김 진 일 교수지도

박사학위 청구논문

한국산 검정풍뎅이과(딱정벌레목, 풍뎅이상과)의 분류 및 형태 형질에 의한 수염풍뎅이속의 분지분석

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생 물 학 과

김 아 영

인 준 서

김아영의 박사학위 논문으로 인준함

심사위원 _____ 인

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성신여자대학교 대학원

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논문개요

1. 한국산 검정풍뎅이과의 분류

한국산 검정풍뎅이과(Melolonthidae)의 분류학적 재검토를 실시하였다. 연구 결과, 긴다리풍뎅이아과는 1족 2속 3종, 검정풍뎅이아과는 4족 12속 29종, 우단풍뎅이아과는 1족 7속 29종으로 총 6족 21속 61종으로 정리되었다. 이 중에는 4종(*Miridiba yangjuensis* n. sp., *Nipponoserica melanosoma* n. sp., *Serica monticum* n. sp., *Sericania lucidalis* n. sp.)의 신종, 1종(*Maladera kamiyai* Sawada= *Serica septentrionalis* Murayama)의 오동정, 4종(*Hoplia djukini* Jacobson, *Miridiba castanea* (Waterhouse), *Serica septentrionalis* (Murayama), *Sericania latisulcata* Murayama)의 국내분포 재확인종, 고유종 6종(*Bunbunius reticulatus* (Murayama), *Eumaladera opaciventris* (Moser), *Maladera schoenfeldti* (Murayama), *Serica hirsuta* Kim et Kim, *Sericania koryoensis* Murayama, *Sericania latisulcata* Murayama), 7종(*Brahmina crenicollis* (Motschulsky), *B. darcis* (Reitter), *B. excissiceps* (Moser), *Brahmina sedakovii* Mannerheim, *Holotrichia kiotoensis* Brenske, *H. sichotana* Brenske, *Lasiopsis manchurica* Murayama)의 표본 미확인종이 포함되어 있다.

2. 형태 형질에 의한 수염풍뎅이속의 분지분석

수염풍뎅이속(*Polyphylla*)의 단계통성을 시험하기 위해 28분류군에 대한 53 가지 형태학적 형질을 근거로 분지분석을 수행하였다. 분석결과 계통수의 길이가 279인 12개의 최소가정수(most parsimonious trees)를 얻었으며,

수염풍뎅이속은 단계통을 형성하고 있었다. 이들은 가늘고 긴 수컷생식기의 모양, 가시 같은 복잡한 구조가 없는 단순한 부절(parameres)이라는 두 개의 공유파생형질에 의해 정의될 수 있었다.

수염풍뎅이속 내의 주요한 패턴은 다음과 같다: (*P. donaldsoni* (*P. dahnshuensis* (*P. occidentalis* (*P. variolosa* (((*P. laticollis laticollis, P. laticollis manchurica*) (*P. gracillicornis* (*P. maculipennis*, *P. sikkimensis*))) (*P. rugosipennis* (((*P. hammondi* (*P. monahansensis*, *P. pottsorum*)) (*P. arguta* (*P. diffracta* (*P. decimlineata* (((*P. taiwana* (*P. albolineata*, *P. schoenfeldti*)) ((*P. fullo*, *P. ragusae*) ((*P. davidis*, *P. tonkinensis*) (*P. olivieri* ((*P. irrorata*, *P. tridentata*) (*P. adspersa*, *P. alba*)))))))))))))).

목 차

< 표 차례 >

< 그림 차례 >

I. 서론

검정풍뎅이과(Melolonthidae)는 딱정벌레목(Coleoptera), 풍뎅이아목(Polyphaga), 풍뎅이상과(Scarabaeoidea)에 속하는 분류군으로 기존의 풍뎅이상과의 분류체계에 의하면 성충의 복부 기문이 등판에 위치하는 상기문류(Pleurosticti)의 일원이고(Erichson, 1847), 비교적 최근의 계통발생적 연구에 의하면(Howden 1982, Brown and Scholtz 1996; 1998) 식식성 풍뎅이 계열(Phytophagous Scarab clade)로 분류된다. 검정풍뎅이과는 Leach in Samouelle (1819) 이래로 현재까지 세계적으로 약 840속 11,500종이 기록되어 있다(Houston and Weir 1992, Lacroix 2000, Arnett et als. 2002). 세계적으로 풍뎅이상과(Scarabaeoidea)가 약 35,000종 정도로 추정(Grebennikov 2004)되는 것으로 볼 때, 검정풍뎅이과는 풍뎅이상과 내에서도 대단히 큰 분류군임을 알 수 있다.

화석기록으로 미루어 보았을 때 검정풍뎅이과의 곤충은 현대 주요 풍뎅이류의 갈래짐이 이루어진 신생대(Cenozoic) 제3기(Tertiary) 초기에 기원했을 것이라 생각되고 있으며, 가장 오래된 검정풍뎅이과의 곤충화석은 독일의 신생대 에오세 석탄층에서 발견된 *Eophyllocerus*이다(Browne and Scholtz 1999, Krell 2007). 검정풍뎅이과에 속한 곤충은 균류를 주 먹이원으로 하던 풍뎅이상과의 조상형으로부터 살아있는 식물이나 부식질을 먹이원으로 하여 적응 방산해왔다고 여겨진다(Brown & Scholtz 1999). 특히 일부 검정풍뎅이과 곤충은 먹이원에 있어 중대한 변화를 거쳐왔다. 성충의 경우 나무나 관목의 낙엽, 열매 등을 먹거나 긴다리풍뎅이속(*Hoplia*)처럼 꽃에 모여드는 등 식식성(phytophagous)이 대부분이나 간혹 아무것도 먹지 않고 살아가는 경우도 있다(Scholtz & Chown 1995). 유충은 식물의 뿌리(root), 지하경

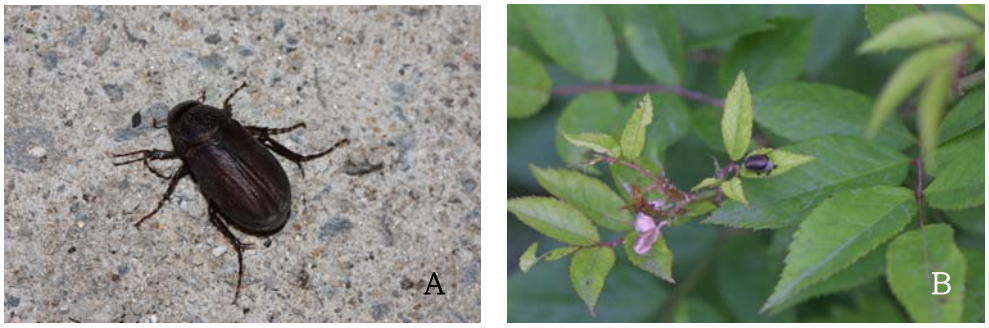

Figure 1. Examples of nocturnal and diurnal melolonthids. A. *Holotrichia parallela* attracted to lights at night; B. *Gastroserica herzi* appeared under daylight.

(underground stems)이나 부식토(humus), 또는 심지어 동물의 분변(dung)을 먹이로 하는 경우도 있다(Ritcher 1966, Scholtz & Brown 1995, Shcoltz 1988).

풍뎅이상과 내 많은 분류군들과 같이 검정풍뎅이과의 성충은 대부분 야행성이지만 주행성인 경우(예: Hoplini, *Miridiba, Gastroserica* 등)도 있다(Fig. 1). 일부 속(*Diplotaxis*, *Polyphylla*, *Holotrichia*, *Maladera*, *Serica*)의 성충과 유충은 농업 해충으로 취급받기도 하고 또는 잔디를 가해하므로 경제적으로 중요하게 여겨지기도 한다(Arnett et al. 2002). 이들은 생활사의 대부분을 유충 시기로 보내며, 이 기간 동안 주로 토양 속에서 섭식하고 성장하며 월동하기 때문에 토양의 상태나 기주 식물은 이들이 서식지를 선택하는데 중요하게 작용한다. 보통 식물의 뿌리 부근, 낙엽 밑, 잔디밭, 경작지, 습지 등에서 발견되며 가끔 사구지역에서도 발견되는 경우도 있다(Fig. 2). 생활환은 대부분 1년에서 2년이 걸리나 기후에 따라 다르다(Tashiro, 1987). 왕풍뎅이속(*Melolontha*)이나 수염풍뎅이속(*Polyphylla*)과 같이 몸의 크기가 비교적 대형인 분류군의 경우 성충이 되기까지 3년 이상이 소요되기도 하는데, 이 경우에

Figure 2. Habitats of the Melolonthidae. A. Agricultural area or grassland; B. River side; C. Mountain; D. Sand dune area.

는 마지막 해의 겨울까지 유충상태로 월동한 후 이듬 해 봄이나 초여름에 성충으로 우화한다(Liu et als. 1997, Russell 2000).

검정풍뎅이과의 성충은 몸 길이가 3 ~ 58 mm 정도로 크기가 다양하며(Evans 2002), 몸의 큐티클층이 매우 경화되어 있고, 모양은 알모양에서 긴 타원형이 주를 이룬다. 체색은 밝은 갈색에서 검정색을 띠며, 주로 갈색 계열의 색상을 나타내나 때로는 금속성 광택을 띠기도 하고, 우단상의 표면을 보이기도 한다. 등면은 털이나 비늘로 덮여있는 경우도 종종 볼 수 있다. 대부분 큰턱(mandibles)이 잘 발달되었으며, 경화되어있고 위에서 볼 때 두순에 완전히 가려져 있다(Evans 2002, Ritcher 1966). 더듬이(antennae)는 7-10

마디이고, 끝 3-7마디는 곤봉부(club)를 이루며, 머리와 더듬이의 연결 부위는 위에서 보이지 않는다. 상순(labrum)은 두순(clypeus)의 아래에 위치하거나 두순의 앞 가두리 끝에 위치한다. 암수 차이를 보면, 대부분 수컷은 암컷에 비해 곤봉부가 자루마디에 비해 길고 배마디가 덜 볼록하며, 긴 발목마디(tarsus)를 갖는다(Evans 2002). 발목마디는 암수 모두 5-5-5식을 갖는다.

검정풍뎅이과의 유충은 풍뎅이상과 내의 다른 분류군처럼 보통 '굼벵이(white grubs)'라고 불리며 몸의 형태는 전형적인 'C'자 모양이다. 더듬이는 4마디이며, 큰턱에는 마찰 부분(stridulatory area)이 없고, 마쇄판(scissorial area)은 둥그런 잎(leaf) 모양이다. 작은턱(maxilla)의 외엽(galea)과 내엽(lacinia)은 대부분 융합되어 있다. 항문은 보통 Y자 모양으로 열려있다. 다리는 4마디로 잘 발달되어 있다(Ritcher 1966).

본 논문에서는 다양한 환경에 서식하면서 높은 종다양성을 가지는 검정풍뎅이과에 대한 연구를 두 개의 주제로 나누어 다루었다.

첫 번째 주제로는 한국산 검정풍뎅이과에 대한 분류학적 연구를 수행하였다. 과(family)와 아과(subfamily)의 체계는 Kim (2001)을 참고 하였으며, 종(species) 이상, 족(tribe) 이하의 상위 분류체계는 Löbl and Smetana (2006)의 세계적 연구에 기반을 두었다. 우단풍뎅이아과의 내용은 Kim and Kim (2003a, b)에서 다루었던 내용을 재검토하고 보완하였다. 또한 본 논문은 동정이 어려운 한국산 검정풍뎅이과에 대한 이전까지의 많은 기록상의 문제점을 검토하였다. 국내 동물상 조사를 통한 여러 기록과 이전의 분류학적 논문들에서 발견되는 오류를 바로잡기 위하여 오동정과 동물이명 등을 검토하여 한국산 검정풍뎅이과의 종 목록을 작성하였다.

두 번째 주제는 형태적 형질을 이용한 수염풍뎅이속(*Polyphylla*)의 분지분석이다. 그동안 독자적으로 연구되어 왔던 신북구와 구북구 분류군들을

대상으로 계통분석을 수행하여 단계통성을 알아보고 수염풍뎅이속 내 아속 및 그룹에 대한 기존의 분류체계를 검증하여 계통분류의 근간을 마련해보고자 하였다.

II. 한국산 검정풍뎅이과(Melolonthidae)의 분류

1. 서론

1) 검정풍뎅이과의 연구사

세계적으로 검정풍뎅이과의 분류체계는 형질의 정의나 사용에 있어 많은 혼란이 있어 왔다(Hardy 1978, Ratcliffe 1991). 족(tribe) 이상의 상위 분류체계는 분류군의 계통연구가 미흡했기 때문에 체제의 통합이 이루어지지 않고 학자들마다 조금씩 다른 기준을 이용해 왔다(Table 1). 긴다리풍뎅이류와 우단풍뎅이류를 포함하는 검정풍뎅이류를 사슴벌레과(Lucanidae), 소똥구리과(Scarabaeidae) 등과 함께 단독의 과(family)로 취급하기도 했고(Murayama 1954, Liu et al. 1997, Wu 1936, Zhang 1984, Kim 2001), 긴

Table 1. The scheme of some major melolonthids classification

Murayama (1954)	Lawrence and Newton (1995)*	Lacroix (2000, 2002)	Evans (2002)	Löbl and Smetana (2006)
Melolonthidae		**Melolonthidae**		
Melolonthinae	**Melolonthinae**		**Melolonthinae**	**Melolonthinae(S)**
		Diplotaxini	Diplotaxini	Diplotaxini
		Heptophyllini		Heptophyllini
	Melolonthini	Melolonthini	Melolonthini	Melolonthini
		Rhizotrogini		Rhizotrogini
Hopliinae		**Hopliidae**		
		Hopliini	Hopliini	Hopliini
Sericinae	Sericini	**Sericidae**		**Sericinae(S)**
			Sericini	Sericini

* Tribal classification is revised by Britton(1957, 1978).

다리풍뎅이류와 우단풍뎅이류를 독자적인 과로 다루기도 하였다(Klausnitzer and Krell 1998, Lacroix 2000, 2002a). 최근에는 검정풍뎅이류를 주로 소똥구리과의 하위 분류군인 검정풍뎅이아과(Melolonthinae)로 인정하는데 여기에는 긴다리풍뎅이와 우단풍뎅이가 족 수준으로 포함되어 있다(Nomura 1970, Lawrence and Newton 1995, Browne and Scholtz 1996, 1998, 1999, Masayuki 2001, Retcliffe et al. 2002). 또 다른 기준으로는 우단풍뎅이아과(Sericinae)와 검정풍뎅이아과로 나누고, 긴다리풍뎅이류는 검정풍뎅이아과 내의 족으로 인정하는 경우이다(Löbl and Smetana 2006).

이와 같은 문제는 풍뎅이상과(Scarabaeoidea) 내에서 검정풍뎅이류 곤충에만 국한된 것이 아니다. 따라서 그동안 풍뎅이상과 수준에서 여러 연구들을 총괄하여 상위체계를 정립하려는 노력이 있어왔다. 대표적 연구로 Lawrence and Newton (1995)과 Browne and Scholtz (1996, 1998, 1999)는 형태적 형질을 근거로 풍뎅이상과 곤충을 12과 또는 14과로 분류하는 체

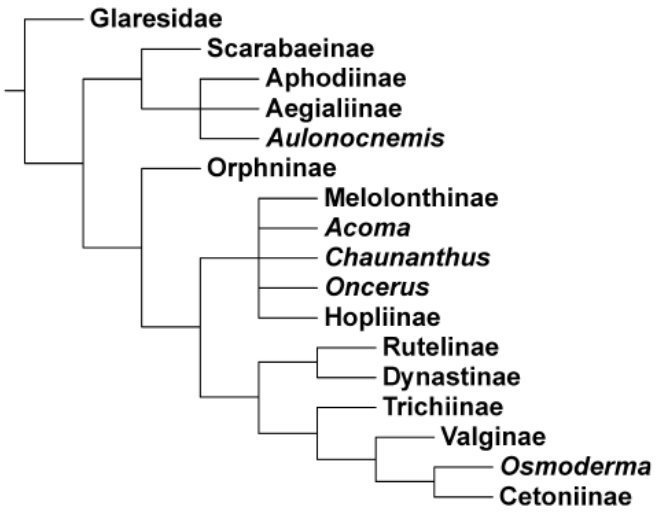

Figure 3. Phylogeny of Scarabaeidae (Ahren 2004).

계를 제시하였으며, Smith et al.(2006)은 최근 분자분석을 통해 이들의 체계를 검증하고자 하였다. Browne and Scholtz (1998)가 제시한 분지분석 결과에 의하면 검정풍뎅이아과(Melolonthinae)는 풍뎅이아과(Rutelinae), 장수풍뎅이아과(Dynastinae), 호랑꽃무지아과(Trichiinae) 등과 자매군(sister group)의 위치에 있는 것으로 나타났으나 군내(ingroup)에서의 관계는 명확하게 설명되지 않았다(Fig. 3). Smith et al.(2006)의 분석 결과에서도 검정풍뎅이아과의 가지(branch)는 다른 분류군에 비해 매우 약하게 지지되고 있었다(Fig. 4). 그 이유는 지난 150여 년 동안 검정풍뎅이류의 분류 체계가 일관성 있게 적용되어오지 않고 다양한 학자들에 의해 매우 다른 관점에서 다루어졌기 때문이었다(Arnett et al. 2002). 실제로 검정풍뎅이류를 주제로 한 계통연구는 아직까지 시도되지 않았기 때문에 아과 이상의 계통분석에서 좋은 재료를 선

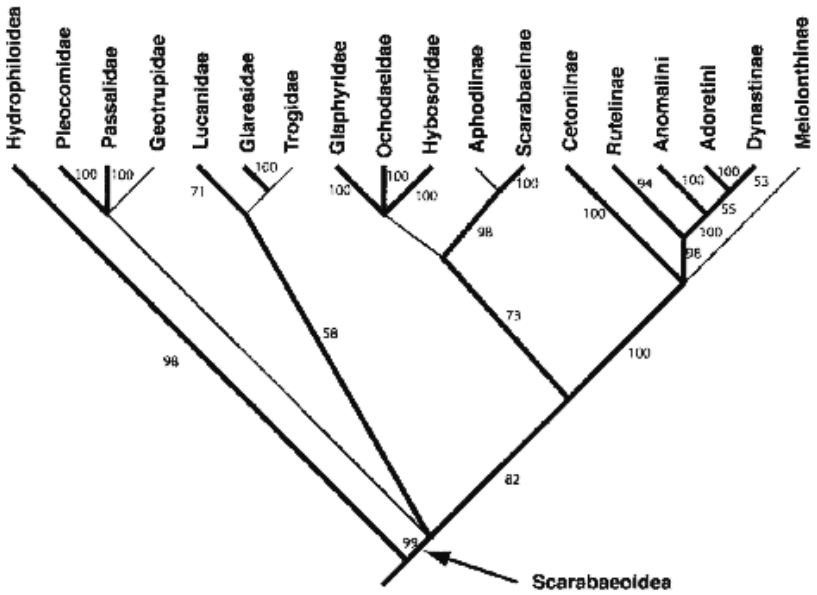

Figure 4. Preliminary phylogenetic tree of the Scarabaeoidea based on molecular data (Smith, Hawks and Heraty 2006).

별하기가 어려울 수밖에 없었다(Smith et al. 2006).

이렇듯 검정풍뎅이과에 대한 계통분석이 아직까지 이루어지지 못한 것은 속과 종의 정의가 불명확한 경우가 많기 때문이다. 1940년대 이전에 발표된 대부분의 속과 종의 기재문들이 삽화(illustrations) 없이 불충분하게 기록되었고 제시된 모식표본이 없거나 심하게 파손되기도 하였다. 게다가 초기 연구자들이 기준표본을 거의 참고하지 않았기 때문에 수많은 동물이명(synonym)과 분류군의 잘못된 배분이 무분별하게 이루어졌다(Arnett et al. 2002). 그러나 최근 이러한 문제점을 바로잡기 위한 연구들이 분류군별로 부분적으로 진행되고 있다(Paulsen and Smith 2003, Bezděk 2004, Evans 2005, Löbl and Smetana 2006).

검정풍뎅이과의 속과 종 수준에서의 계통에 관련한 연구는 Machatschke (1959, Fig. 5), Lacroix (1989, 1993, 2000), Ahrens (2005a, b, 2006, 2007), Coca-Abia (2007), Sabatinelli (2008) 등에 의해 수행되어 왔다. 그 중에서 Coca-Abia (2007)는 검정풍뎅이아과가 측계통 그룹(paraphyletic group)일 가능성을 제시하기도 했다. 하지만 아직까지 신뢰

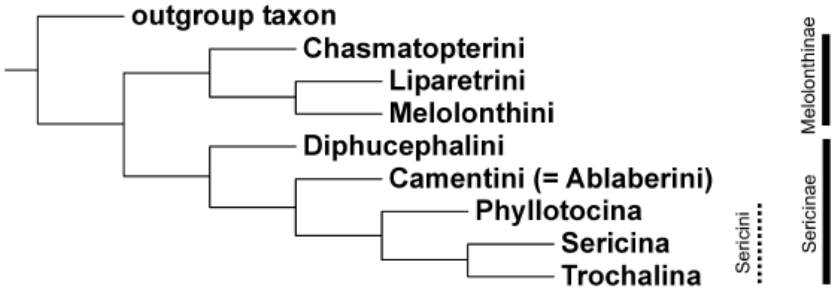

Figure 5. Phylogeny of Sericini (Ahren 2004).

할만한 데이터를 얻지 못한 실정이며 상위분류체계에 있어서는 통일하여 사용되는 기준이 모호한 상태이다. 또한 많은 분류군들이 연구과제로 남겨져 있고, 특히 검정풍뎅이과 곤충의 생태적인 면에 있어서는 거의 알려진 내용이 없는 실정이다.

2) 검정풍뎅이과 아과별 특성

본 논문에서는 Murayama (1954), Kim (2001a), Lacroix (2002a)의 견해를 참고하여 검정풍뎅이과에 긴다리풍뎅이아과(Hoplinae), 검정풍뎅이아과(Melolonthinae), 우단풍뎅이아과(Sericinae)의 세 아과로 정리하였다(Fig. 6). 기존의 자료를 참고하여 아과별 일반적인 특성을 정리하면 다음과 같다.

(1) 긴다리풍뎅이아과(Hopliinae)

긴다리풍뎅이아과(Hopliinae)는 주로 아프리카 열대지역에서 나타나는 분류군으로 동양구와 구북구 지역에도 분포하며, 아메리카 대륙에서는 *Hoplia*

Figure 6. Habitus of melolonthid beetles. A. *Ectinohoplia rufipes* (Hopliinae); B. *Hilyotrogus bicoloreus* (Melolonthinae); C. *Maladera fusania* (Sericinae).

속만 존재한다(Hardy 1977). 세계적으로 약 103속 1300종 정도가 보고되었다(Lacroix 2000).

성충은 보통 크기가 작고, 생김새가 단단하게 보이며 회색에서 갈색 또는 환한 노란색에서 초록색에 이르기까지 색채가 다양하다(Essig, 1926). 더듬이는 9마디, 곤봉부는 3마디이며, 윗입술은 두순의 아래에 위치한다. 5번째 배마디와 전미절은 봉합선에 의해 구분된다. 전경절에만 거(spur)가 있고, 중 · 후경절에는 없다. 후부절에는 한 개의 발톱이 있다(Evans 2002).

(2) 검정풍뎅이아과(Melolonthinae)

검정풍뎅이아과는 동양구에서 구북구, 아프리카 열대지역과 신북구에 걸쳐 거의 세계적인 분포를 보인다(Sabatinelli and Pontuale 1998). 아과 내에 8족 251속 3500 여 종 정도가 기록된 대단히 큰 분류군이다(Lacroix 1993, 2000).

성충의 더듬이는 9-10마디이며, 곤봉부는 3-7마디로 다양한 변화를 보인다. 윗입술은 대개 이마방패와 분리되어 있으나 위에서는 보이지 않는다. 전경절에는 거(spur)가 없거나 1개 있으며, 중 · 후경절은 각각 2개의 거가 있는데 서로 인접하여 있다(Sabatinelli and Pontuale 1998).

(3) 우단풍뎅이아과(Sericinae)

극지방을 제외한 대부분의 지역에 분포하며, 세계적으로 300여속 4300여종이 알려져 있다(Lacroix, 2000).

성충의 더듬이는 9-10 마디로 이루어졌으며, 곤봉부는 3마디이다. 윗입술은 이마방패와 융합되어 잘 보이지 않는다. 5번째 배마디와 전미절은 봉합선에 의해 구분된다. 전경절은 1개의 거가 있으며, 중 · 후경절은 각각 2개의 거가 있는데, 후경절은 거 사이로 부절마디가 삽입되어 있다. 후퇴절은 넓

고 납작하다(Evans 2002).

3) 한국산 검정풍뎅이과의 연구사

한국산 검정풍뎅이과에 대한 연구는 Kolbe (1886)가 4종을 기록한 것이 최초이다. 이듬해 Heyden (1887)은 7종을 추가로 보고하였는데 그 중 4종(*Hoplia* 12-*punctata*, *Lachnosterna* (*Holotrichia*) *castanea*, *L.* (*Holotrichia*) *bicoloreus*, *Serica herzi*)이 신종이었다. 뒤이어 Bates (1888), Brenske (1892), Lewis (1895) 등이 보고한 4종(*L. diomphalia, Brahmina heydeni, L. niponensis, L. inelegans*)도 모두 신종이었다. 1900년대에 들어서 Reitter (1902)와 Arrow (1913)는 6종의 미기록종을 발표하였고, Moser (1915, 1919)는 5종(*Autoserica cariniceps, A. infuscata, A. koreana, A. opaciventris, Brahmina excissiceps*)의 신종을 추가로 기재하였다. 이 후에 Niijima and Kinoshita (1923, 1927), Okamoto (1924)에 의해 16종이 기록되었다.

1930년대에 들어서 Murayama (1934, 1935, 1937, 1938, 1941)는 만주와 국내산 풍뎅이를 대상으로 분류연구를 수행하였다. 검정풍뎅이류에 대해서는 총 24종을 추가로 기록하였는데 이중 12종은 미기록이었고 나머지 12종은 신종으로 기재되었다. 그러나 국내산 풍뎅이에 대한 그의 연구는 6.25 전쟁으로 한동안 중단되었다. 아마도 이때 많은 표본과 연구 자료들이 소실된 것 같으며(Stebnicka 1980), Murayama는 결국 남아있는 단편적인 자료들을 종합하여 1954년 국내 검정풍뎅이과 곤충을 총 61종으로 정리하였다. 하지만 전쟁 이후 그가 다루었던 자료 표본과 문헌들은 현재 중국의 어딘가에 있을 것으로 추측하고 있을 뿐(Stebnicka 1980), 확인할 길이 없어 아직까지도 검정풍뎅이과 곤충의 분류에 많은 어려움을 안겨주고 있다. 그와 동시대에

Masaki (1936), Morita (1936), Haku (1937), Sawada (1937), Nagaoka (1938), Miwa and Chujo (1939), Kim (1956) 등은 별도로 8종의 미기록종을 보고하였고 그 중 1종(*Serica salebrosa*)만이 신종이었다.

1960년대에는 Nomura (1960), Chang (1965), Cho (1969)에 의해 5종이 추가로 보고되었다.

1970년대 이후에는 지역 동물상 조사 위주로 새로운 기록들이 추가되었는데 Kim and Kim (1972), Kim et al. (1974), Lee et al. (1985), Kim and Chang (1987), Park and Han (1992) 등에 의해 7종이 보고되었다. 1980년대에는 Stebnicka (1980)가 극동아시아 풍뎅이의 연구에서 5종을, Kalinina (1989)가 1종의 미기록종을 추가로 발표하였다.

2000년대 초반부에 Kim (2000, 2001a)은 국내 풍뎅이상과 전체를 정리하였는데 검정풍뎅이류에 대해서는 1종의 미기록을 보고함과 동시에 기록 및 근거가 불확실한 몇 종에 대해 삭제 처리를 하며 한국산 검정풍뎅이를 55종으로 정리하였다. 뒤를 이어 Kim and Kim (2003a, b)은 우단풍뎅이에 속하는 4신종 및 1아종을, 2년 뒤 Ahren (2005)은 1종을 추가로 보고하였다.

문헌 검토 결과 현재까지 기록된 한국산 검정풍뎅이과는 모두 3아과 4족 21속 98종 1아종이었다(Table 2). 한국산 검정풍뎅이과의 문헌들은 대부분이 종의 추가에 있었고, 여기에는 동물상 조사에 의한 것들이 많았는데 검정풍뎅이과 곤충이 형태적으로 유사하여 동정이 어려운데다가 전문가의 부재로 오동정 된 경우가 많았다. 또한 미기록종 및 이외의 종 목록도 기존의 기록을 단순히 인용한 경우가 많아 국내 분포의 기록이 무작위적으로 늘어나게 되었다. 속, 종 또는 아과 등의 재검토연구는 Murayama (1934, 1935, 1937, 1938, 1941), Kim (2000, 2001a), Kim and Kim (2003a, b)등에 의해 수행되었으나, Kim (2001a)은 아직 우단풍뎅이류에서 미동정 된 재료가 남아있다고 하였으며, 그룹 전체를 근본적으로 다시 검토할 필요가 있다고 언급했다.

이에 따라 본 연구는 기존에 한국산으로 기록되어 온 검정풍뎅이과 곤충의 총 목록을 재검토하여 잘못된 기록을 바로잡고 오동정 및 동물이명 등을 정리하는데 일차적인 목적을 두었다. 또한 미동정 된 재료들을 포함한 검정풍뎅이과의 표본들을 토대로 미기록 및 신종의 발견의 가능성을 검토하고자 하였다. 그리고 이러한 과정을 통해 한국산 검정풍뎅이과의 분류학적 체계를 재정리하는데 궁극적인 목적을 두었다.

Table 2. Historical review of Korean Melolonthidae with corresponding references

Author (year)	Newly Added	Valid	Added Species	Confirmed name	Remarks
Kolbe (1886)	4	3	*Apogonia cupreoviridis*	*Apogonia cupreoviridis*	
			Lachnosterna parallela	*Holotrichia parallela*	com.
			Serica japonica	*Maladera japonica*	exc.
			Serica orientalis	*Maladera orientalis*	com.
Heyden (1887)	7	5	*Hoplia rufipes*	*Ectinohoplia rufipes*	com.
			Hoplia 12-punctata	*Hoplia aureola*	syn.
			Holotrichia morosa	*Holotrichia parallela*	syn.
			Lachnosterna (Holotrichia) castanea	*Miridiba castanea*	com.
			Lachnosterna picea	*Holotrichia picea*	com.
			Lachnosterna (Holotrichia) bicoloreus	*Hilyotrogus bicoloreus*	com.
			Serica herzi	*Gastroserica herzi*	com.
Bates (1888)	1	1	*Lachnosterna diomphalia*	*Holotrichia diomphalia*	com.
Brenske (1892)	1	1	*Brahmina heydeni*	*Sophrops heydeni*	com.
Lewis (1895)	2	2	*Lachnosterna niponensis*	*Holotrichia niponensis*	com.
			Lachnosterna inelegans	*Holotrichia kiotoensis*	dub.
Reitter (1902)	4	4	*Brahmina crenicollis*	*Brahmina crenicollis*	dub.
			Brahmina intermedia	*Brahmina sedakovii*	dub.
			Polyphylla laticollis mandshurica	*Polyphylla Laticollis manchurica*	
			Sericania fuscolineata	*Sericania fuscolineata*	
Arrow (1913)	2	1	*Rhizotrogus niponicus*	*Pseudosymmachia impressifrons*	syn.
			Melolontha incana	*Melolontha incana*	
Moser (1915)	4	4	*Autoserica cariniceps*	*Maladera cariniceps*	com.
			Autoserica infuscata	*Maladera infuscata*	com.
			Autoserica opaciventris	*Eumaladera opaciventris*	com.
			Brahmina excissiceps	*Brahmina excissiceps*	dub.
Moser (1919)	1	0	*Autoserica koreana*	*Maladera koreana*	exc.
Niijima and Kinoshita (1923)	7	1	*Autoserica castanea*	*Maladera castanea*	com.
			Autoserica formosae	*Maladera formosae*	exc.
			Hoplia koreana	*Hoplia koreana*	exc.
			Miridiva koreana	*Pseudosymmachia impressifrons*	syn.
			Serica formosana	*Serica formosana*	exc.
			Serica spissigrada	*Maladera renardi*	syn.
			Serica motschulsky	*Maladera renardi*	syn.
Okamoto (1924)	3	0	*Serica boops*	*Serica boops*	exc.
			Serica similis	*Nipponoserica similis*	com. exc.
			Autoserica secreta	*Maladera secreta*	com. exc.

Author (year)	Newly Added	Valid	Added Species	Confirmed name	Remarks
Niijima and Kinoshita (1927)	7	5	*Apogonia chinensis*	*Apogonia cribricollis*	syn.
			Autoserica gibbiventris	*Maladera gibbiventris*	com.
			Autoserica ovatula	*Maladera ovatula*	com.
			Holotrichia sichotana	*Holotrichia sichotana*	dub.
			Hoplia aureola	*Hoplia aureola*	
			Serica thibetana	*Serica thibetana*	exc.
			Sophrops striata	*Sophrops striata*	
Murayama (1934)	1	1	*Aserica fusania*	*Maladera fusania*	com.
Murayama (1935)	7	6	*Aserica stridula*	*Maladera stridula*	exc.
			Aserica verticalis	*Maladera verticalis*	com.
			Serica holosericea	*Maladera holosericea*	com.
			Serica koryoensis	*Sericania koryoensis*	com.
			Serica polita	*Serica polita*	
			Serica renardi	*Maladera renardi*	com.
			Serica septentrionalis	*Serica septentrionalis*	
Masaki (1936)	1	0	*Serica salebrosa*	*Maladera orientalis*	syn.
Morita (1936)	1	0	*Apogonia amida*	*Apogonia amida*	exc.
Haku (1937)	1	0	*Hoplia communis*	*Hoplia communis*	exc.
Murayama (1937a)	4	4	*Holotrichia koraiensis*	*Holotrichia koraiensis*	
			Lasiopsis formosanus	*Lasiopsis sahlbergi*	
			Serica laboriosa	*Maladera laboriosa*	com.
			Serica schoenfeldti	*Maladera schoenfeldti*	com.
Sawada (1937)	1	1	*Serica grisea*	*Paraserica grisea*	com. dub.
Nagaoka (1938)	1	0	*Melolontha frater*	*Melolontha frater*	exc.
Murayama (1938)	5	2	*Aserica aureola*	*Maladera aureola*	com.
			Aserica okamotoi	*Maladera infuscata*	com. syn.
			Serica brunnea	*Serica brunnea*	exc.
			Serica elliptica	*Nipponoserica elliptica*	com.
			Serica nakayamai	*Maladera renardi*	com. syn.
Miwa and Chujo (1939)	2	1	*Heptophylla picea*	*Heptophylla picea*	
			Hoplia squamacea	*Hoplia squamacea*	exc.
Murayama (1941)	3	3	*Holotrichia reticulata*	*Bunbunius reticulatus*	com. miss
			Sericania hasegawai	*Sericania yamauchii*	
			Sericania latisulcata	*Sericania latisulcata*	
Murayama (1954)	3	3	*Apogonia cribricollis*	*Apogonia cribricollis*	
			Brahmina darcis	*Brahmina darcis*	
			Holotrichia ernesti	*Holotrichia ernesti*	
Kim (1956)	1	0	*Melolontha japonica*	*Melolontha japonica*	exc.
Nomura (1960)	2	1	*Ectinohoplia obducta*	*Ectinohoplia obducta*	exc.
			Metabolus impressifrons	*Pseudosymmachia impressifrons*	com.
Chang (1965)	1	0	*Holotrichia convexopyga*	*Holotrichia convexopyga*	exc.

Author (year)	Newly Added	Valid	Added Species	Confirmed name	Remarks
Cho (1969)	2	1	*Brahmina rubetra faldermanni*	*Brahmina rubetra faldermanni*	
			Hoplia moerens	*Hoplia moerens*	exc.
Kim and Kim (1972)	1	0	*Sericania kamiyai*	*Sericania kamiyai*	exc.
Kim et al. (1974)	1	0	*Sericania imadatei*	*Sericania imadatei*	exc.
Stebnicka (1980)	5	3	*Cyphochilus farinosus*	*Cyphochilus farinosus*	exc.
			Hoplia djukini	*Hoplia djukini*	exc.
			Holotrichia oblita	*Holotrichia oblita*	
			Lasiopsis manchuricus	*Lasiopsis manchuricus*	dub.
			Maladera nitidiceps	*Maladera nitidiceps*	exc.
Lee et al. (1985)	1	0	*Maladera augulata*	*Sericania angulata*	com. exc.
Kim and Chang (1987)	1	0	*Maladera kamiyai*	*Serica septentrionalis*	syn.
Kalinina (1989)	1	0	*Apogonia nigroolivacea*	*Apogonia nigroolivacea*	exc.
Park and Han (1992)	2	0	*Holotrichia novila*	*Holotrichia novila*	exc.
			Pollaplonyx flavidus	*Pollaplonyx flavidus*	exc.
Kim (2001a)	1	1	*Melolontha insulana*	*Melolontha insulana*	
Kim and Kim (2003)	4	1	*Nipponoserica opacicarina*	*Nipponoserica koltzei*	syn.
			Maladera castanea koreana	*Maladera verticalis*	syn.
			Maladera coreana	*Eumaladera opciventris*	syn.
			Serica hirsuta	*Serica hirsuta*	
			Serica lutea	*Serica polita*	syn.
Ahren (2005)	1	1	*Serica fulvopubens*	*Serica fulvopubens*	
Ahren (2007)	1	1	*Nipponoserica koltzei*	*Nipponoserica koltzei*	
Total	**98**	**57**			

com.: combination changed, exc.: excluded distribution by Kim (2001a), Kim and Kim (2003a, b), dub.: dubious distribution, misi.: misidentification, miss.: miss spelling, syn.: synonym.

2. 재료 및 방법

1) 관찰표본의 채집 및 확보

검정풍뎅이류는 대부분 토양성 곤충으로 표본의 채집은 성충을 대상으로 4~9월 중에 집중적으로 실시하였다. 채집은 2000년부터 2009년까지 전국의 산악지대를 중심으로 이루어졌으며 하천 주변과 고산 습지, 사구 등 다양한 지역을 대상으로 실시하였다. 야간활동성 종이 많은 관계로 주로 유인등(light trap)을 이용하거나, 유인등의 이용이 불가한 경우에는 인가 부근의 가로등 주변을 세밀히 탐색하였다. 주간활동성 종은 채어잡기(brandishing)와 쓸어잡기(sweeping-method) 또는 어린 식물의 부근에 있는 토양을 파는 방법(digging-method) 등을 이용하였다.

표본의 보존과 관리를 위해 성충은 산 채로 잡거나, 또는 99% 에틸알콜(ethyl alcohol)에 담아 실험실로 가져와 건조표본으로 만들거나 또는 장래의 다양한 수준의 분류 샘플로 활용됨을 고려하여 99% 에틸알콜에 액침표본으로 보관하였다.

관찰표본은 직접 채집된 개체들 이외에 추가적으로 성신여자대학교에 소장된 표본 및 고려대학교, 경상대학교, 서울대학교, 이화여자대학교 자연사박물관, 국립농업과학원, 국립과학관 등 국내 대학이나 박물관, 기관 등의 표본실을 직접 방문하여 관찰하거나 대여받아 관찰하였다. 이외에도 종 동정 및 분류를 위하여 북한산 및 외국산 표본을 국외 관련학자와 박물관으로부터 대여 및 기증받아 이용하였다(Table. 3).

본 논문에 사용된 표본이 소장되어 있는 기관과 각 종의 증거표본 소장지 또는 기증한 기관은 표 4에 약어화하여 표시하였다.

2) 형태관찰 및 기재

Table 3. Loaned specimens of Melolonthidae in this works

Species	Locality	Determinator	Deposit	No.
Eumadera nitidiceps	Japan	Kobayashi	CK	1
Heptophylla picea	Japan	Y. Miyake	OWU	2
Holotrichia kiotoensis	Japan	Y. Miyake	OWU	2
Maladera formosae	Taiwan	Kobayashi	CK	1
Maladera castanea	Japan	Kobayashi	CK	10
Maladera ovatula	China	E. Ahrens	NMB	4
Maladera secreta	Japan	Kobayashi	CK	2
Maladera stridula	Germany	E. Ahrens	NMB	3
Maladera verticalis	China	E. Ahrens	NMB	2
Melolontha frater	Japan	Miyake	SSWU	6
Nipponoserica similis *		Lewis	BMNH	1
Paraserica grisea	Japan	Kobayashi	CK	1
Serica angulata *		Lewis	BMNH	1
Serica boops	Japan	Kobayashi	CK	6
Serica brunnea	Bohemia	Kobayashi	BMNH, CK	3
Serica brunnea	Russia	Adam	HNHM	1
Serica japonica	Japan	Frivaldszky	HNHM	9
Sericania kamiyai	Japan	Kobayashi	CK	2
Serica orientalis	China	Frivaldszky	HNHM	1

* Type specimens

표본의 일반적인 외형은 Olympus SZ40 (Japan)와 Leica MZ APO (Switzerland) 해부현미경을 사용하여 8-80배율 내에서 관찰하였다. 몸의 부위별 측정은 해부현미경에 부착된 미세눈금자(ocular grid micrometer)를 이용했다. 생식기와 부속지의 그림은 현미경묘화장치(drawing tube)가 설치된 Leica MZ APO (Switzerland) 해부 현미경을 이용해 그렸으며, 성충의 도판 사진은 디지털카메라(1000D, Cannon, Japan)로 촬영하였다.

이 연구에 사용된 분류학적 형질과 용어는 주로 Ahrens (2005)에서 인용하였다. 기재문(description)은 국제적인 정보교환을 위해 영문을 사용하였다. 분류체계는 주로 Murayama (1954), Kim (2001a), Lacroix (2002a),

Table 4. Type and voucher specimen depositories

Acronym	Name
NHM	Natural History Museum, London, UK
CK	Kobayashi Collection, Japan
ENHM	Ehwa Womans University Natural History Museum, Seoul, Korea
GSNU	Gyeongsang National University, Jinjusi, Korea
HNHM	Hungarian Natural History Museum, Budapest, Hungary
KU	Korea University, Seoul, Korea
NAAS	National Academy of Agricultural Science, Suwon, Korea
NMB	Museum für naturkunde, Berlin, Germany
NSM	National Science Museum, Daejeon, Korea
OWU	Otsuma Women's University, Tokyo, Japan
SNU	Seoul National University, Seoul, Korea
SSWU	Sungshin Women's University, Seoul, Korea

Löbl and Smetana (2006)을 참고하였다. 학명의 표기에 있어 참고할 사항은 국제동물명명규약(4th edition, 1999)을 따랐다. 풍뎅이류는 성적이형이 크지 않으므로 필요한 경우 수컷과 암컷의 차이를 보이는 형질은 부위별 설명 시 추가로 기재하였다. 동정 및 분류학적 연구에 참고한 국내 주요 연구기록을 각 종별로 연도순으로 정리하여 제시하였다. 속 이상의 동물이명 목록은 Löbl and Smetana (2006), Arnet (2002) 등을 기초로 하여 정보를 추가하여 수정 증보하였고, 한국산 검정풍뎅이과 목록표를 별도로 작성하였다(Table 5).

또한 본 논문에 쓰여진 검색표는 속 이상에서는 Evans (2002), Kim (2001a), Kobayashi (1999), Nomura (1967, 1973, 1974, 1976), Medvedev (1951), Reitter (1902), Yu et al. (1998)이 작성한 검색표와 검색에 유용한 기재문을 인용하거나 변형하였고, 종의 검색표는 Kobayashi (1999), Nomura (1967, 1973, 1974, 1976), Yu et al. (1998) 등을 참고하고, 한국산 재료를 관찰하여 새롭게 작성하였다. 국내산 종의 기록은 있으나

국내 분포를 확증할 수 있는 표본을 관찰하지 못한 분류군에 대해서는 외국 기관으로부터 대여하거나 기증받은 증거표본을 기초로 기재문을 작성하려 노력했다. 그러나 국내 고유종이면서 기록은 있으나 표본을 확인 할 수 없는 경우와 같이 부득이 표본을 관찰하지 못한 분류군에 대해서는 원기재문을 인용하여 종의 분별에 참고했다. 또한 원기재문 조차도 종을 분별할 수 없을 정도로 설명이 미약한 경우에는 기재는 하되 혼돈을 피하기 위해 검색표에서 제외하였다. 각 분류군별로 논의가 필요한 경우는 참고사항(remark)에서 소견을 기술하였고, 아울러 채집과 문헌을 통한 생물학적 정보도 기술하였다.

일반적으로 수컷생식기의 구조는 형태적으로 유사한 종들을 구별하는데 매우 유용한 형질들을 제공해준다(Eberhard, 1985). 특히 곤충에 있어서 수컷생식기는 속간, 종간 변이가 심하지만 종 내에서는 변이가 거의 없거나 매우 적은 경우가 많아 안정적인 종 수준의 진단형질을 제공해 준다. 검정풍뎅이과에서도 수컷생식기가 종별로 다양한 형태를 보이고 있어 동정 및 유연관계의 추정에 있어 주요 형질들로 사용될 수 있다. 수컷생식기는 복부 속에 함입되어 있어 다음과 같은 일련의 과정을 통하여 몸 밖으로 분리하여 관찰하였다.

1) 생식기 적출 과정에서 표본의 파손을 방지하기 위해 1시간에서 2시간 정도 80-90℃의 증류수(distilled water)에 연화(softening) 한다.
2) 충분히 연화가 진행되면 날카로운 핀셋을 사용하여 복부 마지막 마디와 미절판의 사이로 생식기를 적출한다.
3) 몸의 크기가 작거나 복부 마디 사이로 적출이 어려운 경우, 복부를 전체적으로 드러내어 안전하게 생식기를 적출하고 복부는 다시 원래의 위치에 부착 시킨다.

4) 생식기를 80% 에탄올이 담긴 작은 페트리접시(petri-dish)에 담근다.

5) 10% KOH 용액이 담긴 작은 시험관에 넣어 10분 정도 물중탕 한다.

6) 중탕 후 이를 중화시키기 위해 약 3% 아세트산(acetic acid)을 함유한 80% 에탄올에 약 1분간 담근다.

7) 중화 후 다시 80% 에탄올이 담긴 작은 페트리접시에 넣는다.

8) 핀셋이나 해부 침 등으로 생식기 주변의 이물질 등을 제거한다.

9) 해부현미경을 이용하여 적당한 배율에서 관찰하고 그림을 그린다.

10) 관찰이 끝난 생식기는 글리세린이 약 1/2 정도 담긴 genitalia vial에 넣어 해당 표본과 함께 곤충핀으로 고정하여 보관한다.

관찰표본의 크기 측정은 10mm 이하의 종들의 경우 현미경의 눈금자를, 10mm 이상의 종들은 Digital caliper (Mitutoyo: model No. CD-15CPX, Japan)와 현미경의 눈금자를 함께 이용하였다. 측정 대상 표본의 수는 지역별, 크기와 색채변이에 따라 5개체씩 선발하여 측정함을 기본으로 하였으나, 변이가 심한 종은 표본의 수를 늘여서 측정하였고, 표본이 부족한 경우는 이 기준치에 미달된 상태로 측정하였다. 종내 변이를 최대한 반영하기 위하여 표본들 중에서 크기와 색깔 등에서 차이가 많은 개체들을 다양하게 선정하였고 되도록 다른 시기, 다른 장소에서 채집된 개체들을 선정하여 측정하였다. 종간의 크기 비교 및 기재를 위하여 다음과 같은 양적 형질들을 사용하였고, 측정방법을 도판 I에 자세히 도시하였다.

1) Body length and width: 개체의 크기를 나타내는 척도로 안테나를 제외하고 두순에서 복부의 끝까지 또는 시초가 복부보다 길게 나

왔을 경우 머리끝에서 시초 끝까지의 길이와, 시초의 가장 넓은 폭을 측정하였다.

2) Club-footstalk ration: 더듬이 곤봉부와 병부의 비율을 나타내었다. 풍뎅이류는 나뭇잎 모양의 곤봉부를 갖는 것이 특징인데 많은 경우 곤봉부와 병부의 비율이 종간 또는 암·수의 구분에 중요한 형질이 된다.

