836; NISHIGUCHI, 1957, Misc. Infor. Tokyo Univ. For., 12 : 70, 72, 77; KRIVOLUTZKAJA, 1958, Короеды Острова Сахалина, p. 179; NISHIGUCHI, 1959, Jour. Jap. For. Soc., 41 : 270; KABE, 1959, Nipponzan Kikuimushirui Shokkon Zusetsu, p. 148; KABE, 1960, On the hosts and habits of the Scolytid and Platypodid beetles in Japan, p. 43; NISHIGUCHI, 1960, Jour. Jap. For., 42 : 65; NAKANE et al., 1963, Iconographia Insectorum Japonicorum, 2 : 383; Krivolutzkaja, 1965, Фауна Короедов Южных Курильских Островов, p. 240.

Ips typographus distributes from Europe to Far eastern Asia. It is very interesting that the specimens taken from Japan and Sakhalin do not show any distinct differences from each other, but Siberian and Korean specimens are distinctly separable from the Japanese specimens by opaque elytral declivity. It is presumable to the author that our taxon is a local type of *I. typographus*.

The male of *I. typographus japonicus* in NIJIMA's collection bearing NIJIMA's number XV-1-046 and label "Tomakomai, NIJIMA, 19th May. 04., *I. japonicus* sp. nov." is here designated lectotype.

This is probably the most destructive species of this genus in Hokkaido and responsible for almost all of the insect-killed spruce tree in its range.

Hosts : —*Abies sachalinensis* FR. SCHM., *Picea excelsa* LK., *P. glehnii* MAST., *P. jezoensis* CARR., *P. jezoensis* CARR. var. *hondoensis* REHD., *Pinus koraiensis* SIEB. et ZUCC., *P. pentaphylla* MAYR var. *himekomatsu* KOIDZUMI, *P. ponderosa* LAWS., and *P. silvestris* L.

Distribution : —Japan (Hokkaido and Honshu) and Sakhalin.

Three hundred and ninety-nine specimens from the following localities were examined. Hokkaido : Pyuka, Takinoue, Shari, Rausu, Nishiokkope, Abashiri, Yamadaonsen, Kamioboro, Asahikawa, Aizankei, Sapporo, Hoheikyo, Jozankei, Tomakomai, and Shikotsu. Gunma : Maru-numa. Saitama : Karisakatôge and Okusenba. Yamanashi : Kaikoma and Mt. Fuji. Nagano : Nakabusaonsen, Takanishi, and Sugadaira. Sakhalin.

Japanese name : Yatsuba-kikuimushi.

Genus *Acanthotomicus* BLANDFORD

Acanthotomicus BLANDFORD, 1894, Trans. Ent. Soc. London, 1894 : 89; HAGEDORN, 1910, Coleopterorum Catalogus, 4 : 62; HAGEDORN, 1910, Genera Insectorum, 111 : 107; HOPKINS, 1914, Proc. U. S. Nat. Mus., 48 (2066) : 116; SCHEDL, 1932, Catalogus Coleopterorum regionis palaearcticae, p. 1645;

MURAYAMA, 1953, Trans. Shikoku Ent. Soc., 3 : 154; MURAYAMA, 1953, Bull. Fac. Agr. Yamaguti Univ., 4 : 15; MURAYAMA, 1954, Ibid., 5 : 172.

This genus is distinguished from other Japanese genera by the very distinctive declivital armature in the male and by the characters of the antennal club which has the strongly procurved first suture. The male genitalia is very characteristic, namely the seminal trough is not sclerotized, the tegmen is subdivided by dorsal longitudinal sutures, and the median lobe is simple.

In the original description, BLANDFORD described as "Prosternum processu nullo," whereas our specimens collected from Japan have a short but distinct prosternal process between the fore coxae in all individuals.

Type species : —*Acanthotomicus spinosus* BLANDFORD, monobasic.

