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**A THESIS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY**

**Taxonomic Review of Scolytinae and Platypodinae
(Coleoptera: Curculionidae)
in Korea**

**한국산 나무좀아과와 긴나무좀아과 (딱정벌레목:
바구미과)의 분류학적 연구**

**By
Sangwook Park**

**Program in Entomology
Department of Agricultural Biotechnology
Seoul National University
August, 2016**

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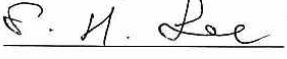

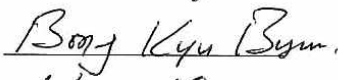

한국산 나무좀아과와 긴나무좀아과 (딱정벌레목 바구미과)의
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SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL
OF SEOUL NATIONAL UNIVERSITY

By
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Program in Entomology
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August, 2016

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ABSTRACT

Taxonomic Review of Scolytinae and Platypodinae (Coleoptera: Curculionidae) in Korea

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This paper consisted of two main results. First one is concerned on a taxonomic review on the Korean Scolytinae and Platypodinae through the re-examination of Korean specimens preserved in the several institutes. Secondly, I examined the taxonomic status of these two subfamilies, identified undetermined species, and placed newly recognized species into the adequate genera using DNA barcodes analysis. I adopted the higher classification system of the Catalogue of Palaearctic Coleoptera edited by Lobl and Smetana (2011) and modified several generic groups because some generic positions are changed after recent studies (Hulcr and Cognato, 2013). In this results, I discussed the changes of phylogenetic status of Scolytinae and Platypodinae. In fact, these two subfamilies of Scolytinae and Platypodinae are still in the center of controversy about their taxonomic positions. Some taxonomists still prefer to consider the two subfamilies as valid families.

In this study, 4 new species and 10 newly recorded species to the Korean fauna were found. And *Scolytoplatypus sinensis*, which was synonymised with *S. mikado* resurrected as a valid species after examining the DNA barcodes and morphological characters. Two species belong to *Xyleborus* transferred to the genus *Cyclorhipidon* after examining the DNA barcode and morphological characters.

New species and newly added species to Korean fauna are as follows:

<i>Hylurgus ligniperda</i> (Fabricius, 1787)	new to Korea
<i>Tomicus heuksandoensis</i> sp. nov.	new to Science
<i>Sueus niisimai</i> (Eggers, 1926)	new to Korea
<i>Hypothenemus expers</i> Blandford, 1894	new to Korea
<i>Scolytoplatypus sinensis</i> Tsai & Huang, 1965	new to Korea, resurrected

<i>Cyclorhipidion japonicus</i> (Nobuchi, 1981)	comb. nov., new to Korea
<i>Cyclorhipidion laetus</i> Niisima, 1909	comb. nov., new to Korea
<i>Cyclorhipidion pseudopelliculosum</i> sp. nov.	new to Science
<i>Xyleborinus kwangreungensis</i> sp. nov.	new to Science
<i>Xyleborus glabratus</i> Eichhoff, 1876	new to Korea
<i>Xyleborus muticus</i> Blandford, 1894	new to Korea
<i>Xylosandrus compactus</i> (Eichhoff, 1876)	new to Korea
<i>Xylosandrus pseudogermanus</i> sp. nov.	new to Science
<i>Dinoplatypus hamatus</i> (Blandford, 1894)	new to Korea

Totally, 261 COI sequences of the 109 Scolytinae and Platypodinae species were analyzed in this study. Several tribal groups are clearly divided into separated branches and show monophyletic aspects. For examples, tribe Ipini, Scolytini, Scolytoplatypodini, and Xyloterini are clearly divided each others. In case of tribe Xyleborini, they show almost independent tree from other tribes except containing some species in genus *Coccotrypes* of tribe Dryocoetini. Tribe Hylastini and Hylurgini also clearly divided into separated monophyletic groups in the level of tribes and genera. Despite of those many efforts on the phylogeny, of the higher classification of the family Curculionidae and the rank of the subfamily Scolytinae and Platypodinae, are still debated and unresolved. To solve the problems on the phylogenetic position of these two groups, additional studies using the both of morphological and molecular methods are required. Many generic and species groups in both subfamilies are still not well-positioned in the classification. Therefore, the phylogenetic studies of the higher category classification should apparently be accompanied with the re-arrangements on unclear generic and species positions.

Key words: Curculionidae, Scolytinae, Platypodinae, Taxonomy, DNA barcodes, Korea.

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I. INTRODUCTION OF THE SUBFAMILY SCOLYTINAE AND PLATYPODINAE

1. General introduction of the subfamily Scolytinae and Platypodinae

The Scolytinae and Platypodinae are two subfamilies of family Curculionidae including more than 7,400 species worldwide (Kirkendall et al., 2013), and they are economically important both in temperate and tropical forests. The majority of species in Scolytinae attack dead or dying trees. A few scolytinae species and many of Platypodinae species attack apparently healthy trees; therefore these feeding behaviors can cause die-back or even mortality of host trees. It was recorded that all species have an association with micro-organisms, including bacteria and fungi, and the fungi can sometimes be pathogenic to the host trees (e.g. Klepzig & Six, 2004; Hulcr & Dunn, 2011; Six, 2012, 2013; Ploetz et al., 2013). Most of all the bark and ambrosia beetles play a key role in the structure of natural plant communities (Raffa et al., 2013). They make a lot of holes on the plants and increase the decaying speed of the plants or plant products and contribute to nutrient cycling, increasing the biodiversity, changing the soil structure. Bark and ambrosia beetles compete with humans for valued plants and plant products in this process, and so humans regard them as the important forest and agricultural pests.

The Scolytinae and Platypodinae have a long evolutionary history in their taxonomic positions (Cognato and Grimaldi, 2009). They have been regarded as valid families for a long time, but after Crowson (1955), many researchers placed those two groups to the subfamilies of family Curculionidae (Farrell et al., 2001; Maraldi et al., 2002; Jordal et al., 2011; Knizek, 2011; Jordal et al., 2014).

These beetles evolved to have cylindrical body, short and broad legs, short antennae, and stout mandible, that makes them suitable for tunneling in trees.

Especially, many bark and ambrosia beetles have morphological adaptations to their elytral declivity, head and legs for digging the tunnels and removing plant fragments from their galleries. Their cylindrical and truncate body plays a great role of blocking the natural enemies and competitors from galleries.

Bark and ambrosia beetles are usually dimorphic (that is, morphological differences between male and female). If so, the shape of frons, antennal club, elytral processes on declivity, and the projections on abdominal segments are different between male and female. Many of Xyleborini species have extreme sexual dimorphism. Usually the male of Xyleborini is much smaller than female and has a dwarfish body. Because the males of them usually do not come out from the trunk of the tree, the hind wings of male are degenerated and remain only as the vestigial organs. Tribe Scolytoplatipodini in Scolytinae and all of species in Platypodinae have different external characters on pronotal organs (ex. mycangia) and characters of declivity between male and female (Fig. 1-2).

The common name "bark beetle" is applied to the entire subfamily Scolytinae, and "ambrosia beetle" is applied to the subfamily Platypodinae. However, many subfamily Scolytinae species may be treated and called "ambrosia beetles", because they establish breeding galleries in trunk of wood and their larvae feed on symbiotic fungi. The bark beetles live under the bark, make mother galleries or a room for laying the eggs. They lay the eggs on each side of the gallery or the room, and the larvae eats the phloem and makes some tunnels under the bark (Fig. 2). The ambrosia beetles make the tunnel vertically to the trunk under the bark. Some species of the ambrosia beetles make tunnels only, and others make a broad room in the trunk to rear the ambrosia fungi and laying eggs. The larvae feed on the fungi in the tunnels or the room (Fig. 3).

The ambrosia beetles have special organ which is called mycangia, to move the symbiotic fungi to a new host. Bark and ambrosia beetles could breed in a wide variety of plant tissues. The feeding behavior of Scolytinae and Platypodinae could be classified into herbiphagy, spermatophagy, mycophagy, myelophagy, phloeophagy, xylomycetophagy, and xylophay. Herbiphagy species feeds on fresh or dry fleshy plant tissues. Spermatophagy species feeds inside of the large hard seeds and the encompassing fruit tissues. Mycophagy species feed on uncultivated and free-living fungi. Myelophagy species feeds inside of the pith of twigs, small branches or small stems, including small vines. Phloeophagy species feeds on phloem tissues, though some larvae engrave outer sapwood. They may or may not be associated with fungi that increase nutritional value of the food. Xylomycetophagy species (especially ambrosia beetles) feeds on farmed ectosymbiotic fungi growing in wood. Xylophagy species feeds on xylem tissues (sapwood, not heartwood), but does not feed on cultivated symbiotic fungus (Schdel, 1958; S.L.Wood, 1982, 1986, 2007). Their diversity and evolution of the mating system was reviewed by Kirkendall (1983, 1993). Outbreeding mating systems of the bark and ambrosia species are classified by how many females breed simultaneously with the same male: one-to-one, monogyny; regularly two females to one male, bigyny; many females to one male, harem polygyny. The examples see table 1 (Abbreviations as follows - larval feeding: Phl, phloeophagy; Xlm, xylomycetophagy; Spm, spermatophagy; Myc, mycophagy; Mye, myelophagy; Xyl, xylophagy; feed?, unknown. Abbreviations, mating systems: MG, monogyny; HP, harem polygyny; BG, bigyny; Col, colonial polygyny; Inbr, inbreeding; MS?, unknown mating system).

The Scolytinae and Platypodinae have various kinds of parasites and predators

(Wegensteiner et al., 2013). In Coleoptea, Carabidae, Cleridae, Cucujidae, Histeridae, Laemorphloeidae, Monotomidae, Nitidulidae, Pyhtidae, Salpingidae, Staphylinidae, Tenebrionidae, Trogossitidae, and Zoperidae feed on the bark and ambrosia beetles. Most of Coleopteran predators are quite mobile and have slender or flattened bodies. Deptera, Heteroptera, and Raphidioptera also feed on bark beetles, but the studies on them are very little in Korea. In case of parasitoids, Braconidae is most famous parasites and Bethylidae, Eulophidae, Eupelmidae, Eurytomidae and Ichneumonidae are known to attack bark beetles. But the parasitoids on bark beetles in Korea also not yet studies well. The bark and ambrosia beetles could be infested with the parasites those are evolved into a cylindrically elongated body (Fig. 4).

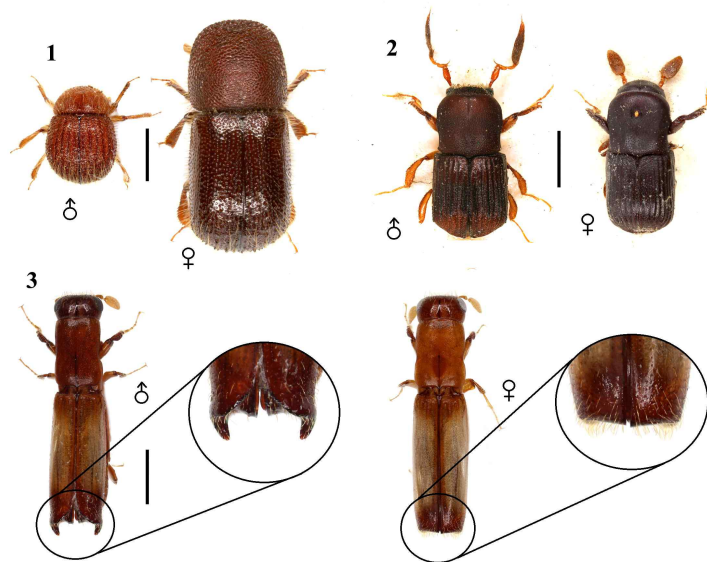


Figure 2. The dimorphism of male and female adults. 1: *Cyclorhipidion lewisi*;
2: *Scolytoplatypus sinensis*; 3: *Dinoplatypus hamatus*. Scale bar - 1 mm.

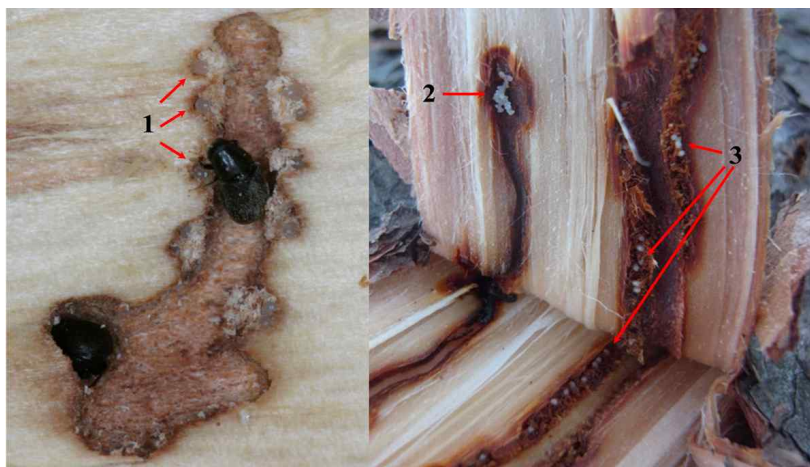


Fig. 2. Mother gallery and room for laying eggs. 1: *Polygraphus proximus* Blandford, 1894; 2: eggs of *Hylastes parallelus*; 3: eggs of *Hylurgops interstitialis*.

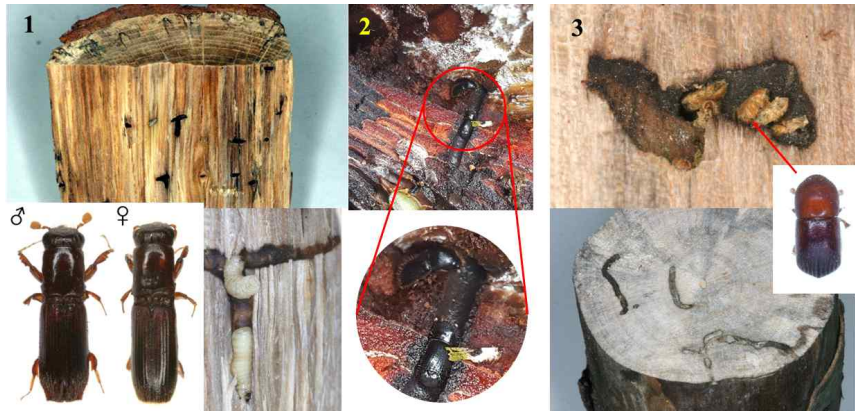


Fig. 3. The gallery of ambrosia beetles. 1: *Platypus koryoensis*; 2: *Euwallacea validus*; 3: *Xylosandrus crassiusculus*.

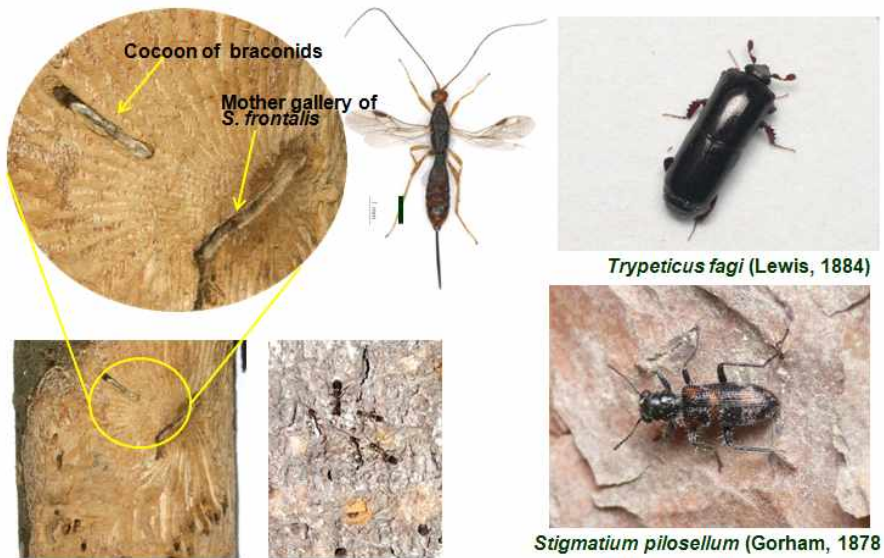


Fig. 4. Parasites and predators of bark and ambrosia beetles.

Table. 1 Feeding behavior and Mating system modified from Kirkendall et al. (2015).

Tribe	Genus	Feeding behavior							Mating systems					No. of Korean species	Number of World species	
		Phl	Xlm	Spm	Myc	Mye	Xly	Hbv	MG	HP	BG	Col	Inbr			
Corthylini	<i>Pityophthorus</i>	○													2	385
Cryphalini	<i>Allemoporos</i>	○							○						1	1
	<i>Cryphalus</i>	○							○						19	190
	<i>Eidophelus</i>	○							un						1	5
	<i>Ernoporicus</i>	○							○						1	15
	<i>Ernoporus</i>	○							○						1	16
	<i>Hypothenemus</i>	○	(○)	○		○		(○)					○		4	183
	<i>Procryphalus</i>	○							○						1	3
	<i>Scolytogenes</i>	○				○			○						1	107
	<i>Trypophloeus</i>	○							○						1	17
	Crypturgini	<i>Crypturgus</i>	○									○			3	15
Diamerini	<i>Sphaerotrypes</i>	○							○					1	47	
Dryocoetini	<i>Coccotrypes</i>	○		○				○					○	2	129	
	<i>Cyrtogenius</i>	○					○		○		○			2	106	
	<i>Dryocoetes</i>							(○)	○		(○)			7	37	
	<i>Taphrorychus</i>	○							○					1	19	
Hylastini	<i>Hylastes</i>	○							○					7	32	
	<i>Hylurgops</i>	○							○					5	21	
Hylesinini	<i>Alniphagus</i>	○							○					1	3	
	<i>Hylesinus</i>	○							○		(○)			6	37	
	<i>Neopteleobius</i>	○							un					1	1	
Hylurgini	<i>Hylurgus</i>	○							○					1	3	
	<i>Tomicus</i>	○							○					6	7	
	<i>Xylechinus</i>	○							○					2	40	
Hyorrhynchini	<i>Sueus</i>		○										○	1	5	
Ipini	<i>Ips</i>	○								○				6	45	
	<i>Orthotomicus</i>	○								○				7	20	
	<i>Pityogenes</i>	○								○				3	24	
	<i>Pityokteines</i>	○								○				1	10	
Micracidini	<i>Pseudothysanoes</i>	○					(○)	(○)			○			1	92	
Phloeosinini	<i>Phloeosinus</i>	○							○					4	66	
Polygraphini	<i>Polygraphus</i>	○							(○)	○				6	100	
Scolytini	<i>Scolytus</i>	○							○	(○)	(○)			15	126	
Scolytoplatypodini	<i>Scolytoplatypus</i>		○						○					4	49	
Xyleborini	<i>Amasa</i>		○										○	1	41	
	<i>Ambrosiodmus</i>		○										○	2	80	
	<i>Ambrosiophilus</i>		○										○	1	8	
	<i>Anisandrus</i>		○										○	3	14	
	<i>Cnestus</i>		○										○	2	32	
	<i>Cyclorhipidion</i>		○										○	5	86	
	<i>Debus</i>		○										○	1	16	
	<i>Eirwallacea</i>		○										○	1	45	
	<i>Microperus</i>		○										○	1	16	
	<i>Xyleborinus</i>		○										○	4	76	
	<i>Xyleborus</i>		○										○	10	404	
	<i>Xylosandrus</i>		○										○	6	39	
	Xyloteriini	<i>Indocryphalus</i>		○						○					2	8
		<i>Trypodendron</i>		○						○					5	13
	Scolytinae		No. of species containing the generic groups not occurred in Korea											169	≒ 6,000	
	Platypodini	<i>Crossotarsus</i>		○							○					1
<i>Dinoplatypus</i>			○							○					2	
<i>Platypus</i>			○							○					2	
<i>Treptoplatypus</i>		○							○					2		
Platypodinae													7			
Total													176	≒ 7,400		

2. Historical Review of Scolytinae and Platypodinae in Korea

The First report of the Korean Scolytinae, *Tomicus piniperda*, was recorded by Ueki (1911). In the early 20th century, many Scolytinae and Platypodinae species were recorded by Murayama in Korea. In 1964, Ju (1964) newly recorded 59 species to the Korean fauna. In the late 20th century, Choo and Woo (1985b, 1989a, b) and Choo et al. (1983a, b, 1988b), recorded 23 Scolytinae species. Park and Lyu (2006) added *Treptoplatypus servini* (Blandford) (Platypodinae) for the fauna. Knizek (2011) added seven species to Korean fauna in the catalogue of Palaearctic Coleoptera. The list of species of Korean Scolytinae and Platypodinae was shown in the Table 2.

Table 2. The records on Korean fauna of Scolytinae and Platypodinae

Author	Species	No. of species
Ueki, 1911	<i>Tomicus piniperda</i>	1
Strohmeyer, 1914	<i>Hylastes ater</i> , <i>Hylastes opacus</i>	2
Murayama, 1926	<i>Ips typographus</i>	1
Murayama, 1957	<i>Cryphalus piceae</i>	1
Murayama, 1929a	<i>Tomicus minor</i> , <i>Ips acuminatus</i> , <i>Orthotomicus proximus</i>	3
Murayama, 1929b	<i>Hylurgops glabratus</i> , <i>Polygraphus subopacus</i> , <i>Cryphalus fulvus</i> , <i>Crypturgus pusillus</i> , <i>Dryocoetes autographus</i> , <i>Orthotomicus laricis</i> , <i>Pityogenes chalcographus</i> , <i>Pityokteines spinidens</i>	8
Murayama, 1929c	<i>Ips cembrae</i> , <i>Pityogenes seirindensis</i>	2
Murayama, 1930a	<i>Phloeosinus perlatus</i> , <i>Polygraphus proximus</i> , <i>Pityophthorus jucundus</i> , <i>Ernoporos tiliae</i> , <i>Xyleborinus saxesenii</i> , <i>Trypodendron lineatum</i>	6
Murayama, 1930b	<i>Sphaerotrypes pila</i> , <i>Hylesinus tristis</i> , <i>Neopteleobius scutulatus</i> , <i>Cryphalus carpivorius</i> , <i>C. exiguus</i> , <i>Eidophelus imitans</i> , <i>Ernoporos tiliae</i> , <i>Coccotrypes nubilus</i> , <i>Scolytus claviger</i> , <i>S. japonicus</i> , <i>S. schevyrewi</i> , <i>Scolytoplatypus mikado</i> , <i>S. tycon</i> , <i>Ambrosiodmus lewisi</i> , <i>Ambrosiophilus atratus</i> , <i>Anisandrus apicalis</i> , <i>Cnestus mutilatus</i> , <i>Cyclorhipidion pelliculosum</i> , <i>Xyleborinus attenuatus</i> , <i>Xyleborus aquilus</i> , <i>X. pfeilii</i> , <i>Xyleborus volvulus</i> , <i>Xylosandrus brevis</i> , <i>X. crassiusculus</i> , <i>X. germanus</i> , <i>Indocryphalus pubipennis</i> , <i>Crossotarsus simplex</i> , <i>Platypus koryoensis</i> , <i>Treptoplatypus solidus</i>	29
Murayama, 1931	<i>Xyleborinus octiesdentatus</i>	1
Murayama, 1932	<i>Platypus lewisi</i>	1
Murayama, 1934a	<i>Hypothenemus furukawai</i> , <i>Ambrosiodmus rubricollis</i>	2
Murayama, 1936	<i>Hylastes plumbeus</i>	1
Murayama, 1937	<i>Hylurgops spessiwzeffi</i> , <i>Polygraphus horyurensis</i> , <i>Dryocoetes infuscatus</i> , <i>Taphrorychus bicolor</i> , <i>Ips sexdentatus</i> , <i>Orthotomicus suturalis</i> , <i>Euwallacea validus</i> , <i>Xyleborus monographus</i> , <i>Trypodendron gaimaense</i>	9
Murayama, 1957	<i>Trypodendron proximum</i> ,	1
Lee and Cho, 1959	<i>Dinoplatypus calamus</i>	1
Ju, 1964	<i>Hylastes brunneus</i> , <i>H. cunicularius</i> , <i>Hylurgops interstitialis</i> , <i>H. longipillus</i> , <i>H. palliatus</i> , <i>Alniphagus costatus</i> , <i>Hylesinus cingulatus</i> , <i>H. eos</i> , <i>H. laticollis</i> , <i>H. pravdini</i> , <i>H. toranio</i> , <i>Tomicus pilifer</i> , <i>T. puellus</i> , <i>Xylechinus bergeri</i> , <i>X. pillosus</i> , <i>Polygraphus abietis</i> , <i>P. jezoensis</i> , <i>Pityophthorus pini</i> , <i>Allernoporos euonymi</i> , <i>Cryphalus asperatus</i> , <i>C. coryli</i> , <i>C. kurenzovi</i> , <i>C. latus</i> , <i>C. malus</i> , <i>C. manschuricus</i> , <i>C. pruni</i> , <i>C. redikorzevi</i> , <i>C. rhusii</i> , <i>C. scopiger</i> , <i>Ernoporos corni</i> , <i>Procryphalus fraxini</i> , <i>Trypophloeus binodulus</i> , <i>Crypturgus cinereus</i> , <i>C. hispidulus</i> , <i>Dryocoetes baikalicus</i> , <i>D. hectographus</i> , <i>D. rugicollis</i> , <i>Ips duplicatus</i> , <i>I. subelongatus</i> , <i>Orthotomicus golovjankoi</i> , <i>Pityogenes foveolatus</i> , <i>Scolytus aratus</i> , <i>S. chikisanii</i> , <i>S. dahuricus</i> , <i>S. intricatus</i> , <i>S. jacobsoni</i> , <i>S. koltzei</i> , <i>S. morawitzi</i> , <i>S. pubescens</i> , <i>S. ratzeburgii</i> , <i>S. semenovi</i> , <i>S. trispinosus</i> , <i>Scolytoplatypus daimio</i> , <i>Anisandrus dispar</i> , <i>A. maiche</i> , <i>Cyclorhipidion bodoanum</i> , <i>Xyleborus seriatus</i> , <i>Trypodendron niponicum</i> , <i>T. signatum</i>	59
Ju, 1969	<i>Indocryphalus aceris</i>	1
Choo et al., 1983a	<i>Hypothenemus eruditus</i> , <i>Xylosandrus borealis</i>	2
Choo et al., 1983b	<i>Tomicus brevipilosus</i> , <i>Phloeosinus rudis</i> , <i>Hypothenemus californicus</i> , <i>Coccotrypes carpophagus</i> , <i>Orthotomicus angulatus</i>	5
Choo and Woo, 1985b	<i>Hylastes attenuatus</i> , <i>H. parallelus</i> , <i>Phloeosinus hopehi</i> , <i>Cryphalus carpini</i> , <i>C. jeholensis</i> , <i>C. laricis</i> , <i>Cyrtogenius brevior</i> , <i>C. luteus</i> , <i>Dryocoetes pini</i> , <i>Cnestus murayamai</i> , <i>Microperus kadoyamaensis</i> , <i>Xyleborus minutus</i> ,	12
Choo et al., 1988b	<i>Debus defensus</i>	1
Choo and Woo, 1989a	<i>Amasa amputatus</i> ,	1
Choo and Woo, 1989b	<i>Polygraphus nobuchii</i> , <i>Hypothenemus expers</i> , <i>Scolytogenes puerararae</i> , <i>Dryocoetes carpivorius</i>	4
Park and Lyu, 2007	<i>Treptoplatypus severini</i>	1
Löbl and Smetana, 2011 (by Knizek)	<i>Phloeosinus aubei</i> , <i>Cryphalus piceus</i> , <i>Orthotomicus erosus</i> , <i>O. tosaensis</i> , <i>Pseudothysanoes modestus</i> , <i>Scolytus frontalis</i> , <i>Xyleborus longipilus</i> ,	7
This study	<i>Hylurgus ligniperda</i> , <i>Tomicus heuksandoensis</i> sp. nov., <i>Sueus niisimai</i> , <i>Scolytoplatypus sinensis</i> , <i>Cyclorhipidion japonicum</i> , <i>C. laetum</i> , <i>C. pseudopelliculosum</i> sp. nov., <i>Xyleborinus kwangreungensis</i> sp. nov., <i>Xyleborus glabratus</i> , <i>X. muticus</i> , <i>Xylosandrus compactus</i> , <i>X. pseudgermanus</i> sp. nov., <i>Dinoplatypus hamatus</i>	13
Total Number of Species.		175

3. Contents of the review of Scolytinae and Platypodinae in Korea

In this paper, I reviewed the Korean Scolytinae and Platypodinae through the re-examination of the records on those groups and additional identifications of Korean specimens that were collected and preserved in the institutes (e.g. National Institute for Agro-Environmental Sciences in Japan, Seoul national University, National Institute of Forest Science, Research institute of Forest Insect Diversity, and Hannam University in Korea).

Secondly, I examined the taxonomic status of the family and subfamilies, using DNA barcode and identifying undetermined species, and placing species into genera. I adopted the higher classification system of the Catalogue of Palaearctic Coleoptera edited by Lobl and Smetana (2011) and modified several generic groups because some generic positions are changed after recent studies (Hulcr and Cognato, 2013).

In this results, I discussed the changes of phylogenetic status of Scolytinae and Platypodinae. In fact, these two subfamilies of Scolytinae and Platypodinae are still in the center of controversy about their taxonomic positions. Some taxonomists still prefer to consider the two subfamilies as valid families.

II. MATERIALS AND METHODS

1. Materials examined

More than 100,000 specimens belonging to subfamilies Scolytinae and Platypodinae throughout Korea, Japan, China, Russia, and Europe were examined. The most specimens were stored under air-dried conditions or preserved in 70~95% ethanol in the Refrigerator. All specimens used in molecular analysis were individually stored in 95% ethanol at - 20°C before DNA extraction.

Since 2003, DNA barcode has been used as a useful tool for accurate species identification in animal taxa (Hebert et al. 2003; Schindel and Miller 2005). The DNA barcode facilitates discrimination of each species within a taxon based on a 658 bp partial sequence of the mitochondrial cytochrome c oxidase subunit I (COI) gene (Hebert et al. 2004b). Over the past decade, the DNA barcode has achieved successful species resolution up to of 97%, contributed to determination of species diversity in many insect groups (e.g. Hajibabaei et al. 2006; Hajibabaei et al. 2007; Meusnier et al. 2008), and many DNA barcode studies have been continuously reported (Frézal and Leblois 2008; Jinbo et al. 2011). Recently, many analysis and studies on the DNA barcode region and other genetic information carried out in the Scolytinae.

The materials were preserved at the following Institutions: Seoul National University (SNU), Seoul, Korea; Research Institute of Forest Insect Diversity (RIFID), Hwaseong, Korea; National Institute of Forest Science (NIFS), Seoul, Korea; Forest Research National Museum of Natural History (NMNH), London, United Kingdom; National Institute of Agricultural Science and Technology (NIAST), Tsukuba, Japan; Chinese Academy of Science (CAS), Beijing, China.

2. Illustrations of species

For morphological study, specimens were observed under stereoscopic microscopes (Leica S8APO and Leica M205C; Leica, Solms, Germany) for general and genital structures. For taking photos, the Canon D-450 Camera, Canon Macro Photo lens MP-E 65mm and Auto montage program (CombineZM, UK) were used.

3. Abbreviations of provinces in the Korean Peninsula

The province abbreviations (Fig.5) are as follows.

HB: Hamgyeongbuk-do, HN: Hamgyeongnam-do (including Ryanggand-do), PB: Pyeonganbuk-do (including Jagang-do), PN: Pyeongannam-do, HH: Hwanghaedo, GW: Gangwon-do, GB: Gyeongsangbuk-do, GN: Gyeongsangnam-do, GG: Gyeonggi-do including Seoul, CB: Chungcheongbuk-do. CN: Chungcheongnam-do, JB: Jeollabuk-do, JN: Jeollanam-do, JJ: Jeju-do (Is.).



Figure 6. A map of Korean peninsula for localities and abbreviations.

4. Terminology

The terminology for morphological features generally followed after Hulcr et al. (2015). Scolytinae and Platypodinae species usually have the declivity on the elytra. In case of Scolytinae, they usually have many asperities on anterior part of pronotum. These small organs may play a role of removing the plant fragments posteriorly. There are some tubercles, spines, granules, or emarginations on declivity, and these characters are very important for identifying the species. Some kinds of bark beetles are usually difficult to distinguish male and female (Fig. 6), but many kinds of Scolytinae and Platypodinae species show the clear dimorphism. For identification, the characters on the frons, antennae, pronotal asperities and punctures, elytral declivities are usually used. In case of genus *Scolytus*, the characters on the frons and abdominal sternites are most important.

Most species of Ipini (fig. 6-2), Scolytoplatypodini and Xyleborini (Figs. 7-1, 8) in Scolytinae and all of Platypodinae have many characters on the elytral declivity. Tribe Scolytini usually have most of important characters on the frons and abdominal sternites (Fig. 7-2). The prosternal process, the width between procoxal cavities, and the shape of tibia and tarsi are also used with the important characters for the identification (Fig. 8).

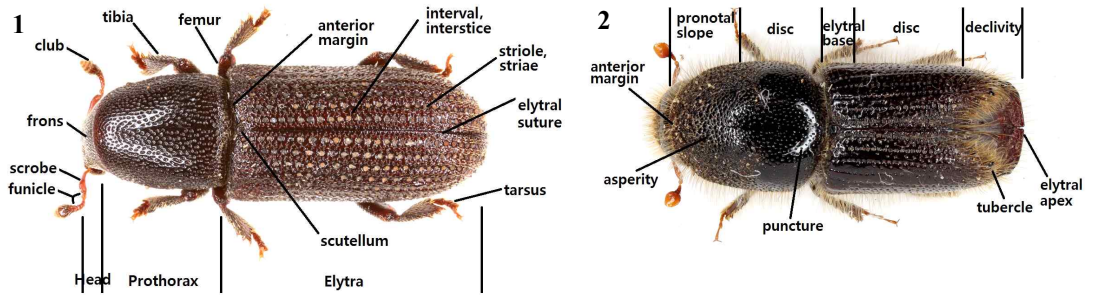


Figure 6. The dorsal aspects of adults. 1: *Hylastes parallelus*; 2: *Ips subelongatus*.

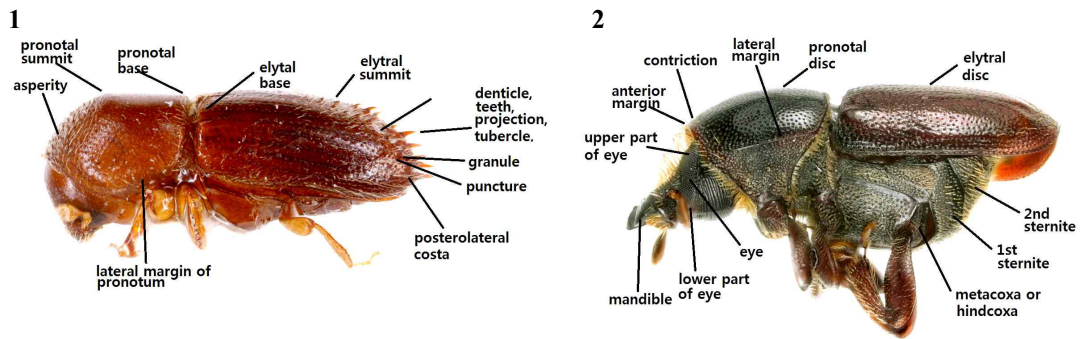


Figure 7. The lateral aspects of adults. 1: Female of *Xyleborinus octiesdentatus*; 2: Male of *Scolytus frontalis*.

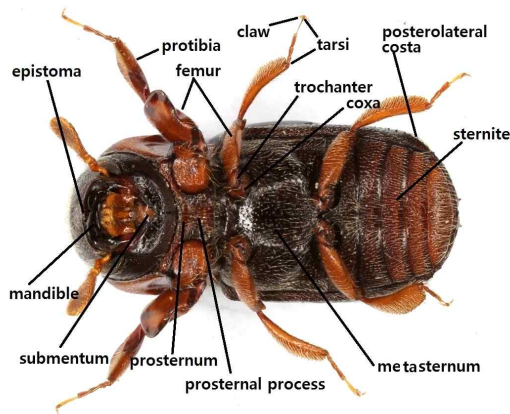


Figure 8. The ventral aspects of female adult of *Scolytoplatypus tycon*.

5. DNA sequencing from nondestructive methods and selection of genetic markers

A total of specimens of species collected from Korea and Japan were analyzed. Genomic DNA was extracted by using a QIAamp DNA Mini Kit (Qiagen, Hilden, Germany) according to the manufacturer's instructions. To protect rare specimens from destructive DNA extraction, I followed a nondestructive method, whereby an entire body was wholly incubated with rotation in 0.8~1 mL ATL (tissue lysis buffer), which increased in proportion to sample size, through the addition of 80 ml proteinase K, for 24 to 30 hour. A 680 bp COI sequence was amplified using one primer set LCO1490/HCO2198 (Folmer et al. 1994). PCR amplifications were conducted with AccuPower PCR PreMix and HF PCR PreMix (Bioneer Daejeon, Korea) for 5 min at 94 °C, followed by 35 cycles of the following: for COI, 30 s at 94 °C and 25 s at 50-52 °C; 1 min at 72 °C; a final extension for 5 min at 72 °C. PCR products were assessed by 0.7% agarose gel electrophoresis and the successful amplicons were purified using a QIAquick PCR Purification Kit (Qiagen, Hilden). DNA sequencing was performed using an automated DNA analyzer (ABI 3730 xl 96-capillary DNA analyzer; Applied Biosystems, USA) and the PCR primers.

6. Data analysis

Total 261 COI sequences containing 142 COI sequences extracted from NCBI Genbank (<http://www.ncbi.nlm.nih.gov/genbank>), of 109 Scolytinae and Platypodinae species were analyzed in this study and sequences of species. All of the species were known as occurred in Palaearctic region. The data set was aligned in MEGA 5.2 (Tamura et al., 2011) using ClustalX. The anterior and posterior regions of uncertain alignment were eliminated from the data matrix. COI sequences were

finally aligned to 582 bp length. A neighbor-joining (NJ) analysis (Saitou and Nei, 1987) was performed with MEGA 5.2. Genetic distances were calculated using Kimura's two parameter test (Kimura, 1980) according to the empirical guide-lines of Nei (1991, 1996). The option is as follow table 3.

Table 3. A Neighbor-joining (NJ) analysis performed for phylogeny reconstruction with MEGA 5.2 under bootstrap methods.

Analysis	
Analysis -----	Phylogeny Reconstruction
Scope -----	All Selected Taxa
Statistical Method -----	Neighbor-joining
Phylogeny Test	
Test of Phylogeny -----	Bootstrap method
No. of Bootstrap Replications -----	1000
Substitution Model	
Substitutions Type -----	Nucleotide
Model/Method -----	Kimura 2-parameter model
Substitutions to Include -----	d: Transitions + Transversions
Rates and Patterns	
Rates among Sites -----	Uniform rates
Pattern among Lineages -----	Same (Homogeneous)
Data Subset to Use	
Gaps/Missing Data Treatment -----	Complete deletion
Codons Included -----	1st+2nd+3rd+Non-Coding

III. Results

1. Taxonomic accounts of Scolytinae and Platypodinae in Korea

Subfamily Scolytinae Latreille, 1804

Key to the Supertribe of Subfamily Scolytinae

1. Each basal margin of elytra procurved and armed by a series of marginal crenulations (or less commonly by a continuous elevated costa in some Bothrosternini, Diamerini, Polygraphini), usually with a scutellar emargination between them; scutellum usually small and rounded or depressed, absent in some groups; pronotum weakly if at all declivous on anterior half usually unarmed but crenulations sometimes present on anterolateral areas; head usually visible from above, somewhat wider; protibia usually wider; scales or deeply divided setae a common feature ----- Supertribe Hylesinitae
- Basal margins of elytra forming a straight, transverse line across body, unarmed, rarely (some Scolytini, Cryphalini) with a weakly elevated continuous line; scutellum usually large, flat (rarely absent or highly modified in some Xyleborini); pronotum weakly to strongly declivous on anterior half and usually armed by many asperate crenulations, particularly on median half; head usually partly or entirely concealed from dorsal aspect, somewhat narrower; protibia usually narrower; scales or deeply divided setae an uncommon feature ----- Supertribe Scolytitae

Supertribe Hylesinitae Erichson, 1836

Key to the Tribe of Supertribe Hylesinitae

1. Scutellar area of metanotum and its postnotum separated by a suturelike

- intersegmental membrane; posterior part of scutoscutellar suture strongly curved mesad to a point near crest of scutellar groove then continuing cephalad parallel to this costa for about two-thirds of metanotum length (except much less in Hyorrhynchini); metapleural suture descending subvertically from pleural wing process to metepisternal groove formed to receive corresponding costal groove and flange of elytron then abruptly angled and continued caudad along this groove to a point near pleural coxal process; scutellum visible; funicle 6- or 7-segmented or if 5-segmented (*Sueus*) then eye divided, male frons not impressed, and antennal club symmetrical ----- 2
- Scutellar area of metanotum and its postnotum completely fused on at least median third, intersegmental suture usually obsolete; scutoscutellar suture less strongly curved, approaching costa of scutellar groove more gradually and continuing cephalad parallel to it for less than half length of metanotum (it never reaches margin of this groove in some groups; metapleural suture sometimes as described above, but more commonly running a more direct route from pleural wing process to pleural costal process, often remote from locked position of costal margin of elytra for most or all of its course; scutellum either not visible or if visible then funicle 5-segmented and male frons impressed --- 5
2. Eye entire to feebly emarginate; scutoscutellar suture parallel to costa of scutellar groove for two-thirds length of notum; precoxal ridge on prothorax present or absent; antennal funicle 5- to 7-segmented ----- 3
- Eye completely divided by an emargination, halves widely separated; scutoscutellar suture remote from costa of scutellar groove; crenulations on basal margins of elytra low, often poorly formed; precoxal ridge on prothorax never present; antennal funicle usually 6-segmented (5-segmented in *Sueus*)

- Hyorrhynchini
3. Prothoracic precoxal area rather large, its lateral margins strongly, sharply elevated from anterior margin to coxae; crenulations on elytral bases usually poorly developed; antennal funicle 7-segmented, club conical, segment 1 often as long as others combined; head somewhat prolonged, subrostrate, frons never sexually dimorphic; eyes entire, rather short; Northern Hemisphere, except introduced elsewhere; in Pinaceae ----- Hylastini
- Prothoracic precoxal piece small, short, its lateral areas elevated or not; crenulations on elytral bases more conspicuously elevated, forming a definite row (except confused in *Dactijlipalpus*): antennal funicle variable, 5- to 7-segmented, club weakly to moderately flattened; head less distinctly rostrate, male frons usually impressed, eye oval to elongate, entire to feebly emarginate ----- 4
4. Pronotum asperate on anterolateral areas (except *Hylastinus*), prothorax with elevated costate ridge from coxa to anterior margin; antennal funicle 6- or 7-segmented; mesal surface of elytra at base of suture immediately behind scutellum with an interlocking series of nodules and cavities, this lock interrupts groove and flange of suture (not visible when elytra in locked position); worldwide ----- Hylesinini
- Anterolateral areas of pronotum unarmed; precoxal costa on prothorax absent; funicle 5- to 7- segmented; mesal surface of elytra at suture with interlocking groove and flange continued to base without a series of nodules or cavities immediately behind scutellum; worldwide ----- Hylurgini
5. Lateral margins of pronotum usually subacutely elevated, costate; mesepimeron moderately to very large, its dorsal portion usually grooved for reception of elytral base; scutellar shield under base of elytra large, extending posteriorly

- beyond visible scutellum; scutoscutellar suture remote from costa of scutellar groove to its base; outer apical angle of protibia often with only one major recurved spine; Africa, southeast Asia to Australia ----- Diamerini
- Lateral margins of pronotum rounded (subcostate in a few neotropical Bothrosternini); mesepimeron not enlarged or grooved (feebly grooved in *Aricerus*), scutellar shield beneath elytra small if present, not extended caudad beyond visible scutellum; scutoscutellar suture near and parallel to costa of scutellar groove on at least anterior fourth of metanotum ----- 6
6. Scutellum visible, elytral bases notched for its reception; tarsal segment 3 stout, usually somewhat bilobed (except slender in *Chramesus*), mesal surface of elytra at suture immediately behind scutellum with a series of interlocking nodules and cavities ----- Phloeosinini
- Scutellum obsolete, elytral bases only slightly if at all emarginate at suture; tarsal segment 3 slender; mesal surface of elytra at suture usually without a special lock, groove and flange extend to base at position of scutellum ----- Polygraphini

Tribe Diamerini Hagedorn, 1909

Genus *Sphaerotrypes* Blandford, 1894

Sphaerotrypes Blandford, 1894a: 61 (Type species: *Sphaerotrypes pila* Blandford, 1894)

Diagnosis.

Pronotum is dorsally carinated before the basal margin and dorsal carina strongly edged at middle. Lateral margins of pronotum are usually subacutely elevated, costate. Mesepimeron is moderately to very large and its dorsal portion is usually

grooved for reception of elytral base. Scutellar shield under base of elytra is large and extending posteriorly beyond visible scutellum. Scutoscutellar suture remote from costa of scutellar groove to its base. Outer apical angle of protibia often has only one major recurved spine.

1 *Sphaerotrypes pila* Blandford, 1894 왕둥근나무좀 (Plate 1-1)

Sphaerotrypes pila Blandford, 1894a: 62.

Sphaerotrypes carpini Eggers, 1926a: 134.

Sphaerotrypes imitans Eggers, 1926a: 134.

Description.

Body 2.4-3.0 mm, very short oval, exceedingly convex. Head with front flat in female, impressed in male, punctured, and thinly hairy, the hairs ascending on to middle of vertex, which is smooth at the sides, finely reticulate and scantily punctured. Prothorax nearly double as wide as long, its base bordered and produced backwards to form an obtuse angle, and slightly concave on either side, basal angles acute, sides rounded and strongly narrowed from base to apex; dorsum separated throughout from flanks by a fine, ridge, convex, transversely impressed behind apex, with close rugose punctuation and a narrow elevated line from base to middle, somewhat shining with a scanty covering of scales, chiefly at apex and on sides, its anterior border fringed with short hairs. Scutellum oblong, rugose. Elytra rather wider than prothorax and less than twice as long, conjointly emarginate at base, basal borders slightly rounded, crenulate, not overlapping base of thorax, basal angles very broadly rounded, sides rounded from base to apex; above dull brown covered with fuscous scales and with a dusty

appearance, due to scattered cinereous scales; striae, the striae rather deep, with obsolete and scattered punctures, interstices quite flat, rugose, more strongly at base. Underside black, punctured, thinly covered with scales. Legs blackish with tarsi lighter (Blandford, 1894a).

Korean Record. Murayama, 1930b; Murayama, 1937; Cho, 1957; Choo et al., 1983; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 2ex., GG. Incheon-si, Jung-gu, Unseo-dong, Unseo-dong, 22.vii-1.viii.2007; 2ex., JB, Gunsan-si, Gaejeog-myeon, Asan-ri, 4.vi.2011.

Distribution. Korea, China, Japan, Taiwan.

Tribe Hylastini LeConte, 1876

Key to the Genera of Tribe Hylastini

1. Third tarsal segments broad, bilobed; pronotum usually constricted anteriorly, usually about equal numbers of small and large punctures intermixed on disc; North America, N Africa, Europe, Asia; *Abies*, *Cedrus*, *Pinus*, 3.3-5.7 mm ----- *Hylurgops*
- Third tarsal segments narrower, emarginate; pronotum not noticeably constricted anteriorly, punctures uniformly large or small, rarely intermixed with a few smaller ones; North America, N Africa, Europe, Asia, Canary Islands; *Abies*, *Cedrus*, *Picea*, *Pinus*, 2.0-5.5 mm ----- *Hylastes*

Genus *Hylastes* Erichson, 1836

Hylastes Erichson, 1836: 47 (Type species: *Bostrichus ater* Paykull, 1800)

Ipsocossomus Oke, 1934: 250 (Type species: *Ipsocossomus anomalus* Oke, 1934
=*Bostrichus ater* Paykull, 1800)

Diagnosis.

Body is elongate oval, reddish brown to black, 2.0-6.0mm in length and are approximately 2.6 to 3.2 times as long as wide. Head is elongate and frons is often carinated with medial, longitudinal carina or median groove. Eyes are oval. The scape is usually as long as the 7-segmented funicle and club is ovate with three straight sutures. Pronotum is as wide as long, usually with longitudinal median ridge. Posterior margin is almost straight. Basal margin of elytra is weakly arcuated, and irregularly crenulated. The striae variably impressed, punctures distinct; interstriae variousely sculptured. The declivity is convex and has granules or rarely small tubercles. The procoxae are contiguous. Third tarsal segment emarginated. *Hylastes* is very similar to *Hylurgops* LeConte from which it is separated by having equally sized punctures on the pronotum and usually shorter vestiture on the declivity. Additionally, the pronotum is usually not constricted anteriorly as in *Hylurgops*.

Key to species of genus *Hylastes* of Korea

1. Body more than 3.5 times as long as wide ----- 2
- Body less than 3 times as long as wide ----- 5
2. Pronotum carinate longitudinally from basal two thirds at middle ----- *H. ater*
- Pronotum not carinate longitudinally ----- 3
- 3 Pronotum as long as wide, not glabrous longitudinally at middle -----
----- *H. cunicularis*

- Pronotum longer than wide, weakly glabrous longitudinally from basal two thirds at middle ----- 4
- 4. Elytral striae somewhat small, intervals slightly convex, weakly wrinkled on disc ----- *H. brunneus*
- Elytral striae somewhat big, intervals flattened not wrinkled ----- *H. parallelus*
- 5. Elytral interstriae with a simple row of short hairs ----- *H. attenuatus*
- Elytral interstriae with irregular double rows of short hairs ----- 6
- 5. Pronotum strongly carinate longitudinally at middle ----- *H. plumbeus*
- Pronotum slightly glabrous longitudinally at middle ----- *H. opacus*

2 *Hylastes ater* (Paykull, 1800) 소나무먹나무좀 (Plate 1-2)

Bostrichus ater Paykull, 1800: 153.

Hylesinus chloropus Duftschmid, 1825: 102.

Hylastes pinicola Bedel, 1888: 390.

Hylastes angusticollis Eggers, 1929a: 9.

Ipsocossonus anomalus Oke, 1934: 251.

Descriptions.

Body 3.8-5.0 mm, elongate oval, dark brown to blackish brown. Frons with longitudinal carina, densely punctured, concentric hairy. Pronotum much longer than wide, punctures large and deep, sometimes confluent each other, with longitudinal line. Scutellum oval, hairy. Elytra slightly wider than pronotum, striae rough, impressed, punctures large, interstriae narrow, convex with rows of irregular short hairs with rugose minute tubercles. Declivital interstriae more distinct.

Korean Record. Murayama, 1930b; Murayama, 1937; Cho, 1957; Choo and Woo,

1985b; Choo and Woo, 1989; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (South), China, Japan, Kazakhstan, Russia, Turkey, Europe, Australian Region (introduced); Nearctic Region (introduced).

3 *Hylastes attenuatus* Erichson, 1836 소나무가는나무좀 (Plate 1-3)

Hylastes attenuatus Erichson, 1836: 50.

Descriptions.

Body 2.0-3.1 mm, elongate oval, reddish brown to blackish brown. Frons convex with furrow, closely punctured. Pronotum slightly longer than wide, lateral margin rounded, longitudinal median line unclear and weakly ridged, punctures large, hairy. Elytra reddish brown, striae strongly impressed, interstriae somewhat convex with a row of hairs.

Korean Record. Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (South), China, Japan, Taiwan, Turkey, Europe, Madeira Archipelago.

4 *Hylastes brunneus* (Erichson, 1836) 검정뿌리나무좀 (Plate 1-4)

Hylesinus brunneus Erichson, 1836: 48.

Hylastes aterrimus Eggers, 1933a: 3.

Hylastes rotundicollis Reitter, 1895b: 60.

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North, South), China (Northern East), India, Kazakhstan, Mongolia, Turkey, Russia, Europe.

5 *Hylastes cunicularius* Erichson, 1836 가문비뿌리나무좀 (Plate 1-5)

Hylastes cuniculatus Erichson, 1836: 49.

Hylurgops starki Eggers, 1933a: 1.

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China, Japan, Kazakhstan, Russia, Syria, Turkey.

Remarks. This species was recorded by Ju (1964) and distributed only in North Korea.

6 *Hylastes opacus* Erichson, 1836 소나무애떡나무좀 (Plate 1-6)

Hylastes opacus Erichson, 1836: 51.

Hylastes simplex Rey, 1892: 30.

Descriptions.

Body 2.5-3.5 mm, blackish brown except reddish antennae and tarsi. Head regulary punctured with short decumbent hairs, eye elongate vertically. Pronotum

slightly glabrous longitudinally at middle, largely punctured, punctures with an inwardly decumbent short hairs. Scutellum small, round. Elytra 2 times as long as wide, striae round and big with short, interstriae weakly convex with irregular double rows of short hairs.

Korean Record. Murayama, 1929b; Murayama, 1930b; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North, South), Japan, Kazakhstan, Mongolia, Russia, Europe, Nearctic Area (introduced).

7 *Hylastes parallelus* Chapuis, 1875 소나무좁은나무좀 (Plate 1-7)

Hylastes parallelus Chapuis, 1875: 196.

Descriptions.

Body 4.5mm, reddish black to brownish black, long, elongate, cylindrical but slightly flattened. Antennal scrobes, funicles, and tarsi pale brown. Pronotum a little longer than wide, densely punctate with short erect setae in punctures. Punctures slightly apart from each others. Pronotal disc with a median longitudinal impunctate line. Impunctate line slightly protruded. Pronotum widest at just before base and slightly narrowing anteriorly and widely rounded at anterior margin. Setae in puncture at lateral margin decumbent outwardly and setae at basal margin decumbent posteriorly. Scutellum round, punctate with short decumbent hairs. Elytra elongate, two times longer than wide, parallel sided to three fourth of its

length, then somewhat rapidly rounded. Elytral striae clear and striae at least twice bigger than pronotal punctures. Interstices as wide as striae. Strioles slightly apart each other. Interstices with two or three irregular lines of decumbent short setae. Declivity with small denticles on interstices and three lines of setae and setae at middle thin but setae at sides twice as wide as middle one. Tarsi with same width from first to third, 4th small and almost invisible.

Korean Record. Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., Seoul, Dongdaemun-gu, Hongneung, 21.v; 1ex., GG. Hadong-eup, Hadong-gun, Songnim, 13.ix.1983; 1ex., GW. Yanggu-gun, Dong-myeon, Mt. Daeamsan, 23.v.2003; 18ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 21.iv-17.v.2011; 11ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 21.iv-17.v.2011; 13ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2012; 1ex., CB. Cheongju-si, Miwon-myeon, Miwon-ri, 29.vii-5.viii.2005; 1ex., JN. Sinan-gun, Heuksan-myeon, Is. Heuksan, 4.vi.2015.

Distribution. Korea (North, South), China, Japan, Kazakhstan, Mongolia, Taiwan, Turkey, Russia.

8 *Hylastes plumbeus* Blandford, 1894 소나무검정좀붙이 (Plate 1-8)

Hylastes plumbeus Blandford, 1894a: 57.

Hylastes obscurus Chapuis, 1876: 197 (Homonym)

Hylastes septentrionalis Eggers, 1923b: 135.

Hylurgops fushunensis Murayama, 1940: 235.

Description.

Body 2.6-3.0mm, elongate oval, dark brown to blackish brown. Frons convex except middle and transversal concave part just before clypeus; closely punctured, hairy. Pronotum slightly longer than wide, with a long longitudinal line. Punctures on pronotum large and close with short hairs. Scutellum round, hairy. Elytra wider than pronotum, basal margin weakly arcuated, and crenated, striae impressed, punctures of striae large, interstices narrow, convex with irregular double rows of short hairs and minute tubercles.

Korean Record. Murayama, 1936; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo et al., 1983a; Choo et al., 1983b; Choo and Woo, 1985b; Choo et al., 1988b; Choo and Woo, 1989a; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 2ex., GG. Pocheon-si Soheul-eup, Gwangneung, 19.v.1966; 1ex., GG. Yangpyeong-gun, Yongmun-myeon, Yeonsu-ri, Mt. Youngmunsan, 1.v.-26.v.2009; 1ex., GW. Pyeongchang-gun, Bongpyeong-myeon, Myeonol-ri Phoenixpark, 11.ix.1999; 1ex., JN. Wando-gun, Wando-eup, 21.iii.1983; 1ex. GN. Ulsan-si, Ulju-gun, Sangbuk-myeon, Mt. Gajisan, 10.v.1981; 2ex., GN. Geoje-si, Sinhyeon-eub, Mundong-ri, Mt. Bugbyeong, 13.v.2006; 3ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 22.iii-21.iv.2011; 2ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 22.iii-21.iv.2011; 392ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 21.iv-17.v.2011; 268ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 21.iv-17.v.2011.

Distribution. Korea (North, South), China, Japan, Taiwan, Russia, Europe.

Genus *Hylurgops* LeConte, 1876

Hylurgops LeConte, 1876: 389 (Type species: *Hylastes pinifex* Fitch, 1858)

Diagnosis.

Species in this genus range from 3.1 to 5.7 mm and are approximately 2.4 to 2.8 times as long as wide. The pronotum is usually as long as wide, constricted anteriorly and unarmed, also with differently sized punctures. The scutellum is small. The declivity is convex, usually bearing granules. The vestiture consists of both hair-like and scale-like setae, the last usually restricted to the declivity. The frons usually has a median carina above the epistoma. The anterior margin of the compound eye is entire. The scape is as long as the 7-segmented funicle. The club is ovate with two to three straight sutures visible. The procoxae are contiguous. *Hylurgops* are very similar to and difficult to distinguish from *Hylastes* Erichson. Most *Hylurgops* have a characteristic declivity vestiture of scale-like setae, while others have rows of long and hair-like setae. Declivital hair-like setae in *Hylastes*, if present, are not longer than the ground vestiture, and scale-like setae are absent in the majority of these species.

Key to species of genus *Hylurgops* of Korea

1. Second intervals on declivity not impressed and same with 1st and 3rd
----- 2
- Second intervals on declivity impressed and lower than 1st and 3rd -----
----- *H. interstitialis*
2. Elytral covered with short hairs at base sparsely ----- 3
- Elytral covered with short hairs at base densely ----- 4

3. Declivity covered with scale-like short hairs sparsely ----- *H. spessiweffi*
 - Declivity covered with scale-like short hairs densely ----- *H. longipillus*
4. Pronotum carinate longitudinally from basal two thirds at middle, body 2.5-4.0
 mm ----- *H. palliatus*
 - Pronotum glabrous longitudinally from basal two thirds at middle, body 4.5-5.6
 mm ----- *H. glabratus*

9 *Hylurgops glabratus* (Zetterstedt, 1828) 갈색소나무좀 (Plate 1-9)

Hylurgus glabratus Zetterstedt, 1828: 343 (NP)

Hylastes decumanus Erichson, 1836: 51.

Hylesinus paykullii Duftschmid, 1825: 99. (NO)

Hylesinus tenebrosus C. R. Sahlberg, 1836a: 139.

Korean Record. Murayama, 1929b; Murayama, 1930a; Murayama, 1930b; Murayama, 1936; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo et al., 1983b; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North, South), China, Japan, Kazakhstan, Mongolia, Taiwan, Turkey, Russia.

10 *Hylurgops interstitialis* (Chapuis, 1875) 소나무줄나무좀 (Plate 1-10)

Hylastes interstitialis Chapuis, 1875: 196.

Hylurgops niponicus Murayama, 1936: 142.

Description.

Body 4.2-5.2mm, robust, elongate oval, reddish brown to reddish black. Frons with a transversal impression in middle, closely punctate with short hair. A longitudinal ridge on clypeus. Pronotum wider than long with longitudinal median line, intermixed small and large punctures. Scutellum small, subcircular, and hairy. Elytra wider than pronotum, basal margin weakly curved and crenated. Striae impressed, punctures large, interstriae convex with irregular many scale-like short hairs, a row of somewhat long setae, and small tubercles. 2nd declivital interval slightly narrower than other intervals and weakly concave.

Korean Record. Ju, 1964; Ju, 1969; Choo et al., 1983b; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., Seoul, Dongdaemun-gu, Hongneung, v.1990; 5ex., Seoul, Dongdaemun-gu, Hongneung, 2.viii.1990; 4ex., Seoul, Seodaemun-gu, 14.vii.2007; 1ex., GG. Pocheon-si, Mt. Jugyeopsan, 21.v.1994; 1ex., GG. Gapyeong-gun, 20.iv.2009; 1ex., GW. Yangyang-gun, 25.vi.1985; 1ex., GW. Pyeongchang-gun, Jinbu-myeon, Mt. Odaesan, Temple Sangwonsa, 24.iv.1997; 17ex., GW. Chuncheon-si, Seo-myeon, Seosang-ri, 21.vii.1997; 1ex., CN. Gongju-si, Banpo-myeon, Dongam-ri, 16-23.viii.2005; 1ex., JB. Jeongeub-si, Bug-myeon, majeong-ri, 26.vii-2.viii.2005; 17ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 1.v.2012; 22ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 2ex., GW. Pyeongchang-gun, yeongpyeong-myeon, soksa-ri, 15.iv-11.v.2016; 2ex., JB. Jeongeub-si, Bug-myeon, majeong-ri, 9-16.viii.2005; 2ex., JB. Jeongeub-si, Bug-myeon, majeong-ri,

16-23.viii.2005; 1ex., JB. Jeongeub-si, Bug-myeon, majeong-ri, 30.viii-6.ix.2005; 20ex., JN. Wando-gun, 21.iii.1983; 1ex., JN. Suncheon-si, Seungju-eup, 14.vii.1999; 1ex., GN. Hadong-gun, Okjong-myeon, vi.1981; 2ex., GN. Hadong-gun, Okjong-myeon, Hangye, 10.viii.1981; 1ex., GN. Sacheon-si, Yonghyeon-myeon, Seokgye-ri, 15.ix.1998; 666ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 22.iii-21.iv.2011; 424ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 22.iii-21.iv.2011; 73ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 21.iv-17.v.2011; 167ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 21.iv-17.v.2011.

Distribution. Korea (North, South), China, Japan, Russia (Far East).

11 *Hylurgops longipillus* (Reitter, 1895) 우쭈리잔털나무좀 (Plate 1-11)

Hylurgops longipillus Reitter, 1895b: 63.

Hylastes imitator Reitter, 1900: 59.

Hylurgops likiangensis Tsai & Hwang, 1964b: 237, 240.

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China, Japan, Russia (Far East).

12 *Hylurgops palliatus* (Gyllenhal, 1813) 눈잣나무좀 (Plate 1-12)

Hylesinus palliatus Gyllenhal, 1813: 340.

Bostrichus abietiperda Bechstein, 1818: 74.