3) Pronotum length and width ratio: 전흉배의 길이와 폭의 비율을 나타내었다. 길이는 정중앙의 길이를 사용하였고, 폭은 가장 넓은 곳을 측정하였다.

4) Pronotum-elytra ratio (pronotum length / elytra length) : 전흉배판과 시초의 길이 비율을 나타내었다. 시초의 길이는 어깨부분부터 시초봉합선 끝까지의 길이로 대표하였고, 전흉배판의 길이도 정중앙의 길이로 대표하여 측정하였다.

5) Eye-interocular space ratio (eye diameter / vertex width) : 복안의 직경과 정수리 폭의 비율을 나타내었다.

6) Metafemur ratio (metafemur width / length): 후퇴절의 폭과 길이의 비율을 나타내었다.

7) Metatibia ratio (metatibia width / length) : 후경절의 폭과 길이의 비율을 나타내었다.

8) Pygidium ratio (pygidium width / length) : 미절의 폭과 길이의 비율을 나타내었다.

한글 지명의 영문표기법은 「국어의 로마자 표기법」(2000년 7월 7일 문화관광부 고시)을 따랐다. 관찰표본(specimens examined)에 사용한 각 도의 약어는 그림 7에 나타내었다.

서울이나 대전, 대구, 부산 등과 같이 행정상 도와 분리되어 독립되어 있는 특별시나 광역시의 경우에는 경기도, 충청남도, 경상북도, 경상남도에 각각 포함시켰는데 이는 행정구역과는 무관하게 분류군의 분포지역을 편리하게 나타내기 위함이다.

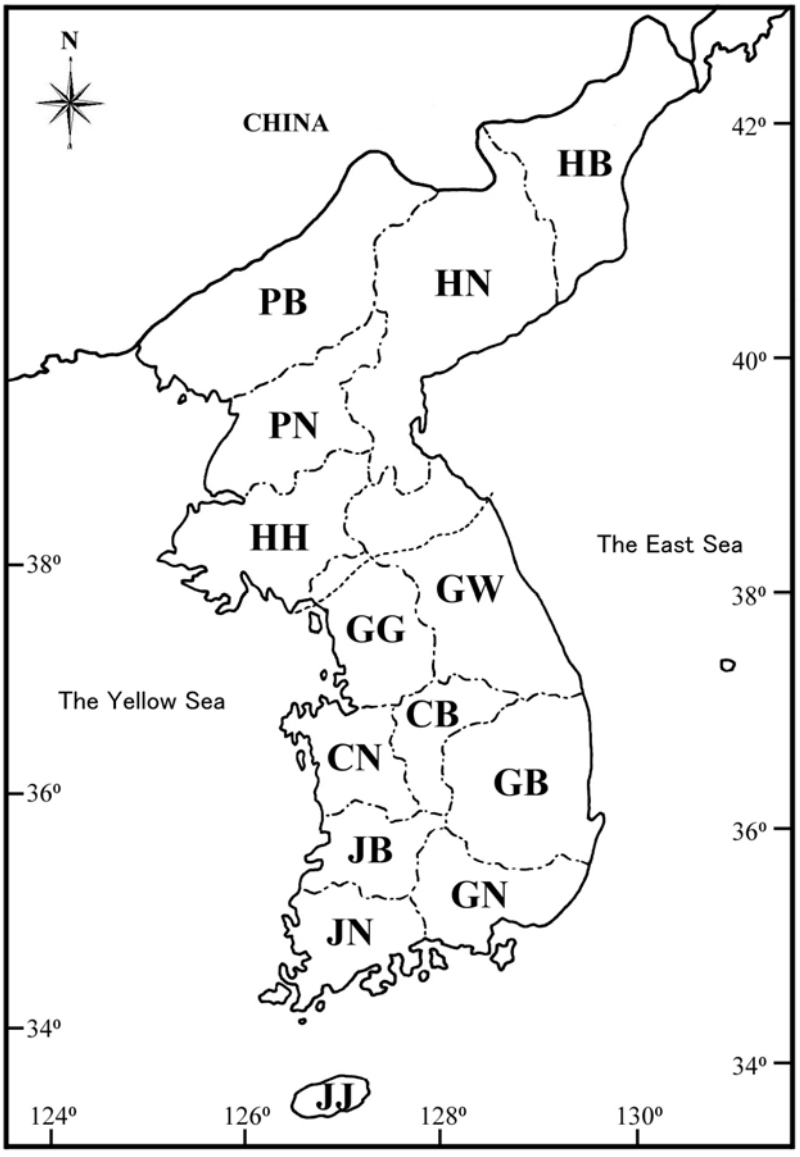

Figure 7. Distributional map of Korea and abbreviation for province. CB: Chungcheongbuk-do, CN: Chungcheongnam-do, GB: Gyeongsangbuk-do, GG: Gyeonggi-do, GN: Gyeongsangnam-do, GW: Gangwon-do, HB: Hamkyeongbuk-do, JB: Jeollabuk-do, JJ: Jeju-do, JN: Jeollanam-do, PB: Pyeonganbuk-do, PN: Pyeongannam-do.

3. 결과

3-1. 한국산 검정풍뎅이과의 목록(Checklist of Korean Melolonthidae)

한국산 검정풍뎅이과의 분류학적 검토 결과 총 3아과, 6족, 21속, 62종이 분포하는 것으로 확인하였다(Table 5). 각 분류군에 대한 국내 기록 및 검색표, 동물이명, 관찰결과를 기록하였다.

Table 5. Checklist of Korean Melolonthidae

Order	**Coleoptera**			**딱정벌레목**
Superfamily	**Scarabaeoidea**			**풍뎅이상과**
Family	**Melolonthidae Leach in Samouelle, 1819**			**검정풍뎅이과**
Subfamily 1	**Hopliinae Péring, 1902**			**긴다리풍뎅이아과**
Tribe 1	**Hopliini Latreille, 1829**			**긴다리풍뎅이족**
Genus 1	*Ectinohoplia* Redtenbacher, 1867			주황긴다리풍뎅이속
	Ectinohoplia	*rufipes*	Motschulsky, 1860	주황긴다리풍뎅이
Genus 2	*Hoplia* Illiger, 1803			긴다리풍뎅이속
	Hoplia	*djukini*	Jacobson, 1914	흥남긴다리풍뎅이
	Hoplia (*Euchromoplia*)	*aureola*	(Pallas, 1871)	점박이긴다리풍뎅이
Subfamily 2	**Melolonthinae Dalla Torre, 1912**			**검정풍뎅이아과**
Tribe 2	**Diplotaxini Burmeister, 1855**			**감자풍뎅이족(신칭)**
Genus 3	*Apogonia* Kirby, 1819			감자풍뎅이속
	Apogonia	*cribricollis*	Burmeister, 1855	잔감자풍뎅이
	Apogonia	*cupreoviridis*	Kolbe, 1886	감자풍뎅이
Tribe 3	**Heptophyllini S. I. Medvedev, 1951**			**긴다색풍뎅이족(신칭)**
Genus 4	*Heptophylla* Motschulsky 1857			긴다색풍뎅이속
	Heptophylla	*picea*	Motschulsky, 1857	긴다색풍뎅이
Genus 5	*Hilyotrogus* Fairmaire 1886			쌍색풍뎅이속
	Hilyotrogus	*bicoloreus*	(Heyden, 1887)	쌍색풍뎅이
Tribe 4	**Melolonthini Samouelle, 1819**			**왕풍뎅이족**
Genus 6	*Melolontha* Fabricius 1775			왕풍뎅이속
	Melolontha	*incana*	(Motschulsky, 1853)	왕풍뎅이
	Melolontha	*insulana*	(Moser, 1918)	꼬마왕풍뎅이
Genus 7	*Polyphylla* Harris 1841			수염풍뎅이속
	Polyphylla	*laticollis manchurica*	Semenov, 1882	수염풍뎅이
Tribe 5	**Rhizotrogini Burmeister, 1855**			**검정다색풍뎅이족**
Genus 8	*Brahmina* C.E. Blanchardt 1851			홍다색풍뎅이속
	Brahmina	*rubetra faldermanni*	(Murayama, 1935)	활더맨홍다색풍뎅이
	Brahmina	*crenicollis*	(Motschulsky, 1854)	본방홍다색풍뎅이
	Brahmina	*darcis*	Reitter, 1902	다르키스홍다색풍뎅이
	Brahmina	*excissiceps*	Moser, 1915a	홍다색풍뎅이
	Brahmina	*sedakovii*	Mannerheim	북방홍다색풍뎅이
Genus 9	*Bunbunius* Nomura, 1970			그물눈검정풍뎅이속(신칭)
	Bunbunius	*reticulatus*	(Murayama, 1941)	제주그물눈검정풍뎅이
Genus 10	*Holotrichia* Hope 1837			검정풍뎅이속
	Holotrichia	*koraiensis*	Murayama, 1937	고려다색풍뎅이
	Holotrichia	*diomphalia*	(Bates, 1888)	참검정풍뎅이
	Holotrichia	*ernesti*	Reitter, 1902	꼬마붙이검정풍뎅이
	Holotrichia	*kiotoensis*	Brenske, 1894	검정풍뎅이
	Holotrichia	*oblita*	(Faldermann, 1835)	북한검정풍뎅이
	Holotrichia	*parallela*	(Motschulsky, 1854)	큰검정풍뎅이
	Holotrichia	*picea*	(Waterhouse, 1875)	꼬마검정풍뎅이
	Holotrichia	*sichotana*	Brenske, 1896	서울검정풍뎅이
	Holotrichia	*niponensis*	(Lewis, 1895)	큰다색풍뎅이
Genus 11	*Lasiopsis* Erichson 1847			털보갈색풍뎅이속
	Lasiopsis	*sahlbergi*	(Mannerheim, 1849)	사흘베르그털보갈색풍뎅이
	Lasiopsis	*manchurica*	Murayama, 1941	만주털보갈색풍뎅이
Genus 12	*Miridiba* Reitter 1902			밤색풍뎅이속
	Miridiba	*castanea*	(Waterhouse, 1875)	밤색풍뎅이
	Miridiba	*yangjuensis*	Kim n. sp.	
Genus 13	*Pseudosymmachia* Dalla Torre, 1912			고려노랑풍뎅이속(신칭)

	Pseudosymmachia	*impressifrons*	Fairmaire, 1887	고려노랑풍뎅이
Genus 14	*Sophrops* Fairmaire 1887			갈색줄풍뎅이속
	Sophrops	*heydeni*	(Brenske, 1892)	하이덴갈색줄풍뎅이
	Sophrops	*striata*	(Brenske, 1892)	황갈색줄풍뎅이
Subfamily 3	**Sericinae Brenske, 1897**			**우단풍뎅이아과**
Tribe 6	**Sericini Kirby, 1837**			**참우단풍뎅이족**
Genus 15	*Eumaladera* Nomura, 1967			진우단풍뎅이속(신칭)
	Eumaladera	*opaciventris*	(Moser, 1915)	아래검은우단풍뎅이
Genus 16	*Gastroserica* Brenske 1897			줄우단풍뎅이속
	Gastroserica	*herzi*	(Heyden, 1887)	줄우단풍뎅이
Genus 17	*Maladera* Mulsant and Rey, 1871			애우단풍뎅이속
	Maladera	*aureola*	(Murayama, 1938)	금색우단풍뎅이
	Maladera	*cariniceps*	(Moser, 1915b)	알모양우단풍뎅이
	Maladera	*castanea koreana*	Kim and Kim, 2003b	우리밤색우단풍뎅이
	Maladera	*fusania*	(Murayama, 1934)	부산우단풍뎅이
	Maladera	*gibbiventris*	(Brenske, 1897)	주름배우단풍뎅이
	Maladera	*holosericea*	(Scopoli, 1772)	홀쭉우단풍뎅이
	Maladera	*infuscata*	(Moser, 1915b)	그을음우단풍뎅이
	Maladera	*laboriosa*	(Brenske, 1897)	대남우단풍뎅이
	Maladera	*orientalis*	(Motschulsky, 1857)	애우단풍뎅이
	Maladera	*ovatula*	(Fairmaire, 1891)	차색우단풍뎅이
	Maladera	*renardi*	(Ballion, 1870)	레나아드우단풍뎅이
	Maladera	*schoenfeldti*	(Murayama, 1937)	스웬휄드트우단풍뎅이
	Maladera	*verticalis*	(Fairmaire, 1888)	빨간색우단풍뎅이
Genus 18	*Nipponoserica* Nomura, 1973			조롱박우단풍뎅이속
	Nipponoserica	*elliptica*	(Murayama, 1938)	조롱박우단풍뎅이
	Nipponoserica	*koltzei*	Reitter, 1897	무테날개우단풍뎅이
	Nipponoserica	*melanosoma*	Kim n. sp.	
Genus 19	*Paraserica*		Reitter, 1896	회색우단풍뎅이속
	Paraserica	*grisea*	(Motschulsky, 1866)	회색우단풍뎅이
Genus 20	*Serica* Mac Leay, 1819			우단풍뎅이속
	Serica	*fulvopubens*	Reitter, 1896	갈색우단풍뎅이(신칭)
	Serica	*hirsuta*	Kim and Kim, 2003a	털보우단풍뎅이
	Serica	*polita*	(Gebler, 1832)	북방우단풍뎅이
	Serica	*septentrionalis*	(Murayama, 1935)	참우단풍뎅이
	Serica	*monticum*	Kim n. sp.	
Genus 21	*Sericania* Motschulsky, 1860			다색우단풍뎅이속
	Sericania	*fuscolineata*	Motschulsky, 1860	흑다색우단풍뎅이
	Sericania	*koryoensis*	Murayama, 1935	광릉다색우단풍뎅이
	Sericania	*latisulcata*	Murayama, 1941a	넓은줄우단풍뎅이
	Sericania	*yamauchii*	Sawada, 1938	하세가와다색우단풍뎅이
	Sericania	*lucidalis*	Kim n. sp.	

Total 3 Subfamilies, 6 Tribes, 21 Genera, 61 species

3-2. 분류(taxonomic account)

Family Melolonthidae Leach in Samouelle, 1819 검정풍뎅이과

Melolonthidae Leach in Samouelle, 1819: 189

Melolonthinae Leach in Samouelle, 1819: 189

Melolonthinae MacLeay 1819: 79

Common names: The may beetles, june beetles, and chafers

Diagnosis. Head unarmed; clypeus expanded, covering mouthparts; labrum visible, not membranous, chitinous, located under clypeus; mandibles well developed; antennal insertions not visible from above; antennal club elongate with three or more segments. Pronotum convex, unarmed; scutellum exposed. Abdomen with six visible sternites; the last three abdominal spiracles not divergent; six sternites visible; pygidium exposed. Meso- and metatarsal segments of leg not imbricate; metatibia with one or two spurs; tarsal claws fixed, not independently movable; claws equal or subequal, cleft or toothed, pectinate; onychium present (Lacroix 2002).

Biological notes. Larvae are subterranean feeders on the roots and underground stems of living plants (Ritcher 1966).

Key to the subfamilies of Melolonthidae in Korea

1. Metatarsus with single claw; Metatibia with one spur; sixth sternite contracted ····· **Hopliinae**

- Metatarsus with two claws; Metatibia with two spurs; sixth sternite

very visible ····· 2

2. Metatibial spurs subcontiguous, located below tarsal articulation, proximal segments of tarsus movable only above spurs; labrum in the shape of horn, very visible ····· Melolonthinae

- Metatibial spurs set apart, below and above tarsal articulation, proximal segments of tarsus movable between spurs; labrum adjacent to clypeus, none visible ····· Sericinae

Subfamily Hopliinae Latreille, 1829 긴다리풍뎅이아과

Hopliinae Latreille, 1829: 563

Hopliidae Latreille, 1829: 563

Hopliini Latreille, 1829: 563

Diagnosis. Body generally small, surface covered with scales and scale-like hairs. Antennae nine-segmented; last three segments clubbed. Sixth sternite contracted. Metatarsus with single claw. Metatibia with one spur (Sawada, 1938).

Tribe Hopliini Latreille, 1829 긴다리풍뎅이족

Hopliini Latreille, 1829: 563

Hopliinae Latreille, 1829: 563

Hopliina Latreille, 1829: 563

Type genus: *Hoplia* Illiger, 1803: 226

Diagnosis. Antennae nine-segmented, with three-segmented club.

Labrum located below clypeus distinctly. Fifth abdominal sternite and propygidium separated by suture. Protibiae with spurs, meso and metatibiae without apical spurs. Pro- and mesotarsi with subequal claws, metatarsi with single claw (Evans 2002).

Remark. In the Palaearctic region, the tribe Hopliini comprises four genus and 197 currently valid species: *Hoplia* Illiger, 1803 (six subgenera and 170 species) *Ectinohoplia* Redtembacher, 1867 (25 species), *Himalhoplia* Sabatinelli, 1983 (one species), *Spinohoplia* Sabatinelli, 1997 (one species). In spite of the large number of species described, many other species need to be described especially from the East Palearctic and Oriental regions while several local forms were described as good species. The phylogenetical relationships are fare to be understood and the taxonomic grouping in genera is still unsatisfactory (Sabatinelli 2008).

Key to the genera of Korean Hopliini

Elytra with several long setae at sutural apex. Pygidium exposed out of elytra. Femur and tibia thin and long ····· ***Ectinohoplia***

- Elytra without setae at sutural apex. Anterior part of pygidium covered with elytra. Femur and tibia thick and short ····· ***Hoplia***

Genus *Ectinohoplia* L. Redtenbacher 주황긴다리풍뎅이속

Ectinohoplia L. Redtenbacher 1867: 63

Type species: *Ectinohoplia sulphuriventris* L. Redtenbacher, 1867: 63.

Diagnosis. Body elongated with scales. Antennae 10 segmented with 3 segmented club. Legs thin as well as long. Protibia tridentate. Elytra with several setae at sutural apex. Pygidium expose out of elytra (Sawada 1938).

Ectinohoplia rufipes (Motschulsky) 주황긴다리풍뎅이

(Pl. II. Fig. II-1: A-C; Pl. II. Fig. III-1: A)

Decamera rufipes Motschulsky, 1860b: 133.

Korean records.

Hoplia rufipes: Heyden, 1887: 251; Bates, 1888: 372; Miwa et al., 1939: 73; Cho, 1957: 300; KZS, 1968: 137.

Ectinohoplia rufipes: Niijima and Kinoshita, 1923: 80; Okamoto, 1924: 74; Kôno, 1935: 164; Mochizuki et al., 1935: 32; 1937: 91; Miwa et al., 1939: 72; Cho, 1957: 300; 1963: 218; 1969: 683; Nomura, 1960: 57; Cho et al., 1968: 264; KZS, 1968: 137; Won et al., 1968: 379; KSPP, 1972: 206; Kim et al., 1975: 250; 1981: 125; 1982a: 156; 1982b: 276; Kim, 1978: 358; Stebnicka, 1980: 261; Kim, 1981: 345; 1995a: 165; Nam et al., 1982: 129; Yoon et al., 1990: 110; Kim and Lee, 1991a: 66; Park and Kim, 1993: 112; Park et al., 1993: 177; ESK and KSAE, 1994: 149; Kim and Kim, 1996: 48; Kim and Kim, 1996: 127; 1998: 170; Kim et al., 1999: 129; Kim, 2001: 18; Kim et al, 2002: 119; Löbl and Smetana, 2006: 184.

Description. Body length 7.2-9.1mm; Body width 3.7-4.9mm; Club-footstalk ratio 0.41-0.64; Pronotum ratio 0.64-0.72;

Pronotum-elytra ratio 0.46-0.54; Metafemur ratio 3.86-4.83; Metatibia ratio 4.29-7.6; Pygidium ratio 0.78-0.86.

Body short, oblong, reddish brown. Dorsal surface opaque except shiny labroclypeus. Head, pronotum and elytra with scales.

Clypeus trapezoidal, widest at base, straight at lateral sides, convergent forward to broadly rounded front angles, anterior margin straight, anterior border reflexed; surface shiny, with fine punctures and hairs, medially with a shallow longitudinal elevation. Frontoclypeal suture distinctly impressed and straight; ocular canthus moderately long, densely punctate, with setae and scales. Frons densely punctate, with scales. Antenna brown, 10-segmented; club 3-segmented, shorter than remaining antennomeres combined in both sex. Eyes not large, eye - interocular space ratio 0.43. Apical segment of maxilliary palpus widened at base and sharply pointed at apex.

Pronotum strongly convex, widest at middle, anterior angles sharp, not rounded at apex, posterior angles bluntly rounded, lateroanterior margin and lateral border setaceous; surface densely punctate with scales. Scutellum triangular, with punctures similar to that of elytra, with scales.

Elytra short, pygidium exposed, densely punctate with scales, lateral margins setaceous, several long setae at sutural apex; scales redish brown to brown, undulant at posterior third.

Ventral side of abdomen black, glabrous, covered with yellow scales. Mesosternum closely adjacent between mesocoxa. Pygidium flattened declivity, with dense scales, some long hairs beside apical

border.

Legs long and slender; Femur with scales and some hairs. Hind tibia with some scales and seta. Fifth metatarsomere as long as three upper segments combined, tarsal claw long and simple. Protibia long, tridentate, anterior tarsal claws in both sexes symmetrical but inner claws somewhat small. Aedeagus: Pl. II. Fig. III-1: A.

Specimens Examined: CB Jecheon-si: Mt. Wolaksan, 10.VII.1991, HJ Lee, 2exs (SSWU); ditto, JY Na, 2exs (SSWU); ditto, DW Lee, 1ex (SSWU). **CN** Daejeon-si: Shinsong-dong, 3.VI.1994, SL Ahn, 1ex (NSM); ditto, 20.VII.1993, SL Ahn, 1ex (NSM). Buyeo-gun: Mt. Mansusan, 19-20.VII.1999, JI Kim et al. 1ex (SSWU). Cheonan-si: Danguk Univ., 20.V.1989, TE Yang, 1ex (EWU). Seosan-gun: Mt. Gayasan, 12.V.1994, JH Hong, 1ex (SSWU); ditto, 2.VI.1994, HJ Cho, 1ex (SSWU); ditto, 8.VI.1994, HJ Cho, 1ex (SSWU); ditto, JY Lee, 1ex (SSWU); ditto, 9.VI.1995, SY Hwang, 1ex (SSWU); ditto, 4.VI.1996, JG Im, 1ex (SSWU); ditto, 10.VI.1996, BS Song, 1ex (SSWU); ditto, 29.IV.1997. SH Park, 1ex (SSWU); ditto, 2-10.V.1997, HW Kim, 5exs (SSWU). **GB** Cheongsong-gun: Mt. Juwangsan, 24.VI.1986, SH Kim, 1ex (SSWU); ditto, 16.VIII.1990, JA Lee, 1ex (SSWU); Mt. Taeheangsan, Dalgipokpo, 24.VI.1988, YS Lee, 1ex (SSWU); ditto, K Moon, 2exs (SSWU). Mungyeong-si: Mt. Joryeongsan, 1st Door, 22.VI.1989, JI Kim, 1ex (SSWU). seongju-gun: Suryun-myeon, Bongyang-ri, 9.VI.1992, 1ex (SSWU). Wuljin-gun: Bulyeong valley, 24-27.VI.1990, HO Kang, 2exs (SSWU); ditto, BK Choe, 4exs (SSWU); ditto, TJ Yoon, 2exs (SSWU); ditto, JI Lee, 1ex (SSWU); ditto, BH Jeon, 1ex (SSWU); ditto, KH Jung,

2exs (SSWU); ditto, MW Kim, 1ex (SSWU); ditto, YL Kang, 1ex (SSWU); ditto, YD Ji, 4exs (SSWU); ditto, IJ Kim, 2exs (SSWU); ditto, HK Jeon, 1ex (SSWU); ditto, SI Park, 2ex (SSWU); ditto, SH Choe, 1ex (SSWU); ditto, S Jin, 1ex (SSWU); ditto, JH Park, 2exs (SSWU); ditto, KW Park, 1ex (SSWU). Yeongju-si: Pungki-eup, Mt. Sobaeksan, 3.VII.1998, JI Kim et al., 1ex (SSWU); ditto, 4.VIII.1989, SH Jeon, 1ex (SSWU); ditto, 13.VIII.1992, SL Nam, 1ex (SSWU); ditto, Birobong, 3.VIII.1994, TY Moon, 2exs (SSWU); ditto, Huibangsa, 28.V.1999, JI Kim et al., 2exs (SSWU). GG Anyang-si: Gwanak, 19.IX.1992, HJ Kim, 1ex (SSWU); Anyangsumokwon, 6.VI.1986, ES Kim, 1ex (EWU). Gapyeong-gun: Daeseong-ri, 10.V.1984, HJ Choe, 1ex (EWU); ditto, 4.VI.1982, CS Cho, 1ex (EWU); Mt. Myeongjisan, 5.VI.1994, MJ Shim, 1ex (SSWU); ditto, 18.VII.1991, EJ Lee, 1ex (SSWU); Buk-myeon, Mt. Hwaksan, 25.VII.1998, HA Lee, 1ex (SSWU); Mt. Cheongyesan, 18.VII.1991, JI Kim (SSWU). Goyang-si: Beokje 21.VI.1969, ES Yoon, 1ex (EWU); ditto, 5.VI.1974, JS Oh, 1ex (EWU); Seosamnung, 3.VI.1972, SJ Yeo, 3exs (EWU); ditto, NH Lee, 1ex (EWU); ditto, AS Lee, 1ex (EWU); ditto, HS Lee, 1ex (EWU); Seonung, 25.V.1963, YJ Oh, 1ex (EWU); ditto, 2.VI.1984, HY Kim, 1ex (EWU); ditto, NC Kim, 1ex (EWU); ditto, 6.VI.1962, OH Lee, 1ex (EWU); ditto, 21.V.1984, HJ Lee 1ex (EWU); ditto, 3.VI.2001, SI Jung, 2exs (SSWU); ditto, 5.VI.2001, SM Lee, 1ex (SSWU). Gunpo-si: Mt. Surisan, 28.VI.1975, SH Yu, 1ex (EWU). Gwachon-si: 28.V.1972, NH Lee, 1ex (EWU); Seoul Grand Park, 29.V.1999, SJ Kim, 1ex (SSWU). Hanam-si: Engogae, 13.VI.1981, ES Song, 2exs (SSWU); ditto, 5.VI.1982, WH Baek, 1ex

(SSWU); ditto, 11.VI.1983, KS Park, 1ex (SSWU). Namyangju-si: Pyeongnae-dong, 6.VI.1984, JE Park, 1ex (EWU); Jinjeop-eup, Gwangnung, 29.IV.1961, YJ Yoon, 1ex (EWU); ditto, 3.VI.1961, SH Han, 1ex (EWU); ditto, 9.VI.1973, MS Yoon, 1ex (EWU); ditto, 19.VII.1980, IR Kim, 1ex (SSWU); ditto, 7.VI.1981, JY Yu, 1ex (SSWU); Sudong-myeon, Bikumgyegok, 6.VI.1983, HJ Oh, 1ex (EWU); ditto, 17.V.1984, YK Kim, 1ex (EWU); ditto, 2.VI.1984, SS Kim, 1ex (EWU); ditto, 6.VI.1984, MS Shin, 1ex (EWU); ditto, 9.VI.1984, OS Kwon 1ex (EWU); ditto, YM Kim, 1ex (EWU); ditto, HK Yoon, 1ex (EWU); ditto, HK Kim, 1ex (EWU); Mt. Chonmasan, 26.V.1962, JS Park, 1ex (SSWU); ditto, 18.VI.1974, HJ Ma, 1ex (EWU); ditto, 21.VI.1975, YS Choe, 1ex (EWU); ditto, 13.VI.1981, JH Heo, 1ex (SSWU); ditto, SK Lee, 1ex (SSWU); ditto, 4.VI.1983, MH Ahn, 1ex (SSWU); ditto, 26.V.1983, HS Kim, 1ex (EWU); ditto, 28.V.1983, SH Kim, 1ex (SSWU); ditto, 27.V.1984, MH Ha, 1ex (EWU); ditto, 10.VI.1984, MH Kim (SSWU); ditto, 8.VI.1986, SY Seong, 1ex (EWU); ditto, 9.V.1987, IM Choe, 1ex (EWU); ditto, 28.V.1988, WS Shin, 1ex (EWU); ditto, 17.VI.1995, EJ Lee, 1ex (SSWU); Mt. Chukryngsan, 12.VII.1980, JI Kim, 2exs (SSWU); ditto, 18.VI.1983, KM Lee, 2exs (SSWU); Hwado-eup, Masok, 27.V.1984, JW Lee, 1ex (EWU); Saeteo, 7.VI.1986, SO Jung, 1ex (EWU); Wabu-eup, Paldang-ri, 9.VI.1984, MS Nam, 1ex (EWU); ditto, 21.V.1989, TE Yang, 1ex (EWU). Pocheon-si: 27.VII.1995, KC Seong, 1ex (SSWU). Pyeongtaek-si: Maseok, 1.VIII.1985, MK Hwang, 1ex (SSWU). Seoul: Gwanak-gu, Mt. Gwanaksan, 20.VI.1982, HI Nam, 1ex (EWU); Kangbuk-gu, Wuidong, 2.VI.1986, SO Lee, 1ex (EWU);

Kangnam-gu, Gaepo-dong, 27.V.1991, SJ Yoon, 1ex (SSWU); Wonji-dong, 8.VI.1986, HJ Kim, 1ex (SSWU); ditto, 1.VI.1985, SY Cho, 1ex (SSWU); ditto, 11.VI.1983, SH Park, 1ex (SSWU); ditto, 7.VI.1986, SH Park, 1ex (SSWU); ditto, 4.VI.1985, MK Hwang, 1ex (SSWU); ditto, 7.VI.1986, JH Lee, 1ex (SSWU); ditto, Mt. Cheonggyesan, 7.VI. 1986, SM Kim, 1ex (SSWU); ditto, 26.V.1981, KJ Lee, 1ex (SSWU); Mt. Daemosan, 30.V.1998, KN Park, 1ex (SSWU); Seocho-gu, Mt. Cheonggyesan, 26.V.1989, JM Park, 1ex (SSWU); ditto, 2.VI.1991, HS Park, 1ex (SSWU); ditto, 6.VI.1994, HK Kim, 1ex (SSWU); ditto, 22.V.1998, JE Park, 1ex (SSWU); Naegokd-ong, Heuninrung, 11.VI.1983, YM Cheon, 1ex (SSWU); Seongbuk-gu, Jeongrung, 26.VI.1989, JA Yu, 1ex (EWU). Seongnam-si: Mt. Namhansan, 23.V.1999, EJ Kim, 1ex (SSWU); ditto, 23.V.1999, HK seong, 1ex (SSWU); ditto, 7.VI.1986, MS Jeong, 1ex (SSWU); ditto, 17.VIII.1993, SH Jeong, 1ex (SSWU). Suwon-si: 10.VI.1973, JH Lee, 2exs (EWU); ditto, 26.V.1957, Lee, 1ex (SNU); Kwanggyo-dong, 9.VI.1957, Lee, 1ex (SNU); ditto, Choe, 1ex (SNU). Yangpyeong-gun: Mt. Yongmunsan, 5.VI.1955, TW Cho, 1ex (EWU); ditto, DJ Oh, 1ex (EWU); ditto, 6.VI.1955, BS Kim, 1ex (EWU); ditto, 2.VI.1973, MS Yoon, 1ex (EWU); ditto, 28.V.1991, HT Kim, 1ex (SSWU); ditto, SM Yu, 3exs (SSWU). **GN** Gachang-gun: 19.VI.1976, 7exs (SSWU). Jinjusi: Guigok-dong, 30-31.V.1992, 3exs (SSWU). Jinyang-gun: Daepyeong-myeon, Dangchon-ri, 27.VI.1992, YW Park, 1ex (SSWU); ditto, Daepyeong-ri, 12.VI.1992, 3exs (SSWU); ditto, Hachon-ri, 19.VII.1992, 1ex (SSWU); Myeongseok-myeon, Shinjung-ri, 30-31.V.1992, 1ex (SSWU). **GW**

Chunchun-si: Namsan-myeon, Gangchon, 20.V.1972, CD Lee, 1ex (EWU); ditto, Nami Is., 5.VI.1977, EK Joo, 1ex (EWU). Gangrung-si: Wangsan-myeon, Domi-ri, 17.VIII.1987, EJ Oh, 1ex (SSWU). Goseong-gun: Hyangrobong, 29.VIII.1990, JI Kim, 1ex (SSWU); Gojin-dong, Mt. Geonbongsan, 5.VII.1995, JI Kim, 1ex (SSWU); Madal-ri, 10.VII.1990, JI Kim, 4exs (SSWU); ditto, JK Kim, 2exs (SSWU); ditto, HC Park, 1ex (SSWU); Myeongpa-ri, 10.VII.1990, JI Kim, 1ex (SSWU). Hongchon-gun: Mt. Odaesan, Chogye-dong, 30.VI.1997, SY Kim, 1ex (SSWU). Inje-gun: Mt. Bangtaesan, Maehwa-dong, 26.VI.1996, Yeongnam Univ., 1ex (SSWU); ditto, Misan-ri, 25.VI.1996, ditto, 1ex (SSWU); ditto, JI Kim and SY Kim, 2exs (SSWU); Jinburyeong, 19.VI.1998, KJ Chue, 3exs (SSWU); ditto, HJ Ahn, 2exs (SSWU); ditto, SY Nam, 1ex (SSWU); ditto, 24.VII.1984, SJ Yoon, 1ex (EWU); ditto, 12.VIII.1980, SJ Yoon, 2exs (EWU); ditto, 11.VIII.1979, SH Lee, 1ex (EWU). Jungson-gun: Bukpyeong-myeon, Samhwasa, 26-27.VI.1984, SE Yang, 1ex (SSWU); ditto, KH Kim 1ex (SSWU); ditto, YM Seo, 2exs (SSWU); ditto, MI Lee, 2exs (SSWU); ditto, YS Han, 1ex (SSWU); ditto, YH Kim, 1ex (SSWU). Moonchun-si: Gapyeong-dong, Mt. Mangdeoksan, 15.VII.1993, SJ Yoon, 1ex (EWU). Pyeongchang-gun: Doam-myeon, Yongsan-ri, 29.VI.1985, EY Lee, 1ex (SSWU); ditto, MK Hwang, 2exs (SSWU); ditto, YH Choe, 1ex (SSWU); Jinbu-myeon, Dongsan-ri, 2.VII.1985, YS Kim, 1ex (SSWU); Mt. Odaesan, 24.VI.1998, TM Han and TH Kang, 9exs (SSWU); ditto, 14.VII.1992, MR Kim, 1ex (SSWU); ditto, SL Nam, 2exs (SSWU); ditto, 31.VII.1976, 1ex (SSWU); Wunduryeong, 20.VI.1998, KH Cho, 1ex

(SSWU). Sokcho-si: Mt. Seolaksan, 3.VII.1993, SY Kim, 1ex (SSWU); ditto, 1.VII.1993, EH Kim, 1ex (SSWU); Nohak-dong, 11.VI.1992, 1ex (SSWU). Wonju-si: Panbu-myeon, Mt. Baekwunsan, 5.VII.1996, JI Kim, 1ex (SSWU). Yanggu-gun: Yongneup, Mt. Daeamsan, 7.VII.1995, JI Kim, 3exs (SSWU); Haean-myeon, Mt. Dosolsan, 7.VII.1995, JI Kim, 1ex (SSWU). **JB** Buan-gun: Naebyeonsan-myeon, 26.VI.1991, KO Hwang, 1ex (SSWU). Jangsu-gun: Sanggye-myeon, Mt. Sadobong, 30.VII.1997, SM Yu, 1ex (SSWU). **JN** Gurye-gun: Mt. Jirisan, Piagol, 23.VI.1987, KH Min, 1ex (SSWU); ditto, GY Park, 1ex (SSWU); ditto, OJ Lee, 1ex (SSWU); ditto, SY Kim, 3ex (SSWU); ditto, SY Yoon, 1ex (SSWU); ditto, YA Jang, 1ex (SSWU). Hamyang-gun: Mt. Baekwunsan, 14..VIII.1994, EH Lee, 1ex (SSWU). seongju-gun: Mt. Chogyesan, Seonamsa, 22.VI.1987, HJ Kim, 1ex (SSWU); ditto, SY Kim, 1ex (SSWU). Wandogun: 24.V.1981, JJ Lee, 1ex (EWU). **JJ** 2.VIII.1959, PS Cho, 1ex (SSWU). Bukjeju-gun: Gujwa-eup, Bijarim, 13.VII.1983. 1ex (SSWU); Hanrim-eup, Gumak-ri, 8.VIII.1997, DW Oh, 1ex (SSWU). Jeju-si: Mt. Hanrasan, 11.VII.1979. SJ Yoon, 1ex (EWU); ditto, 15.VIII.1995, TJ Kang, 1ex (SSWU); Baekrokdam, 28.VII.1978, JW Lee, 1ex (SSWU); Yongsil, 11.VII.1994, SL Ahn, 1ex (NSM); 1,100m Resting Area, 22.VII.2003, SL Ahn, 5exs (NSM). Namjeju-gun: seongsan-eup, 17.VI.1990, 2exs (SSWU).

Distribution: China, Siberia, Sakhalin, Korea, Japan

Remarks: This species often appears in golf course. 94 species has been reported in 30 families as host plants (Lee et al. 2008).

Genus *Hoplia* Illiger 긴다리풍뎅이속

Hoplia Illiger, 1803: 226

Hopliatus Rafinesque, 1815: 111

Hyperis Dejean, 1833: 167

Echyra Erichson, 1847: 705

Diphydactylus Thomson, 1858: 58

Type species: *Scarabaeus argenteus* Poda von Neuhaus, 1761: 20

Diagnosis. Body with irregular scales. Antennae 9-10 segmented with 3 segmented club. Protibia bidentate or tridentate. Apical of metatibia with small setae. Pro- and mesotarsus with 2 claws; metatarsus with 1 claw (Sawada 1938).

Remark. This genus comprise more than 250 species from the Holarctic, Ethiopian, and Neotropical regions (Hardy 1977, Mico et al. 2003). The adults are small, robust beetles with elytra gray, brown, or brightly colored yellow or green and black. They occur in colonies in sandy areas and are diurnal, feeding on the foliage and flowers of many different plants including orange, apricot, almond, apple, peach, and olive and on the flowers of rose, ceanothus, California poppy, and lupine. The larvae have been found feeding on grass roots and the roots of strawberries (Ritcher 1966).

Key to the species of Korean *Hoplia*

Size larger than 10mm. Abdominal margin of fifth tarsus with 2 elevations. Claws slightly bended. ····· ***djukini***

- Size smaller than 8mm. Abdominal margin of fifth tarsus with 4 to 5 small elevations. Claws almost straight. ····· ***aureola***

Subgenus *Decamera* Mulsant, 1842: 503 type species *Scarabaeus philanthus* Fuessly, 1775: 3

Diagnosis. Male with 10-segmented antennae, female with 9-segmented antennae (Sawada 1938).

Hoplia (*Decamera*) *djukini* Jacobson 홍남긴다리풍뎅이

Hoplia djukini Jacobson, 1914: 2.

Korean records.

Hoplia (*Decamera*) *djukini*: Stebnicka, 1980: 260; ESK& KSAE, 1994: 149; Kim, 2001: 20; Löbl and Smetana, 2006: 185.

Description. Body oblong, yellow. Dorsal surface with dense scales. Labroclypeus, head and pronutum opaque, elytra shiny.

Sides of clypeus slightly convergent forward, anterior border reflexed; surface with coarse punctures, scales and hairs. Frontoclypeal suture not incised. Frons densely punctate as clypeus, with scales and hairs. Antenna 10-segmented, club 3-segmented shorter than the rest segments combined in both sex. Apical segment of maxilliary palpus oval.

Pronotum gently convex, sides convergent forward, posterior half almost straight, anterior angles sharp, posterior angles broadly rounded and almost indistinct; surface with dense shallow punctures

bearing scales and some setae. Scales almost yellow, with some black. Scutellum triangular, punctuated similar to that of elytra, with scales, concentrated black scales in the middle.

Elytra widest in apical second, not striate, without seta at sutural apex, moderately short, anterior part of pygidium covered with it; surface covered with yellow scales, and some setae.

Ventral side black, weakly glabrous, surface with yellow scales. Mesosternum closely adjacent between mesocoxae. Abdominal sternites shallowly punctate with scales. Pygidium almost flattened declivity, with scales, few fine hairs beside apical border.

Legs long; Femur with scales and some hairs. Hind Femur and tibia robust, apex near tarsal articulation with deep median sinuation, apical spines short. Fifth metatarsomere as long as three upper segments combined, with 2 serration along inner side, tarsal claw long and simple. Protibia tridentate, without inner tibial spur, inner tarsal claw longer than outer one in both sexes. All tarsi with some spines and hairs.

Specimen Examined. HN Pyeongsan-gun, Huchiryeong, 25.VI.1999, ?, 2 ♀ (NSM).

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

Remarks. This species reported as unknown with North Korean spcimen by Stebnicka (1980). Two North Korean specimens (female) deposited in National Science Museum in Daejeon examined in this study. It is different from *H. aureola*; the body size over 10mm, fifth metatarsi with two elevation on inner margin, the curved form of

metatarsal theeth (Stebnicka, 1980).

Subgenus *Euchromoplia* S. I. Medvedev, 1952: 235 type species *Scarabaeus aureolus* Pallas, 1781

Diagnosis. Male and female with 10-segmented antennae (Sawada 1938).

Hoplia (*Euchromoplia*) *aureola* (Pallas) 점박이긴다리풍뎅이

(Pl. II. Fig. II-1: D-F; Pl. III. Fig. III-1: B)

Scarabaeus aureola Pallas, 1781: 18.

Melolontha duodecimpunctata A.G. Olivier, 1789: 121.

Melolontha sibirica A.G. Olivier, 1789: 121.

Hoplia impunctata Kraatz, 1879: 232.

Hoplia impuctata Kraatz, 1879: 232.

Hoplia 12-*punctata*: Heyden, 1887: 251.

Hoplia maculata Reitter, 1890b: 378.

Hoplia maculosa Reitter, 1897a: 48.

Hoplia macularis Reitter, 1903: 118.

Hoplia flavicollis Reitter, 1903: 119.

Hoplia maculicollis Reitter, 1903: 119.

Korean records.

Hoplia aureola: Niijima and Kinoshita, 1927: 29; Yoshino, 1935a: 13; Mochizuki et al., 1935: 32; 1937: 91; Murayama, 1935: 5; Haku, 1937: 120 (*auleola*); Miwa et al., 1939: 72; Cho, 1969: 684 (점박이긴다리풍뎅이); KSPP, 1972: 207; Kim et al., 1975: 251; 1985: 105; Stebnicka,

1980: 260; Paik, 1984: 182 (*accureolka*); Kim et al. 1991: 179; 1999: 129; Kim and Lee, 1991a: 66; Kim and Kim, 1998: 170; ESK and KSAE, 1994: 149; Kim, 2001: 19; Löbl and Smetana, 2006: 185.

Hoplia aureula: Kim. 1978: 359; Kim and Nam, 1982a: 156; 1982b: 276; 1984b: 328.

Description. Body length 6.2-7.5 mm; Body width 3.8-4.3 mm; Club-footstalk ratio 0.5-0.71; Pronotum ratio 0.6-0.71; Pronotum-elytra ratio 0.46-0.56; Metafemur ratio 2.78-3.5; Metatibia ratio 2.86-4; Pygidium ratio 0.8-0.9.

Body short, oblong, yellow to reddish brown, dorsal surface with dense scales. Labroclypeus, head and pronutum opaque, elytra shiny.

Sides of Clypeus slightly convergent forward, anterior border reflexed; surface with coarse punctures, scales and hairs. Frontoclypeal suture not incised; Frons densely punctuate as clypeus, with scales and hairs. Eyes moderately small, ratio of diameter to interocular distance 0.47 in both sexes. Antenna 10-segmented, club 3-segmented shorter than rest segments combined in both sex. Apical segment of maxilliary palpus oval.

Pronotum gently convex, sides convergent forward, posterior half almost straight, front angles sharp, posterior angles broadly rounded and almost indistinct; surface with dense shallow punctatures bearing scales and some setae. Scales almost yellow, with some black. Scutellum triangular, punctation similar to that of elytra, with scales,

black scales concentrated in the middle.

Elytra widest in apical second, not striate, without seta at sutural apex, moderately short, anterior part of pygidium covered with it; surface covered with yellow scales, 0-12 black scale groeup, and some hairs.

Ventral side black, weakly glabrous, surface with yellow scales. Mesosternum closely adjacent between mesocoxae. Abdominal sternites shallowly punctate with scales. Pygidium almost flattened declivity, with scales, few fine hairs beside apical border.

Legs long; Femur with scales and some hairs. Hind Femur and tibia robust, apex near tarsal articulation with deep median sinuation, apical spines short. Fifth metatarsomere as long as three upper segments combined, tarsal claw long and simple. Protibia tridentate, without inner tibial spur, inner tarsal claw longer than outer (<0.5) in both sexes. All tarsi with some spine and hairs. Aedeagus: Pl. III. Fig. III-1: B.

Specimen Examined. CB Chungju-si: Danwuel-dong, 5.V.1997, YH Jeon, 1 (SSWU); Goesan-gun: Chungcheon-myeon, Mt. Gumdansan, 23.V.1981, EK Park, 1 (ENHM). **GB** Andong-si: Susang-dong, 5.V.1998, EY Lee, 1 (GSNU). **GG** Gapyeong-gun: 16.V.1987, JY Kang, 3♂ (SSWU); ditto, SY Gu, 1 (SSWU); ditto, Daeseong-ri, 12.V.1990, SH Park, 1 (SSWU); ditto, 26.V.1985, YM Kim, 1 (ENHM); ditto, 6.V.1989, SH Yoon, 1 (ENHM); Oeseo-myeon, Mt. Hwayasan, 6.V.1989, SY Yu, 1 (ENHM); ditto, HJ Hwang, 6 (ENHM); ditto, HS Seo, 1 (ENHM); ditto, 6.V,1989, MJ Lee, 1 (ENHM); ditto, JW Park, 2 (ENHM); ditto,

6.V.1989, SW Yoon, 1 (ENHM); ditto, 6.V.1989, HH Jo, 1 (ENHM); Mt. Baekyeonsan, Sancheon-dong, 8.VI.1970, S. Mahunka & H. Steinmann, 1 (SSWU); Yeoncheon-gun: Misan-myeon, 20.V.1993, 1 (SSWU); Paldang, 14.V.1961, JS Park, 1♂ (SSWU); Namyangju-si: Hwado-eup, Saeteo, 12.V.1985, 1 (ENHM); ditto: Sudong-myeon, Bigumgyegok, 6.VI.1984, SH Kim, 1 (ENHM); ditto: Pyeongnae-dong, 4.V.1984, HS Han, 1 (ENHM); ditto: Mt. Cheonmasan, 27.V.1989, HJ Gang, 1 (ENHM); ditto, 6.VI.1985, YN Kim, 1 (ENHM); ditto: Gwangreung, 3.VI.1961, SH Han, 1 (ENHM); ditto, 23.V.1959, YI Kim, 1 (ENHM); ditto, OJ Ji, 1 (ENHM); ditto, 15.V.1965, JI Son, 2 (ENHM); ditto, 6.VI.1966, SH Kim, 1 (ENHM); ditto, 16.V.?, KJ Kim, 1 (ENHM); ditto: Gumgok-dong, 8.VI.1968, ES Kwak, 1 (ENHM); Yangpyeong: Mt. Yongmunsan, 10.VI.1961, BJ Yoon, 1 (ENHM); ditto, 1.VI.1991, MJ Song, 1 (ENHM); Seoul: Dobong-gu, Mt. Dobongsan, 16.V.1959, 1 (ENHM); ditto, JI Son, 1 (ENHM); ditto, DS Seo, 1 (ENHM); Eunpyeong-gu, susak-dong, 4.V.1968, ES Kwak, 1 (ENHM); Gwanak-gu, Mt. Gwanaksan, 9.V.1989, JH Lee, 1 (ENHM); ditto, 20.V.1989, YS Shin, 1 (ENHM); Gwangjin-gu, Gwangjang-dong, Walkerhill, 15.V.1966, OH Kim, 2 (ENHM); ditto, Gui-dong, Ttukseom, 17.V.1961, YS Lee, 1 (ENHM); Seodaemun-gu, Yonsei Univ., 4.VI.1962, MJ Shim, 1 (ENHM); seongbuk-gu, Jeongreung, 23.VI.1959, ES Boo, 1 (ENHM); Suwon-si: 5. VI. 1965, YE Choe, 1 (ENHM); ditto, 10.V.1959, WH Baek, 2 (SNU). **GN** Hadong-gun: Hwagae-eup, Top-ri, 27.V.1990, ?, 2 (GSNU); Sancheong-gun: Mt. Woongseoksan, 6.V.1973, JS Park, 1 (GSNU). **GW** Wunsansi park, 28.V.1970, S. Mahunka & H. Steinmann,

13 (SSWU); Jeongseon-gun: Najeon-myeon, 6.V.1989, JS Seo, 1♂ (SSWU); Hoengseong-gun: Ganheung-myeon, Gangrim-ri, 8.VI.1985, JI Kim, 1 (SSWU); Wonju-si: Jijung-myeon, Ganhyeon, 19.V.1985, WS Jeong, 2 (ENHM); ditto, GJ Baek, 1 (ENHM); Chuncheon-si: Namsan-myeon, Namiseom, 21.V.1972, NH Lee, 1 (ENHM); Pyeongchang-gun: Mt. Odaesan, 7.VI.1979, MJ Im, 1 (ENHM). **JJ** Baekrokdam, 1.VIII.1972, BI Kim, 1 (SSWU). **PB** Mt. Myohyangsan, 22.V.1985, A. Vojnits & L. Zombori, 6 (SSWU).