Acanthotomicus spinosus BLANDFORD

Acanthotomicus spinosus BLANDFORD, 1894, Trans. Ent. Soc. London, 1894 : 90; HAGEDORN, 1910, Coleopterorum Catalogus, 4 : 62; HAGEDORN, 1910, Genera Insectorum, 111 : 107; SCHEDL, 1932, Catalogus Coleopterorum regionis palaearcticae, F. 1645; MURAYAMA, 1934, Ann. Zool. Japon., 14 : 299; MURAYAMA, 1936, Tenthredo, 1 : 129; MURAYAMA, 1953, Trans. Shikoku Ent. Soc., 3 : 154; MURAYAMA, 1953, Bull. Fac. Agr. Yamaguti Univ., 4 : 15; MURAYAMA, 1955, Ibid., 6 : 99; NOBUCHI, 1955, Akitu, 8 : 14; KABE, 1959, Nipponsan Kikuimushirui Shokkon Zusetsu, p. 150; KABE, 1960, On the hosts and habits of the Scolytid and Platypodid beetles in Japan, p. 44; MURAYAMA, 1961, Publ. Ent. Lab., Univ. Osaka Pref., 6 : 96; NAKANE et al., 1963, Iconographia Insectorum Japonicorum, 2 : 383.

Acanthotomicus spinosus, ? female : BLANDFORD, 1894, Trans. Ent. Soc. London, 1894 : 91.

This species is distinguished from other Japanese representatives of the tribe by the generic characters and by its host plants.

Hosts : —*Quercus gilva* BLUME, *Q. myrsinaefolia* BLUME, and *Q. salicina* BLUME.

Distribution : —Japan (Honshu, Shikoku, and Kyushu).

Two hundred and twelve specimens from the following localities were examined. Tokyo : Takao. Kyoto : Kibune. Nara : Kasuga. Wakayama : Mt. Ohto. Kochi : Kuroson. Ehime : Omogo. Kagoshima : Koyama, Ikeda, Uchinoura, Yakushima (Kosugidani), and Amamioshima (Komiya and Higashinakama).

Selected literature

- 1) BALACHOWSKY, A. : Faune de France, 50 : Coléoptères Scolytides. Paris, 320 pp., (1949)
- 2) BLANDFORD, W. F. H. : The Rhynchophorous Coleoptera of Japan III. Trans. Ent. Soc. London, 1893, 53~141, (1894)
- 3) EGGERS, H. : Japanische Borkenkäfer I. Ent. Blätt., 22, 133~138, (1926)
- 4) EICHHOFF, W. : Beiträge zur Käferfauna von Japan meist auf R. HILLER's Sammlungen besirt. Japanische Scolytiden. Dtsch. ent. Z., 21, 117~128, (1877)
- 5) ESCHERICH, K. : Die Forstinsekten Mitteleuropas II. Berlin, 662 pp., (1923)
- 6) FUCHS, G. : Morphologische Studien über Borkenkäfer, I Die Gattung *Ips* DEGEER und *Pityogenes* BEDEL. München, 45 pp., (1911)

- 7) INOUE, M. : A detailed book of the forest insect control II (in Japanese). Tokyo, 293 pp., (1953)
- 8) KABE, M. : Studies on the galleries of bark-beetles and ambrosia-beetles in Japan (in Japanese). Maebashi Regional Forest Office, 134 pp., (1955)
- 9) KABE, M. : Nipponsan Kikuimushirui Shokkon Zuzetsu. Tokyo, 290 pp., (1959)
- 10) KABE, M. : On the hosts and habits of the Scolytid and Platypodid beetles in Japan (in Japanese). Maebashi Regional Forest Office, 176 pp., (1960)
- 11) Kôno, M. : Neue und wenig bekannte Ipiden als Schädlinge an Sachalintannen und Ezo-fichten in Hokkaido. Ins. Mats., 12, 64~73, (1938)
- 12) KRIVOLUTZKAJA, G. O. (Криволицкая Г. О.) : Короеды Острова Сахалина. Moscow, 195 pp., (1958)
- 13) MURAYAMA, J. : A new genus and some new species of Scolytidae from Japan (Coleoptera). Trans. Shikoku Ent. Soc. 1, 49~53, (1950)
- 14) MURAYAMA, J. : Scolytid-fauna of the Chugoku and Kinki Districts. Bull. Fac. Agr. Yamaguchi Univ., 4, 1~38, (1953)
- 15) MURAYAMA, J. : Scolytid beetles from Niigata Prefecture, Japan II. Niigata, 65 pp., (1965)
- 16) NIJIMA, Y. : Yatsuba-kikuimushi ni tsuite. Mitt. jap. forstl. Ges., 270, 1~2, (1905)
- 17) NIJIMA, Y. : Die Scolytiden Hokkaido unter Berücksichtigung ihrer Bedeutung für Forstschäden. Jour. Coll. Agr., Tohoku Imp. Univ., Sapporo, 3, 109~179, (1909)
- 18) NOBUCHI, A. : Some species of Scolytidae from Ryukyu Islands, Studies on Scolytidae II (in Japanese). Bull. Gov. For. Exp. Sta., 116, 21~26, (1959)
- 19) NOBUCHI, A. : A comparative morphological study of the proventriculus in the adult of the superfamily Scolytoidea (Coleoptera). Ibid., 224, 39~110, (1969)
- 20) NOBUCHI, A. : Studies on Scolytidae IX. Key to the subfamilies, tribes and genera of Japan. Ibid., 238, 149~164, (1971)
- 21) SAWAMOTO, T. : Über die Larchenborkenkäfer von Sachalin, Hokkaido und Honshu. Ins. Mats., 14, 95~108, (1940)
- 22) SCHEDL, K. E. : Bestimmungstabellen der paläarktischen Borkenkäfer 5. Mitt. forstl. Bundesver. Mariabrunn, 47, 74~100, (1951)
- 23) SCHEDL, K. E. : Bestimmungstabellen der paläarktischen Borkenkäfer 11. Centrbl. ges. Forstw., 79, 132~159, (1962)
- 24) STARK, V. N. (Спарк, В. Н.) : Фауна СССР 31; Короеды. Moscow, 461 pp., (1952)
- 25) YANO, S. : Karamatsu no Senkôchû ni Kansuru Chôsa. Tokyo Regional Forest Office, 23 pp., (1924)