Hylesinus fuscus Duftschmid, 1825: 105.

Hylurgus helferi A. Villa & G. B. Villa, 1835: 49.

Hylesinus marginatus Duftschmid, 1825: 104.

Hylurgops parvus Eggers, 1933a: 2.

Ips piceus Marsham, 1802: 58. (NO)

Hylurgus rufescens Stephens, 1830: 364.

Ips rufus Marsham, 1802: 57. (NO)

Korean Record. Ju, 1964; Ju, 1969; Choo and Woo, 1989a; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North, South), China, Japan, Kazakhstan, Russia, Turkey, Nearctic Region (introduced).

13 *Hylurgops spessiwezefi* Eggers, 1914 비로봉소나무좀 (Plate 2-13)

Hylurgops spessiwezefi Eggers, 1914b: 187.

Hylurgops modestus Murayama, 1937: 367.

Hylurgops squamosus Murayama, 1942: 56.

Description.

Body 3.9-4.5mm, robust, elongate oval, blackish brown to black. Frons with a transversal impression in middle, closely punctate with short hair. A longitudinal ridge on clypeus. Pronotum wider than long with longitudinal median line and only covered with large punctures. Scutellum small, subcircular, and hairy. Elytra wider than pronotum, basal margin weakly curved and crenated. Striae impressed, punctures large, interstriae convex with irregular weak scale-like short hairs, a low of somewhat long setae, and small tubercles. 2nd declivital interval almost

same with other intervals and not concave.

Korean Record. Murayama, 1937; Murayama, 1942; Cho, 1957; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 8ex., GW, Pyeongchang-gun, Yeongpyeong-myeon, Soksa-ri, 15.iv-11.v.2016.

Distribution. Korea (North, South), China (Northern East), Japan, Russia, Taiwan.

Tribe Hylesinini Erichson, 1836

Key to the Genera of Tribe Hylesinini

1. Funicle 6-segmented; male and female frons impressed, strongly in male, moderately in female, impression not extending above upper level of eyes; eye shallowly emarginate, elytral ground vestiture scalelike, costal margin near apex descending; E. Asia; 2.2-2.8 mm ----- *Neopteleobius*
- Funicle 7-segmented; female frons flat to convex; male frons, if strongly concave, with excavation extending above eyes; eye less strongly to not emarginate ----- 2
2. Eye entire, oval, less than 3.0 times as long as wide; protibia armed on lateral margin of apical fourth by six or more closely set, socketed teeth; body stouter; declivity more gradual, abdomen distinctly ascending to meet elytral apex; elytral vestiture of uniform length, mostly of scales (except almost subglabrous in *crenatus*), almost worldwide; *Fraximis and other Oleaceae*; 1.7-4.8 mm ----- *Hylesinus*
- Eye shallowly emarginate, somewhat elongate, at least 3.3 times as long as

wide; protibia armed by 2-.5 socketed teeth; body more slender; declivity shorter, more abrupt, abdomen horizontal, not rising to meet elytral apex; elytral vestiture of ground cover of short hair or scales, and interstitial rows of longer, erect bristles Japan to North America; *Alnus*; 2.1-3.4 mm ----- *Alniphagus*

Genus *Alniphagus* Swain, 1918

Aliphagus Swain, 1919: 73 (Type species: *Hylesinus aspericollis* LeConte, 1876)

Hylastinoides Spessivtsev, 1919: 249 (Type species: *Hylastes alni* Niisima, 1909
=*Hylesinus costatus* Blandford, 1894)

Diagnosis.

Species in this genus range from 2.1 to 3.4 mm in length and are approximately 2.0 to 2.1 times as long as wide. The two North American species in this genus have a slight contrasting color between the pronotum and the elytra, the pronotum ranging from dark brown to reddish with yellowish to light brown elytra. The pronotum is wider than long, with the anterolateral areas armed by several asperities. The scutellum is small. The declivity is convex and has pointed tubercles. The vestiture consists of hair-like setae. The anterior margin of the compound eye is emarginate. The scape is nearly as long as the 7-segmented funicle. The club is ovate and flattened, marked by three straight sutures, the first partly septate. The procoxae are separated.

14 *Alniphagus costatus* (Blandford, 1894) 거철오리나무좀(신칭) (Plate 2-14)

Hylesinus costatus Blandford, 1894a: 63.

Hylastes alni Niisima, 1909: 137.

Alniphagus imitator Sokanovskiy, 1958: 38.

Description.

Body Length. 3.4 mm, oblong, black with elytra obscurely piceous. Head with labrum pitchy, separated by a transverse depression from front, which is flattened, shining, strongly punctured and glabrous; vertex finely reticulate. Antennae ferruginous, club small, pointed, sutures transverse. Prothorax transverse, base biconcave, depressed, scarcely produced in middle, sides strongly rounded; surface convex, finely reticulate and with strong asperate punctuation somewhat weaker at base, with traces of a central elevation; sides tuberculate before apex. Scutellum small, punctured. Elytra wider than prothorax and two and a half times as long, their bases convex, overlapping thorax, sides parallel to middle, then rounded to apex, surface convex cylindrical, strongly declivous behind, with strong punctured striae, the punctures round and distinct; all interstices transversely rugose and punctured to middle, 1,3,5,7 and 9 after middle with a series of transverse asperities which become strongly tuberculate on the apical declivity, where the interstices are elevated; alternate interstices not asperate behind middle, multipunctate. Underside black, punctured, shortly pubescent, metasternum with a deep longitudinal impression, its episterna not very narrow; abdomen scarcely convex longitudinally, its terminal segment rugose. Tibiae spined externally (Blandford, 1894a).

Korean Record. Ju, 1964; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China, Japan, Russia (Far East), Taiwan.

Remarks. This species had not Korean name. So, I made Korean name with the characters on pronotum and elytral declivity. The host plants of this species are known to *Betula* sp., *Alnus* sp., and so on.

Genus *Hylesinus* Fabricius, 1801

Hylesinus Fabricius, 1801: 390 (Type species: *Bostrichus crenatus* Fabricius, 1787)

Leperisinus Reitter, 1913b: 41 (Type species: *Bostrichus fraxini* Panzer, 1799
=*Bostrichus varius* Fabricius, 1775)

Diagnosis.

Species in this genus range from 1.8 to 4.0 mm in length and are 1.8 to 2.0 times as long as wide. The pronotum is wider than long and usually armed on the anterolateral areas by coarse asperities. The scutellum is small. The anterior margin of the elytra is armed by a row of overlapping crenulations. The declivity is convex. The vestiture consists of a mixture of white, light brown and/or black scales in a variety of patterns. The anterior margin of the compound eye is sinuate. The scape is usually as long as the 7-segmented funicle. The club is large and ovate with three straight sutures. The procoxae are subcontiguous. *Hylesinus* can be easily distinguished by characters of the anterior margin of the eye which is sinuate in *Hylesinus*, entire in *Hylastinus* Bedel, and emarginate in *Alniphagus* Swaine. It can also be distinguished by having a patterned coloration, due to the light and dark colored scale-like setae that cover their bodies.

Key to species of genus *Hylesinus* of Korea

1. Elytral covered with scale-like short hairs ----- 2

- Elytral covered with normal hairs ----- *H. toranio*
- 2. Elytral covered with two kind of colored scale-like hairs making some pattern
----- 3
- Elytral covered with one colored scale-like hairs without pattern ----- 4
- 3. Yellowish colored scale-like hairs making round circular band on elytra.
----- *H. cingulatus*
- Mostly covered with yellowish red scale-like hairs and irregular stripes pattern
with brownish hairs on elytra ----- *H. eos*
- 4. Pronotal asperities somewhat bigger, stout and irregular ----- *H. laticollis*
- Pronotal asperities somewhat smaller and regular ----- *H. tristis*

15 *Hylesinus cingulatus* Blandford, 1894 물푸레나무좀 (Plate 2-15)

Hylesinus cingulatus Blandford, 1894a: 67.

Description.

Body 2.3-2.8 mm, black, dull. Head closely granulate, front hairy, impressed in male, subconvex in female. Antennae ferruginous, club rather broad, obtusely pointed, with dark pubescence. Prothorax with base bisinuate, not produced as in *H. laticollis* and *H. tristis*, sides rounded at base, thence narrower and straighter to apex; above uniformly convex, thinly hairy, without scales, granulate, the asperities stronger towards the sides, which are distinctly tuberculate in front. Elytra as wide as prothorax, and two and a half times longer, separately rounded at base, overlapping thorax, sides subparallel, feebly sinuate to behind middle, thence rounded; surface convex, obliquely declivous behind, striate, the striae punctured to behind middle, interstices tuberculate at base, then rugose, covered

with short hairs and scales, blackish except on middle of elytra, where they form a transverse cinereous-brown vitta, curved backwards at sides so as to cover the apices of the 5th to the marginal interstices, and continued narrowly along apical margin, forming an irregular oval. Underside punctured, with rather dense cinereous pubescence; abdomen not strongly convex. Legs ferruginous or pitchy, with tarsi lighter, front tibiae hairy, spined externally (Blandford, 1894a).

Korean Record. Ju, 1964; Ju, 1969; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1 ex., GW, Inje-gun, 30.iv.2015.

Distribution. Korea (North, South), China, Japan, Russia (Far East).

16 *Hylesinus eos* Spessivtsev, 1919 물푸레인피나무좀 (Plate 2-16)

Hylesinus eos Spessivtsev, 1919: 248.

Description.

Body 2.3-2.9 mm, small, oblongly convex, dark brown. Frons slightly concave, closely covered with hairs and granules. Pronotum wider than long, widest at base, bisinuate at basal margin, near antero-lateral margin with asperities, closely unctate and thinly decumbent hairy. Scutellum small, round. Elytra slightly wider than pronotum, basal margin elevated and crenated. Striae clear and impressed, interstriae crenated anteriorly like rugosities, covered with scales forming characteristic pattern. Declivity broadly rounded, interstriae with tiny rugose tubercles.

Korean Record. Ju, 1964; Ju, 1969; Choo and Woo, 1985b; Choo and Woo,

1989a; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 2ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 1.v.2012; 21ex., GB, Yeongil-gun, Jukjang-myeon, Habuk-ri, 16.vii.1983.

Distribution. Korea (North, South), China, Japan, Russia (Far East).

Remarks. Choo and Woo (1985b, 1989a) mis-recorded this species with *H. cingulatus*.

17 *Hylesinus laticollis* Blandford, 1894 들메인피나무좀 (Plate 2-17)

Hylesinus laticollis Blandford, 1894a: 65.

Hylesinus striatus Eggers, 1933a: 4.

Hylesinus lubarskii Stark, 1936a: 153.

Description.

Body 4.0-4.2 mm, broad oval, convex, black. Head strongly punctured, front flattened, shortly hairy; in two specimens probably males, impressed over mouth with a fine central carina, and with stronger pubescence; in the other, probably a female, with impression and carina obsolete and hairs scantier; epistoma shortly produced over mandibles, vertex reticulate. Antennae ferruginous, club long, stout, with transverse sutures. Prothorax very transverse, narrowed from base to apex, with sides rounded, base strongly produced in middle, surface asperately punctured, with short bristles, closer at sides, with an indistinct smooth central line, and an oblique impression on either side before and parallel to base; sides muricate towards apex. Scutellum rounded, rugose. Elytra wider than prothorax and two and a half times longer, widest in middle, base of each strongly rounded and crenulate; sides slightly rounded to middle, gradually more strongly towards

apex, which is obtuse; surface obliquely and not strongly declivous to apex, with deep rather wide striae, obsolete to middle, thence smooth, interstices coarsely tuberculate at base, the tubercles becoming finer, and being replaced behind the middle by short fuscous scales, which give the elytra a brownish tinge; the two outer interstices and lateral margin with a close covering of short bristles. Underneath coarsely punctured, shortly hairy; abdomen more convex longitudinally than elytra, first two segments much longer than last three, fourth and fifth bristly. Spines of anterior tibiae nearly obsolete (Blandford, 1894a).

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China, Japan, Russia (Far East).

18 *Hylesinus pravdini* Stark, 1936 양털인피나무좀 (Plate 2-19)

Hylesinus pravdini Stark, 1936a: 153.

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), Russia (Far East).

19 *Hylesinus toranio* (D'Anthoine, 1788) 두색향나무좀 (Plate 2-19)

Byrrhus toranio D'Anthoine, 1788: 270.

Bostrichus oleiperda Fabricius, 1792: 366.

Ips scaber Marsham, 1802: 56.

Hylesinus bicolor Brullé, 1832: 250.

Hylesinus suturalis W. Redtenbacher, 1842: 21.

Hylesinus esau Gredler, 1863: 370.

Hylesinus antipodus Schedl, 1952a: 17.

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), Israel, Japan (Introduced), Lebanon, Turkey, Europe, North Africa.

Remarks. Although this species was recorded in North Korea, the distributions in other countries are restricted in Europe and adjacent regions. It was also introduced in Japan, so the distribution in Korea is very doubtful.

20 *Hylesinus tristis* Blandford, 1894 물푸레떡나무좀 (Plate 2-20)

Hylesinus tristis Blandford, 1894a: 66.

Description.

Body 3.0-3.5 mm, similar in sculpture and appearance to *H. laticollis*, but smaller, more oblong-oval, less strongly convex, the elytra more declivous behind, as convex as ventral surface. Front in male broadly impressed between eyes with a short central carina, pubescent; in female, narrowly impressed over mouth, flat between eyes, with pubescence thin. Prothorax less transverse than in *H. laticollis*, with sides less narrowed to apex, and base less strongly produced in middle, its sculpture similar. Elytra narrower, subparallel to middle, less obtuse at apex, interstices less coarsely tuberculate at base, alternate interstices behind middle with an indistinct row of stronger tubercles in the male; laterl setae shorter throughout,

inconspicuous before middle of elytra. Anterior tibiae distinctly spinose on outer margin (Blandford, 1894a).

Korean Record. Murayama, 1930b; Murayama, 1936; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., GW. Hoengseong-gun, vi.2007; 30ex., GB. Yeongil-gun, Jukjang-myeon, Habuk-ri, 16.vii.1983.

Distribution. Korea (North, South), Japan.

Genus *Neopteleobius* Nobuchi, 1971

Neopteleobius Nobuchi, 1971a: 125 (Type species: *Hylesnius scutulatus* Blandford, 1894)

Diagnosis.

Oblong, cylindrical. Colour pattern composed of dark brown to gray scales in various patterns. Frons flattened in female, deeply impressed and clothed with rather broad setae. Eyes oblong, distinctly emarginated in anterior margin. Antennae inserted near base of mandibles; scapes long; funicles six-segmented; clubs elongate-ovate, flat, longer than funicles, with transverse two sutures. Pronotum regularly convex, rather broader than long, widest at near base, roundly narrowed anteriorly on lateral sides, tuberculate on antero-lateral portions and in anterior margin, with short erect setae in anterior margin. Elytra cylindrical, nearly two-thirds as wide as long, subparallel to behind middle on lateral sides; basal margins curved and crenulate; striae narrow and deep; interstriae wide and not or slightly elevated, with rather broad setae; declivity abruptly arched and convex.

Anterior coxae widely separated at base; prosternum elevated between coxae. Third tarsal segments widened and bilobed. Abdominal sternites almost horizontal.

21 *Neopteleobius scutulatus* (Blandford, 1894) 느릅나무좀 (Plate 2-21)

Hylesinus scutulatus Blandford, 1894a: 67.

Pteleobius trepanatus Wichmann, 1914a: 137.

Description.

Body 2.7 mm, oblong, cylindrical, black, tessellated with close-lying grey and brownish scales. Head granulate with front flattened, hairy, impressed and more densely hairy in the male. Antennae black, club rather short, acuminate oval, its basal joint large. Prothorax rather broader than long, its base bisinuate, not produced, sides uniformly rounded, tuberculate in front, surface regularly convex, front and sides with short erect bristles. Elytra cylindrical, wider at base than thorax, and a little more than twice as long, base crenulate, sides subparallel to behind middle, apex strongly declivous and convex; with rather fine punctured striae, interstices flat with a single row of setae throughout, and with one or two tubercles at base. Underside strongly punctured with short scalelike hairs, metathoracic episterna narrow, abdomen not convex longitudinally. Legs black, with tarsi lighter (Blandford, 1894a).

Korean Record. Murayama, 1930b; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo et al., 1983b; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 7ex., Seoul, Dongdaemun-gu, Hongneung, viii.1990; 3ex.,

GG. Pocheon-si Soheul-eup, Gwangneung, 18.ix.1982; 6ex., GG. Pocheon-si Soheul-eup, Gwangneung, 18.x.1982; 2ex., GG. Pocheon-si Soheul-eup, Gwangneung, 18.xi.1982; 3ex., GG. Pocheon-si Soheul-eup, Gwangneung, 3.xii.1982; 1ex., GG. Gunpo-si, Sokdal-dong, Mt. Surisan, 16.x.2008; 1ex., JB, Jeonju-si, Deokjin-gu, Ua-dong, 1-ga, 3.vi.2011; 1ex., JN. Suncheon-si, Temple Songgwangsa, 2.ii.1999; 1ex., JN. Jangseong-gun, Temple Baegyangsa, 2.ii.1999.

Distribution. Korea (North, South), China, Japan, Russia (Far East).

Tribe Hylurgini Gistel, 1848

Key to the Genera of Tribe Hylurgini

1. Ground vestiture on elytra scalelike, metepisternal setae scalelike; antennal funicle 5-segmented; median frontal carina present (except absent in a few South American species); procoxae rather widely separated; North and South America, Europe, Asia, Africa, Australia; coniferous and broadleaf hosts; 1.5-3.5 mm ----- *Xylechinus*
- Ground vestiture on elytral disc hairlike, metepisternal setae hairlike ----- 2
- 2 Procoxae contiguous; pronotum more slender, 0.95-1.1 times as long as wide, only slightly constricted on anterior third; erect interstitial setae abundant, confused; a short median carina from epistomal margin to level of antennal insertion; Europe, W. Asia; 3.1-5.3mm ----- *Hylurgus*
- Procoxae moderately separated; pronotum stouter, less than 0.85 times as long as wide, strongly constricted on anterior third; erect interstitial setae in uniseriate rows (except confused in *T. puellus*), a fine median carina from epistoma to middle of frons (absent in *T. puellus*), Europe, Asia, N. Africa; 2.5-4.5mm -----
----- *Tomicus*

Genus *Hylurgus* Latreille, 1806

Hylurgus Latreille, 1806: 274 (Type species: *Bostrichus ligniperda* Fabricius, 1787)

Diagnosis.

Species in this genus range from 2.0 to 5.7 mm in length. The pronotum is longer than wide. The declivity is convex and unarmed; sexual dimorphism is presented in this genus by the second declivital interstriae of females which are more clearly impressed than in males. The vestiture consists of hair-like setae. The frons is transversely impressed. The anterior margin of the compound eye is entire. The scape is longer than the 6-segmented funicle. The club is ovate with 3 straight sutures. The procoxae are contiguous. This genus resembles the genus *Dendroctonus* Erichson, which differs in having a 7-segmented funicle.

22 *Hylurgus ligniperda* (Fabricius, 1787) 왕털소나무좀(신칭) (Plate 2-17)

Bostrichus ligniperda Fabricius, 1787: 37.

Bostrichus elongatus Herbst, 1794a: 117.

Bostrichus flavipes Panzer, 1799a: 9.

Hylurgus longulus Kolenati, 1846: 38.

Descriptions.

Body 4.0-5.7 mm. Body cylindrical, moderately stout. Derm blackish brown to black covered with brown hairs. Frons with a tubercle on anterior part. Pronotum shining but clearly punctuate. Elytral striole clear, but intervals rough and more or less wrinkle. Elytral declivity slightly concave covered with dense pubescences.

Korean Record. New to Korea.

Specimens examined. JN, 1ex., Seungju-eub, Suncheon-si, 14.vii.1999; JB, 1ex., Majeong-ri, Jeongeub-si, 19-26.vii.2005; GW, 1 ex., Hoengseong-gun, 10. vi. 2007.

Distribution. Korea (South), Japan, China, Europe, Afrotropical region, Australian region, Nerctic Region.

Genus *Tomicus* Latreille, 1802

Tomicus Latreille, 1802: 203 (Type species: *Dermestes piniperda* Linnaeus, 1758)

Diagnosis.

The size of the species on this genus ranges from 2.9 to 5.4 mm in length. The elytral color ranges from yellowish brown to almost black with a darker pronotum. The pronotum is wider than long, shiny and unarmed. The scutellum is small and depressed. The declivity is convex bearing interstrial granules with a vestiture of erect hair-like setae. The frons has a median vertical carina above the epistoma. The anterior margin of the compound eye is entire. The scape is as long as the 6-segmented funicle. The club is ovate with three straight sutures. The procoxae are contiguous with no prothoracic elevated ridges. This genus from the subtribe Tomicina is closely related to *Hylurgus* Latreille. *Tomicus* are less hairy overall and the surface of both the frons and the declivity are shiny versus asperate on *Hylurgus*.

Key to the species of genus *Tomicus* of Korea

1. Interstria 2 on declivity with rows of small granules, not impressed (weakly impressed in some *T. minor*) ----- 2

- Interstria 2 devoid of granules, clearly impressed ----- 4
- 2. Elytral vestiture consisting of longer, erect interstitial hairs in uniseriate rows and shorter decumbent hairs (ground vestiture), erect hairs longer on declivity. Elytral declivity with conspicuous interstitial tubercles in regular uniseriate rows. Larger species, length 3.1-5.2 mm. ----- 3
- Elytral interstitial hairs and ground vestiture equally short, dense, confused, decumbent or nearly so, not longer on declivity. Elytral interstriae strongly crenulate; interstitial tubercles large, transversely confluent, confused. Interstitial punctures confused on declivity, only slightly larger than striae punctures; interstitial tubercles inconspicuous on declivity. Smallest species, length 2.9-3.5 mm. Maternal gallery monoramous, longitudinal. ----- *T. puellus*
- 3. Interstitial punctures on disc and declivity fine points, difficult to see with normal lighting, not dense. Declivital ground vestiture absent or sparse and difficult to see, inconspicuous. Pronotal punctures sparse, most separated by much more than their diameter; most specimens with a distinct central impunctate longitudinal median strip. Antennal club pale to medium brown, at most little darker than funicle. Larger, length 3.2-5.2 mm. Maternal gallery biramous, transverse. ----- *T. minor*
- Interstitial punctures on disc and declivity conspicuous, uniformly dense, on declivity only slightly smaller than, or equal to, striae punctures. Declivity densely hairy due to abundant conspicuous decumbent ground vestiture. Pronotal punctures dense, separated on average by about their diameter, no impunctate median strip. Antennal club brown to dark brown, distinctly darker than funicle. Smaller, length 3.0-4.3 mm. Maternal gallery monoramous, longitudinal. ----- *T. pilifer*

4. Granules on declivity somewhat big, acute, clearly visible on 1st, 3rd, 4th, 5th interstices ----- 5
- Granules on declivity minute, only several ones clearly visible on 1st and 3rd interstices at elytral summit ----- *T. heuksandoensis*
5. Erect elytral hairs on disc longer, about as long as distance between striae; erect hairs on declivity distinctly longer than those on disc. Antennal club brown, antenna uniformly colored. Interstria 2 on declivity strongly impressed and concave, with uniseriate, regularly spaced fine punctures. More slender, elytra 1.7-1.8x longer than wide; larger, length 3.5-5.2 mm. Elytra usually longer than twice width of pronotum. Maternal gallery monoramous, longitudinal ----- *T. piniperda*
- Erect elytral hairs on disc shorter, about 0.5x as long as distance between striae; erect hairs on declivity as long as those on disc. Antennal club brown to dark brown, usually noticeably darker than funicle. Interstria 2 on declivity weakly impressed, with punctures very fine, uniseriate, sparse, often widely spaced or even absent on much of declivity. Stouter, elytra 1.6x longer than wide; smaller, length 3.2-4.4 mm. Elytra shorter than twice width of pronotum. Maternal gallery unknown, but probably monoramous and longitudinal ----- *T. brevipilosus*

23 *Tomicus brevipilosus* (Eggers, 1929) 잣나무좀 (Plate 2-23)

Blastophagus brevipilosus Eggers, 1929c: 103.

Blastophagus khasianus Murayama, 1959: 75.

Blastophagus multisetosus Murayama, 1963a: 37.

Description.

Body 3.2-4.4 mm, dark brown to blackish brown, smaller, stouter, elytra 1.6x longer than wide. fine punctures of interstria 2 on declivity uniseriate; punctures of striae 1 to 3 on declivity more than twice as large as fine interstitial punctures. Granules on interstriae 2 and 3 on disc closely spaced, most by a distance equal to 1.5-2.5 punctures of adjacent striae. Antennal club brown, same color as or darker than funicle. Elytra shorter than twice width of pronotum. Erect elytral hairs on disc shorter, about 0.5x as long as distance between striae; erect hairs on declivity as long as those on disc. Antennal club brown to dark brown, usually noticeably darker than funicle. Interstria 2 on declivity devoid of granules and weakly impressed, with punctures very fine, uniseriate, sparse, often widely spaced or even absent on much of declivity. Granules on declivity somewhat big, acute, clearly visible on 1st, 3rd, 4th, 5th interstices.

Korean Record. Choo et al., 1983b; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea, China, Japan.

Remarks. Although Choo et al. (1983b) recorded this species and described with 2-3 lines of short pubescences on intervals, but this character is not occurred in *T. brevipilosus* of the photos in Kirkendall et al. (2008). But, the voucher specimen used in this paper which is preserved in Japan, has very short erect hairs and 2-3 lines of short decumbent hairs and second interstria is not impressed as the photos and key in 2008. So, the Chinese and Japanese *T. brevipilosus* specimens with the original type specimens should be checked again.

24 *Tomicus minor* (Hartig, 1834) 애소나무좀 (Plate 2-24)

Hylesinus minor Hartig, 1834: 413.

Myelophilus corsicus Eggers, 1911a: 75.

Description.

Body length 3.2-5.2 mm, larger, reddish brown to dark brown, usually elytra reddish or slightly more light colour than body or pronotum. Antennal club pale to medium brown, at most little darker than funicle. Scutellum conical, shining without hairs. Interstrial punctures on disc and declivity fine points, difficult to see with normal lighting, not dense. Declivital ground vestiture absent or sparse and difficult to see, inconspicuous. Pronotal punctures sparse, most separated by much more than their diameter; most specimens with a distinct central impunctate longitudinal median strip. Interstria 2 on declivity with rows of small granules, not impressed. Granules on declivity somewhat big, acute, clearly visible on all interstices.

Korean Record. Murayama, 1929a; Murayama, 1930b; Cho, 1957; Lee and Cho, 1959; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 4ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 22.iii-21.iv.2011; 8ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 22.iii-21.iv.2011; 1ex., GN. Jinju-si, Banseong-myeon, Dapcheon-ri, 29.viii-12.ix.2005; 1ex., GN. Jinju-si, 12.vii.2007.

Distribution. Korea (North, South), China, Cyprus, Japan, Kazakhstan, Mongolia,

Russia, Turkey.

25 *Tomicus pilifer* (Spessivtsev, 1919) 잣솔털나무좀 (Plate 2-25)

Myelophilus pilifer Spessivtsev, 1919: 250.

Description.

Body length 3.0-4.3 mm, smaller, somewhat reddish brown to dark brown. Antennal club brown to dark brown, distinctly darker than funicle. Interstrial punctures on disc and declivity conspicuous, uniformly dense, on declivity only slightly smaller than, or equal to, strial punctures. Declivity densely hairy due to abundant conspicuous decumbent ground vestiture. Pronotal punctures dense, separated on average by about their diameter, no impunctate median strip.

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 22.iii-21.iv.2011; 24ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 22.iii-21.iv.2011; 6ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 21.iv-17.v.2011; 2ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 1.v.2012; 3ex., GG, Pocheon-si, Soheul-eub, Kwangreung, 25.vii.2012.

Distribution. Korea (North, South), China, Russia (Far East).

26 *Tomicus piniperda* (Linnaeus, 1758) 소나무좀 (Plate 3-26)

Dermestes piniperda Linnaeus, 1758: 355.

Hylurgus analogus LeConte, 1868: 172.

Blastophagus major Eggers, 1943a: 50.

Bostrichus testaceus Fabricius, 1787: 37.

Description.

Body length 3.5-5.2 mm, larger, dark brown to blackish brown. Antennal club brown, antenna uniformly colored or club darker than funicle. Pronotum evenly punctate with erect but slightly decumbent hairs on punctures, hairs short or long. Scutellum conical, shining without hairs. Erect elytral hairs on disc longer, about as long as distance between striae; erect hairs on declivity distinctly longer than those on disc. Interstria 2 on declivity strongly impressed and concave, with uniseriate, regularly spaced fine punctures. More slender, elytra 1.7-1.8x longer than wide. Elytra usually longer than twice width of pronotum. Interstria 2 devoid of granules, clearly impressed. Fine punctures of interstria 2 on declivity uniseriate; punctures of striae 1 to 3 on declivity more than twice as large as fine interstitial punctures. Granules on interstriae 2 and 3 on disc closely spaced, most by a distance equal to 1.5-2.5 punctures of adjacent striae. Granules on declivity somewhat big, acute, clearly visible on 1st, 3rd, 4th, 5th interstices.

Korean Record. Ueki, 1911; Homiki, 1917; Murayama, 1929a; Murayama, 1930b; Murayama, 1936; Cho, 1957; Lee and Cho, 1959; Ju, 1964; Ju, 1969; Choo et al., 1983b; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., GG. Suwon-si, Gwonseon-gu, Seodun-dong, 17-18.viii.1996; 1ex., GG. Hwaseong-si, Songsan-dong, Temple Yongjusa, 3.vi.2005; 1ex., GG. Incheon-si, Ganghwa-gun, Ganghwa-eup, 2.vii.2006; 1ex., GW.

Hongcheon-gun, 10.vi.2012; 4ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwang-san, 1.v.2012; 5ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2012; 1ex., GW. Goseong-gun, Ganseong-eup, Heul-ri, 15.iv-11.v.2016; 2ex., JN. Gurye-gun, Toji-myeon, Piagol, 17.vii.1968; 1ex., GB. Kyeongju-si, Hyeongog-myeon, Namsa-ri, 25.viii-2.ix.2005; 1ex., GN. Hadong-gun, Okjong-myeon, vi.1981; 2ex., GN. Jinju-si, 12.vii.2007; 324ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 22.iii-21.iv.2011; 1839ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 22.iii-21.iv.2011; 45ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 21.iv-17.v.2011; 185ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 21.iv-17.v.2011.

Distribution. Korea (North, South), China, Cyprus, Japan, Kazakhstan, Mongolia, Russia, Taiwan, Turkey, Europe, North Africa, Nearctic Region (introduced), Oriental Region.

27 *Tomicus puellus* (Reitter, 1895) 가문비나무좀 (Plate 3-27)

Myelophilus puellus Reitter, 1895b: 53.

Blastophagus orientalis Krivolutskaya, 1956: 828.

Blastophagus starki Eggers, 1929c: 104.

Description.

Body length 2.9-3.5 mm, smallest species, yellowish brown to pale brown. Elytral interstitial hairs and ground vestiture equally short, dense, confused, decumbent or nearly so, not longer on declivity. Elytral interstriae strongly crenulate; interstitial tubercles large, transversely confluent, confused. Interstitial punctures confused on declivity, only slightly larger than striae punctures; interstitial tubercles

inconspicuous on declivity.

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), Japan, Russia (Far East).

28 *Tomicus heuksandoensis* **sp. nov.** 흑산도소나무좀(신칭) (Plate 3-28; Fig. 11)

Description.

Body 4.2-4.4mm, dark brown to blackish brown except reddish brown antennal funicle and tarsi. Antennal club dark brown and darker than funicle. Pronotum evenly punctate with erect but slightly decumbent hairs on punctures. Scutellum conical, shining without hairs. Erect elytral hairs on disc longer, about as long as distance between striae; erect hairs on declivity distinctly longer than those on disc. Fine punctures of interstria 2 on declivity uniseriate; punctures of striae 1 to 3 on declivity more than twice as large as fine interstitial punctures. Granules on interstriae 2 and 3 on disc closely spaced, most by a distance equal to 1.5-2.5 punctures of adjacent striae.

Korean Record. New to Korea.

Specimens examined. Holotype: JN, Sinan-gun, Heuksan-do, 8.v.2015; Paratypes: 50exs., same locality with holotype, 8.v-15.x.2015.

Distribution. Korea (South).

Etymology. The species name comes from the type locality.

Remarks. This species occurred and found in Heuksan-do Islands during the survey for the pest of pine tree in National park area. External shape very close to *T. piniperda*, but the life cycle and occurrence patterns are clearly different.

Genus *Xylechinus* Chapuis, 1869

Xylechinus Chapuis, 1869: 36 (Type species: *Hylesinus pilosus* Ratzeburg, 1837)

Pruniphagus Murayama, 1958: 930 (Type species: *Pruniphagus gummensis* Murayama, 1958)

Squamosinus Nunberg, 1964: 431 (Type species: *Squamosinus chiliensis* Nunberg, 1964)

Xylechinops Browne, 1973: 283 (Type species: *Xylechinus australis* Schedl, 1957)

Diagnosis.

Species in this genus range from 1.5 to 3.5 mm in length and are approximately 2.0 to 2.4 times as long as wide. Their color ranges from brown to dark brown in species north of Mexico, but it is usually variegated due to light and dark colored scale-like setae vestiture in the Neotropical species. The pronotum is usually wider than long, with a few species having it longer than wide, and it is unarmed. The scutellum is small. The declivity is convex, with small granules and a vestiture of small scale-like setae and sparse long, light, semi-erect, thick bristles. Their frons usually has a median carina above the epistoma. The anterior margin of the compound eye is sinuate to slightly emarginate. The scape is nearly as long as the 5-segmented funicle. The club is ovate and has three straight sutures. The prothoracic precoxal ridge is either present or absent. The procoxae are contiguous. *Xylechinus* is unique among the Tomicina in having a slightly emarginate or sinuate anterior margin of the eye. In the subtribe, they share the 5-segmented funicle only with *Dendroctonus* Erichson. They have a similar

vestiture to *Hylorgupinus* Swaine but can be distinguished by the number of funicle segments.

29 *Xylechinus bergeri* Spessivtsev, 1919 오갈피모피나무좀

Xylechinus bergeri Spessivtsev, 1919: 249.

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea, China, Russia(Far East).

30 *Xylechinus pillosus* (Ratzeburg, 1837) 가문비모피나무좀 (Plate 3-30)

Hylesinus pilosus Ratzeburg, 1837: 178.

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea, China, Japan, Kazakhstan, Mongolia, Russia (East Siberia, Far East, West Siberia).

Tribe Hyorrhynchini Hopkins, 1915

Genus *Sueus* Murayama, 1951

Sueus Murayama, 1951: 1 (Type species: *Sueus sphaerotrypoides* Murayama, 1951
= *Hyorrhynchus niisimai* Eggers, 1926)

Parasphaerotrypes Murayama, 1958: 933 (Type species: *Sphaerotrypes controversae*
Murayama, 1950 = *Hyorrhynchus niisimai* Eggers, 1926)

31 *Sueus niisimai* (Eggers, 1926) 날개흙줄나무좀(신칭) (Plate 3-31)

Hyorrhynchus niisimai Eggers, 1926a: 133.

Hyorrhynchus pilosus Eggers, 1936a: 81.

Sphaerotrypes controversae Murayama, 1950b: 62.

Sueus sphaerotrypoides Murayama, 1951: 2.

Descriptions.

Body length 1.6-2.0 mm. Body elongate but slightly flattened. Derm reddish brown except yellow antennae and tarsi. Frons carinate longitudinally in the middle. Pronotum shining with minute puncture. Lateral margin of pronotum slightly edged but not carinate. cylindrical, moderately stout. Strioles of elytra grooved and connected longitudinally. Intervals of elytra covered with dense and more or less decumbent pubescences.

Korean Record. New to Korea.

Specimens examined. GG, 1 ex. Kwangreung, Soholeub, Pocheon-si, 8.viii.2008; JJ, 1 ex., Donneko, Seoguipo-si, 27.ix.2000; JJ, 5 exs., Jeolmul, Donggye-dong, Jeju-si, 27.viii-10.ix.2005.

Distribution. Korea (South), China, Japan, Taiwan, India.

Tribe Phloeosinini Nüsslin, 1912

Genus *Phloeosinus* Chapuis, 1869

Phloeosinus Chapuis, 1869: 37 (Type species: *Hylesinus thujae* Perris, 1855)

Diagnosis.

Species in this genus range from 1.5 to 4.1 mm in length and are 1.8 to 2.1 times as long as wide. Their color ranges from brown to black, usually with lighter elytra, which can be reddish brown to brown. The pronotum is usually wider than long and unarmed. The scutellum is large. Crenulations are present in the anterior margin of the elytra. The declivity is convex with one or more interstriae, usually number three, armed by pointed tubercles. The vestiture consists of hair-like setae, except for scale-like setae in a few species. The anterior margin of the compound eye is emarginate. The scape is longer than the 5-segmented funicle. The ovate club is asymmetrical, and has three straight sutures. The procoxae are separated. *Phloeosinus* can be distinguished from the other Phloeosinina by the 5-segmented antennal funicle and the third declivital interstriae which are armed with denticles.

Key to species of genus *Phloeosinus* of Korea

- 1. Elytral covered with normal hairs ----- 2
- Elytral covered with scale-like short hairs ----- *P. perlatus*
- 2. Elytral hairs decumbent, striae deeply impressed ----- 3
- Elytral hairs erect, striae slightly impressed ----- *P. hopehi*
- 3. First interstice curved out, declivity regularly covered with similar size tubercles
----- *P. aubei*
- First interstice straight and 4-5 strong tubecles on declivity ----- *P. rudis*

32 *Phloeosinus aubei* (Perris, 1855) 어리노송나무좀 (신칭) (Plate 3-30)

Hylesinus aubei Perris, 1855: 68.

Phloeophthorus praenotatus Gredler, 1866: 370.

Phloeosinus transcaspicus Semenov, 1903: 79.

Phloeosinus hercegovinensis Eggers, 1922b: 120.

Phloeosinus schumensis Eggers, 1922c: 166.

Description.

Body blackish brown to black except reddish brown to dark brown elytra and yellowish brown antennae and tarsi. Pronotum densely covered with punctures. Elytra slightly wider than pronotum, striae deeply impressed, first interstice curved out laterally at declivity and regularly covered with similar size tubercles.

Korean Record. Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (South?), China, Cyprus, Iran, Israel, Japan, Syria, Taiwan, Turkey, Turkmenistan, Europe, North Africa.

Remarks. This species was recorded by foreign taxonomist with out Korean name, and the Korean name comes from its similar shapes with *P. rudis*.

33 *Phloeosinus hopehi* Schedl, 1953 *흑백나무좀* (Plate 3-33)

Phloeosinus hopehi Schedl, 1953a: 23.

Description.

Body. 1.8-2.0 mm, elongate oval, reddish brown to dark brown. Frons clearly and regularly punctate, eye elongate and deeply emarginate anteriorly. Pronotum slightly wider than long, widest at base, weakly narrowing anteriorly until middle,

after then rapidly narrowing shortly and then weakly narrowing anteriorly again. Pronotal constriction broad. Pronotum regularly punctate with slightly decumbent short hairs. Elytra 1.3 times longer than wide, widest at middle, after then slight narrowing and gently arched at postal area. Intervals with a row of clear punctures with somewhat long setae and striae with short hairs. Declivity with strong tubercles on 1st and 3rd intervals and small tubercles on 7th intervals. 2nd interval glabrous on declivity without setae.

Korean Record. Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 3ex., JB, Namweon-si, 25.ix.1982.

Distribution. Korea, China, Japan, Russia (Far East).

34 *Phloeosinus perlatus* Chapuis, 1876 향나무좀 (Plate 3-34)

Phloeosinus perlatus Chapuis, 1876: 198.

Description.

Body. 2.4-3.4 mm, oval, convex, reddish brown to black, antennae, tarsi and elytra reddish brown. Frons almost flat, with longitudinal carina, finely and densely punctate, covered with decumbent hairs, several tiny tubercles between vicinity of upper part of longitudinal line and eyes. Pronotum nearly as wide as long, closely punctured with longitudinal line from anterior margin to posterior margin. Scutellum trapezoid. Elytra wider than pronotum, basal margin elevated and crenated, striae strongly impressed, interstriae wide with hairs and tiny tubercles, second interstriae slightly flat and narrowing at apex. Elytral hairs

somewhat thin at base and gradually thickened posteriorly, declivity densely covered with scale-like short hairs. Tubercles on declivity bigger than disc. Foretibia slightly widened at base and rapidly widened after middle.

Korean Record. Murayama, 1930a; Murayama, 1930b; Murayama, 1934c; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; Choo et al., 1988b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North, South), China, Japan, Taiwan.

35 *Phloeosinus rudis* Blandford, 1894 노송나무좀 (Plate 3-35)

Phloeosinus rudis Blandford, 1894a: 73.

Phloeosinus shotoensis Murayama, 1955: 88.

Description.

Body. 4.0-4.2 mm, black, oval; head strongly punctured, front flattened in female, impressed in male, almost glabrous, except for a few hairs over mouth and a few on vertex in female, eyes perfectly flat. Prothorax transverse, its base produced in middle towards scutellum, slightly contracted towards apex with sides rounded from base; convex, somewhat shining, strongly and closely punctured without asperation, usually with a median shining longitudinal line. Scutellum round, dull, punctured. Elytra scarcely wider than prothorax and rather less than twice as long, their basal borders rounded, crenulate, slightly everted, sides straight at base, rounded from middle to apex; above gradually declivous almost from base, black,

with apex sometimes piceous, with short scanty pubescence, without scales or setose hairs, striae rather fine, indistinctly punctured at base, nearly smooth towards apex, interstices granulate to middle, then 2nd and 4th in male smooth, multi-punctate, with one or two tubercles before apex, in the female with a few fine tubercles throughout; 1st in male with about 5, 3rd with about 7 strong spinous tubercles, which do not unite to form a crest, in female with smaller tubercles; outer interstices towards apex with rows of tubercles in both sexes. Underide black, punctured, pubescent; metasternum rather prominent. Legs black with tarsi lighter (Blandford, 1894a).

Korean Record. Choo et al., 1983b; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., GG. Suwon-si, Gwonseon-gu, Seodun-dong, 26.iv.1989; 1ex., GG. Suwon-si, Gwanggyo, 22.vi.1989; 2ex., GN. Namhae-gun, Samdong-myeon, 21.x.1982; 1ex., GG. Suwon-si, Gwonseon-gu, Seodun-dong, 30-31.xiii.1997.

Distribution. Korea, Japan, France (introduced), Netherlands (introduced).

Tribe Polygraphini Chapuis , 1869

Genus *Polygraphus* Erichson, 1836

Polygraphus Erichson, 1836: 57 (Type species: *Bostrichus pubescens* Fabricius, 1792 = *Dermestes poligraphus* Linnaeus, 1758)

Lepisomus Kirby, 1837: 193 (Type species: *Apate rufipennis* Kirby, 1837)

Nipponopolygraphus Nobuchi, 1981a: 12 (Type species: *Nipponopolygraphus kaimochii* Nobuchi, 1981)

Ozophagus Eggers, 1920b: 234 (Type species: *Ozophagus camerunus* Eggers, 1920 = *Polygraphus primus* Wichman, 1915)

Pseudopolygraphus Seitner, 1911: 105 (Type species: *Polygraphus grandiclava* C.G.Thomson, 1886)

Spongotarsus Hagedorn, 1908: 372 (Type species: *Spongotarsus quadrioculatus* Hagedorn, 1908)

Diagnosis.

Species in this genus range from 1.8 to 3.1 mm and are approximately 2.0 to 2.4 times as long as wide. The color is black. The pronotum is wider than long and unarmed. The scutellum is not visible. The declivity is convex, bearing granules. The vestiture consists of abundant, short and light colored scales. The eye is divided in two parts. The scape is usually longer than the 5- to 6-segmented funicle. The ovate club is flat and without sutures, finely pubescent, and often ending in a pointed tip. The procoxae are contiguous. *Polygraphus* can be distinguished from *Carphoborus* Eichhoff by the completely divided eye and a club without sutures.

Key to species of genus *Polygraphus* of Korea

1. Antennal funicles 6-segmented. ----- 2
- Antennale funicles 5-segmented ----- *P. subopacus*
2. Antennal club dull at apex ----- 3
- Antennale club pointed at apex ----- 4
3. Pronotum and elytra covered with somewhat big bright coloured scale-like

- pubescences ----- *P. abietis*
- Pronotum and elytra covered with small brown to reddish scale-like pubescences
----- *P. proximus*
4. Frons with somewhat long setae densely ----- *P. horyurensis*
- Frons with somewhat short setae sparsely ----- *P. jezoensis*

36 *Polygraphus abietis* Kurentsov, 1941 분비회색네눈배기나무좀

Polygraphus abietis Kurentsov, 1941: 131, 229.

Description.

Body 2.5-2.8 mm, head, pronotum and elytra blackish, elytral declivity somewhat reddish coloured, legs yellowish red, tibiae black at base, antennae with same colour as sclae. Antennal funicles 6-segmented, club somewhat round at apex. Front closely and finely punctured in male, with short and sparse hairs and paired tubercles at middle, female with longer and denser pubescence. Pronotum and elytra covered with somewhat big bright coloured scale-like pubescences. Pronotum at base somewhat wider than long, gradually narrowing to its front margin, longitudinal median line on pronotum faint, but well seen throughout its length, whole surface with fine and close sculpture, decumbent scales directed to median line. Elytra as wide as pronotum at its base, and one and half time longer than wide, striae fine but nearly invisibly punctate, interstices thickly clothed with light decumbent scales (3-4 scales in a row). Elytral declivity with small tubercle on interstriae. Abdomen and legs covered with short light decumbent hairs (Kurensov, 1941).

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China (Northern East), Russia (Far East).

Remarks. This species is doubted as a junior synonym of *P. proximus*, and Mandelshtam noted about it in the website (Mandelshtam, 2011).

37 *Polygraphus horyurensis* Murayama, 1937 앞갈나무가는나무좀 (Plate 3-37)

Polygraphus horyurensis Murayama, 1937: 368.

Description.

Body 2.3-2.9 mm, cylindrically oblong, dark brown to blackish brown, slightly darker than elytra and legs, antennae yellowish brown. Frons slightly flat, with coarse punctures, densely covered with somewhat long whitish pubescences, 2 small medial tubercles in male, eyes deeply emarginated and separated with two parcels. Antennal funicle 6 segmented, scape longer than funicles combined, club oval, pointed at apex, densely covered with decumbent short hairs. Pronotum wider than long, parallel-sided one thirds from base, after then gently arced anteriorly. Anterior margin of pronotum slightly emarginated at middle. Elytra 1.6 times as long as wide, basal margins armed with coarse crenulations from suture to humeral angles, submarginal crenulations rather abundant medially, a few and small at sides. Elytral sides almost parallel slightly broadened posteriorly on basal five-sixth, broadly rounded behind, striae and interstriae punctures confused but distinguished by scalelike hairs on interstices and decumbent short hairs on striae. Interstriae indicated by uniserrate small granules on and near declivity.

2nd interstice on declivity slightly flat. Tibia slightly broadened apically with 3 somewhat big processes outwardly at apical area.

Korean Record. Murayama, 1937; Niijima, 1941; Cho, 1957; Ju, 1964; Ju, 1969; Nobuchi, 1979; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 6ex., GG. Pocheon-si Soheul-eup, Gwangneung, 11.xi.1981.

Distribution. Korea (North, South), China (Northern East), Japan, Russia (Far East), Taiwan.

38 *Polygraphus jezoensis* Niisima, 1909 가문비회색네눈배기나무좀 (Plate 3-38)

Polygraphus jezoensis Niisima, 1909: 135.

Description.

Body 2.4-3.2 mm, slightly slender, more than 2.28 times as long as wide, blackish brown except reddish brown elytra and yellowish red antennae and legs. Head covered with short hairs on frons, somewhat long hairs on epistoma, eyes deeply emarginated and separated with two parcels. Antennal funicles 6 segmented, clubs pointed at apex. Pronotum covered with hairs and scales intermixed. Elytra long, 1.5 times as long as wide, with a row of fine or distinct tubercles, interstriae finely rough, covered with distinct tubercles. Declivity with tubercles on 1st and 3rd interstriae in male.

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), Japan, Russia (Far East).

39 *Polygraphus nobuchii* Choo & Woo, 1989 한라구상나무좀

Polygraphus nobuchii Choo & Woo, 1989: 57. [TL: Jeju Prov. Mt. Hanla]

Description.

Body 2.7-3.0 mm, oblong, cylindrical; yellowish brown to black. Antennae and legs reddish brown. Male: Frons convex with two big tubercles in middle, close and large punctures, with long introvent setae and longer and dense setae above epistoma; vertex shining, with small close punctures and longitudinal line in middle, antennal funicle 6-segmented, club oblong-oval, thick in middle, slightly tapered to apex, but not pointed; eyes biparted. Pronotum wider than long, constricted to anteriorly, close punctures intermixed with setae and scales, fine granules, fine granules on around anterior and lateral margin, basal margin slightly sinuate. Scutellum black, shining. Elytra a little wider than pronotum, longer than wide, slightly narrowed to posterior margin, anterior margin tuberculate, granulate around anterior part, striae not impressed, large punctures, interstriae wide, intermixed with short setae and irregular rows of scales, with fine tubercles, 2nd interstriae of declivity impressed, lateral junction part of 5h 3rd, 4th, and 5th abdominal segment black, hardened, look small nodules. Female: Similar to the male except the following characters, I.e., frons looks less setae, shining without tubercles, antennal club narrower than that of male (Choo & Woo, 1989).

Korean Record. Choo and Woo, 1989b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (Jeju Is.).

Remarks. The type specimens is known to be lost.

40 *Polygraphus proximus* Blandford, 1894 애전나무좀 (Plate 3-40)

Polygraphus proximus Blandford, 1894a: 75.

Polygraphus oblongus Blandford, 1894a: 75.

Polygraphus miser Blandford, 1894a: 76.

Polygraphus laticollis Eggers, 1926a: 135.

Polygraphus nigricans Kurentsov, 1948: 50.

Polygraphus magnus Murayama, 1956a: 279, 282, 290.

Description.

Body 2.4-3.2 mm, oblong, black, with elytra becoming gradually reddish towards apex. Head with front slightly convex and with two distinct tubercles at middle in male but slightly impressed in lower part of tubercles, rugosely punctured and rather dull, pubescent, clypeus emarginate in middle, eyes separated two parcels, feebly convex, more distinctly in female, antennal club rather large, infusate and evidently acuminate at inner side of apex, more strongly in male than in female. Prothorax nearly half as broad again as long, strongly constricted towards apex with sides more convex behind constriction than at base; surface rather shining, with close subaciculate punctuation and thin squamous covering; median line slightly elevated, variable in length and distinctness. Elytra more than half as long again as prothorax, one-third longer than wide, slightly but discernibly dilated towards apex, dull, scales close, cinereous with a yellow tinge, striae faint but

distinguishable throughout, weaker at apex in female than in male. Legs dark, ferruginous, with tarsi lighter; all tibiae spined at apex (Blandford, 1894a).

Korean Record. Murayama, 1930a; Murayama, 1930b; Murayama, 1936; Murayama, 1937; Nijima, 1941; Cho, 1957; Ju, 1964; Ju, 1969; Nobuchi, 1979; Choo and Woo, 1985b; ESK/KSAE, 1994; Choi and Ko; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 12ex., GW, Pyeongchang-gun, Jinbunyeon, Mt. Odaesan, 12.vi.2009.

Distribution. Korea (North, South), China, Japan, Russia (East Siberia, Far East), Europe (introduced).

41 *Polygraphus subopacus* C.G.Thomson, 1871 가문비꼬마나무좀(개칭) (Plate 3-41)

Polygraphus subopacus C.G.Thomson, 1871: 393.

Polygraphus fontinalis Kurentsov, 1941: 136.

Polygraphus minor Lindemann, 1875b: 242.

Polygraphus nanus Schedl, 1955a: 22.

Polygraphus sachalinensis Eggers, 1926a: 135.

Description.

Body 1.6-2.4 mm, elongate oval, reddish brown to black. Frons flat, densely punctured, covered with short hairs, frons of male with a pair of small tubercles and concave under them, antennal funicles 5 segmented, club compressed, flat, and pointed at apex. Pronotum wider than long, with distinct longitudinal line, covered with punctures and scales. Scutellum small. Elytra 1.5 times as wide as long,

basal margin with rows of small crenulations, striae punctured, punctures large, interstriae with scales and tiny tubercles.

Korean Record. Murayama, 1929b; Murayama, 1930b; Murayama, 1937; Niiijima, 1941; Cho, 1957; Ju, 1964; Ju, 1969; Nobuchi, 1979; Choo and Woo, 1985b; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North, South), China, Japan, Mongolia, Russia, Europe.

Remarks. I change the Korean name because of the same name with other species.

Supertribe Scolytitae Latreille, 1804

Key to the Tribe of Supertribe Scolytitae

1. Lateral margins of pro- and metatibiae unarmed except for a single, apical, spine-like process that curves toward and extends beyond process of inner apical angle (*Camptocerus*). lateral margins of pronotum subacutely elevated, costate; pleural suture descending subvertically from pleural wing process to groove receiving groove and flange on costal margin of elytra, at this point suture turns abruptly and follows groove caudad to metapleural coxal process; funicle 7-segmented, sutures of antennal club strongly procurved or obsolete; Holarctic and Neotropical ----- Scolytini
- Lateral margin of protibia armed by more than one denticle, none of which exceed or curve toward inner apical process; pleural suture less strongly angulate, groove receiving flange of costal margin of elytra displaced ventrad from course

- followed by pleural suture; lateral margins of pronotum subacutely raised or not, antenna variable ----- 2
2. Metepisternum visible throughout its length, slightly more than its dorsal half covered by elytra when in locked position, either with a conspicuous groove for reception of costal flange throughout its length or else groove represented at its anterior end by a denticulation or costate remnant near anterior end of metepisternum; antennal club varying from flat to obliquely truncate ----- 3
- Metepisternum largely covered by elytra, its groove for reception of costal flange obsolete, a small, transverse callus (*Cryphalini*) or a small transverse groove (*Corthylini*) at anterior end of metepisternum; antennal club strongly flattened; antennal club never obliquely truncate ----- 8
3. Lateral margins of pronotum subacutely elevated, basal margins of elytra usually finely elevated; procoxae rather widely separated except contiguous in *Xyloctonini*; protibia with prominent outer apical process recurved (*Scolytodes*), usually extending beyond tarsal insertion, posterior tibia tapered on apical third and armed by several small socketed denticles; funicle 6- or 7-segmented; tarsi often retractible into tibial grooves ----- Scolytoplatypodini
- Lateral and basal margins of pronotum rounded (except *Cnestus*); procoxae subcontiguous (except most *Micracini* and a few *Xyleborini*); protibia with outer apical angle inconspicuous, armed by several small socketed denticles; funicle 2- to 6-segmented; tarsi not retractible (except in *Eccoptyterus*) ----- 4
4. Meso- and metathoracic tibiae more slender, more abruptly narrowed on apical fourth, lateral and apical margins armed by fewer, coarser teeth; eye sinuate to shallowly emarginate; pronotum sometimes with a raised line on basal or lateral margin; preular area not depressed; sexes of similar size and body form

- (except male dwarfed and deformed in *Coccotrypes* and *Ozopemon*); habits varied but never woodboring or mycetophagous ----- 5
- If eye completely divided into two parts and antennal funicle 4-segmented then male frons deeply excavated and male equal in size to female; if eye emarginate (or if divided and funicle 5-segmented) then male dwarfed, deformed, and flightless and female meso- and metathoracic tibiae expanded to just beyond middle then arcuately tapered to apex, its apical two-thirds on outer margin armed by a row of numerous small, closely set teeth of equal size, these usually supplemented in same row by submarginal hair on posterior face; male pronotum highly modified; preular area depressed (except *Premnobius*), woodboing, mycetophagous ----- 7
5. Eye shallowly sinuate, its lower half distinctly narrower than above; protibia with 3-4 socketed teeth; antennal club rarely obliquely truncate (*Pityokteines*, *Orthotomicus*), procoxae contiguous, intercoxal piece longitudinally emarginate to absent, never complete; elytra moderately sulcate to elaborately excavated, with lateral margin usually armed by tubercles or spines; pronotum more strongly declivous on anterior third, asperities usually larger; worldwide ----- Ipin
- Eye sharply, rather deeply emarginate (sinuate in *Deropria*), lower half usually almost equal in width to upper half protibiae usually with four or more socketed teeth (most exceptions with lateral margins of pronotum acutely elevated); procoxae either contiguous or distinctly, narrowly separated; elytral declivity flattened to convex, unarmed by spines or large tubercles; pronotum either evenly arched from base to anterior margin or less strongly declivous on anterior third, asperities, when present, usually fine and abundant (a few exceptions) ----- 6

6. Antennal funicle 4- to 6-segmented, club either obliquely truncate or with sutures on posterior face strongly displaced toward apex; anterior half of pronotum more strongly declivous and rather coarsely asperate (unarmed in *Tiarophorus*); worldwide ----- Dryocoetini
- Antennal funicle 2- or 3-segmented, club with sutures on posterior face about equal to those on anterior face; pronotum feebly declivous on anterior half and unarmed (minutely granulate in some *Aphanarthrum*), reticulate in many species; size small; Northern Hemisphere and Africa ----- Crypturgini
7. Eye always completely divided into two parts; antennal funicle 4-segmented, base of club feebly to moderately corneous, usually pubescent to base; male subequal in size to female, his frons flattened or excavated and anterior margin of his pronotum more broadly rounded; male joins female in parental gallery, reproduction always bisexual; Holarctic and Oriental ----- Xyloterini
- Eye emarginate except divided in some *Amasa*; funicle 5-segmented (3- or 4-segmented in a few Asiatic forms); males flightless, dwarfed, deformed, anterior slope of pronotum variously excavated; male head convex; male absent from parental gallery except as progeny; partly parthenogenetic, male haploid; almost worldwide ----- Xyleborini
8. Costal margin of elytra slightly to moderately ascending from base of declivity to apex; basal end of metepisternum armed by a callus or partial groove of degenerating metepisternal spine; sutures on posterior face of antennal club more strongly displaced toward apex; funicle 3- to 5-segmented; tibiae more strongly flattened, usually armed by more than four denticles; vestiture commonly includes scales; eye usually entire, less commonly emarginate; worldwide ----- Cryphalini

- Costal margin of elytra descending toward apex (except *Brachyspartus*), basal end of metepisternum with a small, transverse groove (concealed when elytra in locked position), elytra in locked position more completely cover metepisternum; sutures on posterior face of antennal club only slightly displaced toward apex; funicle 1- to 5-segmented; tibiae more slender, rarely armed by more than four socketed denticles; vestiture rarely includes scales (in tropical forms only); eye emarginate; almost worldwide except Australia ----- Corthylini

Tribe Corthylini LeConte, 1876

Subtribe Pityophthorina Eichhoff, 1878

Genus *Pityophthorus* Eichhoff, 1864

- Pityophthorus* Eichhoff, 1864: 39 (Type species: *Bostrichus lichtensteinii* Ratzeburg, 1837)
- Cladoborus* Sawamoto, 1942: 165 (Type species: *Cladoborus arakii* Sawamoto, 1942)
- Conophthcranulus* Schedl, 1935d: 343 (Type species: *Conophthcranulus blackmani* Schedl, 1935)
- Ctenyophthorus* Schedl, 1955b: 26 (Type species: *Ctenyophthorus glabratus* Schedl, 1955)
- Gnathophorus* Schedl, 1935d: 342 [HN] (Type species: *Gnathophorus sparsepilosus* Schedl, 1935)
- Gnathophthorus* Wood, 1962: 76 [RN] (Type species: *Gnathophorus sparsepilosus* Schedl, 1935)
- Hagedornus* R.Lucas, 1920: 683 [RN] (Type species: *Trigonogenius fallax* Hagedorn, 1912)
- Hypopityophthorus* Bright, 1981: 14 (Type species: *Pityophthorus inops* Wood, 1976)
- Myeloborus* Blackman, 1928: 16 (Type species: *Pityophthorus ramiperda* Swaine, 1917)
- Neomips* Schedl, 1954a: 37 (Type species: *Neomips brasiliensis* Schedl, 1954 = *Pityophthorus dimorphus* Schedl, 1959)

Pityophthoroides Blackman, 1942: 199 (Type species: *Pityophthoroides pudens* Blackman, 1942)

Trigonogenius Hagedorn, 1912c: 354 [HN] (Type species: *Trigonogenius fallax* Hagedorn, 1912)

Diagnosis.

Species in this genus range from 0.8 to 3.2 mm in length and are approximately 2.0 to 3.4 times as long as wide. Their color ranges from yellowish brown to almost black. The pronotum is equally to longer than wide, and the lateral margins present a raised line. The scutellum is large and flushed with the elytra. The declivity varies from convex to bisulcate and can be unarmed or bearing small granules. The metepisternum is only visible anteriorly. The frons is usually sexually dimorphic, often ornamented by long setae. The anterior margin of the compound eye is emarginate. The scape is usually approximately as long as the 5-segmented funicle. The club is near circular to oval, with two to three straight to procurved complete to incomplete sutures, which have some degree of septation. The procoxae are contiguous. *Pityophthorus* are a large and difficult group; they are distinguished from *Araptus* Eichhoff in that they have chitinized lateral septa on their first two sutures.

Key to species of genus *Pityophthorus* of Korea

1. Prolongation of elytral apex distinct, pronotal asperities not extended laterally over the middle. Elytral striae formed with large round punctures. ----- *P. pini*
- Prolongation of elytral apex slight, pronotal asperities extended laterally over the

middle. ----- *P. jucundus*

42 *Pityophthorus jucundus* Blandford, 1894 북방가문미애나무좀 (Plate 4-42)

Pityophthorus jucundus Blandford, 1894a: 87.

Description.

Body 1.6 mm, head black, finely reticulate, front strongly punctured, with a circular patch of villous pubescence in female. Antennae fuscotestaceous, their club ovate, tri-articulate with slightly curved sutures. Prothorax with base finely margined, truncate, basal angles obtuse, sides behind nearly straight, rounded in front and sinuate before apex, which is somewhat obtusely rounded, and feebly crenulate, the apical constriction much slighter than in *P.lichtensteini* Ratz.; surface depressed on either side of a median smooth elevated line, reaching to the middle of the prothorax, with very short pubescence at sides and apex, its anterior half becoming weaker on sides. Elytra rather narrower at base than prothorax, and nearly twice as long, sides straight to middle then feebly rounded, apex obtusely rounded, not acuminate but with suture slightly prominent; glabrous except at apex, with regular lines of strong punctures, not impressed, interstices impunctate and flat, feebly rugose here and there, apex nearly vertically declivous, impressed on either side of suture, the impression shining, impunctate, its outer margins more strongly elevated than suture, with two or three weak setigerous tubercles; suture very slightly elevated, with traces of tuberculation near apex; underside black, thinly pubescent. Legs fuscous (Blandford, 1894a).