Distribution. Far Eastern Asia (China, Japan, Korea, Mongolia, Russia).

Biological note. Adults occur once a year; the third larvae hibernate and the adult appear next spring (the end of April). They attack apple or pear tree especially their flowers and young leaves (Nakayama and Okamoto 1940).

Subfamily Melolonthinae Leach in Samouelle, 1819 검정풍뎅이아과

Melolonthinae Leach in Samouelle, 1819: 189

Melolonthinae MacLeay 1819: 79

Type genus: *Melolontha* Fabricius, 1775: 31

Diagnosis. Antennae nine- or 10-segmented ending in a unilateral lamellate club; labrum chitinous and visible externally, mandibles generally not visible from above, pronotum without horns or pronounced depression on the upper surface and with anterior margin without membranous border; elytra short enough to expose at least the pygidium spiracles of the fourth to seventh abdominal segment lying in

almost parallel lines; basal abdominal sternites rigidly connected; anterior tibiae adapted for digging, flattened, generally tridentate on the outer edge; meso- and metatibiae with terminal spurs placed below the tarsus joint so that the proximal segment of the tarsus can pass only above the spurs during movement; claws of the meso- and metatarsi fixed and equal; wings with radial vein one and three jointed distally. The larval stages: Apical antennal segment about as wide as penultinate segment; galea and lacinia either partly fused proximally or fitting together; anal cleft usually Y-shaped or angular in the middle (Rhizotrogini) or transverse (Melolonthini); and mandibles without transverse granular ridges forming stridulatory areas (Sabatinelli and Pontuale 1998).

Distribution. This subfamily is consisted of about 3,300 species in eight tribes ; Diplotaxini, Schizonychini, Pegylini, Rhizotrogini, Enarini, Leucopholini, Heptophyllini and Melolonthini (Lacroix 1993). They occurs in all zoogeographical regions from Oriental, Palaearctic, Afrotropical and Nearctic regions (Sabatinelli and Pontuale 1998).

Biological note. Melolonthines feed on roots as larvae (white grubs), and on leaves as adults (chafers). The larvae of several genera are often economically important pests (Booth et al. 1990).

Key to the Tribes of Korean Melolonthinae

1. Antennal club with more than three segments ····· 2
- Antennal club with three segments ····· 3
2. Body not covered with setae or scale. Antennal club with 5 to 7

segments in male, 4 to 5 segments in female ····· Heptophyllini

- Body covered with setae or scale. Antennal club with 7 segments in male, 5 to 6 segments in female ····· Melolonthini

3. Labrum transverse. Sixth abdominal sternite nearly completely retracted beneath fifth sternite ····· Diplotaxini

- Labrum not transverse. Sixth abdominal sternite not retracted beneath fifth sternite ····· Rhizotrogini

Tribe Heptophyllini S. I. Medvedev, 1951 긴다색풍뎅이족 (신칭)

Type genus: *Heptophylla* Motschulsky, 1858: 32.

Diagnosis. Body 10-17mm. Body elongated and posterior slightly enlarged. Antenna 10-segmented with five to seven (male) or four to five (female) segments. Claws bifid. Tarsus with regular setae and longer than femur.

Key to the genera of Heptophyllini in Korea

Body length 11 - 14mm. Antennal club with five (female) or six (male) segments. Pygidium with hair. Body shinning ····· *Heptophylla*

- Body length 14 - 20mm. Antennal club with six segments in both sexes. Pygidium without hair. Body velvet-like ····· *Hilyotrogus*

Genus *Heptophylla* Motschulsky 긴다색풍뎅이속

Heptophylla Motschulsky, 1858: 32

Hypochrus Fairmaire, 1891: cci

Type species: *Heptophylla picea* Motschulsky, 1858

Diagnosis. Antennal club with five (female) or seven (male) segments. Pygidium with hair. Body shinning.

Heptophylla picea Motschulsky 긴다색풍뎅이

(Pl. II. Fig. II-1: G,H; Pl, III. Fig. III-1: C)

Heptophylla picea Motschusky, 1857: 33.

Holotrichia transversa Motschulsky, 1860a: 15.

Heptophylla tosana Miyatake, 1963: 23.

Korean records. *Heptophylla picea*: Miwa et al., 1939: 69; Takahashi, 1941: 232; Kim H.K, 1958: 98; Cho, 1957: 300; Nomura, 1960: 65; Cho et al., 1967: 197; Won et Choi, 1968: 379; Hyun and Woo, 1969: 193 (긴다색풍뎅이); Kim and Kim, 1971: 160; 1972a: 84; Shin, 1979: 144; Stebnicka, 1980: 207; Nam and Kim, 1982: 129; Park and Cho, 1986: 128; Kim and Chang, 1987: 104; Park and Kim, 1993: 178; ESK and KSAE, 1994: 150; Kim and Kim, 1998: 170; Kim, 2001: 45; Kim et al., 2005: 79.

Heptophylla picea picea: Löbl and Smetana, 2006: 183.

Description. Body length 11.53-13.74 mm; Body width 5.35-7.8 mm; Club-footstalk ratio 0.93-1.19 (♂), 0.58-0.64 (♀); Pronotum ratio 0.5-0.54; Pronotum-elytra ratio 0.29-0.31; Metafemur ratio 0.27-0.32; Metatibia ratio 0.12-0.15; Pygidium ratio 0.73-0.82.

Body oblong-oval, slightly wide at posterior; chestnut-brown, surface shiny.

Head surface coarsely punctured with erect hairs. Clypeus gently excavate, with a distinct transverse upheaval before the frontoclypeal suture, with the anterior margin broadly rounded, refexed and slightly emarginate in the middle. Eyes rather small, eye to interocular space ratio 0.4-0.47. Antennae 10-segmented, with the club consisting of six lamellate segments in male and five segments in female; fourth (male) and fifth (female) segment of the footstalk short and with a lamella-like tooth on the inner sides. Maxillary palpus with the last segment elongate and blunt at the end.

Pronotum slightly convex, widest at middle, front and posterior angles bluntly rounded, anterior and lateral margins setaceous, disc sparsely punctured with long erect hairs. Scutellum nearly semicircular, somewhat ogival posteriorly, flat and somewhat finely punctured.

Elytra each with four stria, the inner one being distinct and widened posteriorly, the others rather obscure; surface coarsely punctured and densely setose along the lateral margins.

Ventral side shinny. Sternum densely covered with yellowish hairs. Six abdominal sternites visible, and each line disappeared in the middle. Pygidium triangular, not convexed with fine punctures.

Legs long and slender; Protibia tridentate, with thin and long tibial spur, anterior tarsal claws symmetrical in both sexes. Hind tibia with two spurs. Second metatarsomeres much longer than first one. Aedeagus: Pl, III. Fig. III-1: C.

Specimen Examined. CN Buyeo-gun, Mt. Mansusan, 19.VII.1999, JI Kim, 1♂ (SSWU). **GG** Anyang-si, Pyeongchon-dong, 5.VI.1999, SJ Kim, 1♂

(SSWU); Goyang-si, Jichuk, 18.VII.1992, KM Ham, 2♂ (SSWU); ditto, Jangheung-myeon, 8.VIII.1993, KR Kwon, 1♀ (SSWU); Gunpo-si, Mt. Surisan, 9.VIII.1994, KI Lee, 1♂ (SSWU); Seoul: Gangnam-gu, Yeoksam-dong, 11.VI.1999, JH Lee, 1♀ (SSWU); Nowon-gu, Sangye-dong, 13.VI.1999, EH Jo, 1♀ (SSWU); Seongbuk-gu, Dongseon-dong, Sungshin Women's Univ., 18.VI.1999, TW Kim, 1♂ (SSWU); ditto, 22.VI.2004, YR Kim, 1♂ (SSWU); ditto, 5.VI.2004, SI Jeong, 1♀ (SSWU); ditto, 1.VII.2000, JS Baek, 1♂ (SSWU); ditto, 1.VII.2003, KS Park, 1♂ (SSWU); ditto, 8.VII.2003, KS Park, 1♀ (SSWU); ditto, 22.VIII.2001, AY Kim, 1♂ (SSWU); ditto, 15.VI.2005, AY Kim, 1♂ (SSWU). **GN:** Busan-si, Gumjeong-gu, Seon-dong, 30.VI.?, ?, 1♀ (SSWU); ditto, Taejongdae, 26.VI.1996, JY Ro, 1♂ (SSWU); ditto, Saha-gu, Molwundae park, 8.VII.1994, BE Mo, 1♂ (GSNU); Jinhae-si, Yongwon-dong, 26.VI.?, ?, 1♂1♀ (SSWU); Masan-si, Hoewon-gu, Hapseong-dong, Mt. Palryongsan, 3.VI.2000, TH Ahn, 1♂ (GSNU). **GW:** Pyeongchang-gun, Wundoryeong, 20.VI.1998, JY Kim, 1♀ (SSWU).

Distribution. China, Japan, Korea.

Genus *Hilyotrogus* Fairmaire 쌍색풍뎅이속

Hilyotrogus Fairmaire, 1886: 325

Melichrus Brenske, 1892b: 156

Type species: *Hilyotrogus unguicularis* Fairmaire, 1886

Diagnosis. Velvetlike body. Antennae 10-segmented; club 6-segmented in both sexes. Pygidium without hair (Murayama 1954).

Hilyotrogus bicoloreus (Heyden) 쌍색풍뎅이

(Pl. II. Fig. I-1: I, Fig. II-2: A; Pl. III. Fig. III-1: D)

Lachnosterna (Holotrichia) bicoloreus Heyden, 1887: 265 (Korea).

Korean records. *Hilyotrogus bicoloreus*: Reitter, 1902: 258; Niijima and Kinoshita, 1923: 59; Kato, 1935: 115; Murayama, 1937: 35, 1938: 14; 1941c: 82; 1954: 127; Nagaoka, 1938: 25; Miwa and Chûjô, 1939: 68; Mori and Cho, 1940: 13; Kondo, 1941: 72; Cho, 1947: 65; 1957: 300; 1963: 221 (쌍색풍뎅이); 1969: 673; Cho et al., 1968: 265; KZS, 1968: 137; KSPP, 1972: 207(*bicolorens*); Kim and Kim, 1974: 108; Kim et al., 1976: 102; Kim, 1978: 344; Yoon and Nam, 1980: 150; Yoon and Kim, 1981: 47; Yoon et al., 1990: 110; Stebnicka, 1980: 261; Kim, 1981: 344; 1993: 62; 1995a: 164; 1996: 174; 2000b: 132; 2001: 45; Nam and Kim, 1983: 129; Park et al., 1993: 178; Park and Kim, 1993: 112; ESK and KSAE, 1994: 150; Kim and Kim, 1996: 48; Kim and Kim, 1996: 127; 1998: 170; Kim and Lee, 1997: 233; Kim et al., 1999: 129; 2002: 120; 2004: 116; Löbl and Smetana, 2006: 183.

Description. Body length 14.5-19.17mm; Body width 7.6-10.03mm; Club-footstalk ratio 1.33-1.67 (♂), 0.9 (♀) ; Pronotum ratio 0.5-0.55; Pronotum-elytra ratio 0.27-0.29; Metafemur ratio 0.25-0.3; Metatibia ratio 0.1-0.13; Pygidium ratio 0.77-0.81.

Body oblong-oval, slightly wide at posterior; chestnut-brown, surface velvety.

Head reddish brown. Clypeus gently excavate, with densely

punctuated; the anterior margin broadly rounded. Frons sparsely punctured with long erect hairs scattered. Eye to interocular space ratio 0.57-0.62. Antennae 10-segmented, with the club consisting of six lamellate segments in both sexes; fourth segment of the footstalk short and with a lamella-like tooth on the inner sides. Antennal club sligthly longer than footstalk in male, shorter in female. Maxillary palpus with the last segment elongate and blunt at the end.

Pronotum reddish brown, slightly convex, widest at middle, front and posterior angles bluntly rounded, anterior margins setaceous, disc sparsely punctured. Scutellum nearly semioval, somewhat ogival posteriorly, flat and finely punctured at the sides.

Elytra each with five stria, the inner three being distinct, the others rather obscure; surface finely punctured without setose along the lateral margins.

Sternum shinny, densely covered with yellowish hairs. Sixth abdominal sternites visible. Pygidium triangular, not convexed with fine punctures.

Legs shinny, long and slender; Protibia tridentate, with thin and long spur, anterior tarsal claws symmetrical in both sexes. Hind tibia with two spurs. Aedeagus: Pl. III. Fig. III-1: D.

Specimen Examined. CB Cheungwon-gun, Miwon-myeon, 15.VII.1990, EJ Lee, 1♂ (SSWU); Chungju-si, Mt. Namsan, 24.VIII.2000, Kim and Kim, 3♂ (SSWU); Danyang-gun, Mt. Sobaeksan, 29.VII.1983, SJ Yoon, 2 ♂1♀ (ENHM); ditto, 12.VIII.1992, JH Kang, 1♂ (SSWU); Jaecheon-si, Mt. Wulaksan, 11.VII.1991, HJ Gu, 1♂ (SSWU); Jincheon-gun,

Baekgok-myeon, Daemun-ri, 7.VII.1998, TM Han, 2♂ (SSWU); ditto, yeongok-ri, 8.VII.1998, Han and Kang, 2♂ (SSWU); Yeonpung-gun, Yeonpung-myeon, 26.VIII.1987, SJ Yoon, 1♂ (ENHM). CN Buyeo-gun, Mt. Mansusan, 19.VII.1999, JI Kim et al., 1♀ (SSWU); Cheonan-gun, Mt. Gwangdeoksan, 22.VII.1994, HS Choe, 1♂ (SSWU); Cheongyang-gun, Mt. Chilgapsan, 7.VII.1987, HG Kim, 1♂ (SSWU); Gongju-si, Mt. Gyeryongsan, 13.VII.1971, HG Kim, 2♂ (ENHM); Seosan-si, Mt. Gayasan, 24.VI.1996, SC Park, 1♂ (SSWU). GB Bonghwa-gun, Seokpo-myeon, Daehyun-ri, 24.VII.1986, JI Kim, 4♂ (SSWU); ditto, 25.VII.1986, GS Jang, 4♂1♀ (SSWU); Cheongsong-gun, Mt. Juwangsan, 29.VII.1983, GS Jang, 1♂ (SSWU); Daegu-si, Mt. Palgongsan, 8.VII.1986, SH Jeon, 3♂ (SSWU); Wuljin-gun, Seo-myeon, Sogwang-ri, 31.VII.1999, JI Kim et al., 1♂1♀ (SSWU); yeongju-si, Mt. Sobaeksan, 8.VIII.1985, ?, 1♀ (SSWU); ditto, 12.VIII.1992, SM Lee, 1♂ (SSWU); ditto, 13.VIII.1992, SL Nam, 2♂ (SSWU); ditto, 4.IX.1993, SY Kim, 1♀ (SSWU); ditto, 3.VII.1998, JI Kim et al., 1♂ (SSWU); ditto, Temple Hibang, 31.VIII.1986, UO Jeong, 1♂ (SSWU); ditto, Jukryeongpokpo, 13.VIII.1999, DS Gu, 2♀ (SSWU); ditto, Buseok-myeon, Namdae-ri, Mt. Seondalsan, 29.VI.1998, JI Kim et al., 9♂1♀ (SSWU); ditto, 1.VII.1998, JI Kim et al., 1♂ (SSWU); yeongyang-gun, Mt. Ilwulsan, 22.VII.1997, YB Cho, 1♂ (SSWU). GG Gapyeong-gun, Nogok-ri, 24.VII.1985, HJ Kwon, 1♂ (SSWU); ditto, Mt. Myeongjisan, 23.IX.1989, JI Kim, 1♀ (SSWU); ditto, 28.VII.1991, HS Lee, 1♂ (SSWU); ditto, 29.VIII.1992, SH Oh, 1♂1♀ (SSWU); ditto, Buk-myeon, Mt. Hwaksan, 24.VIII.1998, SY Kim, 3♂ (SSWU); ditto, Mt. Cheongyesan, 18.VII.1991, SH Jeon, 1♀ (SSWU);

ditto, Daeseong-ri, 24.VII.1998, SY Shin, 1♂ (SSWU); Incheon-si, Onjin-gun, Daecheongdo, 11.VI.1990, IY Han, 1♂ (SSWU); ditto, Deokjeok-myeon, Seonmido, 28.VII.1956, HS Kim, 1♂ (ENHM); Seongnam-si, Jungwon-gu, 21.VII.1993, EH Gwak, 1♀ (SSWU); Namyangju-si, Joan-myeon, Mt. Ungilsan, 17.VII.1985, MC Lee, 1♂ (SSWU); Sudong-myeon, Mt. Chukryeongsan, 6.VIII.1980, HK Park, 1♀ (SSWU); ditto, GS Jang, 3♂ (SSWU); Seoul: Songpa-gu, Oryun-dong, 30.X.1992, YH Kim, 1♂ (SSWU); Pocheon-gun, Sohul-eup, 28.VII.1994, SY Kim, 1♂ (SSWU); ditto, Sanjeong lake, 31.VII.1992, JI Kim, 1♀ (SSWU); Pyeongtaek-si, 6.IX.1992, YK Gwak, 1♂ (SSWU); Yangpyeong-gun, 28.VII.2000, JI Kim et al., 1♂ (SSWU); ditto, Mt. Yongmunsan, 26.VII.1965, HJ Go, 1♂ (ENHM); ditto, 25.VIII.1998, SY Kim, 1♂1♀ (SSWU); ditto, 1.IX.1980, GS Jang, 1♂ (SSWU); Yongin-gun, Myeongji Univ., 10.VIII.1996, YH Kim, 1♀ (SSWU); ditto, Yongin Univ., 13.IX.1995, MS Kim, 1♂ (SSWU). **GN** Busan-si, Temple Bogye, 23.VII.1918, ?, 2♂ (SSWU); Hamyang-gun, Macheon-myeon, Baekmu-dong, 21.VII.1985, ?, 1♂ (SSWU); ditto, Anui-myeon, Temple Yongchu, 16.VII.1985, ?, 2♂ (SSWU); Jinhae-si, Mt. Jangboksan, 10.VIII.1988, ?, 1♀ (SSWU); Sancheong-gun, Mt. Jirisan, 14.VII.1981, YJ Kwon, 1♀ (SSWU); ditto, 26.VII.1990, EK Yu, 1♀ (SSWU); ditto, Georimgyegok, 7.VII.1990, SH Jeon, 15.VII.1989, SH Jeon, 8♂7♀ (SSWU); ditto, Jungsan-ri, 30-31.VII.1981, IB Yoon, 2♂ (SSWU); ditto, JI Kim, 2♂ (SSWU); HY Han, 1♂ (SSWU); ditto, 5.VII.1989, SH Jeon, 2♂ (SSWU); **GW** Chuncheon-si, Soyanggang, 23.VII.1993, HY Kim, 1♀ (SSWU); Donghae-si, Temple Samhwa, 25.VIII.1997, JI Kim et al., 1♀

(SSWU); ditto, 25.VI.1984, HS Heo, 1♂ (SSWU); ditto, HS Choe, 2♂3♀ (SSWU); ditto, 26.VI.1984, YH Kim, 1♂ (SSWU); ditto, MA Bang, 1♂1♀ (SSWU); ditto, SM Lee, 1♂ (SSWU); ditto, SI Yang, 1♀ (SSWU); ditto, 27.VI.1984, MI Lee, 1♂ (SSWU); ditto, JI Kim, 1 ♂ (SSWU); ditto, YS Han, 1♂ (SSWU); ditto, JH Son, 1♀ (SSWU); ditto, YJ Lee, 1♀ (SSWU); Gangreung-si, Yeongok-myeon, 12.VIII.1995, KC Seong, 1♂ (SSWU); Goseong-gun, Geojin-eup, 14.VIII.1980, SJ Yoon, 1♂ (ENHM); Inje-gun, Mt. Seolaksan, 14.VII.1973, SM Lee, 3♂ (SSWU); ditto, 9.VIII.1974, SM Lee, 2♂ (SSWU); ditto, 11.VIII.1974, SM Lee, 2♀ (SSWU); ditto, Mt. Bangtaesan, Misan-ri, 23.VI.1996, SY Kim, 3♂1♀ (SSWU); ditto, 16.VIII.1995, JI Kim, 3♂2♀ (SSWU); ditto, Jogyeong-dong, 24.VII.2000, Kim and Kim, 1♂ (SSWU); ditto, Jinburyeong, 11-12.VIII.1980, SJ Yoon, 2♂ (ENHM); ditto, 12.VII.1983, SJ Yoon, 1♂ (ENHM); Hongcheon-gun, Mt. Odaesan, Sambongyaksu, 10.VIII.1997, JI Kim et al., 5♂ (SSWU); ditto, Myeongye-ri, 29.VI.1997, SY Kim, 1♂ (SSWU); Hueng seong-gun, Cheongil-myeon, Mt. Balgyosan, 24.VII.1998, SY Kim, 2♂ (SSWU); ditto, Hwadong-ri, 5.VII.1993, CH Gwak, 1♂ (SSWU); Yangyang-gun, Mt. Seolaksan, Osaek, 12.VIII.2003, JG Lee, 1♂ (SSWU); Pyeongchang-gun, Mt. Odaesan, 5.VIII.1955, HG Kim, 2♂ (ENHM); Taebaek-si, Sodo-dong, 23.VII.1986, GS Jang, 2♂1♀ (SSWU); ditto, Temple Cheongwon, 22.VII.1986, KH Kim, 1♂1♀ (SSWU); Wonju-si, Guirae-ri, 4.VII.1996, JI Kim, 1♂ (SSWU); ditto, Mt, Chiaksan, 10.VIII.1971, 1♀ (ENHM); ditto, Temple Sangwon, 14.VIII.1999, DS Gu, 1♀ (SSWU). **HN** Pyeongsan, Huchiryeong, 25.VI.1999, SL Ahn, 1♂2♀ (NSM). **JB** Jeongup-si, Mt. Naejangsan, 18-19.VII.1998, TM Han, 1♂1♀ (SSWU); Mt. Jirisan,

Georim, 7.VII.1989, SH Jeon, 3♂4♀ (SSWU); Muju-si, Mt. Deokyusan, 28.VII.1990, YS Lee, 1♂ (SSWU). **JN** Gurye-gun, Sandong-myeon, Shimwongyegok, 9.VII.2001, JB Jeon, 1♀ (SSWU); Gwangyang-si, Dapgok-ri, 9.VIII.1993, KE Jeong, 1♂1♀ (SSWU); ditto, 9.VIII.1993, SJ Park, 1♀ (SSWU); ditto, 10.VIII.1993, SY Kim, 4♂ (SSWU); ditto, Mt. Baekwunsan, 10.VIII.1993, SY Kim, 1♂1♀ (SSWU); Namwon-gun, Mt. Jirisan, 13.VII.1995, HJ Won, 1♂ (SSWU); ditto, Baemsagol, 29.VII.1998, TM Han, 1♂ (SSWU); ditto, Piagol, 23.VI.1987, HG Park, 1♂ (SSWU); ditto, 8.VII.1986, SH Jeon, 1♂ (SSWU); Wando-gun, Wando-eup, 6.VII.1982, Dept. Biology, 1♂ (SSWU); Yeosu-si, Geomunseodo, 12.VII.1984, GS Jang, 1♀ (SSWU).

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

Tribe Melolonthini Leach in Samouelle, 1819 왕풍뎅이족

Type genus: *Melolontha* Fabricius, 1775: 31

Diagnosis. Body large, generally more than 18 mm in length, sexual dimorphism well marked. Upper surface of body usually scaly. Antennae 9 or 10-segmented, club three, five, or seven-segmented, generally longer than the stem. Labrum bilobed, symmetric and located below clypeus, distinct in most. Protibiae with apical spurs, meso- and metatibiae with two spurs. Metatibial spurs contiguous, located below tarsal articulation. Metepisternum wide, less than three times as long as its width, metepimera large; metepisternum in the same plane as metepimera. Abdominal sternites connate with sutures fine or absent in

middle; sixth abdominal sternite not retracting under the fifth. Anterior coxae not prominent, transverse. Wings and humeral callus in both sexes well developed. Larvae with anus transverse (Evans 2002; Sabatinelli and Pontuale 1998).

Remark. The tribe Melolonthini distribute throughout the world and nearly 340 species known to date. They are spreaded in the Nearctic, Palaearctic, Oriental, Australian and Neotropical regions, while they are completely absent from the Afrotropical region (Sabatinelli and Pontuale, 1998).

Key to the genera of Melolonthini in Korea

Abdominal sternites with a white spot on each side. Each elytron with four feeble costae in addition to sutural one. Dorsal surface without white spot ····· *Melolontha*

- Abdominal sternites without white spot on each side. Each elytron without costae. Dorsal surface with irregular white spots ····· ····· *Polyphylla*

Genus *Melolontha* Fabricius 왕풍뎅이속

Melolontha Fabricius, 1775: 31

Hoplosternus Guérin, 1838: 63

Ludibrius Des Gozis, 1886: 33

Melolontha (*Tocoma*) Reitter, 1902: 265

Exolontha Reitter, 1902: 225,269

Type species: *Scarabaeus melolontha* Linnaeus, 1758: 351

Diagnosis. Antennae ten segmented; last seven segments lamellated and elongated in male, six segments lamellated and shorter than footstalk in female. A mesosternal process passes through the interval of two second coxae. Two white areas on the lateral sides of the posterior half of each abdominal sternite. A claw with a teeth at the base. In both sexes a normal spur on the inner border of a front tibia (Murayama 1954, Yu et al. 1998).

Key to the species of *Melolontha* in Korea

Mesosternal process bald, broad at the base, and very long to reach to the prosternum. ····· *M. incana*

- Mesosternal process more or less narrow at the base, and short only to reach to the anterior margins of middle coxae. ····· *M. insulana*

Melolontha incana (Motschulsky) 왕풍뎅이

(Pl. II. Fig. II-2: B, C; Pl. III. Fig. III-1: E)

Oplosternus incana Motschulsky, 1854a: 46.

Korean records. *Melolontha incana*: Arrow, 1913: 401; Niijima and Kinoshita, 1927: 63; Saito, 1928: 12; Maruta, 1929: 368; Kamijo, 1932: 21; Haku, 1935: 57; Kato, 1935: 116; Tomiura and Tomiura, 1935a: 51; 1935b: 237; Masaki, 1936: 260; Mochizuki and Tsunekawa, 1937: 91; Miwa and Chûjô, 1939: 69; Murayama, 1941c: 82; Cho, 1957: 300; 1969: 674; KZS, 1968: 137 (왕풍뎅이); KSPP, 1972: 207; Kim and Kim, 1972b: 197; 1996: 127; 1998: 170; Kim et al, 1975: 243; Kim, 1978:

346; Shin, 1979: 144; Yoon and Nam, 1980: 150; Yoon and Kim, 1981: 47; Kim and Nam, 1982a: 156; 1982b: 276; 1984b: 328; Nam and Kim, 1982: 129; Kim and Lee, 1989, 176; 1991a: 67; 1997: 234; Yoon et al., 1990: 110; Kim et al., 1991: 179; 1999: 129; 2002: 120; 2003: 126; 2004: 116; 2005: 79; Park and Kim, 1993: 113; Park et al., 1993: 178; Kim, 1993: 62; 1995a: 164; 1995b: 139; 1996: 174; 1998: 357; 2000b: 132; 2001: 48; ESK and KSAE, 1994: 150; Löbl and Smetana, 2006: 195.

Hoplosternus incanus: Stebnicka, 1980: 261.

Description. Body length 26.33-30.5mm; Body width 12.89-15.1mm; Club-footstalk ratio 2-2.1 (♂) 0.58-0.71 (♀); Pronotum ratio 0.55-0.61; Pronotum-elytra ratio 0.33-0.35; Metafemur ratio 0.23-0.26 (♂), 0.34-0.35 (♀); Metatibia ratio 0.12-0.14; Pygidium ratio 0.77-0.83.

Body large-sized oval, reddish brown, covered with short, grayish yellow or yellowish brown hairs.

Head coarsely punctured, covered with pilosity. Clypeus somewhat rectangular, anterior margin flat and severely elevated. Frontoclypeal suture distinct. Frons with a longitudinal line on the middle. Ocular canthus with dense pilosity. Eye to interocular space ratio 0.42-0.64. Antennae 10 segmented; Antennal club consist with last seven segments and very long in male, with six segments and short in female; first segment of antenna with dense pilosity. Maxillary palpus setaceous with the last segment narrowed at apex.

Pronotum wide at posterior, front angles blunt, posterior angles

acute; disc finely punctured, and covered with dense hairs. Scutellum nearly semioval, somewhat ogival posteriorly, flat and finely punctured with fine hairs.

Elytra, covered with hairs similar to those on the pronotum, with four feeble costae in addition to sutural one, lateral margin without setaceous.

Ventral side reddish brown, glabrous, covered with fine hairs. Mesosternal process bald, broad at the base, and very long to reach to the prosternum. Sixth abdominal sternites visible, each sternite with a white spot on the sides. Pygidium triangular, covered with fine hairs, with a longitudinal line on the middle.

Legs slender, punctured, and setaceous. Protibia tridentate, but the third teeth vestigial in male. Tarsal claws symmetrical in both sexes. Aegeagus: Pl. III. Fig. III-1: E.

Specimen Examined. CB Chungju-si, Mt. Namsan, 24.VIII.2000, SY Kim & AY Kim, 1♂1♀ (SSWU); ditto, Mt. Manrisan, 1.X.1990, SH Kim, 1♀ (SSWU); Jungwon-gun, Geumga-myeon, 10.VIII.1987, KH Min, 1♂ (SSWU); Okcheon-gun, 13.VIII.1969, BS Yuk, 2♂ (ENHM); Yeongdong-gun, 11-15.VII.1993, RGO, 1♂ (SSWU). **CN** Boryeong-gun, Sapsido, 26.VII.1995, HY Lee, 1♂ (SSWU); Buyeo-gun, Mt. Mansusan, 19.VII.1999, JI Kim, 1♂ (SSWU); Daejeon-si, Dong-gu, Cheon-dong, 9.VIII.1997, HJ Im, 1♀ (SSWU); ditto, Sinsong-dong, 20.VII.1992, SL Ahn, 1♂ (NSM); ditto, Yuseong-gu, 28.VII.1971, HS Lee, 1♂1♀ (ENHM); Gongju-si, Mt. Gyerongsan, 13.VII.1971, HK Kim, 2♂ (ENHM); Seosan-si, Mt. Gayasan, 29.VIII.1997, Hanseo Univ., 1♂ (SSWU);

Taean-gun, Anmyeondo, 25-26.VII.1994, RR Kim, 2♂1♀ (SSWU); ditto, Cheonripo, 19.VII.1969, GC Hwang, 1♂2♀ (ENHM); ditto, Guryepo, 5.VIII.1998, HY Park, 1♂ (SSWU); ditto, Manripo, 19-20.VII.1969, JS Sin et al., 4♂ (ENHM); ditto, 29.VII.1971, HS Im, 1♂ (ENHM); ditto, Mohang-ri, 27.VII.1994, GW Song, 1♂ (SSWU). **GB** Bonghwa-gun, 13.VIII.1971, JH Park, 1♂ (ENHM); ditto, 24.VII.1993, R.G.O. 2♂ (SSWU); ditto, ?.VII.1997, SW Park, 1♂ (SSWU); ditto, 31.VII.1998, JE Kim, 1♀ (SSWU); ditto, 1.VIII.1998, JH Kim, 1♂ (SSWU); Daegu-si, 31.VII.1971, SS Nam, 1♂ (ENHM); ditto, Dong-gu, Sincheon-dong, 13.VII.1989, SH Jeon, 2♂ (SSWU); ditto, Buk-gu, Sankyeok-dong, Kyeongbuk Univ., 13.VIII.1976, ?, 1♀ (SSWU); ditto, 25-26.VI.1989, SH Jeon, 2♂3♀ (SSWU); Gumi-si, Mt. Geumosan, 19.VII.2001, SY Kim, 3♂ (SSWU); Kimcheon-si, Daesin-dong, 11.VII.1972, IW Han, 1♂ (ENHM); Mungyeong-si, Mungyeong, The 1,2nd gate, 2.VIII.1980, JY Lee, 1♂ (ENHM); Pohang-si, Buk-gu, Yeocheon-dong, 1-14.VIII.1989, CH Park, 1♂ (SSWU); ditto, Nam-gu, Guryongpo, 10.VIII.1972, JH Park, 1♂ (ENHM); Seonsan-gun, 4.VII.1997, SL Ahn, 2♂ (NSM); Wuljin-gun, Seo-meyon, Sogwang-ri, 31.VII.1999, JI Kim et al., 1♂2♀ (SSWU); Yeongdeok-gun, 10.VIII.1996, HJ Hong, 1♀ (SSWU); Yeongju-si, Buseok-myeon, Namdae-ri, Mt. Seondalsan, 29.VI.1998, JI Kim et al., 1♂ (SSWU); ditto, Jangsu-myeon, Galsan-ri, 30.VII.1986, HS Kim, 3♀ (SSWU); ditto, 30.VIII.1986, EO Jeong, 1♂ (SSWU); ditto, Pungki-eup, Sucheol-ri, Temple Hibangsa, 29.VII.1986, JH Lee, 1♂ (SSWU). **GG** Anseong-si, 9.VIII.1996, HS Byeon, 1♂1♀ (SSWU); ditto, Anseong-eup, 12.VIII.1994, EO Kim, 1♂ (SSWU); Anyang-si, 20.VII.1972, SJ Yun &

HM Lee, 1♂1♀ (ENHM); ditto, 8.IX.1990, SB Kim, 1♂ (SSWU); Euijeongbu-si, 25.VII.1970, SW Lee, 1♀ (SSWU); ditto, Gosan-dong, 13-15.VIII.1992, EA Choe, 2♂ (SSWU); Ganghwa-gun, 11.VIII.1969, YS Yun, 1♂ (ENHM); ditto, 26.VIII.1990, MJ Seo, 1♀ (SSWU); ditto, Temple Jeondeungsa, 10.VIII.1991, JI Kim, 2♀ (SSWU); Gapyeong-gun, Mt. Myeongjisan, 29.VIII.1992, SH Oh, 1♀ (SSWU); ditto, Buk-myeon, Mt. Hwaaksan, 24.VIII.1998, SY Kim, 1♂ (SSWU); ditto, Gapyeong-eup, Yongchu, 5.VIII.1964, JH Im, 2♂ (ENHM); ditto, Cheongpyeong, 6.VIII.1967, HS Eom, 1♀ (ENHM); ditto, Daeseong-ri, 24.VII.1998, HA Lee, 1♂ (SSWU); Goyang-si, 25.VII.1955, MJ Park, 1♀ (ENHM); ditto, Byeokje, 3.X.1973, HN Kim, 1♂ (ENHM); ditto, Hyoja-dong, 30.VII.1984, HJ Yu, 1♂ (SSWU); ditto, 20.VII.1987, ditto, 1♂ (SSWU); ditto, 18.VIII.1987, ditto, 1♀ (SSWU); ditto, Jangheung-myeon, 29.IX.1991, SA Kim, 1♂ (SSWU); Gwangju-si, 15.VI.1963, SJ Choe, 1♀ (ENHM); ditto, Namhansanseong, 1.VIII.1986, HS Lee, 1♂ (SSWU); ditto, Nakseng-dong, 28.VII.1967, YO Yu, 1♀ (ENHM); Incheon-si, Ongjin-gun, Deokjeok-myeon, 28.VII.1955, HK Kim, 1♂ (ENHM); ditto, 23.VII.1977, SY Nam, 3♂2♀ (SSWU); ditto, 2-6.VIII.1982, KS Jang, 1♂1♀ (SSWU); ditto, Soyado, 23.VII.2005, AY Kim & JY Jun, 1♂ (SSWU); ditto, Mungapdo, 4.VIII.1982, KS Jang, 1♀ (SSWU); ditto, Jawol-myeon, Ijakdo, 21.VIII.1996, AY Kim, 1♂1♀ (SSWU); Namyangju-si, Jinjeop-eup, Gwangreung, 1.VI.1954, GS No, 1♂(ENHM); ditto, 4.VIII.1960, JW Lee et al., 1♂1♀ (ENHM); ditto, 10.VIII.1967, IH Jo, 1♀ (ENHM); ditto, 21.X.1968, HS Mun, 1♀ (ENHM); ditto, 4.VIII.1981, SJ Yun, 2♂ (ENHM); ditto, 7.IX.1985, MN Park, 1♀ (SSWU); ditto, 19.IX.1991, ES Ahn, 1♂

(SSWU); ditto, 4.VIII.?, JE Kim, 1♂ (ENHM); ditto, Joan-myeon, Hwado-eup, Mt. Cheonmasan, 13.VIII.1983, MH Ahn, 1♀ (SSWU); ditto, Sudong-myeon, Mt. Chukryeongsan, 16.VIII.1999, DS Ku, 1♂ (SSWU); ditto, Ipseok-ri, 6.X.1968, HS Mun, 1♂ (ENHM); Paju-si, Bongilcheon, 7.VIII.1986, SM Park, 1♀ (SSWU); Pocheon-gun, 23.VII.1960, TW Kang, 1♂ (ENHM); ditto, 17.VII.1992, HH Son, 1♂ (SSWU); ditto, Gwangreung, 25.VII.1981, IS Lee, 1♀ (SSWU); ditto, Soheul-eup, 25.VIII.?, YK Jeong, 1♂ (ENHM); Seongnam-si, Bundang-gu, Geumgok-dong, 29.VII.1967, YO Yu, 1♀ (ENHM); Namhansanseong, 15.IX.1991, HY Baek, 1♂ (SSWU); Seoul: 19-24.VIII.1954, HS Chae et al., 3♂ (ENHM); ditto: Dobong-gu, Mt. Dobongsan, 28.VIII.1992, MJ Kim, 1♀ (SSWU); Dongjak-gu, Dongjak-dong, 26.X.1969, YS Yun, 1♀ (ENHM); ditto, Sangdo-dong, 5.IX.1965, SO Baek, 1♂(ENHM); Eunpyeong-gu, Galhyun-dong, 7.VIII.1993, KH Kwon, 1♂ (SSWU); Gangdong-gu, Godeok-dong, 2.VII.1987, SY Choe, 1♂ (SSWU); Gwanak-gu, 19.IX.1992, HJ Kim, 1♂ (SSWU); ditto, Mt. Gwanaksan, 4.X.1997, HJ Ahn, 1♂ (SSWU); Jongro-gu, Cheongwun-dong, 4.VIII.1955, EJ Kim, 1♂ (ENHM); Mapo-gu, Hapjeong-dong, Yanghwadaegyo, 23.VI.1965, HJ Baek, 1♂ (ENHM); ditto, Mt. Nogosan, 3.VI.1961, JJ Lee, 1♂ (ENHM); Nowon-gu, Gongreung-dong, 2.X.1995, JS Lee, 1♀ (SSWU); Seocho-gu, Mt. Cheongyesan, 7.VI.1981, SH Sim, 1♂ (ENHM); Seodaemun-gu, Ehwa Woman's Univ., 9.IX.1967, KH Im, 1♀ (ENHM); ditto, Yeonhi-dong, 19.VIII.1965, JH Lee, 1♀ (ENHM); Seongbuk-gu, Mt. Bukhansan, 31.VIII.1991, KO Hwang, 1♀ (SSWU); ditto, Seongbuk-dong, 12.VIII.1955, KJ Jang, 1♀ (ENHM); Seongdong-gu, Gui-dong,

5.VIII.1986, JW Mok, 1♂ (SSWU); ditto, Jayang-dong, 29.VII.1985, ES Kim, 1♂ (SSWU); Songpa-gu, 12.IX.1992, HH Park, 1♂ (SSWU); Yongsan-gu, Mt. Namsan, 10.VIII.1954, CH Yu, 1♀ (ENHM); Suwon-si, 7.VII.1957, Lee, 1♀ (SSWU); ditto, Hwaseo-dong, 2.VIII.2000, SY Kim, 1♂ (SSWU); Yangju-si, 19.VIII.1955, KH Park, 1♂ (ENHM); ditto, Nam-myeon, 30.VIII.1997, HJ Lee, 1♂ (SSWU); ditto, Daeseong-ri, 1.VIII.1986, HS Yang, 1♂ (SSWU); Yangpyeong-gun, 24.VIII.2000, ?, 1♂ (SSWU); ditto, Mt. Yongmunsan, 10.VI.1961, BJ Yun, 1♂ (ENHM); ditto, 30.VII.1978, KS Jang, 2♂ (SSWU); ditto, 27.IX.1986, SH Kim, 1♀ (SSWU); ditto, 6.VIII.1987, JI Kim, 1♂ (SSWU); ditto, 22.IX.1990, JH Kim, 1♂ (SSWU); ditto, 22.VIII.1998, JY Park, 1♀ (SSWU); ditto, Yangpyeong-eup, 19.VIII.1998, JY Park, 1♂ (SSWU); Yeoju-si, Heungcheon-myeon, 2.VIII.1997, JY Kim, 1♂ (SSWU); Yongsan-gun, Naesa-myeon, 29.VIII.1992, OJ Lee, 1♀ (SSWU). **GN** Busan-si, Dongrae-gu, Yeonshin-dong, 20.VIII.1985, HS Kim, 1♂ (SSWU); Eonyang-si, Jakcheonjeong, 29.VII.1990, SY Choe, 1♀ (SSWU); Haman-gun, 20.VII.1945, YJ Ahn, 1♀ (ENHM); Hamyang-gun, Aneui-myeon, Temple Yonchusa, 16.VII.1985, ?, 1♂ (SSWU); Jinju-si, Chokseokru, 11.VIII.1995, WJ Jeong, 1♀ (SSWU); ditto, Daean-dong, 10.VI.1964, HE Kim, 1♂ (ENHM); Namhae-gun, 14.VIII.1974, MS Do, 1♂ (ENHM); Sacheon-si, Sanam, 10.VII.1986, KS Lee, 4♂1♀ (SSWU); Sancheong-gun, Mt. Jirisan, Jungsan-ri, 31.VII.1981, JI Kim, 1♂ (SSWU); Wulsan-si, Yaeum, 22.IX.1991, SJ Sim, 1♀ (SSWU); ditto, Taehwa-dong, 19.VII.1990, SY Choe, 1♀ (SSWU). **GW** Chuncheon-si, 12.VIII.1964, HS Gang, 1♀ (ENHM); ditto, Deokduwon, 24.VII.1980, KH

Lee, 1♂ (SSWU); ditto, Gangchon, 23.VIII.1986, SL Choe, 1♂ (SSWU); ditto, Namiseom, 16.VIII.1972, HM Jang, 1♀ (ENHM); ditto, Shin-dong, 10.VII.1982, SA Lee, 1♂ (SSWU); Donghae-si, Temple Samhwasa, 25.VIII.1997, JI Kim, 1♀ (SSWU); Gangreung-si, 10.VIII.1954, AJ Yun, 1♀ (ENHM); ditto, Jukheon-dong, 22.VII.1997, YJ Choe, 1♂ (SSWU); ditto, Dusan-dong, 25.V.1980, SS Lee, 1♀ (SSWU); ditto, Yeongok-myeon, 12.VIII.1995, YJ Baek, 1♂1♀ (SSWU); ditto, Samsan-ri, Buyeon Valley, 18.VIII.2001, AY Kim et al., 1♂2♀ (SSWU); ditto, Sacheon-myeon, Mino-ri, 29.VII.1983, SH Park, 1♀ (SSWU); ditto, Seongsan, 16.VII.1981, SH Choe, 1♂ (SSWU); ditto, Jumunjin-eup, 18.VII.1987, YR Lee, 2♂ (SSWU); Hongcheon-gun, 12.VII.1989, KS Lee, 1♂ (SSWU); ditto, Mt. Odaesan, Sambongyaksu, 11.VIII.1997, JI Kim, 1♂ (SSWU); Inje-gun, Mt. Seoraksan, Temple Baekdamsa, 25.VII.1984, SJ Yun, 1♀ (ENHM); ditto, Jokyeong-dong, 24-26.VII.2000, SY Kim & AY Kim, 1♂ (SSWU); Samcheok-si, Geundeok-myeon, 31.VII.1990, JK Jeon, 2♀ (SSWU); Mt. Sobaeksan, 29.VII.1983, SJ Yun, 1♂ (ENHM); Sokcho-si, Mt. Seoraksan, 25.VIII.1997, BY Kim, 1♂1♀ (SSWU); Wonju-si, 29.VII.1987, JH Lee, 1♀ (SSWU); ditto, Mt. Chiaksan, 10.VIII.1971, HK Kim, 1♂ (ENHM); ditto, Temple Sangwonsa, 14.VIII.1999, DS Ku, 1♀ (SSWU); ditto, Heungeop-myeon, Maeji-ri, 30.VII.1997, JI Kim, 1♀ (SSWU); Yangyang-gun, 8.VII.1994, SJ Yun, 5♂ 5♀ (ENHM); ditto, Wol-ri, 29.VII.1981, YR Kim, 1♀ (SSWU); Yeongwol-gun, Yeondang, 4.VIII.1986, JH Lee, 1♀ (SSWU). **HN** Pyeongsan, Huchiryeong, 25.VI.1999, SL Ahn, 2♂ (NSM). **JB** Buan-gun, 28.VI.1990, EK Yu, 1♀ (SSWU); ditto, Naebyeonsan, 4.VIII.1992, CG

Lee, 1♂1♀ (SSWU); Imsil-gun, 4.VIII.1965, YJ Kim, 1♂ (ENHM); Muju-gun, Mt. Deokyusan, 2.VIII.1974, JJ Lee, 1♂ (ENHM); Wanju-gun, Yongdeok-eup, 26.VII.1996, CH Lee, 1♂ (SSWU). **JJ** Seoguipo-si, Huesu-dong, 5.IV.1989, KS Lee, 2♂ (SSWU). **JN** Gurye-gun, Temple Cheoneunsa, 7.VIII.1959, HK Kim, 1♂ (ENHM); ditto, Masan-myeon, Temple Hwaeomsa, 7.VIII.1959, HK Kim, 1♂ (ENHM); Jangseong-gun, Temple Baekyangsa, 12.VIII.1989, YH Kang, 1♀ (SSWU); Suncheon-si, Mt. Jogyesan, 9.IX.1998, SL Ahn, 1♀ (NSM).

Japan: Niko, 10.VIII.1993, SM Lee, 2♂ (SSWU); ditto, SH Lee, 1♀ (SSWU); Mine, Utsunomiya Tochigi-Pref., 30.VII.1955, T Tanaka, 1♀ (SSWU); Tokyo, Suginami, 30.VIII.1954, N Fukuhara, 1♀ (SSWU).

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

Melolontha insulana (Moser) 꼬마왕풍뎅이

(Pl. II. Fig. II-2: D, E; Pl. III. Fig. III-1: F)

Hoplosternus insulana Moser, 1918: 246.

Korean records. *Melolontha insulana*: Kim, 2001: 49.

Description. Body length 22.34-27.1mm; Width 11.2-13.9mm; Club-footstalk ratio 1.95-2.63 (♂), 0.74-0.75 (♀); Pronotum ratio 0.6-0.65; Pronotum-elytra ratio 0.36-0.37; Metafemur ratio 0.29-0.32 (♂), 0.37-0.4 (♀); Metatibia ratio 0.15-0.16; Pygidium ratio 0.75-0.83.