Explanation of plates

Plate 1

- Fig. 1 *Pityogenes bistridentatus* (EICHHOFF), male.
- Fig. 2 *Pityogenes chalcographus* (LINNÉ), male.
- Fig. 3 *Pityogenes foveolatus* EGGERS, male.
- Fig. 4 *Pityogenes japonicus* sp. nov., male.
- Fig. 5 *Pityogenes seirindensis* MURAYAMA, male.
- Fig. 6 *Orthotomicus angulatus* (EICHHOFF), male.
- Fig. 7 *Orthotomicus golovjankoi* PJATNIZKY, male.
- Fig. 8 *Orthotomicus kuniyoshii* (NOBUCHI).
- Fig. 9 *Orthotomicus laricis* (FABRICIUS).
- Fig. 10 *Orthotomicus proximus* (EICHHOFF), male.
- Fig. 11 *Orthotomicus suturalis* (GYLLENHAL), male.
- Fig. 12 *Orthotomicus tosaensis* (MURAYAMA), male.
- Fig. 13 *Ips acuminatus* (GYLLENHAL), male.

Plate 2

- Fig. 14 *Ips duplicatus* (SAHLBERG), male.
- Fig. 15 *Ips cembrae* (HEER).
- Fig. 16 *Ips typographus japonicus* NIJIMA, male.
- Fig. 17 *Acanthotomicus spinosus* BLANDFORD, male.
- Figs. 18~21. Heads, frontal aspect.
- Fig. 18 *Pityogenes chalcographus* (LINNÉ), female.
- Fig. 19 *Pityogenes foveolatus* EGGERS, female.
- Fig. 20 *Pityogenes japonicus* sp. nov., female.
- Fig. 21 *Pityogenes seirindensis* MURAYAMA, female.
- Figs. 22~30. Elytral declivities, lateral aspect.
- Fig. 22 *Pityogenes bistridentatus* (EICHHOFF), male.
- Fig. 23 *Pityogenes chalcographus* (LINNÉ), male.
- Fig. 24 *Pityogenes foveolatus* EGGERS, male.
- Fig. 25 *Pityogenes japonicus* sp. nov., male.
- Fig. 26 *Pityogenes seirindensis* MURAYAMA, male.
- Fig. 27 *Orthotomicus angulatus* (EICHHOFF), male.
- Fig. 28 *Orthotomicus golovjankoi* PJATNITZKY, male.
- Fig. 29 *Orthotomicus kuniyoshii* (NOBUCHI).
- Fig. 30 *Orthotomicus laricis* (FABRICIUS), male.

Plate 3

- Figs. 31~39. Elytral declivities, lateral aspect.
- Fig. 31 *Orthotomicus proximus* (EICHHOFF), male.
- Fig. 32 *Orthotomicus suturalis* (GYLLENHAL), male.
- Fig. 33 *Orthotomicus tosaensis* (MURAYAMA).
- Fig. 34 *Ips acuminatus* (GYLLENHAL), male.