Korean Record. Murayama, 1930a; Murayama, 1930b; Murayama, 1936;

Murayama, 1937; Cho, 1957; Lee and Cho, 1959; Murayama, 1963b; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; Choo et al., 1988b; Choo and Woo, 1989a; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., GG. 1ex., GG. Suwon-si, Paju-si, 11.vi.2008; 1ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 21.iv-17.v.2011; 3ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 21.iv-17.v.2011; 2ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 1ex., GN, Namhae-gun, Mt. Geumsan, 6.vi.1982; 1ex., GN, Jinju-si, Banseong-myeon, Dapcheon-ri, 12-26.ix.2005.

Distribution. Korea (North, South), China (Northern East), Japan, Russia (Far East, Sakhalin).

43 *Pityophthorus pini* Kurentsov, 1941 솔큰애기나무좀

Pityophthorus pini Kurentsov, 1941: 176, 233.

Description.

Body Length. 2.0-2.5 mm, body black, shining above, with reddish brown translucent stripes on elytra, black beneath, legs dark red, antennae pale yellow, top of head with coarse punctation, frons with finer punctation and clothed with rather long erect red hairs. Anterior margin of pronotum without distinct teeth, front part of pronotum with large tubercles, some of which arranged in a row parallel to front margin, both on sides and on median part, hind part of pronotum with ill-defined elevated line above, spot of asperities and sides clothed with short slightly decumbent hairs directed posteriorly, elytra longer and a little narrower than pronotum. Striae of large round punctures arranged in regular rows,

interstices smooth, with several rows of rather short erect light hairs becoming considerably denser and longer towards declivity. Apices of elytra longer and more acute than in *P. micrographus* Linne, impression (fovea) broad, smooth and shining in front, and in small wrinkles and tubercles towards apices of elytra, its sutures at the very apices with four small closely situated and indistinct tubercles, up the suture with larger granular tubercles, round the borders of impression (fovea) tubercles small and closely situated. Abdomen and legs clothed with sparse short hairs (Kurensov, 1941).

Korean Record. Ju, 1964 Ju, 1969; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China, Russia (East Siberia, Far East).

Tribe Cryphalini Lindemann, 1876

Genus *Allernoporus* Kurentsov, 1941

Allernoporus Kurentsov, 1941: 159, 230 (Type species: *Allernoporus euonymi* Kurentsov, 1941)

44 *Allernoporus euonymi* Kurentsov, 1941 회나무좀

Allernoporus euonymi Kurentsov, 1941a: 159, 230.

Description.

Body 1.5-1.7 mm. Head black, pronotum, elytra and body beneath reddish brown, tarsi and antennal funicles brownish red, club light red. Frons concave in male,

flat in female, rather coarse longitudinal wrinkles of vertex extended to frons, curving there nearly transversely to middle, at sides frons clothed with short light hairs in male, getting denser beneath, with a thick tuft of red hairs above mouth, club more rounded than *Ernoporus* species, in shape more closely allied to *Cryphalus* species or *Ernoporicus spessivtzevi* Berger. Pronotum a little wider than long, with basal angles rounded and sides immargined. Anterior margin of pronotum with two distinct asperities. Spot of asperities at sides narrower than *E. fraxini* Berger, somewhat overlapping median part of pronotum and very sparsely clothed with decumbent hairs. Space behind spot of asperities with coarse wrinkles and long whitish hairs directed forwards, becoming longer near base and angles of pronotum. Elytra 2.2 times longer than pronotum, equal in width to basal part of pronotum. Striae composed of distinct but small punctures not so deep as in *Ernoporus* species, extending throughout length of elytra. Interstices slightly elevated, covered with fine sparse punctures and oblique wrinkles. Scales and hairs on the interstices peculiar to the genus, intermediate to the genera *Ernoporus* and *Cryphalus*. Large erect scales, similar to those of *Ernoporus*, arranged in distinct rows only on declivity of elytra, being scarce on rest surface, and absent from middle of elytra. Small decumbent scales, generally two in a row, on interstices clothing all elytra in *Ernoporus* and *Cryphalus*, more or less densely situated from declivity to middle of elytra, and scarce, generally arranged one in a row, on interstices of front part in this new genus. In connection with reduction of scales, hairs more abundantly clothing elytra of this genus. A row of hairlike scales stretched along lower margin of elytra from rounded apices, gradually transforming into hairs towards base. Above declivity scales becoming more scarce, whole surface of elytra clothed with hairs, longer on sides, shorter on rest surface. Like

scales, hairs light gray and directed posteriorly. Abdomen clothed with short decumbent darker hairs (Kurensov, 1941).

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), Russia (Far East).

Genus *Cryphalus* Erichson, 1836

Cryphalus Erichson, 1836: 61 (Type species: *Bostrichus asperatus* Gyllenhal, 1813)

Allarthrum Hagedorn, 1912c: 355 (Type species: *Allarthrum kolbei* Hagedorn, 1912)

Cryptarthrum Blandford, 1896b: 200 (Type species: *Cryptarthrum walkeri* Blandford, 1896)

Ericryphalus Hopkins, 1915a: 38 (Type species: *Ericryphalus henshawi* Hopkins, 1915 = *Hypothenemus sylvicola* Perkins, 1900)

Ernocryphalus Murayama, 1958: 934 (Type species: *Ernocryphalus birosimensis* Murayama, 1958)

Piperius Hopkins, 1915a: 39 (Type species: *Piperius pini* Hopkins, 1915 = *Hypothenemus sylvicola* Perkins, 1900)

Pseudocryphalus Ferrari, 1869: 252 (Type species: *Bostrichus sidneyanus* Nördlinger, 1856)

Taenioglyptes Bedel, 1888: 398 (Type species: *Bostrichus piceae* Ratzeburg, 1837)

Diagnosis.

Size range from 1.4 to 2.1 mm in length, and approximately 2.3 to 2.4 times as long as wide. Body color brown. The pronotum is wider than long with the lateral margins marked by a raised line or carina, the anterior half is asperate and

armed in its margin by four to eight teeth. The scutellum is not visible. The declivity is convex and covered as the rest of its body by light colored and short, recumbent hair-like setae. The metepisternum is only visible anteriorly. The anterior margin of the compound eye is emarginate. The scape is usually longer than the 4-segmented funicle. The club is oval and it has at least the last two of its three sutures recurved. The procoxae are contiguous. This species can be distinguished from the similar *Hypocryphalus* Hopkins by the 4-segmented antennal funicle, the three sutured oval club with at least the last two sutures recurved on the anterior face, and the broad third tarsomere.

45 *Cryphalus asperatus* (Gyllenhal, 1813) 가문비초두나무좀 (Plate 4-45)

Bostrichus asperatus Gyllenhal, 1813: 368.

Bostrichus abietis Ratzeburg, 1837: 163.

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), Japan, Russia (East Siberia, Far East), Turkey, Europe, North Africa.

46 *Cryphalus carpini* Berger, 1917 서어나무좀붙이 (Plate 4-46)

Cryphalus carpini Berger, 1917: 234.

Description.

Body 1.4-1.6 mm, yellowish brown. Vertex convex, frons slightly concave on

apical area with sparse hairs. Pronotum slightly wider than long, convex, with many asperities. Basal one thirds area covered with short decumbent hairs without asperities. Slightly and posteriorly decumbent long hairs on anterior area with asperities. Anterior margin of pronotum with 6-8 asperities. Scutellum small, reversely triangular and slightly pointed. Elytra covered with short decumbent hairs and slightly longer erect hairs. Erect hairs on interstices, short decumbent hairs becoming to short scalelike hairs from middle of elytra. Procoxal cavity almost contiguous. Protibia slightly flattened but not expanded with 6-8 small spines along outer margin except inner uncus.

Korean Record. Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 11ex., GN. Sacheon-si, 3.viii.1982.

Distribution. Korea (South), Japan, Russia (Far East).

47 *Cryphalus carpinivorus* Murayama, 1930 물개나무좀

Cryphalus carpinivorus Murayama, 1930b: 14.

Korean Record. Murayama, 1930b; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea.

Remarks. This species is doubted as a junior synonym of *C. carpini*. Mandelshtam noted about this in his website (Mandelshtam, 2011).

48 *Cryphalus coryli* Stark, 1936 난티잎개암초두나무좀

Cryphalus coryli Stark, 1936b: 144.

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), Russia (Far East).

49 *Cryphalus exiguus* Blandford, 1894 뽕나무애나무좀 (Plate 4-49)

Cryphalus exiguus Blandford, 1894a: 82.

Cryphalus pilosus Sasaki, 1899: 238.

Description.

Body 1.6 mm, oblong-oval, convex, dull black with a covering of grey scales. Head with front subconvex, reticulate, puctured at sides, impressed over mouth and with an obtuse median elevation separated above from vertex by a sharp transverse shining carina; eyes oblong-oval, anteriorly emarginate; antennae testaceous with club deeply infusate, roundish oval, its basal joint shining, with superior apical border rounded, fringed, remaining joints pilose with border less strongly rounded. Prothorax narrowed towards apex, rather broader than long, its base bisinuate with narrowly elevated margin, basal angles rounded when seen from above, sides and apex rounded throughout, the latter more strongly, its margin with two prominent tubercles in middle; surface uniformly convex, not gibbous, anteriorly with scattered asperate elevations, forming a patch angulately produced behind but not reaching very near base, interstices and remainder of surface finely reticulate and rugosely punctured, with thin covering of scales and

hirs. Scutellum very small, triangular. Elytra as wide as prothorax, and not quite half as long again, slightly and separately rounded at base, gumental angles rather obtuse, but not rounded, shoulders finely elevated, sides nearly straight and subparallel to posterior third, then broadly rounded to apex; surface transversely convex, subcylindrical to behind middle, then obliquely declivous and convex to apex, with distinct rows of punctures, the outer ones obsolete towards apex interstices narrow, finely multipunctate and squamous, with a single series of scattered erect setae. Legs fuscous with tarsi testaceous (Blandford, 1894a).

Korean Record. Murayama, 1930b; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 8ex., GN. Hamyang-gun, Macheon-myeon, Baengmu-dong, 7.xi.1982.

Distribution. Korea (North, South), China, Japan, Russia (Far East, Kuriles), Taiwan.

50 *Cryphalus fulvus* Niisima, 1908 노랑애나무좀 (Plate 4-50)

Cryphalus fulvus Niisima, 1908: 92.

Cryphalus pini Eggers, 1921: 39.

Description.

Body 1.4-1.7 mm, yellowish brown to dark brown. Vertex convex with transverse carina in male, frons from carina almost flat, densely covered with hairs. Carina on vertex glabrous, short hairs sparse above carina. Pronotum slightly wider than

long, convex, with asperities sparsely. Basal one thirds area covered with short decumbent hairs without asperities. Short decumbent hairs and twice longer erect hairs on anterior area with asperities. Anterior margin of pronotum with 4 asperities but some individuals with 5 asperities. Scutellum small and reversely triangular. Elytra covered with short decumbent hairs and slightly longer erect hairs. Erect hairs on interstices, short decumbent hairs becoming to short scalelike hairs from beginning of declivity. Procoxal cavity almost contiguous. Protibia slightly flattened but not expanded with 5-6 small spines on outer margin.

Korean Record. Murayama, 1929b; Murayama, 1930b; Murayama, 1936; Murayama, 1937; Cho, 1957; Lee and Cho, 1959; Ju, 1969; Choo et al., 1983b; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 4ex., GG. Hwaseong-si,, Cheonggye-dong, 7.vii.1998; 5ex., GG. Gunpo-si, Hosuro, Mt.Surisan, 24.iii-14.iv.2016; 2ex., GG. Hwaseong-si, 25.iv.2016; 1ex., GN. Namhae-gun, Mt. Geumsan, 6.vi.1982; 31ex., GN. Jinju-si, Gajwa-dong, 7.iv.1982; 1ex., GN. Goseong-gun, Gacheon-myeon, Okcheonsa, 9.v.1982; 35ex., GN. Jinju-si, Gajwa-dong, 17.vii.1982; 1ex., GN. Hamyang-gun, Baekjeon-myeon, Seobaek, 14.xi.1982; 2ex., GN. Jinju-si, Jiphyeon-myeon, Sindang-ri, 15.xi.1981; 1ex., GN. Jinju-si. Myeongseok-myeon, ,Omi-ri 19.viii.1992; 1ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 22.iii-21.iv.2011; 2ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 22.iii-21.iv.2011; 18ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 21.iv-17.v.2011; 6ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 21.iv-17.v.2011; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2012; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt.

Gariwangsan, 2.viii.2012.

Distribution. Korea (North, South), China, Japan, Taiwan.

51 *Cryphalus jeholensis* Murayama, 1939 만주곰솔나무좀 (Plate 4-51)

Cryphalus jeholensis Murayama, 1939: 143.

Description.

Body 1.6 mm, oblong, reddish brown, opaque, elytra blackish-brown, antennae and legs yellowish-brown. Head globose, obscure, granulate, frons granulate, having an excavation behind labrum, with uncertain elevation transverse, with erect, long and yellow setae, vertex convex, in male with a transverse carina, having minute obscure granulation behind the groove, in female vertex without a carina, convex, obscure. Eyes, black, lenticular, anterior margin emarginate by antennae. Antennae inserted near anterior margin of eyes funicles four segmented, club oval, black, shining, with nearly straight transverse sutures. Prothorax semioval, narrowing anteriorly, wider than its length, basal margin slightly sinuate, basal angle almost rectangular; disc strongly convex, tubercles extending triangularly beyond anterior half, closely granulate and covered with short setae, having four to six minute asperities on anterior margin. Scutellum small, semicircular. Elytra convex, nearly as wide as prothorax, and about two-thirds as wide as long, humeral angles almost rectangular, lateral sides parallel as far as anterior three-fourths, rounded and declivous to tip, surface, humeral callosities small, covered with seriate and rounded punctures, interstices large, densely set yellow scales, erect and long setae.

Korean Record. Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., GN. Sancheong-gun, Wonji 18.xiii.1982; 23ex., JJ. Seogwipo-si, 12.i.1985.

Distribution. Korea (South), China, Japan.

52 *Cryphalus kurenzovi* Stark, 1936 관모초두나무좀

Cryphalus kurenzovi Stark, 1936b: 150.

Cryphalus punctulatus Eggers, 1942: 29.

Cryphalus ussuriensis Eggers, 1942: 29.

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), Russia (Far East).

53 *Cryphalus laricis* Niisima, 1909 지리산젓나무좀 (Plate 4-53)

Cryphalus laricis Niisima, 1909: 142.

Description.

Body 1.8 mm, cylindrical, sides not quite parallel, yellowish brown to blackish brown, prothorax usually darker than elytra, opaque, elytra slightly shining, clothed with setae. Head closely and distinctly rusoso-punctate, with rather sparse clothing of upright setae, frons subconvex, with triangularly impressed and weakly carinate longitudinally at middle, and feebly raised at each side of the carina, nearly

shining. Eyes rather large, emarginate anteriorly. Antennal funicles with four segments, second segment stout, clubs oval. Prothorax wider than long at base, lateral sides roundly narrowing to apex, part just behind anterior margin with a row of some fine asperities, basal border bisinuate and very narrowly marginate, hind angles strongly rounded, upper surface strongly convex and again upheaved behind center, closely covered with conspicuous and rounded granulations, which are stronger on base and lateral parts than those on frontal, and closely clothed with decumbent setae, and with strongly and rather closely scattered tubercles. Elytra at base a little wider than those of pronotum, about four-fifths as wide as long, parallel-sided and roundly convergent strongly to apex, humeral angles obtusely angulate; surface strongly convex, humeral callosities small and indistinct, striae distinctly impressed and with a row of large but shallow punctures, and very fine setae; interstices slightly convex and finely punctured, and with relatively sparse clothing of rather narrow but long squamiform setae in comparison with other species, and with a row of minute granules bearing long setae.

Korean Record. Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 5ex., GG. Pocheon-si Soheul-eup, Gwangneung, 20.xi.1982; 2ex., GN. Sancheong-gun, Mt.Jirisan, Daewon, 20.viii.1981.

Distribution. Korea (South), Japan, Russia (Far East).

54 *Cryphalus latus* Eggers, 1929 이갈초두나무좀 (Plate 4-54)

Cryphalus latus Eggers, 1929a: 10.

Cryphalus paemayaensis Murayama, 1943: 97.

Korean Record. Ju, 1964; Ju, 1969; Choi and K, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China (Northern East), Russia (East Siberia, Far East).

55 *Cryphalus malus* Niisima, 1909 복숭아나무좀 (Plate 4-55)

Cryphalus malus Niisima, 1909: 144.

Cryphalus padi Krivolutskaya, 1958: 144.

Description.

Body 1.6-2.0 mm, oblong oval, blackish brown. Frons slightly convex with short longitudinal carina on anterior area in male. Surface of frons coarsely punctured, sparsely hairy. Pronotum slightly wider than long. Anterior margin of pronotum with 4-6 asperities. Four asperities always large. Scutellum small, almost invisible from above. Elytra as wide as pronotum. Interstriae slightly convex, with 3-4 rows of scales and much long erected hairs.

Korean Record. Ju, 1964; Ju, 1969; Choo et al., 1983a; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 5ex., JB. Namwon-si, Sannae-myeon, Baemsagol, 7.xi.1982; 14ex., GN. Jinju-si, Chojeon, Buk-dong, 1.x.1982; 9ex., GN. Jinju-si, Jiphyeon-myeon, Sindang-ri. 15.xi.1981.

Distribution. Korea (North, South), China, Japan, Russia (Far East).

56 *Cryphalus mandschuricus* Eggers, 1929 물개암초두나무좀 (Plate 4-56)

Cryphalus mandschuricus Eggers, 1929a: 10.

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China (Northern East), Russia (Far East).

57 *Cryphalus piceae* (Ratzeburg, 1837) 가문비아나무좀 (Plate 4-57)

Bostrichus piceae Ratzeburg, 1837: 163.

Cryphalus hattorii Kôno, 1938: 67.

Cryphalus orientalis Eggers, 1911b: 122.

Cryphalus subdepressus Eggers, 1940f: 37.

Description.

Body 1.4-1.8 mm, oblong, cylindrical, sides nearly parallel, reddish-brown to dark brown, dully shining, covered with setae and scale-like setae on elytra. Head subconvex, indistinctly punctured, lateral sides and vertex finely reticulate, frons narrowly and weakly impressed transverse, in male narrow and feeble upheaved on middle line and remarkably rugose, with setae closer and longer than those of female. Eyes oblong, emarginate at anterior margin. Antennal funicles four segmented, second segment large, clubs oval. Prothorax shorter than its basal width, lateral sides nearly parallel at basal half and strongly rounded anteriorly, basal border bisinuous and very narrowly marginate, anterior margin with a row of about ten minute asperities, basal corners rounded, disc strongly convex, scattered thin tubercles in anterior two-thirds, closely setiferous, and closely granulate but not larger than those of *C. laricis*. Scutellum small, nearly triangular.

Elytra nearly two-thirds longer than width, with base as wide as base of pronotum, lateral sides widened posteriorly, gently rounded to apex, humeral angles rounded; upper surface strongly convex, rugged on basal part of middle, humeral elevations rather large, elytral striae not distinct except rather distinct basal part, shallowly and rather distinctly punctured, and very short setiferous, interstices flattened, very finely punctured, and with squamiform, setae and a row of long setae.

Korean Record. Murayama, 1927; Cho, 1957; Lee and Cho, 1959; Ju, 1969; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China (Northern East), Japan, Russia (Far East), Turkey.

58 *Cryphalus piceus* Eggers, 1926 어리에나무좀(신칭) (Plate 5-58)

Cryphalus piceus Eggers, 1926a: 136.

Description.

Body 1.5 mm, small, rather short oblong subparallel-sided, testaceous to piceous-brown, nearly opaque, densely hairy. Head closely punctate, but impunctate laterally, vertex very finely reticulate, and sparsely ciliate. Frons slightly impressed transversely, punctate and shiny at middle in female. Frons with a shiny transverse laminate carina on posterior portion of frons, slightly concave, shining not closely punctate in male. Eye oval, triangularly marginate at anterior margin. Antennal funicles four-segmented, clubs oval. Prothorax shorter than width at base, lateral sides gently narrowing anteriorly, frontal margin strongly rounded and with four to

six small asperities, basal margin very narrowly rimmed and slightly wavy-edged, posterior angle rounded, disc strongly convex and again feebly prominent behind center, closely and finely granulate, rather sparsely situated comparatively thin and small tubercles on anterior two-thirds, clothed with long setae and scales. Scutellum small, triangular, surface rugose. Elytra slightly wider than base of pronotum, nearly three-fourths as wide as long, lateral sides almost parallel, strongly rounded at apex, humeral angles rounded, surface strongly convex and humeral elevations small, elytral striae not excavate and with punctures indistinct and never larger than on interstices, with minute and decumbent setae, interstices flat, closely and finely punctured, densely covered with relatively narrow scales and sparsely seriated long setae.

Korean Record. Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North?), China (Heilongjiang), Japan, Russia (Far East).

59 *Cryphalus pruni* Eggers, 1929 뽕초두나무좀

Cryphalus pruni Eggers, 1929a: 11.

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China (Yunnan), Russia (Far East).

60 *Cryphalus redikorzevi* Berger, 1917 전나무초두나무좀

Cryphalus redikorzevi Berger, 1917: 232

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China, Russia (Far East).

61 *Cryphalus rhusii* Niisima, 1909 붉나무초두나무좀 (Plate 5-61)

Cryphalus rhusii Niisima, 1909: 145.

Cryphalus kurilensis Krivolutskaya, 1968: 53.

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), Japan, Russia (Far East, Kuriles).

62 *Cryphalus scopiger* Berger, 1917 가래초두나무좀 (Plate 5-62)

Cryphalus scopiger Berger, 1917: 228.

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China, Japan, Russia (Far East).

Genus *Eidophelus* Eichhoff, 1876

Eidophelus Eichhoff, 1876: 200 (Type species: *Eidophelus imitans* Eichhoff, 1876)

Phellodendrophagus Krivolutskaya, 1958: 107, 150 (Type species:

Phellodendrophagus elegans Krivolutskaya, 1958 = *Eidophelus imitans* Eichhoff, 1876)

Idophelus Rye, 1877: 362 [unjustified emendation]

Diagnosis.

Body glabrous, cylindrical, slender, and much longer than wide with sparse hairs. Pronotum with asperities connected with linear manners. Basal area of pronotum is sparsely punctate. Elytral striae are clear. The procoxae are contiguous.

63 *Eidophelus imitans* Eichhoff, 1876 참나무좀 (Plate 5-63)

Eidophelus imitans Eichhoff, 1876: 201.

Phellodendrophagus elegans Krivolutskaya, 1958: 150.

Ptilopodius nitidus Schedl, 1959d: 475.

Korean Record. Murayama, 1930b; Murayama, 1937; Cho, 1957; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 15ex., Seoul, Dongdaemun-gu, Hongneung, 26.vi.?

Distribution. Korea, Japan, Taiwan, Russia (Far East), Oriental Region.

Genus *Ernoporius* Berger, 1917

Ernoporius Berger, 1917: 242 (Type species: *Ernoporius spessivtzevi* Berger, 1917)

Eocryphalus Kurentsov, 1941: 161, 231 (Type species: *Eocryphalus semenovi* Kurentsov, 1941)

Ernopocerus Wood, 1954: 986 (Type species: *Ernopus caucasicus* Lindemann, 1876)

Diagnosis.

The type species measured 1.65 mm long and 2.6 times as long as wide. Their color ranges from dark brown to black in other species. The pronotum is usually

longer than wide, its anterior half asperate, and the anterior margin armed. The scutellum is small and flush with the elytra. The declivity is convex and the vestiture consists of erect and light colored scale-like setae; it is also unarmed. The anterior margin of the compound eye is weakly sinuate. The funicle is 4-segmented. The club is near circular, with three procurved sutures. The procoxae are contiguous.

64 *Ernoporicus corni* (Kurentsov, 1941) 말채나무좀

Hypthenemus corni Kurentsov, 1941: 162, 232.

Description.

Body 1.1-1.5 mm, head and beneath black, legs and antennae light-red, elytra and pronotum dark brown, dull. Front slightly convex, with small tubercles growing larger towards mouth, and fine wrinkles besides it, sparsely clothed with short and light decumbent hairs, upper part of head with fine punctation. Pronotum at base rounded, with several teeth at anterior margin, space behind spot of asperities with a faint transverse impression at each side, covered rather closely with small asperities and large decumbent brown scales, transformed into hairs towards impression, sides of pronotum with much longer hairs, spot of asperities clothed with same decumbent hairs, directed posteriorly. Elytra as wide as pronotum, twice as long as side, striae of rather large but not deep punctures, the latter fact, as well as dense net of wrinkles crossing interstices and striae making punctures nearly invisible. Interstices throughout length clothed with small decumbent brown scales, larger erect scales arranged in projecting rows only on declivity of elytra and then transformed into rows of hairs, sides of elytra without large erect scales,

with but decumbent hairs only which begin from curve of elytra. Abdomen and legs in sparse decumbent hairs (Kurensov, 1941).

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), Russia (Far East).

Genus *Ernopor* C.G.Thomson, 1859

Ernopor C.G.Thomson, 1859: 147 (Typespecies: *Apate tiliae* Panzer, 1793)

Cryphalops Reitter, 1889b: 94 (Type species: *Cryphalus lederi* Reitter, 1889 = *Apate tiliae* Panzer, 1793)

Euptilius Schedl, 1940e: 589 (Type species: *Ernoporus centralis* Eggers, 1936)

Stephanorhopalus Hopkins, 1915a: 35 (Type species: *Stephanorhopalus nulodori* Hopkins, 1915 = *Stephanorhopalus melodori* Hopkins, 1915)

65 *Ernoporus tiliae* (Panzer, 1793) 분비나무좀 (Plate 5-65)

Apate tiliae Panzer, 1793: 14.

Cryphalus ratzeburgi Ferrari, 1867: 11.

Cryphalus lederi Reitter, 1889b: 93.

Ernoporus eggersi Kurentsov, 1941: 155.

Ernoporus starki Eggers, 1942: 31.

Korean Record. Murayama, 1930b; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 2ex., GB, Is. Ulleung, Ulleung-gun, 11.vii.2011.

Distribution. Korea (North, South), Russia (Far East), Turkey, Europe.

Genus *Hypothenemus* Westwood, 1834

Hypothenemus Westwood, 1834: 35 (Type species: *Tomicus eruditus* Westwood, 1834)

Adiaeretus Hagedorn, 1909: 744 (Type species: *Adiaeretus spinosus* Hagedorn, 1909 = *Stephanoderes elephas* Eichhoff, 1872)

Archeophalus Schedl, 1941c: 392 (Type species: *Archeophalus natalensis* Schedl, 1941)

Chondronoderes Schedl, 1940e: 589 (Type species: *Stephanoderes magnus* Eggers, 1924)

Ernophloeus Nunberg, 1958: 484 (Type species: *Ernophloeus costalimai* Nunberg, 1958 = *Stephanoderes fuscicollis* Eichhoff, 1878)

Homoeocryphalus Lindemann, 1876b: 168 (Type species: *Stephanoderes ehlersi* Lindemann, 1876 = *Tomicus eruditus* Westwood, 1834)

Lepiceroides Schedl, 1957b: 59 (Type species: *Lepiceroides aterrimus* Schedl, 1957 = *Hypothenemus aterrimulus* Wood, 1989)

Macrocryphalus Nobuchi, 1981a: 14 (Type species: *Macrocryphalus oblongus* Nobuchi, 1981)

Pachynoderes Schedl, 1941c: 393 (Type species: *Pachynoderes deprecator* Schedl, 1941)

Stephanoderes Eichhoff, 1872a: 132 (Type species: *Stephanoderes chapuisii* Eichhoff, 1872 = *Crypturgus dissimilis* Zimmermann, 1868)

Stylotentus Schedl, 1963: 448 (Type species: *Hypothenemus concolor* Hagedorn, 1909)

Triarmocerus Eichhoff, 1878a: 383[=1878b: 119] (Type species: *Triarmocerus cryphaloides* Eichhoff, 1878)

Diagnosis.

Species in this genus range from 0.6 to 2.2 mm in length and 2.0 to 2.7 times as long as wide. Body color pale yellowish brown to black. The pronotum usually wider than long with lateral margins with a raised line; the anterior half asperate and its margin armed by a series of teeth. The scutellum large. The declivity convex and unarmed. The vestiture consists of light and erect bristles. The anterior margin of the compound eye emarginated. The scape usually longer than their usually 5-segmented funicle, which varies from 4-segmented in females of smaller species to 3-segmented in most *H. birmanus*. In general, males usually have one less segment than females. The ovate club usually constricted, partly septate at the first suture which is straight, and has one or two more sutures which are procurved to slightly bisinuate. The procoxae contiguous. *Hypothenemus* can be distinguished from similar Cryphalina by the combined characters of the 3- to 5-segmented antennal funicle and the oval club with the first suture almost straight and only partly septate, whereas it is entirely septate in *Procryphalus* Hopkins, and the other two are procurved to slightly bisinuate. It is also distinguishable by its vestiture of erect and light colored thick bristles.

Key to species of genus *Hypothenemus* of Korea

1. Erect hispid scales on the elytra ----- 2
- Without erect hispid scales on the elytra ----- *H. expers*
2. Posterolateral areas of pronotum deeply, coarsely, closely punctured to lateral margin, pronotum rather broadly rounded in front ----- *H. californicus*
- Posterolateral areas of pronotum indistinctly, shallowly, finely punctured, punctures usually obsolete near lateral margin, pronotum rather narrowly rounded

in front ----- *H. eruditus*

66 *Hypothenemus californicus* Hopkins, 1915 캘리포니아나무좀

Hypothenemus californicus Hopkins, 1915a: 19.

Hypothenemus tritici Hopkins, 1915a: 19.

Hypothenemus thoracicus Hopkins, 1916: 598.

Stephanoderes zae Schedl, 1973b: 169.

Description.

Female. 1.0-1.4 mm, 2.5 times as long as wide, dark brown to black. Frons convex above, shallowly, transversely impressed on lower half, median line shining and indistinctly elevated in impressed area, remaining surface reticulate-granulate, particularly in marginal areas, becoming more nearly punctate toward ventromedian area, vestiture inconspicuous. Pronotum as long as wide, widest one-third length from base, sides moderately, evenly arcuate, rather broadly rounded in front, anterior margin armed by six coarse teeth of equal size, summit in front of middle, not high, posterior and lateral areas closely, rather coarsely, deeply punctured, with fine, indistinct granules intermixed, vestiture of hair and, on posterior half, with slender, erect scale intermixed. Elytra 1.6 times as long as wide, sides almost straight and parallel on basal two-thirds, rather narrowly rounded behind, striae not impressed, punctures small, shallow; interstriae about one and one-half times as wide as striae, smooth, punctures fine, uniseriate. Declivity convex, steep, essentially as on disc, vestiture of rows of fine, short, strial hair on disc, with a few similar supplemental interstitial setae on lateral areas of declivity, and rows of erect interstitial scales; each scale slightly longer

than distance between rows and between scales within a row, each about six times as long as wide. Male. 0.75-0.85 mm, 2.2 times as long as wide, eye reduced, funicle often 3-segmented, club smaller, more slender, one or more marginal teeth on pronotum absent, pubescence longer, more slender (Wood, 1982).

Korean Record. Choo et al., 1983b; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (South), Israel, Afrotropical Region, Nearctic Region, Neotropical Region.

Remarks. According to the distribution, this species would be introduced in Korea, but it seems to fail to adapt to Korean circumstance.

67 *Hypothenemus eruditus* (Westwood, 1834) 감나무좀 (Plate 5-67)

Tomicus eruditus Westwood, 1834: 34.

Cryphalus aspericollis Wollaston, 1860b: 365.

Bostrichus boieldieui Perroud, 1864: 188.

Cryphalus obscurus Ferrari, 1867: 17 [HN].

Homoeocryphalus ehlersi Lindemann, 1876b: 168.

Stephanoderes germari Eichhoff, 1878a: 386 [=1878b: 159].

Stephanoderes myrmidon Eichhoff, 1878a: 386.

Stephanoderes myrmedon Eichhoff, 1878b: 160.

Stephanoderes communis C.F.C.Schaufuss, 1891: 11.

Hypothenemus insularis Perkins, 1900: 181.

Cryphalus tectonae Stebbing, 1903: 263.
Cryphalus basjoo Niisima, 1910: 9.
Cryphalus striatopunctatus Lea, 1910: 142.
Cryphalus tantillus Lea, 1910: 142.
Hypothenemus tuberculosus Hagedorn, 1912b: 339.
Cosmoderes schwarzi Hopkins, 1915a: 11.
Hypothenemus bradfordi Hopkins, 1915a: 15.
Hypothenemus flavosquamosus Hopkins, 1915a: 15.
Hypothenemus asiminae Hopkins, 1915a: 16.
Hypothenemus hamamelidis Hopkins, 1915a: 16.
Hypothenemus myristicae Hopkins, 1915a: 16.
Hypothenemus nigricollis Hopkins, 1915a: 16.
Hypothenemus pruni Hopkins, 1915a: 16.
Hypothenemus rumseyi Hopkins, 1915a: 16.
Hypothenemus tenuis Hopkins, 1915a: 16.
Hypothenemus koebelei Hopkins, 1915a: 17.
Hypothenemus lineatifrons Hopkins, 1915a: 17.
Hypothenemus mali Hopkins, 1915a: 17.
Hypothenemus parvus Hopkins, 1915a: 17.
Hypothenemus sacchari Hopkins, 1915a: 17.
Hypothenemus webbi Hopkins, 1915a: 17.
Hypothenemus flavipes Hopkins, 1915a: 18.
Hypothenemus punctifrons Hopkins, 1915a: 18.
Hypothenemus nigripennis Hopkins, 1915a: 19.
Hypothenemus ferrugineus Hopkins, 1915a: 20

Hypothenemus heathi Hopkins, 1915a: 20.
Hypothenemus punctipennis Hopkins, 1915a: 20.
Stephanoderes flavicollis Hopkins, 1915a: 24.
Stephanoderes pygmaeus Hopkins, 1915a: 24.
Stephanoderes elongatus Hopkins, 1915a: 25.
Stephanoderes subconcentralis Hopkins, 1915a: 25.
Stephanoderes unicolor Hopkins, 1915a: 25.
Stephanoderes evonymi Hopkins, 1915a: 26.
Hypothenemus rottroui Peyerimhoff, 1919b: 255.
Hypothenemus bicolor Eggers, 1920b: 241.
Hypothenemus juglandis Blackman, 1922: 88.
Hypothenemus pusillus Eggers, 1927c: 173.
Stephanoderes intersetosus Eggers, 1928a: 85.
Hypothenemus lezhavai Pyatnitskiy, 1929: 8.
Stephanoderes gracilis Eggers, 1929b: 51 [RN].
Hypothenemus citri Ebeling, 1935: 21.
Stephanoderes erythrinae Eggers, 1936c: 628.
Hypothenemus bicolor Schedl, 1939a: 32 [HN]
Hypothenemus argentinensis Schedl, 1939e: 408.
Hypothenemus cylindricus Schedl, 1939e: 409.
Hypothenemus asaroriensis Beeson, 1940: 195.
Hypothenemus dubiosus Schedl, 1940b: 207.
Stephanoderes subcylindricus Schedl, 1940c: 233.
Hypothenemus mauiensis Schedl, 1941b: 110.
Hypothenemus glabratus Schedl, 1942b: 175.
Archeophalus ealaensis Eggers, 1944b: 94.

Stephanoderes nanulus Schedl, 1949b: 263.
Hypothenemus parilis Schedl, 1951c: 100.
Hypothenemus obscuriceps Schedl, 1952e: 449.
Stephanoderes tigrensis Schedl, 1952e: 452.
Hypothenemus glabratellus Schedl, 1953d: 292.
Hypothenemus parcius Schedl, 1957b: 49.
Hypothenemus cylindripennis Schedl, 1957b: 51.
Hypothenemus vianai Schedl, 1958b: 42.
Hypothenemus mesoleius Schedl, 1959d: 480.
Hypothenemus minutulus Schedl, 1972e: 225.
Cryphalus minutus Schedl, 1978b: 299.

Description.

Female. 1.0-1.3 mm, 2.4-2.6 times as long as wide, mature color black. Frons convex, a slight, transverse impression immediately above epistoma, surface rugose-reticulate, punctures fine to moderately coarse, median line shining or not, usually with a small median groove at upper level of eyes, vestiture inconspicuous. Pronotum 0.85-0.95 times as long as wide, widest on basal third, sides moderately arcuate, converging slightly anteriorly on basal two-thirds, rather broadly rounded in front, anterior margin armed by six teeth, lateral ones smaller, summit slightly in front of middle, rather well developed, posterior areas obscurely rugose-reticulate, punctures small, shallow, a few of them subgranulate particularly behind summit, vestiture of coarse hair in asperate anterior area, fine hair and erect scales intermixed on posterior half. Elytra 1.6 times as long as wide, sides almost straight and parallel on basal two-thirds, rather narrowly rounded behind,

striae not impressed, punctures moderately large, interstriae almost smooth, as wide as striae, punctures fine, uniseriate, very finely, often obscurely subvulcanate. Declivity steep, convex, about as on disc except interstitial granule very slightly larger, vestiture of rows of fine, short, strial hair, often supplemented by similar interstitial hair on disc, supplemental hair almost always present on declivity, and rows of erect interstitial scales, each scale as long as distance between rows and between scales within a row, each scale from three to five times as long as wide. Male. 0.7-0.8 mm, 2.2 times as long as wide, eye reduced in size, funicle usually 3-segmented, club smaller, more slender, one or more marginal teeth on pronotum absent, pubescence longer, more slender (Wood, 1982).

Korean Record. Choo et al., 1983a; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 11ex., GN. Jinju-si, Gajwa-dong, 14.x.1982; 1ex., GN. Namhae-gun, Idong-myeon, 30.xii.1983; 15ex., GN. Namhae-gun, Idong-myeon, Mt. Namsan. 9.i.1984.

Distribution. Korea (South), China, India, Iran, Israel, Japan, Taiwan, Turkey, Afrotropical Region, Australian Region, Europe, North Africa, Nearctic Region, Neotropical Region, Oriental Region.

68 *Hypothenemus expers* Blandford, 1894 가슴네뿔나무좀 (Plate 5-68)

Hypothenemus expers Blandford, 1894a: 85.

Hypothenemus seoulensis Choo & Woo, 1989b: 58. **syn. nov.**

Description.

Body 2.0 mm, elongate oval, dark brown to black, usually black, rather larger and

more robust, darker in colour than *Hypothenemus peritus* Blandford (= *H. birmanus* Eichhoff), being black with a pitchy tinge, the thorax pitchy-red in middle, and not obscurely testaceous. Front of head more convex, very finely reticulate, sparse and short setae in middle and longer setae above clypeus and not punctured except transversely impressed rostrum. Antennae bright testaceous, basal joint of club deeply infusate, funicles 5-jointed. Pronotum wider than long, widest before base, rounded anteriorly, anterior margin with four prominent tubercles, base truncate, sides more strongly rounded, its tuberculation similar, but marginal tubercles less prominent, the two outer ones nearly obsolete, basal half closely reticulate and covered with small asperate elevations, closer than the non-elevated punctures in *H. peritus*. Scutellum triangular. Elytra longer than wide, strial punctures with a row of short setae, interstriae Interstices without evident scales, but with a single row of erect long hairs, longer and more dense hairs from the middle to declivity. A few finer hairs are found between the rows. Legs clear testaceous.

Korean Record. Choo and Woo, 1989b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 17ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 21.iv-17.v.2011; 76ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 21.iv-17.v.2011.

Distribution. Korea, Japan.

Remarks. The absence of the conspicuous erect hispid scales on the elytra, which are replaced by hairs, will at once distinguish this species from either of *H. tristis* and *H. peritus* (Blandford, 1894a). This species looks the genus *Trypophloeus* in the tubercle arrangement of pronotum and similar to *Hypothenemus cosmoderoides*

Murayama, but distinguished by the five antennal funicles, tubercle arrangement of pronotum, and weakly impressed striae (Choo and Woo, 1989b). The elytral pubescent character status of type species deposited in BMNH does not coincided with original description. It might be mis-labeled or replaced with another specimens. It must be checked again. Although the type specimens of *H. seoulensis* Choo & Woo were lost and could not be checked, the descriptions and pictures (Choo & Woo, 1989b) are coincided with this species.

69 *Hypothenemus furukawai* (Murayama, 1934) 물오리나무좀

Cryphalus furukawai Murayama, 1934a: 59.

Description.

Body 1.3-1.5mm long, oblong, pitchy-black, shiny, covered with yellow scales and setae. Head finely reticulate, front subconvex, rugosely punctate at sides with sparse long hairs, median line elevated, ciliate over the mouth, eyes ovate, large, slightly emarged in front, antennae yellowish, funicles 4-jointed, clubs slightly tapered to apex. Prothorax wider than long, base subtruncated, basal angles obtusely rounded, sides slightly dilated before base, contracted to apex, which is rounded with 4-6 tubecles in middle, in front of which imbricately asperate forming it triangular area produced behind, interstices densely covered with upright strong setae, sides and basal half rugose with fine but strong punctures, covered with fine hairs and yellow scales. Scutellum small, triangular, black. Elytra as wide as and one half longer than prothorax, base truncated, slightly elevated and rounded, humeral callosities distinct, basal angles almost rectangular, sides parallel to two thirds of length, thence rounded and contracted to apex, surface cylindrical,

finely striate-punctate, with short erect hairs, interstices transversely rugose, with a row of yellow scales, declivity convex, gentle, apex slightly prominent (Murayama, 1934a).

Korean Record. Murayama, 1934a; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo et al., 1983; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (South), Japan.

Genus *Procryphalus* Hopkins, 1915

Procryphalus Hopkins, 1915a: 33 (Type species: *Procryphalus populi* Hopkins, 1915 = *Cryphalus mucronatus* LeConte, 1879)

Diagnosis.

The range from 1.5 to 2.2 mm in length, and are approximately 2.5 to 2.8 times as long as wide. Their color ranges from dark brown to black. The pronotum is as long as wide with the lateral margins rounded, the anterior half is asperate and armed in its margin by several teeth. The scutellum is small. The declivity is convex and unarmed. The contrastingly light vestiture consists of recumbent, short, scale-like setae and short, erect, interstitial bristles. The anterior margin of the compound eye is entire. The scape is usually as long as the 4-segmented funicle. The club is elongate-oval, with two to three procurved sutures, the first septate. The procoxae are contiguous. *Procryphalus* are distinguished from other *Cryphalina* by the combination of the rounded lateral margins of the pronotum and the oval

club with 2 to 3 procurved sutures, the first being septate.

70 *Procryphalus fraxini* (Berger, 1917) 들메가지나무좀

Ernoporos fraxini Berger, 1917: 238.

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China (Northern East), Russia (Far East).

Genus *Scolytogenes* Eichhoff, 1878

Scolytogenes Eichhoff, 1878a: 387 [=1878b: 497] (Type species: *Scolytogenes darwini* Eichhoff, 1878)

Cryphalomorphus C.F.C.Schaufuss, 1891: 12 (Type species: *Cryphalomorphus communis* C.F.C.Schaufuss, 1891)

Cryphalophilus Schedl, 1970c: 358 (Type species: *Cryphalophilus afer* Schedl, 1970)

Ernoporides Hopkins, 1915a: 34 (Type species: *Ernoporides floridensis* Hopkins, 1915 = *Bostrichus jalappae* Letzner, 1849)

Hypothenoides Hopkins, 1915a: 11 (Type species: *Hypothenoides parvus* Hopkins, 1915)

Lepicerinus Hinton, 1936: 473 [RN] (Type species: *Lepicerus aspericollis* Eichhoff, 1878)

Lepicerus Eichhoff, 1878a: 388 [=1878b: 501] [HN] (Type species: *Lepicerus aspericollis* Eichhoff, 1878)

Lepidocerus Rye, 1880: 103 (Type species: *Lepicerus aspericollis* Eichhoff, 1878)

Letznerella Reitter, 1913b: 68 (Type species: *Bostrichus jalappae* Letzner, 1849)

Negritus Eggers, 1923a: 141 (Type species: *Negritus ater* Eggers, 1923)

Neocryphalus Eggers, 1922c: 169 (Type species: *Neocryphalus usagaricus* Eggers, 1922)
Xylocryptus Schedl, 1975b: 352 (Type species: *Xylocryptus papuanus* Schedl, 1975
= *Scolytogenes papuensis* Wood, 1989)

Diagnosis.

Species in this genus range from 0.8 to 2.0 mm in length and are 2.3 to 2.7 times as long as wide. Their color varies from brown to black. The pronotum is as long as wide, with a fine raised line on the lateral and basal margins, and armed in the anterior half. The scutellum is small. The declivity is convex with or without granules. The vestiture consists of short and light colored hair- and scale-like setae, which is erect in some species. The anterior margin of the compound eye varies from entire to emarginate. The scape is usually longer than the 4-segmented funicle. The oval to ovate club is large relative to its eye, and without sutures except for a septum that extends to the middle at an angle. The procoxae are contiguous.

71 *Scolytogenes puerarae* Choo & Woo, 1989 *췁나무좀* (Plate 5-71)

Scolytogenes puerarae Choo & Woo, 1989: 58.

Description.

Body 1.7 mm, oblong oval, reddish brown to black. Frons flat with close and rough punctures, sparse setae; antennal funicle 4-segmented, club roundly oval, 1st antennal suture strongly septate; eyes entire, oval. Pronotum round, convex, anterior margin with five large tubercles, anterior roundly narrowed, summit convex, anterior part with several retrovert teeth and these teeth make irregular

rows laterally, lateral and posterior part finely punctate with dens scales, basal margin bordered, slightly sinuate. Scutellum black, triangular. Elytra as wide as pronotum, lateral margin parallel, rounded posteriorly, declivity roundly steep, striae not impressed with scales, interstriae intermixed with irregular rows of short and long scales and fine tubercles, posterior margin roundly tapered, declivity with uniserial scales and erect long scales looked uniserial (Choo & Woo, 1989).

Korean Record. Choo and Woo, 1989b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. Neotype: JN, Sinan-gun, Heuksan-do, 15.i.2012, (rearing from *Pueraria thunbergiana*); 1ex., GW, Chuncheon-si, Dongsan-myeon, Joyang-ri, 21.iv-17.v.2011; 2ex., JN, Sinan-gun, Heuksan-do, 15.i.2012, (rearing from *Pueraria thunbergiana*); 1ex., GW, Chuncheon-si, Dongsan-myeon, Joyang-ri, 24.iii-21.iv.2011.

Distribution. Korea (South).

Remarks. This species is quite similar with *S. candidus*, but can be easily distinguished by somewhat round antero-lateral margin of prothorax (Choo & Woo, 1989).

Genus *Trypophloeus* Fairmaire, 1864

Trypophloeus Fairmaire, 1864: 105 (Type species: *Bostrichus binodulus* Ratzeburg, 1837)

Glyptoderes Eichhoff, 1878b: 34 (Type species: *Bostrichus binodulus* Ratzeburg, 1837)

Diagnosis.

Species on this genus range from 1.5 to 2.1 mm in length and are approximately

2.3 to 2.5 times as long as wide. Their color ranges from dark brown to black. The pronotum is usually wider than long, with the anterior half asperate, and the anterior margin armed; their lateral margins are not marked by a raised line. The scutellum is small and flush with the elytra. The declivity is convex and unarmed. The vestiture consists of abundant, short ground cover of scales and/or hair and interstitial rows of short erect bristles. The anterior margin of the compound eye is entire. The scape is usually as long as the 5-segmented funicle. The club is ovate, apically pointed, and has three straight sutures. The procoxae are contiguous. *Trypophloeus* is distinguished from other Cryphalina by the 5-segmented antennal funicle, the ovate and often pointed club which has three straight sutures, and by the absence of erect thick long bristles that occur in some of the other genera in the subtribe.

72 *Trypophloeus binodulus* (Ratzeburg, 1837) 물황철나무좀

Bostrichus binodulus Ratzeburg, 1837: 163.

Cryphalus grothii Hagedorn, 1904b: 232.

Trypophloeus spiculatus Eggers, 1927b: 122.

Trypophloeus populi Kurentsov, 1941: 164, 231 [HN].

Trypophloeus berenzinae Stark, 1952: 285.

Trypophloeus kurenzovi Nunberg, 1956: 208 [RN].

Trypophloeus kurenzowi Schedl, 1959b: 42.

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), Japan, Russia (East Siberia, Far East), Europe, North

Africa.

Tribe Crypturgini LeConte, 1876

Genus *Crypturgus* Erichson, 1836

Crypturgus Erichson, 1836: 60 (Type species: *Bostrichus pusillus* Gyllenhal, 1813)

Diagnosis.

Species in this genus range from 1.0 to 1.2 mm in length and are approximately 2.8 times as long as wide. Their color varies from dark brown to black. The pronotum is longer than wide. The scutellum is small. The declivity is convex and has a vestiture of recumbent long bristles, the same as in the rest of the body; the females of two native species have a spongy area at the apex. The anterior margin of the compound eye is emarginate. The scape is longer than the 2-segmented funicle, which often looks like a single segment. The club is asymmetrical and club-shaped (rhomboid) with only an indistinct procurved suture at its apex. The procoxae are contiguous.

73 *Crypturgus cinereus* (Herbst, 1794) 가문비아기나무좀 (Plate 5-73)

Bostrichus cinereus Herbst, 1794a: 116.

Hylesinus tenerrimus C.R.Sahlberg, 1836a: 140.

Crypturgus atticus Eggers, 1911b: 120.

Crypturgus corsicus Eggers, 1923b: 135.

Crypturgus apfelbecki Eggers, 1940f: 36.

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China, Mongolia, Russia, Europe.

74 *Crypturgus hispidulus* C.G.Thomson, 1870 잣솔애기나무좀 (Plate 5-74)

Crypturgus hispidulus C.G.Thomson, 1870: 338.

Crypturgus maulei Roubal, 1910: 203.

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China, Russia, Europe.

75 *Crypturgus pusillus* (Gyllenhal, 1813) 가문비가는나무좀 (Plate 5-75)

Bostrichus pusillus Gyllenhal, 1813: 371.

Bostrichus aphodioides A.Villa & G.B.Villa, 1833: 36.

Crypturgus atomus LeConte, 1868: 152.

Polygraphus minimus Stebbing, 1903: 252.

Crypturgus danicus Eggers, 1932b: 80.

Description.

Body 1.1-1.2 mm, 2.8 times as long as wide, reddish brown to dark brown. Frons convex, surface reticulate, punctures fine and obscure, vestiture inconspicuous. Pronotum 1.2 times as long as wide, widest near middle, sides moderately arcuate, converging equally anteriorly and posteriorly, anterior and posterior margins equally and rather narrowly rounded, surface reticulate at margins, subreticulate and shining toward disc, punctures moderately coarse, deep, not close, vestiture

hairlike, restricted to peripheral areas. Elytra 1.8 times as long as wide, 1.6 times as long as pronotum, sides almost straight and parallel on more than basal two-thirds, rather narrowly rounded behind, 1st striae feebly, others not impressed, punctures rather small and deep, interstriae wider than striae, smooth, shining, interstitial punctures minute to obsolete. Declivity convex, moderately steep, striae punctures smaller than on declivity, vestiture almost obsolete on disc, consisting of rows of minute striae and slightly longer interstitial hair, longest setae on declivity equal to less than half distance between rows (Wood, 1982).

Korean Record. Murayama, 1929b; Murayama, 1930b; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 2ex., CB. Cheongyang-gun, Daechi-myeon, Gwanggeum-ri, 14.vi.2008.

Distribution. Korea (North, South), China, India, Japan, Kazakhstan, Nepal, Pakistan, Russia, Turkey, Europe, Nearctic Region (introduced).

Tribe Dryocoetini Lindemann, 1876

Key to genera of tribe Dryocoetini of Korea

1. Antennal club compressed or slightly thickened at base, usually with procurved sutures on both surfaces; funicle 5segmented; fore tibiae slender, abruptly dilated apex; pronotum slightly narrowing anteriorly; summit situated in middle, and rather strongly elevated; basal area impressed behind summit ----- *Taphrorychus*
- Antennal club obliquely truncate on outer surface, thickened at base, with straight or recurved sutures on outer surface ----- 2

2. Antennal funicle 4 segmented ----- *Cyrtogenius*
 - Antennal funicle 5 segmented ----- 3
3. Pronotum not arcuate in lateral margins ----- *Dryocoetes*
 - Pronotum arcuate at least in basal half of lateral margins ----- *Coccotrypes*

Genus *Coccotrypes* Eichhoff, 1878

Coccotrypes Eichhoff, 1878a: 391 (Type species: *Bostrichus dactyliperda* Fabricius, 1801)

Cryphaloides Formánek, 1908:91 (Type species: *Cryphaloides donisthorpei* Formánek, 1908 = *Bostrichus carpophagus* Hornung, 1842)

Dendrurgus Eggers, 1923a: 144 (Type species: *Dendrurgus sundaensis* Eggers, 1923 = *Thamnurgides myristicae* Roepke, 1919)

Poecilips C.F.C. Schaufuss, 1898a: 110 (Type species: *Poecilips sammio* C.F.C. Schaufuss, 1898)

Spermatoplex Hopkins, 1915a: 48 (Type species: *Spermatoplex rhizophorae* Hopkins, 1915)

Thamnurgides Hopkins, 1915a: 45 (Type species: *Thamnurgides persicae* Hopkins, 1915 = *Coccotrypes advena* Blandford, 1894)

Diagnosis.

Species in this genus range from 1.2 to 2.5 mm in length and are approximately 2.1 to 2.5 times as long as wide. Their color ranges from reddish brown to almost black. The frons is convergently aciculate with a sparse, hair-like vestiture. The pronotum is usually longer than wide, with or without asperities. The scutellum is small. The declivity is convex and unarmed. The vestiture consists of abundant and erect hair-like setae. The anterior margin of the compound eye is emarginate. The scape is longer than the 5-segmented funicle. The club is

obliquely truncate, with none to two recurved sutures on its posterior face. The procoxae are contiguous. Species in the genus *Coccotrypes* can be distinguished from those in *Dryocoetes* Eichhoff by the convergently aciculate frons, the smaller oral region and its subtropical distribution and hosts.

76 *Coccotrypes carpophagus* (Hornung, 1842) 성관악나무좀

Bostrichus carpophagus Hornung, 1842: 116.

Coccotrypes integer Eichhoff, 1878a: 391 [=1878b: 311]

Coccotrypes pygmaeus Eichhoff, 1878a: 391 [=1878b: 310]

Cryphaloides donisthorpei Formánek, 1908: 91.

Coccotrypes annae Hopkins, 1915a: 46.

Coccotrypes bakeri Hopkins, 1915a: 46.

Coccotrypes hubbardi Hopkins, 1915a: 46.

Coccotrypes thrinacis Hopkins, 1915a: 46.

Coccotrypes liberiensis Hopkins, 1915a: 47.

Coccotrypes rollinae Hopkins, 1915a: 47.

Coccotrypes nanus Eggers, 1920a: 33.

Coccotrypes canariensis Eggers, 1928b: 117.

Coccotrypes phoenicola Beeson, 1939: 281.

Coccotrypes trevori Beeson, 1939: 282.

Coccotrypes pilosulus Schedl, 1949a: 118.

Coccotrypes ceylonicus Schedl, 1949a: 119.

Coccotrypes punctulatus Eggers, 1951: 151.

Coccotrypes grisseopuberulus Schedl, 1972b: 59.

Coccotrypes exasperatus Schedl, 1975a: 455.

Description.

Body 1.2-1.9 mm, 2.2 times as long as wide, dark brown to almost black. Frons broadly concave, weakly, transversely impressed on lower half, surface shining, rather coarsely and convergently aciculate from vertex to epistoma, a few fine, obscure punctures above, vestiture of sparse fine, long hair. Pronotum 1.05 times as long as wide, anterior margin rather coarsely serrate, asperate to base, asperities moderately coarse, close, abundant, those behind summit longitudinal and about four to six times as long as thick; punctures not evident, vestiture of rather sparse hair of moderate length. Elytra 1.3 times as long as wide, 1.3 times as long as pronotum, striae not impressed, punctures small, distinct, very shallow, interstriae smooth, shining, three to four times as wide as striae, punctures replaced by small, uniseriate granules. Declivity rather steep, broadly convex; sculpture as on disc, vestiture of rows of short, recumbent striae hair, and rows of erect interstitial bristles, each bristle slender, blunt, very slightly longer than distance between rows or between bristles within a row (Wood, 1982).

Korean Record. Choo et al., 1983b; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (South), India, Japan, Taiwan, Afrotropical Region, Australian Region, Nearctic Region, Neotropical Region, Oriental Region.

77 *Coccotrypes nubilus* (Blandford, 1894) 털나무좀 (Plate 5-77)

Dryocoetes nubilus Blandford, 1894a: 95.

Thamnurgides parvus Beeson, 1939: 297 [HN].

Thamnurgides brevipilosus Beeson, 1939: 298.

Thamnurgides corticis Beeson, 1939: 298.

Thamnurgides himalayensis Beeson, 1939: 299.

Poecilips mauritianus Browne, 1970: 569.

Description.

Body 1.7-2.2 mm, oblong, lighter, or darker piceous-brown. Front of head scantily punctured, weakly impressed at sides, and with a median subelevated longitudinal line, its pubescence long and thin, mouth ciliate; antennae testaceous, with sutures of club straight. Prothorax a little longer than broad, its base truncate, basal angles obtusely rounded, sides rounded, slightly behind, more strongly towards apex; surface somewhat depressed, asperate in front with concentric lines of transverse tubercles, becoming weaker behind and replaced at base by rugose punctures, except over and indistinct median smooth line; sides and apex with long scanty hairs. Scutellum rather large, rounded, shining. Elytra rather wider than prothorax at base, and one half longer, truncate at base, with shoulders nearly rectangular, sides parallel to near apex, then gradually rounded; apex not obtuse; surface cylindrical, obliquely and convexly declivous for posterior third, with rows of fine punctures, the sutural stria alone with a trace of impression in some specimens; interstices subrugose, with a single row of finer setigerous punctures, the setae becoming longer and more conspicuous towards apex. Underside testaceous-brown, nearly glabrous and impunctate. Legs reddish testaceous (Blandford, 1894a).

Korean Record. Murayama, 1930b; Murayama, 1931; Murayama, 1937; Cho, 1957; Cho, 1963; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 7ex., GG. Pocheon-si Soheul-eup, Gwangneung, iv.1990.

Distribution. Korea (South), China, India, Japan, Oriental Region.

Remarks. Distinguishable from *D. alni* Georg, by its smaller size, the weaker punctuation of the base of the thorax and elytra, and the absence of the lateral impressions and elevated suture of the apical declivity.

Genus *Cyrtogenius* Strohmeier, 1910

Cyrtogenius Strohmeier, 1910: 127 (Type species: *Cyrtogenius bicolor* Strohmeier, 1910)

Carposinus Hopkins, 1915a: 9, 47 (Type species: *Carposinus pini* Hopkins, 1815 = *Dryocoetes luteus* Blandford, 1894)

Orosiotes Niisima, 1917: 1 (Type species: *Orosiotes kumamotoensis* Niisima, 1917)

Metahlyastes Eggers, 1922c: 165 (Type species: *Metaylastes africanus* Eggers, 1922 = *Cyrtogenius africanus* Wood, 1988)

Pelicerus Eggers, 1923a: 216 (Type species: *Pelicerus nitidus* Hagedorn, 1910)

Eulepiops Schedl, 1939c: 344 (Type species: *Eulepiops glaber* Schedl, 1939)

Ozodendron Schedl, 1957b: 13 (Type species: *Pelicerus grandis* Beeson, 1929)

Mimidendrulus Schedl, 1957b: 68 (Type species: *Mimidendrulus movoliae* Schedl, 1957)

Carpophloeus Schedl, 1958d: 143 (Type species: *Carpophloeus rugipennis* Schedl, 1958)

Taphroborus Nunberg, 1961: 617 (Type species: *Taphroborus vaticae* Nunberg, 1961)

Ozodendron Schedl, 1964c: 243 [HN] (Type species: *Pelicerus grandis* Beeson, 1929)

Artepityophthorus Schedl, 1969c: 157 (Type species: *Artepityophthorus aries* Schedl, 1969)

Key to species of genus *Cyrtogenius* of Korea

1. Elytral striae weakly impressed; interstriae slightly convex; tubercles on declivital interstriae less strong; pronotum asperate over anterior a half -----
----- *C. brevior*
- Elytral striae more deeply impressed; interstriae flat; tubercles on declivital interstriae rather strong; pronotum asperate over anterior two-thirds --- *C. luteus*

78 *Cyrtogenius brevior* (Eggers, 1927) 반송나무좀 (Plate 6-78)

Pelicerus brevior Eggers, 1927e: 86.

Description.

Body 2.0 mm, bright yellowish brown, cylindrically elongate, covered with yellowish long hairs sparsely. Head slightly convex, punctate, scantily hairy in male, and ciliate over mouth, in female with a circular tuft of somewhat short pubescence between eye. broadly elongate vertically, and emarginate anteriorly. Pronotum slightly longer than wide, parallel-sided at basal half, moderately arcuate anteriorly, anterior part finely asperate, posterior part densely punctate, shining. Scutellum subround, shining. Elytra as wide as pronotum, striae weakly impressed, punctures large, interstriae weakly convex, wide, shining with a row of punctures, 1st interstice slightly widened posteriorly, declivity short, steep, abruptly truncate, interstices of declivity with a row of small tubercles.

Korean Record. Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 45ex., GG. Pocheon-si Soheul-eup, Gwangneung, 26.ix.1986;

2ex., GG. Incheon-si, Jung-gu, Is. Yeongjongdo, 10.viii.2007; 1ex., JN, Jangheung-gun, 16.iv.2009; 3ex., JJ, Jejusi, Hangeong-myeon, Mt. Suweolbong, 14.viii.2007.

Distribution. Korea (South), Japan, Oriental Region.

79 *Cyrtogenius luteus* (Blandford, 1894) 층층나무좀 (Plate 6-79)

Dryocoetes luteus Blandford, 1894a: 94.

Oriodiotus formosanus Schedl, 1952b: 63.

Description.

Body 2.0 mm, bright yellow-testaceous, with short scanty pubescence on sides of thorax and apex only of elytra. Head strongly punctured, with front convex, scantily hairy in male, and ciliate over mouth; in female with a circular tuft of yellow pubescence. Eyes broad oval, coarsely granulate, and emarginate anteriorly. Antennae testaceous with sutures slightly curved. Prothorax longer than broad, with base truncate, its angles obtuse, sides nearly parallel to middle, thence strongly rounded to apex; above moderately convex, not gibbous, with close punctures, simple at base, and asperate over anterior two-thirds. Scutellum rounded, shining. Elytra as wide as prothroax and one-half longer, base truncate, humeral angles rectangular, sides parallel to apex, then abruptly flexed, their apical margin being almost transverse when seen from above; surface cylindrical, nearly vertically declivous at apex but convex, with regular impressed rows of strong punctures dilated after the base, sutural stria more deeply impressed and widened behind, interstices flat with a single row of fine punctures, replaced by small stigerous tubercles on declivity. Underside and legs testaceous, the former scantily punctured

and pubescent (Blandford, 1894a).