Body large-sized oval (but smaller than *M. incana*) reddish brown, covered with short, grayish yellow or yellowish brown hairs.

Head coarsely punctured, covered with pilosity. Clypeus

somewhat rectangular, anterior margin flat and severely elevated. Frontoclypeal suture distinct. Frons with a longitudinal line on the middle. Ocular canthus with dense pilosity. Eye to interocular space ratio 0.61-0.66 (♂), 0.53 (♀). Antennae 10 segmented; Antennal club consist with last seven segments and very long in male, with six segments and short in female; first segment of antenna with dense pilosity. Maxillary palpus setaceous with the last segment narrowed at apex.

Pronotum wide at posterior, front angles blunt, posterior angles acute; disc finely punctured, and covered with dense hairs. Scutellum nearly semioval, somewhat ogival posteriorly, flat and finely punctured with fine hairs.

Elytra, covered with hairs similar to those on the pronotum, with four feeble costae in addition to sutural one, lateral margin without setaceous.

Ventral side reddish brown, glabrous, covered with fine hairs. Mesosternal process more or less narrow at the base, and short only to reach to the anterior margins of middle coxae. Sixth abdominal sternites visible, each sternite with a white spot on the sides. Pygidium triangular, covered with fine hairs, with a longitudinal line on the middle.

Legs slender, punctured, and setaceous. Protibia tridentate, but the third teeth vestigial in male. Tarsal claws symmetrical in both sexes. Aegeagus: Pl. III. Fig. III-1: F.

Specimen Examined. GB Bonghwa-gun: 24-30.VII.1993, R.G.O, 1♂

(SSWU); Gunwui-gun: ?.VII.1997, SW Park, 1♂ (SSWU). GG Suwon-si: 7.VII.1957, 1♀ (SSWU). JB Jeonju-si: 22.VI.1965, 1♂ (SSWU).

Distribution. Taiwan, Korea.

Genus *Polyphylla* Harris 수염풍뎅이속

Polyphylla Harris, 1841: 30

Granida Motschulsky, 1861: 8

Macranoxia Crotch, 1873: 61

Polylamina Hardy, 1974: 6; Coca-Abia 2000: 11

Type species: *Melolontha variolosa* Hentz, 1830, by subsequent designation (Young, 1988: 21)

Diagnosis. Antennae 10-segmented; club seven-segmented in male, five-segmented in female. Accessory teeth on adjoining tarsal claws for most species nearly equal in size, length of teeth not differing more than 50%; Parameres of male genitalia lacking subapical spine on ventral margin, apex variably compressed and often hooked downward (Murayama 1954, Young 1988, Yu et al. 1998, Evans 2002, Skelley 2003).

Remarks. *Polyphylla* is a well known genus of large melolonthine scarabs. Members of the genus are Holarctic distribution (Skelley 2003).

Polyphylla laticollis manchurica Semenov 수염풍뎅이

(Pl. II. Fig. II-2: F, G; Pl. III. Fig. III-2: A)

Polyphylla laticollis Lewis, 1887: 231.

Polyphylla chinensis manchurica Semenov, 1900: 308.

Korean records. *Polyphylla laticollis*: Niijima and Kinoshita, 1923: 68; Okamoto, 1924: 174; Kamijo, 1932: 21; Kato, 1935: 116; Tomiura and Tomiura, 1935a: 51; 1935b: 238; Miwa and Chûjô, 1939: 68; Murayama, 1941c: 83; 1954: 133; Takahashi, 1941: 232; Cho, 1956: 77 (수염풍뎅이); 1957: 300; 1963: 218; 1969: 673; Cho et al., 1968: 264; KZS, 1968: 137; Kim et al., 1975: 243; Kim and Nam, 1982a: 156; 1982b: 276; Kim, 1978: 343; Stebnicka, 1980: 207; Park and Kim, 1993: 113; Kim, 1993: 63; 1998: 356.

Polyphylla laticollis mandshurica: Reitter, 1902: 271.

Polyphylla laticollis mandsurica: Miwa and Chûjô, 1939: 68; Cho, 1957: 300; KZS, 1968: 137.

Polyphylla laticollis mandschurica: De Wailly, 1948: 108.

Polyphylla laticollis manchurica: ESK and KSAE, 1994: 151; Kim, 2001: 47.

Polyphylla chinensis manchurica: Miwa and Chûjô, 1939: 68; Stebnicka, 1980: 207.

Description. Body length 33.42-36.2mm; Body width 16.2-17.9mm; Club-footstalk ratio 3-3.4 (♂), 0.76-0.78 (♀); Pronotum ratio 0.56-0.64; Pronotum-elytra ratio 0.28-0.33; Metafemur ratio 0.28 (♂), 0.38-0.41 (♀); Metatibia ratio 0.12-0.17; Pygidium ratio 0.75-0.83 (♂), 0.73 (♀).

Body large-sized oval reddish brown; surface with irregular white spots, shinny.

Head coarsely punctured, covered with scale-like setae and hairs. Clypeus somewhat rectangular, anterior margin flat and severely elevated. Frontoclypeal suture distinct. Ocular canthus with dense pilosity. Eye to interocular space ratio 0.69-0.73 (♂), 0.63-0.68 (♀). Antennae 10 segmented; last seven segments lamellated and very long in male, six segments lamellated and short in female; first segment of antenna with dense pilosity. Maxillary palpus setaceous with the last segment narrowed at apex.

Pronotum widest at the middle, front angles blunt, posterior angles acute; disc coarsely punctured, and scale-like setae scattered; lateral margins carinated with a low of setae. Scutellum linguiform, flat, with scales on the sides.

Elytra surface with irregular white spots, without costae, lateral margin without setaceous.

Ventral side reddish brown, glabrous, covered with fine yellowish brown hairs. Six abdominal sternites visible, each sternite covered with fine short hairs. Pygidium triangular, covered with fine hairs.

Legs slender, punctured, and setaceous. Protibia bidentate in male, tridentate in female. Tarsal claws symmetrical in both sexes. Aegeagus: Pl. III. Fig. III-2: A.

Specimen Examined. CN Nonsansi, Ganggyeong-eup, Hwangsandaegyo, ?.VI.1999, MS Kim, 2♂1♀ (SSWU); ditto, 23.VI.2005, AY Kim, 1♂2♀ (SSWU). **GG** Bokwang, 7.VIII.1968, ? 1♀ (SSWU); Seoul: 1.VII.1955, EY Lee, 1♂ (ENHM); Jongrogu, Shinyeongdong, Saegumjeong, 22.V.1965,

MJ Kim, 1♀ (ENHM); Mapogu, Hapjeongdong, Yanghwadaegyo, 23.VI.1965, HJ Baek, 2♂1♀ (ENHM); Seogang, 26.VI.1965, JJ Shim, 1♂ (ENHM); Seodaemungu, Shinchon, 26.V.1965, SJ Shin, 1♂1♀ (ENHM); ditto, Yonsei Univ., 17.VI.1969, HS Choi, 1♀ (ENHM); ditto, Yoenhidong, 18.VI.1965, JH Lee, 1♂ (ENHM); yeongdeungpogu, yeongdeungpo, 23.VI.1961, YS Lee, 1♂ (ENHM). **PB** Uiju, ?.VIII.1931, BS Cho, 1♂ (SSWU). **PN** Pyeongyang, Moranbong, 8.VIII.1982, Forro & Ronkay, 1♂ (SSWU); Shinyanggun, Bukdaebong, 10.VII.1995, ?, 1♂ (NSM).

Distribution. China (North), Korea.

Tribe Diplotaxini Kirby, 1837 감자풍뎅이족(신칭)

Type genus: *Diplotaxis* Kirby, 1837: 129

Diagnosis. Antennae nine or 10-segmented with three-segmented club. Labrum visible, transverse, nearly straight, lacated below clypeus. Apical part of fore coxa subvertical. Abdominal sutures distinct; fifth abdominal sternite and propygidium not separated by suture; sixth abdominal sternite nearly completely retracted beneath fifth sternite. Protibiae with apical spurs, meso- and metatibiae with two spurs; metatibial spurs contiguous, located below tarsal articulation (Bezděk 2004, Evans 2002, Lacroix 1989; 2000).

Remark. The tribe Diplotaxini is found in the Afrotropical, Neotropical, and Oriental regions with one genus found in the Nearctic region. Adults are small, elongate, black or redish, shiny beetles, not exceeding an inch in length (Ritcher 1966). They are mostly nocturnal,

feeding on the foliage of various plants. The larvae of some species may damage seedlings of commercially grown trees (Evans 2002).

Genus *Apogonia* Kirby 감자풍뎅이속

Apogonia Kirby 1819: 401

Type species: *Apogonia gemellata* Kirby, 1819 (= *Melolontha rauca* Fabricius, 1781); by monotypy.

Diagnosis. 4.5-18mm. Antennae with three segmented club. Clypeus and frons without transverse keels, clypeus level with ocular canthus. Pronotum with membrane along anterior margin. Vestiture variable, minute to long hair. Pygidium small, round. Propygidium fused, without suture, to venter. Abdomen usually with five, sometimes six visible sternites, with or without sharp lateral margins. Tarsal claws split apically. Male genitalia asymmetrical (Murayama 1954, Booth et al. 1990, Lacroix 2000).

Remark. This genus contains 385 species (Lacroix, 2000), Adults are chafers, larvae are root feeders (Booth et al. 1990). The majority of species is distributed in the Oriental and Ethiopian regions. Several species reach the south-eastern part of Palaearctic region (China, Korea, and Japan), and one species was described from eastern Iran. Surprisingly, the genus Apogonia has recently been recorded from Asiatic Turkey (Keith, 2001), but without identification of particular species (Bezdék, 2004).

Key to the species of Korean *Apogonia*

Body length 7-8mm. Pronotum punctation fine. Length of metepisternum almost three times of that of metacoxa ····· ····· *A. cribricollis*

- Body length 8-11mm. Pronotum punctation somewhat coarse. Length of metepisternum almost 3.5 times of that of metacoxa. ····· ····· *A. cupreoviridis*

Apogonia cribricollis Burmeister 잔감자풍뎅이

(Pl. II. Fig. II-2: H; Pl. III. Fig. III-2: B)

Apogonia cribricollis Burmeister, 1855: 256.

Korean records. *Apogonia cribricollis*: Murayama, 1941c: 84; 1954: 139; Cho, 1969: 667; Kim and Kim, 1974: 108; Stebnicka, 1980: 262; Kim and Lee, 1991a: 67; 1997: 231; Park and Kim, 1993: 112; ESK and KSAE, 1994: 150; Kim et al., 1999: 129; 2004: 116; Kim, 2001: 22; Löbl and Smetana, 2006: 182.

Apogonia chinensis: Niijima and Kinoshita, 1927: 16; Liu et al., 1997: 61.

Description. Body length 7-8mm; Width 4.3-5mm; Club-footstalk ratio 0.43-0.5; Pronotum ratio 0.44-0.5; Pronotum-elytra ratio 0.33-0.38; Metafemur ratio 2.85-4.4; Metatibia ratio 4.5-6.67; Pygidium ratio 0.64-0.71.

Body short, oval, wide at posterior, reddish brown to dark brown, surface glabrous and shinny.

Clypeus broad, rounded, densely punctured, extended to ocular canthus. Frontoclypeal suture distinctly impressed. Frons shinny, almost 2.5 times as long as clypeus. Antenna brown, 10-segmented, club three segmented, shorter than rest segments in both sexes. Eyes not large, ratio of diameter to interocular distance 0.46. Labrum located under clypeus with few seta.

Pronotum slightly convex, front angles sharp, posterior angles bluntly rounded, margin not setaceous; disc finely and densely punctate without hairs in. Scutellum triangular, with finer puncture than that of pronotum.

Elytra short, simple and convex, not cover the pygidium, have four vague intervals, densely punctate, lateral margin without setaceous.

Ventral side of abdomen reddish brown, glabrous; short hairs scattered over. Mesosternum closely adjacent between mesocoxa. Five abdominal sternites visible. Length of metepisternum almost three times of that of metacoxa. Pygidium not triangular, almost circular, with punctures and fine hairs.

Legs slender; first to fourth tarsus with dense hair downward. Protibia tridentate, with short tibial spurs, anterior tarsal claws symmetrical in both sexes. Hind tibia with two spurs. Each length of first to fourth Metatarsomeres not much different. Aedeagus: Pl. III. Fig. III-2: B.

Specimen Examined. CN Daejeon-si, Shinsong-dong, 3.VIII.1993, SL Ahn, 1 (NSM); Seosan-si, Mt. Gayasan, 6.V.1994, KM Lee, 1 (SSWU);

ditto, 22.VI.1995, SE Jo, 1 (SSWU). **GB** Bonghwa-gun: Daehyeong-ri, 25.VII.1986, GS Jang, 1 (SSWU); Pohang-si: Nam-gu, Guryongpo, 27.VII.1989, JI Kim, 1 (SSWU); Wuljin-gun: Onjeong-myeon, Mt. Baekamsan, 29.V.1999, JI Kim et al., 1 (SSWU); yeongju-si: Buseok-myeon, Namdae-ri, Mt. Oraesan, 30.VI.1998, JI Kim et al., 1 (SSWU). **GG** Goyangsi: Byeokje, 18.V.1978, JG Jeong, 1 (ENHM); Namyangju-si: Gwangreung, 10.V.1959, YI Kim, 1 (ENHM); Hwado-eup, Mt. Cheonmasan, 25.V.1987, 1 (ENHM); ditto, 6.VI.1991, CDJ, 1 (SSWU); Sudong-myeon, Mt. Chukryeongsan, 18.VI.1983, MJ Jo, 1 (SSWU); Suwon-si, 10.V.1979, 2 (ENHM); Yangpyeong-gun: Temple Yongmun, 28.V.1982, HJ Lee, 1 (SSWU); Ongjin-gun: Seopo-ri, 7.VII.1981, GS Jang, 1 (SSWU); Seoul: Dobong-gu, Mt. Dobongsan, 16.V.1959, JI Son, 1 (ENHM); Jung-gu, Jangchung-dong, 14.VI.1959, CM Im, 1 (EWU); Seodaemun-gu, Ehwa Woman's Univ., 19.VI.1975, YH Seo, 1 (ENHM); Songpa-gu, Bangi-dong, Olympic park, 29.V.2005, BH Jeong, 1 (SSWU). **GN** Wulsan-si, Taehwa, 7.VIII.1990, SY Choe, 1 (SSWU). **GW** 15.V.1963, 1 (SSWU); Samcheok-si: Songjeong-ri, 7.VI.1980, GS Jang, 5 (SSWU); ditto, JI Kim, 4 (SSWU); ditto, HK Park, 3 (SSWU); Pyeongchang-gun: Jinbu-myeon, Mt. Sobaeksan, 29.VII.1983, SJ Yoon, 1 (ENHM); Gapyeong-dong, 4.VI.1985, 1 (SSWU); Wonju-si: Mt. Chiaksan, 4.V.2003, JG Lee, 2 (SSWU); Jeongseon-gun: Mt. Gariwangsan, 21.V.1998, BY Kim et al., 1 (SSWU). **JN** Haenam-gun: Samsan-myeon, Mt. Duryunsan, 22.VI.1993, KMC, 1 (SSWU).

Distribution. Oriental region (China, Korea etc.)

Remark. *Apogonia chinensis* in Liu et al. (1997) is identical with this

species (misidentification).

Apogonia cupreoviridis Kolbe 감자풍뎅이

(Pl. II. Fig. II-2: I; Pl. III. Fig. III-2: C)

Apogonia cupreoviridis Kolbe, 1886: 193 (Seoul, Pusan).

Korean records. *Apogonia cupreoviridis*: Bates, 1888: 373; Niijima and Kinoshita, 1923: 73; Maruta, 1929: 369; Kato, 1935: 116; Tomiura and Tomiura, 1935a: 51; Miwa and Chûjô, 1939: 62; Mochizuki and Tsunekawa, 1937: 90; Murayama, 1941c: 83; 1954: 137; Cho, 1957: 298; 1963: 221; 1969: 666; Nomura, 1960: 63; Cho et al., 1968: 265 (감자풍뎅이); Yoon and Nam, 1980: 149; Kim et al., 1975: 240; Stebnicka, 1980: 262; Kim and Nam, 1981: 125; 1982a: 155; 1982b: 276; Kim and Yoo, 1987a: 223; 1987b: 505; Kim and Lee, 1991a: 67; 1997: 233; Kim, 1993: 62; 1996: 174; 2000b: 132; 2001: 23; Park and Kim, 1993: 112; Park et al., 1993: 177; ESK and KSAE, 1994: 150; Kim and Kim, 1996: 127; Kim et al., 1999: 129; 2004: 116.

Apogonia cupreoviridis fusania: Kolbe, 1886: 193; Niijima and Kinoshita, 1923: 73; Haku, 1937: 121; Cho, 1957: 298.

Apogonia cupreoviridis cupreoviridis: Löbl and Smetana, 2006: 182.

Description. Body length 8-11mm; Body width 4.9-7mm; Club-footstalk ratio 0.5-0.75; Pronotum ratio 0.47-0.51; Pronotum-elytra ratio 0.33-0.4; Metafemur ratio 3.56-5; Metatibia ratio 5-6.75; Pygidium ratio 0.63-0.71.

Body short, oval, wide at posterior, reddish brown to black with

a faint cupreous tint, surface glabrous and shinny.

Clypeus broad, arched, densely punctured, extended to ocular canthus. Frontoclypeal suture distinctly impressed. Frons shinny, almost 2.1 times as long as clypeus, densely punctured. Antenna brown, 10-segmented, club three segmented, shorter than rest segments in both sexes. Eyes not large, ratio of diameter to interocular distance 0.42. Labrum eye shaped, located under clypeus with few seta.

Pronotum short and broad, slightly convex, front angles not sharp, posterior angles bluntly rounded, margin not setaceous; disc punctation somewhat coarse compared with *A. cribricollis*. Scutellum triangular, with few punctures.

Elytra short, simple and convex, not cover the pygidium, have four vague intervals, strongly punctured, lateral margin without setaceous.

Ventral side of abdomen reddish brown to black, glabrous; short hairs scattered over. Mesosternum closely adjacent between mesocoxa. Five abdominal sternites visible. Length of metepisternum almost 3.5 times of that of metacoxa. Pygidium not triangular, almost circular, with punctures and fine hairs.

Legs slender; first to fourth tarsus with dense hair downward. Protibia tridentate, with short tibial spurs, anterior tarsal claws symmetrical in both sexes. Hind tibia with two spurs. Each length of one to four metatarsomeres not much different. Aedeagus: Pl. III. Fig. III-2: C.

Specimen Examined. CB Boeun-gun, Mt. Sokrisan, 6.V.2001, SL Ahn, 1

(NSM); Gyoesan-gun, Yeonpung-myeon, Wonpung-ri, 25.VI.1986, MS Jeong, 1 (SSWU); Jaecheon-gun, Mt. Wolaksan, 29.V.1987, SM Han, 1 (SSWU). CN: Buyeo-gun, Mt. Mansusan, 10.VI.1999, Han and Kim, 1 (SSWU); Cheonan-gun, Mt. Gwangdeoksan, 16-18.VI.1994, JM Park, 4 (SSWU); ditto, SY Kim, 2 (SSWU); ditto, JI Kim, 1 (SSWU); ditto, HS Choe, 1 (SSWU); ditto, 22-23.VII.1994, SY Kim, 1 (SSWU); ditto, JI Kim, 1 (SSWU); Cheongyang-gun, 20.V.1988, SH Lee, 1 (ENHM); Taean-gun, Anmyeondo, Jungjang-ri, 8.VI.2003, SL Ahn, 1 (NSM); ditto, 25.VII.1994, LL Kim, 1 (SSWU); ditto, Wonbok-ri, 25.V.1995, JH Kim, 1 (SSWU). GB Daegu-si, 15.VIII.1971, JH Kim, 1 (ENHM); Gyeongsan-si, yeongnam Univ., 21.VI.1992, KS Jung, 1 (SSWU); Munkyeong-si, Sangcho-ri, Mt. Juhulsan, 23.V.1997, AY Kim et al., 2 (SSWU); yeongju-si, Buseok-myeon, Namdae-ri, Mt. Seondalsan, 29.VI.1998, JI Kim et al., 3 (SSWU); ditto, Mt, Eoraesan, 30.VI.1998, JI Kim et al., 1 (SSWU); Wuljin-gun, Bulyeonggyegok, 26.VI.1990, HD Kim, 1 (SSWU); ditto, Onjeong-myeon, Mt. Baekamsan, 29.V.1999, SH Wu, 1 (SSWU); ditto, JI Kim et al., 2 (SSWU); Cheongsong-gun, Mt. Juwangsan, 29.VII.1983, GS Jang, 1 (SSWU); ditto, Temple Daejeon, 6.VI.1989, SY Yoon, 1 (SSWU); Wulrung-gun, Wulrungdo, 6.VI.1985, WH Baek, 1 (SSWU). GG Ganghwado: Gyodong-myeon, Gyodongdo, 2.VII.1987, JI Kim, 1 (SSWU); Gapyeong-gun, Daegok-ri, 26.V.1988, HJ Oh, 1 (SSWU); ditto, Mt. Godongsan, 25.VIII.1979, WY Lee, 1 (SSWU); ditto, Mt. Cheongyesan, 29.VI.1991, SH Jeon, 1 (SSWU); Goyang-si, Hangjusanseong, 28.V.1984, MW Kwon, 1 (SSWU); Gwacheon-si, Mt. Cheongyesan, 25.V.1986, IS Phang, 1 (SSWU); Gwangju-si,

Joongbu-myeon, Namhansanseong, 19.VI.1974, DJ Shim, 10 (SSWU); ditto, BJ Lee, 20 (SSWU); ditto, 29.VI.1970, MG Lee, 1 (SSWU); ditto, 19.VI.1974, BK Lee, 1 (SSWU); ditto, GS Son, 1 (SSWU); ditto, JW Gu, 4 (SSWU); ditto, 17.VIII.1974, H Namgung, 1 (SSWU); ditto, 27.VI.1975, MG Lee, 1 (SSWU); Gwangmyeong-si, Okildong, 3.VI.1994, EJ Kim, 1 (SSWU); Namyangju-si, Gwangrung, 30.IV.1961, JW Jeong, 1 (SSWU); ditto, 16.V.1959, CM Im, 1 (ENHM); ditto, 30.V.1959, GS Lee, 1 (ENHM); ditto, 13.VI.1971, JI Kim, 1 (SSWU); ditto, SJ Kim, 1 (SSWU); ditto, Ipseok, 6.X.1968, HS Yoon, 1 (ENHM); ditto, Maseok, 22.VI.1969, YH Kang, 1 (ENHM); ditto, Mt. Chukryeongsan, 6.VI.1984, YS Choe, 1 (SSWU); ditto, Sudong-myeon, Ipseok, 22.VII.1976, SB Baek, 1 (SSWU); Hwado-eup, Mt. Cheonmasan, 26.VI.1972, DH Lee, 1 (SSWU); ditto, 16.VI.1978, YH Kim, 1 (SSWU); ditto, 5.VI.1978, JS Lee, 1 (SSWU); ditto, 12.VI.1982, Dept. of Biology, 1 (SSWU); ditto, 28.IV.1985, WO Kim, 1 (SSWU); ditto, 2.VI.1984, SM Gang, 1 (SSWU); Icheon-si, Janghowon, 14.VI.1999, SJ Yoon, 1 (ENHM); Incheon, Ongjin-gun, Daecheongdo, 12.VI.1990, IY Han, 1 (SSWU); ditto, 14.VI.1990, IY Han, 1 (SSWU); ditto, Daecheong-ri, 11.VII.1990, EJ Jo, 8 (SSWU); ditto, EJ Lee, 1 (SSWU); ditto, Seopori, 6.VII.1981, JI Kim, 1 (SSWU); ditto, Baekryeongdo, 26.VII.1987, HJ Yoo, 1 (SSWU); ditto, Gwangyo-dong, Mt. Munhaksan, 24.V.1997, KJ Choe, 1 (SSWU); ditto, Nam-gu, Jangsu-dong, 5.VII.1986, HM Park, 1 (SSWU); ditto, yeongjongdo, 9.V.1993, YJ Kang, 1 (SSWU); Pajusi, 24.V.1991, GY Yoon, 1 (SSWU); ditto, Temple Bogwang, 21.VII.1974, YS Yu, 1 (SSWU); ditto, 28.VI.1975, DS Kang, 1 (SSWU); ditto, 3.VII.1977, SH Nam, 1 (SSWU);

ditto, 22.V.1985, MJ Lee, 1 (SSWU); ditto, 22.V.1985, MG Son, 1 (SSWU); Pocheon-si, 8.VII.1981, EY Lee, 1 (SSWU); ditto, Gwangrung, 9.V.1987, SY Choe, 1 (SSWU); ditto, Sohul-eup, Mubong-ri, 12.IV.2003, AY Kim, 1 (SSWU); Seoul: Dobong-gu, Mt. Dobongsan, 16.VI.1968, OH Lee, 1 (ENHM); ditto, 29.V.1999, GN Kim, 1 (SSWU); ditto, Uidong, 8.V.1961, Jae, 1 (SSWU); ditto, 14.V.1961, Jae, 1 (SSWU); Dongdaemun-gu, Huegi-dong, 26.VII.1987, SY Yoon, 1 (SSWU); Dongjak-gu, Sangdo-dong, 26.V.1992, HJ Choe, 1 (SSWU); Eunpyeong-gu, Galhyun-dong, 12.V.1990, JK Jeon, 2 (SSWU); ditto, Bulgwang-dong, Mt. Bukhansan, 18.IV.1998, TW Kim, 1 (SSWU); ditto, Jingwanoue-dong, 6.VI.1968, GS Park, 1 (ENHM); Gangdong-gu, Godeok-dong, 10.V.1987, SY Choe, 1 (SSWU); ditto, Sangil-dong, 20.IX.1998, HJ Lee, 1 (SSWU); Gangnam-gu, Wonji-dong, 7.VI.1986, SH Park, 1 (SSWU); ditto, Heoninrung, 24.IV.1983, GE Kim, 1 (SSWU); ditto, 15.V.1988, HJ Shim, 1 (SSWU); ditto, Gaepo-dong, 20.VII.1998, SH Jo, 3 (SSWU); ditto, Mt. Daemosan, 22.V.1998, JY Lyu, 1 (SSWU); ditto, Wonji-dong, Mt. Cheongyesan, 1.VI.1985, JS Heo, 1 (SSWU); ditto, 12.V.1990, EJ Jo, 1 (SSWU); ditto, 18.V.1991, SR Yoon, 2 (SSWU); ditto, YH Lee, 1 (SSWU); ditto, 31.V.1992, JH Bae, 1 (SSWU); Gwanak-gu, Shinrim-dong, Mt. Gwanaksan, 7.V.1994, YJ Kim, 1 (SSWU); ditto, HW Seol, 1 (SSWU); ditto, 15.V.1987, DJ Kim, 3 (SSWU); ditto, 27.V.1990, JH Kye, 1 (SSWU); Nowon-gu, Gongrung-dong, 6.VIII.1994, MJ Shin, 1 (SSWU); ditto, Nokcheon, 3.V.1997, JY Lee, 1 (SSWU); ditto, Mt. Suraksan, 15.IV.1989, OJ Lee, 1 (SSWU); Seocho-gu, Mt. Wumyeonsan, 25.V.1997, HY Yeom, 1 (SSWU);

ditto, HJ Kim, 1 (SSWU); Seodaemun-gu, Bukahyun-dong, 7.VI.1961, MS Park, 1 (ENHM); ditto, Yeonhi-dong, 22.V.1983, MR Kim, 1 (ENHM); ditto, Ehwa Woman's Univ., 9.VI.1966, HS Song, 1 (ENHM); ditto, 14.VI.1966, JJ Kim, 1 (ENHM); ditto, 23.VI.1966, GS Kim, 1 (ENHM); ditto, 23.VI.1972, JO Park, 1 (ENHM); ditto, 20.VI.1973, MH Lee, 1 (ENHM); Seongbuk-gu, Anam-dong, 18.V.1981, CH Byeon, 1 (SSWU); ditto, 11.XI.1981, SH Lee, 1 (SSWU); ditto, Mt. Bukhansan, 9.VI.1996, MS Jeon, 1 (SSWU); ditto, Seongbuk-dong, 21.VIII.1960, MJ Lee, 1 (ENHM); Songpa-gu, Bangi-dong, Olympic park, 29.V.2005, BH Jeong, 3 (SSWU); Siheung-si, Mt. Gwanaksan, 20.V.1989, DJ Kim, 2 (SSWU); ditto, Okgudo, 25.VIII.1989, Han, 1 (SSWU); Suwon-si, 30.IV.1960, WH Baek, 6 (SNU); ditto, 20.VI.1970, MH Kim, 1 (SNU); ditto, 21.V.1973, JC Baek, 1 (SSWU); ditto, 3.VI.1973, JH Lee, 1 (ENHM); ditto, 20.V.1979, SH Park, 1 (ENHM); ditto, Jangan-gu, Yuljeon-dong, 15.V.1983, KS Jeon, 1 (ENHM); Yangju-si, Ilyeong, 6.VI.1987, SH Ha, 1 (SSWU); ditto, Mt. Cheonbosan, 6.VI.1982, SP Hong, 1 (SSWU); Yangpyeong-gun, 24.VII.1970, JS Park, 1 (SSWU); ditto, Temple Yongmun, 27.V.1973, SK Kim, 1 (ENHM). **GN** Changnyeong-gun, Ebang-myeon Jumae-ri Upon-eup, 17.VI.1995, ?, 1 (GSNU); Hamyang-gun, Baejeon-myeon, Mt. Baekunsan, 30.V.1997, YB Jo, 1 (SSWU). **GW** Chuncheon-si, Gangchon, 22.V.1977, BG Jeong, 1 (SSWU); ditto, Namiseom, 5.VI.1977, JH Lee, 1 (ENHM); Honcheon-gun, 3.VII.?, ?, 3 (SSWU); ditto, Bukbang-myeon, Neungpyeong-ri, 1-25.V.2001, SI Han, 1 (SSWU); Samcheok-si, Songjeong-ri, 7.VI.1980, GS Jang, 1 (SSWU); Injae-gun, Mt. Gachilbong,

21-23.VI.1984, J Seok, 1 (SSWU); ditto, Mt. Seolaksan, 29.VII.1990, EJ Lee, 1 (SSWU); Gangrung-si, Sacheon-myeon, 19.VIII.1997, YJ Choe, 1 (SSWU); Wonju-si, Mt. Chiaksan, 15.VI.1999, JI Kim et al., 1 (SSWU). **JB** Jeongup-si, Mt. Naejangsan, 5.VII.1985, JE Kim, 1 (SSWU); ditto, 4.VII.1985, KI Song, 1 (SSWU); Jeonju-si, Wanju-gun, Gosan-myeon, 10.VII.2000, YW Choe, 1 (SSWU); Muju-gun, Mt. Deokyusan, 25.V.1993, JI Kim, 1 (SSWU). **JJ:** Jejudo, 5.VI.1963, ?, 2 (SSWU); Jeju-si, Ara-dong, Temple Gwanum, 21.VII.1973, JS Park, 1 (SSWU); ditto, Sancheondan, 20.VII.1973, 1 (SSWU); Seoguipo-si, Marado, 9.VII.1994, SL Ahn, 3 (NSM); ditto, Jungmun, 4.V.1978, JW Lee, 1 (SSWU). **JN** Gangjin-gun, Walnam-ri, Temple Mui, 29.VII.1988, HC Park, 2 (SSWU); Gochang-gun, Mt. Gyeongsusan, 16.VII.1997, YB Cho, 2 (SSWU); Gwangyang-gun, Temple Baekwun, 19.V.1991, JG Seo, 1 (SSWU); ditto, Mt. Baekwunsan, 10.VIII.1993, SY Kim, 2 (SSWU); ditto, Mt. Eokbulbong, 19.V.1991, KIY, 1 (SSWU); Gurye-gun, Temple Hwaum, 28.V.1987, YE Jang, 1 (SSWU); Haenam-gun, Mt. Duryunsan, 23.VI.1993, JSH, 1 (SSWU); ditto, PMJ, 1 (SSWU); ditto, Temple Daehyeung, 12.VII.1986, ?, 2 (GSNU); ditto, JS Jeon, 1 (GSNU); ditto, DS Gu, 1 (GSNU); Muan-gun, Imjado, 14.VII.1997, YB Cho, 1 (SSWU); Seungju-gun, Temple Seonam, 22.VI.1987, YE Jang, 1 (SSWU); Shinan-gun, Heuksando, 5.VII.1975, IAS, 1 (SSWU); ditto, Heuksan-myeon, Hongdo, 27.VI.1992, SJ Yoon, 1 (ENHM); Yeosu-si, Mt. Gubongsan, 22.V.1998, EK Ahn, 1 (SSWU); yeongam-gun, Mt. Wolchulsan, 27.VII.1988, CH Park, 1 (SSWU); ditto, JK Kim, 1 (SSWU); Wando-gun, Wando-eup, 6.VI.1982, Dept. Biology, 1 (SSWU); Mt.

Chirisan, 8.VII.1976, SH Nam, 1 (SSWU); ditto, Piagol, 23.VI.1987, OJ Lee, 1 (SSWU); ditto, KH Min, 1 (SSWU); ditto, Temple Hwaum, 3.V.1984, JH Go, 1 (SSWU).

Distribution. China (Northeast), Japan, Korea.

Remarks. This is the most common species in Korean *Apogonia* (Murayama 1931; larva information, Sawada 1940). Adults occur once a year; third larvae hibernate, adult appear near the late April in next year.

Tribe Rhizotrogini Burmeister, 1855 검정다색풍뎅이족

Type genus: *Rhizotrogus* Latreille, 1825: 371

Diagnosis. Antennal club in both sexes 3-segmented, equal or shorter than the stem; foot-stalk in males with third segment not longer than the second. Claws in males not cleft at apex, with basal tooth, outer and inner teeth subequal. Labrum not transverse, bilobed and symmetrical. Anterior margin of pronotum in the middle with short setae. Mesosternum not protruding between the middle coxae. Metepisternum narrow, more than three times as long as its width, metepimera small, in the same plane as the metepisternum. Abdominal sternites connate with sutures fine or absent in the middle, without white spots on each side, 6th abdominal sternite not retracting under the 5th. Anterior coxae not prominent, transverse. Anterior tibiae 2- or 3-dentate on the outer edge and with a spur on the inner edge. Larvae with anus angular in the middle (Sabatinelli and Pontuale, 1998).

Distribution. This large tribe contains about 1400 species and is well

represented in the Palaearctic, Nearctic, Neotropical and Oriental regionsm, while the Rhizotrogini are absent from the Australian region (Sabatinelli and Pontuale, 1998).

Key to the genera of Rhizotrogini in Korea

1. Claw cleft at apex, with ventral tooth stouter than dorsal one …… 2

- Claw cleft at medial part, with a vertical tooth beneath usually not stout …… 6

2. Metasternum pruinose, glabrous, sometimes with short setae on the anterior part …… *Sophrops*

- Metasternum shining, densely covered with long hairs …… 3

3. Antenna 10-segmented …… 4

- Antenna 9-segmented …… 5

4. Body size 10-17 mm. Hole body planted with hairs. Front tibiae tridentate in both sexes …… *Brahmina*

- Body size over 17 mm. Dorsal surface with few hairs or without hairs. Front tibiae bidentate in male …… *Bunbunius*

5. Dorsal surface without hairs. Frons waved with transverse elevations. Club little longer than remaining segments combined in male …… *Pseudosymmachia*

- Dorsal surface covered with hairs. Frons without transverse elevations. Club shorter than remaining segments combined in both sexes …… *Lasiopsis*

6. Vertex with a strong transverse carina. Each elytron without costae except sutural one …… *Miridiba*

- Vertex without carina. Each elytron with 4-5 costae ····· *Holotrichia*

Genus *Sophrops* Fairmaire 갈색줄풍뎅이속

Sophrops Fairmaire, 1887: 106

Microtrichia Brenske, 1900: 343

Type species: *Sophrops parviceps* Fairmaire, 1887: 106

Diagnosis. Body somewhat cylindrical. No hair on the surface. Antennae 10-segmented; last three segments lamellated. Posterior half of eye exposed. Longitudinal stripes on the elytra narrow at those ends (Murayama 1954).

Remark. In this genus, two species have been reported from Korea.

Key to the species of *Sophrops* of Korea

Protibia with a spur on it's inner border. Clypeus simple. Proepisternal punctures without hair ····· *S. heydeni*

- Protibia without a spur on it's inner border. Clypeus severely concave at the anterior margin. Proepisternal punctures bearing long brown hairs ····· *S. striata*

Sophrops heydeni (Brenske) 하이덴갈색줄풍뎅이

(Pl. II. Fig. II-3: A, B; Pl. III. Fig. III-2: D)

Brahmina heydeni Brenske, 1892a: 108 (Korea).

Korean records.

Sophrops heydeni: Reitter, 1902: 173; Niijima and Kinoshita, 1927: 25;

Maruta, 1929: 368; Murayama, 1935: 4; 1937: 34; 1954: 101; Mochizuki and Tsunekawa, 1937: 92; Miwa and Chûjô, 1939: 67; Cho, 1957: 299; 1963: 221; 1969: 672; Cho et al., 1968: 265; KZS, 1968: 137; Kim and Kim, 1972a: 84; 1974: 108; Kim, 1978: 342; Yoon and Nam, 1980: 150; Stebnicka, 1980: 264; Kim and Nam, 1982a: 155; 1982b: 276; Kim et al., 1985: 105; Kim and Yoo, 1987a: 223; Yoon et al., 1990: 110; Kim and Lee, 1991a: 66; Kim, 1993: 62; 1995b: 139; 1996: 174; 2001: 31; Park et al., 1993: 178; Park and Kim, 1993: 113; ESK and KSAE, 1994: 150; Kim and Kim, 1996: 127; Kim et al., 1999: 129; 2004: 116; Löbl and Smetana, 2006: 227.

Description. Body length 10.2-12.25mm; Width 5-6.2mm; Club-footstalk ratio 1.26-1.42 (♂), 0.63-0.83 (♀); Pronotum ratio 0.57-0.59; Pronotum-elytra ratio 0.32-0.33; Metafemur ratio 0.22-0.31; Metatibia ratio 0.14-0.16; Pygidium ratio 0.67-0.8.

Body elongated oval, yellowish brown to brown, surface glabrous.

Head reddish brown to dark brown, densely punctate. Clypeus simple, shorter than frons and narrowed laterally, with anterior margin rather sinuate in the middle, not deeply emarginate. Frontoclypeal suture distinct. Frons slightly convex. Eye to interocular space ratio 0.56-0.67. Ocular canthus with setae. Antenna 10-segmented; club composed last three segments, little longer than remaining segments combined in male, shorter than remaining segments combined in female. Labrum narrow, strongly depressed in the middle. Last

maxillary palp as long as remaining segment, with few seta.

Pronotum feebly convex, punctured, lateral margin rounded with shallow carina and few setae. Pronotal anterior angles not acute, posterior angles rounded. Scutellum almost semicircular, somewhat ogival posteriorly, flat with fine punctation scattered on the sides.

Elytra with four vague costae, densely punctated on the intervals, lateral margin with few setae.

Ventral side shinny, with pruinose parts on the sides. Proepisternal punctures without hair. Prosternum punctated regularly. Sixth abdominal sternites visible with punctation. Pygidium slightly convex, punctate, with a low of setae on the ventral boarder.

Legs long and slender. Interval of metatrochanter as wide as the width of mesofemur. Protibia tridentate, with punctures, anterior tarsal claws cleft at apex, ventral teeth wider than dorsal one, symmetrical in both sexes. Basal joint of hind tarsi shorter than second one. Meso- and metatibiae with dorsal spurs. Spur adjacent to metatarsus slightly longer than first tarsi. Aedeagus: Pl. III. Fig. III-2: D.

Specimen Examined. CB Chungju-si, Mt. Gyemyeongsan, 24.VIII.2000, JI Kim et al., 1♀ (SSWU); ditto, Mt. Namsan, 24.VIII.2000, SY Kim & AY Kim, 1♀ (SWU); Jecheon-gun, Baekun-myeon, 10.VIII.1988, JH Kim, 1♀ (SSWU); Jincheon-gun, Baekgok-myeon, Daemun-ri, 7.VII.1998, TM Han, 2♂ (SSWU); ditto, Yeongok-ri, 8.VII.1998, TM Han & TH Kang, 3♂ (SSWU). **CN** Buyeo-gun, Mt. Mansusan, 19.VII.1999, JI Kim et al., 1♀ (SSWU); Cheonan-gun, Mt. Gwangdeoksan, 22-23.VII.1994, HS Choe, 1

♂ (SSWU); Gongju-si, Mt. Gyeryongsan, Temple Gapsa, 8.VII.1976, JH Kim, 1♀ (SSWU); Taean-gun, Anmyeondo, 24.VII.1981, KH Sin, 1♂ (SSWU). **GB** Bonghwa-gun, 1.VIII.1998, JH Kim, 1♀ (SSWU); ditto, Daehyeon-ri, 25.VII.1986, GS Jang, 1♂ (SSWU); Cheongsong-gun, Mt. Juwangsan, 29.VII.1983, GS Jang, 1♂ (SSWU); ditto, 13.VII.1978, SH Nam, 1♂ (SSWU); Daegu-si, Mt. Palgongsan, 8.VII.1986, SH Jeon, 1♀ (SSWU); ditto, Hwanggum-dong, 22.VII.1989, SH Jeon, 2♂ (SSWU); Gumi-si, Mt. Geumosan, 19.VII.2001, SY Kim, 1♂ (SSWU); ditto, AY Kim, 2♀ (SSWU); Gyeongsan-si, Yeongnam Univ. 26.VII.1990, MS Jeong, 1♀ (SSWU); Pohang-si, Mt. Eoyusan, 9.VI.1979, Dept. Biology, 1♀ (SSWU); Wuljin-gun, Kiseong, 30.VII.1986, JG Han, 1♂ (SSWU); Yecheon, 1-14.VIII.1989, CH Park, 1♀ (SSWU); Yeongcheon, 1.VIII.1966, ES Lee, 1♂ (ENHM); Yeongdeok-gun, Mt. Naeyeonsan, Temple Bokyeongsa, 12.VII.1978, SH Nam, 1♂ (SSWU); Yeongpung-gun, Jangsu-myeon, Kalsan-ri, 30.VII.1986, HS Kim, 1♀ (SSWU). **GG** Anyang-si, 6.VIII.1965, MJ Kim, 1♂ (ENHM); Gwangreung, 10.VII.1964, YJ Jeong, 1♀ (ENHM); Gwangju-si, Gwangju-dong, 15.VII.1993, YL Jo, 1♀ (SSWU); ditto, Eommi-ri, 18.IX.1981, YL Kim, 1♂ (SSWU); Incheon-si, Baekryeongdo, 25.VII.1987, HJ Yu, 1♀ (SSWU); Namyangju-si, Sudong-myeon, Ipseok-ri, 3.X.1968, BJ Go, 1♂ (ENHM); ditto, Mt. Achasan, Uminae, 30.VIII.2005, IS Yu, 1♀ (SSWU). Seoul: Gangbuk-gu, Suwu-dong, 28.VI.1970, HJ Lee, 1♂ (ENHM); ditto, Ui-dong, 10.VIII.1965, KH Lee, 1♂ (ENHM); Gangdong-gu, Sangil-dong, 29.VII.1995, BH Kim, 1♂ (SSWU); Gangnam-gu, Mt. Cheongyesan, 12.VIII.1987, JH Lee, 1♂ (SSWU); Mapo-gu, Moraenae, 10.IV.1966, EH

Kim, 1♀ (ENHM); Seodaemun-gu, Ehwa Woman's Univ., 15.VII.1997, SJ Yun, 3♂ (ENHM); Yangcheon-gu, Sinjeong-dong, 15.VIII.1996, JE Baek, 1♂ (SSWU); Paju-si, Seolma-ri, 18.VIII.1984, MJ Kim, 1♂ (SSWU); Pyeongtaek-si, 9.IX.1954, KS Choe, 1♂ (ENHM); Seongnam-si, Namghansanseong, 20.VIII.1968, HS Lee, 1♀ (ENHM). Yangpyeong-gun, Yongcheon, Mt. Yongmunsan, 25.VIII.1998, SY Kim, 5♂2♀ (SSWU). **GN** Changwon-si, 15.VIII.1988, SD Yeo, 1♀ (SSWU). **GW** Cheolwon-gun, Mt. Myeongseongsan, 12.VIII.1999, JI Kim, 1♂ (SSWU); Donghae-si, Temple Samhwasa, 25.VIII.1997, JI Kim et al., 1♂ (SSWU); Gangreung-si, Gyeongpodae, 22.VII.1997, YJ Choe, 2♂ (SSWU); ditto, Jukheon-dong, 22.VII.1997, YJ Choe, 1♂ (SSWU); Inje-gun, Mt. Bangtaesan, 15.VIII.1995, JI Kim, 1♂ (SSWU); ditto, Jogyeong-dong, 24-26.VII.2000, SY Kim & AY Kim, 1♂ (SSWU); Mt. Sobaeksan, 29.VII.1983, SJ Yoon, 1♂ (ENHM); ditto, 17.VIII.1992, L. Ronkay & A. Vojnits, 1♂ (SSWU); Wonju-si, Mt. Chiaksan, 15.VIII.1999, TW Kim, 1♀ (SSWU). **JB** Buan-gun, Naebyeonsan, 5.VIII.1992, JM Park, 1♂ (SSWU); Jeongeup, Mt. Naejangsan, 19.VII.1998, TM Han, 1♂1♀ (SSWU); Namwon-gun, 18.VIII.1991, DG Park, 1♂ (SSWU). **JN** Gwangyang-si, Mt. Baekunsan, 10.VIII.1993, SY Kim, 1♂ (SSWU); Yeocheon-gun, Nam-myeon, Yeondo, 20.VII.1993, DS Gu et al., 3♂ (SSWU).

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

Sophrops striata (Brenske) 황갈색줄풍뎅이

(Pl. II. Fig. II-3: C. D; Pl. III. Fig. III-2: E)

Brahmina striata Brenske, 1892a: 112.

Korean records. *Sophrops striata*: Niijima and Kinoshita, 1927: 24; Maruta, 1929: 368; Murayama, 1935: 4; 1937: 34; 1954: 99; Miwa and Chûjô, 1939: 67; Cho, 1957: 299; 1969: 672 (황갈색줄풍뎅이); KZS, 1968: 137; Kim and Kim, 1972b: 197; 1974: 108; Kim et al., 1975: 242; 1985: 105; Kim, 1978: 341; Shin, 1979: 144; Stebnicka, 1980: 265; Kim, 1981: 344; 1993: 62; Kim and Nam, 1982a: 155; 1982b: 276; 1984a: 103; 1984b: 328; Kim and Chang, 1987: 104; Yoon et al., 1990: 110; Kim and Lee, 1991a: 66; ESK and KSAE, 1994: 150; Kim and Kim, 1996: 127; 1998: 170; Kim and Lee, 1997: 233; Kim, 2000a: 132; 2001: 32; Kim et al, 2002: 120; Löbl and Smetana, 2006: 227.

Description. Body length 10.8-13.6mm; Width 5-6.7mm; Club-footstalk ratio 1-1.17 (♂), 0.57-0.8 (♀); Pronotum ratio 0.57-0.6; Pronotum-elytra ratio 0.28-0.3; Metafemur ratio 0.23-0.26 (♂), 0.32-0.37 (♀); Metatibia ratio 0.11-0.13; Pygidium ratio 0.63-0.69.

Body cylindrical, yellowish brown to dark brown, surface glabrous without pubescence.

Head reddish brown to dark brown, densely punctate. Clypeus severely concave at the anterior margin, shorter than frons and rounded laterally. Frontoclypeal suture distinct. Frons slightly convex. Eye to interocular space ratio 0.69-0.78. Ocular canthus thin with setae. Antenna 10-segmented; club composed last three segments, same or little longer than remaining segments combined in male, shorter than remaining segments combined in female. Labrum narrow, strongly depressed in the middle. Last maxillary palp sesame shaped,

as long as remaining segment, with few seta.

Pronotum feebly convex, punctured, lateral margin somewhat arched with carina and setae. Pronotal anterior angles acute, posterior angles obtuse. Scutellum linguiform, flat with fine punctation scattered on.