- Fig. 35 *Ips acuminatus* (GYLLENHAL), female.
 Fig. 36 *Ips cembrae* (HEER).
 Fig. 37 *Ips duplicatus* (SAHLBERG).
 Fig. 38 *Ips typographus japonicus* NIJIMA.
 Fig. 39 *Acanthotomicus spinosus* BLANDFORD, male.
 Figs. 40~42. Elytral declivities, caudal aspect.
 Fig. 40 *Orthotomicus golovjankoi* PJATNITZKY, male.
 Fig. 41 *Orthotomicus laricis* (FABRICIUS), male.
 Fig. 42 *Orthotomicus suturalis* (GYLLENHAL), male.

Plate 4

Figs. 43~55. Seminal troughs.

- Fig. 43 *Pityogenes bistridentatus* (EICHHOFF).
 Fig. 44 *Pityogenes chalcographus* (LINNÉ).
 Fig. 45 *Pityogenes foveolatus* EGGERS.
 Fig. 46 *Pityogenes japonicus* sp. nov.
 Fig. 47 *Pityogenes seirindensis* MURAYAMA.
 Fig. 48 *Orthotomicus angulatus* (EICHHOFF).
 Fig. 49 *Orthotomicus golovjankoi* PJATNITZKY.
 Fig. 50 *Orthotomicus proximus* (EICHHOFF).
 Fig. 51 *Orthotomicus suturalis* (GYLLENHAL).
 Fig. 52 *Orthotomicus tosaensis* (MURAYAMA).
 Fig. 53 *Ips acuminatus* (GYLLENHAL).
 Fig. 54 *Ips cembrae* (HEER).
 Fig. 55 *Ips typographus japonicus* NIJIMA.

Figs. 56, 57. Proventricular plates.

- Fig. 56 *Pityogenes bistridentatus* (EICHHOFF).
 Fig. 57 *Pityogenes japonicus* sp. nov.

キクイムシ科の研究 第12報

日本産 *Ipini* 族のキクイムシ (鞘翅目)野 淵 輝⁽¹⁾

Ipini 族は *Ipinae* 亜科に属するキクイムシで、日本には5属19種の樹皮下穿孔虫が分布している。シラカシノキクイムシを除く全種が針葉樹を加害するため、この族は森林害虫として重要な種類を含んでいる。たとえば、エゾマツ、トウヒ類のヤツバキクイムシ、カラマツのカラマツヤツバキクイムシ、アカマツ、クロマツのマツノムツバキクイムシ、マツノツノキクイムシなどの被害は林業経営上問題となることが多い。

しかしながら、図示された種類が少ないこと、適当な検索表がないことなどの理由から日本の虫を同定するのに著しく不便だけでなく正確を欠くきらいがあった。筆者は日本、サハリン、シベリア、ヨーロッパなどの標本約2,900点に基づき分類学的な検討を行なった。この結果、ニホンホシガタキクイムシを新種とし、フタツノキクイムシを未記録種として日本のフェウナーに加え、クニヨシキクイムシとトサキクイムシを *Ips* 属から *Orthotomicus* 属に移した。さらに同定を容易ならしめるように各種類ごとに文献、加害樹種、分布を整理記載し、ほとんどの種類を図示し、全種の検索表を作成した。

この報告で取り扱った種類とその加害樹種、分布は次のとおりである。

1. フタツノキクイムシ *Pityogenes bistridentatus* (EICHHOFF)

加害樹種：ヒメコマツ、ハイマツ。

分 布：日本（北海道、本州）、ヨーロッパ。

2. ホシガタキクイムシ *Pityogenes chalcographus* (LINNÉ)

加害樹種：モミ、トドマツ、ベイマツ、オウシュウトウヒ、アカエゾマツ、エゾマツ、トウヒ、カラマツ、グイマツ、バンクスマツ、アカマツ、チョウセンゴヨウマツ、ヒメコマツ、ハイマツ、ストロブマツ、オウシュウアカマツ

分 布：日本（北海道、本州）、サハリン、クリル列島、シベリア、中国（東北地方）、ヨーロッパ。

3. オンタケキクイムシ *Pityogenes foveolatus* EGGERS

加害樹種：エゾマツ、ハイマツ。

分 布：日本（北海道、本州）、サハリン、クリル列島、シベリア、カムチャツカ。

4. ニホンホシガタキクイムシ *Pityogenes japonicus* NOBUCHI sp. nov.