Korean Record. Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (South), China, Japan, Taiwan, Oriental region.

Genus *Dryocoetes* Eichhoff, 1864

Dryocoetes Eichhoff, 1864: 38 (Type species: *Bostrichus autographus* Ratzeburg, 1837)

Anodius Motschulsky, 1860: 155 (Type species: *Bostrichus autographus* Ratzeburg, 1837)

Dryocoetinus Balachowsky, 1949a: 180 (Type species: *Bostrichus villosus* Fabricius, 1792)

Diagnosis.

Species in this genus range from 1.7 to 4.4 mm in length and are approximately 2.3 to 2.6 times as long as wide. Their color is a dark reddish brown. The pronotum is usually longer than wide, with the anterior area asperate. The scutellum is small. The declivity ranges from convex to flat and has granules. The vestiture consists of long and erect hair-like setae. The frons vestiture consists of a dense brush of hair-like setae in females of some species and its surface is rugulose. The oral region is particularly broad. The anterior margin of the compound eye is emarginate. The scape is longer than the 5-segmented funicle. The club is obliquely truncate with one to two recurved sutures on the posterior face. The procoxae are contiguous. Species in the genus *Dryocoetes* can be recognized from the similar *Coccotrypes* Eichhoff by their broad oral region and their rugulose and never convergently aciculate frons.

80 *Dryocoetes autographus* (Ratzeburg, 1837) 가문비뿌리나무좀 (Plate 6-80)

Bostrichus autographus Ratzeburg, 1837: 160.

Bostrichus villosus Herbst, 1794a: 121 [HN].

Bostrichus septentrionis Mannerheim, 1843: 298.

Bostrichus semicastaneus Mannerheim, 1852: 358.

Bostrichus victoris Mulsant & Rey, 1853: 91.

Dryocoetes americanus Hopkins, 1915a: 51.

Dryocoetes pseudotsugae Swaine, 1915: 360.

Dryocoetes suecicus Eggers, 1923b: 136.

Dryocoetes alternans Eggers, 1931: 30.

Dryocoetes brasiliensis Schedl, 1940b: 207.

Dryocoetes artepunctatus Eggers, 1941b: 122.

Dryocoetes longicollis Eggers, 1941b: 121.

Dryocoetes sachalinensis Sokanovskiy, 1960: 675.

Description.

Body 2.8-4.4 mm, 2.5 times as long as wide, dark reddish brown. Frons in male broadly convex from epistoma to vertex, surface smooth, shining, with moderately coarse, rather close, deep punctures, their margins feebly granulate at least in lateral areas, vestiture of very sparse, long hair, epistomal brush wide, conspicuous. Frons in female with a weak, transverse impression just below middle, impunctate at center, remaining area with sparse granules. Pronotum 1.1 times as long as wide, widest at middle, sides evenly, strongly arcuate from base to rather narrowly rounded anterior margin, anterior two-fifths and lateral areas to

base finely asperate, remaining area coarsely, deeply, closely punctured; a smooth, shining, impunctate median line on posterior half usually present. Vestiture confined to marginal areas, of long hair. Elytra 1.6 times as long as wide, 1.6 times as long as pronotum, sides almost straight and parallel on basal two-thirds, rather broadly rounded behind, atriae not impressed, punctures rather coarse, deep; interstriae smooth, shining, as wide as striae, punctures moderately fine, deep, uniseriate. Declivity steep, broadly convex, sculpture about as on disc; interstitial punctures finely granulate or not; 1st interstriae feebly elevated; vestiture of rows of fine, short, strial hair and rows of much longer, rather fine interstitial hair. Interstitial punctures on declivity in female finely granulate (Wood, 1982).

Korean Record. Murayama, 1929b; Murayama, 1930b; Murayama, 1937; Kono, 1938; Cho, 1957; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North, South), China, Japan, Mongolia, Russia, Taiwan, Europe, North Africa, Nearctic Region, Neotropical Region (introduced).

81 *Dryocoetes baikalicus* Reitter, 1899 이깔털나무좀

Dryocoetes baikalicus Reitter, 1899c: 286.

Dryocoetes ursus Sokanovskiy, 1960: 675.

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China, Japan, Kazakhstan, Mongolia, Russia.

82 *Dryocoetes carpinivorus* Choo & Woo, 1989 한라산서어나무좀

Dryocoetes carpinivorus Choo & Woo, 1989b: 58.

Description.

Body 3.6 mm, oblong, cylindrical, blackish brown. Frons weakly convex, surface shining, with granulate-punctate and sparse long setae from middle to above epistoma. Pronotum a little wider than long, widest in middle, base truncated, basal angles rounded, anterior roundly narrowed, most of anterior and lateral part with granulate-punctate, posterior part and summit punctate. Scutellum large, flat, blackish shining, shield-shape. Elytra wider than pronotum, lateral margin feebly widened posteriorly, posterior declivity rounded from the three-fourths, striae somewhat impressed, largely punctate, shining, rarely sparse setae, lateral part with long setae, other parts shining, declivity steep, flat, inerstriae with a row of fine tuberculate-punctures, 2nd declivital interstriae impressed in middle, lower part elevated. Male. Simiar to female but different from the following points, I.e., frons with long dense setae and declivital tubercles larger than those of female (Choo & Woo, 1989b).

Korean Record. Choo and Woo, 1989b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea.

Remarks. This new species is allied to *D. hectographus* Reitter, but distinguished

by elytral interstriae (Choo & Woo, 1989b). The type specimens of *D. carpinivorus* were lost, so it could not be checked.

83 *Dryocoetes hectographus* Reitter, 1913 가문비털나무좀 (Plate 6-83)

Dryocoetes hectographus Reitter, 1913b: 76.

Ozopemon ater Eggers, 1933e: 101.

Dryocoetes formosanus Nobuchi, 1967: 18.

Description.

Body 3.1 mm, oblong, cylindrical, opaque, prothorax shining, black, mouth parts, antennae and legs yellowish brown, closely covered with scales and hairs. Male. Head with vertex finely reticulate posteriorly, frons weakly impressed circularly, with two blunt tubercles at upper level of eyes, punctures closer and vestiture shorter. Eyes biparted, upper division semicircular, lower one nearly rhombic. Antennal funicles 6 segmented, clubs larger, oblong oval, about 1.45 times as long as wide, wider at middle, not pointed at apex. Prothorax wider than long, wider before base, basal margin truncate and weakly sinuate, lateral margins rounded, constricted behind apex, apical margin weakly retuse at middle disc strongly convex, transversely impressed behind anterior area, with a distinctly elevated line from base to over middle, closely and distinctly punctured, the punctures replaced by close granules at lateral areas, vestiture consistion of close setae and scales intermixed. Elytra nearly equal in width to base of prothorax, 1.67 times as long as wide, lateral margins parallel at basal two-thirds and thence roundly narrowing, upper surface strongly convex, declivity beginning at two-thirds of elytral length, basal margin slightly curved and with a row of narrow asperities, basal area rather

closely tuberculate, striae deeply and widely impressed, with a row of distinct punctures and very fine hairs, interstices wide and elevated, distinctly rugose and finely punctured, 1st interstriae with a row of granules and others with irregular row of granules declivity elevated at 1st interstriae and impressed at 2nd, striae narrower and impressed with fine punctures, interstriae armed with a row of granules, which are obliterated at 2nd. Female similar to male except flattened frons, which not or slightly impressed at anterior area, without tubercle, closely punctured and densely setigerous, setae longer at upper and lateral areas. Antennal clubs narrower than that of male (Nobuchi, 1967).

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China, Japan, Russia, Taiwan, Europe.

84 *Dryocoetes infuscatus* Murayama, 1937 앞갈나무좀

Dryocoetes infuscatus Murayama, 1937: 370 (Type Locality: North Korea - Horyuri).

Dryocoetes orientalis Kurentsov, 1941: 169, 233.

Dryocoetes pilosiusculus Kurentsov, 1948: 51.

Korean Record. Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North, South), China (Northern East), Japan, Mongolia, Russia (East Siberia, Far East).

85 *Dryocoetes pini* Niisima, 1909 섬나무좀 (Plate 6-85)

Dryocoetes pini Niisima, 1909: 152.

Korean Record. Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 3ex., GG. Cheongpyeong-gun, 26.ix.2007.

Distribution. Korea (South), China, Japan, Russia (Far East).

86 *Dryocoetes rugicollis* Eggers, 1926 날개긴털나무좀 (Plate 6-86)

Dryocoetes rugicollis Eggers, 1926a: 137.

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China, Japan, Russia (Far East).

Genus *Taphrorychus* Eichhoff, 1878

Taphrorychus Eichhoff, 1878b: 49, 204 (Type species: *Bostrichus bicolor* Herbst, 1794)

87 *Taphrorychus bicolor* (Herbst, 1794) 앞갈나무좀붙이 (Plate 6-87)

Bostrichus bicolor Herbst, 1794a: 116.

Ips fuscus Marsham, 1802: 53.

Korean Record. Murayama, 1937; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), Turkey, Europe.

Tribe Ipini Bedel, 1888

Key to genus of Tribe Ipini of Korea

1. Elytral declivity rather narrowly bisulcate, lateral margins rather broadly elevated, rounded, and armed by not more than 3 pairs of denticles; lower margin of declivity rounded; usually smaller than 3 mm ----- 2
- Elytral declivity broadly, rather deeply excavated, margins acutely elevated and armed by 3 or more pairs of denticles, lower margin of declivity with an acutely elevated, transverse ridge separating declivital excavation from apical margin; usually larger than 3 mm ----- 3
2. Prosternal intercoxal piece short, obtuse; female frons sometimes deeply, rather narrowly excavated; male declivity with 2 - 3 pairs of enlarged denticles; antennal club compressed, 2 sutures visible on apical third of posterior face; North America, Europe, Asia, North Africa; Pinaceae; 1.8-3.7 mm --- *Pityogenes*
- Prosternal intercoxal piece long and acutely tapered; female frons convex, never excavated; male declivity more narrowly impressed; female frons and anterior pronotum with dense, long vestiture (2 American exceptions); North America, Asia, Europe; *Abies*; 1.6-3.0 mm ----- *Pityokteines*
3. Antennal club obliquely truncate, sutures recurved; third (lowest) major denticle

not on lateral margin of elytral declivity, displaced mesad from margin, eye of normal size; North America, Asia, Europe; Pinaceae; 2.2-4.3 mm

----- *Orthotomicus*

- Antennal club flattened, sutures either procurved or moderately to strongly bisinuate; lateral margins of elytral declivity armed by 1 to 6 pairs of major denticles, third pair (if present) on or incorporated into crest of lateral margin; eye usually either abnormally large or else very small. North America to Nicaragua, Asia, Europe, N Africa; Pinaceae; 2. 1-6.9 mm ----- *Ips*

Genus *Ips* DeGeer, 1775

Ips DeGeer, 1775: 190 (Type species: *Dermestes typographus* Linnaeus, 1758)

Bonips Cognato, 2001: 779 (Type species *Tomicus bonanseai* Hopkins, 1906)

Cumatotomicus Ferrari, 1867: 44 (Type species: *Bostrichus stenographus* Duftschmid, 1825 = *Dermestes sexdentatus* Boerner, 1766)

Cyrtotomicus Ferrari, 1867: 44 (Type species: *Bostrichus acuminatus* Gyllenhal, 1827)

Emarips Cognato, 2001: 779 (Type species: *Tomicus emarginatus* LeConte, 1876)

Granips Cognato, 2001: 780 (Type species: *Tomicus grandicollis* Eichhoff, 1868)

Diagnosis.

Species in this genus range from 2.1 to 6.9 mm in length and are approximately 2.4 to 2.8 times as long as wide. Their color ranges from yellowish brown to almost black. The pronotum is as long as wide and asperate anteriorly. The scutellum is large and flushed with the elytra. The declivity is concave, with the lateral margins bearing spines, the third always being the largest and often

capitate. The vestiture consists of long and erect hair-like setae. The anterior margin of the compound eye is emarginated. The scape is longer than the 5-segmented funicle. The club is oval to near circular, strongly flattened, with two bisinuate sutures on the anterior face. The procoxae are contiguous.

Key to species of genus *Ips* of Korea

1. First spine on elytral declivity distally thickened ----- 2
 - First spine on elytral declivity not distally thickened; lateral margin of declivity with 3 spine; 3rd spine distally bifurcate in male, uniformly pointed in female ----- *I. acuminatus*
2. Lateral margin of elytral declivity with 6 spines; 4th spine largest and distally thickened; 3rd and 4th spines occurring together on post portursion of lateral margin of elytral declivity ----- *I. sexdentatus*
 - Lateral margin of elytral declivity with 4 spines ----- 3
3. Body larger than 4.2mm; distance between first and second declivital teeth almost equal to distance between the second and third ----- 4
 - Body small (3.0-4.0mm); distance between first and second declivital teeth longer than distance between the second and third ----- *I. duplicatus*
4. Elytral interstriae impunctate; elytral declivity almost glabrous, except its lateral sides ----- *I. typographus*
 - Elytral interstriae punctured; elytral declivity covered with long hairs ----- *I. subelongatus*

88 *Ips acuminatus* (Gyllenhal, 1827) 솔여섯가시나무좀 (Plate 6-88)

Bostrichus acuminatus Gyllenhal, 1827: 620.

Bostrichus geminatus Zetterstedt, 1828: 345.

Tomicus heydeni Eichhoff, 1884: 298.

Description.

Body 2.2-3.5mm, stout cylindrical, yellowish brown to reddish brown. Frons convex, lower part with several small tubercles, and covered with long hairs. Antennal club with 2 straight sutures. Pronotum slightly longer than wide, convex with fine asperities anteriorly. Posterior disc glabrous and punctate with somewhat long hairs. Scutellum round pentagon. Elytra as wide as pronotum, striae not impressed, punctures small, interstices wide and weakly convex. Lateral margin of declivity with 3 spines, 3rd on distally bifurcate in male but weakly pointed in female.

Korean Record. Murayama, 1929a; Murayama, 1929c; Murayama, 1930b; Murayama, 1936; Murayama, 1937; Cho, 1957; Lee and Cho, 1959; Ju, 1964; Ju, 1969; Nobuchi, 1974; Choo et al., 1983b; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 2ex., GW. Yangyang-gun, 25.vi.1985; 3ex., GW. Chuncheon-si, Dong-myeon, Jinae-ri, 2005; 1ex., GW. Pyeongchang-gun, Daegwallyeong-myeon, Yucheon-ri, 10.vi.2012; 1ex., GB. Pohang-si, Yeongil, 18.vii.1987; 1ex., GB. Yeongyang-gun, Yeongyang-eup, Hwacheon-ri, 14.vii.2010

Distribution. Korea (North, South), China, Japan, Kazakhstan, Mongolia, Russia, Syria, Taiwan, Turkey, Oriental Region.

89 *Ips cembrae* (Heer, 1836) 왕소나무좀 (Plate 6-89)

Bostrichus cembrae Heer, 1836: 28.

Ips engadinensis Fuchs, 1913a: 82.

Ips fallax Eggers, 1915b: 96.

Ips shinanoensis Yano, 1924: 2.

Korean Record. Murayama, 1929c; Murayama, 1930a; Murayama, 1930b; Murayama, 1936; Murayama, 1937; Cho, 1957; Lee and Cho, 1959; Nobuchi, 1974; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (South?), China, Japan, Kazakhstan, Mongolia, Russia, Europe.

Remarks. The records in south Korea are mis-identifications of *I. subelongatus*. Because of external similarities between these two species, the distribution of *I. cembrae* in Korea is doubtful.

90 *Ips duplicatus* (C.R. Sahlberg, 1836) 털이빨나무좀 (Plate 6-90)

Bostrichus duplicatus C.R. Sahlberg, 1836a: 144.

Tomicus infucatus Eichhoff, 1877a: 392.

Tomicus infucatus Eichhoff, 1878b: 247 [HN].

Bostrichus judeichii Kirsch, 1871a: 388.

Tomicus rectangulus Eichhoff, 1867: 83.

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China, Japan, Kazakhstan, Mongolia, Russia, Europe.

91 *Ips sexdentatus* (Boerner, 1766) 세쌍니나무좀 (Plate 6-91)

Dermestes sexdentatus Boerner, 1766: 78.

Bostrichus pinastri Bechstein, 1818: 74.

Bostrichus stenographus Duftschmid, 1825: 88.

Ips junnanicus Sokanovskiy, 1959a: 94, 95.

Discrptions.

Body 5.5-8.0 mm, dark reddish brown to dark brown, cylindrical. Frons densely covered with tubercles, several tubercles connected to each others and becoming short border transversely. Slightly concave like a big puncture under transverse border, and a big tubercles located under puncture. Funicles 5-segmented. Disc on pronotum glabrous and sparsely punctate without hairs. Somewhat long hairs at sides and anterior parts. Asperities closely covered on anterior half. Scutellum small and located lower than elytral surface. Elytra glabrous, hairless on dorsum. Strioles clearly punctate, interstices slightly convex. Posterior margin with short transverse border, declivity with 2 pair of tubercles between most big tubercles and posterior border.

Korean Record. Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., GW, Inje-gun, 22.v.013; 9ex., GW, Pyeongchang-gun,

13.vi-19.vi.2013; 1ex., GW, Pyeongchang-gun, 19.vi-26.vi.2013; 14ex., GW, Pyeongchang-gun, 26.vi-3.vii.2013; 3ex., GW, Pyeongchang-gun, 3-17.vii.2013; 1ex., GB. Uljin-gun, Seo-myeon, Hawon-ri, Temple Buryeongsa, 2.v.1999.

Distribution. Korea (North, South), China, Japan, Kazakhstan, Mongolia, Russia, Taiwan, Turkey, Europe, Oriental Region.

92 *Ips subelongatus* (Motschulsky, 1860) 이깔여덟이발나무좀 (Plate 6-92)

Tomicus subelongatus Motschulsky, 1860: 155.

Discrptions.

Body 4.2-6.4 mm, cylindrical, dark reddish brown to dark brown except yellowish brown antennae and tarsi. Frons densely covered with tubercles. Hairs on frons erect and as long as those of anterior part of pronotum. Pronotum slightly wider than elytra, gently arced at basal angle, slightly narrowing anteriorly and then gently arced towards anterior margin. Funicles 5-segmented. Disc on pronotum glabrous and regularly punctate without hairs. Somewhat long hairs at sides and anterior parts. Asperities closely covered on anterior half and slightly concave transversely at beginning of asperities. Scutellum small and located lower than elytral surface. Elytra glabrous, hairless on dorsum. Strioles clearly punctate, interstices slightly convex. Posterior margin with long transverse border, declivity with one pair of tubercles between most big tubercles and posterior border.

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 3261ex., GW, Injegun, 22.v.013; 192ex., GW, Pyeong

chang-gun, 13.vi-19.vi.2013; 217ex., GW, Pyeongchang-gun, 19.vi-26.vi.2013; 942ex., GW, Pyeongchang-gun, 26.vi-3.vii.2013; 1888ex., GW, Pyeongchang-gun, 3-17.vii.2013.

Distribution. Korea (North, South), China, Japan, Mongolia, Russia, Taiwan, Netherlands (introduced).

93 *Ips typographus* (Linnaeus, 1758) 여섯가시큰나무좀 (Plate 7-93)

Dermestes typographus Linnaeus, 1758: 355.

Bostrichus octodentatus Paykull, 1800: 146.

Ips japonicus Niisima, 1909: 147.

Korean Record. Murayama, 1926; Murayama, 1929b; Murayama, 1929c; Murayama, 1930b; Murayama, 1936; Murayama, 1937; Cho, 1957; Ju, 1964; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North, South), China, Japan, Kazakhstan, Mongolia, Russia, Turkey, Europe, North Africa.

Genus *Orthotomicus* Ferrari, 1867

Orthotomicus Ferrari, 1867: 44 (Type species: *Bostrichus laricis* Fabricius, 1792)

Neotomicus Fuchs, 1911: 33 (Type species: *Bostrichus laricis* Fabricius, 1792)

Diagnosis.

Species in this genus range from 2.4 to 3.3 mm in length and are approximately

2.5 times as long as wide. The color is dark reddish brown. The pronotum is usually longer than wide. The scutellum is large and flush with elytra. The declivity is concave, with three pairs of spines in the margins; the lowest is displaced towards the suture. The vestiture consists of usually long and erect hair-like setae. The anterior margin of the compound eye is emarginate to sinuate. The scape is usually longer than its 5-segmented funicle. The club is obliquely truncate with two recurved sutures, though sinuate in *latidens* and *spinifer*. The procoxae are contiguous. *Orthotomicus* can be distinguished from similar spine-bearing genera in having the third and lowest pair of spines displaced toward the elytral suture and away from the margin. The declivital margin is elevated in a distinct ridge, unlike in *Pityokteines* Fuchs.

Key to species of genus *Orthotomicus* of Korea

1. Body robust, usually larger than 3.0mm (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 ----- *O. tosaensis*
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 incurve; 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, with secondary tubercle on outside of first, third and fourth teeth; body length 3.0-3.8mm. ----- *O. proximus*

- 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 3.1-3.6mm ----- *O. angulatus*
- 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*
- 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 3.3-3.8mm ----- *O. golovjankoi*
- 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 3.3-3.8mm ----- *O. laricis*

94 *Orthotomicus angulatus* (Eichhoff, 1876) 소나무뿔나무좀 (Plate 7-94)

Tomicus angulatus Eichhoff, 1876: 200.

Korean Record. Choo et al., 1983b; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 8ex., GG. Pocheon-si Soheul-eup, Gwangneung, 26.ix.1986; 1ex., GG. Hwaseong-si, Songsan-dong, Temple Yongjusa, 30.v.2005.

Distribution. Korea (North, South), China, Japan, Russia (Far East), Taiwan, Australian Region (introduced), Oriental Region.

95 *Orthotomicus erosus* (Wollaston, 1857) 닭은빨소나무좀 (신칭)

Tomicus erosus Wollaston, 1857: 95.

Tomicus rectangulus Ferrari, 1867: 83.

Korean Record. Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea, Afghanistan, China, Iran, Israel, Jordan, Syria, Turkey, Uzbekistan, North Africa, Afrotropical Region (introduced), Nearctic Region (introduced).

Remarks. The distributional localities of this species are mostly West Asia and North Africa, so the distribution in Korea is doubtful.

96 *Orthotomicus golovjankoi* Pyatnitskiy, 1930 향목곧추선나무좀 (Plate 7-96)

Orthotomicus golovjankoi Pyatnitskiy, 1930: 179.

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China, Japan, Russia (East Siberia, Far East).

97 *Orthotomicus laricis* (Fabricius, 1792) 낙엽송나무좀 (Plate 7-97)

Bostrichus laricis Fabricius, 1792: 365.

Scolytus chalcographus Olivier, 1795: 7.

Korean Record. Murayama, 1929b; Murayama, 1929c; Murayama, 1930b; Murayama, 1936; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Nobuchi, 1974; Choo et al., 1983b; Choo and Woo, 1985b; Choo and Woo, 1989; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 2ex., GG. Pocheon-si Soheul-eup, Gwangneung, 16.viii.1982; 1ex., GN. Jinju-si, Gajwa-dong, 7.iv.1982; 2ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 22.iii-21.iv.2011; 2ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 22.iii-21.iv.2011; 16ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 21.iv-17.v.2011; 3ex., GN. Jinju-si, Daegok-myeon, Majin-ri, 27.vii.1982; 1ex., GN. Namhae-gun, Changseon-myeon, Jijok-ri, 20.x.1982.

Distribution. Korea (North, South), China, Japan, Kazakhstan, Mongolia, Russia, Turkey, Europe.

98 *Orthotomicus proximus* (Eichhoff, 1868) 소나무껍질나무좀 (Plate 7-98)

Tomicus proximus Eichhoff, 1868d: 403.

Tomicus omissus Eichhoff, 1872b: 138.

Ips fefferi Keler, 1925: 191.

Description.

Body 3.0-3.8mm, robust. Elytral declivity with bluntly pointed teeth on lateral sides, evenly elevated in apical margin. Sutures of antennal club procurved; in male second tooth on elytral declivity more strongly enlarged at base than the

others. Elytral striae nearly as wide as interstriae in middle, declivity circular, with secondary tubercle on outside of first, third and fourth teeth.

Korean Record. Murayama, 1929a; Murayama, 1929b; Murayama, 1930b; Murayama, 1936; Murayama, 1937; Cho, 1957; Lee and Cho, 1959; Ju, 1964; Ju, 1969; Nobuchi, 1974; Choo and Woo, 1985b; Choo and Woo, 1989; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 22.iii-21.iv.2011; 2ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 21.iv-17.v.2011; 2ex., CN. Cheongwon-gun, Nami-myeon, Sudaeri, 7.vi.2008.

Distribution. Korea (North, South), China, Japan, Kazakhstan, Mongolia, Russia, Turkey, Europe, North Africa, Afrotropical area (introduced), Oriental Region.

99 *Orthotomicus suturalis* (Gyllenhal, 1827) 이비나무좀 (Plate 7-99)

Bostrichus suturalis Gyllenhal, 1827: 622.

Bostrichus nigritus Gyllenhal, 1827: 623.

Description.

Body 3.0-3.8mm, robust. elytral declivity with bluntly pointed teeth on lateral sides, evenly elevated in apical margin. Sutures of antennal club nearly straight or incurve; in male second tooth on elytral declivity the same size as the others. 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.

Korean Record. Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Nobuchi, 1974; Choo and Woo, 1985b; Choo et al., 1988b; Choo and Woo, 1989a; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 21.iv-17.v.2011; 3ex., GN. Jinju-si, Daegok-myeon, Majin-ri, 27.vii.1982; 4ex., GN. Namhae-gun, Changseon-myeon, Jijok-ri, 20.x.1982.

Distribution. Korea(North, South), China, Japan, Kazakhstan, Mongolia, Russia, Turkey, Europe.

100 *Orthotomicus tosaensis* (Murayama, 1950) 서해안뿔나무좀(신칭) (Plate 7-100)

Ips tosaensis Murayama, 1950a: 52.

Description.

Body 2.2-2.9 mm, slender, elongate, subcylindrical, shiny, reddish brown, apex and elytra infusate, legs yellowish brown, with long yellow hairs sparsely set. Head globular, piceus, shiny, front flat, rugose, strongly punctate, with an obtuse elevated middle line, ciliate over mouth, antennae fusco-testaceous, with club round, strongly excavaed anteriorly. Pronotum as long as wide, base truncate, basal angles obtuse, sides almost parallel to middle, then contracted and strongly rounded to apex, which is obtuse with small scaly tubercles, disc gibbous, middle of pronotum with an impressed part just behind it, antreiorly with strong aspertities, Posteriorly shiny, with strong scattered punctures, with obtuse median elevated line. Scutellum small, triangular, black, shiny. Elytra two thirds as long as prothorax, their base truncated, humeral angles obtuse, sides subparallel until two thirds of the length, thenc slightly dilated and rounded, surface convex, with

lines of large round punctures, the first strongly impressed, interstices slightly convex, rugose, with a row of fine punctures. Declivity beginning from two thirds of the elytral length, apex excavated nearly vertically, margin with three small pointed spines respectively, of which the third is twice as far from the second as the second is from the first, excavated surface somewhat oblong, shiny, with fine rows of punctures, suture elevated. Elytral declivity with sharply pointed teeth on lateral sides, less elevated in middle of apical margin. Elytral declivity with three teeth on each lateral margin, of which last tooth displaced mesially, not on summit of declivital margin; striae punctures small and more numerous; proventriculus with sutural teeth.

Korean Record. Löbl and Smetana, 2011.

Specimens examined. 4ex., JN. Wando-gun, 11.viii.2007; 1ex., JN. Sinan-gun, Heuksan-do, 30.vii.2015.

Distribution. Korea (South), Japan.

Remarks. This species was recorded by foreign taxonomist with out Korean name. This species mostly occurred in Pine forest of Western costal area.

Genus *Pityogenes* Bedel, 1888

Pityogenes Bedel, 1888: 397 (Type species: *Dermestes chalcographus* Linnaeus, 1760)

Eggersia Lebedev, 1926: 121 (Type species: *Bostrichus bidentatus* Herbst, 1784)

Pityoceragenes Balachowsky, 1947: 44 (Type species: *Bostrichus quadridens* Hartig, 1834)

Diagnosis.

Species in this genus range from 1.8 to 3.7 mm in length and are approximately 2.5 to 2.7 times as long as wide. Their color varies from light brown to almost black. The pronotum is longer than wide, with the anterior half asperate. The scutellum is large and flushed with the elytra. The declivity is sulcate (concave) and armed by two or three pairs of spines, the first being the largest and downcurved in males. The vestiture consists of sparse hair-like setae. The frons is sexually dimorphic, females usually having a central fossa. The anterior margin of the compound eye is sinuate. The scape is usually as long as the 5-segmented funicle. The oval club has two bisinuate sutures on the anterior face. The procoxae are contiguous. *Pityogenes* can be distinguished from *Ips* DeGeer in having two to three declivital margin spines, with the first pair being the largest and down curved in males. Also, females often have a pit or fossa in the frons.

Key to species of genus *Pityogenes* of Korea

1. Elytral declivity oblique, beginning near middle of elytra, 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; 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*
2. Pronotum finely punctured at base; in female frons with an inverted U-shaped impression ----- *P. seirindensis*
- Pronotum strongly punctured at base; in female frons with a circular impression

----- *P. chalcographus*

101 *Pityogenes chalcographus* (Linnaeus, 1760) 여섯가시나무좀 (Plate 7-101)

Dermestes chalcographus Linnaeus, 1760: 143.

Ips spinosus DeGeer, 1775: 197.

Scolytus sexdentatus Olivier, 1795: 11.

Bostrichus xylographus C.R.Sahlberg, 1836b: 148.

Description.

Body 1.8-2.2 mm, elytral declivity oblique, beginning near middle of elytra, and with three compressed or conical teeth on each side, much larger in male. First declivital tooth in male situated behind middle of elytra; in female frons granulate, shining, with a deep impression, and evenly covered with straight and short hairs. Pronotum strongly punctured at base; in female frons with a circular impression.

Korean Record. Murayama, 1929b; Murayama, 1929c; Murayama, 1930b; Murayama, 1936; Murayama, 1937; Cho, 1957; Lee and Cho, 1959; Ju, 1964; Ju, 1969; Choo et al., 1983b; Choo and Woo, 1985b; Choo et al., 1988b; Choo and Woo, 1989a; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., GG. Pocheon-si Soheul-eup, Gwangneung, 7.xi.1981; 2ex., GG. Pocheon-si Soheul-eup, Gwangneung, 3.xii.1982; 4ex., GG. Goyang-si, 19.viii.2007; 5ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 22.iii-21.iv.2011; 11ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 21.iv-17.v.2011; 1ex., GW,

Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 1.v.2012.

Distribution. Korea (North, South), China, Japan, Mongolia, Russia, Turkey, Europe, Neotropical Region (introduced).

102 *Pityogenes foveolatus* Eggers, 1926 가문비벌나무좀 (Plate 7-102)

Pityogenes foveolatus Eggers, 1926a: 137.

Description.

Body Length. 2.4-3.1 mm, 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; in female frons rather finely reticulate and almost opaque, with a deep circular fovea on upper side of middle, which is surrounded with very dens short hairs.

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), Japan, Russia (East Siberia, Far East).

103 *Pityogenes seirindensis* Murayama, 1929 청립동나무좀 (Plate 7-103)

Pityogenes seirindensis Murayama, 1926: 26, 30.

Pityogenes aizawai Kôno, 1938:69.

Pityogenes nitidus Eggers, 1941b: 121.

Description.

Body 2.2-2.7 mm, elytral declivity oblique, beginning near middle of elytra, and with three compressed or conical teeth on each side, much larger in male. First declivital tooth in male situated behind middle of elytra; in female frons granulate, shining, with a deep impression, and evenly covered with straight and short hairs. Pronotum finely punctured at base; in female frons with an inverted U-shaped impression.

Korean Record. Murayama, 1929c; Murayama, 1930a; Murayama, 1930b; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Nobushi, 1974; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea, China, Japan, Russia (Far East).

Genus *Pityokteines* Fuchs, 1911

Pityokteines Fuchs, 1911: 33 (Type species: *Ips curvidens* Germar, 1824)

Orthotomicus Wood, 1951: 32 (Type species: *Orthotomicus lasiocarpi* Swaine, 1916)

Pityoctines C.F.C. Schaufuss, 1916: 1246 (Type species: *Ips curvidens* Germar, 1824)

Diagnosis.

Species in this genus range from 1.6 to 2.9 mm in length and are approximately 2.5 to 2.8 times as long as wide. Their color ranges from brown to very dark brown. The pronotum is longer than wide with the anterior half asperate. The scutellum is large and flushed with the elytra. The declivity is sulcate (concave), with the lateral margins armed by three pairs of spines, the second pair the largest, the first the smallest and displaced towards the suture; from one to two

tubercles can be present between the second and third spines. The vestiture is of abundant and long hair-like setae. The anterior margin of the compound eye is emarginate. The scape is usually longer than its 5-segmented funicle. The club is obliquely truncate and has two straight sutures on the anterior face. The procoxae area contiguous. *Pityokteines* is distinguished from the similar *Orthotomicus* Ferrari by the rounded lateral margins of the declivity, the apical margin which is not clearly raised, and the abundant vestiture on the head and anterior parts of the pronotum in females. Males usually have a pair of smaller spines pointing forward in the top margin of the declivity between the first and largest pair of marginal spines.

104 *Pityokteines spinidens* (Reitter, 1895) 가시소나무좀 (Plate 7-100)

Ips spinidens Reitter, 1895b: 85.

Tomicus heterodon Wachtl, 1895: 15.

Korean Record. Murayama, 1929b; Murayama, 1929c; Murayama, 1930b; Murayama, 1937; Cho, 1957; Choo et al., 1983; Choo and Woo, 1985; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea, Turkey, Europe.

Remarks. This species mostly occurred in European region, so the distribution in Korea is doubtful. I missed taking the photos or writing the records of the voucher specimen's label deposited in Japan.

Tribe Micracidini LeConte, 1876

Genus *Pseudothysanoes* Blackman, 1920

- Pseudothysanoes* Blackman, 1920: 46 (Type species: *Pseudothysanoes drakei* Blackman, 1920 = *Cryphalus rigidus* LeConte, 1876)
- Aphanocleptus* Wood, 1960b: 63 (Type species: *Aphanocleptus coniferae* Wood, 1960)
- Bostrichips* Schedl, 1952a: 21 (Type species: *Bostrichips spinatus* Schedl, 1952)
- Chalcohyus* Blackman, 1943b: 363 (Type species: *Chalcohyus securigerus* Blackman, 1943)
- Cryptocleptes* Blackman, 1920: 51 [HN] (Type species: *Cryptocleptes dislocatus* Blackman, 1920)
- Cryptulocleptus* Wood, 1962: 76 [RN] (Type species: *Cryptocleptes dislocatus* Blackman, 1920)
- Gretschkinia* Sokanovskiy, 1959b: 276 (Type species: *Gretschkinia mongolica* Sokanovskiy, 1959 = *Cryphalus modestus* Murayama, 1940)
- Neoglostatus* Schedl, 1979b: 300 (Type species: *Neoglostatus squamosus* Schedl, 1978 = *Cryptocleptes abbreviatus* Schedl, 1954)

Diagnosis.

Species in this genus range from 0.7 to 2.0 mm in length and are approximately 2.0 to 2.8 times as long as wide. Their color ranges from yellowish brown to black. The pronotum is as wide as or wider than long and asperate on its anterior half. The scutellum is small. The declivity is convex and is either unarmed or has small spines. The vestiture consists of erect, scale-like setae, is light and contrasting with their usually dark body color, and is wider apically. The anterior margin of the eye is entire. The scape is shorter than the 6-segmented funicle and has long setae. The oval to elongate club varies in size and the number of

sutures ranges from none to two; these are procurved when present. The procoxae are separated. *Pseudothysanoes* can be distinguished from the similar *Thysanoes* LeConte by the wider than long pronotum.

105 *Pseudothysanoes modestus* (Murayama, 1940) 만주애나무좀(신칭)

Cryphalus modestus Murayama, 1940: 236.

Gretschkinia mongolica Sokanovskiy, 1959b: 277.

Korean Record. Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China, Japan, Mongolia, Russia (East Siberia).

Remarks. This species was recorded by foreign taxonomist with out Korean name.

Tribe Scolytini Latreille, 1804

Genus *Scolytus* Geoffroy, 1762

Scolytus Geoffroy, 1762: 309 (Type species: *Bostrichus scolytus* Fabricius, 1775)

Ekkoptogaster Herbst, 1794a: 124 (Type species: *Bostrichus scolytus* Fabricius, 1775)

Coptogaster Illiger, 1804: 108 (Type species: *Bostrichus scolytus* Fabricius, 1775)

Eccoptogaster Gyllenhal, 1813: 346 (Type species: *Bostrichus scolytus* Fabricius, 1775)

Scolytoshelus Reitter, 1913b: 23 (Type species: *Ips multistriatus* Marsham, 1802)

Archaeoscolytus Butovitsch, 1929: 21, 23 (Type species: *Scolytus claviger* Blandford, 1894)

Spinuloscolytus Butovitsch, 1929: 21, 24 (Type species: *Ips multistriatus* Marsham, 1802)

Tubuloscolytus Butovitsch, 1929, 21, 33 (Type species: *Eccoptogaster intricatus* Ratzeburg, 1837)

Pinetoscolytus Butovitsch, 1929: 22, 48 (Type species: *Scolytus morawitzi* Semenov, 1902)

Pygmaeoscolytus Butovitsch, 1929: 21, 28 (Type species: *Bostrichus pygmaeus* Fabricius, 1787)

Ruguloscolytus Butovitsch, 1929: 20, 47 (Type species: *Bostrichus rugulosus* P.W.J.Müller, 1818)

Confusoscolytus Tsai & Hwang, 1962: 3, 13 (Type species: *Eccoptgaster confusus* Eggers, 1922 = *Scolytus japonicus* Chapuis, 1876)

Diagnosis.

Species in this genus range from 1.5 mm to approximately 5.2 mm in length and have a body size ratio of 2.0 to 2.4 times long as wide. Their color varies from dark reddish brown to almost black and shows transverse bands in some species. The pronotum is proportionally large in relation to its body and has the margins marked by a raised line; it usually appears as long as wide but it actually varies slightly. The scutellum is large. There is no declivity and the abdomen can be seen ascending towards its apex. The anterior margin of the compound eye is sinuate to slightly emarginate. The scape is shorter than the 7-segmented funicle. The club is oval to obovate, usually pubescent, and can have one procurved suture at most. Their procoxae are subcontiguous. The tibia has a single apical spine. The most distinctive character used to distinguish *Scolytus* from other genera is the absence of a declivity

Key to species of genus *Scolytus* of Korea

1. Second abdominal segment with a process. ----- 2
- Second abdominal segment unarmed with process or tubercle. ----- 5

2. Elytra with reddish brown and broad band ----- *S. schevirewi*
 - Elytra with concolorous colour ----- 3
3. Elytral margin and sternites covered with long and dense pubescences
 ----- *S. pubescens*
 - Elytral margin without dense pubescences ----- 4
4. Posterior margin of sternite almost straight in both sexes ----- *S. semenovi*
 - Posterior margin of sternite arched in both sexes, distinctly raised and carinate
 in male ----- *S. claviger*
5. Third abdominal segment with a long flattened process in male
 ----- *S. jacobsoni* ♂
 - Third abdominal segment unarmed with process ----- 6
6. Posterior margin of first abdominal segment strongly elevated or carinate
 ----- 7
 - Posterior margin of first abdominal segment not or feebly elevated ----- 8
7. Elytral striae impressed; frons irregularly covered with straight hairs or glabrous
 ----- 10
 - Elytral striae not or slightly impressed; frons with longer, incurved hairs from
 periphery; alternate interstriae with a irregular row of punctures ----- *S. frontalis*
8. Frons with a median longitudinal carina, which is short and distinct in female, and
 rather weak and extending from epistoma to upper level of eyes in male
 ----- *S. ratzeburgi*
 - Frons without a median longitudinal carina in both sexes ----- 9
9. Interstriae of elytra with a single row of punctures; abdominal segment
 unarmed tubercles ----- *S. jacobsoni* ♀
 - Third interstriae of elytra with double rows of punctures from base to apex or

- at base; abdomen usually with a tubercle in each posterior margin of third and fourth segments. ----- *S. chikisanii*
10. Body large (4.0 - 7.0 mm). Apical margin of elytra minutely serrate at near suture; fifth abdominal segment with a pair of close tufts of long golden hairs in male. ----- *S. dahuricus*
- Body smaller than 3.5 mm ----- 11
11. Clypeus with a pair of setal bunch in male, elytral striae and intervals indistinguishable, interstices closely punctured with somewhat similar size of punctures on striae ----- *S. intricatus*
- Clypeus without a pair of setal bunch, elytral striae and intervals distinguishable, interstices sparsely punctured with smaller size of punctures on striae ----- 12
12. Elytra reddish brown; frons sparsely covered with hairs on anterior portion in male; fifth abdominal segment not recurved at apex and with a pair of tufts of long hairs on rather distinct elevation in male. ----- *S. aratus*
- Elytra black; frons with hairs or scale-like hairs in middle; fifth abdominal segment recurved at apex and without tuft of hairs ----- *S. japonicus*

106 *Scolytus aratus* Blandford, 1894 쉼달나무좀 (Plate 7-106)

Scolytus aratus Blandford, 1894a: 79.

Scolytus aequipunctatus Niisima, 1905: 71.

Scolytus intermedius Kurentsov, 1941: 82.

Scolytus brevipennis Kurentsov, 1941: 100, 227.

Description.

Body 2.0-3.5 mm, allied to *S. carpini* Ratzeburg, but with stronger thoracic

punctuation, and elytral striae more impressed with coarser punctures. Black with elytra pitchy-brown. Head convex, finely aciculate and glabrous, without sexual differences; vertex dull, closely punctured. Prothorax as long as broad, with strong oval punctures, scattered on disc, closer, deeper and rugose at sides and apex. Elytra as wide as thorax and one-half longer, with lateral margins slightly rounded to behind middle, then narrowed; apical margin nearly truncate, feebly excised at suture, and slightly irregular, but not serrate as in *S. agnatus*; surface with regular rows of strong punctures, deeper and closer at base, slightly impressed throughout, interstices narrow, with a single series of punctures rather weaker than those of striae, and sometimes impressed, first and second with a few oblique wrinkles. Abdomen convex, covered with short hairs; last segment in male emarginate at apex and impressed, with a fringe of long hairs (Blandford, 1894a).

Korean Record. Ju, 1964; Ju, 1969; Choo and Woo, 1985a; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North, South), China, Japan, Russia (Far East).

107 *Scolytus chikisanii* Niisima, 1905 느릅큰검은나무좀 (Plate 8-107)

Scolytus chikisanii Niisima, 1905: 69.

Scolytus curviventralis Niisima, 1905: 70.

Scolytus mandschuricus Schedl, 1941a: 42

Description.

Body 2.5-4.7 mm, oblong, oval, shining, dark brown to black, antennae and tarsi

reddish brown. Frons flat in male and slightly convex in female, finely and longitudinally rugose, covered with short thin hairs. Hairs somewhat longer and denser in male, particularly longer above clypeus. Pronotum in male widest at middle and rapidly narrowing anteriorly with a conspicuous constriction. Female pronotum widest at base, faintly, arcuately constricting anteriorly. Scutellum triangular, broad. Elytra somewhat longer than wide, as wide as pronotum, sides of elytra subparallel, with moderate and long arched posterior angles. Posterior margin of elytra slightly emarginate at suture. Striae slightly impressed, 2nd and 3rd interstices with two rows of small punctures and other interstices with one row of punctures. Abdomen concavely ascendant in both sexes, 3rd and 4th sternites with small swellings at middle of posterior margins. Abdominal sternites scanty covered with short setae except long and fine hairs on posterior margin of 5th sternite.

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., GW, Pyeongchang-gun, Yongpyeong-myeon, Nodong-ri, Unduryeong, 29.vi.2009.

Distribution. Korea (North, South), China (North East), Japan, Russia (East Siberia, Far East).

108 *Scolytus claviger* Blandford, 1894 너도밤나무좀 (Plate 8-108)

Scolytus claviger Blandford, 1894a: 80.

Eccoptogaster platystylus Wichmann, 1915b: 213.

Description.

Body 3.7 mm, elongate and depressed, black with elytra piceous. Head with front strongly impressed in male and margined with long curled hairs, in female subconvex and strigose with scanty pubescence; vertex strongly punctured in both sexes. Prothorax as long as broad, with sides nearly parallel behind middle, not strongly contracted in front, its punctuation rather strong, not close, weak over base only. Elytra as wide as prothorax and one-half longer, very slightly rounded at sides and narrowed behind, apex serrate and feebly emarginate; surface with regular impressed rows of punctures, interstices narrow with subimpressed rows of rather weaker punctures, tending to become double on alternate interstices. Apical impression extending along sides of elytra and bordered within, above outer angles, by six or seven small tubercles. Underside black, abdomen reddish at sides, its first ventral segment prominently bordered, second in male with an oblong process, flattened vertically, its tip thickened and recurved upwards; in female with a short pointed tubercle, and rather dense pubescence (Blandford, 1894a).

Korean Record. Murayama, 1930b; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Nobuchi, 1973b; Choo et al., 1983b; Choo and Woo, 1985a; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 3ex., Korea, Koryo, 20.viii.1929; 1ex., GG, Pocheon-si, Soheul-eub, Kwangreung, 29.vi.2007.

Distribution. Korea (North, South), China, Japan, Russia (Far East).

109 *Scolytus dahuricus* Chapuis, 1869 물자작검은나무좀 (Plate 8-109)

Scolytus dahuricus Chapuis, 1869: 60.

Scolytus agnatus Blandford, 1894a: 78.

Scolytus possyeti Stark, 1938: 129.

Description.

Body 3.3-7.0mm, oval in shape, particularly in male, strongly shining, dark-brown to black. Legs and antennae brown-yellow, elytra lighter than pronotum. Frons in male broad, reached margin of eyes, slightly impressed and longitudinally rugose. Rugosities lower the line of eyes considerably stronger and intermittent, producing coarse longitudinal and short furrows. Middle of frons with an indistinct, smooth and depressed line. Frons lower line of eyes with long golden hairs incurved towards middle on its sides. Clypeus slightly triangularly notched with long bunches of golden hairs on margin of the notch. Frons in female convex and slightly longitudinally rugose. Rugosities on lower part of frons coarser and with two distinctive impressions. Impression on the line of eyes faintly apparent and crescent-shaped with its ends directed downwards. Another impression above clypeus. Hairs on lower part of frons short. Pronotum of males rounded, somewhat wider than long, widest at middle, distinctly narrowed anteriorly and with a narrow, laterally contracted nec-like constriction. Pronotal punctures oval, irregularly circular, not very dense, larger and denser towards the sides, large on the anterior angles, not confluent. Punctures on anterior part of pronotum considerably elongate and larger on a narrow area. Punctures on sides of constriction confluent to form furrows. Frontal anterior margin with irregular double row of circular punctures. Whole surface of pronotum micro-punctate and

the punctures scarcely perceptible. Anterior part of pronotum with a faintly marked, smooth line. Sides of constriction with erected rather long hairs sparsely. Pronotum of females somewhat wider than long, widest at base, and with sides constricting towards front. Smooth line in middle of pronotum extended considerably farther than males. Constriction much wider. Scutellum triangular, acutely and triangularly convex in middle, finely furrowed, and covered with very short hairs. Elytra longer than pronotum, and narrower than pronotum. Elytral posterior angles moderately arcuate, posterior margin near suture lightly emarginate and finely serrate. Interstices considerably wider than striae. Punctures very coarse in front of the elytral apex. Abdomen moderately concave and ascendant in both sexes. The 1st sternite of males angled in its mid-length, and posterior margin of sternite merges with margin of 2nd sternite, not forming either an acute transition or angle. Posterior margin of 2nd sternite distinctly raised in the middle; 3rd sternite nearly twice as long as 4th one, Posterior margins of both pronounced. 5th sternite bilobed, lobes directed backwards and characteristically incurved towards middle with slightly upwards bunches of hairs, bunches being denser and longer on the outer sides of the lobes. A fringe of shorter hairs between lobes. All sternites covered with not very dense hairs, densest and longest hairs being on 1st sternite. In female, 1st sternite not angled in its mid-length, but forming quite a distinct transition to 2nd sternite, posterior margin of sternite raised as in male, 3rd sternite usually narrower than 4th, 5th sternite biobed, being broad, flat with a deep impression between them (Michalski, 1973).

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China (North East), Japan, Russia (East Siberia, Far East).

110 *Scolytus frontalis* Blandford, 1894 앞털뭉뚝나무좀 (Plate 8-110)

Scolytus frontalis Blandford, 1894a: 79.

Scolytus formosanus Eggers, 1939b: 115.

Description.

Body 3.5-4.6 mm, oval, oblong, stocky, not very strongly shining, dark-brown to black. Elytra rusty-brown to rusty. Frons in male long, flat, slightly impressed above the clypeus. Whole surface of frons regularly, very narrowly and finely rugose. Margin of clypeus emarginate, covered with golden, short, medially directed hairs. Lower angles of frons with slightly granular, longitudinal ridges. Lateral margins of frons with a distinct granular carina bordering the frons and attaining upper margin of eyes. The sculpture of the frons very distinct. Long, sparse, golden, medially directed hairs on sides. Hairs on upper part of frons shorter and finer. Frons of female convex, ridged above clypeus, fairly deeply punctured with short golden hairs. Antennal club distinctive, oval with its one side straight, with a pointed, very narrow suture and a faintly defined, pointed, short septum. Scape not very broad. Apex of antennal club arcuate and very weakly defined with another suture. Pronotum somewhat wider than long, widest at 1/4 from base, with a short and smooth line in the middle. Sides slightly arcuate, converging anteriorly, abruptly turning into a distinct, broad and strong constriction. Surface covered with well-defined oval punctures and punctures

widely spaced in the middle (Blandford, 1894a).

Korean Record. Löbl and Smetana, 2011.

Specimens examined. 12exs., GG, Goyang-si, 14.vii-1.viii.2007; 1ex., JB, Jeonju-si, Wansan-gu, Seonosong-dong, 31.viii.2009.

Distribution. Korea (South), China (North East), Japan, Taiwan.

Remarks. This species seems to be introduced in Korea. I found this species from *Zelkova serrata* at Goyang-si in 2007. After that, the reports on the damage of this trees by this species increase.

111 *Scolytus intricatus* (Ratzeburg, 1837) 난티검은나무좀 (Plate 8-111)

Eccoctogaster intricatus Ratzeburg, 1837: 186.

Scolytus picicolor Stephens, 1830: 362.

Scolytus penicillatus Reitter, 1913b: 21.

Eccoctogaster simmeli Eggers, 1923b: 133.

Scolytus lenkoranus Eggers, 1942: 34.

Description.

Body 2.4-4.2 mm, oblong-oval, rusty-brown to dark-brown, rarely almost black. Elytra usually lither than body, legs and pronotal anterior margin rusty-bronze, antennae and tarsi light-rusty. Male frons very slightly convex, nearly flat between eyes with a transverse impression above the clypeus. Frons covered with rather long, light-rusty hairs. Clypeus protruding a pair of rusty hair bunch above base towards front in male. Pronotum slightly wider than long, widest a base, parallel to one third, then narrowing gradually, constriction somewhat unclear.

Punctures on disk somewhat elongate except round at sides and in front. Scutellum broad, triangular, pubescent. Elytra as wide as pronotum, longer than pronotum, sides subparallel before half. Posterior angles with moderate arches, elytral apices rounded and slightly emarginate at suture. Striae and interstices longitudinally corrugate. Punctures on interstices and striae dense and similar each other. Abdomen obliquely ascendant without any projections. Sternites covered with dense and fine punctures and somewhat short or long setae, particularly long on 5th sternite in female. 5th sternite more densely covered with short recumbent fine hairs between long setae (Michalski, 1973).

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North?), Iran, Turkey, Europe.

Remarks. This species is widely distributed in Europe and Northern Africa. And some East Asian country as Iran and Turkey. But there is no record on the distribution in China, Russia (Far East) and other East Asian countries. So, the record in North Korea is doubtful.

112 *Scolytus jacobsoni* (Spessivtsev, 1919) 후지검은나무좀 (Plate 8-112)

Eccoptogaster jacobsoni Spessivtsev, 1919: 246.

Scolytus montana Kurentsov, 1935: 22.

Scolytus rimskii Kurentsov, 1941: 103, 228.

Description.

Body 2.5-5.0 mm, shining, brownish black to black, male stocky, short, smaller

than female. Female longer, ovate. Elytra and legs except tarsi reddish black. Antennae and tarsi yellowish brown. Male frons flat, distinctly, deeply, circularly impress between eye, longitudinally rugose, with scattered punctures. Sides of frons with long, dense, light yellow hairs. Female frons broadly convex, scantily pubescent. Hairs above clypeus longest, incurved towards middle. A slight transverse impression above clypeus and a distinct circular fovea between eyes. Male pronotum wider than long. widest at middle, slightly narrowing posteriorly and somewhat more rapidly narrowing anteriorly. Anterior constriction somewhat light coloured and narrow. Female pronotum widest at base. Scutellum triangular, covered with short and sparse hairs. Elytra nearly as long as pronotum, sub-parallel, slightly narrowing posteriorly, rapidly arcuate and almost truncate at hind angle. Striae furrowed longitudinally, interstices slightly convex except 3rd and 4th furrowed interstices. 2nd interstices with a double row of punctures. Abdomen ascendant vertically in male and obliquely in female. 3rd sternite of male with a large, backwardly directed process at middle of posterior margin. 5th sternite in male with two broad bunches of long and dense golden hairs. Pubescence on sides of sternites longer (Michalski, 1973).

Korean Record. Ju, 1964; Ju, 1969; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 6exs., GW, Yeongwol-gun, Yeongwol-eub, Geoun-ri, 8.vi.2011; 1ex., GB, Daegu-si, Mt. Palgongsan, 9.v.2009.

Distribution. Korea (North, South), China, Japan, Russia (Far East).

113 *Scolytus japonicus* Chapuis, 1876 자두애나무좀 (Plate 8-113)

Scolytus japonicus Chapuis, 1876: 199.

Eccoptogaster confusus Eggers, 1922a: 13.

Eccoptogaster mandli Eggers, 1922a: 13.

Scolytus starki Kurentsov, 1941: 101, 225.

Scolytus ussuriensis Kurentsov, 1941: 102, 226.

Scolytus subconfusus Eggers, 1941b: 123.

Description.

Body 1.9-3.5 mm, small, oval, shining, dark brown to black. Antennae and legs rusty brown. Frons broad, flat or slightly convex; finely, longitudinally rugose, with sparse periphery hairs. Frons of both sexes transversely impressed above clypeus. Pronotum wider than long, with well defined punctures, widest in its half-length, with sides arcuately rounded. Constriction strong, distinct. Scutellum triangular, depressed, flat, with apex slightly raised. Scutellar fovea noticeable, broad, deep and short. Elytra as wide as pronotum, sides parallel before half, moderately constricted. Abdomen except only 1st sternite densely covered with short hairs, obliquely ascendant; 2nd sternite slightly transversely impressed, suture between 1st and 2nd sternites indistinct; posterior margin of 2nd, 3rd and 4th sternites raised, abdominal sternite without tubercles or spines. 5th sternite triangular in shape, noticeably impressed in front of apex.

Korean Record. Murayama, 1930b; Murayama, 1936; Murayama, 1937; Cho, 1957; Lee and Cho, 1959; Ju, 1964; Ju, 1969; Nobuchi, 1973b; Choo et al., 1983a; Choo and Woo, 1985a; Choo and Woo, 1985b; Choo and Woo, 1989; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana,

2011.

Specimens examined. 1ex., GN, Sancheong-gun, Danseong-myeon, Gangnu-ri, 12.ix,1982; 1ex., Seoul, Dongdaemun-gu, Hongreung, vii.1990.

Distribution. Korea (North, South), China, Japan, Mongolia, Russia (East Siberia, Far East), Taiwan.

114 *Scolytus koltzei* Reitter, 1894 피나무검은나무좀

Scolytus koltzei Reitter, 1894b: 128.

Scolytus vexator Reitter, 1913b: 23.

Description.

Body 3.0-4.5 mm, shining, dark-brown to black, with elytra lighter, rusty brown. Legs and antennae rusty. Female oval, male more oblong. Frons of males slightly concave, broad, longitudinally rugose, sometimes more strongly, longitudinally punctured at middle. Frons of female convex, longitudinally rugose, rugosities coarser and stronger on sides. Frons of both sexes slightly covered with sparse, short, light hairs. Dense brush of hairs on middle of emargination of clypeus. Pronotum nearly as long as wide in female, wider than long in male. Punctures on pronotum sparse, elongate, small, a little larger and circular on sides, punctures in front considerably larger and longer. Punctures on constriction compressed, almost confluent, often strong furrows formed. Scutellum triangular, broad, conspicuously raised at apex. Elytra longer and wider than pronotum, posterior angles of elytra moderately arched, apex noticeably emarginate at suture. Punctures on narrow, distinctly depressed striae elongate, not deep. Interstices broad, flat, considerably broader than striae, 4th interstice mostly widest, with a single row of

not very fine, sometimes elongate, smaller or larger punctures. Abdomen convexly ascendant, male without process on 2nd sternite, female with a conspicuous, large 2nd sternite process located nearly at middle. 5th sternite of both sexes slightly impressed like a wheelbarrow. Abdomen covered with relatively short, dense and coarse hairs (Michalski, 1973).

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), Russia (Far East).

115 *Scolytus morawitzi* Semenov, 1902 이발검은나무좀

Scolytus morawitzi Semenov, 1902: 267.

Scolytus pini Eggers, 1942: 33.

Description.

Body 2.6-4.0 mm, oblong, shining, dark brown to pitch-black. Anterior sometimes posterior margin of pronotum, occasionally elytra, legs and antennae rusty brown. Frons of males convex, surface distinctly granular, covered with densely spaced, partly confluent punctures with small granules in middle. Frons of female convex, sometimes more strongly. Pubescence of frons weak, denser and longer above clypeus. Pronotum nearly as long as wide, widest at base with sides subparallel in basal part, then strongly arcuately narrowing anteriorly with a weak neck-like constriction. Punctures on pronotum not regularly arranged, elongate, deep and well-defined, gradually becoming larger on sides. Anterior margin of pronotum with infrequent hairs. A smooth, narrow line on middle of pronotum. Scutellum

triangular, broad, raised in middle, densely and finely pubescent. Elytral suture somewhat raised. Elytra more strongly corrugated at base, on sides and anterior half. Punctures on striae large, nearly same size as those on interstices except considerably smaller punctures on 1st interstice. Margins of posterior angles and apices of elytra granular. Abdomen obliquely ascendant, sternites noticeably punctured. Suture between 1st and 2nd sternites indistinct. Posterior margin of 2nd sternite thickened, 2nd sternite of male thickened somewhat more strongly in middle, transversely impressed. 3rd and 4th sternites of male narrower than female. Anal sternite of male narrow, slightly emarginate at apex. Sides of emargination with slight but distinct projections, bearing brushes of dense, golden hairs which protruding mainly from under elytra. 5th sternite of females broader, conspicuously, transversely impressed, pubescent on margins (Michalski, 1973).

Korean Record. Ju, 1964; Ju, 1969; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China, Mongolia, Russia (East Siberia, Far East, West Siberia, European territory).

116 *Scolytus pubescens* Stark, 1936 느릅검은나무좀

Scolytus pubescens Stark, 1936b: 154.

Scolytus pubescens Eggers, 1942: 34 [nom. praeocc.]

Description.

Body 2.9-4.0 mm, stocky, shining, dark-brown, except a black pronotum with

brown anterior and posterior margins with strong, long pubescence. Frons of males flat, longitudinally rugose, densely pubescent on sides. Hairs long, golden, incurved towards middle of frons. Female frons convex, longitudinally rugose with a short, fine, smooth line, considerably more weakly pubescent. Pronotum of males widest in its half, nearly as long as wide. Female pronotum widest at base and somewhat wider than long. Nec-like constriction distinct in both sexes, posterior pronotal angles broadly rounded. Punctures fine, somewhat elongate, stronger, coarser and more circular in front and on sides of pronotum. Pronotum glabrous, only its anterior margin with long hairs. Hairs sparser on anterior angles at constriction. Scutellum triangular, broad, acutely ended, with fine, dense, grey pubescence. Elytra narrower and somewhat longer than pronotum. Posterior angles of elytra with short, slightly angled arches, shortly emarginate at middle of apex. Punctures on striae large and deep, sometimes on slight, depressed furrows. Interstices flat, with fine punctures nearly same size as those on striae. Abdomen in both sexes vertically ascendant. Anterior margin of 2nd sternite of male with an obtuse process, incurved upwards and dilated at tip. Anterior margin of 2nd sternite of female with a strongly reduced, small, acute and straight process. Abdominal sternites very strongly pubescent, particularly in vicinity of proess and on margins of sternites 2-4. 5th sternite most strongly punctured (Michalski, 1973).

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North, South), Russia (Far East).

117 *Scolytus ratzeburgii* E.W. Janson, 1856 아무르검은나무좀 (Plate 8-117)

Scolytus ratzeburgii E.W. Janson, 1856: 86.

Eccoptogaster amurensis Eggers, 1908b: 144.

Eccoptogaster sahlbergi Eggers, 1912c: 204.

Eccoptogaster sibiricus Eggers, 1922: 14.

Scolytus lineatus Kurentsov, 1941: 104, 206.

Scolytus bituberculatus Puzyr, 1951: 46.

Description.