Elytra with very vague costae, densely punctated, lateral margin with few setae.

Ventral side shinny. Proepisternal punctures bearing long brown hairs. Prosternum punctated on the sides. Sixth abdominal sternites visible with punctation and pubescence. Penultimate sternite of abdomen with a pruinose patch at each side. Pygidium convex in male, somewhat flat in female, punctate with a low of setae on the ventral boarder.

Legs long and slender. Interval of metatrochanter narrower than the width of mesofemur. Protibia tridentate, with punctures, anterior tarsal claws cleft at apex, symmetrical in both sexes. Basal joint of hind tarsi shorter than second one. Meso- and metatibiae with dorsal spurs. Spur adjacent to metatarsus as long as first tarsi. Aedeagus: Pl. III. Fig. III-2: E.

Specimen Examined. **CB** Cheongju-si, 16.VI.1970, HS Jeong, 1♂ (ENHM); Goesan-gun, Hwayang-ri, 25-26.V.1996, JI Kim, 2♂2♀ (SSWU); Okcheon-gun, 8.VI.1969, BS Yuk, 1♀ (ENHM). **CN** Daejeon-si, Sinsong-dong, 6.III.1994, SR An, 1♂ (NSM); ditto, Mt. Daedunsan, 4.IV.1997, KJ Choe, 1♂ (SSWU); Seosan-si, 31.V.1997, SH Lee, 1♀ (SSWU); ditto, Mt. Gayasan, 6.VI.1997, KJ Yeom, 1♂ (SSWU);

Yesan-gun, 20.VII.1964, SJ Jeong, 1♀ (ENHM). **GB** Cheongdo-gun, Temple Unmunsa, 23-24.V.1987, YM Hong et al., 7♂ (SSWU); Daegu-si, Dong-gu, Temple Donghwasa, 30.V.1986, ML Koo, 1♀ (SSWU); Gyeongsan-si, Yeongnam Univ. 23.VI.1987, HS Yang, 1♂ (SSWU); ditto, 16.V.1990, CH Kil, 1♀ (SSWU); ditto, 21.V.1990, MH Lee, 1♂ (SSWU); ditto, 15.V.1991, OS Kim et al., 3♂ (SSWU); Kimcheon-si, Daesin-dong, 30.IV.1972, IW Han, 1♂ (ENHM); Munkyeong-si, Mt. Juheulsan, Sangcho-ri, 23.V.1997, JI Kim, 1♂1♀ (SSWU); ditto, Munkyeongsaejae, 26.V.1996, HY Lee et al., 3♂2♀ (SSWU); Mt. Taehaengsan, Dalkipokpo, 24.VI.1988, JH Kim, 1♀ (SSWU); Uljin-gun, Mt. Baekamsan, 28.V.1999, JH Kim, 1♂ (SSWU); Yongyang-gun, Mt. Ilwolsan, 20.VI.1997, YB Cho, 1♀ (SSWU). **GG** Anyang-si, 21.V.1961, YS Lee, 1♂ (ENHM); Gwanaksumokwon, 24.V.1987, KJ Oh, 1♂ (ENHM); ditto, 21.V.1991, YH Son et al., 2♂ (SSWU); ditto, 25.V.1996, SJ Baek, 1♂ (SSWU); Bucheon-si, Mt. Seongjusan, 6.VI.1994, SJ Kim, 1♀ (SSWU); Dongducheon-si, 7.VI.1976, HS Go, 1♀ (ENHM); Euijeongbu-si, Gosan-dong, 10.V.1992, EA Choe, 1♂ (SSWU); Ganghwa-gun, Mt. Marisan, 15.V.1983, EJ Kim, 1♀ (ENHM); ditto, 6.VI.1985, EY Kim, 1♀ (ENHM); ditto, Temple Jeondeungsa, 2.VI.1984, MY Yun, 1♂ (ENHM); Gapyeong-gun, Daeseong-ri, 7.VI.1975, YH Kim, 1♂ (ENHM); ditto, 10-12.V.1990, KH Jeong et al., 3♂1♀ (SSWU); ditto, 16.V.1992, HH Park, 1♂ (SSWU); ditto, 4.VI.2000, AY Kim, 1♂ (SSWU); ditto, Mt. Godongsan, 27.V.1978, SW Hong et al., 1♂1♀ (ENHM); ditto, 2.V.1981, HH Jeong, 1♂ (ENHM); ditto, Mt, Myeongjisan, 29.V.1993, KH Kwon, 1♂ (SSWU); ditto, Saeteo,

16-17.V.1984, MY Yun et al., 1♂2♀ (ENHM); ditto, 12.V.1985, WS Jeong, 1♀ (ENHM); ditto, Seorak-myeon, Mt. Hwayasan, 6.V.1988, MK Lee et al., 2♀ (ENHM); ditto, 3.VI.1993, SJ Go & EH Kim, 1♀ (ENHM); Goyang-si, Byeokje, 2.V.1971, SN Choe, 1♂ (SSWU); ditto, 19.V.1973, HY Kim, 1♂ (ENHM); ditto, 30.V.1987, YM Lee, 1♀ (SSWU); ditto, 27.V.1989, JJ Mun, 1♂ (SSWU); ditto, Hyoja-dong, 26.IV.1987, YH Lee, 1♂ (SSWU); ditto, Jangheung-myeon, 8.VIII.1993, KR Kwon, 1♂ (SSWU); ditto, Haengjusanseong, 24.V.1987, YM Lee, 1♂ (SSWU); Gwacheon-si, 2.VI.1978, JH Park, 1♂ (SSWU); Gwangreung, 16.VI.1956, JS Im, 1♂ (ENHM); ditto, 26.V.1962, SK Jeong, 1♂ (ENHM); ditto, 27.IV.1963, CH Im, 1♂ (ENHM); ditto, 2.V.1964, HE Kim, 1♂ (ENHM); ditto, 15.V.1965, KS Kim et al., 1♂3♀ (ENHM); ditto, 23.V.1965, CJ Park, 1♀ (ENHM); ditto, 12.VI.1965, SS Hwang, 1♀ (ENHM); ditto, 29.V.1966, MJ Kim, 1♀ (ENHM); ditto, 8.VI.1966, MJ Lee, 1♂ (ENHM); ditto, 8.VI.1968, SL Jang, 1♂ (ENHM); ditto, 17.VI.1976, YH Choe, 1♀ (ENHM); ditto, 11.VI.1977, OH Yun, 1♀ (SSWU); ditto, 29.V.1983, SH Park et al., 1♂1♀ (SSWU); ditto, 27.V.1985, YK Hwang, 1♂ (ENHM); ditto, 30.IV.1989, JH Jeong, 1♂ (SSWU); ditto, 28.V.1989, NR Kim, 1♂ (SSWU); ditto, 26.V.1990, JE Sin, 1♀ (SSWU); ditto, 12.V.1991, HW Song, 1♀ (SSWU); Icheon-si, 6.V.1978, HS Kim, 1♂ (ENHM); ditto, Janghowon, 14.VI.1999, SJ Yun, 1♂2♀ (ENHM); Incheon-si, Dong-gu, Manseok-dong, Jakyakdo, 30.V.1964, SJ Kang, 1♂ (ENHM); Namyangju-si, Geumgok-dong, 6.V.1985, JS Ryu, 1♂ (ENHM); ditto, Sudong-myeon, Bigeumgyegok, 27.V.1984, HJ Lee, 1♀ (ENHM); ditto, 7.VI.1984, MK Chae, 1♂ (ENHM); ditto, Mt. Cheonmasan, 28.V.1962, JS Park, 1♀ (SSWU); ditto,

12.VI.1965, SH Lee et al., 2♂1♀ (ENHM); ditto, 3.VI.1972, SM Lee, 1♂ (SSWU); ditto, 15.VI.1974, WH Jeong, 1♂ (ENHM); ditto, 22.V.1982, YH Choe, 1♀ (SSWU); ditto, 12.VI.1982, Dept. Biology, 1♀ (SSWU); ditto, 4.V.1984, NC Kim et al., 1♂1♀ (ENHM); ditto, 12.V.1984, MK Ji, 1♂ (ENHM); ditto, 2.VI.1984, MK An, 1♀ (SSWU); ditto, 10.VI.1984, HJ An, 1♂ (SSWU); ditto, 21.V.1985, ES Lee, 1♂ (ENHM); ditto, 9.V.1987, HS Lee et al., 2♂ (ENHM); ditto, 27.V.1989, JH Wu, 1♂ (ENHM); ditto, 26.V.1990, JK Jeong, 1♂ (ENHM); ditto, Paldang-ri, 16.V.1970, MH Kim, 1♂ (ENHM); ditto, 9.VI.1984, JE Park, 1♂ (ENHM); ditto, Pyeongnae-dong, 12.VI.1971, JW Seo, 1♀ (ENHM); ditto, 4.V.1984, IS Yang, 1♀ (ENHM); ditto, Maseok, 26.V.1989, HS Jo, 1♂ (SSWU); ditto, Sudong-myeon, Naebang-ri, 13.VI.1980, HK Park, 1♂ (SSWU); Seoul: 28.IV.1955, SH Seo, 1♂ (ENHM); ditto: 4.V.1955, BS Kim, 1♂ (ENHM); ditto: 16.V.1955, BJ Kim, 1♂ (ENHM); ditto: 16.VI.1955, YS Lee, 1♀ (ENHM); ditto: 17.V.1956, GS Lee, 2♂ (ENHM); ditto: Dobong-gu, Mt. Dobongsan, 16.V.1962, KJ Mun, 1♂ (ENHM); ditto, 15.VI.1979, JS Park, 1♂ (SSWU); ditto, 22.V.1981, MY Eom et al., 3♂ (SSWU); ditto, 29.V.1982, Y Kim, 2♂ (SSWU); ditto, 25.IV.1987, HJ Kim, 1♀ (SSWU); ditto, 28.V.1987, JY Kang, 1♂ (SSWU); ditto, 28.V.1989, HS Jo, 3♂ (SSWU); ditto, 15.V.1992, KY Kim et al., 2♂ (SSWU); ditto, 29.V.1993, HJ Kim, 1♂ (SSWU); ditto, 30.V.1999, YJ Jo, 1♀ (SSWU); ditto, Mt. Suraksan, 6.VI.1981, HS Jeong, 1♀ (SSWU); ditto, Chang-dong, 14.V.1966, YJ Song, 1♂ (ENHM); ditto, Ui-dong, 1.VI.1996, HJ Hong, 2♂ (SSWU); ditto, Wolgye-dong, 25.V.1985, MN Park, 1♀ (SSWU); Dongjak-gu, Sangdo-dong, 26.V.1992, HJ Choe, 1♂ (SSWU);

Eunpyeong-gu, Galhyeon-dong, 19.V.1988, EJ Park, 1♂ (SSWU); ditto, Gupabal, 6.V.1961, ID Choe, 1♀ (ENHM); ditto, Nokbeon-dong, 10.VIII.1990, HJ Park, 1♂ (SSWU); ditto, Mt. Baekryeongsan, 9.VIII.1996, HJ Han, 1♀ (SSWU); ditto, Jingwanoe-dong Temple Jingwansa, 6.V.1961, JJ Seo, 1♂ (ENHM); Gangbuk-gu, Suyu-dong, 20.V.1984, IS Yang, 1♀ (ENHM); ditto, Ui-dong, 11.V.1963, OJ Oh, 1♀ (ENHM); Gangdong-gu, Godeok-dong, 10.V.1987, SY Choe, 1♀ (SSWU); Gangnam-gu, Wonji-dong, 1.VI.1985, KS Jang et al., 1♂2♀ (SSWU); ditto, Mt. Cheongyesan, 24.V.1986, UO Jeong et al., 2♀ (SSWU); ; ditto, Heoninreung, 20.IV.1985, SY Jo et al., 2♂ (SSWU); ditto, Mt. Daemosan, 19.V.1990, JE Lee, 1♂ (ENHM); ditto, 5.VI.1991, KI Bae, 1♀ (ENHM); ditto, Mt. Umyeonsan, 15.V.1988, YS Lee, 1♂ (SSWU); Gangseo-gu, Deungchon-dong, 5.VI.1981, HH Jeong, 1♀ (ENHM); Gwanak-gu, Mt. Gwanaksan, 5.VI.1965, JS Byeon, 1♀ (ENHM); ditto, 6.VI.1982, HH Sin, 1♀ (SSWU); ditto, 4.VI.1987, IS Lee, 1♂ (ENHM); ditto, 3.VI.1989, HJ Hwang, 1♀ (ENHM); ditto, 12.V.1990, YS Lee, 1♂ (SSWU); ditto, 10.V.1992, SJ Park et al., 1♂1♀ (SSWU); ditto, Sinrim-dong, 1.V.1990, EJ Jo, 1♀ (SSWU); Gwangjin-gu, Gwangjang-dong, Warkerhill, 15.V.1966, OH Kim, 1♀ (ENHM); Jongro-gu, Muak-dong, Mt. Inwangsan, 13.V.1961, KJ Kim, 1♀ (ENHM); Jungrang-gu, Sangbong-dong, 15.V.1966, MR Park, 1♂ (ENHM); Mapo-gu, Mapo, 20.V.1956, YS Kang, 1♂ (ENHM); Nowon-gu, Gongreung-dong, Taereung, 19.IV.1962, KJ Kim, 1♂ (ENHM); ditto, 12.V.1962, SS Choe, 1♀ (ENHM); Seocho-gu, Mt. Cheongyesan, 28.V.1989, MJ Sim, 1♀ (SSWU); ditto, 18.V.1991, MR Park et al., 3♂

(SSWU); ditto, 31.V.1992, KM Ham, 1♂ (SSWU); ditto, 23.V.1998, SK Oh, 1♂ (SSWU); ditto, Ilwon-dong, Mt. Daemosan, 19.V.1996, MJ Kang, 1♂ (SSWU); Seodaemun-gu, Bongwon-dong, Mt. Ansan, Temple Bongwonsa, 10.VI.1961, MS Park, 1♂ (ENHM); ditto, Yonsei Univ. 5.VI.1974, HW Lee, 1♂ (ENHM); ditto, Yeonhi-dong, 28.IV.1955, JS Ryu, 1♂ (ENHM); ditto, Ehwa Woman's Univ., 19.V.1955, YH Yun, 1♂1♀ (ENHM); ditto, 25.IV.1964, JM Bae, 1♂ (ENHM); ditto, 6.V.1966, JH Lee, 1♀ (ENHM); ditto, 20.VI.1966, JJ Kim, 1♀ (ENHM); ditto, 13.VI.1969, JH Sim, 1♂ (ENHM); ditto, 5.VI.1970, SO Kim, 1♀ (ENHM); ditto, 12.V.1973, BH Yeom, 1♂ (ENHM); ditto, 27.V.1974, YH Kim, 1♀ (ENHM); ditto, 23.V.1976, MH Song, 1♂ (ENHM); ditto, 4.VI.1976, ditto, 1♂ (ENHM); ditto, 11.V.1983, YH Kim, 1♂ (ENHM); ditto, 10.V.1984, YM Kim, 1♀ (ENHM); ditto, 14.V.1984, EM Kim, 1♂ (ENHM); ditto, 17.V.1985, YN Kim, 1♂ (ENHM); ditto, 14.V.1987, JY Lee, 1♂ (ENHM); ditto, Hongeun-dong, 12.VI.1961, SJ Kim, 1♂ (ENHM); Seongbuk-gu, Sungshin Women's Univ., 20.V.1994, SH Kim, 1♀ (SSWU); ditto, Anam-dong, 24.V.1982, HS Kim, 2♂ (SSWU); ditto, Jeongreung, 23.V.1959, YS Lee, 1♀ (ENHM); ditto, 27.VI.1959, KE Sin, 1♂ (ENHM); ditto, 11.V.1963, SH Jo, 1♀ (ENHM); ditto, Mt. Bukhansan, 21.V.1989, CW Seo, 1♂ (ENHM); Songpa-gu, Bangi-dong, Olympic park, 29.V.2005, BH Jeong, 1♂ (SSWU); ditto, Oryun-dong, 27.V.1992, YH Kim, 1♂ (SSWU); ditto, Munjeong-dong, 11.VI.1987, YR Lee, 1♂ (SSWU); Yeongdeungpo-gu, Yeongdeungpo, 1.V.1963, DU Choe, 1♂ (ENHM); Paju-si, Temple Bogwangsa, 18.VI.1972, SH Choe, 2♂ (ENHM); Pocheon-si, Gwangreung, 9.V.1987, HW Yun et al., 2♀ (SSWU);

Pyeongtaek-si, Hyeondeok, Daean 4-ri, 16.V.1999, TM Han, 1♀ (SSWU); Seongnam-si, 1.VI.1999, HS Seong, 1♂ (SSWU); ditto, Bundang-gu, Imae-dong, 8.VI.1993, SY Kim, 1♂ (SSWU); ditto, Changgok, 30.V.1992, SM Choe, 1♂ (SSWU); ditto, Namhansanseong, 2.VI.1975, KS Jo, 1♂ (ENHM); ditto, 20.V.1988, JH Kang, 1♂ (SSWU); ditto, 26.V.1995, EY Kim, 1♀ (SSWU); ditto, 6.VI.1996, KH Jo, 1♂ (SSWU); ditto, 18.V.1997, JH Lee, 1♂ (SSWU); ditto, 22.V.1998, YJ Sin, 1♂ (SSWU); ditto, 3.VI.2000, YA Kang, 1♂ (SSWU); Suwon-si, 21.VI.1955, Lee, 1♀ (SNU); ditto, 29.IV.1957, WH Baek, 1♂ (SNU); ditto, 25.VI.1960, WH Baek, 1♂ (SNU); ditto, Agri. Seoul. Nat. Univ., 29.V.1996, JY Kim, 2♂1♀ (SSWU); ditto, 29.V.1999, YJ Lee, 1♂ (SSWU); ditto, seonggyungwan Univ., 10.V.1996, JH Lee, 1♂1♀ (SSWU); ditto, Yuljeon, 15.V.1983, KS Jeon, 1♂ (ENHM); ditto, 2.VI.1983, JO Yun, 2♀ (ENHM); ditto, Mt. Paldalsan, 18.V.1978, CJ Cha, 1♂ (ENHM); Yangju-si, Temple Bogwangsa, 9.V.1999, HW Sin, 1♂ (SSWU); ditto, Jangheung-myeon, 30.V.1992, MY Park, 2♂1♀ (SSWU); ditto, Ilyeong, 10.VI.1973, JS Oh, 1♀ (ENHM); ditto, 19.V.1984, BH Jo, 1♂ (ENHM); ditto, 7.VI.1984, SS Han, 1♂ (ENHM); ditto, 21.V.1987, YK Kim, 1♀ (ENHM); ditto, Songchu, 5.VI.1971, SE Kim, 1♂ (ENHM); Yangpyeong-gun, Mt. Yongmunsan, 19.V.1979, OH Lee, 1♂1♀ (SSWU); Yeoncheon-gun, Mt. Mangoksan, 30.V.1999, YS Im, 1♂ (SSWU); Yongin-si, Yongin-eup, 27.V.1989, EJ Jang, 1♀ (SSWU). **GN** Changryeong-gun, Mt. Yongsan, 28.VI.1987, HW Yun, 1♀ (SSWU); Geojaedo, 23.VI.1964, JM Bae, 1♂ (ENHM); Temple Naewonsa, 27.V.1989, SH Jeon, 10♂2♀ (SSWU). **GW** Bukpyeong, Temple Samhwa,

26.VI.1984, MJ Kim, 1♂ (SSWU); Chuncheon-si, Nam-myeon, Gangchon-ri, 30.V.1989, JH Wu, 1♂ (ENHM); ditto, 10.V.1997, DW Jeong, 1♀ (SSWU); ditto, Temple Cheongpyeongsa, 8.VI.1983, KS Choe, 1♀ (ENHM); ditto, Hupyeong-dong, Hanrim Univ., 18.V.2003, JG Lee, 1♀ (SSWU); Donghae-si, Bukpyeong-dong, 23.V.1965, SJ Eun, 1♀ (ENHM); Gangreung-si, Yeongok-myeon, Samsan-ri, Buyeongyegok, 18.VI.2001, AY Kim, 1♀ (SSWU); Goseong-gun, 1.VI.1990, SJ Lee, 3♂ (ENHM); Honcheon-gun, Mt. Odaesan, Bangadariyaksu, 22.VI.2005, TW Kim, 1♀ (SSWU); ditto, Seoseok-myeon, 22.V.1999, MK Ham, 1♂ (SSWU); Inje-gun, Mt. Seoraksan, 10.V.1990, JY Choe, 1♂ (ENHM); ditto, Mt. Bangtaesan, Sangnam-ri, 23.VI.1996, JI Kim, 1♂ (SSWU); ditto, Buk-myeon, Jinburyeong, 13.VIII.1979, BJ No, 1♂ (ENHM); Pyeongchang-gun, Gapyeong, 5.VI.1985, ER Kim, 1♂ (SSWU); ditto, Doam-myeon, Yongsan, 29.VI.1985, ER Lee, 1♂ (SSWU); Samcheok-si, 1.VI.1990, HK Park, 1♂ (ENHM); Wonju-si, 30.IV.1966, HS Kim, 1♀ (ENHM); ditto, Mt. Chiak, 1-3.VI.1979, SJ Yun, 1♂3♀ (ENHM). **JB** Gochang-gun, Mt. Seonwunsan, 21.V.1992, JM Park, 1♂ (SSWU); Jeongeup-si, Mt. Naejangsan, 24-26.V.1994, HS Choe et al., 6♂ (SSWU); Jeonju-si, Wanju-gun, Gosan-myeon, 10.VIII.2000, YW Choe, 1♀ (SSWU); Muju-gun, Samgong-ri, 24.V.1993, HK Hong, 1♀ (SSWU); Mt. Wunjangsan, 5.V.1998, SR An, 1♂ (NSM). **JN** Gurye-gun, Temple Hwaeomsa, 6.VIII.1959, HK Kim, 1♀ (ENHM); ditto, 22.VI.1987, SR Lee, 1♂ (SSWU); Jangseong-gun, Temple Baekyangsa, 27.V.1994, ?, 1♂ (SSWU); ditto, 24-26.V.1994, JM Park et al., 6♂8♀ (SSWU); Muan-gun, Cheongye-myeon, 26.V.1973, MH Jo, 1♀ (ENHM); Mt. Jirisan, Piagol,

23.VI.1987, SJ Ban, 1♂ (SSWU); ditto, 21.V.1999, TM Han, 1♂ (SSWU); Seungju-gun, Temple Seonamsa, 22.VI.1987, SR Lee, 1♀ (SSWU); Sunchang-gun, Mt. Naejangsan, 26.V.1994, SH Lee, 1♂ (SSWU); Yeongam, Mt. Wolchulsan, 25.IV.1999, HJ Oh, 1♂ (SSWU); Wando, 24.V.1981, JJ Lee, 1♂ (ENHM).

Distribution. China, Korea,

Genus *Brahmina* C.E. Blanchard 홍다색풍뎅이속

Brahmina C.E. Blanchard, 1851: 140

Rhizocolax Motschulsky, 1860b: 130

Type species: *Melolontha cylindrica* Gyllenhal, 1817: 174

Diagnosis. Right reddish brown to dark reddish brown. The hole body are planted with hairs. Anterior margin of clypeus concave and elevated. Frontoclypeal suture distinct.. Antennae 10-segmented, last three segments are lamellated. Pronotum wide (Murayama 1954).

Remarks. This genus charaterized between *Holotrichia* and *Sophrops*. They distribute mainly oriental region, especially upper part of Asia (Murayama 1954). In this genus, five species have been reported, but one species is examined in this study. *B. crenicollis* and *B. excissiceps* are excluded from the key of this genus, because there is no specimen examined, nor their original descriptions are insufficient to compare with other species.

Key to the species of *Brahmina* of Korea

1. Size under 15mm in length, 7mm in width. Scutellum with long erect hair ····· *B. rubetra faldermanni*

- Size over 15mm in length, 7mm in width. Scutellum with short laid hair ····· 2

2. Antennal club as long as 1-6 segments; Lateral margin of pronotum with strong and wide teeth. Scutellum wide triangular ····· *B. darcis*

- Antennal club as long as 1-5 segments. Lateral margin of pronotum with fine teeth. Scutellum almost equilateral triangle ····· *B. sedakovii*

Brahmina rubetra faldermanni (Murayama) 활더맨홍다색풍뎅이

(Pl. II. Fig. II-3: E; Pl. III. Fig. III-2: F)

Melolontha rubetra Faldermann, 1835: 376.

Brahmina faldermanni Kraatz, 1892: 309.

Korean records. *Brahmina rubetra faldermanni*: Murayama, 1954: 88; Cho, 1969: 670 (활더맨홍다색풍뎅이); Kim and Chang, 1987: 104; Kim, 1993: 62; 2001: 25.

Brahmina rubetra: Stebnicka, 1980: 264; ESK and KSAE, 1994: 150;

Brahmina (Brahminella) rubetra: Löbl and Smetana, 2006: 212.

Description. Body length 10.8-11.8mm; Body width 6.1-6.7mm; Club-footstalk ratio 0.56-0.68; Pronotum ratio 0.57-0.62; Pronotum-elytra ratio 0.36-0.4; Metafemur ratio 0.3-0.34; Metatibia ratio 0.16 (♂), 0.13-0.14 (♀); Pygidium ratio 0.7 (♂), 0.74-0.81 (♀).

Body oblong, wide at posterior, reddish brown to dark brown, surface glabrous and covered with long erect hairs.

Head small, densely punctuated with hairs. Clypeus rounded, anterior border reflexed. Frons with a distinct transverse upheaval. Frontoclypeal suture distinct. Eye to interocular space ratio 0.56-0.67. Antenna yellowish brown, 10-segmented, last three segments lamellated and shorter than remaining segments combined in both sexes.

Pronotum slightly convex, widest at the middle, with dense disciform punctures, front and posterior angles bluntly rounded, lateral margins bearing hairs carinated. Scutellum linguiform, with some punctures and hairs.

Elytra shinny, simple without costae, covered with coarse punctations and hairs, lateral margin with setaceous.

Ventral side reddish brown, glabrous, covered with fine yellowish brown hairs. Sixth abdominal sternites visible, each sternite covered with fine short hairs. Pygidium slightly convexed, covered with fine punctures and hairs.

Legs slender, punctured, and setaceous. Protibia tridentate in both sexes. Tarsal claws symmetrical in both sexes. Mesotibia and metatibia dentated toward outside. Aegeagus: Pl. III. Fig. III-2: F.

Specimen Examined. GG Incheon-si, Ongjin-gun, Daecheongdo, 11-15.VI.1990, IY Han, 3 (SSWU); ditto, EJ Cho, 3 (SSWU). GW Chulwon-gun, Mt. Myeongseongsan, 12.VIII.1999, JI Kim, 2 (SSWU).

Distribution. China (North), Korea (North and South).

Brahmina darcis Reitter 다르키스홍다색풍뎅이

Brahmina darcisi Reitter, 1902: 180.

Korean records. *Brahmina darcisi*: Murayama, 1941c: 77; 1954: 95; Cho, 1969: 671 (다르키스홍다색풍뎅이); Stebnicka, 1980: 207; ESK and KSAE, 1994: 150; Kim, 2001: 26.

Brahmina (Brahmina) darcisi: Löbl and Smetana, 2006: 211.

Description. Body length 16-17.5mm; Body width 8-9mm.

Body oblong, wide at posterior, dark brown, surface glabrous and covered with hairs.

Head small, densely punctuated with hairs. Clypeus rounded, anterior border reflexed. Frons with a distinct transverse upheaval. Frontoclypeal suture distinct. Antenna reddish brown, 10-segmented, last 3 segments lamellated and as long as 1-6 segments.

Pronotum slightly convex, widest at the middle, with dense disciform punctures, front and posterior angles bluntly rounded, lateral margins bearing hairs strongly carinated. Scutellum wide triangular, with short laid hair.

Elytra shinny, simple without costae, covered with coarse punctations and hairs, lateral margin with setaceous.

Ventral side reddish brown, glabrous, covered with fine yellowish brown hairs. Sixth abdominal sternites visible, each sternite covered with fine short hairs. Pygidium convexed in the middle, covered with fine punctures and hairs.

Legs slender, punctured, and setaceous. Protibia tridentate in both sexes. Tarsal claws symmetrical in both sexes. Mesotibia and

metatibia dentated toward outside.

Specimen Examined. none.

Remark. Murayama (1941c) described this species with five individuals from Manchuria (1♂4♀) and one individual from North Korea (1♂). The specimen from North Korea, however, is female, so it is possible to confuse with females of other species. The rest records of Korean distribution are all citation of Murayama (1941c). It is also possible of the same species with *B. sedakovii* , but there is no evidence related. The description in this study is according to Murayama (1941c).

Distribution. China, Korea.

Brahmina sedakovii Mannerheim 북방홍다색풍뎅이

Rhizotrogus sedakovii Mannerheim, 1849: 237.

Rhizotrogus intermedia Mannerheim, 1849: 238.

Korean records. *Brahmina intermedia*: Reitter, 1902: 180; Murayama, 1941c: 77; 1954: 90; Cho, 1957: 299; 1969: 670; KZS, 1968: 137 (북방홍다색풍뎅이); Stebnicka, 1980: 207; ESK & KSAE, 1994: 150; Kim, 2001: 27.

Brahmina intermedia sibirica: Niijima and Kinoshita, 1923: 55; Murayama, 1935: 4; 1937: 35; Miwa and Chûjô, 1939: 66.

Description. Body length 15-17mm; Body width 7-9mm.

Body oblong, wide at posterior, reddish brown, surface glabrous and covered with hairs.

Head small, densely punctuated with hairs. Clypeus rounded,

anterior border reflexed. Frons with a distinct transverse upheaval. Frontoclypeal suture distinct. Antenna reddish brown, 10-segmented, last 3 segments lamellated and as long as 1-5 segments.

Pronotum slightly convex, widest at the middle, with dense disciform punctures, front and posterior angles bluntly rounded, lateral margins bearing hairs finely carinated. Scutellum almost equilateral triangle, with short laid hair.

Elytra shinny, simple without costae, covered with coarse punctations and hairs, lateral margin with setaceous.

Ventral side reddish brown, glabrous, covered with fine yellowish brown hairs. Six abdominal sternites visible, each sternite covered with fine short hairs. Pygidium convexed in the middle, covered with fine punctures and hairs.

Legs slender, punctured, and setaceous. Protibia tridentate in both sexes. Tarsal claws symmetrical in both sexes. Mesotibia and metatibia dentated toward outside.

Specimen Examined. none.

Distribution. Korea, Manchuria, Mongolia, Siberia, Russia (Far east).

Remark. Reitter (1902) reported Korean distribution of *Brahmina intermedia* (Mannerheim), and Murayama (1941c; 1954) described with North Korean specimens (2♂). *Brahmina intermedia* (Mannerheim) was synonymized with *Brahmina sedakovii* Mannerheim (Löbl and Smetana, 2006). This species is larger than *B. rubetra faldermanni,* but similar to *B. darcis* in size and male aedeagus. I couldn't examine any Korean specimen in this study, but it should be added in the list because of

the possibility of North Korean distribution.

Brahmina crenicollis (Motschulsky) 본방홍다색풍뎅이

Ancylonycha crenicollis Motschulsky, 1854b: 64.

Korean records. *Brahmina crenicollis*: Reitter, 1902: 181; Niijima and Kinoshita, 1923: 55; Kato, 1935: 115; Miwa and Chûjô, 1939: 66; Murayama, 1941c: 78; 1954: 97; Cho, 1957: 299; 1969: 671 (본방홍다색풍뎅이); KZS, 1968: 137; Stebnicka, 1980: 207; ESK and KSAE, 1994: 150; Kim, 2001: 26.

Brahmina crinicollis: Löbl and Smetana, 2006: 212.

Specimen Examined. none.

Distribution. China, Russia (Far East).

Remark. There is only one Korean record by Reitter (1902), and all records after his are citations. Most of 'Reitter Collection' deposited in Hungarian Natural Histroy Museum, however, I couldn't find. Murayama (1954) described the adult and show the male aedeagus by Manchurian specimen, but he had never seen Korean sample. Reitter recorded 'Korea' without detail collection site. According to Murayama (1954), This species is very similar to *B. darcis* in shape (except the size) and distribution. Because there are many overlapping record in Reitter (1902), it could be possible to misidentify this species as *B. darcis*.

Brahmina excissiceps Moser 홍다색풍뎅이

Brahmina excisiceps Moser, 1915a: 137 (Korea, Seoul).

Korean records. *Brahmina excisiceps*: Niijima and Kinoshita, 1923: 55; 1927: 22; Kato, 1935: 115; Miwa and Chûjô, 1939: 66; Cho, 1957: 299; KZS, 1968: 137 (홍다색풍뎅이); Stebnicka, 1980: 208 (*excissiceps* Murayama); ESK and KSAE, 1994: 150; Kim, 2001: 27; Löbl and Smetana, 2006: 212.

Specimen Examined. none.

Distribution. China (Ho-chan), Korea.

Remark. The original description of Moser (1915) was written by the specimen from Seoul. He mentioned that this species also distributes in China. Nevertheless, I couldn't find any specimens from Korea. Niijima and Kinoshita (1923) cited Moser (1915), and recorded one specimen from Suwon. Yet it is possible to misidentify because their report included many errors. Murayama(1954) also couldn't see any sample, and he had had doubt about Korean distribution of this species. Stebnicka(1980) also cited ohters. Neither the original descripton of Moser is insufficient for identification, nor it is possible to misidentify as *Brahmina rubetra faldermanni*.

Genus *Bunbunius* Nomura 그물눈검정풍뎅이속(신칭)

Bunbunius Nomura, 1970: 65

Type species: *Holotrichia reticulata* Murayama, 1941a: 39

Diagnosis. Anterior margin of clypeus feebly emarginate in male, nearly straight in female. Head pubescent in male, pronotum, elytra and

abdomen bare, without pubescence. Pygidium moderately, uniformly convex in male, feebly in female. Abdomen not depressed in male, penultimate sternite with a pruinose patch at each side. Antennae 10-segmented, with club composed of three lamellae, as long as five to seven preceding joints combined in male. Claws cleft at apex in male, bearing a strong vertical tooth in female. Front tibiae tridentate in female, bidentate or bearing blunt, vague third tooth in male. Basal joint of hind tarsi shorter than 2nd one (Nomura 1970).

Bunbunius reticulatus Murayama 제주그물눈검정풍뎅이

(Pl. II. Fig. II-3: F, G; Pl. III. Fig. III-3: A)

Holotrichia reticulata Murayama, 1941a: 39 (Mt. Hallasan, Korea).

Korean records. *Holotrichia reticulata*: Murayama, 1954: 115; Cho, 1963: 218; 1969: 669; Cho et al., 1968: 264; KZS, 1968: 137; Stebnicka, 1980: 208; ESK and KSAE, 1994: 150 (제주그물눈검정풍뎅이); Kim, 2000a: 17; 2001: 43.

Holotrichia (Bunbunius) reticulata Nomura, 1970: 65.

Bunbunius retuculatus: Löbl and Smetana, 2006: 213.

Description. Body length 17.05-18.54mm; Body width 7.98-9.6mm; Club-footstalk ratio 0.88-0.89 (♂), 0.62-0.64 (♀); Pronotum ratio 0.61-0.66; Pronotum-elytra ratio 0.31-0.35; Metafemur ratio 0.24-0.25 (♂), 0.31-0.32 (♀); Metatibia ratio 0.15-0.16; Pygidium ratio 0.71-0.83.

Body flat compared with other Melolonthid beetles, reddish brown.

Head small, with dense punctation. Anterior margin of clypeus feebly emarginate in male, nearly straight in female. Frontoclypeal suture distinctly impressed. Eye to interocular space ratio 0.64-0.67. Antennae 10-segmented, last three segments lamellated as long as five to seven preceding joints combined in male. Last segment of maxillary palp widened at apex.

Pronotum densely punctate like head, anterior and posterior angles bluntly rounded, lateral margin setaceous. Scutellum almost triangular, with puntation same as that of head and pronotum.

Elytra glabrous with four vague costae, punctures scattered, lateral margin without setaceous.

Ventral side of abdomen yellowish brown. First and fifth sternite distinct, second to fourth sternites vague in the middle. Penultimate sternite of abdomen with a pruinose patch at each side. Pygidium moderately, uniformly convex in male, feebly in female.

Legs long and slender, especially the fore legs of male. Pro and mesotrochanter adjacent, metatrochanter separated almost as wide as mesofemur. Claws cleft at apex in male, bearing a strong vertical tooth in female. Front tibiae tridentate in female, bidentate or bearing blunt, vague third tooth in male. Basal joint of hind tarsi shorter than second one. Aedeagus: Pl. III. Fig. III-3: A.

Specimen Examined. **GB** Wulreung-gun, 6.VI.1985, WH Baek, 1♀ (SSWU). **JJ** Jeju, 17-20.V.1990, SH Jeon, 5♂ (SSWU); ditto, 27.V.1983, JH Park, 1♂ ENHM); Mt. Hanrasan, 27.V.1984, YJ Kwon, 1♀ (SSWU); ditto, yeongsil, 27.IV.1994, SL Ahn, 5♂ (NSM); Namjeju-gun,

Seongsan-eup, 6.V.1997, YE Kim, 1♀ (SSWU); Seogyuipo-si, 10.IV.1986, ?, 1♂ (SSWU); ditto, 20.X.1983, KS Lee, 1♂ (SSWU); ditto, Sanghyo-dong, Donnaeko, 23.V.1995, HS Lee, 1♀ (SNU).

Distribution. Korea (Native).

Remark. This species firstly named as *Holotrichia reticulata,* but the combination changed and the species name corrected by Löbl and Smetana (2006) as *Bunbunius reticulatus*.

Genus *Pseudosymmachia* Dalla Torre 고려노랑풍뎅이속(신칭)

Metabolus Fairmaire, 1887: 107

Symmachia Brenske, 1892b: 151

Pseudosymmachia Dalla Torre, 1913: 224

Ablotemus Paulsen and Smith, 2003: 254

Type species: *Symmachia chinensis* Brenske, 1892b: 151 (=*Metabolus impressirons* Fairmaire 1887)

Diagnosis. Surface of body usually glabrous or pubescent. Labrum symmetric. Antenna 9 segments with 3-segmented club in both sexes; club slightly longer than footstalk in male. Elytra thin. Claw cleft at apex.

Remark. Smetana and Smith (2006: 50) synonymized *Pseudosymmachia* Dalla Torre, 1913 with *Metabolus* Fairmaire 1887, *Symmachia* Brenske, 1892b, and *Ablotemus* Paulsen and Smith, 2003. In this genus, one species reported from Korea.

Pseudosymmachia impressifrons Fairmaire 고려노랑풍뎅이

(Pl. II. Fig. II-3: H, I; Pl. III. Fig. III-3: B)

Metabolus impressifrons Fairmaire, 1887: 316.

Symmachia chinensis Brenske, 1892b: 151.

Rhizotrogus niponicus Lewis, 1895: 399.

Korean records. *Rhizotrogus niponicus*: Arrow, 1913: 399; Okamoto, 1924: 174; Miwa and Chûjô, 1939: 67; Cho, 1957: 299; KZS, 1968: 137.

Miridiva koreana Niijima and Kinoshita, 1923: 40; Okamoto, 1924: 173; Maruta, 1929: 367; KZS, 1968: 137; Miwa and Chûjô, 1939: 67; Murayama, 1941c: 76; 1954: 83; Cho, 1957: 299; Cho et al., 1968: 264; Kim and Kim, 1972b: 197; Kim et al., 1976: 102; Kim and Nam, 1982b: 276; Nam and Kim, 1982: 129.

Miridiva coreana: Eguchi, 1932: 51.

Miridiba koreana: Cho, 1969: 671 (고려노랑풍뎅이); Kim and Kim, 1972b: 197; Kim and Nam, 1982b: 276; Stebnicka, 1980: 265; Yoon and Kim, 1981: 47; Nam and Kim, 1982: 129.

Metabolus impressifrons: Nomura, 1960: 63; KSPP, 1972: 207; Stebnicka, 1980: 208; Kim et al., 2004: 116;

Metalobus impressifrons: Kim and Lee, 1991a: 66; Kim et al., 1991: 179; Kim and Lee, 1997: 233; Kim, 1993: 62; 2001: 29; ESK and KSAE, 1994: 150.

Pseudosymmachia impressifrons: Löbl and Smetana, 2006: 224.

Description. Body length 12.1-13.54mm; Body width 6.43-7.39mm;

Club-footstalk ratio 1-1.15 (♂), 0.57-0.62 (♀); Pronotum ratio 0.54-0.56; Pronotum-elytra ratio 0.35-0.37; Metafemur ratio 0.28-0.31 (♂), 0.35-0.36 (♀); Metatibia ratio 0.2-0.23 (♂), 0.29-0.3 (♀); Pygidium ratio 0.81-0.84.

Body elongated oval, yellowish brown to brown, surface glabrous.

Head reddish brown to dark brown, densely punctate. Clypeus shorter than frons and arcuate laterally, with anterior margin rather sinuate in the middle, not deeply emarginate. Frontoclypeal suture distinct. Frons convex, with longitudinal impression in the middle. Eye somewhat large, eye to interocular space ratio 0.62-0.76 (♂), 0.55-0.57 (♀). Ocular canthus with few setae. Antenna 9-segmented; club composed last three segments, little longer than remaining segments combined in male, shorter than remaining segments combined in female. Labrum narrow, strongly depressed in the middle. Last maxillary palp little longer than remaining segment, with few seta.

Pronotum convex, punctured, widest at middle, lateral margin with shallow carina and setae, Pronotal anterior and posterior angles rounded. Scutellum almost semicircular, flat with fine punctation scattered.

Elytra with four costae, densely punctated on the intervals, lateral margin with few setae, long to cover propygidium in male, short to expose propygidium in female.

Ventral side shinny, pubescence, covered with dense brown hairs from pro- to metathorax. Prosternum with almost free punctation.

Six abdominal sternites visible with few punctation. Pygidium almost flat, punctate, with a low of setae on the ventral boarder.

Legs long and slender. Interval of metatrochanter shorter than the width of mesofemur. Protibia tridentate, with punctures, anterior tarsal claws cleaved distally, ventral teeth wider than dorsal one, symmetrical in both sexes. Basal joint of hind tarsi shorter than second one. Meso- and metatibiae with dorsal spurs. Spur adjacent to metatarsus slightly shorter than first tarsi. Aedeagus: Pl. III. Fig. III-3: B.

Specimen Examined. **CB** Cheongju-si, ?.?.1967, KI Lee, 1♂ (SNU); Jecheon-si, Mt. Wolaksan, 12.VII.1991, HS Park, 1♂ (SSWU). **CN** Nonsan-si, Kanggyeong-eup, 23.VI.2005, AY Kim, 1♂ (SSWU); Seosan-gun, Mt. Gayasan, 23.VI.1994, EK Kim, 1♂ (SSWU). **GB** Dalseong-gun, Mt. Biseulsan, 10.VII.2000, JS Baek, 1♂ (SSWU); Kimcheon-si, Daeshin-dong, 15.VI.1972, IW Han, 1♂ (ENHM). **GG** Chuncheon-si, Gangchon, 10.VI.1973, SO Yun, 1♂ (ENHM); Gapyeong-gun: Mt. Myeongjisan, 6.V.1972, CD Lee, 1♂ (ENHM); Mt. Godongsan, 2.V.1981, SH Maeng, 2♂ (ENHM); Cheongpyeong-myeon, Daeseong-ri, 5.VII.1975, IS Bu, 1♀ (ENHM); Goyangsi: Deokyang-gu, Byeokje-dong, 27.V.1972. NS Lee, 1♂ (ENHM); Byeokje, 17.VI.1973, CH Han, 1♂ (ENHM); ditto, 16.VI.1973, MH Jo, 1♂ (ENHM); Seoneung, 28.V.1984, JH Park, 1♂ (ENHM); ditto, 6.VI.1990, SY Kim, 1♂ (ENHM); Gwacheon-si: Mt. Cheonggyesan, 19.VI.1994, YJ Shin, 1♀ (SSWU); Gwangju-si, 10.VI.1984, HJ Jeong, 1♂ (ENHM); ditto, 7.VII.1997, HJ Kim, 1♂ (SSWU); Namyangju-si: Joan-myeon, Paldang, 16.V.1970, SO

Kim, 1♂ (ENHM); ditto, 7.VII.1970, YS Kim, 1♂ (ENHM); ditto, 10.VIII.1980, YS Jeong, 1♀ (SSWU); Hwado-eup, Mt. Cheonmasan, 24.VI.1961, SJ Jo, 1♂ (ENHM); Jinjeop-eup, Gwangreung, 16.VI.1956, HY Han, 1♂ (ENHM); ditto, SJ Lee, 1♂1♀ (ENHM); ditto, 25.VI.1960, JO Kim, 1♂ (ENHM); ditto, 29.V.1965, SJ Lee, 1♂ (ENHM); ditto, 20.V.1972, SH Choe, 3♂ (ENHM); ditto, 27.V.1977, DA Shim, 1♂ (ENHM); Paju-si: Jori-eup, Neungan-ri, 1.VII.1956, HJ Jo, 2♂ (ENHM); Pocheon-si, 23.VII.1960, TH Kang, 1♂ (ENHM); ditto, 24.VI.1973, WS Kim, 2♂ (ENHM); Seoul-si: 30.VI.1955, HS Kim, 1♀ (ENHM); 9.VII.1955, YS Jang, 1♀ (ENHM); Hangang, 22.VI.1960, YE Lee, 1♂ (ENHM); Dobong-gu, Mt. Dobongsan, 1.X.1994, JY Im, 1♂ (SSWU); Dongdaemun-gu, Mt. Baebongsan, 27.V.1979, WY Lee, 2♂ (SSWU); Dongjak-gu, Heukseok-dong, 25.VI.1960, HS Lee, 2♂ (ENHM); Eunpyeong-gu, Galhyun-dong, 19.VI.1981, HY Jeong, 1♂ (SSWU); ditto, 2.VI.1987, SH Park, 1♂ (ENHM); ditto, Gusan-dong, 3.V.1984, JH Park, 1♂ (ENHM); ditto, Bulkwang-dong, 24.VI.1960, HJ Hong, 1♂1♀ (ENHM); ditto, 22.VI.1960, YO Chae, 2♂1♀ (ENHM); ditto, 22.VI.1960, YH Kim, 1♂ (ENHM); ditto, 5.VI.?, MS Lee, 1♂ (ENHM); Gangnam-gu, Wonji-dong, 14.IX.1985, HM Kang, 1♀ (SSWU); ditto, Daechi-dong, 20.VI.1996, SJ Wu, 1♂ (SSWU); ditto, Dogok-dong, 5.II.1979, JI Kim, 1♀ (SSWU); ditto, 26.VI.1994, YJ Kwon, 2♂ (SSWU); ditto, 24.VII.1994, BH Choe, 5♂ (SSWU); ditto, Samseong-dong, Seonjeongreung, 8.V.1988, SY Lee, 2♂ (ENHM); ditto, Shinsa-dong, 19.VI.1982, HJ Kim, 1♂ (ENHM); ditto, 20.VI.1982, YS Kim, 1♂ (ENHM); ditto, 19.VI.1982, KS Kim, 1♂ (ENHM); ditto, Apgujeong-dong, 5.VI.1988, JK Hong, 1♂

(ENHM); Guro-gu, Gaebong-dong, 20.VI.1979, SH Jo, 1♂ (ENHM); ditto, Shindorim-dong, 23.VI.1994, IP Son, 3♂ (SSWU); Jongro-gu, Cheongwun-dong, Changeuimun, 25.VI.?, MS Lee, 2♂ (ENHM); ditto, Insa-dong, 28.VII.1964, HJ Jeon, 1♂ (ENHM); ditto, Waryong-dong, Changdeokgung, 23.VI.1955, OY Lee, 1♂ (ENHM); Kangbuk-gu, Wuidong, 23.VI.1960, YS Seo, 1♂ (ENHM); Kangdong-gu, Sangil-dong, 1.VI.1998, SH Jo, 2♂ (SSWU); ditto, HJ Yun, 2♂ (SSWU); ditto, 21.VI.1998, HJ Lee, 1♂1♀ (SSWU); Kangseo-gu, Deungchon-dong, 28.VI.1981, HH Jeong, 1♂ (ENHM); ditto, 2.VII.1981, HH Jeong, 1♂ (ENHM); ditto, 6.VII.1985, KM Min, 1♂ (SSWU); Hwagok-dong, 6.V.1973, YO Lee, 1♂ (ENHM); Kwangjin-gu, Ttukseom, 25.VI.1970, JL Choe, 1♂ (ENHM); Mapo-gu, Seogyo-dong, 29.VI.1969, 2♂ (ENHM); Seocho-gu, Banpo-dong, 28.VI.1980, YR Lee, 1♂ (ENHM) ditto, 23-28.VIII.1990, SH Kuk, 3♂1♀ (SSWU); ditto, 10.VII.1993, CH Kwak, 4♂ (SSWU); ditto, 10.VIII.1993, SK Lee, 3♂ (SSWU); Seodaemun-gu, Bukahyun-dong, 2.VII.1956, UO Kwun, 1♂ (ENHM); ditto, 27.VI.1960, OJ Han, 1♀ (ENHM); ditto, 1.VII.1960, NS Seong, 1♀ (ENHM); ditto, OJ Han, 1♂ (ENHM); ditto, 19.VI.1960, SJ Park, 1♂ (ENHM); ditto, 13.VI.1960, CJ Kim, 1♂ (ENHM); ditto, Shinchon, 12.VI.1956, UO Kwun, 1♀ (ENHM); ditto, 27.VI.1956, JO Seo, 1♀ (ENHM); ditto, 5.VI.1956, SJ Tak, 1♂ (ENHM); ditto, 2.VII.1956, JO Seo, 2♂ (ENHM); ditto, 22.VI.1961, SJ Seo, 1♂ (ENHM); ditto, 16.V.1964, MJ Lee, 1♀ (ENHM); 15.VI.1970, SS Lee, 1♂ (ENHM); ditto, Ahyun-dong, 26.V.1956, HW Han, 1♂ (ENHM); ditto, 12.VI.1956, ditto, 1♂ (ENHM); ditto, 29.VI.1956, ditto, 1♂ (ENHM); ditto, Yonsei Univ., 19.VI.1970, JH Eom, 1♂ (ENHM);

ditto, Yeonhi-dong, 3.VII.1965, JH Lee, 1♀ (ENHM); ditto, 29.V.1984, HJ Lee, 1♂ (ENHM); ditto, Ehwa Woman's Univ., 16.VI.1970, YS Yun, 1♂ (ENHM); ditto, 18.VI.1972, JH Kwak, 1♂ (ENHM); ditto, 17.VI.1978, SO Yu, 1♂ (ENHM); ditto, 5.VII.1979, HS Han, 1♂ (ENHM); ditto, Hongje-dong, 21.VI.1968, HS Han, 1♂ (ENHM); Songpa-gu, Bangi-dong, Olympic park, 29.V.2005, BH Jeong, 9♂ (SSWU); ditto, 18.VI.2005, BH Jeong, 6♂9♀ (SSWU); seongdong-gu, Gui-dong, 7.VII.1986, JW Mok, 1♀ (SSWU); ditto, Wangsimri-dong, 20.VI.1976, MH Jeong, 1♂ (ENHM); seongbuk-gu, Jeongreung-dong, 22.VI.1960, TH Kang, 1♂ (ENHM); ditto, 25.VI.1960, KY Kim, 1♂ (ENHM); ditto, 11.VI.1961, JS Shin, 1♀ (ENHM); ditto, 10.VII.1964, HS Lee, 1♂ (ENHM); ditto, 11.VI.1982, CS Jo, 1♀ (ENHM); ditto, 25.VI.?, YG Kim, 2♂ (ENHM); ditto, Mt. Bukhansan, 23.VI.1960, MJ Lee, 1♂ (ENHM); Yongsan-gu, Huam-dong, 28.VI.1987, HK Kim, 2♀ (SSWU); Suwon-si: 2.VII.1950, YW Jo, 1♂ (SNU); ditto, 2.VII.1954, BW Kim, 1♂ (SNU); ditto, SB Kim, 1♂ (SNU); ditto, DH Lee, 1♂ (SNU); ditto, BH Bak, 1♂ (SNU); ditto, KS Hong, 1♂ (SNU); ditto, GS Shin, 1♂ (SNU); ditto, 29.VI.1958, WH Baek, 1♂ (SNU); ditto, 25.VI.1960, ?, 3♂ (SNU); ditto, 6.VI.1970, HS Kim, 1♂ (EWU); ditto, 27.X.1987, SB Ahn, 1♂ (SSWU); ditto, 23.VI.1996, AY Kim, 1♂ (SSWU); Yangpyeong-gun: Mt. Samgaksan, 4.VII.1964, HS Lee, 1♂ (EWNH). **GW** Inje-gun: Mt. Seoraksan, 3.VII.1993, SY Kim, 1♂ (SSWU); Kirinmyeon, 12.VIII.1971, OL Kim, 1♀ (ENHM). **HN** Pyeongsan-si, Huchiryeong, 25.VI.1999, SL Ahn, 2♂ (NSM). **JB** Buan-gun, Shinnae-myeon, 28.VI.1990, EJ Jo, 1♂ (SSWU); ditto, Byeonsan, 25.VI.1991, SM Kim, 1♀ (SSWU). **JJ** JeJudo, 12.VII.1973, YO

Kim, 1♂ (ENHM); Marado, 9.VII.1994, SL Ahn, 1♂ (NSM); Bukjeju, 30.VI.1993, R.G.O., 1♂ (SSWU); Seoguipo-si, Jungmun, 27.VI.1994, HW Seol, 1♀ (SSWU). **JN** Wando, Dang-ri, 28.V.1982, JI Kim, 1♂ (SSWU); Haenam-gun, Samsan-myeon, Mt. Duryunsan, 6.VII.1991, SJ Yoon, 1♀ (ENHM).