加害樹種：ハイマツ。

分 布：日本（本州）。

5. セイリンドウキクイムシ *Pityogenes seirindensis* MURAYAMA
加害樹種：トドマツ，アカエゾマツ，エゾマツ，オウシュウアカマツ。
分 布：日本（北海道），サハリン，クリル列島，シベリア，朝鮮。
6. キョクシキクイムシ *Pityokteines curvidens* (GERMER)
加害樹種：モミ，ウラジロモミ，アオモリトドマツ，トドマツ。
分 布：日本（北海道，本州），ヨーロッパ。
7. マツノツノキクイムシ *Orthotomicus angulatus* (EICHHOFF)
加害樹種：ツガ，アカマツ，リュウキユウマツ，ゴヨウマツ，クロマツ，スギ，ヒノキ，イチイガシ。
分 布：日本（本州，四国，九州，沖縄），中国（雲南，台湾），カンボディア。
8. ゴロウヤンコキクイムシ *Orthotomicus goloujankoi* PJATNITZKY
加害樹種：オウシュウトウヒ，アカエゾマツ，エゾマツ，トウヒ，アカマツ，チョウセンゴヨウマツ，クロマツ。
分 布：日本（北海道，本州），サハリン，シベリア，中国（東北地方）。
9. クニヨシキクイムシ *Orthotomicus kuniyoshii* (NOBUCHI)
加害樹種：リュウキユウマツ。
分 布：日本（沖縄）。
10. カラマツキクイムシ *Orthotomicus laricis* (FABRICIUS)
加害樹種：エゾマツ，アカマツ，チョウセンゴヨウマツ。
分 布：日本（北海道，本州），サハリン，シベリア，カムチャツカ，朝鮮，中国（東北地方），ヨーロッパ。
11. マツカワノキクイムシ *Orthotomicus proximus* (EICHHOFF)
加害樹種：エゾマツ，アカマツ，チョウセンゴヨウマツ，ヒメコマツ，クロマツ。
分 布：日本（北海道，本州，四国，九州），シベリア，朝鮮，中国（福建），ヨーロッパ。
12. ホンスンキクイムシ *Orthotomicus suturalis* (GYLLENHAL)
加害樹種：トウヒ，カラマツ，アカマツ，チョウセンゴヨウマツ，ハイマツ。
分 布：日本（北海道，本州），シベリア，朝鮮，中国（東北地方），ヨーロッパ。
13. トサキクイムシ *Orthotomicus tosaensis* (MURAYAMA)
加害樹種：アカマツ，クロマツ。
分 布：日本（本州，四国，九州）。
14. マツノムツバキクイムシ *Ips acuminatus* (GYLLENHAL)
加害樹種：エゾマツ，カラマツ，アカマツ，チョウセンゴヨウマツ，ヒメコマツ，ゴヨウマツ。
分 布：日本（北海道，本州，四国），サハリン，シベリア，朝鮮，中国。
15. カラマツヤツバキクイムシ* *Ips cembrae* (HEER)

* 本種の和名はマツノオオキクイ（新島 1913），カラマツオオキクイ（矢野 1924），カラマツヤツバキクイ（沢本 1940）がある。一般林業実務家によってこの虫の形態，習性から最も適当な和名としてカラマツヤツバキクイ（ムシ）が用いられているので，この和名に統一するように提案する。

加害樹種：トドマツ，オウシュウトウヒ，カラマツ，アカマツ，チョウセンゴヨウマツ，ストロ
ブマツ，オウシュウアカマツ。

分 布：日本（北海道，本州），サハリン，クリル列島，シベリア，朝鮮，中国（東北地方），ヨ
ーロッパ。

16. オオハキクイムシ *Ips duplicatus* (SAHLBERG)

加害樹種：アカマツ。

分 布：日本（本州），サハリン，シベリア，中国（東北地方），ヨーロッパ。

17. マツノトゲキクイムシ *Ips multidentatus* MURAYAMA

加害樹種：クロマツ。

分 布：日本（本州，四国，九州）。

18. ヤツバキクイムシ *Ips typographus japonicus* NIJIMA

加害樹種：トドマツ，オウシュウトウヒ，アカエゾマツ，エゾマツ，トウヒ，ボンデロサマツ，チ
ョウセンゴヨウマツ，ゴヨウマツ，オウシュウアカマツ。

分 布：日本（北海道，本州），サハリン。

19. シラカシノキクイムシ *Acanthotomicus spinosus* (BLANDFORD)

加害樹種：イチイガシ，シラカシ，ウラジロガシ。

分 布：日本（本州，四国，九州）。