Body 4.0-6.5 mm, large, shining, dark brown to black, with the elytra lighter, reddish brown. The tarsi and antennae rusty. Frons of males strongly, deeply impressed, sometimes flat, longitudinally, coarsely rugose, the rugosities being often intermittent; distinctly furrowed on sides. Frons with a conspicuous, cariniform ridge at middle, densely covered with fairly long, fine hairs. Margin of clypeus semicircularly emarginate with a bunch of dense, long, golden hairs. Female frons convex and slightly impressed flatly above clypeus and more deeply between eyes. Impression between eye varied in shape, circular, longitudinal, elliptic, triangular as well as deeper or shallower, turning into a narrower or broader depressed furrow on vertex. Rosturm with a longitudinal carina. Pronotum wider than long, with sides parallel at base, then conspicuously constricting anteriorly. Punctures on pronotum varied in size and shape, elongate or nearly circular, fine or coarse. Constriction prominent, broad. Pronotum with a smooth, longer or shorer line at middle. Scutellum triangular, convex at middle, with apex slightly raised. Elytra less wider than pronotum, longer than pronotum. Sides of elytra subparallel, being somewhat wider in half of its length and then slightly

constriction posteriorly. Interstices broad with different size of punctures which always smaller than striae. Abdomen of males steeply ascendant, whole surface of 2nd sternite almost vertical. Females abdomen slightly concavely ascendant, 2nd sternite somewhat impressed, and nearly vertical before half of its height. Female without tubercles of projections but with distinct posterior margin. 5th sternite in female transversely and narrowly impressed at posterior margin. 3rd and 4th sternites of males with large tubercles. Tubercle on 3rd sternite elongate, nearly as long as broad, rounded at tip. Shape of tubercles 3rd and 4th variable (Michalski, 1973).

Korean Record. Ju, 1964; Ju, 1969; Nobuchi, 1973b; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North, South), China, Japan, Russia (East Siberia, Far East, West Siberia), Europe.

118 *Scolytus schevyrewi* Semenov, 1902 서울나무좀 (Plate 8-118)

Scolytus schevyrewi Semenov, 1902: 265.

Scolytus sinensis Eggers, 1910a: 35.

Eccoptogaster frankei Wichmann, 1915b: 214.

Eccoptogaster emarginatus Wichmann, 1915b: 215.

Eccoptogaster transcaspicus Eggers, 1922b: 116.

Scolytus seulensis Murayama, 1930: 5.

Description.

Body 2.9-4.0 mm, oblong, shining, dark-brown to black, with yellowish brown antennae and legs. Elytra sometimes with dark reddish broad band or spots. Male frons long, flat, fairly strongly impressed between eyes, its longitudinal rugosities long. Sides of frons with long, not dense hairs directed towards middle. Hairs on surface of frons considerably sparser. Female frons slightly convex, shortly and sparsely pubescent with a weak impression above clypeus. Pronotum square in outline, as wide as long in male, somewhat wider in female, sides parallel behind half, then strongly narrowing anteriorly with a distinct, broad, neck-like constriction. Pronotum covered with longitudinal, small, fairly dense punctures. Scutellum triangular, dull, covered with light, recumbent, fine hairs. Elytra longer and somewhat wider than pronotum in male, longer and narrower than pronotum in female, sides parallel before half, then distinctly constricting, with long arches of posterior angles, somewhat truncate at suture. Base of elytra behind scutellum with yellowish bunch of short hairs. Posterior margin serrate from posterior angles. Abdomen slightly convexly ascendant, beginning from 3rd sternite slightly concavely ascendant. 2nd sternite with a weakly truncated process. Process located at middle in female, on lower part in male. Male process somewhat wider than long, distinctly dilated and notched at tip (Michalski, 1973).

Korean Record. Murayama, 1930b; Murayama, 1936; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo et al., 1983a; Choo and Woo, 1985a; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 3ex., GN, Euryeong-gun, Euryeong-eub, Jeongam-ri, 11.ix.1982; 2ex., GN, Jinju-si, Gajwa-dong, 14.x.1982; 8exs., GG, Pocheon-si,

Soheul-eub, Gomo-ri, 13.iv.2016.

Distribution. Korea (North, South), China, Mongolia, Russia (East Siberia, Far East), Tajikistan, Nearctic region (introduced).

119 *Scolytus semenovi* (Spessivtsev, 1919) 배긴털나무좀 (Plate 8-119)

Eccoptogaster semenovi Spessivtsev, 1919: 247.

Scolytus kononovi Kurentsov, 1941: 98, 228

Description.

Body 1.7-2.5 mm, stocky, short, rectangular-oval in male, oblong oval in female, brownish black, elytra lighter, head and pronotum black, antennae and legs rusty brown. Male frons flattened, slightly impressed, distinctly longitudinally rugose with sides strongly, densely covered with bronze hairs. Female frons convex, impressed above clypeus, finely, longitudinally rugose, almost glabrous. Hairs above clypeus short. Male pronotum somewhat wider than long, widest at middle, with sides arcuately narrowing anteriorly and with a noticeable, broad constriction. Female pronotum widest at base, narrowing straight anteriorly with a weak constriction. Scutellum triangular, small in male, considerably larger in female. Elytra parallel-sided, as wide as pronotum, widest at base, nearly as long as pronotum in male and longer in female. Elytral posterior angles short arched. Elytral punctures oval or slightly elongate, large on a longitudinal depression in striae, somewhat small and sometimes on a longitudinal depression in interstices. Posterior margin and angle of elytra slightly and weakly serrate. Abdomen vertically ascendant, 2nd sternite of female somewhat convex at middle. 2nd sternite with an obtuse, relatively short process at base, slightly dilated at tip in

male, narrower in female. Posterior margin of sternites raised slightly. 4th sternite broadly swollen in male (Michalski, 1973).

Korean Record. Ju, 1964; Ju, 1969; Choo and Woo, 1985a; Choo and Woo, 1985b; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 2ex., GB, Daegu-si, Maesil-dong, 14.xi.1982; 1ex., GW, Inje-gun, Inje-myeon, Habgang-ri, 27.v.1993.

Distribution. Korea (North, South), China, Japan, Mongolia, Russia(East Siberia, Far East).

Remarks. Choo and Woo (1985a) had reported this species new to Korea, but it was not the first report in southern part of Korea.

120 *Scolytus trispinosus* Strohmeyer, 1908 셋침검은나무좀 (Plate 8-120)

Scolytus trispinosus Strohmeyer, 1908a: 69.

Scolytus grandis Kurentsov, 1941: 104, 227.

Description.

Body 3.8-6.5 mm, stocky, oval, shortened, shining, dark brown to black, antennae, elytra, legs are brown. Male frons flat, finely and longitudinally rugose, pubescent on whole surface with a bunch of brown hairs above clypeus. Sides of frons under eye granulate. Female frons convex, finely, longitudinally rugose, pubescent sparsely with a slight transverse impression above clypeus. Pronotum wider than long, widest at base, gradually narrowing anteriorly with a conspicuous broae, neck-like constriction. Scutellum triangular, finely pubescent with apex slightly

raised. Elytra as wide as pronotum in male, narrower in female, longer than pronotum. Elytra slightly longer than wide, almost quadrate, posterior arches truncate. Posterior margin weakly serrate, granular. Interstices with one or two irregular rows of punctures. Strioles slightly bigger than punctures on interstices. Abdomen straight, obliquely ascendant in male, convexly in female. 1st sternite with not very long, sparse yellowish hairs. 3rd and 4th sternites with conspicuous tubercles in middle of posterior margin in male. 5th sternite in male with a triangular impression and three similar, dense bunches of yellowish hairs. 5th sternite in female transversely impressed at posterior margin (Michalski, 1973).

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), China (North East), Japan, Russia (Far East).

Tribe Scolytoplatypodini Blandford, 1893

Genus *Scolytoplatypus* C.F.C. Schaufuss, 1891

Scolytoplatypus C.F.C. Schaufuss, 1891: 31 (Type species: *Scolytoplatypus permirus* C.F.C. Schaufuss, 1891)

Spongocerus Blandford, 1893b: 431 (Type species: *Scolytoplatypus tycon* Blandford, 1893)

Strophionocerus Sampson, 1921: 36 [RN] (Type species: *Scolytoplatypus mikado* Blandford, 1893)

Taeniocerus Blandford, 1893b: 437 [HN] (Type species: *Scolytoplatypus mikado* Blandford, 1893)

Diagnosis.

Length 1.2-4.6 mm, 1.7-2.2 times as long as wide. Colour yellowish brown to black, elytra occasionally with dark sutural and lateral bands on a paler ground. Vestiture usually sparse dorsally, but some species with denser hairs on the elytral declivity. Sexual differences marked. Head globose with convex frons in female, concave in male sometimes with brushes of hairs. Eyes elongate oval, entire. Antennal scape clavate, funicle six-segmented, club flattened, varying in shape from oval to elongate triangular, lacking sutures, covered by short sensory setae, sometimes with a few longer hairs at base, along ventral margin, and at apex. Pronotum usually as wide as or wider than long, the base bisinuate, the sides usually constricted towards the base to form femoral grooves, the posterolateral angles often right-angled or projecting, disc evenly curved without a summit. Scutellum small, normally triangular, often depressed, barely reaching the elytral surface. Elytra a little wider and clearly longer than the pronotum, the base simply angled or carinate, cylindrical, the sides parallel, the apex broadly or angularly rounded, occasionally with a sutural emargination, discal puncturation usually confused, less often seriate, interstriae often raised or carinate near top of declivity, sometimes with spines projecting over the declivity, the latter convex, steep. Procoxae large, widely separated, the prosternum often modified in males, profemora strongly built, sometimes with a triangular tooth near the apex on the upper side, protibiae with the outer margin toothed, emarginate before the strong apical tooth. Abdomen horizontal or slightly rising posteriorly (Beaver & Gebhardt, 2006).

Key to the species of Korean *Scolytoplatypus*

1. Elytral striae clear and linear. Declivity with strong and pointed spines ----- 2
 - Elytra glabrous, elytral striae unclear. Declivity without spines ----- 3
2. Prosternum with two tubercles anteriorly, only 5-6 pubescences on anterior part
 of procoxae. China, Japan, Taiwan ----- *S. mikado*
 - Prosternum with one tubercles anteriorly, a tuft of pubescences on anterior part
 of procoxae. China, Japan, Korea ----- *S. sinensis*
3. Upper half of frons clearly punctured, lower half impunctate, with a rather
 sparse fringe of hairs on each side curving inwardly, but not extending to lower
 half of frons. Prosternum without a pair of translucent processes anteriorly.
 Rows of punctures on elytral dorsum feebly but clearly impressed before
 declivity ----- *S. tycon*
 - Frons impunctate throughout, the incurved brushes of hairs denser and longer,
 extending beyond middle of frons. Prosternum with a pair of widely separated,
 translucent, divergent processes anteriorly. Rows of punctures on elytral dorsum
 not impressed, usually indistinct ----- *S. daimio*

121 *Scolytoplatypus daimio* Blandford, 1893 독나무좀 (Plate 8-121)

Scolytoplatypus daimio Blandford, 1893b: 433.

Scolytoplatypus siomio Blandford, 1893b: 436.

Scolytoplatypus muticus Hagedorn, 1904a: 124.

Description.

Body Length. 3.5 mm, cylindrical, convex, much smaller and narrower than *S. tycon*, shining, piceous black; elytra obscurely marked at base with two testaceous streaks. Head in male excised deeply, fundus finely reticulate, set over eyes with

two dense fasciculi of long piceous hairs, which are curled into fundus, vertex punctured; in female, convex, punctured, finely pubescent. Antennae of male short, scape curved, clubbed, funiculus shorter than scape, flexible, its 1st joint produced externally so as to be subcylindrical, but pointed at apex, and transverse, 2nd joint situated on distal side of 1st before apex, transverse, conical, succeeding joints transverse, little increasing in size, 4th and 6th slightly produced internally to bear a long seta; club subtriangular, acuminate, its outer edge feebly convex, its inner edge convex at base, forming a prominent rounded angle inside attachment of funiculus, and thence subconcave to apex; extremity of the scape, the funiculus and club, hairy, the hairs of the latter of various lengths, and there is a fringe of about 16 long hairs on the inner edge and apex, as in *S. tycon*. Scape in the female less strongly clubbed; the 1st joint of the funiculus of the usual mushroom shape, and the rest as in the male; club oval, feebly acuminate and hairy, but without the long cilia and processes. Prothorax rather broader than long, its base slightly bisinuate, its basal angles acute; sides bisinuate, the anterior angles of the emargination being feebly marked, and broadly rounded at the apex in the female, more narrowly in the male, where there is a well-marked emargination. Surface finely reticulate, punctured and feebly pubescent; in the male there is a distinct longitudinal impression towards the anterior end of the median line, and two less marked ones on either side behind it. Elytra cylindrical, convex, double as long as thorax, and much wider at base, basal angles rectangular, sides parallel to near apex, then angled, the angulation being marked with a small tooth, and proceeding nearly straight to apex, which is obtuse; surface piceous brown, obscurely testaceous at shoulders, without trace of striae, with rather fine irregular punctures, some of which belong to the obliterated striae, but are not distinguishable from

the rest, except with a strong light; apex rather abruptly declivous, subconvex, striate, the striae after the first two being obliterated below the flexure, the interstices in the male shortly carinate at the flexure, the alternate ones more strongly, 7th toothed, forming lateral tooth of elytron; declivity with six or seven tubercles on 1st, three or four on 32nd interstice in both sexes. Unverside piceous, with mesosternum lighter, pubescent and punctured, strongly on prosternum and abdominal segments, these nearly equal in length. Legs and antennae testaceous brown, club of latter darker. Middle and posterior tibiae with outer border angulate in middle; tarsal joints not strongly compressed (Blandford, 1893b).

Korean Record. Ju, 1964; Ju, 1969; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), Bhutan, China (North East), India, Japan, Nepal, Russia (Far East).

122 *Scolytoplatypus mikado* Blandford, 1893 잡식나무좀 (Plate 9-122, Figs. 18, 19-1,2)

Scolytoplatypus mikado Blandford, 1893b: 437.

Description.

Body Length. 3.5 mm, Head in both sexes dull, with close reticulation; front in male impressed to eyes, concave, vertex, which forms an angle with front, and is hidden when head is extended, more strongly punctured, feebly pubescent; front in

female convex, glabrous, except for a fringe over mouth, impressed above mouth, and with a fine central suture. Antennal hairs of male not very long, except at tip of club, simple; pores of club small, not close. Pronotum with base strongly bisinuate, produced in middle, its basal angles produced, and pointing slightly forwards; lateral border gradually rounded anteriorly and not angulate, apical emargination in male inconspicuous, surface quite dull, with a fine median impressed line, not extending in front of pore in female, closely covered with shallow, somewhat variolose punctures, which are smaller in female. Elytra with base slightly bisinuate, its margin raised and acute, humeral prominence small, obtuse; striae impressed, with irregular coalesced punctures, the first two obsolete at base, interstices finely reticulate, somewhat shining at base, with fine irregular punctures, which become stronger and more rugose towards apex; alternate interstices carinate in male from before middle of elytra the carinae smooth on the summit throughout, ending in short free spines with but the barest trace of any hairs, towards the apex the 2nd interstice is faintly impressed and narrowed; interstices in female similar throughout. Underside black, with apex of elytra lighter, sparsely pubescent, punctured, coarsely on base of prosternum and abdomen; metasternum flattened in front with a fine longitudinal carina. Male with a long wisp of hair on anterior coxae; abdomen with apical segments flatter than in female, last segment hairy. Anterior legs of male somewhat stout, junction of trochanter and femur angulated below, femoral lamella distinct. Prothoracic foveae of male deep, reniform. Prothoracic pore in female conspicuously filled with a tuft of yellow material (Blandford, 1893b).

Korean Record. Murayama, 1930b; Murayama, 1931; Murayama, 1936; Murayama,

1937; Cho, 1957; Cho, 1963; Ju, 1969; Choo and Woo, 1985a; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Beaver and Gebhardt, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North?), China, Japan, Taiwan, Oriental Region.

Remarks. This species is not occurred in South Korea. All of the records in Southern part of Korea are the misidentification of *S. sinensis*.

123 *Scolytoplatypus sinensis* Tsai & Huang, 1965 애잡식나무좀(신칭) (Plate 9-123, Figs. 18, 19-3,4)

Scolytoplatypus sinensis Tsai & Huang, 1965: 121, 123.

Description.

Body 3.2-3.3 mm, reddish brown to dark brown, antennae and legs light yellowish brown. Frons shallowly concave, uniformly shagreened, slightly flattened above epistoma without narrow brushes of long hairs in males, but fringe of hairs on margin much longer than hairs at middle in male; frons of female weakly convex. Antennal club flattened, long and narrowly acuminate in male, but slightly acuminate oval in female; both sides covered with short appressed setae, ; apex of club with a few long setae in male. Pronotum 0.81-0.97 times as long as wide, widest at middle of its length; anterior margin with distinct median emargination at middle in male; posterior margin weakly bisinuate, slightly produced in the middle, posterolateral corners approximately rectangular and weakly produced laterally. Pronotal surface uniformly shagreened, shallowly and sparsely irregularly punctured; median longitudinal area impunctate; vestiture of pronotum very fine

and short hairlike setae nearly invisible, more dense along frontal edge. Prosternum with a tubercle anteriorly and a pair of tapering processes at anterior margin in male. Elytra 1.14-1.37 times as long as wide, 1.50-1.67 times as long as pronotum, slightly wider than pronotum, sides almost straight and parallel on basal three-fourths, widest in posterior part, then strongly converging to rounded apex. striae impressed, with irregular coalesced punctures, the first two obsolete at base, interstices finely reticulate, somewhat shining at base, with fine irregular punctures, which become stronger and more rugose towards apex; alternate interstices carinate in male from before middle of elytra, the carinae smooth on the summit throughout, ending in short free spines with short hairs; interstices in female similar throughout. Elytra nearly glabrous, only semierect hairlike setae below each interstitial tubercle on the declivity.

Korean Record. New to Korea.

Specimens examined. 1ex., GW, Taebaek city, Mt. Taebaeksan, 30.v.1999; 2ex., GW, Inje-gun, Girin-myeon, Mt. Jeombong-san, 24.vi.2011; 181exs., CN, Geumsan-gun, Jinsan forest park, 10.vi.2010; 1ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri, 21.iv-17.v.2011; 698ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 165ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2012; 7ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 18.vii.2012; 2ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 2.viii.2012; 19ex., GN., Sancheong-gun, 23.v-17.vii.2009; 17exs., JB, Wanju-gun, 21.v-16.vii.2009; 2ex., JN, Kwangyang city, 23.vi.1991; 5ex., JN, Kwangyang city, 28.vii.1998; 1ex., JJ, Jeju-si, Donggye-dong, 9.vii.2004; 1ex., JJ, Seoguiipo-si, Donneko, 30.iv.2003; 1ex., JJ, Jeju-si, Eorimok, 4.viii.2003; 1ex., JJ, Seoguiipo-si,

Donneko, 9.vi.2004.

Distribution. Korea (South), China, Japan.

Remarks. This species had been synonymized to *S. mikado* by Wood (1982), but this species is a clearly different species with *S. mikado* by the external characters and gene informations.

124 *Scolytoplatypus tycon* Blandford, 1893 단풍나무좀 (Plate 9-124)

Scolytoplatypus tycon Blandford, 1893b: 432. (Type Locality: Japan, Nikko and Kiga.)

Scolytoplatypus ussuriensis Berger & Kholodkovskiy, 1916: 4.

Description.

Body 3.5-4 mm, Oblong, cylindrical, some flattened above. Head black, in males excavate up to eyes, fundus finely reticulate, and distinctly punctured behind, margin of reticulation ciliate with long inwardly curved yellowish hairs, vertex strongly punctured; in females convex, impressed over mouth, front slightly flattened, with a fine median impressed line, and somewhat close punctuation, mouth fringed with hair, and front with short dense pubescence. Antennae with scape and funiculus nearly similar in both sexes, the former mere strongly clubbed at apex in male; club in male acuminate, with a fringe of about 14 long serrate cilia on inner side and apex, in female exactly oval, shortly hairy. Prothorax rather broader than long, more distinctly so in the male which has the anterior border emarginate, its base feebly bisinuate, basal angles nearly rectangular, sides subsinuate to near apex, with anterior angle of emargination inconspicuous, thence strongly rounded; its surface variable in colour, entirely ferruginous, or with an anterior black patch, which may invade the whole dorsum, finely reticulate with

short sparse pubescence and a fine median raised line, limited in front in the females by sorsal pore, distinctly punctured in male, the punctures close on anterior third at sides of median line, in female with finer sparse punctuation. Elytra wider than thorax at base, and twice as long, basal angles rectangular, rounded, sides feebly convex to near apex, then strongly rounded at apical flexure, apex obtusely rounded; surface convex, slightly flattened in middle, somewhat shining, ferruginous, or with sides and suture blackish, or entirely black, irregularly punctured with fine striate impressions, the punctures of which are barely distinguishable from those of the interstices; in the male the striae are deeper, especially the sutural stria, and the interstices are feebly convex; apical declivity rounded, shortly pubescent, striate, its interstices subconvex, with close rugose punctures, 1st with seven or eight, 3rd with five or six small tubercles, the other segments with traces of tuberculation at the base of the declivity. Tarsal joints 2-3 strongly dilated. Underside punctured and hairy; abdominal segments 1 and 2 longer than 3 and 4. Lateral fovea of thorax indistinct in male (Blandford, 1893b).

Korean Record. Murayama, 1930b; Murayama, 1931; Murayama, 1937; Cho, 1957; Cho, 1963; Ju, 1964; Ju, 1969; Choo and Woo, 1985a; Choo and Woo, 1985b; ESK/KSAE, 1994; Choi and Ko, 2006; Beaver and Gebhardt. 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., GW, Pyeongchang-dun, Doam-myeon, Byeongnae-ri, Mt. Odaesan, 27.v.1993; 1ex., GW, Pyeongchang-gun, Mt. Odaesan, Bukdaesa, 28.v.1998; 7ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri, 21.iv-17.v.2011; 3ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri, 21.iv-17.v.2011; 13exs., GW,

Inje-gun, Girin-myeon, Mt. Jeombong-san, 24.v.2011; 1ex., GW, Yeongwol-gun, Sangdong-eub, Mt. Jangsan, 12.vi.2011; 18ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 1.v.2012; 8233ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 8012ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2012; 865ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 18.vii.2012; 124ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 2.viii.2012; 6ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 16.viii.2012; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 11.ix.2012; 1701ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2102; 253ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 18.vii.2012; 124ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 2.viii.2012.

Distribution. Korea (North, South), China (North East), Japan, Russia (Far East), Taiwan.

Tribe Xyleborini LeConte, 1876

Key to Genera of Female Xyleborini in Korea

1. Scutellum conical, minute, placed in sutural notch between elytral bases, usually surrounded by setae ----- *Xyleborinus*
- Scutellum flat, triangular, flush with elytral surface; or scutellum not visible ----- 2
2. Scutellum not visible ----- *Microperus*
- Scutellum moderate, flat, triangular ----- 3
3. No vestiture on elytral disc, elytral declivity sharply truncated. ----- *Amasa*
- Vestiture on elytral disc, elytral declivity not sharply truncated. ----- 4
4. Procoxae moderately to widely separated, intercoxal piece continuous, not

- longitudinally emarginate ----- 5
- Procoxae contiguous, intercoxal piece longitudinally emarginate ----- 6
5. Anterior margin of pronotum distinctly armed by two dominant serrations at middle and several small serrations ----- *Cnestus*
- Anterior margin of pronotum armed by several common serrations ----- *Xylosandrus*
6. Body covered with decumbent hairs. ----- *Cyclorhipidion*
- Body covered with erected hairs. ----- 7
7. Antennal club distinctly obliquely truncate, with segment 1 corneous, its distal margin forming a complete circle extending from anterior face to apex, suture on apical area of posterior face not visible, segment 2 on anterior face not visible ----- 8
- Antennal club with segment 1 on both faces rounded, extending to subapical area of posterior face, segment 2 on anterior face conspicuous ----- 9
8. Anterior margin of pronotum distinctly armed by several coarse serrations; body stout, <2.2 times as long as wide ----- *Anisandrus*
- Anterior margin of pronotum unarmed by large serrations, if serrations present, smaller than asperities on anterior slope of pronotum; body more slender >2.3 times as long as wide ----- *Xyleborus* (major part)
9. Third segment of antennal club visible on anterior face but not on posterior face; elytral vestiture uniseriate or confused ----- 10
- Third segment of antennal club (i.e., 2 sutures) clearly visible on both anterior and posterior face; elytral vestiture uniseriate on disc. ----- 11
10. Elytral punctures confused, vestiture abundant and confused on disc and declivity ----- *Xyleborus* (in part)

- Strial and interstitial punctures clearly in rows, vestiture less abundant, uniseriate
----- *Ambrosiophilus*
- 11. Pronotal asperities extending from anterior to base, asperities on disc and posterior half almost as coarse as those on anterior half; posterolateral margin of declivity rounded; elytral vestiture abundant. ----- *Ambrosiodmus*
- Pronotal asperities confined to anterior half, posterior half of pronotum often punctate; posterolateral margin of declivity subacutely elevated from sutural apex to interstriae 7; strial and interstitial punctures in rows, elytral vestiture sparse, confined to strial and interstitial rows ----- *Euwallacea*

Genus *Amasa* Lea, 1894

Amasa Lea, 1894: 322 (Type species: *Amasa thoracica* Lea, 1894 = *Tomicus truncatus* Erichson, 1842)

Anaxyleborus Wood, 1980: 90 (Type species: *Tomicus truncatus* Erichson, 1842)

Pseudoxyleborus Eggers, 1930b: 206 (Type species: *Pseudoxyleborus beesoni* Eggers, 1930)

Diagnosis.

Eyes deeply emarginate to almost disjunct, upper part of eye smaller than lower part. Antennal club circular, segment 1 small, second and third prominent on both sides or all pubescent and sutures obscured. Segment 1 of club convex, small, its margin segment soft and pubescent on posterior side, or margin all soft, pubescent. Segment 2 visible on both sides of club, but soft, or corneous part on anterior side only, rarely corneous on both sides of club. Segment 3 clearly visible and dominant on both sides of club. Segment 1 of antennal funicle shorter

than pedicel, funicle 4-segmented, scapus of regular shape. Mandibular mycangia may be visible as swellings above epistoma. Frons above epistoma mostly smooth or alutaceous, with minor punctures. Submentum deeply impressed, narrow. Anterior edge of pronotum mostly with distinct row of serrations. Pronotum from lateral view of basic shape, or elongated, with low summit, or with disc distinctly elongated. Pronotum from dorsal view basic, short, parallel-sided, rounded frontally, or elongated basic shape with rounded frontal margin. Pronotal disc shining or smoothly alutaceous, with small punctures, lateral edge of pronotum obliquely costate. Procoxae contiguous or narrowly separated, prosternal posterocoxal process short and conical, or flat and inconspicuous, or tall and pointed. No setose mycangial openings either in mesonotum or in elytral bases. Scutellum flat, flush with elytra. Elytral bases straight, with oblique edge, elytral disc longer than declivity, flat, punctures on elytral disc in striae lines. Elytral declivity sharply truncated, mostly with complete circumdeclivital costa or elevated carina around margin. Declivity mostly devoid of hair, or with few setae or scales, or covered with adherent flat setae or scales. Declivital surface variable but always devoid of major projections or other structures, except small uniform granules. First interstriae parallel on elytral disc, often distinctly broadened towards apex of elytra. Protibiae with evenly rounded edge to obliquely triangular, broadest at 2/3 of its length, to very slender, slightly broader only at distal end. Posterior side of protibia flat, without tubercles (setae only), or appears inflated, often with several granules. Protibial denticles small, bases of denticles not enlarged or only slightly elevated, usually between 6 and 8 protibial denticles. Metatibiae of regular size. Length is 2.1-3.7 mm, body color is uniformly light brown, or reddish, or uniformly dark brown, or rarely uniformly black, pronotum commonly lighter than

elytra, sometimes starkly contrasting (yellow pronotum, black elytra) (Hulcr and Cognato, 2013).

125 *Amasa amputatus* (Blandford, 1894) 무화과나무좀 (Plate 9-125)

Xyleborus amputatus Blandford, 1894b: 575.

Xyleborus melli Schedl, 1938f: 463.

Description.

Body 2.5 mm, cylindrical, moderately shining with short pubescence and light testaceous except reddish brown mandibles, rostrum and elytral declivity. Head short, frons with minute vertical tubercles and pubescences. Prothorax semi-elliptic, almost parallel at sides from base to middle, widest near middle, and finely crenulate from one third, base subtruncate. Surface with an indistinct median transverse elevation, thinly pubescent, its anterior two third with fine somewhat scattered granular asperities, its posterior one third rather finely punctate, with close upstanding pubescence at middle and intersected by a subelevated median shining line. Scutellum ligulate, rather large. Elytra slightly longer than the prothorax, with oblique but scarcely rounded basal margins, the shoulders rectangular, the sides straight and subparallel with a very slight posterior divergence; surface cylindrical, obliquely truncate behind from the posterior third, with very fine striae, interstices with finer irregular piliferous punctures, truncate area subcircular, sharply margined all round, subconcave on each side and elevated along the suture, dull, glabrous, with three clear rows and one indistinct row of punctures on either sides, the interstices flat, irregularly punctured, its inferior apical border forming a very obtuse angle when seen from above. Underside and

legs light testaceous, procoxae and midcoxae moderately separated (Blandford, 1894b).

Korean Record. Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 2 ex., JJ, Jeju-si, Bongaedong, Jeolmul, 13.viii-20.viii.2005; 1 ex., JJ, Jeju-si, Bongaedong, Jeolmul, 29.viii-3.ix.2005; 1ex., JJ, Seoguipo-si Namwon-eub, Hannam-ri, 29.viii.2007; 8ex., JJ, Jeju-si, Yonggang-dong, 21.v.2013; 2exs., JJ, Jeju-si, Bonggae-dong, 25.vi.2013; 2 ex., JJ, Jeju-si, Jocheon-eub, Saryeoni Forest, 15.vii.2013; 7 ex., JJ, Seoguipo-si, Namwon-eub, Sumang-ri, 21.v.2013; 1ex., JJ, Jeju-si, Bonggae-dong, Seongpanak, 15.vii.2013; 8ex., JJ, Seoguipo-si, Namwon-eub, Sumang-ri, 21.v.2013; 2ex. JN, Sinan-gun Heuksan-myeon, Heuksan Is. 4.vi.2015.

Distribution. Korea (South), China, Japan, Taiwan.

Remarks. This species was located in genus *Xylosandrus* (Löbl and Smetana, 2011), but it is quite similar to *Amasa resecta*, a typical representative of the genus.

Genus *Ambrosiodmus* Hopkins, 1915

Ambrosiodmus Hopkins, 1915: 55 (Type species: *Xyleborus tachygraphus* Zimmermann, 1868)

Brownia Nunberf, 1963: 37 (Type species: *Xyleborus illepidus* Schedl, 1941 = *Pityophthorus obliquus* LeConte, 1878)

Phloeotrogus Motschulsky, 1863: 512 (Type species: *Phloeotrogus obliquecauda* Motschulsky, 1863)

Diagnosis.

Species in this genus range from 1.8 to 4.9 mm in length and are approximately 2.2 to 2.6 times as long as wide. Their color ranges from yellowish brown to black. As in other Xyleborina they are sexually dimorphic with smaller and flightless males. The pronotum is usually as long as wide and completely asperate. The scutellum is large and flushed with the surface of the elytra. The declivity is convex with a few species having a shallow sulcus near the suture; usually has granules with a few species having tubercles. The vestiture consists of erect hair-like setae all over and shorter, recumbent hair-like setae on the striae. *Ambrosiodmus* clearly differs from other genera in having a completely asperate pronotum.

Key to the species of Korean *Ambrosiodmus*

1. Body longer than 4mm. Pronotum slightly narrowing anteriorly at sides
----- *A. lewisi*
- Body shorter than 3mm. Pronotum almost parallel at sides ----- *A. rubricollis*

126 *Ambrosiodmus lewisi* (Blandford, 1894) 루이스나무좀 (Plate 9-126)

Xyleborus lewisi Blandford, 1894a: 104.

Ozopemon tuberculatus Strohmeyer, 1912a: 38.

Xyleborus lewekianus Eggers, 1923a: 181.

Xyleborus tegalensis Eggers, 1923a: 181.

Description.

Body 4.5 mm, oblong, convex, and cylindrical, pilose with long hairs, reddish

brown with elytra infusate. Head regularly punctured except coarsely punctured frons and short rostrum, with an indistinct elevated shining median line, thinly hairy and ciliate over mouth. Eyes elliptical and clearly emarginate behind upper area of antennal scrobe. Prothorax transverse, nearly quadrate, but with sides and apex separately rounded and antero-lateral angles more strongly rounded; above gibbous and convex, but without median elevation, dull and entirely scabrous with asperities, asperities slightly weaker posteriorly. Scutellum triangular with dull edge, shining, infusate, anteriorly impressed. Elytra as wide as base of pronotum and more than one-half longer, truncate at base, with humeral angles rounded-rectangular, sides almost straight but slightly widen to apex, which is rather abruptly and broadly rounded and inconspicuously carinate below; surface very convex with scarcely impressed irregular striae of large shallow punctures and long coarse pubescence, especially at apex, interstices finely punctured in irregular double rows, declivity very convex, with first interstice widened, impressed and finely tuberculate, the second very strongly, the rest less strongly tuberculate. Procoxae contiguous, midcoxae moderately separated. Male small, dwarfish, reddish brown, round, convex with long pubescences (Blandford, 1894a).

Korean Record. Murayama, 1930b; Murayama, 1934c; Murayama, 1937; Cho, 1957; Lee and Cho, 1959; Ju, 1964; Ju, 1969; Choo et al., 1983; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 7ex., GG. Yongin-si, Giheung-gu Jung-dong, Mt. Seokseongsan, 29.viii.2007; 6ex., CN. Buyeo-gun, Buyeo-eup, 10.vii.2008; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 18.vii.2012; 2ex., GW,

Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 2.viii.2012; 1ex. JN, Sinan-gun Heuksan-myeon, Heuksan Is. 4.vi.2015.

Distribution. Korea (South), China, Japan, Taiwan, Nearctic Region (introduced), Oriental Region.

127 *Ambrosiodmus rubricollis* (Eichhoff, 1876) 붉은목나무좀 (Plate 9-127)

Xyleborus rubricollis Eichhoff, 1876: 202.

Xyleborus taboensis Schedl, 1952b: 65.

Xyleborus strohmeyeri Schedl, 1975a: 457.

Description.

Body 2.3 mm, reddish brown with slightly darken elytra, cylindrical, moderately covered with whitish hairs. Head with coarsely lined frons, thinly hairy and ciliate over mouth. Eyes elliptical and weakly emarginate behind antennal scrobe. Prothorax transverse, nearly quadrate, but with sides and apex separately rounded and antero-lateral angles weakly rounded; above gibbous and convex, dull and entirely scabrous, asperities slightly weaker posteriorly. Scutellum ligulate with slightly acute edge, shining, infusate. Elytra truncate and as wide as base of pronotum at base and one-half longer than pronotum, with weakly angulated humeral angles, sides almost straight but slightly widen to apex, which is rather abruptly and broadly rounded and clearly serrate with below. Surface with scarcely impressed regular striae of large shallow punctures except somewhat irregular punctures at base and long and thin pubescence, especially at apex, interstices finely punctured in regular single row. Declivity very convex, with first interstice slightly widened and all interstices finely tuberculate. Pubescences on interstices

more or less erected and clearly longer than those of striae. Procoxae contiguous, midcoxae moderately separated.

Korean Record. Murayama, 1934a; Murayama, 1936; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo et al., 1983a; Choo and Woo, 1985b; Choo et al., 1988b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 2ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri, 21.iv-17.v.2011; 13ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri, 21.iv-17.v.2011; 1ex., JJ, Jeju-si, Bonggae-dong, Seongpanak, 15.vii.2013; 6ex., JJ, Seoguipo-si, Namwon-eub, Sumang-ri, 21.v.2013; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 8ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2012; 3ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 18.vii.2012; 2ex., JN, Naju-si, 25.v.1981; 1ex., JN, Kwangju-si, 25.v.1981; 1ex., JN, Hwasun-gun, 25.v.1981.

Distribution. Korea (North, South), China, India, Japan, Taiwan, Australian Region (introduced), Italia (introduced), Nearctic Region (introduced), Oriental Region.

Genus *Ambrosiophilus* Hulcr & Cognato, 2009

Ambrosiophilus Hulcr & Cognato, 2009: 21 (Type species: *Xyleborus restrictus* Schedl, 1939)

Diagnosis.

Eyes shallowly emarginate, upper portion of eyes smaller than lower part. Antennal club more or less circular in shape, club type three (with first segment

straight or convex). First segment of club straight (may be slightly concave or convex) on anterior face, margin of the first segment mostly costate, may appear softer on posterior side. Second segment of club visible on both sides of the club, either soft and pubescent, or corneous on one side of the club, or corneous on both sides of club. Third segment of club clearly visible on both sides of the club. First segment of antennal funicle shorter than pedicel, funicle composed of 4 segments, scapus of regular shape (relatively robust and curved, not long and slender). Frons above epistoma mostly smooth, alutaceous, with minor punctures, or rugged, coarsely punctate. Submentum flat, flush with genae, or slightly impressed, narrow (shaped as a very narrow triangle). Anterior edge of pronotum with no conspicuous row of serrations (at most serrations that do not differ from those on the pronotal slope). Pronotal disc densely and evenly punctured, lateral edge of pronotum obliquely costate. Procoxae contiguous, prosternal posterocoxal process short, conical or flat, inconspicuous, or tall and pointed, or conical and slightly inflated. Tuft on pronotal basis associated with mesonotal mycangium absent, setae on elytral bases associated with elytral mycangium absent. Scutellum flat, flush with elytra. Elytral bases straight, with oblique edge, elytral disc longer than declivity, flat, elytral disc with distinct punctures in strial lines. Lateral profile of elytral declivity flat or rounded, sometimes steep or very steep. Dorsal profile of elytral apex rounded, often broadened laterally. In one species (*A. sexdentatus*) the declivity is excavated. Elytral declivity with few setae or scales, not conspicuously pubescent. Posterolateral costa ending on 7th interstriae. The inner part of declivity has no tubercles on interstria 1 (sutural), and several tubercles on interstriae 2, 3 and beyond. First interstriae are parallel (sometimes slightly broadened towards elytral summit). Protibiae with evenly rounded edge, or

obliquely triangular, broadest at 2/3 of the length. Posterior side of protibia flat, without tubercles (setae only). Protibial denticles large, distinctly longer than wide, bases of the denticles not enlarged or only slightly enlarged, usually between 6 and 8 protibial denticles present. Metatibiae of regular size. Body length between 2.4 and 3.2 mm. Mostly black, sometimes dark brown (Hulcr & Cognato, 2009).

128 *Ambrosiophilus atratus* Eichhoff, 1876 뽕나무좀 (Plate 9-128)

Xyleborus atratus Eichhoff, 1876: 201.

Description.

Body 2.7-2.8 mm, blackish brown except yellowish brown legs and antennae, elongated oval, cylindrical. Frons slightly flat with coarsely and shallowly impressed punctures and somewhat long hairs. Eyes elliptical and weakly emarginate behind upper area of antennal scrobe. Pronotum transverse, nearly semi-elliptical, weakly gibbous at sides, crenulate but without asperities on pronotal disc, basal angles roundly angulate and antero-lateral angles gently rounded. Scutellum ligulate, parallel-sided with round edge. Elytra parallel-sided, slightly wider and one-half longer than pronotum, with weakly angulated humeral angles, sides almost straight but slightly gibbous at middle. Elytral surface with regular striae of large shallow punctures, interstices finely punctured in regular single row. Declivity short, abruptly and shortly rounded, not carinate with below. First and second interstice on declivity slightly emarginate and all interstices finely tuberculate. Pubescences on interstices more or less erected and clearly longer than those of striae. Procoxae contiguous, midcoxae moderately separated. Male cylindrical, pronotum clearly wider than elytra, roundly emarginate anteriorly with

a big horn curved backwardly on anterior margin.

Korean Record. Murayama, 1930b; Murayama, 1936; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo et al., 1983b; Choo and Woo, 1985b; Choo et al., 1988b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 4ex., Seoul, Hongreung, 8.v.(No year); 2ex., GG, Yongin-si, Giheung-gu Jung-dong, Mt. Seokseongsan, 21-27.vii.2007; 1ex., CN, Buyeo-gun, Eunsan-myeon, 18.vii.2008; 167ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri, 21.iv-17.v.2011; 136ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri, 21.iv-17.v.2011; 1ex., GG, Pochensi, Soheul-eub, Kwangreung, 15.v.2012; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 1.v.2012; 7ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 8ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2012; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 18.vii.2012; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 2.viii.2012; 2ex., JJ, Seoguipo-si, Namwon-eub, Sumang-ri, 24.v.2013.

Distribution. Korea (North, South), China, Japan, Taiwan, Italia (introduced), Nearctic Region (introduced).

Genus *Anisandrus* Ferrari, 1867

Anisandrus Ferrari, 1867: 24 (Type species: *Apate dispar* Fabricius, 1792)

Diagnosis.

Species in this genus range from 1.8 to 3.7 mm in length and range from 2.0 to 2.3 times as long as wide. Their color ranges from dark brown to black. The

pronotum is wider than long, with semi-circular rows of asperities on the anterior half and a serrate anterior margin with 6 to 8 teeth, the middle 2 usually larger. There is a tuft of hair-like setae at the base in front of the scutellum. The scutellum is relatively large and flushed with the elytra. The elytral anterior margin has no asperities. The declivity is convex to concave and varies from unarmed to bearing small granules. The anterior margin of the compound eye is emarginate. The scape is proportionally longer than the 5-segmented funicle. The club is obliquely truncate, with two recurved sutures on its anterior face. They have a depressed preangular region. The anterior coxae are contiguous. This genus is different from *Cnestus* in having two sutures on the anterior side of the antennal club instead of three and from both genera by having contiguous procoxae.

Key to the species of Korean *Anisandrus*

1. Elytral declivity with a pair of spines at upper angle ----- *A. apicalis*
 - Elytral declivity without a pair of spines at upper angle ----- 2
 2. Body longer than 3mm, Eyes strongly emarginate ----- *A. dispar*
 - Body Shorter than 2.5mm, Eyes with small emargination ----- *A. maiche*

129 *Anisandrus apicalis* (Blandford, 1894) 사과등근나무좀 (Plate 9-129)

Xyleborus apicalis Blandford, 1894a: 105.

Xyleborus cristatus Hagedorn, 1908: 377 [HN].

Xyleborus fabricii Schedl, 1964d: 217 [RN]

Description.

Body 3 mm, Oblong, pitchy black with antennae and legs reddish testaceous.

Head finely reticulate, front with scattered strong punctures, thinly hairy, mouth ciliate. Prothorax transverse, truncate at base, basal angles obtusely rounded, sides and apex rounded, the latter more strongly and tuberculate surface with a median transverse elevation, anteriorly exasperate, posteriorly with fine scattered aciculate punctures, with long pubescence scattered at sides and apex, denser along basal margin. Scutellum triangular, piceous. Elytra rather narrower at base than greatest width of prothorax, and one-half longer, humeral angles obtuse, sides rounded from middle to apex, which is somewhat obtuse surface cylindrical at base, with rows of punctures, very fine at base becoming strong about middle, interstices with an irregular series, usually double, of finer setigerous punctures, apical declivity convex, strong but not abrupt, not acutely carinate below, impressed on either side of suture and margined by the elevated and finely tuberculate 3rd interstice, 2nd interstice with a short obtuse spine at upper angle of declivity, hairs long, especially towards apex (Blandford, 1894a).

Korean Record. Murayama, 1930b; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., GG, Pochensi, Soheul-eub, Kwangreung, 15.v.2012; 2ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 22.iii-21.iv.2011; 2ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 22.iii-21.iv.2011; 5ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 21.iv-17.v.2011; 175ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 1.v.2012; 779ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 121ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2012; 5ex., GW, Jeongseon-gun,

Jeongseon-eub, Mt. Gariwangsan, 18.vii.2012; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 16.viii.2012; 6ex., GW, Wonju-si, Sinrim-myeon, Hwangdun-ri, 30.iii-14.iv.2016.

Distribution. Korea(North, South), Bhutan, China, India, Japan, Russia(Far East), Taiwan, Oriental Region.

130 *Anisandrus dispar* (Fabricius, 1792) 활엽수큰나무질나무좀 (Plate 9-130)

Apate dispar Fabricius, 1792: 363.

Bostrichus thoracicus Panzer, 1796: 18.

Bostrichus brevis Panzer, 1796: 20.

Scolytus pyri Peck, 1817: 207.

Bostrichus ratzeburgii Kolenati, 1846: 39.

Bostrichus tachygraphus C.R.Sahlberg, 1863b: 152.

Anisandrus aequalis Reitter, 1913b: 81.

Anisandrus swaini Drake, 1921: 203.

Xyleborus rugulosus Eggers, 1922a: 17.

Xyleborus ceraxi Eggers, 1937: 335.

Xyleborus Khinganensis Murayama, 1943: 100.

Description.

Body 3.3 mm, oblong, pitchy brown with yellowish testaceous antennae and legs. Head finely reticulate, frons with regularly scattered shallow punctures, thinly hairy, mouth ciliate, rostrum with an indistinct elevated shining median line. Eyes elliptical and strongly emarginate behind upper area of antennal scrobe. Prothorax slightly darker than elytra, semi-elliptical, truncate at base, basal angles obtusely

rounded, sides slightly narrowing anteriorly, apex rounded, the latter more strongly and crenulate until a median transverse elevation, thence regularly punctate without crenation, Long pubescence scattered at sides and apex, somewhat short pubescences on disc, anteriorly decumbent pubescences dense at basal margin. Scutellum semi-globose, smooth. Elytra as wide as greatest width of prothorax, and one-half longer, humeral angles obtuse, sides parallel and rounded from middle of declivity to apex. Striae clearly visible, somewhat small at base becoming strong about middle, interstices with setigerous punctures uniseriately, declivity somewhat flat, slightly edged but not carinate with below, minutely tuberculate on interstice.

Korean Record. Ju, 1964; Ju, 1969; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North, South), China, Iran, Japan, Kazakhstan, Mongolia, Russia, Turkey, Europe, Nearctic Region (introduced), Oriental Region.

131 *Anisandrus maiche* Stark, 1936 활엽수작은나무질나무좀 (Plate 9-131)

Anisandrus maiche Stark, 1936: 142.

Xyleborus maiche Eggers, 1942: 36.

Description.

Body 2.1 mm, Oblong, dark brown with yellowish testaceous antennae and legs. Head finely reticulate, frons with regularly scattered very shallow punctures, thinly hairy, short rostrum ciliate. Eyes elliptical with small emargination behind upper

area of antennal scrobe. Prothorax globose, truncate at base, basal angles weakly edged, anterior margin rounded with 6~10 crenations. Pronotum gibbous and crenulate until middle thence smooth and regularly punctate without crenation, Long pubescence bundle arise at basal area triangularly. Scutellum triangular, smooth with obtuse edge. Elytra as wide as greatest width of prothorax, and one-half longer, humeral angles obtuse, sides parallel and widely narrowing posteriorly from beginning of declivity to apex. Striae small but clearly visible, interstices with minute setigerous punctures uniseriately, declivity somewhat flat with short and unclear carination with below, minutely tuberculate on interstice. Procoxae contiguous and midcoxae slightly separated.

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., Seoul, Gangbuk-gu, Suyu-dong, Mt. Bukhansan, 5.vi.2012; 1ex., GG, Pocheonsi, Kwangreung, 13.xi.1981; 1ex., Seoul, Dongdaemun-gu, Hongreung, 27.vi.1990; 1ex., Seoul, Dongdaemun-gu, Hongreung, 20.vii.1990; 1ex., GG, Anyang-si, Manan-gu, Kwanag Aboretum, 28.vi-14.vii.2008; 2ex., GG, Anyang-si, Manan-gu, Kwanag Aboretum, 15.vii-25.vii.2008; 1ex., GG, Yongin-si, Suji-gu, Mt Kwanggyosan, 28.vi-14.vii.2008; 1ex., GG, Pochensi, Soheul-eub, Kwangreung, 2.vii.2012; 2ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vii.2012; 16ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 18.vii.2012; 9ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 2.viii.2012; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 16.viii.2012.

Distribution. Korea (North, South), China, Russia (East Siberia, Far East), Nearctic Region (introduced), Ukraine.

Genus *Cnestus* Sampson, 1911

Cnestus Sampson, 1911: 383 (Type species *Cnestus magnus* Sampson, 1911)

Tosaxyloborus Murayama, 1950a: 49 (Type species: *Tosaxyloborus pallidipennis* Murayama, 1950 = *Cnestus murayamai* Schedl, 1962)

Diagnosis.

Cnestus can be distinguished from *Xylosandrus* Samson by the subcontiguous procoxae and by the more broad declivity which covers most of the elytra. The elytra are only slightly longer than the pronotum. Bulky to globular appearance. Pronotum as large as abdomen or larger. Antennae type 1, truncated and flattened, scapus appears slender. Pronotum with mycangial tuft, with lateral carina. Similar to *Xylosandrus*, but procoxae contiguous and pronotum carinate laterally. Similar to *Diuncus* but black or black with white patches on elytra, pronotum carinate, mycangial tuft present. Similar to *Hadrodemius*, but scutellum present (Hulcr & Cognato, 2013).

Key to the species of Korean *Cnestus*

1. Elytra with a pair of big pale patches from base, declivity round, not truncate
----- *C. murayamai*
- Elytra concolorous, shortly and abruptly truncate ----- *C. mutilatus*

132 *Cnestus murayamai* Schedl, 1962 민나무좀 (Plate 9-132)

Cnestus murayamai Schedl, 1962c: 207.

Tosaxyloborus pallidipennis Murayama, 1950a: 49. (nom. praeocc.)

Cnestus murayamai: Browne, 1963, 54. [Rename]

Description.

Body 2.1 mm, oblong, shining, reddish brown, eyes black, basal half of prothorax and scutellum darker and elytra paler. Head finely reticulate; frons feebly impressed at middle, microscopically punctured and minutely setigerous, strongly shining at posterior half, mouth-ciliae rather long. Eyes large, slightly emarginate at anterior margin. Antennae almost similar to those of female, but clubs somewhat smaller. Prothorax longer than wide, apical side strongly projected, reflexed, sharply edged and somewhat bisinuous, lateral margins nearly parallel in basal half and slightly narrowing in anterior half, basal margin truncate, almost straight, basal corners rounded; disk strongly convex, anterior half declivous, with a strong oval impression at frontal portion, the impression with a key-hole-like flattened area at middle, ground surface of the impression sparsely and finely punctured, moderately covered with fine and decumbent setae, the punctures denser and stronger laterally, basal half of disk finely reticulate and strongly punctured, the punctures sparser at lateral sides, denser and larger at middle, except an oblong smooth part of median line, longer setae situated at lateral and anterior parts, not forming a patch of setae before scutellum. Scutellum nearly semicircular; upper surface slightly elevated and smooth. Elytra longer than wide, slightly narrower than base of prothorax, lateral margins somewhat rounded, widest at middle and thence strongly rounded at apical third, apex gently rounded; dorsum remarkably convex, declivity beginning at about one-third of elytral length, gradually and roundly declivous, 1st striate punctures somewhat sparser in male than those in female, apex of elytra not rough, other points almost the same as female on elytra.

Korean Record. Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 3ex. JN, Sinan-gun Heuksan-myeon, Heuksan Is. 4.vi.2015.

Distribution. Korea (South), Japan, Taiwan.

Remarks. Although Choo and Woo (1985b) recorded this species with two specimens which had been collected from Kwangreung, but it was a mis-identification of other species. So, it is unclear whether *Quercus aliena* is a host of this species. This species would not occur in main land of Korea, and might only occur in southern Island area.

133 *Cnestus mutilatus* (Blandford, 1894) 왕녹나무좀 (Plate 9-133)

Xyleborus mutilatus Blandford, 1894a: 103.

Xyleborus sampsoni Eggers, 1930b: 184.

Xyleborus banjoewangi Schedl, 1939a: 41.

Xyleborus taitonus Eggers, 1939b: 118.

Description.

Body Length. 3.5 mm, black, with the base of the elytra alone shining, covered with fine erect fuscous hairs. Head large, prominent finely reticulate, front convex, punctured, and hairy; mouth ciliate with yellow pubescence; eyes small, flat, finely emarginate; antennae ferruginous, club round, basal joint large, shining, reaching nearly to apex of club. Prothorax a little longer than broad, its base bisinuate, produced behind, basal angles nearly rectangular, sides straight and subparallel behind, becoming more rounded in front with apex broadly convex apical margin

bisinate, slightly produced in middle and armed with two prominent tubercles; surface very convex, cylindrical at base, with an obtuse transverse elevation in middle, in front of which it is declivous to apex anteriorly separate and pilose, posteriorly densely punctured except over two shining alateral impressions, with thin pubescence at sides and a dens patch before scutellum, which is large, shining, and rounded. Elytra as wide but not as long as prothorax, basal borders feebly convex, shoulders narrowly elevated; at first cylindrical, then obliquely declivous from basal fourth to apex, shining and irregularly punctured, the punctures rugose and confluent along basal margin; apical declivity rounded oval with a sharp raised margin to sides and lower border, its surface subconvex, pilose, with impunctate striae, interstices closely granulate; lateral border of elytra declivous, parallel throughout to margin of apical declivity. Underside black, thinly pubescent, anterior coxae separated by a narrow prosternal process. Legs ferruginous, tibiae strongly dilated and obsolete spined; tarsi short, their first three joints compressed, and pilose beneath (Blandford, 1894a).

Korean Record. Murayama, 1930b; Murayama, 1931; Murayama, 1937; Cho, 1957; Cho, 1963; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 41ex., GG, Pochensi, Soheul-eub, Kwangreung, 12.vi.2012; 64ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vii.2012; 58ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 18.vii.2012; 2ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 2.viii.2012; 6ex., GB, Cheongdo-gun, Unmun-myeon, Mt. Unmunsan, 1.vii.2015.

Distribution. Korea (South), China, Japan, Taiwan, Australian Region, Nearctic

Region (introduced), Oriental Region.

Genus *Cyclorhipidion* Hagedorn, 1912

Cyclorhipidion Hagedorn, 1912c: 355 (Type species: *Cyclorhipidion pelliculosum* Hagedorn, 1912 = *Xyleborus perlaetus* Schedl, 1960)

Kelantanius Nunberg, 1951: 621 (Type species: *Xyleborus punctatopilosus* Schedl, 1936)

Terminalinus Hopkins, 1915a: 57 (Type species: *Terminalinus terminaliae* Hopkins, 1915)

Diagnosis.

Robust, hairy. Antennal club pubescent, type three, four or five. Femora often appear large. Elytral end mostly rounded and elytral declivity with many pubescences in most species. Some species are concave longitudinally at 1-2 interstices on declivity. They are similar to *Coptodryas*, but elytral mycangia absent. Punctures on elytral disc minute, confused in most species. There are several tubercles on declivity or apical margin of elytra. Type species clarified in Hulcr (2010b), and Hulcr and Cognato (2013) wrote *C. multipunctatum* is a typical representative of the genus. But, *C. multipunctatum*. is quite different with the type species, *C. pelliculosum* in this genus. This genus needs more studies on the morphological and genetical studies.

Key to the species of Korean *Cyclorhipidion*

1. Elytral declivity deeply emarginate longitudinally in first two interstices ----- 2
- Elytral declivity truncate, not emarginate ----- 3

2. Body shorter than 2.5mm, declivity with pointed tubercles on third interval
 ----- *C. japonicum*
- Body longer than 2.5mm, declivity with blunt tubercles on third interval
 ----- *C. laetum*
3. Elytral declivity with somewhat big tubercles on 1st and 3rd intervals, two
 pairs of tubercles at posterior margin ----- *C. pseudopelliculosum*
- Elytral declivity with small tubercles almost same size ----- 4
4. Body shorter than 2.5mm, pronotum much longer than wide ----- *C. bodoanum*
- Body longer than 2.5mm, pronotum slightly longer than wide --- *C. pelliculosum*

134 *Cyclorhipidion bodoanum* (Reitter, 1913) 떡갈나무질나무좀 (Plate 10-134)

Xyleborus bodoanus Reitter, 1913b: 82.

Xyleborus punctulatus Kurentsov, 1948: 52.

Xyleborus californicus Wood, 1975: 399.

Xyleborus misatoensis Nobuchi, 1981a: 146. **syn. nov.**

Description.

Body 1.8-1.9mm, oblong, about 2.8 times as long as wide, yellowish brown; eyes, mandibles, elytra and anterior part of pronotum dark brown. Frons slightly convex, minutely reticulate, sparsely covered with fine granules, covered with hairs; mouse ciliate somewhat long. Pronotum shining, about 1.3 times as long as wide; base truncate, slightly rounded at basal angles, lateral sides widest in middle, slightly narrowing posteriorly, roundly narrowing anteriorly; anterior margin broadly rounded, minutely crenulate; disc with a weak transverse elevation before middle, rather slowly declivous in anterior half. Posterior portion behind asperate area

cylindrical, minutely reticulate, very finely punctured; vestiture very fine, hair-like. Scutellum shining, semi-globose. Elytra shining, 1.6 times as long as wide, as wide as pronotum, lateral sides nearly parallel in basal two thirds of elytra, then weakly narrowing posteriorly; apical margin moderately rounded. Striae not impressed with uniserial, small, round punctures, each punctures with a very fine decumbent hair; interstices with irregular one or two rows of minute punctures. Interstitial setae rather long hair-like. Declivity somewhat rapidly slanting down, weakly convex; strial punctures slightly bigger than those on disc; some fine granules on declivity and several somewhat bigger granules at posterior margins; several minute granules on blunt carination below. Procoxae contiguous and midcoxae slightly separated.

Korean Record. Ju, 1964; Ju, 1969; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., GG, Goyang-si, Seongseok-don, Mt. Gobongsan, 29.iv.2007; 1ex., GG, Yangpyeong-gun, Yongmun-eub, Mt. Yongmunsan, 1-26.v.2009; 1ex., GG, Yangpyeong-gun, Yongmun-eub, Mt. Yongmunsan, 27.v-10.vi.2009; 5exs., GG, Pochensi, Soheul-eub, Kwangreung, 16.vii.2012; 9ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 21.iv-17.v.2011; 67ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 21.iv-17.v.2011; 2ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 3ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vii.2012; 3ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 19.vi.2012; 2ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 2.vii.2012; 1ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 17.vii.2012; 6ex., GB, Cheongdo-gun, Unmun-myeon, Mt. Unmunsan, 1.vii.2015; 1ex., Wakayama, Japan, 2.viii.1979 M. Kaimochi leg(Holotype of *X. misatoensis*) in Nobuchi Collection.

Distribution. Korea(North, South), China(North East), Russia(Far East), Europe(introduced), Nearctic Region(introduced).

Remarks. As a result of the examination of the holotype of *X. misatoensis* deposited in museum of NIAST, Japan, *X. misatoensis* is synonymized with this species. It was not compared to the type specimens of *C. bodoanum*, but compared to the specimens having same DNA sequences with this species on NCBI.

135 *Cyclorhipidion japonicum* (Nobuchi, 1981) 작은골잔빨나무좀(신칭) **comb. nov.** (Plate 10-135, Fig. 12)

Xyleborus japonicus Nobuchi, 1981b: 150.

Description.

Body 1.8-2.0 mm, oblong, about 3.0 times as long as wide, yellowish brown; eyes black; apical part of pronotum and elytra reddish brown. Frons shining, convex, with a weak longitudinal elevation in middle, minutely reticulate, shallowly punctured above, setigerous and finely granulate below, the granules denser on antero-lateral sides. Vertex finely reticulate, glabrous. Pronotum shining, about 1.3 times as long as wide; base truncate; basal angles rounded; lateral sides somewhat ridged in basal half, widest in middle, slightly narrowing anteriorly and posteriorly, roundly connected with anterior margin; anterior margin narrowly rounded, finely crenulate; disc nearly cylindrical, gently declivous before middle, without transverse elevation finely asperate on slanting area, the asperation larger and wider anteriorly and laterally; the posterior part behind asperate area strongly shining, distinctly punctured, the punctures closer laterally; vestiture sparse, fine,

hair-like, but becoming longer and closer on apical and lateral sides. Scutellum shining, rather large, nearly semicircular. Elytra shining, about 1.7 times as long as wide, nearly as wide as base of pronotum at base; lateral sides nearly parallel to basal two-thirds, then roundly narrowing, forming strongly rounded postero-lateral angles; apical margin very slightly rounded, not carinate below; disc cylindrical before declivity; striae not impressed; striae punctures very large and close, becoming smaller and sparser on base and before declivity, with a fine hair like seta; interstriae not or slightly elevated, nearly as wide as striae in middle, the punctures fine, usually uniseriate, but irregular on base and before declivity, bearing a hair-like seta. Declivity gently, deeply impressed elliptically along suture for posterior third of elytra, the impression shining, finely setigerous, with elevated callose sides; first and second striae distinctly punctured as on disc; first interstriae narrowly elevated along suture, the second rather wide, dilated in middle, irregularly covered with indistinct punctures, the third with three small conical tubercles; inferior and lateral sides of the declivity sparsely granulate, rather closely covered with uniform and long setae (Nobuchi, 1981b).

Korean Record. New to Korea.

Specimens examined. 1ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 30.v.2012; 2ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 19.vi.2012; 1ex., GG, Anyang-si, Manan-gu, Kwanag Aboretum, 31.v-13.vi.2008; 3ex., GG, Yongin-si, Suji-gu, Mt Kwanggyosan, 28.vi-14.vii.2008; 1ex., GG, Paju-si, 15.vi.2012; 3ex., GG, Pochensi, Soheul-eub, Kwangreung, 2.vii.2012; 1ex., GB, Cheongdo-gun, Unmun-myeon, Mt. Unmunsan, 1.vii.2015.

Distribution. Korea (South), Japan.

136 *Cyclorhipidion laetum* (Niisima, 1909) 큰골잔뿔나무좀 **comb. nov.** (Plate 10-136)

Xyleborus laetus Niisima, 1909: 159.

Description.

Body Length. 2.6-2.9 mm, oblong, about 2.9 times as long as wide, reddish brown; mandibles and eyes black. Frons shining, convex, with an indistinct longitudinal elevation in middle, minutely reticulate, finely granulate, shallowly punctured above, finely setigerous, the granules denser and larger on lateral sides. Vertex finely reticulate, glabrous. Pronotum shining, about 1.2 times as long as wide; base truncate, not or slightly rounded; basal angles rounded; lateral sides somewhat ridged in basal half, widest behind middle, slightly narrowing towards base, gradually roundly narrowing anteriorly, roundly connected with anterior margin, not forming distinct antero-lateral angles; anterior margin narrowly rounded, finely crenulate; disc nearly cylindrical, gently slanting anteriorly before middle, without transverse elevation, finely asperate on slanting area, the asperation becoming larger and wider anteriorly and laterally; posterior part behind asperate area shining, distinctly punctured, the punctures denser towards lateral sides; vestiture sparse, fine, hair-like, becoming longer and closer on apical and lateral margins. Scutellum shining, rather large, nearly semicircular. Elytra shining, about 1.6 times as long as wide, nearly as wide as base of pronotum at base; lateral sides not or slightly widened in basal two-thirds of elytral length, then gradually roundly narrowing; postero-lateral angles strongly rounded; apical margin very slightly rounded, not carinate below; disc nearly cylindrical before declivity; striae not impressed, first and second striae outcurved from basal fourth; strial punctures

large and dense, becoming smaller and sparser on base and before declivity, bearing a hair-like seta; interstriae nearly flattened, distinctly wider than striae, first interstriae distinctly narrowing anteriorly; interstitial punctures rather large and close, irregularly seriate, bearing a hair-like seta. Declivity abrupt, deeply impressed on first to second or third interstriae, the impression rather shining, narrow pear-shaped, sparsely but distinctly setigerous, with strongly elevated calose sides; first and second striae with distinct punctures in a row on the impression, the third impressed, distinctly, vanished on apical part; first interstriae weakly elevated along suture, with a row of setigerous fine granules, the second elevated externally with the third, irregularly granulate and setigerous, the third elevated in upper third, with some black pointed tubercles in a row, the base of tubercles somewhat raised; lateral sides and inferior margin minutely granulate, with irregular long setae.