Distribution. China, Japan, Korea.

Genus *Lasiopsis* Erichson 털보갈색풍뎅이속

Lasiopsis Erichson, 1847: 658

Askeptonycha Kraatz, 1883: 154

Brahminula S. I. Medvedev, 1951: 246

Lasiobrahmina S. I. Medvedev, 1951: 257

Type species: *Melolontha canina* Zubkov, 1829: 156

Diagnosis. Body long, cylindrical, size under 14mm. Many are shinny and yellowish brown to reddish brown with erect long hair. Head narrow with 8 to 9-segmented antennae. Frons with waved, transverse elevations (Murayama, 1954)

Remarks. In this genus, two species have been reported from Korea, and one species is examined in this study. I did not make the key of this genus, because *L. manchurica* is very dubious about Korean distribution (see remark), nor I couldn't find any specimen of this species.

Lasiopsis sahlbergi (Mannerheim) 사흘베르그털보갈색풍뎅이

(Pl. II. Fig. II-4: A; Pl. III. Fig. III-3: C)

Rhizotrogus sahlbergi Mannerheim, 1849: 239

Lachnota bedeli Bergroth, 1892: 99.

Rhizotrogus dahurica C.E. Blanchard, 1851: 144.

Korean records. *Lasiopsis sahlbergi*: Murayama, 1941c: 74; 1954: 79; Cho, 1963: 221; 1969: 670; Cho et al., 1968: 265; Kim and Kim, 1974: 108; Kim et al., 1975: 241; Yoon and Kim, 1981: 47; Kim and Nam, 1982a: 155; Kim, 1993: 62; 1995b: 139; 2001: 28; ESK and KSAE, 1994: 150; Kim et al, 2002: 119; Löbl and Smetana, 2006: 221.

L. formosanus: Murayama, 1937: 34; Miwa and Chûjô, 1939: 66; Cho, 1957: 299; KZS, 1968: 137.

Metabolus sahlbergi: Nomura, 1970: 62.

Description. Body length 10-12mm; Body width 5.1-6.7mm; Club-footstalk ratio 0.92 (♂), 0.64 (♀); Pronotum ratio 0.5-0.52; Pronotum-elytra ratio 0.28-0.3; Metafemur ratio 0.28-0.3 (♂), 0.36-0.38 (♀); Metatibia ratio 0.13-0.19; Pygidium ratio 0.68-0.9.

Body cylindrical, yellow to yellowish brown, surface shinny, covered with dense hairs.

Head densely punctate. Anterior margin of clypeus feebly reflexed. Frontoclypeal suture distinctly impressed. Frons slightly convex. Eye to interocular space ratio 0.5-0.61. Ocular canthus setaceous. Antennae 9-segmented; club composed last three segments, shorter than remaining segments combined in both sexes. Last maxillary palp as long as remaining segment, with few seta.

Pronotum convex with dense shallow punctation, widest at middle, sides rounded, lateral margin feebly carinate with setae, anterior and posterior angles rounded. Scutellum almost semicircular, somewhat ogival posteriorly, flat with fine punctation scattered.

Elytra with very vague costae, densely punctated with hairs, lateral margin with a low of setae.

Ventral side shinny, covered with dense yellowish hairs from pro- to metathorax. Prosternum with few punctation. Six abdominal sternites visibles with fine punctation and hairs. Pygidium almost flat, punctate with hairs.

Legs long and slender. Interval of metatrochanter shorter than the width of mesofemur. Protibia tridentate, anterior tarsal claws cleaved deeply on the apical tip, symmetrical in both sexes. Basal joint of hind tarsi shorter than second one. Spur adjacent to metatarsus almost same length as first tarsi. Aedeagus: Pl. III. Fig. III-3: C.

Specimen Examined. **GB** Munkyeong-si, Mungyeongsaeje, 11.VII.1977, SM Yeo, 1 (SSWU). **GG** Goyang-si, Beokjae, 16.VI.1973, MH Jo, 1♂ (ENHM). **GN** Mt. Jirisan, Jungsan-ri, 30.VII.1981, IB Yoon, 1 (SSWU). **JJ** Jeju-si: Nohyeong-dong, Temple Cheonwangsa, 1-11.VII.2008, SW Park, 1♂ (SSWU); Seogyuipo-si, 12.VI.1973, BH Heo, 1♂ (ENHM).

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

Lasiopsis manchurica Murayama 만주털보갈색풍뎅이

Lasiopsis manchurica Murayama, 1941c: 75

Korean records. *Lasiopsis manchuricus*: Stebnicka, 1980: 264; ESK and

KSAE, 1994: 150; Kim, 2001: 28.

L. manchurica: Löbl and Smetana, 2006: 221.

Description. Body length 14mm; Body width 6.5mm.

Specimen Examined. none.

Distribution. Manchuria, Korea.

Remark. Murayama (1941) reported as new species with Manchurian specimen. It is slightly longer than *L. sahlbergi*, but almost same in width. It is reddish brown and has hair on over the hole body. Murayama (1954) described only with Manchurian specimen, no Korean. Stebnicka (1980) recorded as new to Korea by one male from Juhari in Seonahn (PN) without any description. The illustration of male aedeagus by Stebnicka (1980) is different to Murayama's, however, so that it is hard to conclude that these two are same species. Rather the illustration of Stebnicka is similar to *Brahmina rubetra faldermanni*. Therefore, Stebnicka (1980) could misidentified on this specie. After her record, all references are citations of Stebnicka (1980).

Genus *Miridiba* Reitter 밤색풍뎅이속

Miridiba Reitter, 1902: 170

Holotrochus Brenske, 1894: 75

Shangaia R. Lucas, 1920: 592

Hippotrichia Arrow, 1948: 51

Neodontocnema Arrow, 1948: 51

Type species: *Rhizotrogus trichophorus* Fairmaire, 1891: cxcix

Diagnosis. Similar to *Lasiopsis* but larger and claw with right angle at rear. Body elongated oval, shinny. Dorsal surface with developed punctuation. Antennae 9 to 10 segments, with three segmented club. Antennal club shorter than the rest segments in both sexes. Mentum with plentiful pubescence between the palpi. Labrum strongly depressed in the middle. Clypeus shorter than frons and arcuate laterally. Pronotum with close, small punctures, obtuse posterior angles, wide anterior edge and smooth lateral sides. Free angle of hind coxal plate straight. Fore-tibia with a pubescent longitudinal dorsal carina more or less developed and with punctures. Tibial plates with free spurs. Fore- and mesotarsi with a grouping of setae on ventral apex of each segment. Simple tarsal claws with a well-developed basal tooth (Reitter 1902, Murayama 1954, Coca-Abia 2008).

Distribution. This genus is reported to be distributed across the Eastern Paleartic and Oriental Regions. It is found in China; Japan; Formosa; India; Nepal; Myanmar; Indonesia; Vietnam; Thailand; Laos (Coca-Abia 2008).

Key to the species of *Miridiba* of Korea

Antenna 9-segmented. Pronotum widest at posterior, lateral margin without carina; Lateral margin of elytra setaceous; Prosternum almost free with punctation ····· *M. castanea*

- Antenna 10-segmented. Pronotum widest at middle, lateral margin with carina; Lateral margin of elytra not setaceous; Prosternum with

punctation overall ····· *M. yangjuensis* n. sp.

Miridiba castanea (C. O. Waterhouse) 밤색풍뎅이

(Pl. II. Fig. II-4: B)

Holotrichia castanea C.O. Waterhouse, 1875: 104.

Neodontocnema castanea: (Waterhouse): Arrow, 1948: 51.

Rhizotrogus frontalis Fairmaire, 1886: 325.

Miridiba castanea (Waterhouse): Kobayashi, 1982: 4

Korean records. *Lachnosterna (Holotrichia) castanea*: Heyden, 1887: 251.

Holotrichia (Pledina) castanea: Niijima and Kinoshita, 1923: 44.

H. castanea: Okamoto, 1924: 173; Kato, 1935: 114; Morita, 1936: 860; Miwa and Chûjô, 1939: 63; Takahashi, 1941: 231; Cho, 1957: 298; Stebnicka, 1980: 208; KZS, 1968: 137.

Miridiva castanea: Murayama, 1954: 85; Cho, 1963: 218 (밤색풍뎅이); Cho et al., 1968: 264.

Miridiba castanea: Cho, 1969: 672; Stebnicka, 1980: 208; ESK and KSAE, 1994: 150; Kim, 2001: 30; Löbl and Smetana, 2006: 222.

Neodontocnema castanea: Nomura, 1960: 64; Kim and Kim, 1971: 160 (misidentified); KSPP, 1972: 208.

Description. Body length 18.53-19.4mm; Body width 9.32-10mm; Club-footstalk ratio 0.64-0.68; Pronotum ratio 0.6-0.62; Pronotum-elytra ratio 0.37; Metafemur ratio 0.46-0.47; Metatibia ratio 0.17-0.19; Pygidium ratio 0.7-0.71.

Body elongated oval, dark brown to black, surface glabrous.

Head densely punctate. Clypeus shorter than frons and arcuate laterally, with anterior margin rather sinuate in the middle, not deeply emarginate. Frontoclypeal suture distinct. Frons flat, with transversal upheaval backward. Eyes to interocular space ratio 0.57-0.63. Ocular canthus setaceous. Antenna 9-segmented; club composed last three segments, shorter than remaining segments combined in both sexes. Labrum narrow, strongly depressed in the middle. Last maxillary palp as long as remaining segment, with few seta.

Pronotum convex with close, small punctures, widest at posterior, lateral margin without carina; Pronotal anterior angles sharp, posterior angles rounded. Scutellum almost semicircular, somewhat ogival posteriorly, flat with fine punctation scattered.

Elytra with very vague costae, densely punctated, lateral margin setaceous.

Ventral side shinny, pubescence, covered with dense brown hairs from pro- to metathorax. Prosternum almost free with punctation. Six abdominal sternites visible with dense punctation. Pygidium slightly convex, punctate, pubescence.

Legs relatively short; femora stout, tibiae and tarsus short. Interval of metatrochanter shorter than the width of mesofemur. Protibia tridentate, with a pubescent longitudinal dorsal carina more or less developed and with punctures, anterior tarsal claws cleaved distally, symmetrical in both sexes. Basal joint of hind tarsi shorter than second one. Meso- and metatibiae with dorsal spurs. Spur

adjacent to metatarsus longer than first tarsi.

Specimen Examined. JJ Bukjeju-gun, Udo-myeon, 5.VI.2006, AY Kim, 2 ♀ (SSWU); Jeju-si, Hanrim, 8.VII.1965, YJ Im, 1♀ (ENHM).

Japan: Akiyoshi-dai, 8.VII.1998, TW Kim, 1♀ (SSWU).

Distribution. China, Japan (South), Korea (Jeju).

Remark. It has been recorded as Korean distribution since Heyden (1887). Never had been examined the Korean sample after Murayama (1954), Kim (2001a) had had doubt about Korean distribution. I found one female specimen from the Natural History Museum of Ewha Woman's University, and have collected two female from Jeju-do. I reconfirm the Korean distribution of this species in this study.

Miridiba yangjuensis Kim n. sp.

(Pl. II. Fig. II-4: C; Pl. III. Fig. III-3: D)

Description. Body length 21.4-23.1mm; Body width 10.7-11.1mm; Club-footstalk ratio 0.5-0.71; Pronotum ratio 0.61-0.63; Pronotum-elytra ratio 0.36-0.37; Metafemur ratio 0.34-0.45; Metatibia ratio 0.2; Pygidium ratio 0.73-0.8.

Body elongated oval, reddish brown, surface glabrous.

Head densely punctate. Clypeus shorter than frons and arcuate laterally, with anterior margin sinuate in the middle, deeply emarginate. Frontoclypeal suture distinct. Frons flat, with transversal upheaval backward, surface undulant in female. Eyes to interocular space ratio 0.54-0.68. Ocular canthus setaceous. Antenna 10-segmented; club

composed last three segments, shorter than remaining segments combined in both sexes, the last club segment dull at the tip. Labrum very narrow, strongly depressed in the middle. Last maxillary palp as long as remaining segment, with few seta.

Pronotum convex with close, coarse punctation, widest at middle, lateral margin with carina; Pronotal anterior angles sharp, posterior angles rounded. Scutellum almost semicircular, somewhat ogival posteriorly, flat with coarse punctation scattered.

Elytra with very vague costae, densely punctated, lateral margin not setaceous.

Ventral side shinny, pubescence, covered with dense brown hairs from pro- to metathorax. Prosternum with punctation overall. Six abdominal sternites visible with dense punctation. Pygidium slightly convex, punctate, glabrous.

Legs relatively short; femora stout, tibiae and tarsus short. Interval of metatrochanter shorter than width of mesofemur. Protibia tridentate, with a pubescent longitudinal dorsal carina more or less developed and with punctures, anterior tarsal claws cleaved distally, symmetrical in both sexes. Basal joint of hind tarsi shorter than second one. Meso- and metatibiae with dorsal spurs. Spur adjacent to metatarsus longer than first tarsi. Aedeagus: Pl. III. Fig. III-3: D.

Specimen Examined. Holotype. GG Yangju-si: Nam-myeon, 21.V.1996, Park, 1♂ (SSWU). Paratypes. GG Yangju-si: Nam-myeon, 21.V.1996, Park, 2♀ (SSWU).

Distribution. Korea.

Remark. This species characterized by 1) antenna 10-segmented, 2) pronotum widest at middle, 3) lateral margin of pronotum with carina, 4) lateral margin of elytra not setaceous, and 5) prosternum with punctation overall. Three individuals were collected at Yangju in Gyeonggi-do. The collection site is near the industrial factories. It is possible that they were from imported woods, herbaceous plants or soil, otherwise they might inhabit there for a long time. They are quite big (more than 20mm) in size, and three individuals collected by once. I studied the recent review paper of the genus *Miridiba* by Coca Abia (2008), but there were no taxon matched with this species.

Etymology. This species is named after Yangju (= Yangju-si, GG) where the species collected at.

Genus *Holotrichia* Hope 검정풍뎅이속

Holotrichia Hope, 1837: 100

Type species: *Melolontha serrata* Fabricius, 1792

Diagnosis. Clypeus simple, anterior margin more or less concave. Antennae 10-segmented; club smaller than footstalk in both sexes. A teeth on the underside of each claw large, curved, and sharply pointed. (Murayama 1954)

Remarks. In this genus, species have been recorded from Korea, but in this study, species were examined. *H. sichotana* is excluded from the key of this genus, because there is no specimen examined, nor the original description is insufficient to compare with other species.

Key to the species of *Holotrichia* of Korea

1. Pronotum with a row of seta along the anterior border ····· 2

- Pronotum without a row of seta along the anterior border ····· 4

2. Clypeus small compared with the body. Antennal club of male as long as footstalk. Ventral sternites with longitudinal groove ····· ····· *H. koraiensis*

- Clypeus not small compared with the body. Antennal club of male shorter than footstalk. Ventral sternites without longitudinal groove ····· ····· 3

3. Body size 15.86-17.9 mm. Dorsal surface generally glossy. Pronotum with coarse circular punctures ····· *H. picea*

- Body size 17.78-19.42 mm. Dorsal surface generally not glossy. Pronotum with coarse ellipsoid punctures ····· *H. parallela*

4. Body yellowish brown to reddish brown. Elytra thin. Abdominal sternites overally glossy ····· *H. niponensis*

- Body normally dark brown, sometimes dark reddish brown. Elytra thick. 5th abdominal sternites with pruinose patches at sides ····· 5

5. Pygidium convex medially ····· 6

- Pygidium convex posteriorly ····· 7

6. Body 16.5-19 mm. Antenna dark brown; club slightly shoter than footstalk in male, same as half of footstalk in female ····· *H. ernesti*

- Body 19-19.5 mm. Antenna yellowish brown; club as long as rest 6 segments in male, shoter than that in female ····· *H. kiotoensis*

7. Antennal club shorter than footstalk in male. Convexed pygidium

with longitudinal groove ····· *H. diomphalia*

- Antennal club almost as long as footstalk in male. Convexed pygidium without longitudinal groove ····· *H. oblita*

Holotrichia koraiensis Murayama 고려다색풍뎅이

(Pl II. Fig. II-4: D, E; Pl. III. Fig. III-3: E)

Holotrichia koaiensis Murayama, 1937: 37 (Pungryuri, Namseollyeong, Gwangneung).

Korean records. *Holotrichia koraiensis*: Miwa and Chûjô, 1939: 63; Murayama, 1941c: 80; 1954: 116; Cho, 1957: 298; 1969: 669; KZS, 1968: 137 (고려다색풍뎅이); Stebnicka, 1980: 208; Kim and Yoo, 1987b: 505; Kim and Kim, 1998: 170; Kim, 1993: 62; 1995a: 164; 2000a: 16; 2001: 38; ESK and KSAE, 1994: 150.

Holotrichia (Eotrichia) koraiensis: Löbl and Smetana, 2006: 218.

Description. Body length 18.18-21.77mm; Body width 9.05-10.42mm; Club-footstalk ratio 1.02-1.2 (♂), 0.52 (♀); Pronotum ratio 0.56-0.59; Pronotum-elytra ratio 0.29-0.31; Metafemur ratio 0.25-0.32; Metatibia ratio 0.12-0.13 (♂), 0.15 (♀); Pygidium ratio 0.76-0.78.

Body medium sized, elongated oval, reddish brown to dark brown, surface glabrous.

Head small, with dense punctation. Clypeus slightly narrowed forward, anterior margin of male feebly emarginated and reflexed, that of female strongly emarginated and flat. Frontoclypeal suture distinctly impressed. Eyes somewhat large, eye to interocular space ratio

0.73-0.83 (♂,), 0.62 (♀). Ocular canthus with setae. Antennae 10-segmented; club composed last three segments, in male as long as remaining segments combined, in female as half long as remaining segments combined.

Pronotum slightly convex, widest at middle, with shallow punctation, anterior and posterior angles bluntly rounded, anterior border with a row of seta, lateral margin carinate with setae. Scutellum almost semicircular, punctation scattered smillar to that of pronotum.

Elytra somewhat glabrous with four costae, punctures scattered, lateral margin feebly setaceous.

Ventral side glabrous, covered with dense yellowish hairs from pro- to metathorax. Abdominal sternites with rear hairs, first and fifth distinct, second to fourth vague with longitudinal groove (in male) in the middle. Penultimate sternite of abdomen with a pruinose patch at each side. Pygidium convexed in both sexes.

Legs long and slender. Pro- and mesotrochanter adjacent, metatrochanter separated almost as wide as mesofemur. Protibia tridentate, anterior tarsal claws symmetrical in both sexes. Basal joint of hind tarsi shorter than 2nd one. Aedeagus: Pl. III. Fig. III-3: E.

Specimen Examined. GG Gapyeonggun, Mt. Myeongjisan, 1.VI.1996, JH Lee, 1♂ (SSWU); ditto, PS Kim, 1♂ (SSWU); ditto, CH Lee, 1♂ (SSWU). **GW** Bukpyeong, Temple Samhwa, 27.VI.1984, SI Yang, 1♀ (SSWU); Injaegun: Mt. Soraksan, 22.VII.1970, SM Lee, 1♂ (SSWU); ditto, 25.VI.1973, ditto, 1♂ (SSWU); ditto, 23.VI.1973, JI Kim, 1♂ (SSWU); ditto, Osaek, 24.VI.1991, SJ Yoon, 1♂ (ENHM); ditto: Mt. Bangtaesan,

Misanri, 23.VI.1996, SY Kim, 6♂ (SSWU); ditto, Hyunri, 22.V.1999, JS Seo, 1♀ (SSWU); Honcheongun: Mt. Odaesan, 9.VIII.1976, SM Lee, 1♀ (SSWU); Pyeongchanggun: Mt. Gyebangsan, 16.VI.1993, JI Kim, 1♂ (SSWU); Taebaeksi, Mt. Taebaeksan, 30.V.1999, JI Kim et al., 1♂ (SSWU). **JB** Mujugun, Mt. Deokyusan, 25.V.1993, KE Jeong, 1♂ (SSWU); ditto, HK Hong, 1♀ (SSWU); Wanjugun, Wunjumyeon, Mt. Daedunsam, 2.V.1978, SJ Yoon, 1♀ (ENHM). **JJ** Mt. Hanrasan, 7.VI.1972, JI Kim, 1♂ (SSWU). **Russia** Kamenushka, 42km E. of Ussuriysk Primorskii Kray, 6.VI.1997, JK Kim, 3♂ (SSWU).

Distribution. China, Korea, Russia.

Holotrichia picea (C.O. Waterhouse) 꼬마검정풍뎅이

(Pl. II. Fig. II-4: F; Pl. III. Fig. III-3: F)

Lachnosterna picea C.O. Waterhouse, 1875: 102.

Holotrichia rufopicea C.O. Waterhouse, 1875: 103.

Holotrichia infantula S.I. Medvedev, 1951: 308.

Holotrichia izuensis Nomura, 1969: 73.

Korean records. *Lachnosterna picea*: Heyden, 1887: 252; Shin and Choo, 1977: 90.

Holotrichia picea: Heyden, 1889: 660; Haku, 1935: 57; Miwa and Chûjô, 1939: 65; Murayama, 1941c: 79; 1954: 114; Takahashi, 1941: 231; Cho, 1957: 298; 1963: 218; 1969: 668; KZS, 1968: 137 (꼬마검정풍뎅이); Stebnicka, 1980: 268; Kim and Yoo, 1987b: 505; Kim and Lee, 1991a: 66; ESK and KSAE, 1994: 150; Kim, 2000a: 16; 2000b: 132; 2001: 39.

Lachinosterna picea: Nomura, 1960: 65.

Holotrichia (Holotrichia) picea: Löbl and Smetana, 2006: 219.

Description. Body length 15.86-17.9mm; Width 8.67-9.46mm; Club-footstalk ratio 0.58-0.7; Pronotum ratio 0.56-0.58; Pronotum-elytra ratio 0.31-0.33; Metafemur ratio 0.26-0.3; Metatibia ratio 0.13-0.16; Pygidium ratio 0.63-0.78.

Body elongated oval, wide at posterior, dark brown to black, surface shinny.

Head medium sized, with dense punctation. Anterior margin of clypeus emarginated and feebly reflexed. Frontoclypeal suture distinct. Frons slightly convex, posterior one third bald without punctation. Eye to interocular space ratio 0.41-0.5. Ocular canthus setaceous. Antennae 10-segmented; club composed last three segments, shorter than remaining segments combined. Maxillary palp short, last segment without seta.

Pronotum convex with coarse circular punctation, widest at middle, lateral margin carinate and setaceous, half of lateral margins slightly narrowed backward, anterior boarder with a low of erect seta, anterior and posterior angles bluntly rounded. Scutellum almost semicircular, somewhat ogival posteriorly, flat with fine punctation scattered on the sides.

Elytra glabrous with four vague costae, punctures scattered mainly on intervals, lateral margin without a low of setae.

Ventral side shinny, covered with dense brown hairs from pro-

to metathorax. Prosternum densely punctate with hairs. Abdominal sternites with scattered punctation and few microscopic setae, six sternites visible. Pygidium slightly convexed medially.

Legs long and slender. Pro- and mesotrochanter adjacent, metatrochanter separated almost as wide as mesofemur. Protibia tridentate, anterior tarsal claws symmetrical in both sexes. Basal joint of hind tarsi slightly shorter than 2nd one. Spur adjacent to metatarsus very longer than first tarsi. Aedeagus: Pl. III. Fig. III-3: F.

Specimen Examined. **CN** Gongjusi, Mt. Gyeryongsan, 4.VIII.1973, CH Kim, 1 (SSWU). **GB** Dalsan, yeongdeok, Mt. Baedaesan, 21.VI.1997, YB Cho, 2 (SSWU); Wuljingun, Onjeongmyeon, Mt. Baekamsan, 29.V.1999, JI Kim et al., 2 (SSWU); yeongjusi, Pungki-eup, Temple Hibang, 7.VI.1969, JI Song, (ENHM). **GG** Incheonsi, Onjingun, Daechungmyeon, Sochungri, 31.VII.1956, HS Kim, 1 (ENHM); Namyangjusi, Mt. Cheonmasan, 13.VI.1971, HS Byeun, 1 (ENHM); Pocheonsi, Soheulup, Mubongri, 12.IV.2003, AY Kim, 1 (SSWU); Seoul: Mt. Bukhansan, 21.V.1967, SM Choe, 1 (SSWU); Dongdaemungu, Cheongryangridong, Honreung, 14.VII.1957, HS Kim, 1 (ENHM); Jongrogu, Shinyeongdong, Saegeumjeong, 20.VII.1969, JS Shin, 1 (ENHM); Nowongu, Goreungdong, Taereung, 20.V.1969, JH Oh, 1 (ENHM); ditto, Mt. Suraksan, 28.V.1997, KJ Choe, 1 (SSWU). **GW** Pyeongchanggun, Mt. Sobaeksan, 29.VII.1983, SJ Yoon, 2 (ENHM); Wonjusi, Mt. Chiaksan, 1.VI.1979, SJ Yoon, 2 (ENHM). **JJ** Mt. Hallasan, 22.VII.1978, SM Lee, 1 (SSWU); Jejusi, Aradong, Temple Gwanum, 24.V.1995, KS Wu, 1 (SNU); Seoguiposi, Jungmun, 3.V.1978, SH Nam, 1 (SSWU). **JN** Gwangyangsi,

Chusanri, 18.V.1991, LSY, 1 (SSWU).

Distribution. Amur, China, Japan, Korea, Russia (Far east).

Holotrichia parallela (Motschulsky) 큰검정풍뎅이

(Pl. II. Fig. II-4: G; Pl. III. Fig. III-4: A)

Ancylonycha parallela Motschulsky, 1854b: 64.

Lachnosterna morosa Waterhouse, 1875: 104.

Lachnosterna inelegans Lewis, 1895: 396 (Pusan).

Korean records. *Lachnosterna parallela*: Kolbe, 1886: 193; Heyden, 1887: 251.

Lachnosterna morosa: Heyden, 1887: 251; Bates, 1888: 373; Nomura, 1960: 65; Kim, 1978: 336; Yoon and Nam, 1980: 149; Park and Cho, 1986: 127.

Holotrichia morosa: Niijima and Kinoshita, 1923: 49; Okamoto, 1924: 172; Maruta, 1929: 368; Doi, 1935: 3; Kamijo, 1936: 86; Morita, 1936: 861; Miwa and Chûjô, 1939: 64; Murayama, 1941c: 78; 1954: 104; Takahashi, 1941: 231; Cho, 1957: 298; 1969: 667; Cho et al., 1968: 264; KZS, 1968: 137 (큰검정풍뎅이); Won and Choi, 1968: 379; Hyun and Woo, 1969: 193; KSPP, 1972: 207; Kim and Kim, 1974: 108; Kim et al., 1975: 240; Kim and Nam, 1982a: 155; 1982b: 276; Nam and Kim, 1982: 129; Park and Cho, 1986: 127; Yoon and Nam, 1986: 160; Kim and Yoo, 1987a: 223; 1987b: 505; Kim and Lee, 1989: 176; 1991a: 67; 1997: 233; Yoon et al., 1989: 140; Kim et al., 1991: 179; 1999: 129; Kim, 1993: 62; 2000a: 15; Park et al., 1993: 178; Park et Kim, 1993: 112; ESK and KSAE, 1994: 150; Kim and Kim, 1996: 48;

Kim and Kim, 1998: 170.

Holotrichia molosa: Kato, 1935: 114.

Holotrichia parallela: Miwa and Chûjô, 1939: 64; Cho, 1957: 298; KZS, 1968: 137; Stebnicka, 1980: 297; Kim and Lee, 1991a: 67; ESK and KSAE, 1994: 150; Kim, 2000b: 132; 2001: 37; Kim et al, 2002: 120; 2004: 116.

Holotrichia inelegans: Stebnicka, 1980: 269.

Holotrichia (Holotrichia) parallela: Löbl and Smetana, 2006: 219.

Description. Body length 17.78-19.42mm; Width 9.1-10.19mm; Club-footstalk ratio 0.44-0.47; Pronotum ratio 0.53-0.58; Pronotum-elytra ratio 0.32-0.35; Metafemur ratio 0.28-0.31; Metatibia ratio 0.15-0.16; Pygidium ratio 0.72-0.76.

Body elongated oval, wide at posterior, dark brown to black, surface opaque or slightly velvety.

Head densely punctate. Anterior margin of clypeus emarginated and feebly reflexed. Frontoclypeal suture weekly distinct. Frons slightly convex. Eye to interocular space ratio 0.42-0.46. Ocular canthus short, cover one third of eye, with setae. Antennae 10-segmented; club composed last three segments, shorter than remaining segments combined. Maxillary palp short, last segment without seta.

Pronotum convex with coarse ellipsoid puctation, widest at middle, anterior border with a row of erect seta, lateral margin carinate with setae, half of lateral margins slightly narrowed backward, anterior angles bluntly rounded, posterior angles somewhat acute.

Scutellum almost semicircular, with fine punctation scattered on the sides.

Elytra opaque with four costae, punctures shallow, scattered mainly on intervals, lateral margin weekly glabrous without a low of setae.

Ventral side velvety, covered with dense yellowish hairs from pro- to metathorax. Prosternum glabrous, punctate on the sides and center with some hairs. Abdominal sternites with few microscopic setae, six sternites visible, sixth sternite glabrous. Pygidium slightly convexed.

Legs long and slender. Pro- and mesotrochanter adjacent, metatrochanter separated almost as wide as mesofemur. Protibia tridentate, anterior tarsal claws symmetrical in both sexes. Spur adjacent to Metatarsus longer than first tarsi. Aedeagus: Pl. III. Fig. III-4: A.

Specimen Examined. CB Cheongwon-gun, 5.VIII.1992, YH Park, 2 (SSWU); ditto, Oksan-myeon, 28.VII.1985, BS Han, 1 (SSWU); Danyang-gun, 21.VII.1981, EY Lee, 1 (SSWU); Jincheon-gun, Baekgok-myeon, Daemun-ri, 7.VII.1998, TM Han, 3 (SSWU); ditto, Yeongok-ri, 8.VII.1998, TM Han & TH Kang, 4 (SSWU); ditto, Geumgok-ri, 6.VII.1989, JS Seo, 2 (SSWU); Okcheon-gun, 15.VII.1969, BS Yuk, 1 (ENHM); ditto, 13-20.VIII.1969, BS Yuk, 2 (ENHM) **CN** Boryeong-gun, Sapsido, 26.VII.1995, HY Lee, 1 (SSWU); Buyeo-gun, Mt. Mansusan, 19.VII.1999, JI Kim, 1 (SSWU); Daejeon-si, Donggucheon-dong, 8.VIII.1997, HJ Im, 1 (SSWU); ditto, Sinsong-dong,

25.VI.1993, SL Ahn, 1 (NSM); Dangjin-gun, Dusan-ri, 13.VIII.1984, HS Choe, 1 (SSWU); Gawuido, 24.VII.1996, SL Ahn, 1 (NSM); Gongju-si, Mt. Gyeryongsan, 13.VII.1971, HK Kim, 1 (ENHM); Nonsan-si, 1.VII.1960, YE Lee, 1 (ENHM); ditto, Ganggyeong-gun, Hwangsandaegyo, 23.VI.2005, AY Kim, 3 (SSWU); Seosan-si, Mt. Gayasan, 21-23.VI.1996, HJ Sin & YJ Jeong, 2 (SSWU); Taean-gun, Taean-eup, 13.VIII.1994, MJ Sin, 1 (SSWU). GB Bonghwa-gun, 1.VIII.1998, JH Kim, 1 (SSWU); Daegu-si, Buk-gu, Sangyeok-dong, Geongbuk Univ., 25.VI.1989, SH Jeon, 3 (SSWU); ditto, Mt. Palgongsan, 8.VII.1986, SH Jeon, 3 (SSWU); Dalseong-gun, Mt. Biseulsan, 10.VII.2000, AY Kim & JS Baek, 2 (SSWU); Gyeongsan-si, Hayang, 24.VII.1992, HK Yun, 1 (SSWU); Pohang-si, Guryongpo, 14.VIII.1972, JH Park, 1 (ENHM); Sangju-si, Gongseong-myeon, Bongsan-3-ri, 12.VIII.1985, OH Kim, 3 (SSWU); Uljin-gun, 30.VI.1972, IW Han, 1 (ENHM); ditto, Seo-myeon, Sogwang-ri, 31.VII.1999, JI Kim, 1 (SSWU); Yeongdeok-gun, 25.VIII.1968, KH Bae, 4 (ENHM); Yeongju-si, Buseok-myeon, Namdae-ri, 1.VII.1998, JI Kim et al., 1 (SSWU); ditto, Mt. Seondalsan, 29.VI.1998, JI Kim et al., 1 (SSWU); ditto, Jangsu-myeon, Galsan-ri, 30.VII.1986, HS Kim, 3 (SSWU). GG Anyang-si, Mt. Gwanaksan, 27.IX.1997, SH Lee, 1 (SNU); Ganghwa-gun, Gyodong-myeon, Gyodongdo, 2.VII.1987, JI Kim, 1 (SSWU); ditto, Mt. Marisan, 18.VIII.1996, IS Kim, 1 (SSWU); ditto, Temple Jeondeungsa, 10.VIII.1991, JI Kim, 1 (SSWU); Gapyeong-gun, Buk-myeon, Mt. Hwaaksan, 24.VIII.1998, SY Kim, 1 (SSWU); ditto, Johyeon-ri, 20.VII.1987, HK Kim, 1 (SSWU); ditto, Nogok, 24.VII.1985,

HJ Kwon, 1 (SSWU); ditto, Mt. Myeongjisan, 23.IX.1989, HM Park, 1 (SSWU); Goyang-si, Jangheung-myeon, 8.VIII.1993, KR Kwon, 1 (SSWU); Gunpo-si, Mt. Surisan, 28.VI.2003, TW Kim, 1 (SSWU); Gwangju-si, 7.VIII.1981, YJ Jang, 1 (SSWU); Kiheung-si, 12.VII.1999, DS Ku, 1 (SSWU); Hwaseong-si, Songsan-myeon, Sagang-ri, 25.VII.1968, SH Kim, 2 (ENHM); Icheon-si, 1.X.1982, MH Go, 1 (SSWU); ditto, Gajwa-ri, 13.VIII.1984, HK Park, 1 (SSWU); ditto, Jangrok-ri, 24.VII.1984, SS Lee, 2 (SSWU); Incheon-si, Buk-gu, Sipjeong-dong, 7.VII.1984, HW Im, 1 (SSWU); ditto, Namdong-gu, Sorae-dong, 19.VIII.1965, HJ Go, 1 (ENHM); ditto, Ongjin-gun, Baekryeongdo, 25.VII.1987, HJ Yu & JI Kim, 7 (SSWU); ditto, Daecheongdo, 14.VI.1990, IY Han, 1 (SSWU); ditto, Daecheong-ri, 11.VII.1990, EJ Jo, 1 (SSWU); ditto, Deokjeokdo, 5-7.VII.1981, Y Kim et al., 20 (SSWU); ditto, Seopo-ri, 5-7.VII.1981, JI Kim et al., 22 (SSWU); ditto, Buk-ri, 7.VII.1981, MH Seo, 1 (SSWU); Namyangju-si, Daeseong-ri, 3.IV.1983, JS Choe, 1 (SSWU); ditto, Ipseok, 3.XI.1968, HS Mun, 1 (ENHM); ditto, Jinjeop-eup, Gwangreung, 7.VI.1964, HK Choe, 1 (ENHM); ditto, 7.VII.1964, YJ Kim, 2 (ENHM); ditto, 10.X.1966, SL Jeon, 2 (ENHM); ditto, Joan-myeon, Mt. Ungilsan, 17.VII.1985, MC Lee, 1 (SSWU); ditto, Hwado-eup, Mt. Cheonmasan, 9.VI.1962, WI Jeong, 1 (ENHM); ditto, 15.X.1983, MW Im, 1 (SSWU); ditto, Maseok, 15.VII.1986, KJ Lee, 1 (SSWU); ditto, Pyeongnae-dong, 12.VI.1971, JW Seo, 1 (ENHM); ditto, 3.V.1984, JS Sin, 1 (ENHM); ditto, Saeteo, 15.VII.1983, ME Song, 2 (SSWU); ditto, Sudong-myeon, 23.VI.1993, SJ Yun, 3 (ENHM); ditto, Mt. Chukryeongsan, 11.VI.1983, YE Jang, 1

(SSWU); Paju-si, Ilyeong, 13.VIII.1994, JY Kim, 1 (SSWU); Pocheon-si, 22.VIII.1968, CH Lee, 1 (ENHM); ditto, 27.VII.1995, KC Seong, 1 (SSWU); ditto, Gwangreung, 25.VII.1981, MS Jeon, 3 (SSWU); ditto, Mt. Jukyeopsan, 20.V.1969, DH Na, 1 (ENHM); Pyeongtaek-si, Anjung-myeon, 28-29.VII.1992, JW Mun, 2 (SSWU); ditto, Daean-myeon, 4.V.1998, TM Han, 1 (SSWU); Seongnam-si, Bundang-gu, Gumi-dong, 27.V.1998, MK Kim, 2 (SSWU); ditto, 22.VIII.1998, MJ Kim, 1 (SSWU); ditto, Imae-dong, 9.VII.1994, SY Kim, 1 (SSWU); ditto, Migeum-dong, 3.IX.1998, MK Kim, 2 (SSWU); ditto, Seohyeon-dong, 3.IX.1998, EK An, 1 (SSWU); Seoul: Dobong-gu, Mt. Bukhansan, 29.VIII.1995, MS Ham, 1 (SSWU); Eunpyeong-gu, Bulgwang-dong, 22.VI.1960, YH Kim, 1 (ENHM); ditto, Daejo-dong, 14.VII.1985, OJ Lee, 1 (SSWU); ditto, Galhyeon-dong, 8.VII.1981, HY Jeong, 1 (SSWU); ditto, 7.VIII.1993, KH Kwon, 1 (SSWU); ditto, Nokbeon-dong, 10.VIII.1990, HJ Park, 1 (SSWU); Gangbuk-gu, Ui-dong, 4.IX.1965, HJ Lee, 1 (ENHM); Gangdong-gu, Godeok-dong, 2.VII.1987, SY Choe, 1 (SSWU); ditto, Myeongil-dong, 28.VI.1982, JI Kim, 2 (SSWU); ditto, Sangil-dong, 22.VIII.1995, MR Yun, 1 (SSWU); Gangnam-gu, Gaepo-dong, 10.VII.1987, HK Park, 1 (SSWU); ditto, Wonji-dong, 14.IX.1985, BS Han, 1 (SSWU); ditto, Heuninreung, 30.IX.1984, YM Lee, 1 (SSWU); Gangseo-gu, Banghwa-dong, 25.VII.1992, SL Nam, 1 (SSWU); Guro-gu, Oryu-dong, 20.VIII.1966, MJ Lee, 1 (ENHM); Nowon-gu, Hagye-dong, 26.VII.1998, HJ Yun, 1 (SSWU); Seocho-gu, Mt. Cheongyesan, 8.VII.1989, YJ Oh, 1 (SSWU); ditto, 11.VIII.1993, JY Im, 1 (SSWU); ditto, Yangjae-dong, Mt.