Korean Record. New to Korea.

Specimens examined. 1ex., GW, Hoengseong-gun, Gonggeun-myeon, 24.v.1993; 2ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri, 21.iv-17.v.2011; 3ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri, 21.iv-17.v.2011; 4exs., GW, Chuncheon-si, Dong-myeon, Janghak-ri, 17.v-14.vi.2011.

Distribution. Korea (South), Japan.

137 *Cyclorhipidion pelliculosum* (Eichhoff, 1878) 청량리나무좀 (Plate 10-137, Fig. 12)

Xyleborus pelliculosus Eichhoff, 1878a: 392 [=1878b: 336].

Xyleborus quercus Kurentsov, 1948: 51 [nom. praeocc.].

Xyleborus seiryorensis Murayama, 1930: 21.

Xyleborus starki Nunberg, 1956: 209 [RN].

Description.

Body 3.1 mm, oblong, about 2.8 times as long as wide, reddish brown to dark brown, except antennae, and legs yellowish brown. Frons slightly convex, minutely reticulate, sparsely covered with fine granules, covered with hairs; mouse ciliate somewhat long. Pronotum shining, about 1.3 times as long as wide; base truncate, slightly rounded at basal angles, lateral sides parallel, roundly narrowing anteriorly; anterior margin broadly rounded, minutely crenulate; disc with a weak longitudinal glabrous line. Posterior portion behind middle cylindrical, minutely reticulate, very finely punctured; vestiture very fine, hair-like. Scutellum shining, ligulate. Elytra shining, 1.6 times as long as wide, as wide as pronotum, lateral sides nearly parallel in basal three fourths of elytra, then strongly narrowing posteriorly; apical margin moderately rounded. Striae not impressed with uniserial, small, round punctures, each punctures with a very fine decumbent hair; interstices with irregular two or three rows of minute punctures. Interstrial setae rather long hair-like. Declivity somewhat rapidly slanting down, almost flat; strial punctures bigger than those on disc; some fine granules on declivity and several granules at posterior margins; several minute granules on blunt carination below. Procoxae contiguous and midcoxae slightly separated.

Korean Record. Murayama, 1930b; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; Choo et al., 1988b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., GG, Pocheon-si, Soheul-eub, Kwnagreung, 15.v.2012;

1ex., GW, Inje-gun, Girin-myeon, Mt. Jeonbongsan, 2-22.vi.2011; 1ex., GW, Inje-gun, Namjeon-ri, Wonnam-ro, 27.v-12.vi.2011; 8ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 22.iii-21.iv.2011; 56ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 22.iii-21.iv.2011; 42ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 21.iv-17.v.2011; 162ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 21.iv-17.v.2011; 107ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 1.v.2012; 640ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 258ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2012; 1ex., CB, Cheongwon-gun, Cheongwon-myeon, Miwon-ri, 7-13.vi.2008.

Distribution. Korea (North, South), China, Japan, Russia (Far East), Nearctic Region (introduced).

138 *Cyclorhipidion pseudopelliculosum* sp. nov. 콩지네뿔나무좀 (Plate 10-138, Fig. 12)

Description.

Body 2.5-2.7 mm, oblong, about 2.6 times as long as wide, reddish brown; mandibles and eyes black; elytra slightly darkened. Frons shining, moderately convex, with a short longitudinal groove on upper portion, minutely reticulate, sparsely punctured above, finely and closely granulate below; vestiture sparse, rather long; mouth-ciliae very dense, long. Pronotum shining, about 1.2 times as long as wide; base somewhat roundly truncate; basal angles rounded; lateral sides widest in anterior angle, weakly narrowing posteriorly, anterior margin broadly rounded; disc with a short transverse elevation before middle, gently slanting and nearly concentrically asperate before the elevation, the asperation becoming larger towards apex; posterior area behind the elevation closely covered with

comparatively large, shallow punctures, finely reticulate; vestiture short, becoming longer towards apical and lateral sides. Scutellum shining, rather large, triangular. Elytra shining, about 1.5 times as long as wide, nearly as wide as base of pronotum at base; lateral sides slightly dilated to basal two-thirds of elytral length, then roundly narrowing posteriorly, not forming postero-lateral angles; apical margin rather narrowly rounded, not carinate; disc cylindrical in basal five-sevenths, then declivous; striae not impressed, with rather small uniserial punctures, with are separated by a distance nearly as wide as their own diameters, each striae punctures with a fine, semi-decumbent, hair-like seta; interstriae nearly three times as wide as striae, almost flat, with irregular two or three rows of setigerous punctures, which are rather large, not or slightly smaller than striae punctures, first interstriae narrowing anteriorly; interstitial setae rather long, hair-like, not uniform in size, becoming longer towards declivity and lateral sides. Declivity shining, abrupt, nearly circularly flattened, elevated on lateral and inferior sides, striae punctures as large as and somewhat closer than those on disc; interstriae with somewhat big tubercles, first interstriae with two or three obtuse tubercles, second without tubercle, third with one or two tubercles; inferior margin with four pairs of tubercles, of which median two pairs somewhat big and blunt.

Korean Record. New to Korea.

Specimens examined. Holotype, 1ex., GG, Gunpo-si, Hosu-ro, Mt. Surisan, 24.iii-14.iv.2016; Paratypes: 1ex., GG, Pocheon-si, Soheul-eub, Kwnagreung, 15.v.2012; 14exs., GG, Gunpo-si, Hosu-ro, Mt. Surisan, 24.iii-14.iv.2016.

Distribution. Korea (South).

Etymology. This species allied to *C. pelliculosum* in external characters and closely

combined in the Neighbor-joining tree of DNA barcodes sequences with the latter.

Genus *Debus* Hulcr & Cognato, 2010

Debus Hulcr & Cognato, 2010a; 13. (Type species: *Xyleborus emarginatus* Eichhoff)

Diagnosis.

Pronotal disc is elongated and flat. Tibiae are slender and triangular with few, but large and long denticles. Prosternal posterocoxal process is inflated. Elytral declivity is rarely flat, mostly excavated and emarginate, surrounded by elevated sulcus and tubercles or teeth, first interstriae broadened to displace strial punctures laterally (Hulcr and Cognato, 2013).

139 *Debus defensus* (Blandford, 1894) 목련나무좀 (Plate 10-139)

Xyleborus defensus Blandford, 1894a: 118. (Type locality: Japan-Sapporo)

Description.

Body 2.9 mm, elongate, cylindrical, reddish brown. Mandibles, elytra, sternites darker than other area. Frons minutely reticulate, sparsely and minutely tuberculate with an short obscure swelling longitudinally between eyes. Vertex glabrous horizontally along anterior margin of pronotum. Pronotum 1.3 times as long as wide, parallel-sided from base to middle, then gently arched anteriorly. Anterior half covered with small decumbent crenations and basal half regularly punctate. Scutellum ligulate and gently arched at apex. Pronotum gradually darker from base to apex, parallel sided, 1.6 times as long as wide. Striae clear, slightly curved

outwardly. Declivity glabrous, longitudinally impressed without punctures, gibbous along outline with two pairs of big projections and several small tubercles. posterior margin of elytra widely emarginate. Anterior coxae contiguous.

Korean Record. Choo et al., 1988b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 4ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 55ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2012; 2ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 23.v.2012; 57ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 5.vi.2012; 51ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 19.vi.2012; 2ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 2.vii.2012; 16ex., GG, Paju-si, 30.v.2012; 80ex., GG, Paju-si, 15.vi.2012; 44ex., GG, Paju-si, 28.vi.2012; 1ex., GB, Cheongdo-gun, Unmun-myeon, Mt. Unmunsan, 6.vi-18.vi.2008.

Distribution. Korea (South), Japan.

Genus *Euwallacea* Hopkins, 1915

Euwallacea Hopkins, 1915a: 54 (Type species: *Xyleborus wallacei* Blandford, 1896)

Diagnosis.

Robust, dark-colored. Pronotum tall, usually with inflated anterolateral corners, subquadrate in dorsal profile. Elytral declivity slowly descending, broadened laterally. Antennal club approximately circular, obliquely truncated, segment 2 visible on posterior side or with segment 1 straight or convex. Large species with scapus longer than pedicel and triangular narrow protibia with <6 denticles. Large

species similar to *Fortiborus*, except segment 1 of antennal club concave anteriorly, covering nearly all posterior face of club (not convex anteriorly); antennal club rounded or taller than wide (several *Fortiborus* have antennal club broader than long); anterior pronotal edge not elevated, lacking row of serrations; protibiae triangular, with 6 or fewer denticles, protibial spur present (a single denticle positioned proximal to body, separated from other equidistant denticles). Similar to *Wallacelus* except body mostly more robust, protibiae in large species triangular, with 6 or fewer denticles; sockets of tibial denticles slightly enlarged, first interstriae not divergent at elytral apex. Size variable, 2.8-5.7 mm. Color uniform, brown to black (Hulcr and Cognato, 2013).

140 *Euwallacea validus* (Eichhoff, 1876) 가문비왕나무좀 (Plate 10-140)

Xyleborus validus Eichhoff, 1876: 202.

Description.

Body 3.4-4.0mm, dark brown to blackish brown. Frons convex, with sparse circular punctures and long hairs. Pronotum as wide as long, roundly arched, quadrate. Anterior part of pronotum roughly asperate, posterior part shining and glabrous. Scutellum triangle. Elytra as wide as pronotum, widened at middle, gradually sloped posteriorly, striae weakly impressed, punctures small. Interstices wide, slightly convex with setigerous tubercles, tubercles on declivity more clear and distinct. Postero-lateral margin strongly edged.

Korean Record. Murayama, 1937; Cho, 1957; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 24ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri, 21.iv-17.v.2011; 77ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri, 21.iv-17.v.2011; 3ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 5ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2012; 9ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 18.vii.2012; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 2.viii.2012; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 11.ix.2012; 7ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 23.v.2012; 2ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 5.vi.2012; 2ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 19.vi.2012; 2ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 2.vii.2012.

Distribution. Korea(South), China, Japan, Taiwan, Nearctic Region(introduced), Oriental Region.

Genus *Microperus* Wood, 1980

Microperus Wood, 1980: 94 (Type species: *Xyleborus theae* Eggers, 1940 = *Xyleborus diversicolor* Eggers, 1923)

Diagnosis.

Minute, variously colored and hairy. Elytral mycangia accompanied with costate and curved elytral bases, and dense tufts on elytral bases. Scutellum absent. Larger species similar to *Coptodryas*, but punctures on elytral disc in rows, antennal club obliquely truncated, segment 2 partly visible on posterior side or segment 1 straight or convex, much smaller and more slender (Hulcr and Cognato, 2013).

141 *Microperus kadoyamaensis* (Murayama, 1934) 활엽수나무좀 (Plate 10-141)

Xyleborus kadoyamaensis Murayama, 1934b: 290.

Korean Record. Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (South), Japan, Taiwan.

Genus *Xyleborinus* Reitter, 1913

Xyleborinus Reitter, 1913b: 83 (Type species: *Bostrichus saxesenii* Ratzeburg, 1837)

Diagnosis.

The length of females in this genus ranges from 1.4 to 3.5 mm, and they are 2.6 to 3.0 times as long as wide. The males are dwarfed and flightless. Their color is dark brown. The pronotum is usually longer than wide. The scutellum is conical, does not fit in the scutellar notch, and is surrounded by distinctive short tuft of hairs. The declivity can either be concave, flat, or convex and is armed by a varying number of interstrial tubercles or rarely spines. The anterior margin of the compound eye is emarginate. The scape length in proportion to the funicle is variable and is 5-segmented. The club is obliquely truncate with none to two recurved sutures on its posterior face. They have a depressed preular region. The procoxae are contiguous, if apparently narrowly separated, the intercoxal piece conspicuously notched longitudinally. *Xyleborinus* is distinguished from *Xyleborus* Eichhoff by the conical scutellum that does not fit into the sutural notch and is

surrounded by a conspicuous pubescence.

Key to the species of Korean *Xyleborinus*

1. Elytral declivity deeply emarginate longitudinally in first two interstices without tubercles ----- 2
- Elytral declivity obliquely truncated with several tubercles on 1st intervals ---- 3
2. Body reddish brown. Elytral declivity strongly constricted posteriorly, two or three pairs of spines on third intervals much strong and acute ----- *X. octiesdentatus*
- Body dark brown. Elytral declivity weakly constricted posteriorly, two pairs of spines on third intervals slightly bigger and blunt ----- *X. kwangreungensis*
3. Body shorter than 2.5mm, pronotum much longer than wide ----- *X. saxesenii*
- Body longer than 2.5mm, pronotum slightly longer than wide ----- *X. attenuatus*

142 *Xyleborinus attenuatus* (Bladford, 1894) 가는빛나무좀 (Plate 10-142)

Xyleborus attenuatus Blandford, 1894a: 114.

Xyleborus alni Niisima, 1909: 160.

Description.

Body Length. 2.6 mm, elongate and evidently narrowed, especially towards the apex of the elytra, and is furnished throughout, including the posterior half of the prothorax, with short upstanding hairs; thoracic tubercle more elevated, the surface behind less shining, more evidently and closely punctured; elytral punctures stronger and rather closer, 2nd interstice more deeply impressed at apex, and the tuberculation stronger; third stia also somewhat impressed. From *X. saxesenii* it

can be distinguished by its larger size, the distinct and regular rows of punctures on the elytra, and the wider space between the two inner rows of tubercles on the apex, which is distinctly punctured in the line of the two first striae.

Korean Record. Murayama, 1930b; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; Choo et al., 1988b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 370ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 22.iii-21.iv.2011; 75ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 22.iii-21.iv.2011; 41ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 21.iv-17.v.2011; 12ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 21.iv-17.v.2011; 162ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 1.v.2012; 132ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2012.

Distribution. Korea(South), Japan, Russia(Far East), Taiwan, Europe(introduced), Nearctic Region (introduced).

143 *Xyleborinus kwangreungensis* **sp. nov.** 민들흠길쭉나무좀(신칭) (Plate 10-143, Fig. 13)

Description.

Body 2.7-2.9mm, blackish brown except yellowish brown antennae and legs, elongate, cylindrical, covered with short yellowish pubescences. Frons minutely reticulate, with sparse pubescences. Pronotum longer than wide, parallel-sided from base to middle, then gently arched anteriorly. Anterior half of pronotum semicircular with aspirations, then glabrous, minutely punctate. Scutellum conical,

surrounded with somewhat long hairs. Elytra cylindrical, parallel-sided basal three fourth, then gently arched. Striae clearly punctate with short hairs, intervals with somewhat long and uniserrate hairs. Hairs on declivital intervals slightly longer than others. Declivity obliquely slanted down with some processes. Two processes on third intervals quite bigger than others. First two intervals on declivity glabrous, longitudinally depressed without process.

Korean Record. New to Korea.

Specimens examined. Holotype; GG. Pocheon-si, Soheul-eub, Kwangreung, 15.v.2012; Paratypes: 1ex., GG. Pocheon-si, Soheul-eub, Kwangreung, 15.v.2012; 3exs., GG. Pocheon-si, Soheul-eub, Kwangreung, 15.i.1983.

Distribution. Korea (South).

Remarks. This species allied to *X. attenuatus*, *X. octiesdentatus* and *X. schauffussi*, but easily distinguished to other species as followed characters: first and second interstices on declivity depressed longitudinally without tubercles, the tubercles on third interstice almost same sized and arranged slightly incurved to posterior margin. *X. attenuatus* have several tubercles on first interstice of declivity, *X. octiesdentatus* have two especially big spine on third interstice, and the tubercles on third interstice of *X. schauffussi* are placed almost parallel-sided to elytral suture.

Etymology. The species is named in recognition of the type locality.

144 *Xyleborinus octiesdentatus* (Murayama, 1931) 서어나무좀 (Plate 10-144)

Xyleborus octiesdentatus Murayama, 1931: 46 (Type Locality: Korea - Jeju Is.).

Description.

Body 2.6 mm, reddish brown except yellowish brown antennae and legs, elongate, cylindrical, covered with short yellowish pubescences. Frons minutely reticulate, with sparse pubescences. Pronotum longer than wide, parallel-sided from base to middle, then gently arched anteriorly. Anterior half of pronotum semicircular with aspirations, then glabrous, minutely punctate. Asperated area slightly shorter than glabrous area. Scutellum conical, surrounded with somewhat long hairs. Elytra cylindrical, parallel-sided basal two third, then somewhat rapidly narrowing posteriorly. Striae clearly punctate with short hairs, intervals with somewhat long and uniserrate hairs. Hairs on declivital intervals slightly longer than others. Declivity obliquely slanted down with some processes. Posterior two processes on third intervals quite big, two processes before them somewhat smaller, the others smaller than those four processes. First two intervals on declivity glabrous, longitudinally and deeply depressed without process. Hairs on first two declivital intervals short and somewhat thin.

Korean Record. Murayama, 1931; Murayama, 1937; Cho, 1957; Cho, 1963; Ju, 1964; Ju, 1969; Choo and Woo, 1985; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (Jeju Is.), China, Japan, Nearctic Region (introduced).

Remarks. Murayama (1931) recorded this species from Jeju Island.

145 *Xyleborinus saxesenii* (Ratzeburg, 1837) 암브로시아나무좀 (Plate 10-145)

Bostrichus saxesenii Ratzeburg, 1837: 167.

Tomicus dohrnii Wollaston, 1854: 290.
Tomicus decolor Boieldieu, 1859: 473.
Xyleborus aesculi Ferrari, 1867: 22.
Xyleborus sobrinus Eichhoff, 1876: 202.
Xyleborus subdepressus Rey, 1883: 142.
Xyleborus frigidus Blackburn, 1885: 193.
Xyleborus arbuti Hopkins, 1915a: 64.
Xyleborus floridensis Hopkins, 1915a: 63.
Xyleborus pecanis Hopkins, 1915a: 63.
Xyleborus quercus Hopkins, 1915a: 63.
Xyleborus subspinosus Eggers, 1930b: 203.
Xyleborinus tsugae Swaine, 1934: 204.
Xyleborinus librocedri Swaine, 1934: 205.
Xyleborus pseudogracilis Schedl, 1937: 169.
Xyleborus retrusus Schedl, 1940b: 208.
Xyleborus pergrinus Eggers, 1944c: 142.
Xyleborus pseudoangustatus Schedl, 1948: 28.
Xyleborus paraguayensis Schedl, 1949b: 276.
Xyleborus opimulus Schedl, 1976: 77.
Xyleborus cinctipennis Schedl, 1980b: 186.

Description.

Body Length. 2.1-2.2 mm, elongate and evidently narrowed, especially towards the apex of the elytra, and is furnished throughout, including the posterior half of the prothorax, with short upstanding hairs; thoracic tubercle more elevated, the surface

behind less shining, more evidently and closely punctured; elytral punctures stronger and rather closer, 2nd interstice more deeply impressed at apex without tubercles or granules. Declivity obliquely slanted down with some processes. 1st interstice, 3rd interstice, outer margin of declivity and posterior margin with several tubercles.

Korean Record. Murayama, 1930a; Murayama, 1930b; Murayama, 1934a; Murayama, 1936; Murayama, 1937; Cho, 1957; Lee and Cho, 1959; Ju, 1964; Ju, 1969; Choo et al., 1983a; Choo and Woo, 1985b; Choo et al., 1988b; Choo and Woo, 1989a; ESK/KSAE, 1994; Choi and Ko, 2006; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 12ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 22.iii-21.iv.2011; 2ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 22.iii-21.iv.2011; 248ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 21.iv-17.v.2011; 56ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 21.iv-17.v.2011; 2ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 2ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2012; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 18.vii.2012.

Distribution. Cosmopolitan.

Genus *Xyleborus* Eichhoff, 1864

Xyleborus Eichhoff, 1864: 37 (Type species: *Bostrichus monographus* Fabricius, 1792)

Anaeretus Dugès, 1887: 141 (Type species: *Xyleborus guanajuatensis* Dugès, 1887 = *Bostrichus volvulus* Fabricius, 1794)

Mesoscolytus Brown, 1904: 125 (Type species: *Apate inurbana* Broun, 1880)

Heteroborips Reitter, 1913b: 82 (Type species: *Bostrichus cryptographus* Ratzeburg, 1837)
Boroxylon Hopkins, 1915a: 58 (Type species: *Boroxylon stephegynis* Hopkins, 1915 = *Phloeotrogus bidentatus* Motschulsky, 1863)
Notoxyleborus Schedl, 1934: 84 (Type species: *Notoxyleborus kalshoveni* Schedl, 1934)
Progenius Blandford, 1896a: 20 (Type species: *Progenius fleutiauxi* Blandford, 1896 = *Xyleborus subcostatus* Eichhoff, 1869)

Diagnosis.

Xyleborus have an obliquely truncate club with only one suture visible on the posterior face. The procoxae are contiguous, and the scutellum is large and flushed with the elytra. This is a large and somewhat artificial genus that will eventually get divided into several others. The most common Xyleborini in most tropical forests, uniform size between 2-3 mm, orange to light brown to reddish color, never dark brown or black. Antenna type 2, pronotal shape basic, scutellum present, elytra elongate, tuberculate on declivity. Posterocoxal process distinctly inflated, globular or almost cubical. Currently polyphyletic, but cladistic analysis identified unique combination of homoplastic characters for a subset of species, *Xyleborus* s. str. (Hulcr et al., 2007a, Hulcr & Cognato, 2010a). Inflated posterocoxal process appears to be a single synapomorphy. The clade is monophyletic in molecular phylogeny (Cognato et al., 2010). Many Xyleborini with uncertain placement placed in *Xyleborus* (Hulcr and Cognato, 2013).

146 *Xyleborus aquilus* Blandford, 1894 빛죽이둥근나무좀 (Plate 11-146)

Xyleborus aquilus Blandford, 1894a: 109.

Description.

Body Length. 3.2-3.5, Somewhat similar to *X. eurygraphus* Ratzeburg, but narrower and less convex, with the prothorax shorter and less evidently quadrate, the elytral striae much finer, and the interstices convex at apex, more finely and evenly tuberculate. Ferruginous brown or piceous; head dull, front punctured, thinly pubescent, with an obsolete median raised line. Prothorax a little longer than broad, truncate at base, with posterior angles obtusely rounded, sides and apex separately slightly rounded, antero-lateral angles more strongly; surface gibbous in middle, the elevation transverse but short, its anterior half rather finely asperate, the posterior half shining, scantily and finely punctured. Scutellum small, triangular, shining. Elytra slightly narrower than prothroax at its widest part and about one-half longer, humeral angles rounded rectangular, sides parallel to apex then subcircularly rounded and margined; surface slightly convex from base to declivity, which is oblique, with fine punctured striae, little or not at all impressed before apex, where they are dilated, with a slight outward curve, interstices with a single row of setae, flat anteriorly, convex at apex and finely tuberculate, the first having traces of tubercles from the middle. Underside ferruginous, thinly hairy (Blandford, 1894a).

Korean Record. Murayama, 1930b; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (South), China, Japan.

147 *Xyleborus glabratus* Eichhoff, 1876 홀쭉나무좀(신칭) (Plate 11-147, Fig. 14)

Xyleborus glabratus Eichhoff, 1876: 202

Description.

Body 2.5mm, dark brown to blackish brown except yellowish brown antennae and legs, elongate, cylindrical, covered with minute yellowish pubescences. Frons minutely reticulate, with sparse pubescences. Pronotum 1.3 times longer than wide, parallel-sided from base to middle, then gently arched anteriorly. Anterior one thirds of pronotum semicircular with asperities, then glabrous, minutely punctate. Scutellum ligulate. Elytra cylindrical, parallel-sided basal five sixth, then rapidly narrowing posteriorly. Striae clearly punctate with minute hairs, intervals with somewhat long and uniserrate hairs. Hairs on declivital intervals slightly longer than others. Declivity rapidly slanted down with some many minute tubercles. Posterolateral costa clearly carinate. Tubercles on intervals small but clearly visible. First two intervals on declivity with several slightly bigger tubercles than other area.

Korean Record. New to Korea.

Specimens examined. 1ex., JN, Sinan-gun, Heuksan-do, 8.v.2015; 2ex., JJ. Jeju-si, Yonggang-dong, 21. v.2013; 3ex., JJ. Jeju-si, Seonpanak, 24.v.2016.

Distribution. Korea (South, Jeju Is.), India, Japan, Taiwan, Oriental region, Antarctic area (introduced).

148 *Xyleborus longipilus* Eggers, 1926 길쭉나무좀(신칭)

Xyleborus longipilus Eggers, 1926.

Korean Record. Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (South), Japan.

149 *Xyleborus minutus* Blandford, 1894 생강나무좀 (Plate 11-149)

Xyleborus minutus Blandford, 1894a: 116.

Xyleborus brevisculus Schedl, 1942b: 196.

Xyleborus pernitidus Schedl, 1954c: 152.

Description.

Body 1.5-1.7 mm, oblong, subcylindrical, testaceous brown, a little darker at the extremities. Head finely reticulate, testaceous with epistoma darker, front subconvex, punctured at sides and shortly pubescent, with a median longitudinal elevation towards vertex, carinate in one example, mouth shortly ciliate, eyes oval, flat, emarginate, antennae testaceous. Prothorax a little longer than broad, slightly rounded at base, basal angles obtuse, sides gently rounded to near apex, which is strongly rounded; surface with a slight nodose elevation in middle, scantily pubescent at sides, its anterior half with concentric asperations, the posterior half shining, finely punctured with a ground work of very fine parallel scratches. Scutellum rounded, shining, infusate. Elytra as wide as base of prothorax and rather less than half as long again, base truncate, humeral angles subrectangular rounded, sides very feebly rounded, nearly parallel, apex strongly rounded, with the lateral margin inflexed below for a very short distance, but scarcely carinate; surface shining, convex from base to posterior third, thence obliquely declivous,

the declivity flattened and more or less impressed, with rows of punctures which appear large, rounded, and dark when strongly illuminated, interstices somewhat irregular, with single rows of very fine sparse punctuation and short erect hairs, behind middle with fine tuberculation, obliterated on the impressed apical area on which the striae are slightly impressed, and curved inwards at the tip. Underside and legs testaceous (Blandford, 1894a).

Korean Record. Choo and Woo, 1985b; Choo et al., 1988b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (South), Japan, Taiwan, Oriental Region.

150 *Xyleborus monographus* (Fabricius, 1792) 네뿔나무좀 (Plate 11-150)

Bostrichus monographus Fabricius, 1792: 365.

Xyleborus nitidipennis Roubal, 1937: 67.

Bostrichus tuberculosus Herbst, 1794a: 113.

Korean Record. Murayama, 1937; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (South), Iraq, Turkey, Europe, North Africa.

151 *Xyleborus muticus* Blandford, 1894 여름나무좀 (Plate 11-151)

Xyleborus muticus Blandford, 1894a: 112. (Type locality: Japan-Kashiwagi)

Description.

Body 3 mm, ferruginous-pitchy, with rather long soft pubescence. Head ferruginous, dull, front convex, punctured at sides with a median impunctate slightly raised line, pubescence scanty and short except over mouth; antennae ferruginous. Prothorax oblong, base truncate, basal angles obtusely rounded, sides straight, slightly divergent from base towards apex, which is strongly rounded; surface with only the slightest trace of a transverse elevation, thinly pubescent especially at sides and apex, its anterior third with rather close transverse asperities which become weaker, but are continued back to posterior third, which is very finely reticulate, dull and subacutely punctate, the punctures rather close at the sides. Scutellum rounded, piceous, shining. Elytra slightly wider than prothorax at base and about half as long again, humeral angles subrectangular, shoulders narrowly callose, sides parallel to behind middle, thence rounded to apex, which is not carinate below; surface cylindrical with slightly impressed rows of oblong punctures, interstices narrow with a single row of very fine setigerous punctures, about as numerous as those of striae, the hairs stronger towards apex, which is strongly but obliquely declivous, slightly flattened, and impressed along the suture with the punctures of the striae larger, rounded, and shallow; interstices flat with microscopic traces of tuberculation, rather more evident on the third interstice. Underside and legs ferruginous, the former shining, punctured, and pubescent (Blandford, 1894a).

Korean Record. New to Korea.

Specimens examined. 10ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 18.vii.2012; 27ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 2.viii.

2012; 4ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 16.viii.2012; 77ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 18.ix.2012; 2ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 9.x.2012; 2ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 5.vi.2012; 35ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 19.vi.2012; 15ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 2.vii.2012; 3ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 17.vii.2012; 5ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 1.viii.2012; 9ex., GG, Paju-si, 28.vi.2012; 3ex., GG, Paju-si, 11.vii.2012.

Distribution. Korea (South), Japan.

152 *Xyleborus pfeilii* (Ratzeburg, 1837) 페일나무좀 (Plate 11-152)

Bostrichus pfeilii Ratzeburg, 1837: 168.

Bostrichus alni Mulsant & Rey, 1856: 111.

Xyleborus vicarius Eichhoff, 1876: 203.

Xyleborus adumbratus Blandford, 1894a: 115.

Description.

Body 3 mm, black to piceous brown, with the thrax sometimes lighter than the elytra. Head with the front strongly punctured, with a more or less evident longitudinal carina. Prothorax with the hairs long, and the central elevation prominent and transverse. Its basal half very shining, diffusely punctured except behind elevation, where the punctures are closer. Scutellum conical. Elytra one half longer than prothorax; sides parallel at base, slightly narrowed and rounded behind middle apex feebly produced in middle, sinuate on either side; the punctuation a little stronger and the points of insertion of the hairs on the two

first interstices more or less evidently elevated except at apex, where it is callose, the tubercles more prominent, and surface less wrinkled and more clearly punctured. Underside piceous, or testaceous, with abdomen darker.

Korean Record. Murayama, 1930b; Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; Choo et al., 1988b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., Seoul, Gangbuk-gu, Ui-dong, Mt. Bukhansan, 20.vii.2013; 1ex., Seoul, Seongbuk-gu, Jeongreung-dong, Mt. Bukhansan, 11.viii.2013; 2ex., Seoul, Seongbuk-gu, Jeongreung-dong, Mt. Bukhansan, 31.viii.2013; 9ex., Seoul, Gangbuk-gu, Ui-dong, Mt. Bukhansan, 31.viii.2013; 1ex., Seoul, Gangbuk-gu, Suyu-dong, Mt. Bukhansan, 31.viii.2013.

Distribution. Korea (South), China, Japan, Turkey, Europe, Nearctic Region (introduced).

153 *Xyleborus praeivus* Blandford, 1894 애나무좀 (Plate 11-153)

Xyleborus praeivus Blandford, 1894a: 110.

Description.

Body 3 mm, head dull with front flattened, coarsely punctured at sides, with a smooth, eyes wide, not deeply emarginate, antennae testaceous. Prothorax a little longer than broad, its base truncate, basal angles obtuse, sides scarcely rounded behind, becoming gradually more strongly rounded to apex, which is crenulate, surface elevated in middle, the elevation not evidently transverse, anterior half with rather scattered transverse asperities, becoming very fine over median

elevation, posterior half shining, with irregular scattered but distinct punctures. Scutellum small, obtuse triangular, shining. Elytra as wide as base of thorax, and more than half as long again, humeral angles obtusely rounded, sides not quite parallel, slightly convex from base to apex, thence somewhat obliquely declivous, with rows of shallow punctures, which are not impressed, interspaces between punctures transversely rugose, interstices with a single row of setae, arising from fine tubercles on the whole of the first two, and the apice of the remaining interstices. Apical declivity with a shallow impression on either side of the suture. Underside ferruginous, with abdomen darker, very scantily punctured and pubescent. Legs reddish testaceous (Blandford, 1894a).

Korean Record. Murayama, 1930b; Murayama, 1931; Cho, 1957; Cho, 1963; Ju, 1964; Ju, 1969; Choo et al., 1983; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (South), Japan.

154 *Xyleborus seriatus* Blandford, 1894 북한나무좀 (Plate 11-154)

Xyleborus seriatus Blandford, 1894a: 111. (Type Locality: Japan-Nikko; Miyanoshta)

Xyleborus orientalis Eggers, 1933c: 54.

Xyleborus aceris Kurentsov, 1941: 188.

Xyleborus kalopanacis Kurentsov, 1941: 187.

Xyleborus perorientalis Schedl, 1957b: 85.

Description.

Body 2.5 mm, oblong, cylindrical, dull piceous with elytra lighter, Head finely

reticulate, front nearly flat, scantily punctured and pubescent, with an in distinct median longitudinal elevation, mouth ciliate, eyes deeply emarginate, antennae testaceous. Prothorax as broad as long, truncate at base with posterior angle obtuse, sides slightly rounded, in front strongly rounded to apex; above with an obtuse transverse elevation in middle, anterior half asperate, posterior half finely reticulate and strongly punctured, the punctures becoming asperate at sides, with a smooth median line, pubescence short and scanty. Scutellum small, rounded, piceous. Elytra as wide as prothorax, and more than half as long again, truncate at base with humeral angles rounded rectangular, sides parallel to middle, then obliquely and gradually rounded to apex; surface cylindrical to middle, obliquely declivous behind, the declivity impressed weakly at sides of suture, with inferior margin inflexed but not carinate, with scarcely impressed rows of strong close setigerous punctures, the setae very short and ine, interstices with a single row of pubctures, a little finer and less numerous, bearing longer sitae, and very finely tuberculate for apical half. Legs ferruginous (Blandford, 1894a).

Korean Record. Ju, 1964; Ju, 1969; Choo et al., 1983b; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 35ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 1.v.2012; 8736ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 2827ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2012; 56ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 18.vii.2012; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 2.viii.2012.

Distribution. Korea (North, South), China, Japan, Russia (Far East), Nearctic Region (introduced).

155 *Xyleborus volvulus* (Fabricius, 1794) 두릅나무좀 (Plate 11-155)

Bostrichus volvulus Fabricius, 1794: 454.

Xyleborus torquatus Eichhoff, 1868a: 146.

Xyleborus alternans Eichhoff, 1869c: 280.

Xyleborus badius Eichhoff, 1869c: 280.

Xyleborus interstitialis Eichhoff, 1878b: 375.

Xyleborus guanajuatensis Dugès, 1887:140.

Xyleborus grenadensis Hopkins, 1915a: 65.

Xyleborus hubbardi Hopkins, 1915a: 65.

Xyleborus rileyi Hopkins, 1915a: 65.

Xyleborus schwarzi Hopkins, 1915a: 65.

Xyleborus silverstris Beeson, 1929: 241.

Xyleborus vagabundus Schedl, 1949b: 277.

Xyleborus granularis Schedl, 1950d: 898.

Korean Record. Murayama, 1930b; Murayama, 1931; Murayama, 1936; Murayama, 1937; Cho, 1957; Cho, 1963; Ju, 1969; Choo and Woo, 1985b; Choo et al., 1988b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (South), Japan, Taiwan, Afrotropical Region, Australian Region, Nearctic Region, Neotropical Region, Oriental Region.

Genus *Xylosandrus* Reitter, 1913

Xylosandrus Reitter, 1913b: 83 (Type species: *Xyleborus morigerus* Blandford,

1894)

Apoxyleborus Wood, 1980: 90 (Type species *Xyleborus mancus* Blandford, 1898)

Diagnosis.

Xylosandrus can be distinguished from *Xyleborus* Eichhoff by the widely separated procoxae and by the stout body with the broadly convex and unarmed declivity which starts before the middle. The elytra are only slightly longer than the pronotum. They lack the tubercles in the declivity of *Euwallacea* Hopkins. Stout, robust. Mesonotal mycangium associated with tuft of setae on basis of pronotum, sometimes faint. Procoxae separated. Similar to *Cnestus*, *Diuncus*, *Anisandrus*, except procoxae separated.

Key to species of genus *Xylosandrus* in Korea

1. Elytral declivital striae with punctures clearly impressed, in rows declivital surface shining, granules, if present, in sparse rows ----- 2
- Elytral declivity without punctures, surface granulate, dull ----- *X. crassiusculus*
2. Frons covered with fine rounded granules. Base of pronotum finely punctured; elytral interstriae with uniserial row of punctures; elytral declivity gradually and roundly sloping, not bordered by an edge in upper half; declivital striae consist of punctures ----- 3
- Frons covered with longitudinal carina-like tubercles. Base of pronotum granulate, not punctured; elytral interstriae irregularly punctured; elytral declivity abruptly truncate, bordered by an edge in margin; declivital striae consist of minutely granulate ----- 5
3. Body large (>2.0 mm). Lateral sides of pronotum weakly rounded; striae

- glabrous ----- 4
- Body small (<2.0 mm). Lateral sides of pronotum more strongly rounded. Each strial puncture of elytra bearing a rather long, nearly erected hair-like setae ----- *X. compactus*
 - 4. Elytra slight longer than wide; elytral declivity more or less convex with small granules on interstria. ----- *X. pseudogermanus*
 - Elytra slight wider than long; elytral declivity gently convex without small granules on interstria. ----- *X. germanus*
 - 5. Body large (>2.5mm), blackish brown to black. strial setae on elytral declivity short, nearly as long as interstitial setae ----- *X. brevis*
 - Body small (<2.4mm), yellowish brown. Strial setae on elytral declivity long, two or three times as long as interstitial setae ----- *X. borealis*

156 *Xylosandrus borealis* Nobuchi, 1981 동백나무좀 (Plate 11-156)

Xylosandrus borealis Nobuchi, 1981c: 34.

Description.

Body Length. 1.9-2.1 mm, short, cylindrical, about 2.08 times as long as wide, yellowish brown; mandibles and epistomal margin reddish to blackish brown; eyes black. Frons shining, weakly convex, with a weak median longitudinal line, minutely reticulate, sparsely covered with longitudinal minute carina-like tubercles and rather long hair-like setae. Pronotum shining, nearly as long as wide; base truncate; basal angles rounded; lateral sides gently rounded, widest in basal third of pronotal length, then roundly narrowing anteriorly, roundly connected with anterior margin, not forming antro-lateral angles; anterior margin broadly rounded,

without marginal teeth; disc convex, without a distinct transverse elevation; the summit situated near basal third; its anterior area roundly sloping, rather coarsely covered with numerous asperities in concentric lines; interspaces of asperities finely reticulate, covered with long erect hair-like setae and short semi-decumbent hair-like setae; the posterior area finely reticulate and rather closely granulate, the granules denser in the middle, covered with short semi-decumbent hair-like setae which become dense, long and erect in the middle. Scutellum shining, large, nearly triangular. Elytra shining, somewhat longer than pronotum, about 1.08 times as long as wide, nearly as wide as base of pronotum; basal margin truncate, nearly straight; lateral margins nearly straight, slightly widened to declivital margin, forming postero-lateral angles; apical margin roundly constricted to suture, distinctly carinate; disc cylindrical, subvertically truncate behind from posterior two-fifths; striae narrow, not impressed, with uniserial row of small round punctures, which are separated by a distance greater than their own diameters, denser posteriorly, and usually bearing minute hair-like setae; interstriae wide, flat, irregularly covered with distinct punctures, which are somewhat smaller than striae punctures, bearing a long, erect, hair-like setae; all punctures become smaller towards apex. Declivity not shining, strongly abrupt, nearly circular, subconvex, edged all round, smooth and shining along suture, with four or five rows of granules, each of which bears rather short semi-decumbent hair-like seta; tubercles along suture very fine interspaces of the rows irregularly covered with fine granules, each of which bears a long erect hair-like setae, carinate margins at under half of declivity finely crenulate (Nobuchi, 1981).

Korean Record. Choo et al., 1983a; Choo and Woo, 1985b; ESK/KSAE, 1994;

Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1 ex., Seoul, Gangbuk-gu, Suyu-dong, Mt. Bukhansan, 20.vii.2013; 2ex., Seoul, Gangbuk-gu, Ui-dong, Mt. Bukhansan, 20.vii.2013; 12ex., GB, Cheongdo-gun, Unmun-myeon, Mt. Unmunsan, 1.vii.2015.

Distribution. Korea (South), Japan.

Remarks. This species is closely allied to *X. brevis* (Eichhoff), but can be distinguished by the less weak and shorter median longitudinal line on the frons; by sparser, weak, and arrow asperate on the pronotum; by longer setae on the asperate area of the pronotum; and by sparser granules and distinctly sparser and longer setae on the interstriae of the elytral declivity (Nobuchi, 1981).

157 *Xylosandrus brevis* (Eichhoff, 1877) 반날개나무좀 (Plate 11-157)

Xyleborus brevis Eichhoff, 1877b: 121.

Xyleborus cucullatus Blandford, 1894a: 121.

Description.

Body 2.5-3.0 mm, blackish brown to black. trial setae on elytral declivity short, nearly as long as interstitial setae. Frons covered with longitudinal carina-like tubercles. Base of pronotum granulate, not punctured; elytral interstriae irregularly punctured; elytral declivity abruptly truncate, bordered by an edge in margin; declivital striae consist of minut granulate. Elytral declivital striae with punctures clearly impressed, in rows declivital surface shining, granules, if present, in sparse rows.

Korean Record. Murayama, 1930b; Murayama, 1931; Murayama, 1937; Cho, 1957;

Cho, 1963; Ju, 1964; Ju, 1969; Nobuchi, 1981b; Choo et al., 1983a; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 3ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2012; 2ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 18.vii.2012; 1ex., JJ, Jeju-si, Yonggang-dong, 21.v.2013.

Distribution. Korea (South), China, Japan, Nepal, Taiwan, Oriental Region.

158 *Xylosandrus compactus* (Eichhoff, 1876) 꼬마오리나무좀(신칭) (Plate 11-158)

Xyleborus compactus Eichhoff, 1876: 201.

Xyleborus morstatti Hagedorn, 1912a: 37.

Descriptions.

Body 1.4-1.7 mm, dark brown to blackish brown except yellowish brown antennae and legs. Frons broadly convex, surface shining, reticulate above, with rather sparse, indefinite small punctures, hairs sparsely but epistoma somewhat densely covered with long hairs. Pronotum widest at one thirds from base, lateral sides weakly rounded posteriorly and more strongly rounded anteriorly, basal one fourth glabrous without asperities and densely covered with anteriorly bent hairs at middle of basal area. Elytra parallel-sided at basal one third, slightly narrowing posteriorly and then rapidly narrowing posteriorly at beginning of posterolateral costa. Posterolateral costa clearly carinate and connected to elytral suture and slightly away from posterior margin. Declivital surface shining, striae with punctures clearly in rows, each striae and intervals on declivity with a row of somewhat long hairs. Fore coxae widely separated.

Korean Record. New to Korea.

Specimens examined. 1 ex., GN, Gabcheon-ri, Ibanseong-myeon, Jinju-si, 3-9.VIII.2007; 1 ex., GN, Gabcheon-ri, Ibanseong-myeon, Jinju-si, 25.VI-2.VII.2008; 1ex., JJ, Jeju-si, Sumang-ri, 9-21.v.2013.

Distribution. Korea (South, Jeju Is.), Japan.

159 *Xylosandrus crassiusculus* (Motschulsky, 1866) 팔배나무좀 (Plate 12-159, Fig. 15)

Phloeotrogus crassiusculus Motschulsky, 1866: 403.

Xyleborus semiopacus Eichhoff, 1878b: 334.

Xyleborus semigranosus Blandford, 1896b: 211.

Dryocoetes bengalensis Stebbing, 1908: 12.

Xyleborus mascarenus Hagedorn, 1908: 379.

Xyleborus ebriosus Niisima, 1909: 154.

Xyleborus okoumeensis Schedl, 1935c: 271.

Xyleborus declivigranulatus Schedl, 1936a: 30.

Description.

Body Length 2.1-2.9 mm, reddish brown, except dark brown elytral declivity. Basal part of pronotum glossy with regular punctures. Elytra 1.15 times as long as wide, 1.15 times as long as pronotum; disc occupying slightly less than basal half, striae not impressed, punctures small, interstriae about 6 times as wide as striae, punctures fine and confused. Declivity steep convex, dull, striae obsolete without carina with dense, confused, uniformly distributed granules.; vestiture of fine hair with shorter strial and interstitial setae mostly confused, and longer setae in indefinite interstitial rows.

Korean Record. Murayama, 1930b; Murayama, 1931; Murayama, 1934c; Murayama, 1936; Murayama, 1937; Cho, 1957; Cho, 1963; Ju, 1964; Ju, 1969; Choo et al., 1983a; Choo and Woo, 1985b; Choo et al., 1988b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 2ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri, 21.iv-17.v.2011; 5ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri, 21.iv-17.v.2011; 2ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 19ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2012; 8ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 2.viii.2012; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 16.viii.2012; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 11.ix.2012; 1ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 23.v.2012; 14ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 5.vi.2012; 81ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 19.vi.2012; 43ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 2.vii.2012; 5ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 17.vii.2012; 1ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 1.viii.2012; 1ex., GG, Paju-si, 16.vi.2012; 8ex., GG, Paju-si, 28.vi.2012; 1ex., GG, Paju-si, 11.vii.2012.

Distribution. Korea (North, South), Butan, China, India, Japan, Nepal, Taiwan, Afrotropical Region, Australian Region, Nearctic Region (introduced), Neotropical Region, Oriental Region.

160 *Xylosandrus germanus* (Blandford, 1894) 오리나무좀 (Plate 12-160, Figs. 14, 15)

Xyleborus germanus Blandford, 1894a: 106. (Type locality: Japan-Oyayama, Nikko, Subashiri, Kiga, Miyanoshita)

Xyleborus orbatus Blandford, 1894a: 123. (Type locality: Japan-Kurigahara)

Description.

Body 2-2.3 mm in female, 1.5 mm in male, short, cylindrical, piceus, shining. Head finely reticulate, with front convex, scantily punctured, mouth ciliate; eyes flat, oblong, deeply emarginate. Prothorax as long as broad, base truncate, basal angles rounded, sides scarcely rounded behind, broadly in front; surface convex with an obtuse median transverse elevation, anteriorly with concentric rows of exasperations, strong over apex, posteriorly shining with scattered fine punctures, pubescence short and sparse, except at apex and in middle of basal margin. Scutellum large, subtriangular, shining. Elytra as wide as thorax and nearly twice as long; humeral angles obtusely rounded, sides subparallel to apex, which is abruptly and broadly rounded and carinate below; surface convex, somewhat rounded from base to middle, then obliquely but not abruptly declivous, piceous-brown, with fine rows of punctures which appear impressed in certain lights, interstices rather wide, flattish, each with a row of very fine punctures, and behind middle with erect setae arising from slight tubercles. Underside brown, punctured, pubescent. Legs testaceous (Blandford, 1894a).

Korean Record. Murayama, 1930b; Murayama, 1931; Murayama, 1936; Kono, 1938; Cho, 1957; Lee and Cho, 1959; Cho, 1963; Ju, 1964; Ju, 1969; Nobuchi, 1981b; Choo et al., 1983a; Choo and Woo, 1985b; Choo et al., 1988b; Choo and Woo, 1989a; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 22ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 22.iii-21.iv.2011; 32ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 22.iii-21.iv.2011; 375ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 21.iv-17.v.2011;

1244ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 21.iv-17.v.2011; 5ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 1.v.2012; 1064ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 6ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 23.v.2012; 21ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 5.vi.2012; 3ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 19.vi.2012; 2ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 2.vii.2012; 2ex., GG, Paju-si, 28.vi.2012.

Distribution. Korea (South), China, Japan, Russia (Far East), Taiwan, Turkey, Europe (introduced), Nearctic Region (introduced), Oriental region.

161 *Xylosandrus pseudgermanus* **sp. nov.** 닭은오리나무좀(신칭) (Plate 12-161, Fig. 14)

Description.

Body 2.1-2.2 mm, short, cylindrical, piceus, shining, except antennae and legs testaceous. Head finely reticulate, with front convex, scantily punctured, mouth ciliate; eyes flat, oblong, deeply emarginate. Prothorax as long as broad, base truncate, basal angles rounded, sides scarcely rounded behind, broadly in front; surface convex with an obtuse median transverse elevation, anteriorly with concentric rows of exasperations, strong over apex, posteriorly shining with scattered fine punctures, pubescence short and sparse, except at apex and in middle of basal margin. Scutellum large, subtriangular, shining. Elytra as wide as thorax and nearly twice as long; humeral angles obtusely rounded, sides subparallel to apex, which is abruptly and broadly rounded and carinate below; surface convex, somewhat rounded from base to middle, then obliquely and somewhat abruptly declivous, with fine rows of punctures. Declivity slightly convex with minute tubercles on interstices. Underside brown, punctured,

pubescent.

Korean Record. New to Korea.

Specimens examined. Holotype, 1ex., GG, Gunpo-si, Hosu-ro, Mt. Surisan, 24.iii-14.iv.2016; Paratypes: 8ex., GG, Gunpo-si, Hosu-ro, Mt. Surisan, 24.iii-14.iv.2016; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 1.v.2012; 116ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 127.vi.2012; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 2.viii.2012; 54ex., CN, Boryeong-si, 14.v.2013.

Distribution. Korea (South).

Remarks. This new species resembles to *X. germanus*, but can easily distinguished from the latter by minute tubercles on intervals of declivity.

Etymology. The species allied to *X. germanus* in external shape.

Tribe Xyloterini LeConte, 1876

Key to species of genus Xyloterini in Korea

1. Eye somewhat closely and anteriorly located in male, elytral declivity with somewhat long hairs ----- *Indocryphalus*
- Eye apart and laterally located in male, elytral declivity almost naked ----- *Trypodendron*

Genus *Indocryphalus* Eggers, 1939

Indocryphalus Eggers, 1939a: 6 (Type species: *Indocryphalus malaisei* Eggers, 1939 = *Xyloterus intermedius* Sampson, 1913)

Diagnosis.

Species in this genus of Korea range from 2.6 to 3.5 mm in length and are approximately 2.2 to 2.4 times as long as wide. Their color ranges from yellowish brown to dark brown and they are often uni-colored pronotum or elytra. The pronotum is wider than long and anterior part in male is somewhat flat. The scutellum is somewhat big and triangle. The declivity is covered with somewhat long hair-like setae. The eye is completely divided. *Indocryphalus* is distinguished from *Trypodendron* Stephens by the male eyes located anteriorly and somewhat long hairs on declivity.

Key to species of genus *Indocryphalus* in Korea

1. Anterior margin of pronotum weakly prominent anteriorly with more than 6 asperities and 4 asperities clearly visible. Pronotum and scutellum same color with elytra ----- *I. aceris*
- Anterior margin of pronotum strongly prominent somewhat acutely with not more than 6 asperities and 2 big, 2 small. Head, pronotum and scutellum darker than elytra, basal are of elytra pale yellowish brown ----- *I. pubipennis*

162 *Indocryphalus aceris* (Niisima, 1910) 단풍속나무좀 (Plate 12-162)

Xyloterus aceris Niisima, 1910: 4.

Xyloterus dainichiensis Murayama, 1954: 191.

Description.

Body Length. 3.0-3.2 mm, yellowish brown two brown except head somewhat dark brown. Frons slightly flat, glabrous in male and slightly convex in female,

eyes clearly divided into two parcels, upper one pair located somewhat anteriorly and close each other in male. Pronotum wider than long, anterior part slightly flat in male, anterior margin of pronotum weakly prominent anteriorly with more than 6 asperities and 4 asperities clearly visible, mycangial opening short, oval, located on lateral and basal part of pronotum in female. Scutellum triangle, glabrous, same color with elytra. Elytra as wide as pronotum, parallel-sided, abruptly truncated at declivity, disc without hairs, striae small but clearly punctured. Declivity covered with somewhat long hairs.

Korean Record. Ju, 1969; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 4ex., GW, Pyeongchang-gun, Jinbu-myeon, Mt. Odaesan, Temple Bukdaesa, 4.vi.2009; 1ex., GW, Pyeongchang-gun, Jinbu-myeon, Mt. Odaesan, Temple Sangwonsa, 4.vi.2009; 1ex., GW, Pyeongchang-gun, Jinbu-myeon, Mt. Odaesan, Temple Sangwonsa, 10.vi-12.vii, 2012.

Distribution. Korea (North, South), China, Japan, Russia (Far East).

163 *Indocryphalus pubipennis* (Blandford, 1894) 후박나무좀 (Plate 12-163)

Trypodendron pubipennis Blandford, 1894a: 125.

Description.

Body Length. 2.6-3.2 mm, oblong, fuscous-black with elytra dull testaceous, darker along suture and at apex, moderately shining, with long downy pubescence. Head in male narrow with front flattened, longitudinally impressed, dull, sparsely punctured and pubescent, upper divisions of eyes with a narrow raised glossy

margin continued as a transverse grooved ridge across vertex; in female broader, subconvex, transversely rugose, scantily punctured and hairy. Antennae with club oval, not acuminate, completely pubescent. Prothorax transverse, strongly constricted in front in male, less so in female, its sides rounded, apical margin bituberculate acuminate in male, the whole surface dull with very fine granulations, gibbous in female, depressed in male, with scattered hairs, absent over sides of base, in front with asperate tubercles, becoming finer and produced in middle nearly to base, which is without aciculations at sides. Scutellum piceous, triangular, pubescent. Elytra less than twice as long as prothorax and narrower than its greatest width, sides subparallel, apex obtusely rounded, surface with long pubescence chiefly at sides and apex, finely punctured in rows, interstices multi-punctate, subrugose, the punctures as in the allied species not readily distinguishable from those of the striae. Underside fuscous-black, almost impunctate, pubescent (Blandford, 1894a).

Korean Record. Murayama, 1930b; Murayama, 1931; Murayama, 1937; Cho, 1957; Ju, 1969; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., JJ, Jeju-si, Jocheon-eub, Gyoraeri, Seongpanak, 8-21.v.2013; 2exs., JN, Sinan-gun, Heuksan-do, 8.v.2015; 10ex., JJ, Jeju-si, Jocheon-eub, Gyoraeri, Seongpanak, 21.iv-25.v.2016.

Distribution. Korea (South, Jeju Is.), China, Japan, Russia (Far East), Taiwan.

Genus *Trypodendron* Stephens, 1830

Trypodendron Stephens, 1830: 353 (Type species: *Dermestes domesticus* Linnaeus,

1758)

Xyloterus Erichson, 1836: 60 (Type species: *Bostrichus lineatus* Olivier, 1795)

Trypodendrum Agassiz, 1846: 380 (Type species: *Dermestes domesticus* Linnaeus, 1758)

Xylotrophus Gistel, 1848: [4] (Type species: *Dermestes domesticus* Linnaeus, 1758)

Trypodendrum Gistel, 1856: 368 (Type species: *Dermestes domesticus* Linnaeus, 1758)

Diagnosis.

Species in this genus range from 2.7 to 4.6 mm in length and are approximately 2.5 to 2.6 times as long as wide. Their color ranges from brown to black and they are often striped. The pronotum is wider than long, and its anterior margin may be armed or not. The scutellum is small. The declivity is convex, usually unarmed. The vestiture consists of sparse, fine, short hair-like setae. The eye is completely divided. The scape is longer than the 4-segmented funicle. The obovate club's corneous basal area is strongly procurved. The procoxae are contiguous. *Trypodendron* is distinguished from *Xyloterinus* Swaine by the basal area of the club which is chitinized and procurved into a thin arrow. In addition, the elytra coloration usually consists of longitudinal dark and light stripes.

Key to species of genus *Trypodendron* in Korea

1. Antennal clubs distinctly longer than wide, asymmetrical towards apex, head and most part of pronotum with piceous black or black, punctures on elytra arranged in series, hairs sparse, short and erect ----- *T. signatum*
- Antennal clubs slightly longer than wide, with the distal border rounded,

- scarcely asymmetrical, elytra almost naked ----- 2
2. Body form strongly compressed, elytra lac-lustre, declivity abrupt and perpendicularly swollen ----- 3
- Body slender, upper surface and declivity of elytra a little shining, declivity a little abrupt and not very perpendicular, most of suture and third interstices distinctly elevated, tubercles on suture and third interstices of declivity minute ----- *T. lineatum*
3. Antennal clubs oval, pronotum near base with a brown band, very finely punctured, highest part of gibbosity situated about basal 1/4 of length, elytral striae invisibly slightly impressed, interstices flat, punctures on them almost invisible ----- *T. proximum*
- Antennal clubs ovoid, pronotum with highest part of gibbosity in middle of length, elytral striae distinctly impressed, punctures larger, interstices elevated, with larger punctures about same size in striae on declivity ----- *T. gaimense*

164 *Trypodendron gaimaense* (Murayama, 1937) 피나무좀 (Plate 12-164)

Xyloterus gaimaense Murayama, 1937: 369 (Type Locality: Korea-Horyuri).

Korean Record. Murayama, 1937; Cho, 1957; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North), Japan.

Remarks. I checked the voucher specimens in NIAST (Japan). But, it is doubt the identification of those specimens because this species does not have the hairs much on elytra according to Murayama's key in 1957. So, the specimens in the

plate should be checked again.

165 *Trypodendron lineatum* (Olivier, 1795) 검줄나무좀 (Plate 12-165, Fig. 16)

Bostrichus lineatum Olivier, 1795: 18.

Apate bivittatum Kirby, 1837: 192.

Bostrichus cavifrons Mannerheim, 1843: 297.

Trypodendron vittiger Eichhoff, 1881: 298.

Trypodendron boreale Swaine, 1917: 21.

Trypodendron meridionale Eggers, 1940f: 38.

Description.

Body 2.7-3.5 mm, 2.5 times as long as wide, dark brown to black with ase of pronotum and interstices two to four and seven to eight light yellowish brown to dark brown, transition from light to dark color abrupt, pale areas quite variable in extent, apparently depending upon the age of the specimen as well as other factors. Female. Frons convex, weakly impressed above epistoma, with a short, broad rather indefinite median carina above epistoma, surface reticulate with rather fine sparse granules, vestiture fine, rather long, inconspicuous. Antennal club oval, with mediodistal angle slightly produced. Pronotum 1.2 times as wide as long, sides weakly arcuate, rather broadly rounded in front; anterior margin unarmed, several irregularly placed submarginal asperities present. Asperities decreasing in size posteriorly to base, posterolateral area finely reticulate with sparse, fine, shallow punctures, vestiture fine, sparse, inconspicuous. Elytra 1.6 times as long as wide, sides subparallel on basal two-thirds, rather broadly rounded behind; striae punctures very fine, rather indistinctly and shallowly impressed; interspaces smooth

and shining, with extremely minute, rather abundant, confused punctures. Declivity convex, steep, striae punctures reduced, 2nd interstice weakly impressed and slightly narrower than 1st or 3rd, subapical margin sharply elevated, scarcely or not at all visible from above, when visible the outline appearing broadly rounded from above, vestiture sparse, short, fine. Male. Frons broadly excavated from epistoma to vertex, lateral margins ornamented by longer, more abundant hair, pronotum subquadrate, 1.4 times as wide as long, the anterior margin straight and unarmed (Wood, 1982).

Korean Record. Murayama, 1930a; Murayama, 1930b; Murayama, 1937; Cho, 1957; Lee and Cho, 1959; Ju, 1964; Ju, 1969; Choo et al., 1983b; Choo and Woo, 1985b; Choo et al., 1988b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 233ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 22.iii-21.iv.2011; 22ex., GW, Chuncheonsi, Dong-myeon, Janghak-ri 22.iii-21.iv.2011; 3ex., GW, Chuncheonsi, Dongsan-myeon, Joyangri 21.iv-17.v.2011.

Distribution. Korea (North, South), China, Japan, Kazakhstan, Mongolia, Russia, Turkey, Europe, North Africa, Nearctic Region (introduced).

Remarks. The DNA barcode sequences of Korean specimens quite different to the sequences of other specimens in NCBI. It needs more studies on the morphological and genetical studies on this group.

166 *Trypodendron niponicum* Blandford, 1894 속나무좀

Trypodendron quercus var. *niponicum* Blandford, 1894a: 124.

Korean Record. Ju, 1964; Ju, 1969; ESK/KSAE, 1994; Paek et al., 2010; Löbl

and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North, South), China, Japan, Mongolia, Russia (East Siberia, Far East).

167 *Trypodendron proximum* (Niisima, 1909) 편백나무좀 (Plate 12-167)

Xyloterus proximum Niisima, 1909: 165.

Korean Record. Murayama 1957; Ju, 1964; Ju, 1969; Choo and Woo, 1985b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North, South), China, Japan, Mongolia, Russia (East Siberia, Far East).

168 *Trypodendron signatum* (Fabricius, 1792) 누른띠나무좀 (Plate 12-168)

Apate signatum Fabricius, 1792: 363.

Bostrichus quinquelineatum Adams, 1817: 312.

Bostrichus waringii Curtis, 1840: 279.

Xyloterus quercus Eichhoff, 1865: 381.

Trypodendron suturale Eggers, 1933c: 52.

Trypodendron obtusum Eggers, 1939b: 121.

Korean Record. Ju, 1964; Ju, 1969; Choo et al., 1988b; ESK/KSAE, 1994; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea (North, South), China, Iran, Japan, Mongolia, Russia, Turkey, Europe.

Subfamily Platypodinae

Tribe Platypodini Erichson, 1847

Key to the genus of Korean Platypodini

1. Male protibia armed by transverse rugae, female protibia largely granulate, with no more than one or two weak rugae near apex. Femoral grooves of pronotum angulate at the anterior extreme ----- *Crossotarsus*
- Male and female protibiae similarly armed by rows of transverse rugae; femoral grooves of pronotum usually angulate at posterior extreme ----- 2
2. Suture at apex of male elytral declivity entire; declivity variously convex, with or without armature of tubercles and spines; if present, female mycetangia pores on pronotum numerous; inner part of hind coxae in male without projection ----- *Platypus*
- Male declivity abruptly truncate, its margin obtuse to very acutely costate on almost a complete circle, apex sometimes strongly, attenuately narrowed, declivital face usually concave; inner part of hind coxae in male with projection ----- 4
4. Male elytral declivity much more broadly truncate, declivital base almost as wide as base of elytra, basal margin abrupt, obtusely to very acutely margined; elytral striae not impressed; pronotum with a narrow patch of punctures ----- *Dinoplatypus*
- Elytral apex of male moderately to exceedingly attenuate, strongly narrowed to true base of declivity, dehiscent of suture sometimes small or obscure; basal

margin of declivity usually more gradual, sometimes rounded ----- *Treptoplatypus*

Genus *Crossotarsus* Chapuis, 1865

Type species: *Platypus wallacei* Thomson, 1858, Arch. Entomol. 1: 343.

Crossotarsus Chapuis, 1865. Monogr. Platypides: 23, 44.

Diagnosis.

Protibiae sexually dimorphic. Male declivity moderately reduced to almost absent. Abdomen ascends rather strongly to meet apex. Rounded nodule on metepisternum in several large species. Female pronotum with numerous mycetangia pores.

169. *Crossotarsus simplex* Murayama, 1925 가시나무긴나무좀 (Plate 12-169)

Crossotarsus simplex Murayama, 1925: 231 (TL: Japan; Kyushiu).

Descriptions.

Body 3.1-3.8 mm, elongate cylindrical, dark brown. Frons almost flat with longitudinal impressed median line; densely, finely punctate, and sparsely covered with short and long hairs. Median sulcus of pronotum short, not reach base. Anterior two-thirds of elytra yellow and other part dark brown; interstriae flat, but declivital interstriae elevated. First abdominal sternite with long thick spine, straightly produced behind.

Korean Record. Murayama, 1930b; Murayama, 1931; Murayama, 1934d; Murayama, 1937; Cho, 1957; Cho, 1963; Nobuchi, 1973b; Choo and Woo, 1985a; Choo and Woo, 1985b; Nobuchi, 1993; ESK/KSAE, 1994; Park and Lyu, 2007;

Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen.

Distribution. Korea(South), Japan, Taiwan.

Host Plants. *Quercus glauca*, *Q. gilva*, *Q. serrata*, *Q. acuta*, *Q. salicina*, *Q. paucidentata*, *Q. myrsinaefolia*, *Albizia julibrissin*, *Acer* sp., *Cleyera japonica*, *Machilus thunbergii*, *Castanopsis cuspidata*, *Pterocarya rhoifolia*, *Ternstroemia japonica*, *Fiscus* sp., *Pasania edulis*, *Ilex chinensis*, *Prunus jamasakura* (Choo and Woo, 1985).

Genus *Dinoplatypus* Wood, 1993

Dinoplatypus Wood, 1993, Gt. Basin Nat. 53: 273. (Type species: *Platypus cupulatus* Chapuis, 1865)

Diagnosis.

Subvertical, obliquely truncate male elytral declivity with sutural apex modestly to very strongly and broadly emarginated, and with subvertical face moderately to strongly concave; upper margin of male declivital face usually acute.

Key to the species of Korean *Dinoplatypus*

5. Pronotum with narrow longitudinal patch of punctures along a short longitudinal impressed line behind middle in male and narrow heart-shape patch of punctures in female; Posterior part of elytra shortly and narrowly emarginate inwardly in male and emarginate inner margin gently arced and connected with outer margin and elytral suture gently connected with posterior emarginate line in female
----- *D. calamus*

- Pronotum with unclear longitudinal patch of punctures along a long longitudinal impressed line behind middle in male and elliptical patch of punctures in female; Posterior part of elytra widely and deeply emarginate inwardly in male and emarginate inner margin narrowly connected with outer margin and elytral suture angulate with posterior emarginate line in female ----- *D. hamatus*

170 *Dinoplatypus calamus* (Blandford, 1894) 잡목긴나무좀 (Plate 12-170)

Platypus calamus Blandford, 1894a: 137.

Platypus calamus fukiensis Schedl, 1941: 43.

Dinoplatypus calamus: Wood, 1993: 273.

Description.

Body 2.8-3.9 mm, Slender, reddish testaceous, elytra with apex darker and slightly pale at middle. Male. Head with frons slightly concave in male. A short longitudinal impressed line in middle of frons. Pronotum with narrow V-shaped patch of punctures along a short longitudinal impressed line behind middle. Apex of elytra with an oblique terminal impressed surface, its outer margin strongly angulated and slightly elevated, curving away from suture so as to form an angle with its fellow above the terminal impression, and then sinuate at sides. External angles produced in a curve downwards and backwards, and serrate at posterior part. Emargination of posterior margin of elytra deeper than wide, but 1/2 times shorter than terminal suture of declivity.

Female. Head with frons somewhat more concave than male. A short longitudinal impressed line in middle of frons. Pronotum with narrow heart-shaped patch of punctures along a short longitudinal impressed line behind middle. Punctures of

patch on anterior part bigger than on posterior part. Apex of elytra with an truncated and slightly impressed surface, its outer margin not angulate at beginning of declivity. External angles produced in a curve downwards and gently connected with inner emargination. Emargination of posterior margin of elytra wider than deep (Blandford, 1894a).

Korean Record. Lee and Cho, 1959; Nobuchi, 1973b; Choo and Woo, 1985a; Choo and Woo, 1985b; Nobuchi, 1993; ESK/KSAE, 1994; Park and Lyu, 2007; Paek et al., 2010; Löbl and Smetana, 2011.

Specimen examined. 1 ex., JJ, Harye-ri, Namwon-eub, Seoguipo-si, 2.ix.1996i; 3 exs., JJ, Harye-ri, Namwon-eub, Seoguipo-si, 16.ix.1996.

Distribution. Korea(JJ), Japan, China(Fujian, Guandong), Taiwan.

Host Plants. *Quercus gilva*, *Q. stenophylla*, *Q. grosserrata*, *Q. salicina*, *Q. acuta*, *Q. glauca*, *Q. sessifolia*, *Q. hondai*, *Betula grossa*, *Machilus thunbergii*, *M. japonica*, *M. longifolia*, *Mallotus japonicus*, *Stewartia monodelpha*, *Styrax japonica*, *Illicium religiosum*, *Cleyera japonica*, *Ilex chinensis*, *Prunus spinulosa*, *P. ssiori*, *Symplocos myrtacea*, *Daphniphyllum teijsmanni*, *Abies firma*, *Aesculus turbinata*, *Meliosoma myriantha*, *Castanea crenata*, *Castanopsis cuspidate* var. *sieboldii*, *Actinodaphne lancifolia*, *Fraxinus japonica*, *Distylium racemosum*, *Ternstroemia japonica*, *Styrax japonica* (Choo and Woo, 1985).

171 *Dinoplatypus hamatus* (Blandford, 1894) 가는긴나무좀(신칭) (Plate 12-171)

Platypus hamatus Blandford, 1894a: 138.

Dinoplatypus hamatus: Wood, 1993: 279.

Description.

Body Length. 3.6-4.0mm, slightly more slender than *D. calamus*, reddish testaceous, elytra with apex darker and slightly pale at middle. Male. Head with frons concave. A short longitudinal impressed line in middle of frons. Pronotum with unclear longitudinal patch of punctures along a long longitudinal impressed line behind middle. Apex of elytra with an oblique terminal impressed surface, its outer margin strongly angulated and slightly elevated, curving away from suture so as to form an angle with its fellow above the terminal impression, and then sinuate at sides. External angles produced in a curve downwards and backwards. Emargination of posterior margin of elytra wider than deep and two times wider than long. Female. Head with frons similarly concave with male. A short longitudinal impressed line in middle of frons. Pronotum with elliptical patch of punctures along a long longitudinal impressed line behind middle. Punctures of patch on anterior part bigger than on posterior part. Apex of elytra with an truncated and slightly impressed surface, its outer margin arced and not angulate at beginning of declivity. External angles produced in a curve downwards and gently connected with inner emargination. Emargination of posterior margin of elytra wider than deep. Emarginate inner margin narrowly connected with outer margin and elytral suture angulate with posterior emarginate line (Blandford, 1894a).

Korean Record. new to Korea.

Specimen examined. 443 exs., GN, Gyosan-ri, Hamyang-eub, Hamyang-gun, 26.vi.2013.

Distribution. Korea (South), Japan.

Genus *Platypus* Herbst, 1793

Platypus Herbst, 1793: 128. (Type species: *Bostrichus cylindrus* Fabricius, 1792)

Cylindra Deftschmidt, 1825. Fau. Aust., 3: 87.

Diagnosis.

Posterior portions of metasternum and metepisternum not impressed or armed. Protibiae not sexually dimorphic. Male sutural apex on elytral declivity not dehiscent. Mycetangia pores numerous when present on pronotum.

Key to the species of Korean *Platypus*

1. Body stout, large; rather strong spines on elytral declivity; apex of declivity with irregular projection; 4th abdominal sternites with a pair of strongly pointed spines ----- *P. lewisi*
- Body slender, less large; spines on elytral declivity of male less strong; apex of declivity crescent-shaped; abdominal sternites without spines ----- *P. koryoensis*

172 *Platypus koryoensis* (Murayama, 1930) 광릉긴나무좀 (Plate 13-172)

Crossotarsus koryoensis Murayama, 1930: 28 (TL: Korea; Koryo).

Platypus koryoensis: Schedl, 1972: 219.

Description.

Body Length. 3.8-4.6 mm, slender, less large; spines on elytral declivity of male less strong; apex of declivity crescent-shaped; abdominal sternites without spines. In female, lateral sides of pronotum deeply concave, punctuation of the sides of

median sulcus heart-shaped and apex of elytral declivity higher truncated apex. In male, apex of elytral declivity crescent shaped and hind coxal process absent.

Korean Record. Murayama, 1930b; Murayama, 1934d; Murayama, 1937; Cho, 1957; Nobuchi, 1973b; Choo and Woo, 1985a; Choo and Woo, 1985b; Choo and Woo, 1989a; ESK/KSAE, 1994; Hong et al., 2006; Park and Lyu, 2007; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 4ex., GG., Pocheon-si, Kwangreung, 11.xi.1981; 14ex., GG, Ibaejae, Seongnam-si, 4.x.2004; 2ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2012; 1ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 11.ix.2012; 111ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 23.v.2012; 616ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 5.vi.2012; 2554ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 19.vi.2012; 1828ex., Seoul, Seongbuk-gu, Mt. Bukhansan, 2.vii.2012; 3ex., GG, Paju-si, 30.v.2012; 732ex., GG, Paju-si, 28.vi.2012.

Distribution. Korea, Russia (Ussuri, Primorye), Taiwan.

Host Plants. *Quercus serrata*, *Q. acutissima*, *Q. aliena*, *Q. mongolica*, *Acer* sp., *Carpinus laxiflora* (Hong et al., 2006; Beaver and Shih, 2003). Most of the host records are from the Fagaceae (Beaver and Shih, 2003). There is a clear preference for the genus *Quercus* in Korea.

173 *Platypus lewisi* Blandford, 1894 루이스긴나무좀 (Plate 13-173)

Platypus lewisi Blandford, 1894: 134 (TL: Japan).

Platypus uncacanthurus Beeson, 1941: 347.

Description.

Body 5.2-5.8 mm, frons nearly flat with short longitudinal line in lower part; intermixed with fine and large punctures. Pronotum with cordate patch of small punctures. Elytral interstriae slightly convexed; declivity gently sloped; upper part of declivity with large spines, odd numbered interstriae with small spines; apex of elytral declivity with outer largely bisinuate tubercles and inner a small tubercle.

Korean Record. Murayama, 1932; Murayama, 1934d; Murayama, 1937; Cho, 1957; Ju, 1969; Choo and Woo, 1985a; Choo and Woo, 1985b; Nobuchi, 1993; ESK/KSAE, 1994; Park and Lyu, 2007; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. 1ex., JJ, Donneko, Seoguipo, Jeju Province, 24.vii-4.viii.2006; 5ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 1.v.2012; 238ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 29.v.2012; 79ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 22.vi.2012; 4ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 18.vii.2012; 11ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 2.viii.2012; 3ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 16.viii.2012; 6ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 11.ix.2012; 6ex., GW, Jeongseon-gun, Jeongseon-eub, Mt. Gariwangsan, 9.x.2012.

Distribution. Korea, Japan, China, Taiwan, Bhutan, India.

Host Plants. *Quercus mongolica* var. *grosseserrata*, *Q. acuta*, *Q. aliena*, *Q. serrata*, *Q. gilva*, *Castanea crenata*, *Aesculus turbinata*, *Abies firma*, *Cryptomeria japonica*, *Betula grossa*, *Fagus crenata*, *Kalopanax septemlobus*, *K. rucinifolium*

(Choo and Woo, 1985).

Remarks. Polyphagous but with a clear preference for the Fagaceae (Beaver and Shih, 2003).

Genus *Treptoplatypus* Schedl, 1939

Treptoplatypus Schedl, 1939: 401. (Type species: *Crossotarsus trepanatus* Chapuis, 1865)

Diagnosis.

Male elytral declivity strongly narrowed, rather abruptly, obliquely truncate and dehiscent at sutural apex. Male elytral apex strongly attenuate; declivity of male usually concave. Mycetangia pores on female pronotum numerous.

Key to the species of Korean *Treptoplatypus*

1. Frons slightly and longitudinally concave; elytral declivity slanted down and with parted carinae at each side; metasternum longitudinally concave
----- *T. solidus*
- Frons slightly and roundly concave; elytral declivity not carinated at each side; metasternum not concave ----- *T. severini*

174 *Treptoplatypus severini* (Blandford, 1894) 못뽑이긴나무좀 (Plate 13-174)

Platypus severini Blandford, 1894: 133, 136-137(TL: Japan).

Treptoplatypus severini: Beaver and Shih, 2003: 84.

Description.

Body 4.7-5.6 mm, pale brown. Antenna, tibia, and tarsus yellowish-brown.

Posterior part of elytra dark brown to blackish-brown. Frons slightly concave and covered with somewhat thick polygonal wrinkles. Longitudinal line at middle short. Black line on postmiddle area of pronotum without a cordate patch of punctures. Elytra parallel sided to three-fourths length and then somewhat shortly attenuated and slanted down. Elytral striae impressed and intervals slightly convex. Elytral declivity covered with several rows of sticky pubescence. Apical part of elytra divided like a claw hammer. Aedeagus cylindrical and posterior part bisinuate.

Korean Record. Park and Lyu, 2007; Paek et al., 2010; Löbl and Smetana, 2011.

Distribution. Korea (south), Japan, southeastern China, Russia (Primorye, Kuril Is), Taiwan.

Specimens examined. 4ex., JN, Piagol, Mt. Jirisan, Gurye-gun, 14.v. 1999.

Host Plants. *Fagus crenata*, *Tilia japonica*, *Alnus hirsuta*, *Aesculus turbinata* (Murayama, 1925).

175 *Treptoplatypus solidus* (Walker, 1858) 긴나무좀 (Plate 13-175)

Platypus solidus Walker, 1858: 286 (TL: Ceylon).

Platypus caudatus Motschulsky, 1863: 509.

Platypus cordatus Motschulsky, 1863: 510.

Platypus exilis Chapuis, 1865: 268.

Platypus obtusus Chapuis, 1865: 268.

Platypus pilifrons Chapuis, 1865: 265.

Platypus rudis Chapuis, 1865: 268.

Treptoplatypus solidus: Wood, 1993: 279.

Description.

Body 3.6-4.2 mm, frons slightly concave with weak polygonal wrinkles. Male without pores on pronotum; anterior part of pronotal sulcus slightly branched. Female with two large pores on anterior part of pronotal sulcus. Elytral declivity of male dotted and linear carinae at each sides; declivity posteriorly attenuated and bluntly pointed.

Korean Record. Murayama, 1930b; Murayama, 1936; Murayama, 1937; Cho, 1957; Nobuchi, 1973b; Choo and Woo, 1985a; Choo and Woo, 1985b; Nobuchi, 1993; ESK/KSAE, 1994; Park and Lyu, 2007; Paek et al., 2010; Löbl and Smetana, 2011.

Specimens examined. I could not examine any Korean specimen. 1♂, 1. Nov. 1991. No data. Intercepted by quarantine inspection; 13♂, 6♀, Intercepted by quarantine inspection of the logs of *Shorea* sp. from Papua New Guinea. July. 1988. (CPQS/NPQS)

Distribution. Korea, Japan, Taiwan, Indonesia (Aru Is., Borneo, Sumatra, Java), Malaysia, Moluccas, Philippines, Singapore, Burma, India, Nepal, Sri Lanka, Vietnam, Aroe Is., Australia, Caroline Is., Guam, Mariana Is., New Britain, New Guinea, Solomon.

Host Plants. *Ficus retusa*, *Canarium* sp., *Hevea brasiliensis* (Choo and Woo, 1985).

2. DNA barcodes in the main species of the subfamily Scolytinae and Platypodinae

2-1. Power of discrimination in higher hierarchy of DNA barcode.

As a result of total 109 species in subfamily scolytinae and platypodinae, some tribe groups clearly are divided into separated branches and show monophyletic aspects (Plate 18). For examples, tribe Ipini (Fig. 9), Scolytini (Fig. 20), Scolytoplatypodini (Fig. 19), Xyloterini (Fig. 17) clearly divided into an independent monophyletic group. In case of tribe Xyleborini (Plate 18), they shows almost independent tree from other tribes except containing some species in genus *Coccotrypes* of tribe Dryocoetini (Fig. 13-2, 15-2). Tribe Hylastini and Hylurgini (Fig. 11) also clearly divided into separated monophyletic groups in the level of tribes and genera. Tribe Scolytini also clearly united into a monophyletic group (Fig. 17).

In a genus level, somewhat chaotic situations occur in several group. Tribe Ipini is clearly separated from other tribes and genus *Pityogenes* also clearly separated with other genera, but genus *Ips* and *Orthotomicus* are mixed into paraphyletic group (Fig. 9). This phenomenon also occurred in other genera group. Most of species of genus *Cyclorhipidion* together into a subtree in the tree of Xyleborini, but one species, *C. perpilosellum* are located in other branch (Figs. 12, 16). This situation not only can be occurred when *C. perpilosellum* is located inadequately into wrong genus, but also can be occurred when the power of the discrimination of DNA barcodes analysis in higher hierarchy is too lower. So, in this case, we have to use some other sites of mitochondrial genes or nuclear genes for increasing the discrimination. Still, the Xyleborini group is a big and chaos group. There are a lot of different external shapes of species in single genus *Xyleborus*.

And, the tribe Dryocoetini, Polygraphini, Cryphalini, Crypturgini, Diamerini, Hylesinini and Phloeosinini are unable to confirm the phylogenetic relationships only with DNA barcodes analysis (Fig. 10-1,2,3).

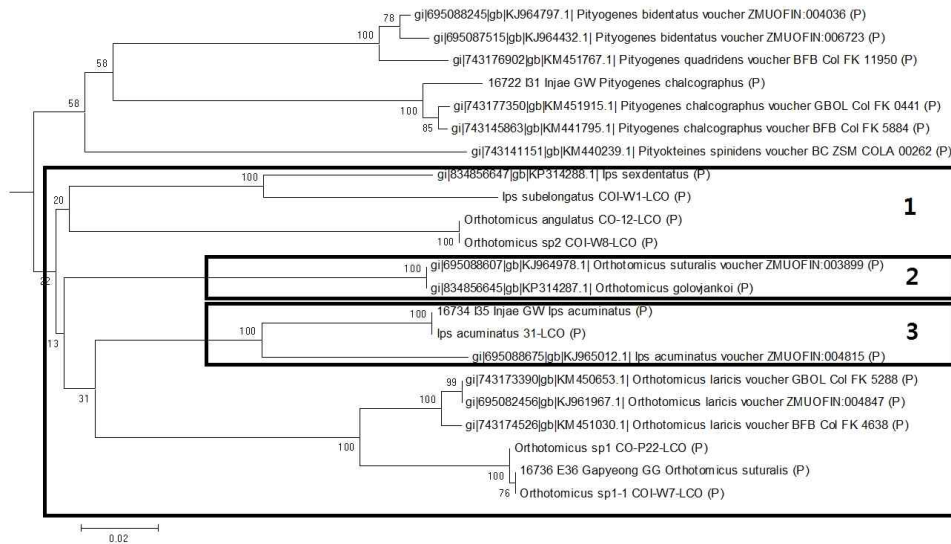


Fig. 9. A separate subtree of Ipini in Neighbor-joining (NJ) tree.

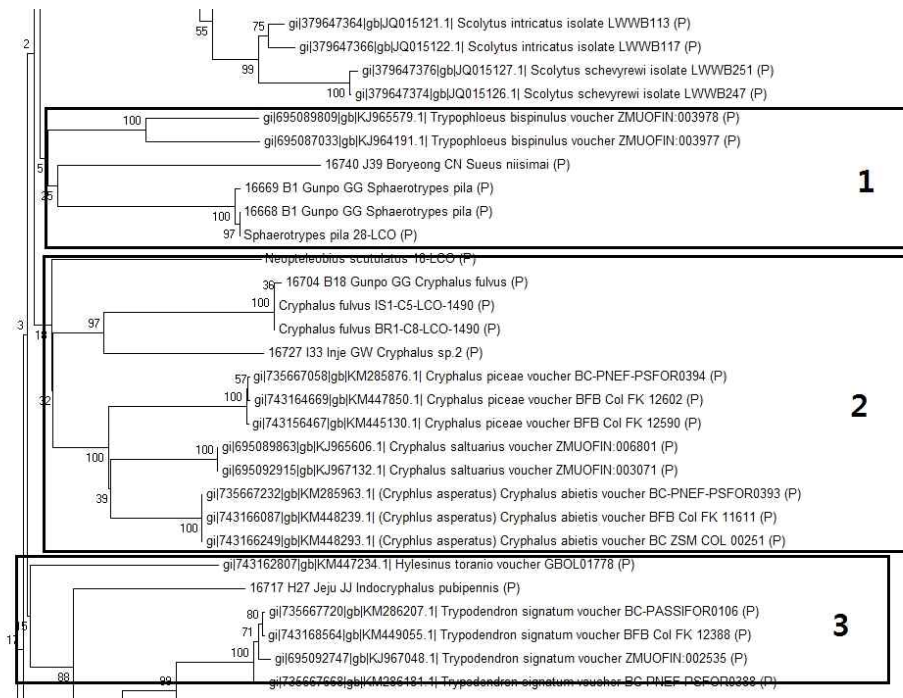


Fig. 10. A partial subtree of Scolytinae in Neighbor-joining (NJ) tree.

2-2. Discovering and confirm the new species.

In case of some species having minor morphological differences, the DNA barcodes analysis is very useful for confirming and deciding the group which have some slightly morphological differences should be divided into new species or not.

As a result of DNA barcode analysis, I found some new species from 4 genera as below.

Tomicus heuksandoensis **sp. nov.**

Cyclorhipidion pseudopelliculosum **sp. nov.**

Xyleborinus kwangreungensis **sp. nov.**

Xylosandrus pseudogermanus **sp. nov.**

2-2-1. *Tomicus heuksandoensis* **sp. nov.**

This new species is very similar to *Tomicus piniperda* in external characters. But the result of DNA barcodes analysis between *T. piniperda* and *T. heuksandoensis* sp. nov. are clearly divided into two groups (Fig. 11-1). The interspecific divergences between these two species range from 15.1-16.6%.

2-2-2. *Cyclorhipidion pseudopelliculosum* **sp. nov.**

This new species is similar to *C. pelliculosum* and *C. bodoanum* in external characters. But the result of DNA barcodes analysis between those three species are clearly divided into another groups (Fig. 12-1). The interspecific divergence between *C. pelliculosum* and *C. pseudopelliculosum* range from 10.0-10.2% and the interspecific divergence between *C. bodoanum* and *C. japonicum* range from 14.2-14.6%. The infraspecific divergence of *C. bodoanum* range from 0-1.7%. *C. japonicum* and the new species, *C. pseudopelliculosum* are combined in this genus, well.

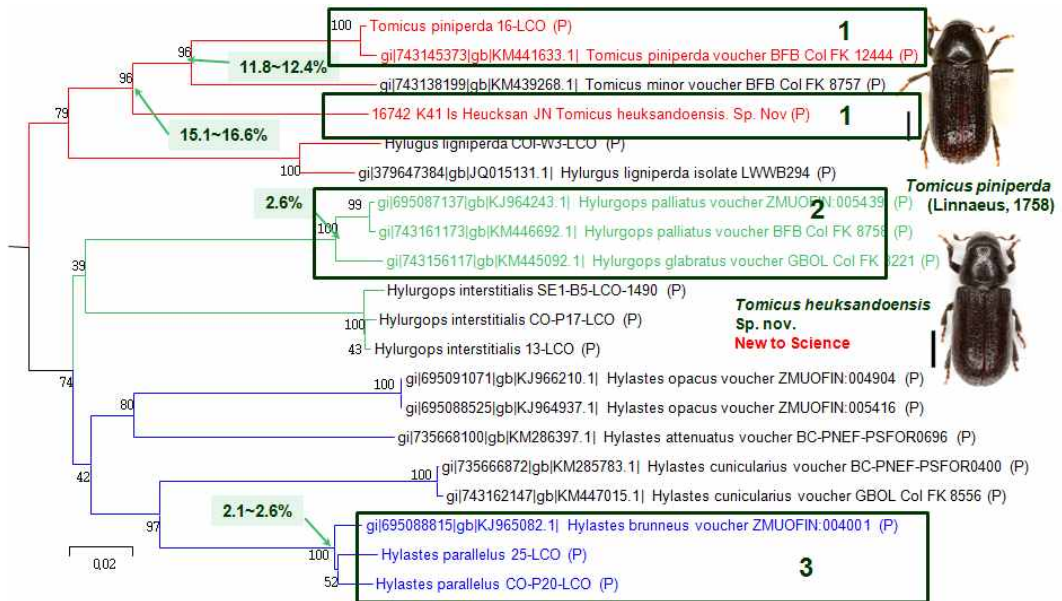


Fig. 11. A separate subtree of Hylastini and Hylurgini in Neighbor-joining (NJ) tree.

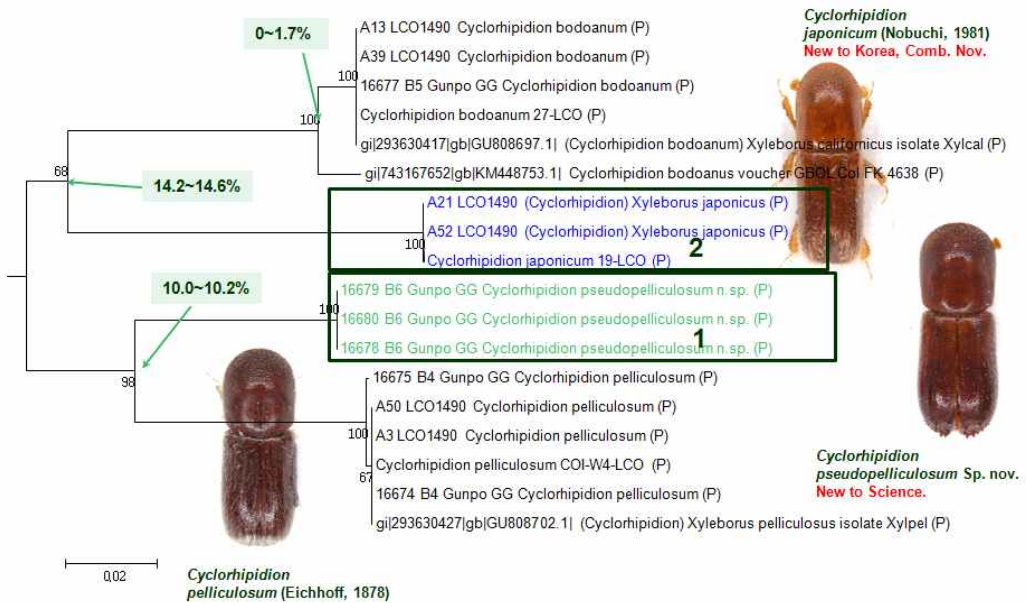


Fig. 12. A separated subtree of genus *Cyclorhipidion* in Neighbor-joining (NJ) tree. 1: *C. pseudopelliculosum*; 2: *C. japonicum*.

2-2-3. *Xyleborinus kwangreungensis* **sp. nov.**

This new species is very similar to *X. attenuatus* and *X. schauffusi* in external characters. After reexamination of the specimens from Kwangreung used in the paper by Choo and Woo (1989a), those specimens are belong to this new species. The result of DNA barcodes analysis between those three species are clearly divided into three groups (Fig. 13-1). *X. kwangreungensis* and *X. schauffusi* are much closer than *X. attenuatus* in the external characters, but *X. kwangreungensis* and *X. attenuatus* are much closer than *X. schauffusi* in the DNA barcodes analysis. *X. schauffusi* used in this study was collected in Japan.

2-2-4. *Xylosandrus pseudgermanus* **sp. nov.**

This new species is very similar to *X. germanus* in external characters. But the result of DNA barcodes analysis between those three species are clearly divided into another groups (Fig. 14-1). The newly recorded species, *X. glabratus* to Korean fauna is intimately combined with these two species. Although the body shape quite different, they all have a distinctly and strongly carinated posterolateral costa.

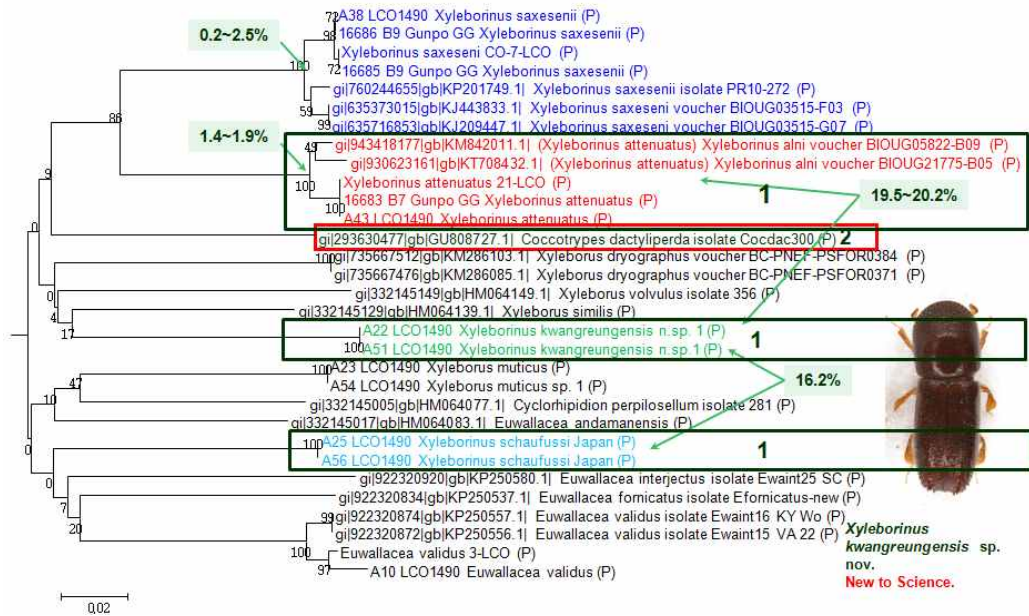


Fig. 13. A partial subtree of *Cyclorhipidion*, *Euwallacea*, and *Xyleborus* in Neighbor-joining (NJ) tree.

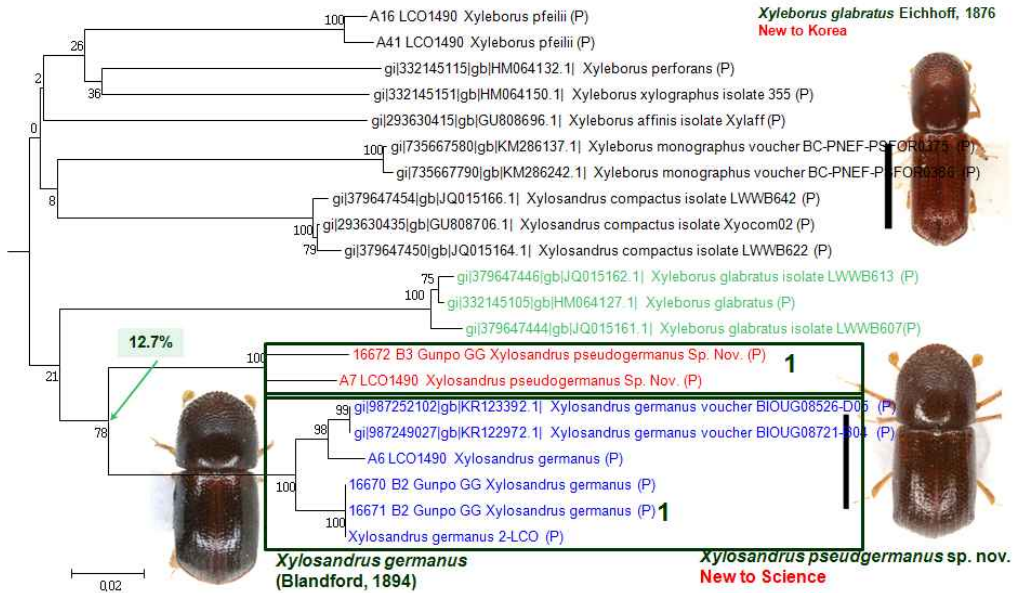


Fig. 14. A partial subtree of *Xylosandrus* and *Xyleborus* in Neighbor-joining (NJ) tree.

2-3. Discovering of the mis-identification, synonym, and mis-location into wrong genus.

2-3-1. Discovering the mis-identification.

In the species level, the mis-identification can be easily distinguished. I found that an information of DNA barcodes which was identified with *X. germanus* is a mis-identification of *X. crassiusculus* after comparing the barcodes and check the specimens using in the DNA barcodes analysis (Fig. 15-1).

In case of *T. lineatum*, Korean specimens and other voucher specimens in NIAST are almost same each other in external characters. But, the result of Korean specimens and voucher specimens in NCBI clearly divided into two groups (Fig. 16). The intraspecific divergence of this species range from 14.7-16.5%. So, Korean specimens can be a new species or another species not yet recorded to Korean fauna, and more careful examinations on these two groups are needed.

In similar case with *T. lineatum*, the result of *S. intricatus* clearly divided into two groups (Fig. 17-2). *S. intricatus* groups also need more careful examinations about species level. In the results, the infraspecific divergence range from 24.7-34.2%. This means those specimens group absolutely belong to other species.

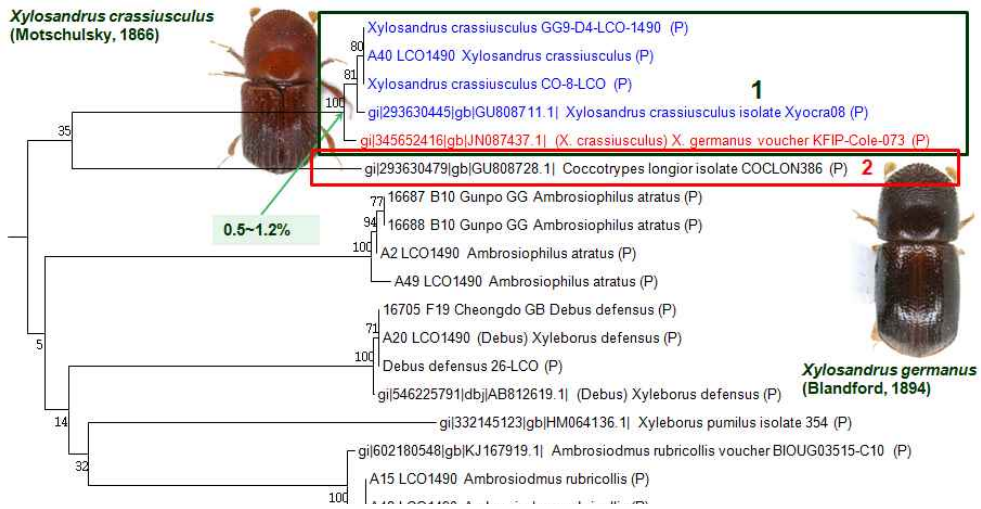


Fig. 15. A partial subtree of Xyleborini in Neighbor-joining (NJ) tree.

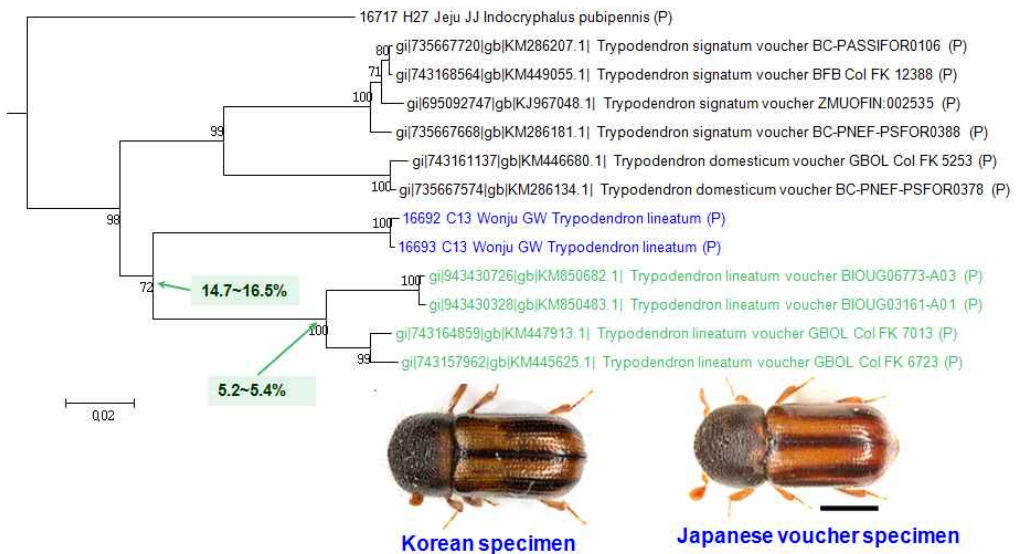


Fig. 16. A partial subtree of Xyloterini in Neighbor-joining (NJ) tree.

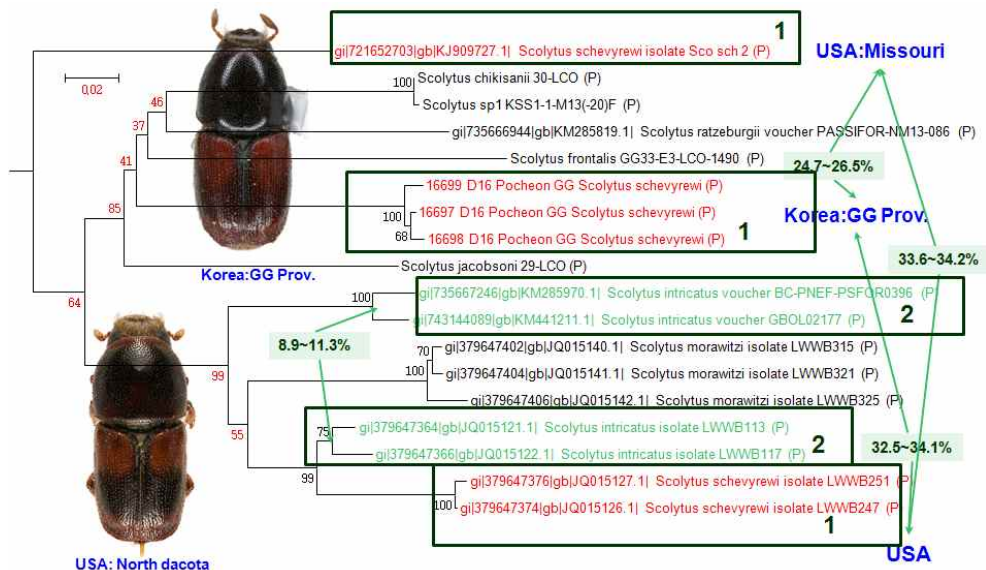


Fig. 17. A partial subtree of Scolytini in Neighbor-joining (NJ) tree.

2-3-2. Discovering the mis-synonym of *S. sinensis*.

In case of *S. mikado* and *S. sinensis*, many morphological characters are very similar to each other, but clearly distinguished by several characters (Fig. 19). Tubercles on prosternum and prosternal processes show very important differences between them and I found the difference of coxal pubescences pattern for distinguishing the species. DNA barcodes analysis also shows these two species are clearly divided into two groups (Fig. 18). The interspecific divergence between these to species range from 10.8-11.2% and intraspecific divergence range from 0.2-1.0%. So, the species, *S. sinensis* should be resurrected with a valid species. The result of *S. schevyrewi* clearly divided into three groups (Fig. 17-1). *S. schevyrewi* belongs to three branches in the result, and they are quite far from each others. So, Korean species can be resurrected independent species, *S. seoulensis* which had been recorded by Murayama. The confusion and great

variability of this species were already mentioned by Michalski (1973).

2-3-3. Change the generic position.

Xyleborus japonicus and *X. laetus* now belong to genus *Xyleborus*. In case of *X. japonicus*, DNA barcodes analysis was conducted and this species combined into a subtree of genus *Cyclorhipidion* (fig. 12-2). So, *X. japonicus* should be moved to the genus *Cyclorhipidion*. And *X. laetus* has very similar external characters except the size and this species also should be transferred to that genus. So, those species change the name with *C. japonicum* and *C. laetum*.

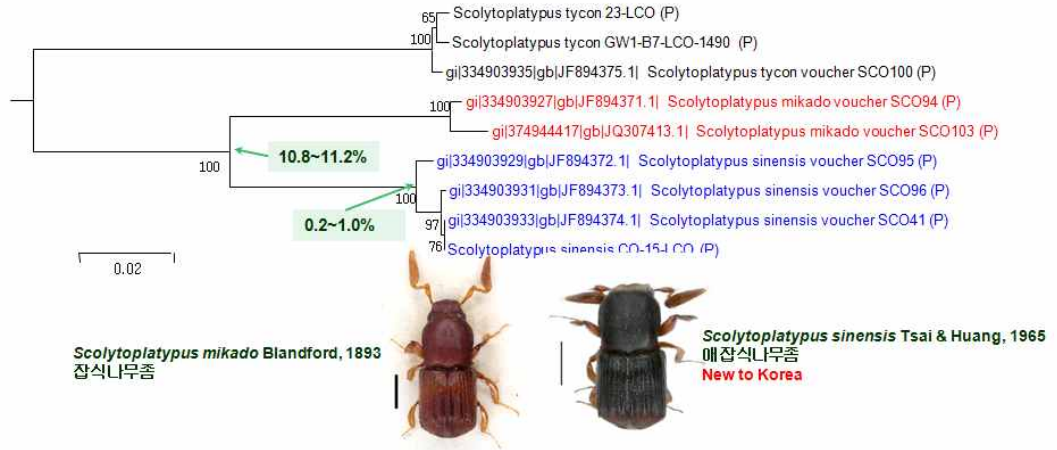


Fig. 18. A partial subtree of Scolytoplatypodini in Neighbor-joining (NJ) tree.

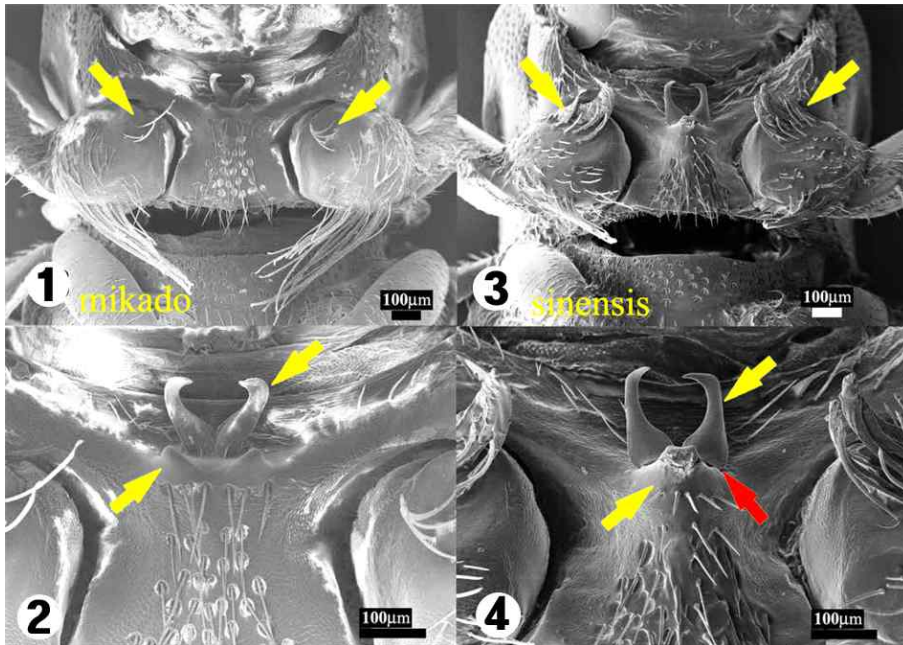


Fig. 19. A comparison of external characters between *S. miado* (1, 2) and *S. sinensis* (3, 4).

IV. Discussion

1. Taxonomic review of Korean Scolytinae and Platypodinae

As the results of this study, in total, 175 species of Scolytinae and Platypodinae are recorded in the Korean fauna. I examined the total 89 species (50.9%) of recorded Korean species, containing four new species and 10 newly recorded species. For the remaining 86 species (49.1%), I checked the records or examined the type specimens and voucher specimens which were recorded by authors from other countries. I took the photographic images of 147 species that are listed in this study (Table 4, Plate 1-17).

Table. 4. The number of species used in this study.

	Recorded species	Type specimens	Voucher specimens	Only the records	Korean specimens Confirmed
Number of species(%)	175(100%)	36(20.6%)	111(63.4%)	28(16%)	89/175(50.9%)

Ju (1964, 1969) added 59 species to Korean fauna but the records were a list or the simplified distributional records without collection locality data. Among the 86 species which Korean samples were not unexamined, 49 species are known to occur only in northern part of Korea (Table. 5). The host tree species of many of them is *Larix olgensis* var. *koreana* which mainly distributed in Northern part of Korean peninsula. If those 50 species occurred in South Korea, the occurrences of those species could be limited at the higher mountains in Gangwon Province such as Mt. Odaesan. In the case of the species, *Polygraphus nobuchii*, *Dryocoetes carpivorius*, occurred only in Jeju islands. I was not able to collect new additional specimens because there are rigorous environmental and legal restrictions

for the taxonomic survey in Mt. Hallasan. Especially, the type localities of *Polygraphus nobuchii* Choo & Woo, 1989, *Dryocoetes carpinivorus* Choo & Woo, 1989, and *Xyleborinus octiesdentatus* (Murayama, 1931) are Jeju Island and Mt. Hallasan. *Coccotrypes carpophagus* (Hornung, 1842) was also recorded from Seongpanak in Mt. Hallasan. Mt. Hallasan is now a National Park, therefore an unofficial personal survey of the fauna is restricted by the local government.

Table. 5. Species list of only known in northern part of Korea.

<i>Hylastes cunicularius</i> Erichson, 1836	<i>Crypturgus hispidulus</i> C.G.Thomson, 1870
<i>Hylurgops longipillus</i> (Reitter, 1895)	<i>Dryocoetes autographus</i> (Ratzeburg, 1837)
<i>Alniphagus costatus</i> (Blandford, 1894)	<i>Dryocoetes baikalicus</i> Reitter, 1899
<i>Hylesinus laticollis</i> Blandford, 1894	<i>Dryocoetes hectographus</i> Reitter, 1913
<i>Hylesinus pravdini</i> Stark, 1936	<i>Dryocoetes infuscatus</i> Murayama, 1937
<i>Tomicus puellus</i> (Reitter, 1895)	<i>Dryocoetes rugicollis</i> Eggers, 1926
<i>Xylechinus bergeri</i> Spessivtsev, 1919	<i>Taphrorychus bicolor</i> (Herbst, 1794)
<i>Xylechinus pillosus</i> (Ratzeburg, 1837)	<i>Ips duplicatus</i> (C.R.Sahlberg, 1836)
<i>Phloeosinus aubei</i> (Perris, 1855)	<i>Ips typographus</i> (Linnaeus, 1758)
<i>Polygraphus abietis</i> Kurentsov, 1941	<i>Pityogenes foveolatus</i> Eggers, 1926
<i>Polygraphus jezoensis</i> Niisima, 1909	<i>Pityogenes seirindensis</i> Murayama, 1929
<i>Polygraphus subopacus</i> C.G.Thomson, 1871	<i>Pityokteines spinidens</i> (Reitter, 1895)
<i>Pityophthorus pini</i> Kurentsov, 1941	<i>Pseudothysanoes modestus</i> (Murayama, 1940)
<i>Allernoporus euonymi</i> Kurentsov, 1941	<i>Scolytus dahuricus</i> Chapuis, 1869
<i>Cryphalus asperatus</i> (Gyllenhal, 1813)	<i>Scolytus intricatus</i> (Ratzeburg, 1837)
<i>Cryphalus coryli</i> Stark, 1936	<i>Scolytus koltzei</i> Reitter, 1894
<i>Cryphalus kurenzovi</i> Stark, 1936	<i>Scolytus morawitzi</i> Semenov, 1902
<i>Cryphalus latus</i> Eggers, 1929	<i>Scolytus pubescens</i> Stark, 1936
<i>Cryphalus mandschuricus</i> Eggers, 1929	<i>Scolytus ratzeburgii</i> E.W. Janson, 1856
<i>Cryphalus redikorzevi</i> Berger, 1917	<i>Scolytus trispinosus</i> Strohmeier, 1908
<i>Cryphalus scopiger</i> Berger, 1917	<i>Scolytoplatypus daimio</i> Blandford, 1893
<i>Ernoporicus corni</i> (Kurentsov, 1941)	<i>Anisandrus dispar</i> (Fabricius, 1792)
<i>Procryphalus fraxini</i> (Berger, 1917)	<i>Trypodendron gaimaense</i> (Murayama, 1937)
<i>Trypophloeus binodulus</i> (Ratzeburg, 1837)	<i>Trypodendron niponicum</i> Blandford, 1894
<i>Crypturgus cinereus</i> (Herbst, 1794)	

There were two cases of misidentification in the records of Scolytinae. In the case of *Tomicus brevipilosus* Eggers, according to the description by Choo et al.

(1983b), this species has short and dense pubescences on elytral interstices. But, *T. brevipilosus* does not have this short pubescences, and *T. pillifer* or *T. puellus* in this genus have this short pubescences. Therefore, the record of *T. brevipilosus* needs a reexamination. Another species, *Cnestus murayamai*, was firstly recorded from Gwangneung. However it was a mis-identification of the male specimens of other species. This species was collected for the first time at Is. Heuksando in 2015. Therefore, the distribution should be only some islands in the southern part of South Korea.

In the case of genus *Cryphalus*, this genus has about 190 species in the world. Among them, 18 species were recorded in Korea. Among them, seven species are known to occur only in Northern part of Korea until now. All of the members of this genus are very small sized species and most of them have not been taxonomically well studied. More thorough research of genus *Cryphalus* is required.

2. DNA barcodes in the examined species of Scolytinae and Platypodinae

In the case of following groups, I could easily distinguish new species from morphologically similar species using the DNA barcodes analysis. The new species, *Tomicus heuksandoensis*, is very morphologically similar to *T. piniperda* and cannot be easily distinguished from the latter except the differences of the size of minute tubercles on declivity. Even though we initially identified them as *T. piniperda*, the collector of the specimens had some questions on the different occurrence patterns of this new species. Therefore, we examined the DNA differences of the species. As a the result (Fig. 14-1), the interspecific divergence between these two species range from 15.1-16.6%. These differences are much bigger than the differences between *T. piniperda* and *T. minor* those are clearly distinctive species. In the case of the new species, *Xylosandrus pseudogermanus* showed a similar result. This species was hardly distinguished from the species *X. germanus* except the differences of the slightly slender body shape and minute tubercles on declivity. But, the interspecific divergence between these two species is about 12.7%. So, the analysis of the DNA barcodes can be a powerful tool in the case of species with similar morphological characters .Secondly, we can discover mis-identifications of the species. In the case of, *Scolytoplatypus sinensis* had been synonymized with *S. mikado* (Wood, 1989). After examining morphologically, I found that they have clearly different morphological characters and I further used the DNA barcodes analysis. I found that they had 10.8-11.2% differences, those are interspecific divergence ranges.

In the results of DNA barcode analysis, *Trypodendron lineatum*, *Scolytus schevyrewi* and *Ips cembrae* shows high percentage of differences at the infraspecific level. This may mean that the past identifications and

synonymizations of these species could be incorrect; therefore, these species need more careful taxonomic re-examinations. In case of several genera as the follows, a lot of species are belonging to one genus. For example, the genus *Coccotrypes* has 129 species in the world and many other genera (*Cryphalus*=190, *Cyrtogenius*=126, *Hypothenemus*=183, *Pityophthorus*=385, *Polygraphus* =100, *Scolytogenes*=107, *Scolytus*=126, *Xyleborus*=404) also have more than 100 species. Moreover, the species, *Hypothenemus eruditus* has 71 synonyms. So, the intensive studies for correcting the wrong identifications and synonyms on this group. So, not only the morphological descriptions and photos but also the partial DNA sequence analysis should be accompanied when the new species and synonyms are reported. The DNA barcode region can be the efficient DNA information.

Lastly, the generic position of the new species or generically mis-located species can be examined, using the DNA barcode analysis. After analyzing the DNA sequence of *Xyleborus japonicus*, I found this species should be placed in genus *Cyclorhipidion*. So, I moved this species and similar kind of species, *Xyleborus laetus* into genus *Cyclorhipidion*.

Of course, the generic recombination (or movement) of the species based on DNA barcode analysis should be conducted carefully. Because they are usually collected with the trap, there were any genetic contaminations of other species or the infections of the wolbachia bacteria on the process of the experiment. So, the sufficient repeated experiments are needed and the analysis should be conducted carefully.

3. Taxonomic status of Scolytinae and Platypodinae

The family-group name Scolitarii was established by Latreille in 1804 as a subgroup of the Curculionites (now Curculionidae). The name was raised to family Scolytidae by Kirby in 1837. This family name was used consistently until Crowson (1955) moved the family to a subfamily of the Curculionidae. Kuschel (1995) adopted Crowson's classification of the family. The issue of family versus subfamily positions of the classification was renewed by Lawrence and Newton (1995). Wood (1973) provided abundant morphological evidence that indicated that the Scolytidae has a distinct evolutionary lineage and should be considered as a separate family within the huge superfamily Curculionoidea. But, the genus *Protohylastes* Wood, which Wood (1973) considered the most primitive representative of the Hylesininae, has been placed as a synonym of *Psepholax*, a genus in the Cryptorhynchinae, tribe Psepholacini, (Curculionidae) by Zimmerman (1994) and this makes much of Wood's interpretation be untenable (Bright, 2014).

A lot of recent studies were conducted on the phylogenetic or cladistic studies (e.g., Thomson, 1992; Kuschel, 1995; Lyal, 1995; Marvaldi, 1997; Alonso-Zarazaga and Lyal, 1999; Marvaldi and Morrone, 2000; Marvaldi, 2002; Marvaldi et al., 2002; Morimoto and Kojima 2003, 2004; McKenna et al., 2009; Hundsdoefer, Rheinheimer, and Wink, 2009, McKenna, 2011; Jordal, Sequeira and Cognato, 2011; Haran et. al., 2013; Gillett et al., 2014; Jordal et al., 2014). Prior to 2002, there were four phylogenetic or cladistic studies of weevil phylogeny, Kuschel (1995), Marvaldi (1997), Farrell (1998) and Marvaldi and Morrone (2000). Alonso-Zarazaga and Lyal (1999) viewed scolytines as a subfamily of Curculionidae but recognized platypodines as a family, at first. They later changed platypodines with a subfamily Platypodinae (2009). Farrell et al. (2001), using

DNA sequences, performed a phylogenetic analysis of bark and ambrosia beetles in order to establish the rate and direction of changes in life histories. Marvaldi et al. (2002) presented a detailed study designed to discover the relationships and major natural groups within the family Curculionidae, and the results showed strong support for the monophyly of some distinct curculionid groups, Platypodidae and Dryophthorinae. Morimoto and Kojima (2003) concluded that the Scolytidae and Platypodidae should be considered independent families which originated from an intermediate branch between the primitive and advanced families in the Curculionoidea in their comparative morphological study of the weevil head. Legalov (2006) concluded in his study that the superfamily can be divided into three groups, 1) the primitive family Nemonychidae; 2) a second group containing nine families (Anthribidae, Belidae, Oxycorynidae, Eccoptarthridae, Allocorynidae, Rhynchitidae, Attelabidae, Ithyceridae, and Brentidae); and 3) a “higher” group containing six families (Brachyceridae, Cryptolarynoidae, Dryophthoridae, Curculionidae, Scolytidae, and Platypodidae) (Wood, 2014). Hundsdoefer et al. (2009) investigated the phylogeny of the Curculionoidea using mitochondrial and nuclear ribosomal DNA sequences. Cognato and Grimaldi (2009) report the recent discovery of a specimen identical to or closely resembling a modern genus of Scolytidae in Burmese amber from the Cretaceous, about 100 million years BP. Kirejtshuk et al. (2009) also report the discovery of another specimen from Cretaceous Lebanese amber. Jordal et al. (2011) published a phylogenetic study of wood-boring weevils and presented valuable information toward a resolution of the phylogeny of the various families and subfamilies. Bright (2014) explained that the Scolytinae is a distinct evolutionary lineage that evidently arose early in the evolution of the

Curculionidae using the morphological differences of mouthparts, rostrum and tibia. Jordal et al. (2014) insisted that the taxonomic positions of this two subfamily Scolytinae and Platypodinae should be placed under family Curculionidae, based on molecular phylogeny analysis (Fig. 20).

Despite of those many efforts on the phylogeny, of the higher classification of the family Curculionidae and the rank of the subfamily Scolytinae and Platypodinae, are still debated and unresolved. A lot of kinds of characters of Scolytinae also were found in other weevil groups and those characters are not specific to scolytinae (Jordal et al., 2014). But, it is also true that each of the Scolytinae and Platypodinae have unique monophyletic positions in the phylogenetic tree (Marvaldi et al. 2002; Jordal et al., 2014). To solve the problems on the phylogenetic position of these two groups, additional studies using the both of morphological and molecular methods are required. Many generic and species groups in both subfamilies are still not well-positioned in the classification. Therefore, the phylogenetic studies of the higher category classification should apparently be accompanied with the re-arrangements on unclear generic and species positions.

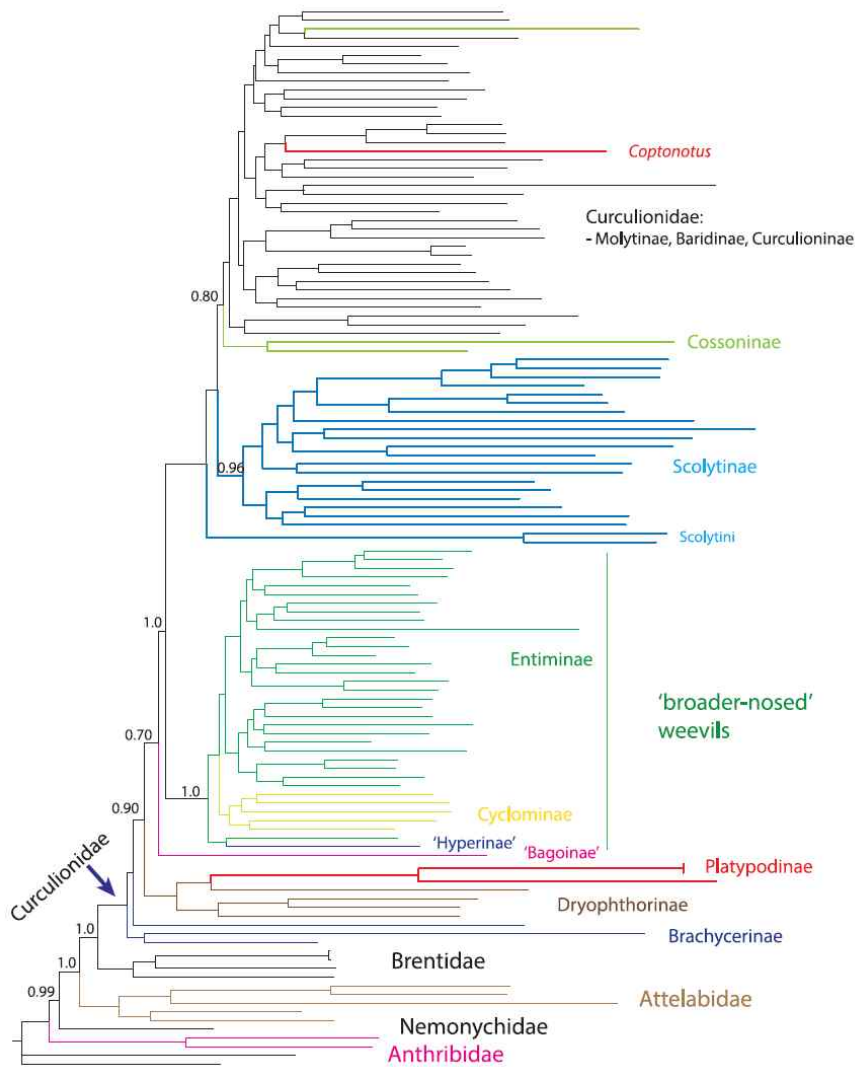


Fig. 20. Mitochondrial genome phylogeny redrawn from Gillett et al. (2014), with various families and subfamilies marked in different colours. Node support values are Posterior probabilities >0.70. (Jordal et al., 2014)

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PLATE

Plate 1. Dorsal and lateral aspects of the adults.

- 1 *Sphaerotrypes pila* Blandford, 1894 왕둥근나무좀
(Japan, Type specimen in BMNH)
- 2 *Hylastes ater* (Paykull, 1800) 소나무먹나무좀
(Switzerland, Voucher specimen in BMNH, determine by Duffy)
- 3 *Hylastes attenuatus* Erichson, 1836 소나무가는나무좀
(Poland, Voucher specimen in BMNH, determine by Bright,)
- 4 *Hylastes brunneus* (Erichson, 1836) 검정뿌리나무좀
(Finland, Voucher specimen in BMNH, determine by Bright)
- 5 *Hylastes cunicularius* Erichson, 1836 가문비뿌리나무좀
(Finland, Voucher specimen in BMNH, determine by Koponen)
- 6 *Hylastes opacus* Erichson, 1836 소나무에먹나무좀
(Finland, Voucher specimen in BMNH, determine by Koponen)
- 7 *Hylastes parallelus* Chapuis, 1875 소나무좁은나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 8 *Hylastes plumbeus* Blandford, 1894 소나무검정좀붙이
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 9 *Hylurgops glabratus* (Zetterstedt, 1828) 갈색소나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 10 *Hylurgops interstitialis* (Chapuis, 1875) 소나무줄나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 11 *Hylurgops longipillus* (Reitter, 1895) 우쭈리잔털나무좀
(Russia Far East, Voucher specimen in NIAST, determine by Eggers and Nijjima)
- 12 *Hylurgops palliatus* (Gyllenhal, 1813) 눈잣나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)

Plate 1. Dorsal and lateral aspects of the adults.