Guryongsan, 14.VIII.1994, JY Im, 1 (SSWU); Seodaemun-gu, Bongwon-dong, Mt. Ansan, 20.VIII.1964, HK Choe, 1 (ENHM); ditto, Bukahyeon-dong, 1.VII.1960, OJ Han, 1 (ENHM); ditto, Ehwa Woman's Univ., 18.VI.1970, YS Yun, 1 (ENHM); ditto, 28.VIII.1980, SJ Yun, 1 (ENHM); ditto, 10.IX.1980, SJ Yun, 1 (ENHM); ditto, Sinchon, 25.VIII.1969, AS Yun, 1 (ENHM); Suwon-si, 6.VII.1929, S Muramatsu, 2 (SSWU); ditto, 25.VI.1960, ?, 1 (SNU); ditto, 3.VIII.1966, JH Sim, 1 (ENHM); ditto, 5.VII.1983, DS Ryu, 1 (SNU); ditto, 16.VII.1997, ?, 1 (NIAST); ditto, Seoul Nat. Univ., 13.VIII.1995, MS Ham, 3 (SSWU); Uijeongbu-si, Gosan-dong, 23.VIII.1992, EA Choe, 1 (SSWU); Yangju-si, Nam-myeon, 30.VIII.1997, HJ Lee, 1 (SSWU); Yangpyeong-gun, Yangpyeong-eup, 19.VIII.1998, JY Park, 1 (SSWU); Yongin-si, 5.V.1993, HJ Lee, 1 (SNU). GN Busan-si, 1.VII.1979, HJ Kim, 1 (ENHM); Changnyeong-si, Mt. Yeongsan, 28.VI.1987, HW Yun, 2 (SSWU); Changwon-si, 1.VII.1988, SD Yeo, 2 (SSWU); Eonyang-si, Jakcheonjeong, 29.VII.1990, SY Choe, 1 (SSWU); ditto, Temple Tongdosa, 11.VIII.1990, JE Sin, 2 (SSWU); Geojaedo, 30.VI.1964, JM Bae, 1 (ENHM); Goseong-gun, Hoehwa-myeon, 20.VII.1994, YJ Kim, 1 (SSWU); Jinhae-si, Mt. Jangboksan, 10.VIII.1988, ?, 1 (SSWU); Jinju-si, Daean-dong, 20.VII.1964, HE Kim, 1 (ENHM); ditto, Gajwa-dong, 26.VII.1996, HJ Jeong, 2 (SSWU); Masan-si, Mt. Muhaksan, 1.VII.1992, ?, 1 (SSWU); Namhae-si, Geumcheon, 26.VII.1983, SH Kim, 1 (SSWU); Sancheong-gun, Mt. Jirisan, Georim Valley, 7.VII.1989, SH Jeon, 2 (SSWU); ditto, Jungsan-ri, 31.VII.1981, JI Kim, 1 (SSWU); Sangju-si, 15.VII.1981, IS Lee, 1 (SSWU); Wulju-gun, Doseo-myeon, 12.IX.1992,

HJ Choe, 1 (SSWU); Wulsan-si, Taehwa, 10.VIII.1990, SY Choe, 1 (SSWU). **GW** Cheolwon-gun, Mt. Myeongseongsan, 12.VIII.1999, JI Kim, 1 (SSWU); Chuncheon-si, Gangchon-ri, 5.VII.1975, EH Lee, 1 (SSWU); ditto, Hupyeong-dong, Hanrim Univ., 6.VII.2003, JK Lee, 2 (SSWU); ditto, Nam-myeon, Namiseom, 5.VI.1977, EK Ju, 1 (ENHM); Gangreung-si, Jukheun-dong, 22.VII.1997, YJ Choe, 1 (SSWU); ditto, Yeongok-myeon, 12.VIII.1995, YJ Baek, 2 (SSWU); ditto, Samsan-ri, Buyeon resort, 18.VIII.2001, AY Kim, 2 (SSWU); Inje-gun, Mt. Seoraksan, 8.VII.1994, SY Lee, 1 (SNU); Wonju-si, Guirye-ri, 5.VII.1996, JI Kim, 1 (SSWU); ditto, Heungeop-myeon, Maeji-ri, ?.VI.1996, JI Kim, 1 (SSWU); ditto, 30.VII.1997, JI Kim, 1 (SSWU); ditto, Mt. Chiaksan, 19.VII.1998, SA Kim, 1 (SSWU); ditto, 15.VI.1999, JI Kim et al., 3 (SSWU). **JB** Buan-gun, Byeonsanbando, 24-25.VI.1991, HJ Jo et al., 19 (SSWU); ditto, Sannae-myeon, 26-28.VI.1990, OJ Lee, 3 (SSWU); Gochang-gun, Mt. Seonwunsan, 25.VI.1991, HJ Jo, 1 (SSWU); Iksan-si, Yeosan, 5.VII.1991, SJ Yun, 1 (ENHM); Jeonju-si, 26.VII.1969, OJ Kim, 1 (ENHM); Kimjae-si, Buyong, 28.VII.1984, KS Jang, 16 (SSWU); Jeongeup-si, Mt. Naejangsan, 2-8.VIII.1989, EJ Jeong, 7 (SSWU); ditto, 19.VII.1998, TM Han, 1 (SSWU); Wanju-gun, Yongdeok-eup, 26.VII.1996, CH Lee, 4 (SSWU). **JJ.** Jeju-si, 27.VII.1985, MG Park, 2 (SSWU); ditto, Oedo-dong, 21.VIII.1996, HJ Jeong, 1 (SSWU); Bukjeju-gun, 25.VI.1993, RGO, 2 (NIAST); ditto, 10.VII.1993, RGO, 1 (NIAST); Geumyeong Beach, 4.VIII.1989, MH Cha, 1 (SSWU); Jeju International Airport, 16.VIII.1998, JK Lee, 1 (SSWU); Namjeju-gun, Mureung-ri, 7.VIII.1999, SY Kim, 3 (SSWU); Seogwipo-si,

13.VII.1979, SJ Yun, 1 (ENHM); ditto, Mt. Hallasan, 7.VIII.1989, JH Park, 1 (SSWU); ditto, Jungmun, 30.VII.1973, YO Lee, 1 (ENHM); ditto, 27.VI.1994, HW Seol, 1 (SSWU); ditto, Topyeong, 15.VII.1994, HJ Moon, 1 (SSWU); ditto, Yeorae-dong, 6-7.VIII.1999, SY Kim, 3 (SSWU); Seongsanpo, Susan, 17.VIII.1991, KM Go, 1 (SSWU). **JN** Boseong-si, Yedang, 9.VIII.1987, K Park, 2 (SSWU); Donggwangyang, Taein, 20.VIII.1994, HJ Jeong, 1 (SSWU); Gwangju-si, Mt. Mudeungsan, 15.VIII.1996, JH Choe, 1 (SSWU); Gwangyang-si, Mt. Baekwunsan, 11.VIII.1993, SY Kim, 1 (SSWU); Haenam-gun, Samsan-myeon, Mt. Duryunsan, 6.VII.1991, SJ Yun, 7 (ENHM); Jindo-gun, Jindo, 28.VII.1983, JI Kim, 1 (SSWU); Mokpo-si, Mt. Yudalsan, 12.VII.1985, YK Min, 1 (SSWU); Namwon-si, Mt. Jirisan, Baemsagol, 29.VII.1998, TM Han, 1 (SSWU); ditto, 14.VII.1970, HK Kim, 2 (ENHM); Wando-gun, Sinji-do, 6.VIII.1987, OJ Lee, 1 (SSWU); ditto, Soando, 3.VIII.1995, MR Yun, 1 (SSWU); ditto, Wando-eup, 7.VII.1982, EM Lee, 1 (SSWU); Yeonggwang-gun, Anmado, 18-19.VIII.1989, JI Kim, 4 (SSWU); ditto, Songido, 16.VIII.1989, JI Kim, 1 (SSWU); Yeosu-si, Nam-myeon, Dumo-ri, 19.VII.1993, DS Ku et al., 3 (SSWU); ditto, Mohwa-ri, 20.VII.1993, GY Park, 1 (SSWU); ditto, Wuhak-ri, 19.VII.1993, BR Go, 1 (SSWU); ditto, Dolsan-eup, Yulrim-ri, Impo, 18.VII.1993, BR Go, 3 (SSWU). **Japan** Akiyoshi-dai, 8.VII.1998, TW Kim, 9 (SSWU).

Distribution. Amur, China, Japan, Korea, Taiwan, Tibet.

Biological note. This species appear once a year. They hibernate as the third larva and the adults occure at June or July (Bishop, 2008).

Holotrichia niponensis (Lewis) 큰다색풍뎅이

(Pl. II. Fig. II-4: H; Pl. III. Fig. III-4: B)

Lachnosterna niponensis Lewis, 1895: 398 [Pusan (Korea) and Japan].

Korean records. *Holotrichia niponensis*: Niijima and Kinoshita, 1923: 54; Miwa and Chûjô, 1939: 64; Cho, 1957: 298; KZS, 1968: 137; Kim and Lee, 1991a: 66; ESK and KSAE, 1994: 150 (큰다색풍뎅이); Kim, 2000a: 15; 2001: 36; Kim et al., 2005: 79.

Holotrichia titans Reitter: Niijima and Kinoshita, 1927: 18; Maruta, 1929: 368; Kamijo, 1932: 21; Miwa and Chûjô, 1939: 65; Murayama, 1954: 111; Cho, 1957: 299; 1963: 218; 1969: 668; Cho et al., 1968: 264; KZS, 1968: 137; Kim and Kim, 1972a: 84; Kim and Nam, 1977: 130; 1982b: 276; 1984a: 103; 1984b: 328; Nam and Kim, 1982: 129; Yoon et al., 1990: 110; Park et al., 1993: 178.

Lachnosterna titanis: KSPP, 1972: 207; Kim, 1978: 337; Yoon and Nam, 1980: 149; Kim and Nam, 1982b: 276.

Eotrichia titanis: Yoon and Nam, 1980: 149; Stebnicka, 1980: 270; ESK and KSAE, 1994: 150; Kim, 1995b: 139; Kim and Kim, 1996: 127.

Lachnosterna nipponensis: Nomura, 1960: 65; Stebnicka, 1980: 207 (*L. nipponensis* Murayama).

Description. Body length 19-22.25 mm; Width 10.25-12 mm; Club-footstalk ratio 0.71-0.97; Pronotum ratio 0.54-0.59; Pronotum-elytra ratio 0.3-0.32; Metafemur ratio 0.31-0.34; Metatibia ratio 0.1-0.13; Pygidium ratio 0.67-0.71.

Body somewhat large (> 19 mm), elongated oval, wide at posterior, yellowish brown to reddish brown, surface opaque.

Head densely punctate. Anterior margin of clypeus emarginated and feebly reflexed. Frontoclypeal suture distinct. Frons slightly convex, posterior one fourth bald without punctation. Eye to interocular space ratio 0.44-0.5. Ocular canthus setaceous. Antennae 10-segmented; club composed last three segments, shorter than remaining segments combined in both sexes. Maxillary palp short, last segment club shape without seta.

Pronotum convex with dense shallow punctation, widest at middle, lateral margin setaceous, half of lateral margins almost parallel backward, anterior and posterior angles bluntly rounded. Scutellum glabrous, almost semicircular, somewhat ogival posteriorly, flat with fine punctation scattered on the sides.

Elytra somewhat pale and thin, with four vague costae, punctures scattered mainly on intervals, lateral margin with a low of setae.

Ventral side shinny, covered with dense yellowish hairs from pro- to metathorax. Prosternum punctate on the center with hairs. Six abdominal sternites overally glossy, visibles with fine punctation, first and second with hair, third to fifth sternite with rare hair. Pygidium slightly convexed, punctate with a low of setae on ventral margin.

Legs long and slender. Pro- and mesotrochanter adjacent, metatrochanter separated almost as wide as mesofemur. Protibia tridentate, anterior tarsal claws symmetrical in both sexes. Basal joint

of hind tarsi shorter than second one. Spur adjacent to metatarsus slightly shorter than first tarsi. Aedeagus: Pl. III. Fig. III-4: B.

Specimen Examined. CB Chungju-si, Suanbo, 17.V.1999, TH Kang, 1♂ (SSWU); Jecheon-si, Mt. Woraksan, 11.VII.1991, SB Kim, 1♂ (SSWU). **CN** Daejeon-si: Dong-gu, Mt. Indansan, 4.V.1997, HJ Im, 1♀ (SSWU); ditto, Shinsong-dong, 16.IV.1993, SL Ahn, 2♀ (NSM). **GG** Bucheon-si, Sosa, 2.V.1965, KS Kim, 1♀ (ENHM); Ganghwa-gun, 8.V.1983, YM Nam, 1♂ (ENHM); ditto, Temple Bomunsa, 5.V.1957, K.C.O., 3♂ (ENHM); ditto, Mt. Marisan, 28.IV.1979, SJ Min, 1♀ (ENHM); Gapyeong-gun, 10.V.1977, KY Mun, 1♂ (SSWU); ditto, Mt. Godongsan, 2.V.1981, KS Park, 1♂ (ENHM); ditto, Daeseongri, 15.V.1983, HS Choe, 1♂ (ENHM); ditto, 4.VI.2000, AY Kim, 1♂ (SSWU); ditto, 21.VI.1975, JH Mun, 1♀ (ENHM); ditto, Oeseo-myeon, Mt. Hwayasan, 4.V.1991, SM Kim, 1♀ (ENHM). Goyang-si, Jangheung-myeon, 8.VIII.1993, KR Kwon, 2♂ (SSWU); ditto, Seoreung, 25.V.1963, YJ Oh, 1♀ (ENHM); Gwacheon-si, 21.V.1991, KH Lee, 1♂ (ENHM); Hanam-si: Mt. Geomdansan, 15.V.1999, SJ Na, 1♂ (SSWU); Incheon-si: Dong-gu, Manseok-dong, Jakyakdo, 30.V.1965, MJ Kim, 2♀ (ENHM); Namyangju-si, Gwangreung, 15.V.1965, JH Go, 1♂ (ENHM); ditto, 15.V.1971, HS Yeon, 1♀ (ENHM); ditto, 29.V.1983, SS Jeong, 1♀ (SSWU); ditto, Mt. Cheonmasan, 9.V.1987, JH Song, 1♀ (ENHM); ditto, 8.VI.1963, HS Choe, 1♀ (ENHM); ditto, 19.VI.1965, MS Lee, 1♀ (ENHM); ditto, Geumgok-dong, Hongyureung, 6.VI.1963, MY Han, 1♀ (ENHM); ditto, 27.IV.1961, MJ Lee, 1♂ (SSWU); ditto, Pyeongnae-dong, 4.V.1984, KS Lee, 1 (ENHM); Pocheon-si, Kangsibong, 2.V.1997, JI

Kim, 1♀ (SSWU); ditto, Gwangreung, 12.IV.1986, HM Park, 1♀ (SSWU); ditto, Mt. Wangbangsan, 5.V.1991, MJ Kim, 1♀ (SSWU); Seoul: 26.IV.1935, ?, 1♂ (SSWU); Dobong-gu, Mt. Dobongsan, 16.V.1959, YI Kim, 1♀ (ENHM); ditto, 17.V.1960, HJ Kim, 1♂ (ENHM); Dongdaemun-gu, Cheongryangri-2-dong, Hongreung, 5.IX.1965, SJ Choe, 3♀ (ENHM); ditto, 27.IV.1961, JH Jang, 1♀ (SSWU); Eunpyeong-gu, Susaek-dong, 16.IV.1977, YH Mun, 1♂ (ENHM); ditto, Shinsa-dong, Saejeol, 28.IV.1959, CM Im, 1♀ (ENHM); Gangbuk-gu, Mia-dong, 6.VI.1979, TJ Jeon, 1♀ (ENHM); ditto, Wui-dong, 12.V.1959, JK Choe, 1 (ENHM); Gangdong-gu, Sangil-dong, 30.IV.1995, MR Yun, 1♂ (SSWU); Gangnam-gu, Heoninreung, 20.IV.1985, KS Jang, 1♀ (SSWU); Gangseo-gu, Deungchon-dong, 5.VI.1981, HH Jeong, 1♀ (ENHM); ditto, Hwagok-dong, 11.V.1983, YO Na, 1 (ENHM); Gwanak-gu, Mt. Gwanaksan, 24.V.1987, JY Lee, 1 (ENHM); ditto, 5-13.VI.1965, JS Byeon, 2 (ENHM); Gwangjin-gu, Children's Grand Park, 11.V.1999, TM Han, 1♂ (SSWU); Jongro-gu, Mt. Inwangsan, 16.VI.1963, KH Ahn, 1♀ (ENHM); ditto, 14.IV.1977, SH Lee, 1♂ (SSWU); ditto, Gahoe-dong, 30.V.1959, JI Son, 1♀ (ENHM); ditto, Hyehwa-dong, 25.IV.1965, JS Kim, 1♀ (ENHM); ditto, Shinyeong-dong, Segeomjeong, 7.V.1969, HS Lee, 1 (ENHM); ditto, Pyeongchang-dong, Temple Seungasa, 11.V.?, RJ Kim, 1♂ (ENHM); Jungrang-gu, Shinnae-dong, 25.V.2001, SM Lee, 1♂ (SSWU); Nowon-gu, Gongreung-dong, Taereung, 20.IV.1968, KS Park, 1 (ENHM); ditto, Sanggye-dong, 7.V.1969, HJ Kim, 1♀ (ENHM); ditto, Mt. Suraksan, 15.IV.1989, HR No, 1♂ (SSWU); ditto, 9.V.1998, JH Kim, 1♂ (SSWU);

ditto, 28.V.1997, KJ Choe, 1♂ (SSWU); Seocho-gu, Mt. Chongyesan, 7.V.1972, HM Lee, 1♀ (ENHM); Seodaemun-gu, Bongwon-dong, 23.IV.1971, EJ Lee, 1♀ (ENHM); ditto, Mt. Ansan, Temple Bongwonsa, 28.IV.1959, YJ Mun, 1 (ENHM); ditto, 21.IV.1959, ES Kim, 1♂ (ENHM); ditto, 18.IV.1965, WY Lee, 1♂ (ENHM); ditto, 26.V.1985, KS Kim, 1 (ENHM); ditto, Yonsei Univ., 10.V.1965, HJ Go, 1 (ENHM); ditto, Yeonhui-dong, 20.V.1965, MJ Park, 1 (ENHM); ditto, 20.V.1965, JH Lee, 1 (ENHM); ditto, Ehwa Woman's Univ., 29.IV.1959, YE Jeong, 2♀ (ENHM); ditto, 20.VI.1959, CM, 1 (ENHM); ditto, 19.V.1963, OR Lee, 1 (ENHM); ditto, 10.V.1965, JJ Ahn, 1♀ (ENHM); ditto, 26.V.1965, MJ Park, 1♂ (ENHM); ditto, 16.IV.1971, HS Im, 1♀ (ENHM); ditto, 20.IV.1971, JH Kim, 1♀ (ENHM); ditto, 8.V.1971, EJ Lee, 1 (ENHM); ditto, 1.VI.1971, YJ Park, 1 (ENHM); ditto, 5.VI.1971, MH Lee, 1♀ (ENHM); ditto, 12.IV.1979, SJ Yoon, 4 (ENHM); ditto, 16.IV.1983, KH Park, 1 (ENHM); ditto, 20.V.1983, KJ Min, 1 (ENHM); ditto, 8.V.1985, HJ Kwon, 1♂ (SSWU); ditto, 13.V.1987, IM Choe, 1 (ENHM); ditto, 14.V.1991, JH Seong, 1♂ (ENHM); ditto, Hongeun-dong, 16.V.1985, JE Kim, 1 (ENHM); Seongbuk-gu, Donam-dong, 13.IV.1991, SH Im, 1♂ (SSWU); ditto, Dongseon-dong, 28.IV.1987, MS Kim, 1♂ (SSWU); ditto, 23.IV.1991, ES Park, 1♂ (SSWU); ditto, Sungshin Women's Univ., 25.IV.1981, SH Lee, 1♀ (SSWU); ditto, 4.V.1987, K Park, 1♂ (SSWU); ditto, 30.IV.1993, YM Choe, 1♀ (SSWU); ditto, 6.V.1993, OJ Lee, 1♂ (SSWU); ditto, 20.IV.1999, TW Kim, 1♀ (SSWU); ditto, 9.V.2001, SA Ahn, 1♂ (SSWU); ditto, Jeongreung, 9.VI.1959, YH Choe, 1♂ (ENHM); ditto, 25.VI.1959, MJ Mun, 1♀ (ENHM); ditto, 13.V.1961, SH Han, 1

(ENHM); ditto, 5.V.1963, JH Hwang, 1♀ (ENHM); Songpa-gu, Ahyeon, 21.V.1998, EY Kim, 1♂ (SSWU); Yangcheon-gu, Mt. Yongwangsan, 28.V.1993, ME Jang, 1♂ (SSWU); Yongsan-gu, Hoegi-dong, Mt. Namsan, YC Jeon, 1 (ENHM); seongnam-si, Namhansanseong, Temple Baekyeonsa, 27.V.1961, HS Oh, 1 (ENHM); Suwon-si: 10.V.1979, CO Jang, 1♂ (ENHM); ditto, Agri. Seoul Nat. Univ., 11.V.1997, YJ Choe, 1♂ (SSWU); ditto, 29.V.1999, YJ Lee, 1♀ (SSWU); Yangpyeong-gun, Yongmun-myeon, 10.V.1987, YH Lee, 1♂ (SSWU). **GW** Chuncheon-si, Namsan-myeon, Gangchon, 31.V.1983, YM Jo, 1♂ (ENHM); Inje-gun, Mt. Seoraksan, 11.V.1991, JK Choe, 1♀ (ENHM); ditto, Mt. Gachilbong, 12.VI.1997, JH Lee et al., 1♀ (SSWU); Naeseorak, Yongdae-ri, 28.V.1983, JI Kim, 1♂ (SSWU); Taebaek-si, Mt. Taebaeksan, 2.V.1999, MJ Lee, 1♂ (SSWU). **HN** Mt. Guwolsan, 15.VII.1996, ?, 1♂3♀ (NSM). **JB** Muju-gun, Seolcheon-myeon, 25.IV.1965, EJ Lee, 1♂ (SSWU); ditto, daebul-ri, 26.V.1993, JY Im, 1♂ (SSWU). **JJ** Jejudo: Mt. Hallasan, 8.V.1965, JJ Im, 1 (ENHM); GSNU, 9.IV.1999, DW Lee, 1♂3♀ (SSWU); Bukjeju-gun, Shinyang, 20.VII.1994, HJ Mun, 1♀ (SSWU); ditto, Aewol-eup, 8.VII.1965, MJ Jang, 2♀ (ENHM); Namjeju-gun, Seongsan-eup, 5.V.1997, YE Kim, 1♀ (SSWU); Seogwipo-si, 5.VI.1977, SR Han, 2♀ (ENHM); ditto, Saekdal-dong, Shila Hotel, 26.IV.2003, AY Kim, 1♀ (SSWU).

Distribution. China, E. Siberia, Japan, Korea.

Holotrichia ernesti Reitter 꼬마붙이검정풍뎅이

(Pl. II. Fig. II-5: B, C; Pl. III. Fig. III-4: C)

Holotrichia ernesti Reitter, 1901 (1902): 177.

Holotrichia ussuriensis S. I. Medvedev, 1951: 305.

Korean records. *Holotrichia ernesti*: Murayama, 1941c: 80; 1954: 120; Cho, 1969: 669; Stebnicka, 1980: 266; Kim and Lee, 1991a: 67; Kim, 1993: 62; 2000a: 16; 2000b: 132; 2001: 40; Park and Kim, 1993: 112; ESK and KSAE, 1994: 150 (꼬마붙이검정풍뎅이).

Holotrichia (Holotrichia) ernesti: Löbl and Smetana, 2006: 218.

Description. Body length 16.45-19.4mm; Width 8.8-9.68mm; Club-footstalk ratio 1.03-1.12 (♂), 0.63-0.69 (♀); Pronotum ratio 0.6-0.66; Pronotum-elytra ratio 0.32-0.35; Metafemur ratio 0.3-0.36; Metatibia ratio 0.13-0.16; Pygidium ratio 0.62-0.64 (♂), 0.68-0.77 (♀).

Body elongated oval, wide at posterior, dark brown to black, surface glabrous.

Head small, with dense punctation. Anterior margin of clypeus emarginated and feebly reflexed, lateral narrowed forward. Frontoclypeal suture distinct. Frons slightly convex. Eye to interocular space ratio 0.51-0.6. Ocular canthus setaceous. Antennae dark brown, 10-segmented; club composed last three segments, a little shorter than remaining segments combined. Maxillary palp short, last segment without seta.

Pronotum slightly convex with puctation, widest at middle, half of lateral margins almost parallel backward, anterior and posterior angles bluntly rounded, lateral margin carinate with setae. Scutellum almost semicircular, with fine punctation scattered on the sides.

Elytra glabrous with four costae, punctures scattered mainly on intervals, lateral margin feebly setaceous.

Ventral side glabrous, covered with dense yellowish hairs from pro- to metathorax. Prosternum opaque without hair and punctation. Abdominal sternites with few hairs, six sternites visible. Penultimate sternite of abdomen with a pruinose patch at each side. Pygidium convexed medially, slightly visible at ventral side in both sexes.

Legs long and slender. Pro- and mesotrochanter adjacent, metatrochanter separated almost as wide as mesofemur. Protibia tridentate, anterior tarsal claws symmetrical in both sexes. Basal joint of hind tarsi slightly shorter than 2nd one. Aedeagus: Pl. III. Fig. III-4: C.

Specimen Examined. **GB** Wuljin-gun, Onjeong-myeon, Mt. Baekamsan, 29.V.1999, JI Kim et al., 11♂4♀ (SSWU); yeongyang-gun, Mt. Ilwolsan, 20.VI.1997, YB Cho, 2♂ (SSWU). **GG** Hanam-si, Gogol, 18.VI.1975, YS Choe, 1♀ (SSWU). **GW** Wonju-si, Mt. Chiaksan, 6.V.1973, SM Lee, 1♂ (SSWU); Taebaek-si, Mt. Taebaeksan, 5.VIII.1961, WJ Kim, 1♀ (SSWU).

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

Holotrichia kiotoensis Brenske 검정풍뎅이

Holotrichia kiotoensis Brenske, 1894: 68.

Lachnosterna inelegans Lewis, 1895: 396 (Pusan).

Holotrichia waterhousei Brenske, 1894: 68.

Korean records. *Holotrichia kiotoensis*: Yoshino, 1935a: 14; Murayama, 1937: 35; 1954: 110; Miwa and Chûjô, 1939: 64; Takahashi, 1941: 231;

Cho, 1957: 298 (*kiotonsis*); 1969: 668; Won and Choi, 1968: 379; KZS, 1968: 137 (검정풍뎅이); Stebnicka, 1980: 208; ESK and KSAE, 1994: 150; Kim, 2001: 43; Kim et al., 2005: 79.

Lachinosterna kiotonensis: Nomura, 1960: 64.

Holotrichia (Holotrichia) kiotonensis: Löbl and Smetana, 2006: 218.

Description. Body length 19-19.5mm; Width 10.2-10.5mm.

Body elongated oval, wide at posterior, dark brown to black, surface shinny.

Head medium, with dense punctation. Anterior margin of clypeus emarginated and feebly reflexed, lateral narrowed forward. Frontoclypeal suture distinct. Frons slightly convex. Ocular canthus setaceous. Antennae yellowish brown, 10-segmented; club composed last three segments, as long as 2-7 segments combined in male, shorter than that in female. Maxillary palp short, last segment without seta.

Pronotum slightly convex with puctation, widest at middle, half of lateral margins almost parallel backward, anterior and posterior angles bluntly rounded, lateral margin carinate with setae. Scutellum almost semicircular, with fine punctation scattered on the sides.

Elytra glabrous with four costae, punctures scattered mainly on intervals, lateral margin feebly setaceous.

Ventral side glabrous, covered with dense yellowish hairs from pro- to metathorax. Prosternum opaque without hair and punctation. Abdominal sternites with few hairs, six sternites visible. Penultimate

sternite of abdomen with a pruinose patch at each side. Pygidium convexed medially, slightly visible at ventral side in both sexes.

Legs long and slender. Pro- and mesotrochanter adjacent, metatrochanter separated almost as wide as mesofemur. Protibia tridentate, anterior tarsal claws symmetrical in both sexes. Basal joint of hind tarsi slightly shorter than second one.

Specimen Examined. none for Korean. **Japan** Higo, Mt. Aso, 13.VIII.1961, Y Miyake, 1♂ (SSWU); Tokyo, Suginami, 7.VI.1955, N Fukuhara, 1♀ (SSWU).

Distribution. China, Japan, Korea, Russia (Far east), Thailand.

Remark. This is very similar to *H. ernesti* or the female of *H. diomphalia*, but more similar to former with the male aedeagus and the middle of pygidium elevated. I couldn't examine Korean sample but two Japanese sample. There are many records of Korean distrinbution, but most of them are citations. Kim (2001a) had doubted the distribution of this species. Murayama (1954) examined one female from Mokpo, and described the male character and the aedeagus by Japanese sample. I couldn't find any *H. kiotoensis* from the examining the specimens of *H. ernesti* and *H. diomphalia*. This species distributes from taiwan to China and Japan, so it is possible that they inhabit in Korean peninsula.

Holotrichia diomphalia (Bates) 참검정풍뎅이

(Pl. II. Fig. II-4: I, Fig. II-5: A; Pl. III. Fig. III-4: D)

Lachnosterna diomphalia Bates, 1888: 373 (Pusan, Korea).

Korean records. *Holotrichia diomphalia*: Niijima and Kinoshita, 1923:

50; Okamoto, 1924: 174; Maruta, 1929: 368; Kamijo, 1932: 21; Eguchi, 1932: 52; Cho, 1934: 75; Haku, 1935: 57; Tomiura and Tomiura, 1935a: 51; 1935b: 238; Masaki, 1936: 260; Mochizuki, 1935: 32; 1936: 211; Mochizuki and Tsunekawa, 1937: 91; Miwa and Chûjô, 1939: 63; Mori and Cho, 1940: 13; Kondo, 1941: 71; Cho, 1947: 65; 1963: 218; 1969: 667 (*dimorphalia*); Murayama, 1941c: 79; 1954: 106; Kim H.K., 1956: 339; 1958: 98 (참검정풍뎅이); Cho et al., 1967: 197; 1968: 264; Won et al., 1968: 379; KZS, 1968: 137; Kim and Kim, 1974: 108; Kim and Nam, 1982a: 155; 1984b: 328; Stebnicka, 1980: 265; Kim and Yoo, 1987b: 505; Kim and Lee, 1991a: 66; 1997: 233; Kim, 1993: 62; 1994: 214; 1995b: 139; 2000a: 16; 2000b: 132; 2001: 40; Park et al., 1993: 178 (*diompharia*); Park and Kim, 1993: 112; ESK and KSAE, 1994: 150; Kim and Kim, 1996: 48; Kim and Kim, 1996: 127; Kim et al, 1999: 129; 2002: 120; 2004: 116.

Lachinosterna diomphalia: Nomura, 1960: 64.

Lachnosterna niponensis: Kim and Yoo, 1987b: 505.

H. (Holotrichia) diomphalia: Löbl and Smetana, 2006: 218.

Description. Body length 16.81-18.87mm; Body width 8.6-9.95mm; Club-footstalk ratio 0.82-0.93 (♂), 0.6-0.77 (♀); Pronotum ratio 0.63-0.65; Pronotum-elytra ratio 0.32-0.36; Metafemur ratio 0.25-0.28 (♂), 0.34-0.37 (♀); Metatibia ratio 0.13-0.14; Pygidium ratio 0.62-0.78.

Body medium sized, elongated oval, wide at posterior, dark brown to black, surface glabrous.

Head small, with dense punctation. Anterior margin of clypeus

emarginated and feebly reflexed. Frontoclypeal suture distinct. Frons slightly convex. Eyes somewhat large, eye to interocular space ratio 0.61-0.71. Ocular canthus setaceous. Antennae 10-segmented; club composed last three segments, in male a little shorter than remaining segments combined, in female as half long as remaining segments combined. Last segment of maxillary palp without seta.

Pronotum slightly convex with puctation, widest at middle, half of lateral margins almost parallel backward, anterior and posterior angles bluntly rounded, lateral margin carinate with setae. Scutellum almost semicircular, with few punctation scattered on the sides.

Elytra somewhat glabrous with four costae, punctures scattered mainly on the intervals, lateral margin feebly setaceous.

Ventral side glabrous, covered with dense yellowish hairs from pro- to metathorax. Abdominal sternites with a few hairs, six sternites visible. Penultimate sternite of abdomen with a pruinose patch at each side. Pygidium strongly convexed at posteriorly with longitudinal groove, visible at ventral side in both sexes.

Legs long and slender. Pro- and mesotrochanter adjacent, metatrochanter separated almost as wide as mesofemur. Femur of female stouter than that of male. Protibia tridentate, anterior tarsal claws symmetrical in both sexes. Basal joint of hind tarsi slightly shorter than 2nd one. Aedeagus: Pl. III. Fig. III-4: D.

Specimen Examined. CB Boeun-gun: Mt. Sokrisan, Hwayang-dong, 12.V.2001, AY Kim, 1♂1♀ (SSWU); Cheongju-si: ?.?.1967, KI Lee, 1♀ (SSWU); Chungju-si: Mt. Woeraksan, 22.V.1998, TM Han & TH Kang,

4♂1♀ (SSWU); Danyang-si: 22.VI.1967, SO Lee, 1♀ (ENHM); Jecheon-si: Mt. Woeraksan, 22.V.1998, TM Han & TH Kang, 1♂ (SSWU); ditto, 11.VII.1991, YL Park & SW Park, 3♂ (SSWU); Okcheon-gun: 15.VII.1969, BS Yuk, 1♂ (ENHM); Gunbuk, Sojeong-ri, 29.V.1991, JI Kim, 1♀ (SSWU); **CN** Buyeo-gun: Mt. Mansusan, 10.VI.1999, TM Han & TH Kang, 2♂1♀ (SSWU); ditto, 19.VII.1999, JI Kim et al., 1♂ (SSWU); Cheonan-si: 23.V.1971, EB Lee, 2 (ENHM); Mt. Gwangdeoksan, 11.V.1991, OJ Lee, 1♂ (SSWU); ditto, 16.VI.1994, HS Choe & SY Kim, 2♂ (SSWU); ditto, 27.VI.1999, TW Kim, 1♂ (SSWU); Mt. Manilsan, 5.IX.1993, YS Kim, 1♀ (SSWU); Daejeon-si: Sinsong-dong, 19.VII.1999, SL Ahn, 1♀ (NSM); Dong-gu, Soho-dong, 8.V.1999, YJ Lee, 1♂ (SSWU); Dangjin-gun: Sudang-ri, 24.VII.1989, SI Kim, 1♂ (SSWU); Gongju-si: Mt. Gyeryongsan, 26.VII.1973, JS Kim, 1♂ (ENHM); ditto, 20.VII.1981, EY Lee, 1♂ (SSWU); Hongseong-gun: 1.VI.1968, MJ Oh, 1♂ (ENHM); Seosan-gun: Mt. Gayasan, 26.V.1990, SH Jeon, 6♂ (SSWU); ditto, 23.V.1994, SW Lee, 1♀ (SSWU); ditto, 26.V.1994, YJ Kim, 1♀ (SSWU); ditto, 9.V.1995, BN Na, 1♀ (SSWU); ditto, 7.VI.1995, BN Na, 1♀ (SSWU); ditto, 5.VI.1996, BS Song, 1♀ (SSWU); ditto, 26.V.1997, BH Hong, 1♀ (SSWU); ditto, 30.V.1997, MJ Kim, 1♀ (SSWU); Taean-gun: Gaui Is., 20.VII.1969, GC Hwang, 1♂1♀ (ENHM). **GB** Daegu-si: 29.VI.1975, SH Yeo, 1♀ (ENHM); ditto, 5.VI.1991, HY Kim, 1♂ (ENHM); Buk-gu, Sankyeok-dong, Gyeongbuk Univ., 23.IV.1985, ?, 1♂ (SSWU); ditto, 25.VI.1989, SH Jeon, 1♀ (SSWU); Dalsan-gun, Yeongdeok, Mt. Baedaesan, 21.VI.1997, YB Jo, 1♂ (SSWU); Kimcheon-si: Daesin-dong, 6.VI.1972, MW Han, 1♂ (ENHM);

Munkyeong-si: Munkyeongsaeje, 26.V.1996, Biology, 1♂ (SSWU); Sangju-si: Yongyu-ri, 2.VIII.1992, SL Nam, 1♂ (SSWU); Wuljin-gun: Onjeong-myeon, Mt. Baekamsan, 28-29.V.1999, HS Sin et al., 19♂10♀ (SSWU); ditto, 2.VIII.1999, JI Kim et al., 1♂ (SSWU); Seo-myeon, Sokwang-ri, 31.VII.1999, JI Kim et al., 1♂ (SSWU); Bulyeonggyegok, 29.V.1999, JI Kim et al., 2♂ (SSWU); Wulsan-si: Dong-gu, Seobu-dong, 14.VIII.1998, JK Lee, 1♂ (SSWU); Yecheon-si: 17.V.1987, JH Song, 2 (ENHM); ditto, 14.VI.1987, JH Song, 1 (ENHM); Yeongju-si: Buseok-myeon, Namdae-ri, Mt. Seondalsan, 29-30.VI.1998, JI Kim et al., 4♂3♀ (SSWU); ditto, Mt. Eoraesan, 30.VI.1998, JI Kim et al., 1♀ (SSWU); Pungki-eup, Mt. Sobaeksan, 6.VI.1981, IY Choe, 1♀ (SSWU); Yeongyang-gun, Mt. Ilwolsan, 22.VII.1997, YB Jo, 1♀ (SSWU). GG Ansan-si: 2.VI.1983, KM Kim, 1 (ENHM); Jungang middle school, 15.VI.1971, EJ Jeong, 1 (ENHM); Anseong-si: 30.V.1983, JH Park, 2 (ENHM); Anyang-si: 16.V.1965, CJ Park, 1♂ (ENHM); ditto, 21.V.1991, YH Son, 1♂1♀ (SSWU); Anyang-5-dong, 14-18.V.1999, JY Seo & JH Lee, 3♀ (SSWU); Bucheon-si: Yeokgok, 29.V.1991, KM Go, 1♀ (SSWU); Mt. Wonmisan, 24.V.2001, YS Yeo, 1♀ (SSWU); Euijeongbu-si: Howon-dong, Mt. Dobongsan, Temple Mangwolsa, 11.VI.1967, KH Im, 1 (ENHM); Ganghwa-gun: Mt. Marisan, 6.VI.1985, YS Oh, 2 (ENHM); Gyodong-myeon, Gyodongdo, 2.VII.1987, JI Kim, 2♂ (SSWU); Kilsang-myeon, Onsu-ri, Temple Jeondeungsa, 6.VI.1981, HH Jeong, 1♂ (ENHM); Gapyeong-gun: Cheongpyeong-myeon, 14.V.1972, JS Yu, 1♀ (ENHM); ditto, 18.VI.1983, KJ Kim, 1♂ (SSWU); Daegok-ri, 26.V.1988, HJ Oh, 1♀ (SSWU); Daeseong-ri, 7-16.VI.1975, JJ Bae, 3♂ (ENHM);

ditto, 24.V.1977, BS Kim, 1♂ (SSWU); ditto, 15.V.1983, KO No, 1 (ENHM); ditto, 4.V.1985, HS Ku, 1 (ENHM); ditto, 3.VI.2000, AY Kim, 1♂ (SSWU); Hyeon-ri, 16.V.1987, JE Kim, 1♂ (SSWU); ditto, 20.VII.1987, HK Kim, 1♂1♀ (SSWU); Mt. Cheongyesan, 23-28.VI.1991, JI Kim, 11♂ (SSWU); ditto, 18.VII.1991, JI Kim, 7♂ (SSWU); Mt. Godongsan, 3.V.1975, HJ Kim, 1♂ (ENHM); ditto, 2.V.1981, IS Yun, 2♂ (ENHM); Mt. Hwayasan, 6.V.1989, JY Lee, 1 (ENHM); Mt. Myeongjisan, 6.V.1972, NS Lee, 1♂ (ENHM); ditto, 14.V.1983, KS Jang, 2♂ (SSWU); ditto, 23.IX.1989, KJ Lee, 1♀ (SSWU); Mt. Yongmunsan, 2.VI.1973, MS Yun, 1♂ (ENHM); ditto, 5.V.1995, EY Kim, 1♂ (SSWU); Sinsang-ri, 3.V.1998, EH Lee, 1♂ (SSWU); Goyang-si: Byeokje, 20.VI.1967, HS Kim, 1♀ (ENHM); ditto, 27.VI.1967, WS Cha, 1♀ (ENHM); ditto, 21.V.1973, SR Ahn, 1♂ (ENHM); ditto, 21.IV.1991, JY Lee, 1♂ (SSWU); Deokyang-gu, Haengjusanseong, 30.IV.1987, YK Kim, 1 (ENHM); ditto, 24.V.1987, YM Lee, 1♀ (SSWU); Ilsan, 2.VI.1973, CH Han, 1♂ (ENHM); ditto, Jeongbalsan, 13.V.1988, SY Kim, 1 (ENHM); Jangheung-myeon, 19.V.1975, KS Jo, 1♂ (ENHM); ditto, 28.VI.1975, JY Kim, 1♀ (ENHM); ditto, 8.VIII.1993, KR Kwon, 1♂ (SSWU); ditto, Songchu, 20.V.1973, SH Hwang, 1♂ (ENHM); ditto, 31.V.1975, HS Kim, 1♀ (ENHM); Seoreung, 3.V.1961, HG Ji, 1♂ (ENHM); ditto, 25.V.1963, YJ Oh, 1 (ENHM); ditto, 23.V.1965, JH Go, 1♀ (ENHM); ditto, 5.VI.1971, OR Kim, 2 (ENHM); ditto, 5.V.?, OE Im, 1♂ (ENHM); Seosamreung, 27.IV.1971, OR Kim, 1 (ENHM); Gwacheon-si: Byeolyang-dong, 5.VI.1993, HY Kim, 2♀ (SSWU); ditto, Seoul Grand Park, 8-21.V.1993, HK Hong et al., 4♂10♀ (SSWU); Gunpo-si: Daeya-2-dong, 23.V.1999, JY Seo, 1♂ (SSWU);

Sokdal-dong, Mt. Surisan, 28.VI.1975, YS Gwak, 1♂ (ENHM); Guri-si, Dongkureung, 12.VI.1971, OL Kim, 1 (ENHM); Gwangju-si: 18.IX.1965, MJ Jang, 1♀ (ENHM); ditto, 3.VI.1984, HJ Jeong, 1 (ENHM); Hanam-si: Changwu-dong, Mt. Goemdansan, 22.V.2001, HY Ok & YS Yeo, 2♂ (SSWU); Gwangam, 7.V.1995, MR Yun, 1♂ (SSWU); Hwaseong-si: Dongtan-myeon, 20.V.1991, MS Park, 1♂ (ENHM); Maesong-myeon, 21.V.1983, JI Kim, 1♂ (SSWU); Icheon-si: Janghowon, 25.V.1979, SE Min, 1♀ (ENHM); Incheon-si: 26.IV.1987, SH Hong, 1 (ENHM); Dong-gu, Manseok-dong, Jakyakdo, 1.VI.1957, SJ Oh, 1♂ (ENHM); ditto, 22.VI.1957, ?, 2♂ (ENHM); ditto, 30.V.1965, MJ Kim, 1♂ (ENHM); Namdong-gu, Nonhyeon-dong, Sorae, 15.V.1965, HJ Go, 2♂ (ENHM); Ongjin-gun, Baekryeongdo, 25-26.VII.1987, HJ Yu, 1♂1♀ (SSWU); ditto, Daecheongdo, 12.VI.1990, IY Han, 1♂1♀ (SSWU); ditto, 11-15.VII.1990, EJ Jo, 6♂ (SSWU); ditto, Deokjeokdo, 28.VII.1955, HK Kim, 2 (ENHM); ditto, 23.VII.1977, SY Nam, 1♂ (SSWU); ditto, Deokjeok-myeon, Seopo-ri, 24.VII.1955, HS Kim, 1♀ (ENHM); ditto, 6-7.VII.1981, HK Park et al., 3♂10♀ (SSWU); ditto, Seonmido, 28.VII.1956, HS Kim, 1♂2♀ (ENHM); Wolmido, 26.IV.1987, SH Hong, 1 (ENHM); ditto, 28.V.1995, HE Go, 1♀ (SSWU); Kiheung-si: 12.VII.1999, DS Ku, 1♂ (SSWU); Kimpo-si: 6.VI.1963, DW Choe, 1 (ENHM); Yangchon-myeon, Yanggok-ri, 20.V.1973, WS Kim, 2♂ (ENHM); Namyangju-si: Byeolnae-myeon, 20.V.1987, KJ Choe, 1 (ENHM); Geumgok-dong, 15.VI.1979, BR Kim, 1♂ (ENHM); ditto, 31.V.1985, JS Ryu, 1 (ENHM); Gwangreung, 9.VI.1957, ?, 1♂ (ENHM); ditto, 6.VI.1961, MS Kim, 1♂ (ENHM); ditto, 10.VI.1961, KS Kim, 1♂2♀ (ENHM); ditto, 17.IV.1965, YJ

Kim, 1♂ (ENHM); ditto, 1.V.1965, HJ Lee, 1♂ (ENHM); ditto, 9.V.1965, YJ Kim, 1♂ (ENHM); ditto, 15.V.1965, MJ Jang, 2♂ (ENHM); ditto, 23.V.1965, WY Lee, 2♂ (ENHM); ditto, 6.VI.1965, MS Lee, 1♂ (ENHM); ditto, 18.VI.1967, MO Lee, 1♀ (ENHM); ditto, 26.VI.1968, HS Jo, 1♂ (ENHM); ditto, 15.V.1971, HS Byeon, 1 (ENHM); ditto, 27.V.1971, IS Bae, 1 (ENHM); ditto, 5.VI.1971, CS Kim, 1 (ENHM); ditto, 3.VI.1972, HM Kim, 1♀ (ENHM); ditto, 9.VI.1973, SA Ho, 1♂ (ENHM); ditto, 6.VI.1981, ML Kim, 1♂ (ENHM); ditto, 30.VI.1981, HA Kim, 1♀ (ENHM); ditto, 29.V.1983, YM No, 1♀ (SSWU); ditto, 6.VI.1987, KJ Oh, 1 (ENHM); ditto, 23.V.1991, KI Bae, 1♂ (ENHM); ditto, 6.V.?, HS Oh, 1 ♀ (ENHM); ditto, 23.VIII.?, JJ Jang, 1♀ (ENHM); Hwado-eup, maseok, 30.VI.1973, MS Park, 1♂1♀ (ENHM); Joan-myeon, Neungnae-ri, 15.V.1975, YH Seok, 1♂ (ENHM); ditto, Paldang, 17.V.1969, GC Hwang, 1♀ (ENHM); ditto, 22.VI.1969, BK Jeong, 1♂ (ENHM); ditto, 16.VI.1973, IJ Ha, 1♂ (ENHM); ditto, Mt. Wunkilsan, 4.V.1989, OJ Lee, 1♂ (SSWU); Saeteo, 22.V.1982, HM Park, 3♂ (SSWU); ditto, 21.V.1983, HR Song, 1 (ENHM); ditto, 12.V.1985, KI Kim, 1 (ENHM); Sudong-myeon, 23.VI.1993, SJ Yun, 4 (ENHM); ditto, Mt. Chukryeongsan, 20.VII.1982, HK Park, 1♂ (SSWU); ditto, 5.V.1983, KS Jang, 1♂ (SSWU); ditto, 16.VIII.1999, DS Ku, 1♂ (SSWU); Pyeongnae, 16.VI.1975, JY Kim, 1♂ (ENHM); ditto, Mt. Cheonmasan, 24.VI.1961, NS Seo, 1♂ (ENHM); ditto, 16.V.1963, CJ Kim, 1♀ (ENHM); ditto, 8.VI.1963, YS Ju, 1♂ (ENHM); ditto, 16.V.1965, SD Lee, 1♀ (ENHM); ditto, 22.V.1965, JS Kim, 1♂ (ENHM); ditto, 30.V.1965, MS Jeong, 1♀ (ENHM); ditto, 13-19.VI.1965, YS Jeong, 2♂ (ENHM); ditto, 4.VI.1967, SJ Lee, 1♂1♀ (ENHM); ditto,

24.VI.1967, SJ Kim, 1♂ (ENHM); ditto, 8.VII.1967, HS Eom, 1♂ (ENHM); ditto, 21.V.1969, JI Song, 2♂ (ENHM); ditto, 2.V.1971, YS Kang, 1 (ENHM); ditto, 30.V.1971, SB Han, 1 (ENHM); ditto, 22.V.1976, Biology, 1♂ (SSWU); ditto, 19.V.1979, EM Kim, 1♂ (ENHM); ditto, 2-14.VI.1979, MS Kim, 2♂1♀ (ENHM); ditto, 12-14.V.1981, HK Park & KS Jang, 3♀ (SSWU); ditto, 13.VI.1981, HS Ku et al., 3♂1♀ (SSWU); ditto, 26.V.1983, HS Kim, 1 (ENHM); ditto, 27.IV.1985, SW Oh, 1 (ENHM); ditto, 10.V.1987, JY Son, 1♂ (SSWU); ditto, 25.V.1987, IO Choe, 1 (ENHM); ditto, 31.V.1989, HK Ku, 1♂ (SSWU); ditto, 2.VIII.1989, JH Hwang, 1♀ (SSWU); ditto, 26.V.1990, KR Choe, 1♀ (ENHM); ditto, 26.V.1990, JH Kim, 1♂ (SSWU); Wabu-eup, Deokso, 21.VI.1969, JI Kim, 1♂ (ENHM); Paju-si: 10.VI.1984, HS Park, 1 (ENHM); Temple Bogwangsa, 10-16.VI.1973, BH Oh & JM Sin, 2♂ (ENHM); ditto, 3.V.1975, NS Kim, 1♂ (ENHM); ditto, 20-25.V.1977, SH Choe & WH Hwang, 2♂1♀ (ENHM); ditto, 10.VI.1977, HS Jeong, 2♂ (ENHM); Geumchon-dong, 28.V.1975, JH Mun, 1♂ (ENHM); Munsan, 15.VI.1969, HS Jang, 1♀ (ENHM); Mt. Papyeongsan, 28.V.1965, JY Lee, 2♂1♀ (ENHM); Wunjeong, 5.V.1973, IR Lee, 1♂ (ENHM); Pocheon-si: Baekwungyegok, 3.VIII.1986, JI Kim, 1♂ (SSWU); Mt. Myeongseongsan, 29.V.1983, BY Kang, 1♀ (SSWU); Mt. Wangbangsan, 15.VI.1979, HJ Kim, 1♂ (SSWU); Pyeongtaek-si: Hyeondeok-myeon, Daean-4-ri, 16.V.1999, TM Han, 3♂ (SSWU); Seongnam-si: Mt. Namhansan, 23.V.1995, JS Kim, 1♂ (SSWU); ditto, 22.V.1999, HS Seong et al., 1♂1♀ (SSWU); Namhansanseong, 7.VI.1975, HN San, 1♂ (ENHM); ditto, 29.V.1982, GH Baek, 1♂ (SSWU); ditto, 1.VIII.1993, JS Yang, 1♀

(SSWU); ditto, 11.IV.1997, KJ Choe, 1♀ (SSWU); Sujeong-gu, Sujin-2-dong, 3.V.1997, DW Jeong, 1♂ (SSWU); Siheung-si: 3.VIII.1972, KE Park, 1♂ (ENHM); Temple Cheonggyesa, 19.V.1989, HN Sim, 1♂ (SSWU); Seoul: Dobong-gu: Banghak-dong, 28.V.1993, HK Choe, 1♀ (ENHM); Dobong-dong, 30.VI.1969, JI Kim, 1♂ (ENHM); Mt. Bukhansan, 3.VII.1987, JE Kim, 1♀ (SSWU); Mt. Choansan, 4.VI.1994, SO Lee, 1♂ (SSWU); Mt. Dobongsan, 16.V.1959, ES Boo, 1♂ (ENHM); ditto, 3.VI.1963, ER Kim, 1♂ (ENHM); ditto, 8.VI.1967, YS Lee, 1 (ENHM); ditto, 15.VI.1979, JS Park, 1♂ (SSWU); ditto, 22.V.1981, OH Park, 1♀ (SSWU); ditto, 18.V.1985, HR No, 1♂ (SSWU); ditto, 29.V.1993, HJ Kim, 2♂ (SSWU); ditto, 21.VI.1997, HJ Kim, 1♂ (SSWU); ditto, 9.V.1998, HJ Park, 1♂ (SSWU); ditto, 29.V.1999, JS Choe, 1♂ (SSWU); ditto, Darakwon, 27.VI.1965, SH Jang, 3♂ (SSWU); ditto, Nanhyangwon, 17.V.1985, JS Kim, 1♂ (SSWU); ditto, 20.V.1991, EJ Han, 1♂ (SSWU); Mt. Suraksan, 12.V.1989, Goo, 1♂ (SSWU); Wolkye-dong, 26.V.1985, MN Park, 1♂ (SSWU); Dongdaemun-gu: Cheongryangri-dong, 27.VI.1959, DS Seo, 1♂ (ENHM); Dapsimri, 23.IV.1967, JS Park, 1♂ (ENHM); Hoeki-dong, 18.V.1994, JY Kim, 1♂ (SSWU); Huikyeong-dong, 7.V.1983, KS Choe, 1 (ENHM); ditto, 28.V.1983, KJ Min, 1 (ENHM); Dongjak-gu: Hukseok-dong, 9.V.1965, SJ Eun, 2♀ (ENHM); Eunpyeong-gu: Bulgwang-dong, 21.VI.1963, YH Chae, 1♂ (ENHM); ditto, 16.VI.1983, SH Park, 1♂ (SSWU); ditto, 20.IV.1999, TW Kim, 1♂ (SSWU); Galhyeon-dong, 30.VI.1979, TS Kim, 1♂ (ENHM); Gupabal, 27.V.1961, SE Kim, 1♂ (ENHM); Jinkwanowe-dong, Temple Jinkwansa, 6.V.1961, KJ Kim & O Jo, 2♂ (ENHM); ditto, 11.V.1963, JJ Lee, 2♀

(ENHM); ditto, 17.IV.1965, SJ Park, 1♂ (ENHM); ditto, 5.VI.1971, YS Han, 1 (ENHM); Mt. Bukhansan, 8.V.1993, KE Jeong, 1♂ (SSWU); Susaek-dong, 12.IX.1964, HK Choe, 1♂ (ENHM); ditto, 30.V.1965, SJ Sin, 1♀ (ENHM); ditto, 8.VI.1977, YH Mun, 2♂ (ENHM); Yeokchon-dong, 20.V.1984, YM Jo, 1♂ (SSWU); Gangbuk-gu: Suyu-dong, 22.V.1965, KH Lee, 4♂ (ENHM); ditto, 14.VIII.1968, HY Lee, 1♂ (ENHM); ditto, 16.VII.1971, IY Kim, 1♂ (ENHM); ditto, 25.IV.1981, YM Park, 1♂ (ENHM); Ui-dong, 18.V.1963, OR Lee & GH Jeong, 1♂1♀ (ENHM); ditto, 4-25.V.1963, SH Jo, 2♂1♀ (ENHM); ditto, 15.V.1965, GS Kim, 1♂ (ENHM); ditto, 20.V.1967, HS Kim, 1♀ (ENHM); ditto, 12.VI.1981, KS Park, 1♀ (ENHM); ditto, Temple Doseonsa, 9.V.1999, K Min, 1♂ (SSWU); Gangdong-gu, Godeok-dong, 10.V.1987, SY Choe, 1♂ (SSWU); Sangil-dong, 1.V.1995, BH Kim, 1♂ (SSWU); ditto, 10.VI.1995, BH Kim, 1♂ (SSWU); ditto, 29.VI.1995, ML Yun, 1♂ (SSWU); Gangnam-gu: Apkujeong-dong, 16.V.1991, HJ Jo, 1♂ (SSWU); Temple Bongeunsa, 9.VI.1963, JJ Yu, 1 (ENHM); Heoninreung, 24.IV.1983, KS Jang, 1♂ (SSWU); Sinsa-dong, 26.V.1985, GJ Baek, 1 (ENHM); ditto, Wonji-dong, 14.IX.1985, YH Kim, 1♂ (SSWU); ditto, Mt. Cheonggyesan, 1.VI.1985, HJ Kwon et al., 3♀ (SSWU); ditto, Mt. Daemosan, 20-21.V.1989, EK Jeon & YH No, 2 (ENHM); ditto, Mt. Guryongsan, 5.V.1999, MH Bae, 1♂1♀ (SSWU); Gangseo-gu, Deungchon-dong, 26.V.1981, HH Jeong, 1♂ (ENHM); ditto, 2.VII.1981, ditto, 1♂ (ENHM); ditto, 5.V.1985, MH Park, 1 (ENHM); ditto, 6.VI.1985, KM Min, 2♂ (SSWU); Hwagok-dong, 6.V.1973, YO Lee, 1♂ (ENHM); Guro-gu: Gocheok-dong, 20.V.1987, JY Lee, 1 (ENHM); Mt.