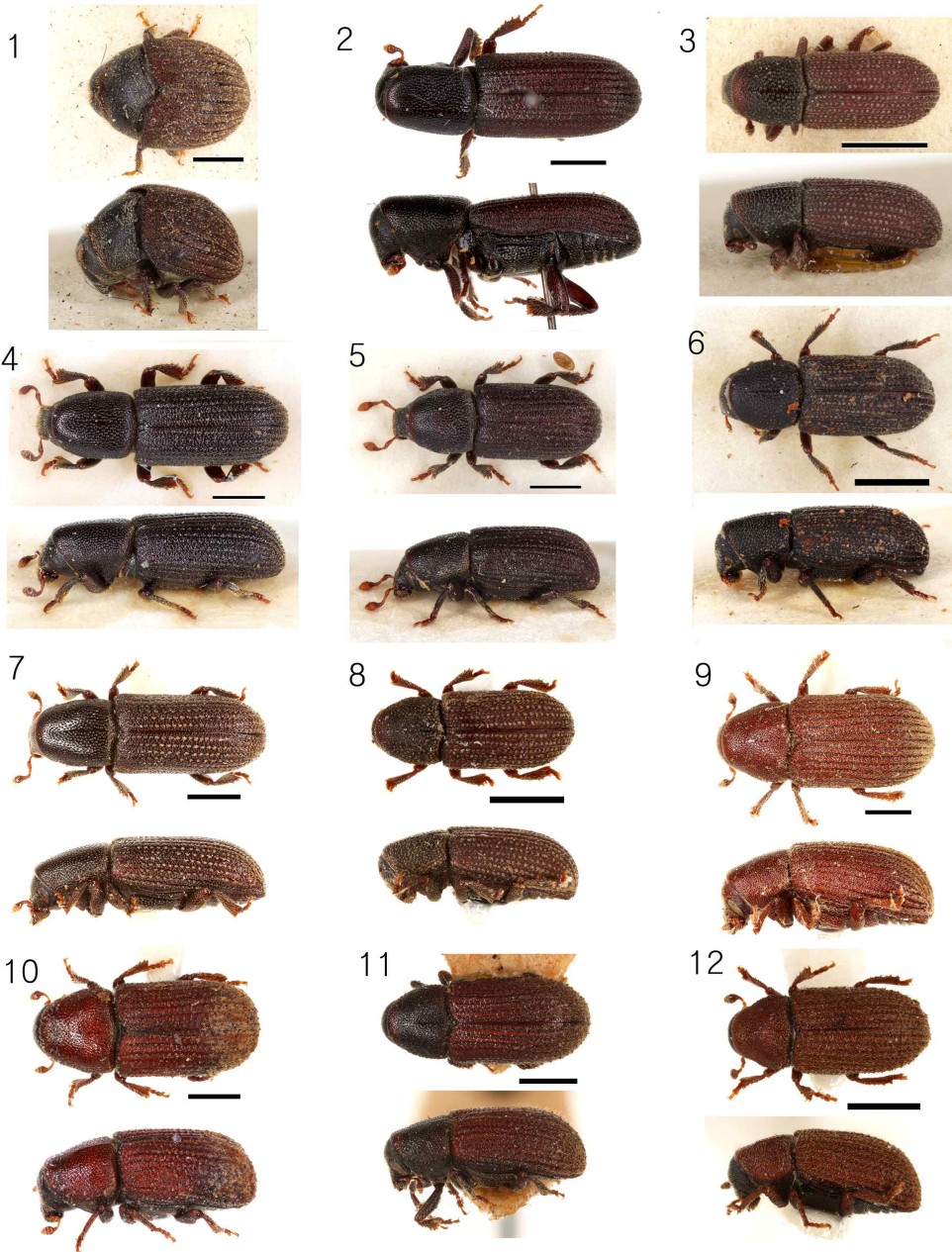


Plate 2. Dorsal and lateral aspects of the adults

- | | |
|--|-------------|
| 13 <i>Hylurgops spessiwzeffi</i> Eggers, 1914
(Japan, Type specimen in BMNH) | 비로봉소나무좀 |
| 14 <i>Alniphagus costatus</i> (Blandford, 1894)
(Japan, Type specimen in BMNH) | 거칠오리나무좀(신칭) |
| 15 <i>Hylesinus cingulatus</i> Blandford, 1894
(Japan, Type specimen in BMNH) | 물푸레나무좀 |
| 16 <i>Hylesinus eos</i> Spessivtsev, 1919
(Russia Far East, Type specimen in BMNH) | 물푸레인피나무좀 |
| 17 <i>Hylesinus laticollis</i> Blandford, 1894
(Japan, Type specimen in BMNH) | 들메인피나무좀 |
| 19 <i>Hylesinus toranio</i> (D'Anthoine, 1788)
(Belgium, Voucher specimen in BMNH) | 두색향나무좀 |
| 20 <i>Hylesinus tristis</i> Blandford, 1894
(Japan, Type specimen in BMNH) | 물푸레떡나무좀 |
| 21 <i>Neopteleobius scutulatus</i> (Blandford, 1894)
(Japan, Type specimen in BMNH) | 느릅나무좀 |
| 22 <i>Hylurgus ligniperda</i> (Fabricius, 1787)
(Japan, Voucher specimen in NIAST, determined by Nobuchi) | 왕털소나무좀(신칭) |
| 23 <i>Tomicus brevipilosus</i> (Eggers, 1929)
(Japan, Voucher specimen in NIAST, determined by Nobuchi) | 잣나무좀 |
| 24 <i>Tomicus minor</i> (Hartig, 1834)
(Japan, Voucher specimen in NIAST, determined by Nobuchi) | 애소나무좀 |
| 25 <i>Tomicus pilifer</i> (Spessivtsev, 1919)
(Japan, Voucher specimen in NIAST, determined by Nobuchi) | 잣솔털나무좀 |

Plate 2. Dorsal and lateral aspects of the adults.



Plate 3. Dorsal and lateral aspects of the adults.

- 26 *Tomicus piniperda* (Linnaeus, 1758) 소나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 27 *Tomicus puellus* (Reitter, 1895) 가문비나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 28 *Tomicus heuksandoensis* **sp. nov.** 흑산도소나무좀(신칭)
(Korea, Type specimen in RIFID)
- 30 *Xylechinus pillosus* (Ratzeburg, 1837) 가문비모피나무좀
(Finland, Voucher specimen in BMNH, determined by Koponen)
- 31 *Sueus niisimai* (Eggers, 1926) 날개흙줄나무좀(신칭)
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 33 *Phloeosinus hopehi* Schedl, 1953 측백나무좀
(Korea, Voucher specimen in NIAST, determined by Nobuchi)
- 34 *Phloeosinus perlatus* Chapuis, 1876 향나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 35 *Phloeosinus rudis* Blandford, 1894 노송나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 37 *Polygraphus horyurensis* Murayama, 1937 앞갈나무가는나무좀
(Korea, Type specimen in NIAST)
- 38 *Polygraphus jezoensis* Niisima, 1909 가문비회색네눈배기나무좀
(Japan, Type specimen in NIAST)
- 40 *Polygraphus proximus* Blandford, 1894 애전나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 41 *Polygraphus subopacus* C.G.Thomson, 1871 가문비꼬마나무좀(개칭)
(Japan, Voucher specimen in NIAST, determined by Nobuchi)

Plate 3. Dorsal and lateral aspects of the adults.

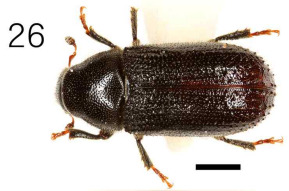


Plate 4. Dorsal and lateral aspects of the adults.

- 42 *Pityophthorus jucundus* Blandford, 1894 북방가문비에나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 45 *Cryphalus asperatus* (Gyllenhal, 1813) 가문비초두나무좀
(Madeira, Voucher specimen in BMNH, determined by F.G. Browne)
- 46 *Cryphalus carpini* Berger, 1917 서어나무좀붙이
(Korea, Voucher specimen in RIFID, determined by Choo)
- 49 *Cryphalus exiguus* Blandford, 1894 뽕나무애나무좀
(Japan, Type specimen in BMNH)
- 50 *Cryphalus fulvus* Niisima, 1908 노랑애나무좀
(Korea, Voucher specimen in RIFID, determined by Park)
- 51 *Cryphalus jeholensis* Murayama, 1939 만주곰솔나무좀
(Hongkong, Voucher specimen in BMNH, determined by Cox)
- 53 *Cryphalus laricis* Niisima, 1909 지리산젓나무좀
(Japan, Type specimen in NIAST)
- 54 *Cryphalus latus* Eggers, 1929 이깔초두나무좀
(Ussuri, Type specimen in NIAST)
- 55 *Cryphalus malus* Niisima, 1909 북송아나무좀
(Japan, Voucher specimen in NIAST, determined by Niisima)
- 56 *Cryphalus mandshuricus* Eggers, 1929 물개암초두나무좀
(Ussuri, Type specimen in NIAST)
- 57 *Cryphalus piceae* (Ratzeburg, 1837) 가문비에나무좀
57-1 (Turkey, Voucher specimen in BMNH, determined by D.J. Atkinson)
57-2 (Unknown, Voucher specimen in BMNH, determined by Nunberg)

Plate 4. Dorsal and lateral aspects of the adults.

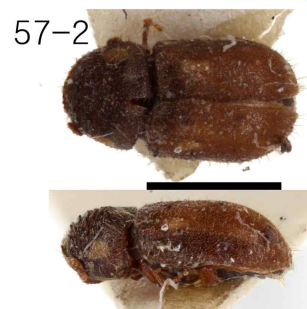
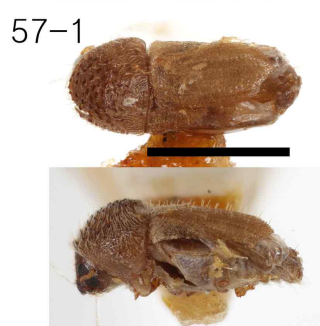
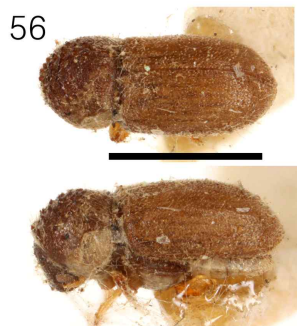
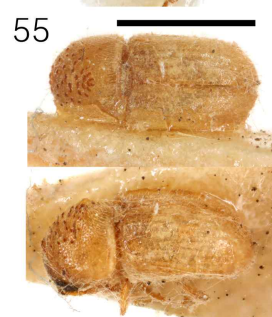
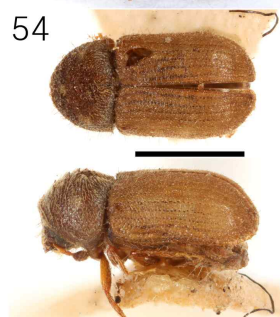
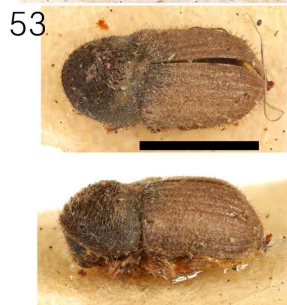
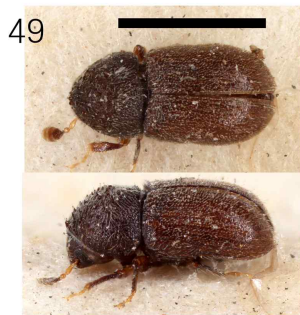


Plate 5. Dorsal and lateral aspects of the adults.

- 58 *Cryphalus piceus* Eggers, 1926 어리에나무좀
(Japan, Voucher specimen in BMNH, determined by Nobuchi)
- 61 *Cryphalus rhusii* Niisima, 1909 붉나무초두나무좀
(Japan, Type specimen in NIAST)
- 62 *Cryphalus scopiger* Berger, 1917 가래초두나무좀
(Ussuri, Voucher specimen in NIAST, determined by Niisima)
- 63 *Eidophelus imitans* Eichhoff, 1876 참나무좀
(Japan, Voucher specimen in BMNH)
- 65 *Ernoporus tiliae* (Panzer, 1793) 분비나무좀
(Unknown, Voucher specimen in BMNH, determined by D.J. Atkinson)
- 67 *Hypothenemus eruditus* (Westwood, 1834) 감나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 68 *Hypothenemus expers* Blandford, 1894 가슴네뿔나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 71 *Scolytogenes puerarar* Choo & Woo, 1989 칩나무좀
(Korea, Neotype in RIFID, determined by Park)
- 73 *Crypturgus cinereus* (Herbst, 1794) 가문비애기나무좀
(Poland, Voucher specimen in BMNH)
- 74 *Crypturgus hispidulus* C.G. Thomson, 1870 잣솔애기나무좀
(Norway, Voucher specimen in BMNH, determined by Bright)
- 75 *Crypturgus pusillus* (Gyllenhal, 1813) 가문비가는나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 77 *Coccotrypes nubilus* (Blandford, 1894) 털나무좀
(Japan, Type specimen in BMNH)

Plate 5. Dorsal and lateral aspects of the adults.

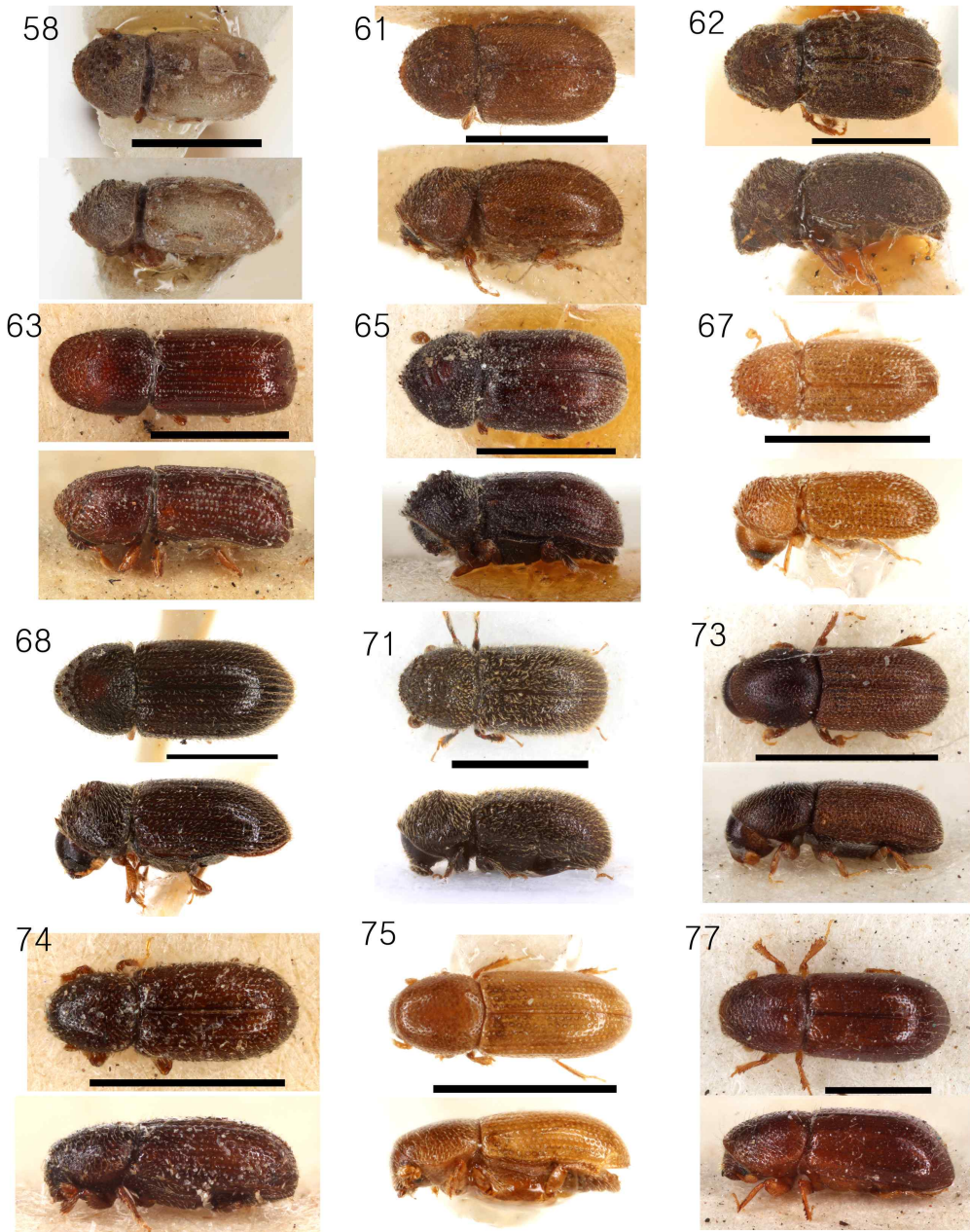


Plate 6. Dorsal and lateral aspects of the adults.

- 78 *Cyrtogenius brevior* (Eggers, 1927) 반송나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 79 *Cyrtogenius luteus* (Blandford, 1894) 층층나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 80 *Dryocoetes autographus* (Ratzeburg, 1837) 가문비뿌리나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 83 *Dryocoetes hectographus* Reitter, 1913 가문비털나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 85 *Dryocoetes pini* Niisima, 1909 섬나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 86 *Dryocoetes rugicollis* Eggers, 1926 날개긴털나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 87 *Taphrorychus bicolor* (Herbst, 1794) 잎갈나무좀붙이
(Japan, Voucher specimen in NIAST, determined by Niisima)
- 88 *Ips acuminatus* (Gyllenhal, 1827) 솔여섯가시나무좀
(Korea, Voucher specimen in RIFID, determined by Park)
- 89 *Ips cembrae* (Heer, 1836) 왕소나무좀
(www.forestryimages.org)
- 90 *Ips duplicatus* (C.R. Sahlberg, 1836) 털이발나무좀
(Finland, Voucher specimen in BMNH, determined by Koponen)
- 91 *Ips sexdentatus* (Boerner, 1766) 세쌍니나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 92 *Ips subelongatus* (Motschulsky, 1860) 이깔여덟이발나무좀
(Korea, Voucher specimen in RIFID, determined by Park)

Plate 6. Dorsal and lateral aspects of the adults.



Plate 7. Dorsal and lateral aspects of the adults.

- 93 *Ips typographus* (Linnaeus, 1758) 여섯가시큰나무좀
(www.forestryimages.org)
- 94 *Orthotomicus angulatus* (Eichhoff, 1876) 소나무빨나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 96 *Orthotomicus golovjankoi* Pyatnitskiy, 1930 향목곧추선나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 97 *Orthotomicus laricis* (Fabricius, 1792) 낙엽송나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 98 *Orthotomicus proximus* (Eichhoff, 1868) 소나무껍질나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 99 *Orthotomicus suturalis* (Gyllenhal, 1827) 이비나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 100 *Orthotomicus tosaensis* (Murayama, 1950) 서해안빨나무좀(신칭)
(Korea, Voucher specimen in RIFID, determined by Park)
- 101 *Pityogenes chalcographus* (Linnaeus, 1760) 여섯가시나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 102 *Pityogenes foveolatus* Eggers, 1926 가문비별나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 103 *Pityogenes seirindensis* Murayama, 1929 청립동나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 104 *Pityokteines spinidens* (Reitter, 1895) 가시소나무좀
(Unknown, Voucher specimen in NIAST, determined by Nobuchi)
- 106 *Scolytus aratus* Blandford, 1894 쉼달나무좀
(Japan, Type specimen in BMNH)

Plate 7. Dorsal and lateral aspects of the adults.

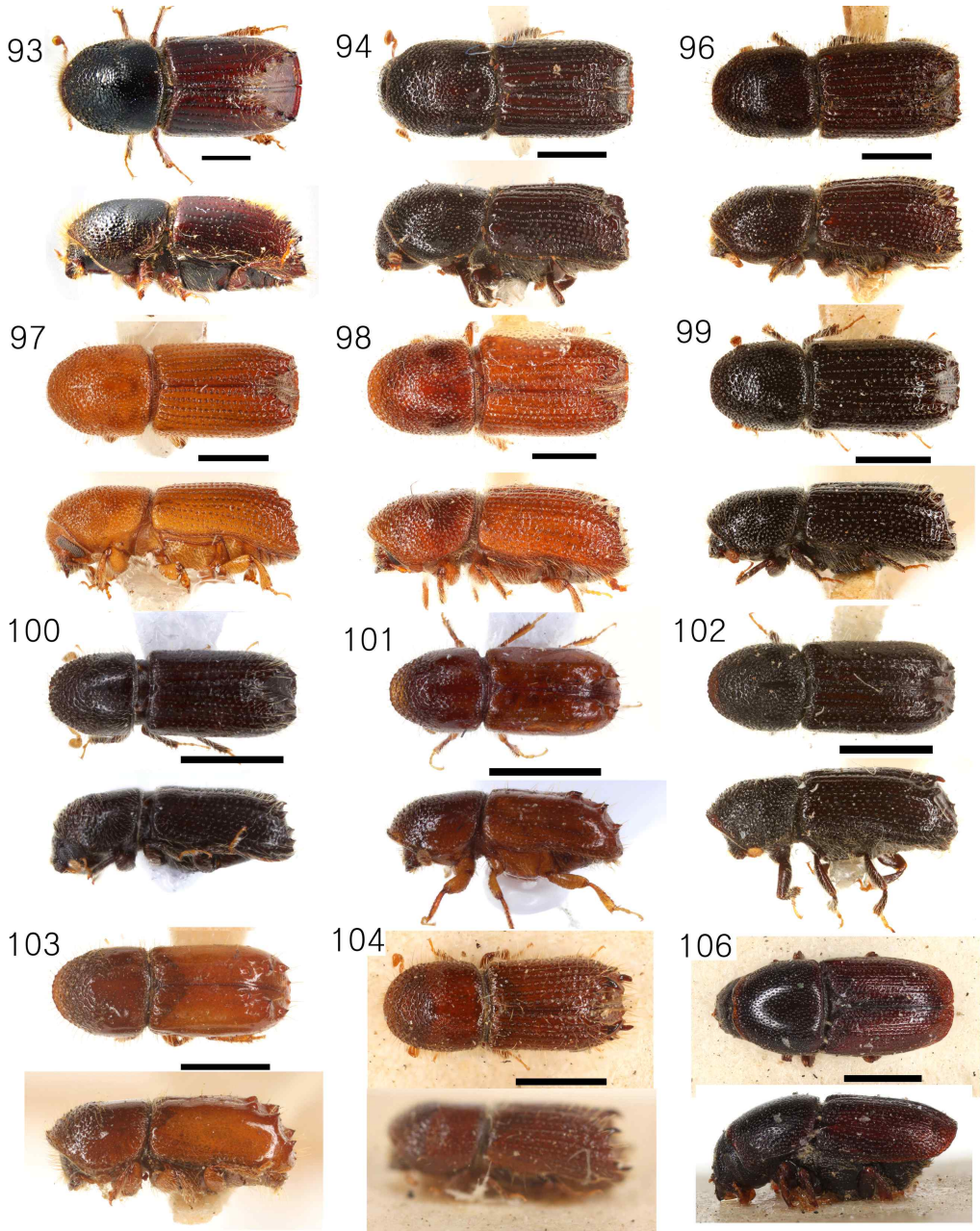


Plate 8. Dorsal and lateral aspects of the adults.

- 107 *Scolytus chikisanii* Niisima, 1905 느릅큰검은나무좀
(Japan, Type specimen in NIAST, determined by Niisima)
- 108 *Scolytus claviger* Blandford, 1894 너도밤나무좀
(Korea, Voucher specimen in NIAST, determined by Niisima)
- 109 *Scolytus dahuricus* Chapuis, 1869 물자작검은나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 110 *Scolytus frontalis* Blandford, 1894 앞털몽뚝나무좀
(Korea, Voucher specimen in RIFID, determined by Park)
- 111 *Scolytus intricatus* (Ratzeburg, 1837) 난티검은나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 112 *Scolytus jacobsoni* (Spessivtsev, 1919) 후지검은나무좀
(Korea, Voucher specimen in RIFID, determined by Park)
- 113 *Scolytus japonicus* Chapuis, 1876 자두애나무좀
(Korea, Voucher specimen in RIFID, determined by Park)
- 117 *Scolytus ratzeburgii* E.W. Janson, 1856 아무르검은나무좀
(Japan, Voucher specimen in RIFID, determined by Park)
- 118 *Scolytus schevyrewi* Semenov, 1902 서울나무좀
(Korea, Voucher specimen in RIFID, determined by Park)
- 119 *Scolytus semenovi* (Spessivtsev, 1919) 배긴털나무좀
(Korea, Voucher specimen in RIFID, determined by Park)
- 120 *Scolytus trispinosus* Strohmeyer, 1908 셋침검은나무좀
(Japan, Voucher specimen in RIFID, determined by Park)
- 121 *Scolytoplatypus daimio* Blandford, 1893 독나무좀
(Japan, Type specimen in BMNH)

Plate 8. Dorsal and lateral aspects of the adults.

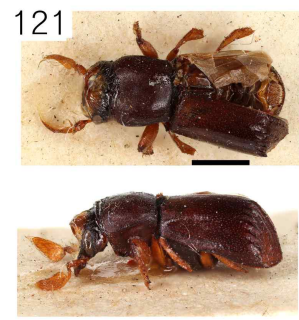
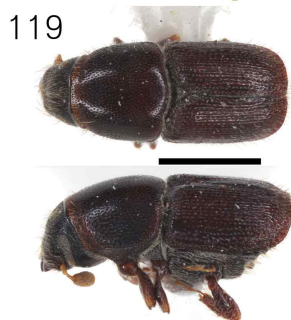
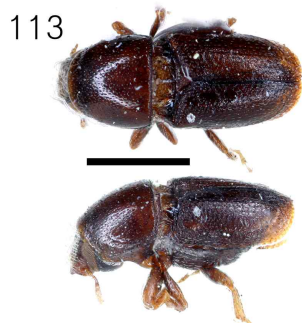
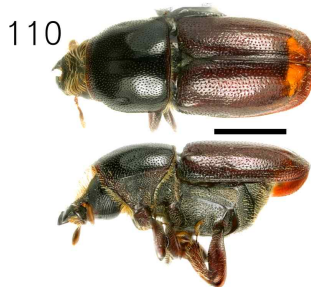
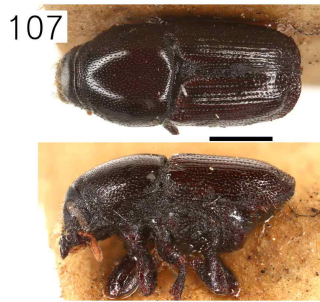


Plate 9. Dorsal and lateral aspects of the adults.

- | | |
|--|-------------|
| 122 <i>Scolytoplatypus mikado</i> Blandford, 1893
(Japan, Type specimen in BMNH) | 잡식나무좀 |
| 123 <i>Scolytoplatypus sinensis</i> Tsai & Huang, 1965
(China, Type specimen in BSM) | 애잡식나무좀(신칭) |
| 124 <i>Scolytoplatypus tycon</i> Blandford, 1893
(Japan, Type specimen in BMNH) | 단풍나무좀 |
| 125 <i>Amasa amputatus</i> (Blandford, 1894)
(Japan, Type specimen in BMNH) | 무화과나무좀 |
| 126 <i>Ambrosiodmus lewisi</i> (Blandford, 1894)
(Indonesia, Type specimen in BMNH) | 루이스나무좀 |
| 127 <i>Ambrosiodmus rubricollis</i> (Eichhoff, 1876)
(Japan, Type specimen in BMNH) | 붉은목나무좀 |
| 128 <i>Ambrosiophilus atratus</i> Eichhoff, 1876
(Korea, Voucher specimen in RIFID, determined by Park) | 뽕나무좀 |
| 129 <i>Anisandrus apicalis</i> (Blandford, 1894)
(Japan, Type specimen in BMNH) | 사과둥근나무좀 |
| 130 <i>Anisandrus dispar</i> (Fabricius, 1792)
(Unknown, Voucher specimen in BMNH)) | 활엽수큰나무질나무좀 |
| 131 <i>Anisandrus maiche</i> Stark, 1936
(Korea, Voucher specimen in RIFID, determined by Park) | 활엽수작은나무질나무좀 |
| 132 <i>Cnestus murayamai</i> Schedl, 1962
(Japan, Voucher specimen in NIAST, determined by Nobuchi) | 민나무좀 |
| 133 <i>Cnestus mutilatus</i> (Blandford, 1894)
(Japan, Type specimen in BMNH) | 왕녹나무좀 |

Plate 9. Dorsal and lateral aspects of the adults.



Plate 10. Dorsal and lateral aspects of the adults.

- 134 *Cyclorhipidion bodoanum* (Reitter, 1913) 떡갈나무질나무좀
(Korea, Voucher specimen in RIFID, determined by Park)
- 135 *Cyclorhipidion japonicus* (Nobuchi, 1981) **new to Korea** 작은골잔빨나무좀(신칭)
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 136 *Cyclorhipidion laetus* Niisima, 1909 **new to Korea** 큰골잔빨나무좀(신칭)
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 137 *Cyclorhipidion pelliculosum* (Eichhoff, 1878) 청랑리나무좀
(Korea, Voucher specimen in RIFID, determined by Park)
- 138 *Cyclorhipidion pseudopelliculosum* **sp. nov.** 콩지네빨나무좀(신칭)
(Korea, Type specimen in RIFID, determined by Park)
- 139 *Debus defensus* (Blandford, 1894) 목련나무좀
(Japan, Type specimen in BMNH)
- 140 *Euwallacea validus* (Eichhoff, 1876) 가문비왕나무좀
(Korea, Voucher specimen in RIFID, determined by Park)
- 141 *Microperus kadoyamaensis* (Murayama, 1934) 활엽수나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 142 *Xyleborinus attenuatus* (Bladford, 1894) 가는벚나무좀
(Japan, Type specimen in BMNH)
- 143 *Xyleborinus kwangreungensis* **sp. nov.** 민들흙길쭉나무좀(신칭)
(Korea, Type specimen in RIFID, determined by Park)
- 144 *Xyleborinus octiesdentatus* (Murayama, 1931) 서어나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 145 *Xyleborinus saxeseni* (Ratzeburg, 1837) 암브로시아나무좀
(Korea, Voucher specimen in RIFID, determined by Park)

Plate 10. Dorsal and lateral aspects of the adults.



Plate 11. Dorsal and lateral aspects of the adults.

- 146 *Xyleborus aquilus* Blandford, 1894 빛죽이둥근나무좀
(Japan, Type specimen in BMNH)
- 147 *Xyleborus glabratus* Eichhoff, 1876 **new to Korea** 홀쭉나무좀(신칭)
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 149 *Xyleborus minutus* Blandford, 1894 생강나무좀
(Japan, Type specimen in BMNH)
- 150 *Xyleborus monographus* (Fabricius, 1792) 네뿔나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 151 *Xyleborus muticus* Blandford, 1894 **new to Korea** 여름나무좀(신칭)
(Japan, Type specimen in BMNH)
- 152 *Xyleborus pfeilii* (Ratzeburg, 1837) 폐일나무좀
(Korea, Voucher specimen in RIFID, determined by Park)
- 153 *Xyleborus praevius* Blandford, 1894 애나무좀
(Japan, Type specimen in BMNH)
- 154 *Xyleborus seriatus* Blandford, 1894 북한나무좀
(Japan, Type specimen in BMNH)
- 155 *Xyleborus volvulus* (Fabricius, 1794) 두릅나무좀
(Philippines, Voucher specimen in BMNH, determined by D.J. Atkinson)
- 156 *Xylosandrus borealis* Nobuchi, 1981 동백나무좀
(Japan, Type specimen in NIAST)
- 157 *Xylosandrus brevis* (Eichhoff, 1877) 반날개나무좀
(Korea, Voucher specimen in RIFID, determined by Park)
- 158 *Xylosandrus compactus* (Eichhoff, 1876) **new to Korea** 꼬마오리나무좀(신칭)
(Korea, Voucher specimen in RIFID, determined by Park)

Plate 11. Dorsal and lateral aspects of the adults.

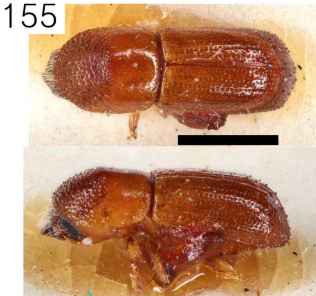
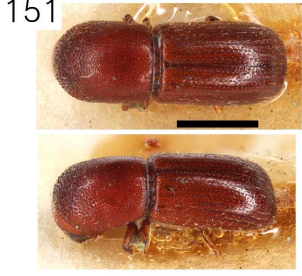
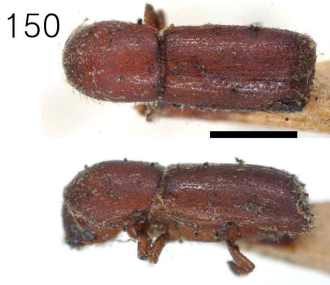
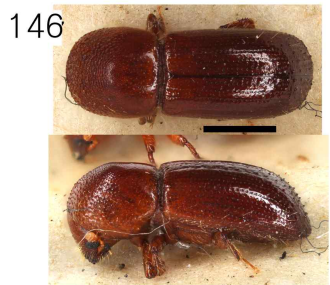


Plate 12. Dorsal and lateral aspects of the adults.

- 159 *Xylosandrus crassiusculus* (Motschulsky, 1866) 팔배나무좀
(Sumatra, Type specimen in BMNH)
- 160 *Xylosandrus germanus* (Blandford, 1894) 오리나무좀
(Japan, Voucher specimen in BMNH)
- 161 *Xylosandrus pseudgermanus* **sp. nov.** 님은오리나무좀(신칭)
(Korea, Type specimen in RIFID, determined by Park)
- 162 *Indocryphalus aceris* (Niisima, 1910) 단풍속나무좀
(Japan, Type specimen in NIAST)
- 163 *Indocryphalus pubipennis* (Blandford, 1894) 후박나무좀
(Japan, Type specimen in BMNH)
- 164 *Trypodendron gaimaense* (Murayama, 1937) 피나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 165 *Trypodendron lineatum* (Olivier, 1795) 검줄나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 167 *Trypodendron proximum* (Niisima, 1909) 편백나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 168 *Trypodendron signatum* (Fabricius, 1792) 누른띠나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 169 *Crossotarsus simplex* Murayama, 1925 가시나무긴나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 170 *Dinoplatypus calamus* (Blandford, 1894) 잡목긴나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 171 *Dinoplatypus hamatus* (Blandford) **new to Korea** 가는긴나무좀(신칭)
(Japan, Type specimen in BMNH)

Plate 12. Dorsal and lateral aspects of the adults.



Plate 13. Dorsal and lateral aspects of the adults.

- 172 *Platypus koryoensis* (Murayama, 1930) 광릉긴나무좀
(Korea, Voucher specimen in RIFID, determined by Park)
- 173 *Platypus lewisi* Blandford, 1894 루이스긴나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 174 *Treptoplatypus severini* (Blandford, 1894) 못뽑이긴나무좀
(Japan, Voucher specimen in NIAST, determined by Nobuchi)
- 175 *Treptoplatypus solidus* (Walker, 1858) 긴나무좀
(Unknown(Quarantined), Voucher specimen in RIFID, determined by Park)

Plate 13. Dorsal and lateral aspects of the adults.

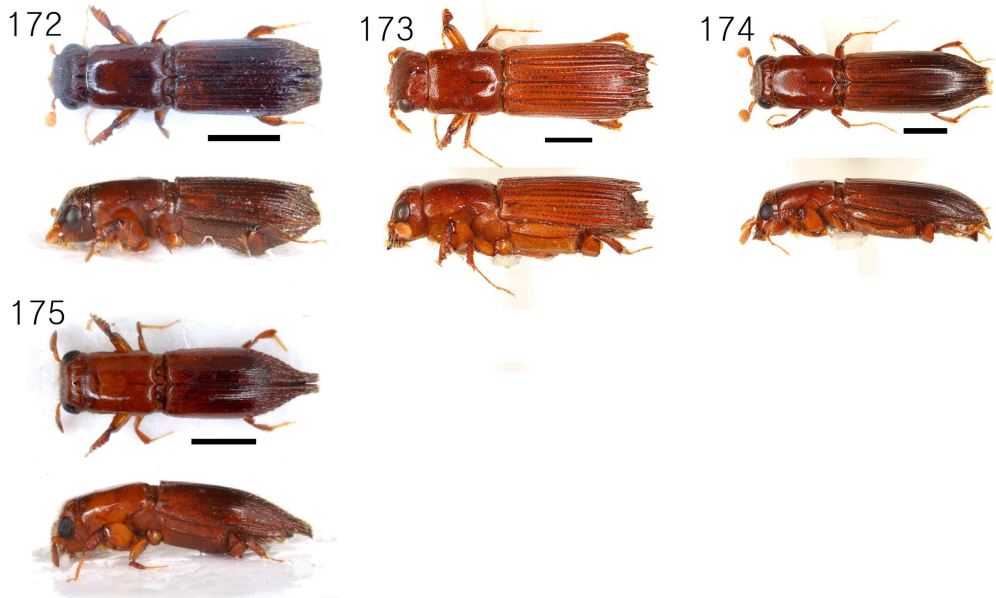


Plate 14. Label of type and voucher specimens.

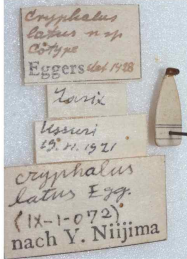


Plate 15. Label of type and voucher specimens.

53



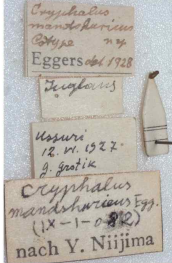
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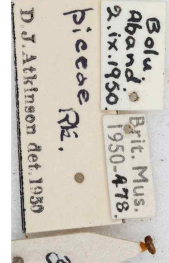
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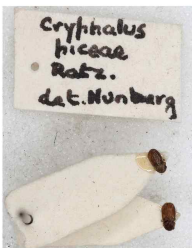
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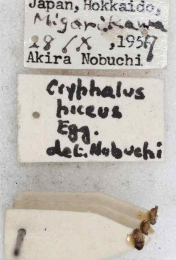
57-1



57-2



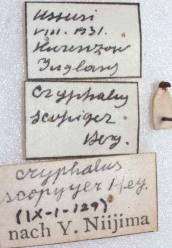
58



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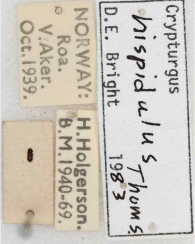
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73



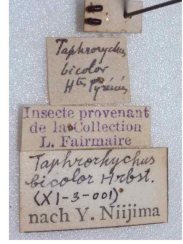
74



77



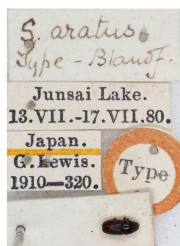
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106



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108



121



Plate 16. Label of type and voucher specimens.

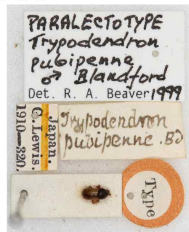


Plate 16. Label of type and voucher specimens.

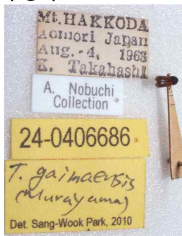
162



163



164



171



Plate 17. NJ Cladogram inferred from COI partial gene sequences (582 bp) in Scolytinae and Platypodinae. Numbers at branches are indicated by the neighbor-joining bootstrap values.

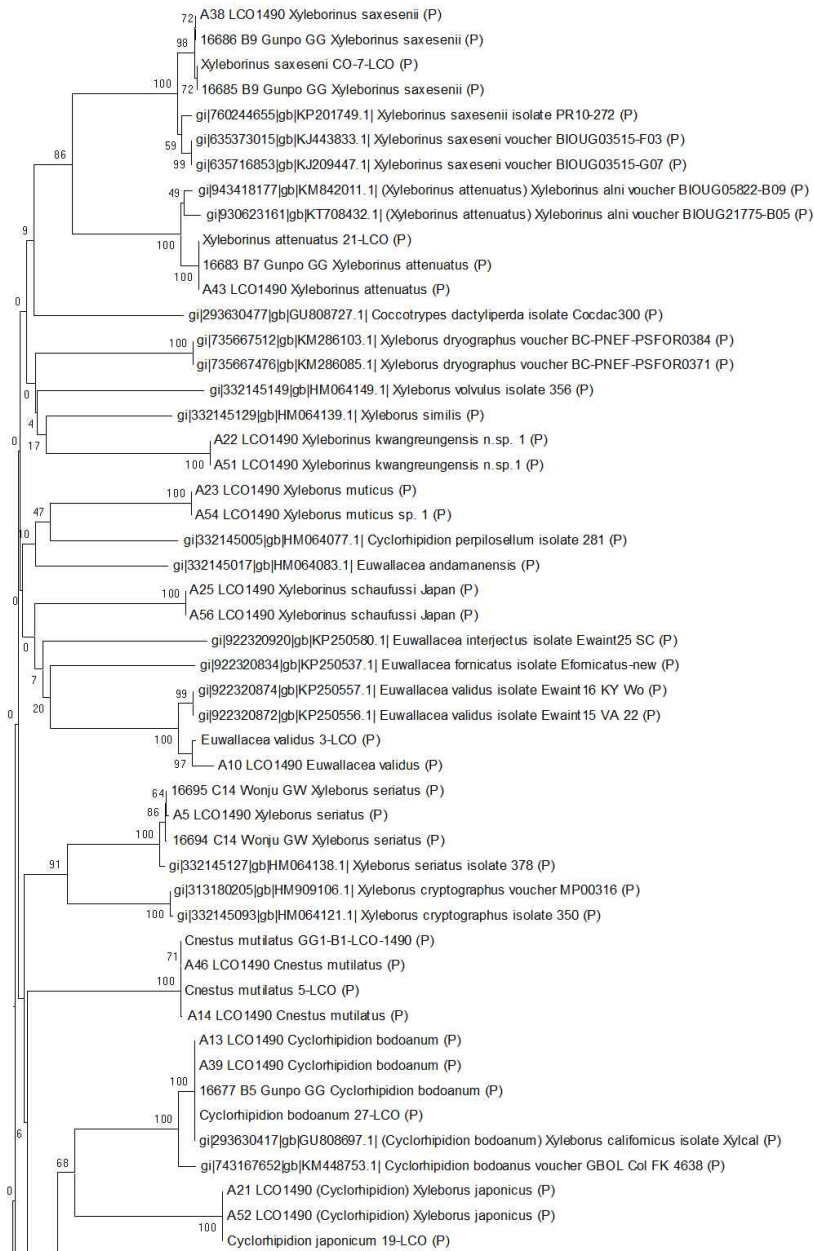


Plate 17. Continued.

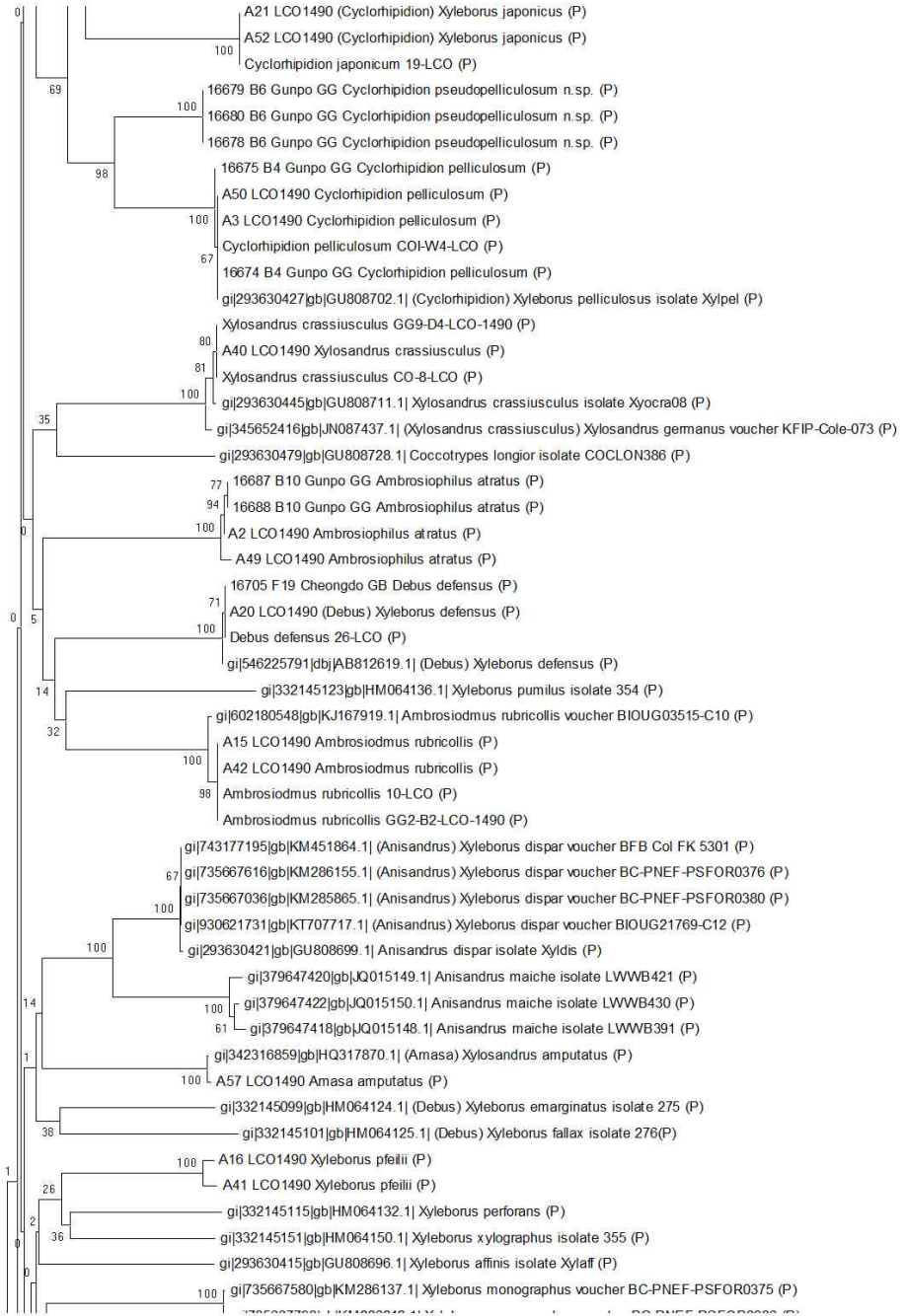


Plate 17. Continued.

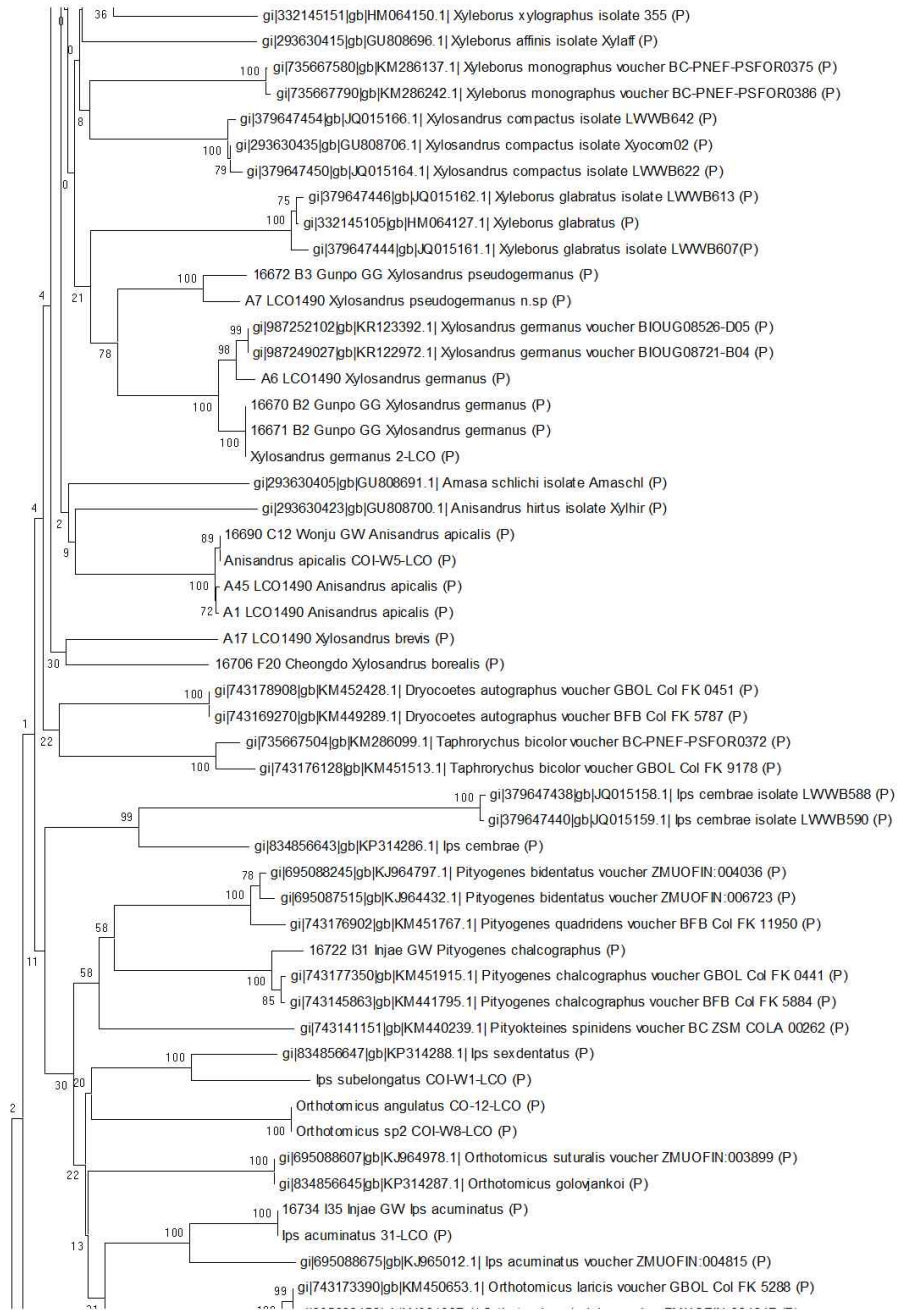


Plate 17. Continued.

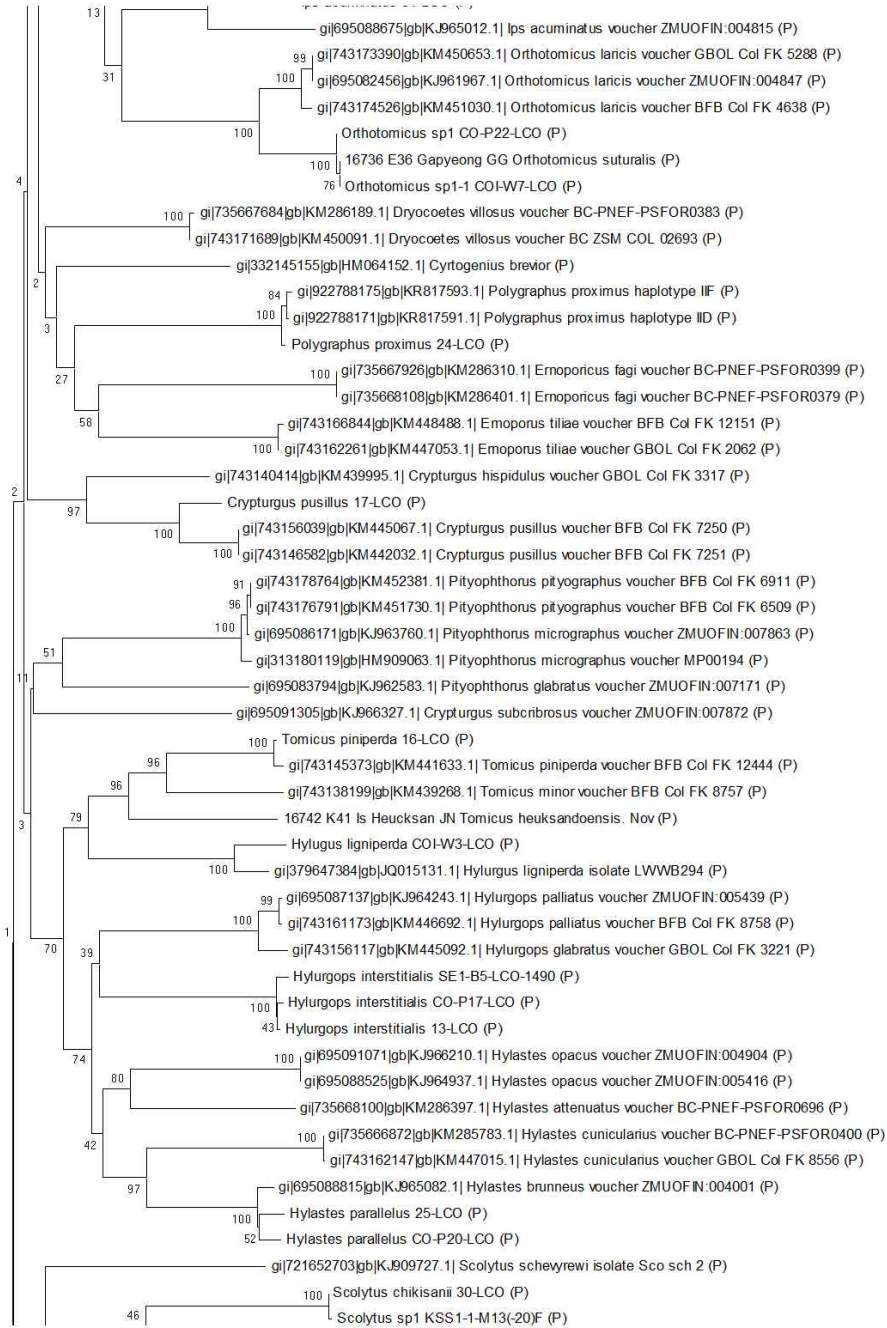


Plate 17. Continued.

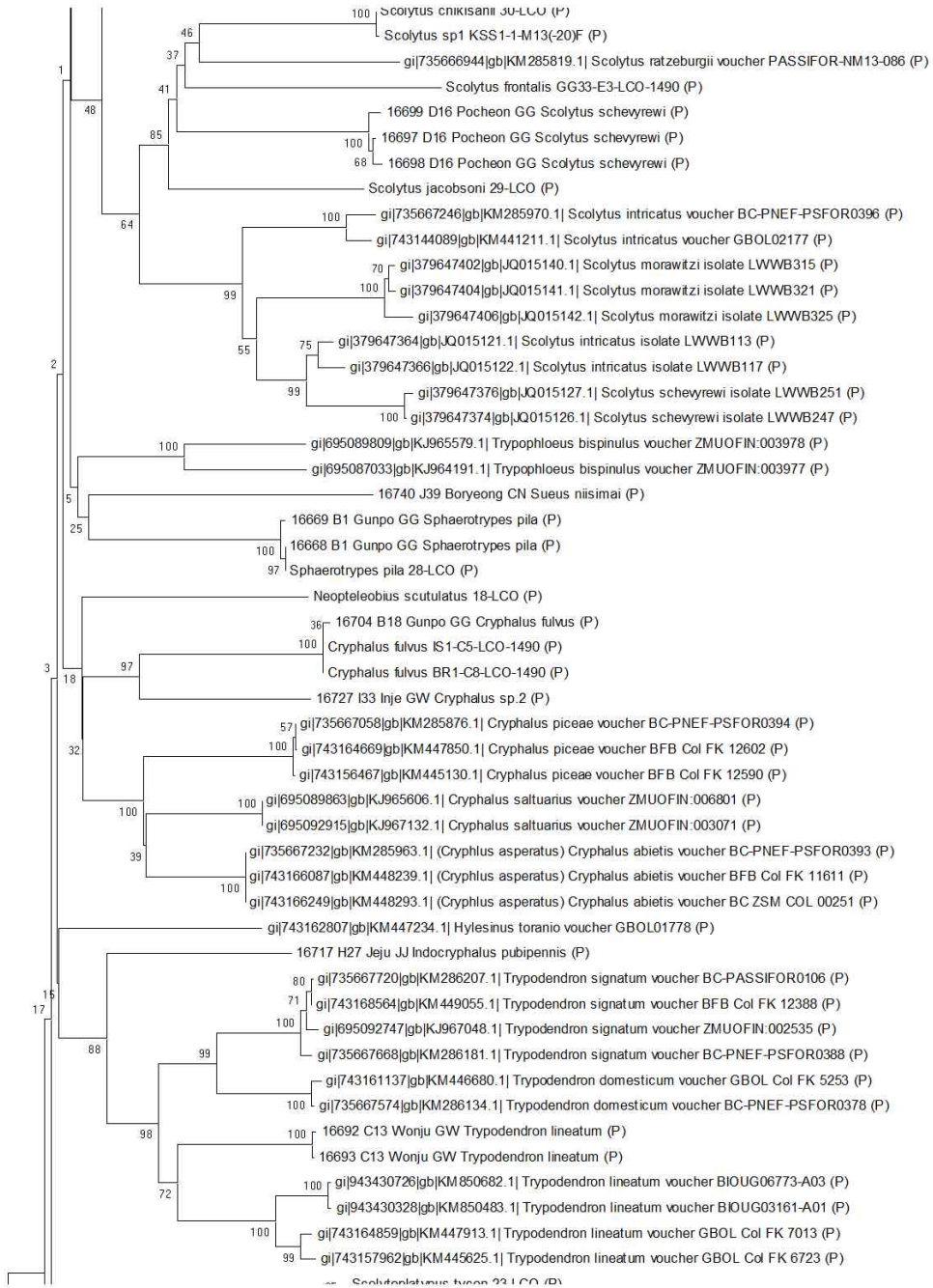
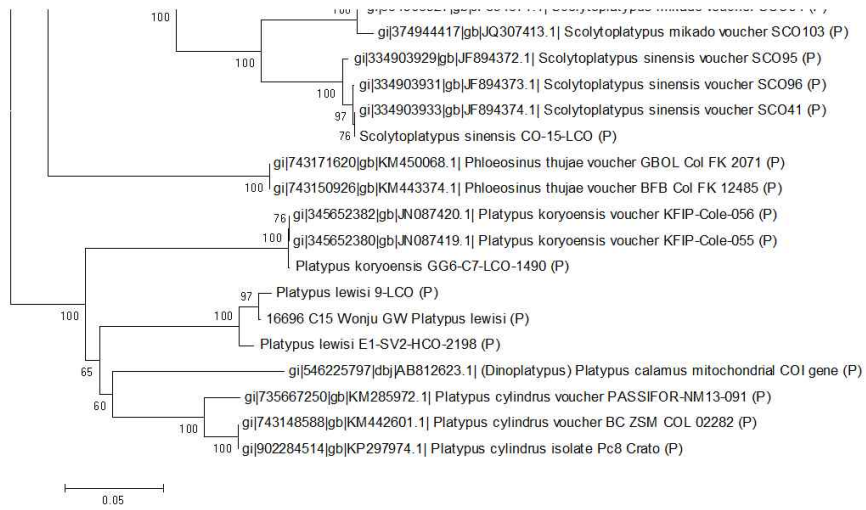


Plate 17. Continued.



국문초록

한국산 나무좀아과와 긴나무좀아과 (딱정벌레목: 바구미과)의 분류학적 재검토

박상욱
농생명공학부 곤충학전공
대학원
서울대학교

본 연구는 두 가지 결과로 구성된다. 첫 번째로, 한국산 나무좀아과와 긴나무좀아과의 국내 기록에 대한 문헌 및 샘플에 대한 조사를 실시하여, 이들의 분포에 대한 분류학적 재검토를 실시하였다. 두 번째로, 이 두 아과에 있어서의 DNA 바코드 유전자를 분석하여, 미동정된 분류군에 대한 분류학적 위치를 검증하고, 이들의 분자분류계통학적 분석을 실시하여 올바른 분류학적 재검토를 실시하고자 하였다.

본 논문에서는 2011년에 Lobl 과 Smetana에 의해 발간된 "Catalogue of Palaearctic Coleoptera"의 상위 분류체계를 따랐으며, 일부 속에 대한 하위 분류군은 최근 변화된 분류체계를 따랐다 (Hulcr 과 Cognato, 2013). 분류학적 연구 결과에서는 4종의 신종과 10종의 한국미기록종을 포함하고 있으며 동종이명 처리되었던 1종을 DNA 바코드 및 형태적인 형질들을 분석하여 명확한 별종으로 재확인하였으며, DNA 바코드를 이용한 계통 및 유연관계 분석을 통하여 *Xyleborus* 속에 속하던 2 종을 *Cyclorhipidon* 속으로 재조합하였다.

새롭게 발표되는 신종과 한국미기록종 및 분류학적 위치가 변동되는 종은 다음과 같다.

<i>Hylurgus ligniperda</i> (Fabricius, 1787)	new to Korea
<i>Tomicus heuksandoensis</i> sp. nov.	new to Science
<i>Sueus niisimai</i> (Eggers, 1926)	new to Korea
<i>Hypothenemus expers</i> Blandford, 1894	new to Korea
<i>Scolytoplatypus sinensis</i> Tsai & Huang, 1965	new to Korea, resurrected
<i>Cyclorhipidion japonicus</i> (Nobuchi, 1981)	comb. nov., new to Korea
<i>Cyclorhipidion laetus</i> Niisima, 1909	comb. nov. new to Korea
<i>Cyclorhipidion pseudopelliculosum</i> sp. nov.	new to Science

<i>Xyleborinus kwangreungensis</i> sp. nov.	new to Science
<i>Xyleborus glabratus</i> Eichhoff, 1876	new to Korea
<i>Xyleborus muticus</i> Blandford, 1894	new to Korea
<i>Xylosandrus compactus</i> (Eichhoff, 1876)	new to Korea
<i>Xylosandrus pseudogermanus</i> sp. nov.	new to Science
<i>Dinoplatypus hamatus</i> (Blandford, 1894)	new to Korea

나무좀아과 및 긴나무좀아과의 109종 261 개체의 COI DNA 바코드 유전자 분석결과에서는 Ipini, Scolytini, Scolytoplatypodini 및 Xyloterini 족에 속하는 종들이 단계통적인 결과를 보여주었으며, 전세계적으로 관심이 높은 Xyleborini 족의 경우에는 Dryocoetini 족의 *Coccotrypes* 속에 속하는 종들이 섞이는 결과를 제외하고는 거의 독립적인 단계통성을 보여주었다. Hylastini 족과 Hylurgini 족 또한 속 및 족 수준의 단계통적인 결과를 보여주었다.

분자계통분석에 대한 최근의 많은 노력에도 불구하고, 현재 나무좀아과와 긴나무좀아과의 분류학적 위치는 바구미과에 속하는 아과로 볼 것인가와 별개의 독립적인 과로 볼 것인가에 대한 논란이 지속되고 있으며, 많은 유전자 분석과 형태형질에 대한 분석을 통한 계통분류학적 검토가 이루어지고 있음에도 확실한 결론을 내리지 못하고 있는 상태이다. 이들의 분류학적 위치에 대한 결론은 더 많은 분석 결과가 추가되어야 할 것이다. 이는 현재까지 속이나 종단위의 불확실하게 정립되어 있는 상위 분류군에 대한 재정립을 포함하는 추가적인 연구를 바탕으로하여, 종합적인 재검토가 이루어져야 할 것으로 보여진다.

주요어: 바구미과, 나무좀아과, 긴나무좀아과, 형태분류, DNA barcodes, 분자계통분류

학번: 2006-30886