Waryongsan, 21.V.1989, MH Cha, 1♂ (SSWU); Gwanak-gu, Mt. Gwanaksan, 5.VI.1965, JS Byeon, 1♂ (ENHM); ditto, 12.VI.1965, JJ An, 1♀ (ENHM); ditto, 4.VI.1967, JB Im, 1♀ (ENHM); ditto, 12.VI.1967, JK Kim, 1♀ (ENHM); ditto, 24.V.1981, YM Park, 1♂ (ENHM); ditto, 6.VI.1982, KJ Kim, 1♀ (SSWU); ditto, 24.V.1987, RY Kim & JY Kim, 2 (ENHM); ditto, 27.V.1990, JH Kye, 1♀ (SSWU); ditto, 21.V.1991, SM Kim, 1♀ (ENHM); ditto, 10.V.1993, SK Lee & JS Lee, 1♂1♀ (SSWU); ditto, 28.V.1993, DJ Hyeon, 2♂ (ENHM); ditto, 2.V.1999, YJ Lee, 1♂ (SSWU); Sinrim-dong, 27.IV.1971, IY Kim, 1 (ENHM); ditto, 9-18.VI.1975, SS Choe, 1♂1♀ (ENHM); ditto, 11-19.V.1993, HY Yun, 1 ♂1♀ (SSWU); ditto, 6.VI.1993, EY Yun, 1♂ (SSWU); Gwangjin-gu, Gunja-dong, Hwayangri, 17.V.1965, MJ Jang, 1 (ENHM); Gwangjang-dong, Walkerhill, 28.V.1965, JI Son, 2♂1♀(ENHM); Jongro-gu: Buam-dong, 1.V.1989, JH Jeong, 2♂ (SSWU); ditto, 6.V.1989, MH Mok, 1♂ (SSWU); ditto, 16.VIII.1989, JH Jeong, 1♂ (SSWU); ditto, 19.V.1989, JH Jeong, 1♂ (SSWU); ditto, 22.V.1993, JY Kim, 1♀ (ENHM); Cheongwun-dong, Changuimun, 22.V.1965, JH Go & JJ Sim, 2♂1♀ (ENHM); Huam-dong, 6.V.1989, MH Mok, 1♂ (SSWU); Myeongryun-dong, 5.V.1961, SJ Kim, 1♂ (ENHM); ditto, 6.VII.1965, SJ Eun, 1♂ (ENHM); Nuha-dong, 6.V.1993, YS Kim, 1♂ (SSWU); Mt. Inwangsan, 18.V.1965, YJ Park, 1♂1♀ (ENHM); ditto, 23.V.1990, MS Lee, 1♂ (SSWU); ditto, 9.VIII.1993, YS Kim, 3♂ (SSWU); Sajik-dong, 17.VI.1987, YS Kim, 1 (ENHM); Samcheong-dong, 20.V.1961, IS Kuk, 1 ♀ (ENHM); ditto, 6.VI.1961, YS Kwon, 1♂ (ENHM); Sejong-ro, Kyeongbokgung, 8.V.1963, JM Lee, 2♂ (ENHM); Sinyeong-dong,

Segeomjeong, 17.VI.1961, DH Seo, 1♂ (ENHM); ditto, 16.VI.1963, JJ Yun, 1♂ (ENHM); ditto, 16.V.1965, MS Lee, 2♂ (ENHM); ditto, 23.VI.1967, SS Kim, 1♂ (ENHM); ditto, 10.V.1969, HS Lee, 2♀ (ENHM); ditto, 22.VIII.1969, JS Sin, 1♀ (ENHM); Tongui-dong, 1.VI.1965, JI Son, 1♀ (ENHM); Waryong-dong, Biwon, 30.V.1963, ER Kim, 1 (ENHM); Jung-gu: Hoehyeon-dong, Mt. Namsan, 23.VI.1957, GH Jeong, 1♂ (ENHM); ditto, 29.VI.1957, MJ Lee, 1♂ (ENHM); ditto, 15.VI.1963, OJ Lee, 1♂ (ENHM); ditto, 11.VI.1965, HJ Baek, 1♂ (ENHM); ditto, 26.VI.1975, YS Han, 1♂ (ENHM); Jungrang-gu: Mangwu-dong, 20.V.1993, YJ Park, 1♂ (SSWU); Myeonmok-dong, 8.VI.1993, SR Kim, 1 ♀ (SSWU); ditto, Mt. Yongmasan, 6.VI.1991, SY Lee, 1♀ (ENHM); Jangchung-dong, Jangchungdan park, 3.VI.1957, ?, 1♂ (ENHM); ditto, 1.VI.1963, DS Kim, 1♀ (ENHM); Sunhwa-dong, 12.V.1968, KS Park, 1♂ (ENHM); Mapo-gu: Daeheung-dong, 5.VI.1985, KR Kim, 1 (ENHM); ditto, seongmun Middle School, 15.VI.1969, HS Jang, 1♀ (ENHM); Mangwon-dong, 4.VII.1996, IH Eom, 1♀ (SSWU); Nogosan-dong, Mt. Nogosan, 2-3.VI.1961, SJ Yu & SJ Lee, 2♂ (ENHM); ditto, 21.VI.1961, CS Kim & BS Park, 2♂ (ENHM); Seongsan-dong, 24.V.1996, HS Park, 1♀ (SSWU); ditto, 30.V.1996, IH Eom, 1♀ (SSWU); Nowon-gu: Dokcheon, 17.V.1997, HS Oh, 1♂ (SSWU); Gongreung-dong, Taeneung, 4.IV.1961, IS Kim, 1 (ENHM); Nokcheon, 3.V.1997, JY Lee, 1♂ (SSWU); Mt. Dobongsan, 31.V.1992, EJ Yu, 1♂ (SSWU); Mt. Bulamsan, 14.V.1997, 1♀ (SSWU); Mt. Suraksan, 18.VI.1981, HS Gu, 1♂ (SSWU); ditto, 15.IV.1989, JJ Moon & HR No, 2♂ (SSWU); ditto, 12.V.1989, HK Gu, 1♂ (SSWU); ditto, 1.V.1998, JH Kim, 1♂ (SSWU); ditto, 9.V.1998,

SY Jo, 1♂ (SSWU); ditto, 14.V.1999, KH Jo, 2♂ (SSWU); Sanggye-dong, 1.VI.1969, SJ Kim, 3♂ (ENHM); ditto, 15.V.1997, SY Nam, 1♀ (SSWU); ditto, 13.VI.1999, EH Jo, 5♂ (SSWU); Seocho-gu: Mt. Cheongyesan, 19.V.1989, SH Yun, 1♂ (SSWU); ditto, 28.V.1989, YH Kang, 1♂ (SSWU); ditto, 17.IX.1989, HK Gu, 1♂ (SSWU); ditto, 28.V.1991, EM Kim et al., 2♂1♀ (SSWU); ditto, 7.VI.1993, EH Kim, 1♂ (SSWU); ditto, 9.V.1999, JY Lee, 2♂ (SSWU); Mt. Wumyeonsan, 11.V.1991, IS Kim, 1♀ (SSWU); ditto, 29.V.1991, ES An, 1♀ (SSWU); Yangjae-dong, 4.V.1967, JH Tak, 1♀ (ENHM); Seodaemun-gu: Bongwon-dong, Mt. Ansan, 13.VII.1998, SJ Yun, 1 (ENHM); ditto, Temple Bongwonsa, 10.VI.1961, MS Park, 1♂ (ENHM); ditto, 18.IV.1965, WY Lee, 1♂ (ENHM); ditto, 30.V.1971, JH Park, 1 (ENHM); Chungjeongro-dong, 10.V.1987, JY Kim, 1 (ENHM); Daehyeon-dong, 30.V.1963, HJ Choe, 1♂ (ENHM); ditto, 5.V.1985, KS Kim, 1 (ENHM); ditto, 22.V.1987, JS Im, 2 (ENHM); Daesin-dong, 23.V.1989, HS Seo, 1 (ENHM); Ehwa Woman's Univ., 31.V.1957, JW Lee et al., 3♂ (ENHM); ditto, 28.IV.1959, CM Im, 1♀ (ENHM); ditto, 5.V.1959, KJ Park, 2♂ (ENHM); ditto, 4.VI.1961, SH Yang, 1♂ (ENHM); ditto, 11.VI.1961, JO Park, 1♂ (ENHM); ditto, 29.V.1965, SY Yu, 1♂ (ENHM); ditto, 18.VI.1965, JJ An, 1♀ (ENHM); ditto, 8.VI.1968, JW Lee, 1♂ (ENHM); ditto, 2.V.1969, JH Sim, 1♂ (ENHM); ditto, 1-24.VI.1969, JH Sim et al., 5♂1♀ (ENHM); ditto, 3.VII.1969, HS Jang, 1♀ (ENHM); ditto, 22.V.1971, HS Kim, 1 (ENHM); ditto, 5.VI.1971, JH Kim, 1 (ENHM); ditto, 8.VI.1971, HS Kim, 1 (ENHM); ditto, 24.VI.1971, YS Kang, 1 (ENHM); ditto, 17.VII.1971, YS Kang, 1♀ (ENHM); ditto, 10.V.1973, HS Jeong, 1♂ (ENHM); ditto,

12.V.1973, BH Yeom, 2♂ (ENHM); ditto, 17.V.1973, HY Kim, 2♂ (ENHM); ditto, 31.V.1973, HS Jeong, 1♂ (ENHM); ditto, 16.VI.1973, HS Kim, 1♂ (ENHM); ditto, 18.VI.1975, YS Kwak, 1♂ (ENHM); ditto, 17.V.1977, HS Hong, 1♂ (ENHM); ditto, 24.V.1977, JS Oh, 1♂ (ENHM); ditto, 30.V.1977, MW Lee, 1♀ (ENHM); ditto, 4.VI.1981, MS No, 1 (ENHM); ditto, 29.IV.1983, YO Na, 1 (ENHM); ditto, 21.V.1983, KS Jeon, 1 (ENHM); ditto, 3.VI.1983, JO Yun, 1 (ENHM); ditto, 29.VI.1983, HS Jang, 1 (ENHM); ditto, 20.V.1984, IO Seo, 1 (ENHM); ditto, 29.IV.1985, MR Han, 1 (ENHM); ditto, 14.V.1985, JS Lee, 1 (ENHM); ditto, 15.V.1989, SH Yun, 1 (ENHM); ditto, 19.V.1989, ?, 1 (ENHM); ditto, 3.VI.1989, MH Park, 1 (ENHM); Hongeun-dong, 16.V.1985, JY Kim, 1 (ENHM); Namkajua-dong, 15.VII.1985, OK Lee, 1♀ (SSWU); Sinchon-dong, 28.VI.1967, JW Lee, 1♂ (ENHM); ditto, 5.VII.1970, EB Lee, 1♂ (ENHM); ditto, 17.VI.1971, IS Lee, 1 (ENHM); ditto, 10.V.1983, SW Paek, 1 (ENHM); ditto, 10.VI.1985, DH Son, 1 (ENHM); ditto, 30.V.1986, KA Park, 1♂ (SSWU); Yeonhi-dong, 4.V.1983, YO Na, 1 (ENHM); ditto, Yonsei Univ. 12-15.VI.1963, SJ Choe & DI Jo, 1♂1♀ (ENHM); ditto, 14-15.V.1989, WO Baek et al., 4 (ENHM); Seongbuk-gu: 20.V.1981, SH Lee, 1♂ (SSWU); Anam-dong, 24-26.V.1989, KD Jeong, 2♂ (SSWU); ditto, Mt. Gaewunsan, 1.VI.1987, KH Min, 1♀ (SSWU); Donam-dong, 20.V.1975, BS Kim, 1♂ (ENHM); ditto, 28.V.1995, SY Jeong, 1♂ (SSWU); Dongseon-dong, 20.V.1981, SH Lee, 1♂ (SSWU); ditto, 20.VI.1983, SY Kwon, 1♂ (SSWU); ditto, 25.V.1985, OJ Lee, 1♀ (SSWU); ditto, 11.VI.1985, YS Kim, 1♂ (SSWU); ditto, 31.V.1999, JH Lee, 1♀ (SSWU); ditto, 24.V.2001, MH Kim, 1♂

(SSWU); ditto, Sungshin Women's Univ., 1.VI.1987, SY Kim, 1♂ (SSWU); 29.V.1989, YJ Go, 1♂ (SSWU); ditto, 1.VI.1991, HH Kim, 2♂ (SSWU); ditto, 9.V.2001, HJ An & EK Shin, 2♂ (SSWU); ditto, 21.V.2003, AY Kim, 1♂ (SSWU); Jeongreung, 13.V.1959, JR Lee, 1♀ (ENHM); ditto, 7.VI.1959, YH Choe & YE Jeong, 1♂1♀ (ENHM); ditto, 13.V.1961, JS Park, 1♂ (ENHM); ditto, 20.V.1961, HK Ji, 1♂ (ENHM); ditto, 10.VI.1961, JS Sin & SJ Jo, 1♂1♀ (ENHM); ditto, 22.IV.1963, MY Han, 1♂ (ENHM); ditto, 5.V.1963, KJ Jo, 1♂ (ENHM); ditto, 10.VI.1963, NS Lee, 1♂ (ENHM); ditto, 16.VI.1963, YS Eom, 1♂ (ENHM); ditto, 6.VIII.1965, MJ Kim, 1♀ (ENHM); ditto, 28.V.1967, SJ Kim, 2♂ (ENHM); ditto, 24.VI.1967, HS Jo, 1♀ (ENHM); ditto, 27.VI.1967, SH Kim, 1♂ (ENHM); ditto, 15.VI.1974, MS Kim, 1♂ (ENHM); ditto, 8.VI.1981, HY Yun, 1♀ (SSWU); Mt. Bukhansan, 4.VI.1987, SH Hong & YS Chae, 2 (ENHM); Samseon-dong, Samseonkyo, 12.V.1963, JH Hwang, 1♂ (ENHM); Seokwandongsan, 1.VI.1971, YS Park, 2♀ (ENHM); Seongbuk-dong, 3.VI.1961, JS Lee, 1♂ (ENHM); ditto, 20.VI.1961, BS Kim, 1♂ (ENHM); Seongdong-gu: Hangdang-dong, 22.V.1983, ME Song, 1♀ (SSWU); Seongsu-dong, 6.V.2001, JE Kim, 1♂ (SSWU); Ttuksom, 30.IV.1989, EM Yu, 1♂ (SSWU); Songpa-gu: Oryun-dong, Olympic Apt., 19.V.2001, JA Baek, 1♀ (SSWU); Yongsan-gu: Hyochang-dong, 26.VI.1965, JJ An, 1♂ (ENHM); Suwon-si: 3.VI.1961, JS Sin, 1♀ (ENHM); ditto, 5.VI.1965, YE Choe, 2♂2♀ (ENHM); ditto, 27.IX.1970, JS Kim, 1 (ENHM); ditto, 4.X.1970, JS Kim, 1 (ENHM); ditto, 4.VI.1977, SH Choe, 1♀ (ENHM); ditto, 20.V.1979, SH Park, 4♂2♀ (ENHM); ditto, 1.VI.1982, ?, 2♂ (SSWU); ditto, 14.VI.1982, HJ Jeong, 1♂ (SSWU); ditto,

11.V.1997, HS Oh, 1♀ (SSWU); ditto, 18.V.1999, KN Kim, 1♂ (SSWU); Jangan-gu, Yuljeon-dong, 2.VI.1983, KH Jo et al., 3 (ENHM); ditto, Cheoncheon-dong, 11.VI.1983, MH Im, 1♂ (SSWU); Kwonseon-gu, 5.V.1997, SH Yeo, 1♀ (SSWU); ditto, 16.V.1999, YS Im, 2♂1♀ (SSWU); ditto, 29.V.1999, YJ Lee, 2♂ (SSWU); Paldal-gu, Mt. Paldalsan, 5.V.1989, YJ Choe, 1♂ (SSWU); Yangju-si: 29.V.1977, YS Jeong, 1♀ (ENHM); Jangheung-myeon, Songchu, 5.VI.1971, SE Kim, 3 (ENHM); Mt. Soyosan, 9.VII.1987, KH Song, 1♂1♀ (SSWU); Yangpyeong-gun: 26.V.1973, SK Kim, 1♂ (ENHM); ditto, 30.V.1983, YM Jo, 1 (ENHM); Mt. Samgaksan, 4.VI.1961, WS Park, 1♀ (ENHM); ditto, 24.VI.1961, IJ Byeon, 1♂ (ENHM); Yongmun, 10.V.1987, YH Lee, 2♂ (SSWU); Temple Yongmunsa, 6.VI.1985, SW Oh, 1 (ENHM); ditto, 1.VI.1991, SS Choe, 1 ♂ (ENHM); Yeoju-gun: 28.VI.1967, JW Lee, 2 (ENHM); ditto, 14.V.1977, YH Ju, 1♂1♀ (SSWU); Yeoncheon-gun, Misan-myeon, Ami-ri, 13.VIII.1987, HJ Yu, 1♂ (SSWU); Yongin-si: Guseong-myeon, 30.V.1998, JY Jeong, 1♂ (SSWU); Kiheung-gu, Singal, 19.V.1985, HJ Lee, 1 (ENHM); Sangha-ri, 17.V.1995, MS Kim, 1♂ (SSWU). **GN** Busan-si: 16.V.1971, JH Kim, 1 (ENHM); Geochang-gun, Namsang, 8.IX.1989, KD Jeong, 1♂ (SSWU); Geoje-si: Geoje-myeon, Geojedo, 3.VI.1999, SJ Yun, 1 (ENHM); Hadong-gun, Hwagye-myeon, Mt. Hyeongjebong, 6.VI.1991, SM Kim, 1♂ (ENHM); Hamyang-gun, Temple Yongchusa, 16.VII.1985, ?, 1♂ (SSWU); Jinyang-gun, Geumsan-myeon, 26.V.1989, HY Seong, 1♀ (SSWU); Milyang-si: Temple Pyochungsa, 23.VII.1986, SJ Yun, 1 (ENHM); Namhae-gun, 29.V.1961, YH Kim, 1 (ENHM); ditto, 5.VI.1966, YH Kim, 1♀ (ENHM); Sacheon-si: 1.VII.1983,

?, 1♀ (SSWU); Wulsan-si: Wulju-gun, Onsan-myeon, Haknam-ri, 31.VI.1985, KS Jang, 1♀ (SSWU). **GW** Chuncheon-si: Gangchon, 20.V.1983, YS Bae, 1 (ENHM); ditto, 6.VI.1984, YS Han, 1♀ (SSWU); Hupyeong-dong, Hanrim Univ., 6.VII.2003, JG Lee, 2♂3♀ (SSWU); Donghae-si: Mt. Dutasan, 13.VI.1997, JI Kim, 2♂ (SSWU); Bukpyeong-myeon, Temple Samhwasa, 27.VI.1984, MW Kwon, 1♂ (SSWU); ditto, 25.VIII.1997, JI Kim, 1♀ (SSWU); Gangreung-si: 20.V.1988, PS Lee, 1 (ENHM); Kyeongpodae, 4.V.1989, HS Bae, 1♂ (SSWU); ditto, 29.VI.1995, JY Kim, 1♂ (SSWU); Jeongdongsin, 3.VI.2000, MJ Jeong, 1♂ (SSWU); Jukheon-dong, 22.VII.1997, YJ Choe, 2♀ (SSWU); Sacheon-myeon, Minori, 29.VII.1983, SH Park, 2♂ (SSWU); Yeongok-myeon, 12.VIII.1995, KC Seong, 1♂ (SSWU); ditto, Mt. Odaesan, Sogeumgang, 14.VI.1998, TM Han & TH Kang, 1♂ (SSWU); ditto, Samsan-ri, Buyeon Valley, 18.VI.2001, AY Kim, 1 ♂ (SSWU); Goseong-gun: Mt. Geonbongsan, Gojin-dong, 5.VII.1995, JI Kim, 1♂1♀ (SSWU); Hoengseong-gun: Cheongil-myeon, Mt. Balgyosan, 23.V.1998, JD Yeo, 2♂ (SSWU); ditto, 24.VII.1998, SY Kim, 1♂ (SSWU); Hwadong-ri, 8.VII.1993, CH Gwak, 1♂ (SSWU); Hyeoncheon-1-ri, 6.VII.1993, KH Kwon, 1♂ (SSWU); Hongcheon-gun: 28.V.1968, MJ Oh, 1♂ (ENHM); ditto: 3.VII.1996, EJ Song, 1♂ (SSWU); Noil-ri, 16.V.1993, KS Heo, 5♂ (SSWU); Sokcho-ri, 7.VII.1995, HJ Song, 2♂ (SSWU); Mt. Odaesan, Myeongye-ri, 29.VI.1997, SY Kim, 5♂ (SSWU); Wundu-ri, 17.VI.1993, SY Kim & JI Kim, 2♂ (SSWU); Inje-gun: 8.V.1977, BN Kim, 1♂ (ENHM); Hyeon-ri, 27.V.1985, ME Kim, 1♂ (SSWU); Jinburyeong, 10.VIII.1979, BJ No, 2 (ENHM); ditto, 24.VII.1984, SJ Yun, 4 (ENHM);

Mt. Bangtaesan, Hanam-ri, 26.VI.1996, JI Kim & SY Kim, 1♀ (SSWU); ditto, Misan-ri, 23.VI.1996, SY Kim, 1♂ (SSWU); ditto, Sangnam-ri, 23.VI.1996, JI Kim, 4♂ (SSWU); Mt. Gachilbong, 12.VI.1997, JH Lee, 10♂4♀ (SSWU); Mt. Seoraksan, 11.V.1991, JK Choe, 1♀ (ENHM); ditto, Osaek, 24.VI.1991, SJ Yun, 1 (ENHM); Sinnam-ri, 23.VII.1971, JW Seo, 1♂ (ENHM); Jeongseon-gun: Hambaek, 7.VI.1979, JH Lee, 1♂ (ENHM); Mt. Gariwangsan, 2.VIII.1996, HS Byeon, 1♂ (SSWU); ditto, 21.V.1998, BY Kim et al., 3♂ (SSWU); Sokcho-si: Mt. Seoraksan, 4.VII.1996, MS Choe, 1♀ (SSWU); Seorak resort, 5.VII.1997, SY Kim & YS Park, 2♂2♀ (SSWU); Pyeongchang-gun: Bongpyeong-myeon, Deokgeo-ri, Mt. Hoeryeongbong, 23.VII.1998, SY Kim, 1♂ (SSWU); Daehwa-myeon, Baekil-dong, 1.VII.1985, ME Kim, 1♂ (SSWU); Doam-myeon, Yongsan-ri, 29.VI.1985, OH Kim et al., 2♂1♀ (SSWU); Jinbu-myeon, Dongsan-ri, 2.VII.1985, HJ Yun, 1♂ (SSWU); ditto, Mapyeong-ri, 30.VI.1985, HR No, 1♂ (SSWU); ditto, Mt. Odaesan, 7.VI.1979, MJ Im, 1♂ (ENHM); ditto, 25.VII.1992, JH Kang, 1♂ (SSWU); ditto, 24.VI.1998, TM Han & TH Kang, 2♂ (SSWU); Mt. Gyebangsan, 16.VI.1993, JI Kim et al., 9♂ (SSWU); Wonju-si: Heungeop-myeon, Maeji-ri, 30.VII.1997, JI Kim, 2♂ (SSWU); Mt. Chiaksan, 3.VI.1979, SJ Yun, 3 (ENHM); ditto, 28.V.1985, EH No, 1♀ (SSWU); ditto, 15.VI.1999, JI Kim, 1♀ (SSWU). HN. Pyeongsan-si: Huchiryeong, 25.VI.1999, SL Ahn, 1♂1♀ (NSM); Mt. Guwolsan, 15.VII.1996, ?, 3♂2♀ (NSM). JB Buan-gun: Byeonsanbando, 24-25.VI.1991, HW Song et al., 3♂ (SSWU); Sinnae-myeon, 26.V.1990, EJ Jo, 1♂ (SSWU); Iksan-si: Mt. Oknyeobong, 23.V.1997, JY Kim & SA Yun, 1♀ (SSWU); Imsil-gun: Cheongwung-myeon, Mt. Baekyeonsan,

13.VI.1963, MJ Yu, 1♂ (ENHM); Jeonju-si: 23.VII.1960, SS Kim, 1♀ (ENHM); Muju-gun: Dapgok-ri, 5.VIII.1993, KE Jeong, 1♀ (SSWU); Seolcheon-myeon, 24-25.V.1993, EJ Lee & SY Kim, 2♂ (SSWU); ditto, Daebul-ri, 26.V.1993, JY Lee, 1♂ (SSWU). **JJ** Jeju: 10.VII.1965, HW Lee, 1♂ (ENHM); ditto: 5.VI.1977, KS Nam, 2♂ (ENHM); ditto: 27.V.1983, JH Park, 2 (ENHM); ditto: 17.V.1990, SH Jeon, 7♂7♀ (SSWU); ditto: 26.V.2003, SL Ahn, 1♀ (NSM); Bukjeju-gun: Hanrim-eup, 8.VII.1965, YJ Im, 1♀ (ENHM); Jeju-si: Aewul-eup, 6.IX.1997, ?, 1♀ (SSWU); Ara-dong, Sancheondan, 20.VII.1973, JS Park, 1♂ (SSWU); Bongrae-dong, 25.VI.1994, HJ Mun, 1♂ (SSWU); Jeju Univ., 8.VII.1995, SJ Song, 1♀ (SSWU); ditto, 26.VII.1995, SJ Song, 1♀ (SSWU); Mt. Hallasan, 30.V.1972, JI Kim, 1♂ (SSWU); ditto, 31.V-1.VI.1972, SM Lee, 4♂ (SSWU); ditto, 6.VI.1977, SR Han, 1♂1♀ (ENHM); Namjeju-gun: Seongsan-eup, 5.V.1997, YE Kim, 2♂1♀ (SSWU); Seoguipo-si: 12.VI.1973, BH Seo, 1♀ (ENHM); ditto: 12.VII.1979, KE Ahn, 1 (ENHM); Mara Is., 9.VII.1994, SL Ahn, 1♂1♀ (NSM); Saekdal-dong, Silla hotel, 26.IV.2003, AY Kim, 3♂2♀ (SSWU). **JN** Gurye-gun: Gurye-eup, 28.V.1987, YE Jang, 1♂ (SSWU); ditto, Temple Cheoneunsa, 7-8.V.1977, S Sin & SJ Yun, 2 (ENHM); ditto, Hwaeomsa, 25.IV.1973, JS Oh, 1♂ (ENHM); ditto, 22.VI.1987, SR Lee & SJ Ban, 2♂1♀ (SSWU); Toji-myeon, Mt. Jirisan, Piagol, 21.V.1999, TM Han, 3♂ (SSWU); Gwangyang-si: Mt. Baekwunsan, 11.VIII.1993, SY Kim, 1♂ (SSWU); Dapgok-ri, 10.VIII.1993, SY Ha, 1♂ (SSWU); Jangseong-gun: Mt. Naejangsan, 17.VI.1973, JI Kim, 1♂ (SSWU); Muan-gun: Imja Is. 14.VII.1997, YB Jo, 1♀ (SSWU); Sinan-gun:

Heuksan-myeon, Heuksan Is. 6.VII.1978, SJ Yun, 1 (ENHM); ditto, Hong Is. 27.VI.1992, SJ Yun, 3 (ENHM); Suncheon-si: Mt. Jirisan, 23.VI.1987, EJ Oh, 1♂ (SSWU); Yeosu-si: 28.V.1987, K Park, 2♀ (SSWU); Geomun Is. Deokchon, 15.VII.1977, SJ Yun, 2 (ENHM); Wan Is., Dang-ri, 29.V.1982, JI Kim, 1♂ (SSWU); ditto, Namhyang-ri, 23.VIII.1998, SH Wu, 1♂ (SSWU); Jangseong-gun: Temple Baekyangsa, 25-26.V.1994, KR Kim & SY Kim, 1♂ (SSWU); Buki-myeon, Jukcheong-ri, 20.VII.1960, JW Lee, 1♂ (ENHM).

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

Biological note. This is the most common species among Korean *Holotrichia*. They are known to attack mainly ginseng, grains, herbs, and fruit trees during larval stage (Kim 1991). *H. diomphalia* occures once every two years. They breed during the end of May to July and their third larvae appear on september and hibernate. They emerge upper the soil on March of next year, feed and pupate until July. Finally, the adults appear on August (Kim and Hyun 1988).

Holotrichia oblita (Faldermann) 북한검정풍뎅이

Ancylonycha oblita Faldermann, 1835: 459.

Korean records. *Holotrichia oblita*: Stebnicka, 1980: 268; ESK and KSAE, 1994: 150 (북한검정풍뎅이); Kim, 2000a: 17; 2001: 42.

Holotrichia (Holotrichia) oblita: Löbl and Smetana, 2006: 219.

Description. Body length 17-21.8mm; Width 8.4-11mm.

Body medium sized, elongated oval, wide at posterior, brown to

reddish brown, surface glabrous.

Head small, with dense punctation. Anterior margin of clypeus emarginated and feebly reflexed. Frontoclypeal suture distinct. Frons slightly convex. Ocular canthus setaceous. Antennae 10-segmented; club composed last three segments, in male as long as remaining segments combined, in female as half long as remaining segments combined. Last segment of maxillary palp without seta.

Pronotum slightly convex with puctation, widest at middle, half of lateral margins almost parallel backward, anterior and posterior angles bluntly rounded, lateral margin carinate with setae. Scutellum almost semicircular, with few punctation scattered on the sides.

Elytra somewhat glabrous with four costae, punctures scattered mainly on the intervals, lateral margin feebly setaceous.

Ventral side glabrous, covered with dense yellowish hairs from pro- to metathorax. Abdominal sternites with a few hairs, six sternites visible. Penultimate sternite of abdomen with a pruinose patch at each side. Pygidium strongly convexed at posteriorly without longitudinal groove, visible at ventral side in both sexes.

Legs long and slender. Pro- and mesotrochanter adjacent, metatrochanter separated almost as wide as mesofemur. Femur of female stouter than that of male. Protibia tridentate, anterior tarsal claws symmetrical in both sexes. Basal joint of hind tarsi slightly shorter than 2nd one.

Specimen Examined. GG Suwon-si, 28.IV.1959, Paik, 1 (SSWU).

Distribution. China, Japan, Korea, Mongolia, Russia (Far east).

Biological note. One generation by every two year appears and they hibernate as adults or the third larvae (Liu et al. 1997).

Remark. Stebnicka (1980) recorded Korean distribution firstly, and her 12 samples are all female. Kim (2001) also examine two female. According to Liu et al. (1997), this species is very similar to *H. diomphalia*. Especially, the male aedeagus also very resemble to.

Holotrichia sichotana Brenske 서울검정풍뎅이

Holotrichia sichotana Brenske, 1897a: 343.

Holotrichia amurensis Brenske, 1897a: 344.

Korean records. *Holotrichia sichotana*: Niijima and Kinoshita, 1927: 17; Maruta, 1929: 368; Murayama, 1935: 4; 1937: 35; 1941c: 80; 1954: 118; Miwa and Chûjô, 1939: 65; Cho, 1957: 298; 1969: 669; KZS, 1968: 137 (서울검정풍뎅이); Stebnicka, 1980: 208; Kim and Nam, 1982a: 155; Kim and Lee, 1991a: 66; ESK and KSAE, 1994: 150; Kim and Kim, 1998: 170; Kim, 2001: 44.

Holotrichia (Holotrichia) sichotana: Löbl and Smetana, 2006: 219.

Specimen Examined. none.

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

Remark. Niijima et al. (1927) recorded two individuals from Seoul. They identified, however, by the description without examining any types of Brenske (1897). All the record after Niijima et al. (1927) are citations, so Kim (2001a) had doubted the Korean distribution. The description and male aedeagus of Liu et al. (1997) are similar to *H.*

koraiensis. The difference of these two species is just the club length of male. On the other hand, Kim (2001) recorded their distribution in China, Siberia and Tibet. Löbl and Smetana (2006), however, recorded their distribution only in Far East Russia (Far East). Therefore, it could be misidentified as the female of *H. koraiensis*.

Subfamily Sericinae Kirby, 1837 우단풍뎅이아과

Type genus: *Serica* MacLeay, 1819: 146.

Diagnosis. Posterior tibiae with two apical spurs, one above and one below the articulation of the tarsus; anterior claws of male strongly asymmetric; anterior coxae more vertical than horizontal, projecting to a distance greater than the width of the coxal cavity; posterior coxae large, so that only five abdominal ventrites are visible from below, the coxae longer than the metepisternum; prosternum usually with a slender rod-like process, setose at the apex, arising from the prosternum just behind and between the coxae; maxilla with lacinia usually setose and without teeth; body length less than 10mm (Britton 1957).

Remarks. The subfamily Sericinae is one of the largest among the Scarabaeidae as number of species. They occurs in all zoogeographic regions and is represented by approximately 4000 species in about 200 genera (Ahrens 2000, 2005b). In the Palaearctic region it comprises some 725 species grouped in two tribes (Sericini and Ablaberini) and 46 genera (Sabatinelli 2008). The adults are generalist herbivores. They are poorly explored in phylogeny, taxonomy and larval

morphology. Almost nothing, despite their great diversity, is known about their ecology. Many species of Sericine chafers are nocturnal, having an inconspicuous dark or brown colour. Sericines often hide underground during the day. At dusk the beetles come to the surface and feet on nearby plants (Ahrens 2005b).

Tribe Sericini Kirby, 1837 우단풍뎅이족(신칭)

Type genus: *Serica* MacLeay, 1819: 146.

Diagnosis. Antennae 9 or 10-segmented, club 3-segmented. Labrum not easily visible, fused to apical margin of clypeus. Fifth abdominal sternite and propygidium separated by suture. Protibiae with apical spurs, meso- and metatiniae with 2 spurs. Metatibial spurs separated, inserted above and below tarsal articulation. Posterior femora broadly flattened. Opposing tarsal claws similar, cleft apically (Evans 2002).

Remark. The tribe Sericini is most diverse in tropical and subtropical regions but absent in Notogea, southern South America and the south-east of Sulawesi (Ahrens 2005b).

Key to the genera of Korean Sericini

1. Mesocoxae widely separated, the distance between them subequal to or more than breadth of mesofemora ····· 2
- Mesocoxae not widely separated, the distance between them subequal to half or two-third breath of mesofemora ····· 5
2. Propleura with transversal groove reach to profemora. Antennal club 4 (male) or 3-4 (female) segments ····· *Gastroserica*

- Propleura with transversal groove basally. Antennal club 3 segments in both sexes ····· 3

3. Dorsal surface bearing dense hairs. Elytral apex membranous ····· *Paraserica*

- Dorsal surface bearing sparse hairs or setae, or almost glabrous ····· ····· 4

4. Anterior margin of metafemur finely serrate ····· *Eumaladera*

- Anterior margin of metafemur noy serrate ····· *Maladera*

5. Metacoxa with transversal groove. Antennal club more than 4 segments in male, 3 segments in female ····· *Sericania*

- Metacoxa without transversal groove. Antennal club 3 segments in both sexes ····· 5

6. Hole body covered with hairs. Posterior margin of Metafemur smooth or feebly serrated near base. Elytral apex chitinous, rarely membranous ····· *Serica*

- Body with few hairs Dorsally. Posterior margin of Metafemur serrate on basal 2/3. Elytral apex membranous ····· *Nipponoserica*

Genus *Gastroserica* Brenske 줄우단풍뎅이속

Gastroserica Brenske, 1897b: 412

Type species: *Gastroserica marginalis* Brenske, 1894: 10

Diagnosis. Antennae 10 segments, club 4 (male) or 3-4 (female) segments. Apical margin of pronotum projected. Elytral apex chitinous. Propleuron with groove at behind. Interval of mesocoxae as wide as

the width of mesofemur. Metatarsus waved vertically with punctation. Protibia bidentate (Nomura 1973, 1974).

Gastroserica herzi (Heyden) 줄우단풍뎅이

(Pl. II. Fig. II-5: D-F, Pl. III. Fig. III-4: E)

Serica herzi Heyden, 1887: 264 (Korea).

Korean records. *Serica herzi*: Bates, 1888: 372.

Microserica hertzi: Reitter, 1902: 143; Wu, 1936: 1020.

Gastroserica herzi: Brenske, 1897b: 414; Niijima and Kinoshita, 1923: 36; Murayama, 1930: 58; 1935: 4; 1937: 34; 1938: 15; 1954: 74; Mochizuki and Tsunekawa, 1937: 91; Miwa and Chûjô, 1939: 60; Nagaoka, 1940: 474; Cho, 1957: 297; 1969: 663 (줄우단풍뎅이); Kondo, 1941: 70; Nomura, 1960: 59; Hyun and Woo, 1969: 193; Kim and Kim, 1972a: 83; 1974: 108; Nakane, 1973: 63; Kim et al., 1974: 229; 1975: 239; 1976: 102; Kim, 1978: 338; Stebnicka, 1980: 250; Kim, 1981: 344; 1995a: 164; 2001: 55; Kim and Nam, 1982a: 129; 1982b: 276; Kim and Chang, 1987: 104; Kim and Yoo, 1987b: 505; Park and Park, 1987: 673; Yoon et al., 1990: 110; Kim and Lee, 1991a: 67; Kim et al., 1991: 179; 1996: 58; 1999: 129; 2002: 120; 2003: 126; 2004: 116; Park and Kim, 1993: 112; Park et al., 1993: 178; ESK and KSAE, 1994: 151; Kim and Kim, 1996: 127; Löbl and Smetana, 2006: 231.

Description. Body length 6.7-7.7mm; Body width 3.7-4.2mm; Club-footstalk ratio 1.14-1.5 (♂), 1(♀); Pronotum ratio 0.59-0.64; Pronotum-elytra ratio 0.32-0.35; Metafemur ratio 0.39-0.45; Metatibia

ratio 0.26-0.31; Pygidium ratio 0.63-0.74.

Body short, ovate, reddish brown (female) to black, sometimes with stripes (male).

Labroclypeus rectangular, sides straight, anterior angles broadly rounded, anterior margin medially weakly sinuated, surface yellowish brown, scattered setae with dense punctures. Frontoclypeal suture distinctly impressed, weakly corved. Ocular canthus very short, triangular, with two or three bristle. Frons black, almost same length as labroclypeus, moderately punctate with some hairs. Antenna yellowish brown to brown, 10-segmented, last 4 segments lamellated, longer than remaining segments combined in male, shorter than remaining segments combined in female. Eyes somewhat large, eye to interocular space ratio 0.48-0.57.

Pronotum convex, narrowed forward, lateral margin slightly rounded, anterior and lateral margin setaceous, anterior and posterior angles bluntly rounded, surface medially punctated with microscopic hairs in, yellowish brown with two longitudinal black line, frequently vague in female. Scutellum yellowish brown, triangular slightly extended, apically bluntly rounded, punctated laterally with microscopic hairs.

Elytra widest at posterior, intervals convex, striae densely punctate, suture and lateral border setaceous, surface yellowish brown (most female) to black or two yellow stripes (most male) with scattered setae posteriorly.

Ventral side pubescence except hind coxae. Mesosternum

widely separated between mesocoxae, mesocoxal distance as wide as mesofemur. Each abdominal sternite with a row of setaceous punctures between scattered punctation. Pygidium strongly convex apically, with fine punctures and hairs, surface and apical border with some setae.

Legs short and robust; metafemur twice as wide as mesofemur, anterior border slightly convex, with sparse punctures and hairs. Hind tibia with strong spines. Tarsus thin and long, first metatarsomere longer than upper metatibial spur but as long as two following segments combined; middle and hind tarsi ventrally serrated. Protibia short, bidentate, anterior tarsal claws in both sexes symmetrical but in male under teeth cut out apically. Aedeagus: Pl. III. Fig. III-4: E.

Specimen Examined. CB Boeun-gun: Mt. Sokrisan, 8,VIII.1990, HC Park & JI Kim, 3♂ (SSWU); Cheonan-si: Mt. Gwangdeoksan, 16-18.VI.1994, JI Kim, 1♀ (SSWU); Cheongwon-gun: Hoebuk-myeon, Yeomchigogae, 28.V.1991, JI Kim, 1♀ (SSWU); Danyang-gun: Mt. Sobaeksan, 2.VIII.1994, TY Mun, 1♀ (SSWU); Jecheon-si: Mt. Weoraksan, 10.VII.1991, DW Lee et al., 4♂14♀ (SSWU). **CN** Buyeo-gun: Mt. Mansusan, 12.VI.1999, TW Kim & TM Han, 1♂2♀ (SSWU); ditto, 19-20.VII.1999, JI Kim et al., 2♂3♀ (SSWU); Cheonan-si: Mt. Gwangdeoksan, 16.VI.1994, SY Kim & HS Choe, 1♂1♀ (SSWU); ditto, 22.VII.1994, JM Park, 1♀ (SSWU); Gongju-si, Mt. Gyeryongsan, 9.VII.1992, SL Ahn, 2♂4♀ (NSM); ditto, Cheonjeonggol, 13.VI.1995, JM Park, 1♀ (SSWU); Hongseong-gun: Mt. Oseosan, Myeongdae valley, 11.VI.1999, TW Kim & TM Han, 1♀ (SSWU); Nonsan-si: Mt. Okryubong, 23.V.1997, SY Kim, 1♀ (SSWU); Seosan-si: Mt. Gayasan,

26.V.1990, SH Jeon, 1♂ (SSWU). **GB** Bonghwa-gun: Seokpo-myeon, Daehyeon-ri, 24-25.VII.1986, KS Jang & JI Kim, 8♂20♀ (SSWU); Cheongdo-gun: Wunmun-myeon, Temple Wunmun, 28.V.1989, KOS, 1♀ (SSWU); Cheongsong-gun, Mt. Juwangsan, 10-11.VIII.1991, BS No et al., 1♂4♀ (SSWU); Daegu-si: 19.VI.1992, SK Lee et al., 1♂1♀ (SSWU); Dalseong-gun: Gachang-myeon, 21.VI.1992, 1992, JLO, 1♂1♀ (SSWU); Munkyeong-si: Munkyeong-eup, Munkyeongseje, 10.VII.1977, JW Lee & Y Kim, 1♂1♀ (SSWU); Pohang-si: Buk-gu, Temple Bokyeong, 6.VII.1979, KS Jang, 1♀ (SSWU); Yeongju-si: Buseok-myeon, Namdae-ri, Mt. Seondalsan, 29.VI-1.VII.1998, JI Kim et al., 2♂1♀ (SSWU); Pungki-eup, Mt. Sobaeksan, Jukryeong fall, 13-14.VIII.1999, DS Gu, 1♀ (SSWU); ditto, Temple Hibang, 31.VII.1986, EY Choe, 1♂ (SSWU). **GG** Anyang-si: 18-21.VI.1982, HY Kim et al., 4♂4♀ (SSWU); Bisan-dong, 6.VI.1992, HJ Kim, 1♂ (SSWU); Bucheon-si: Sosa-gu, 11.VI.1982, HJ Park, 1♀ (SSWU); Dongducheon-si: Mt. Soyosan, 17.V.1935, Cho, 1♂ (SSWU); Ganghwa-gun: Naega-myeon, 5.VI.1994, JY Kim, 1♀ (SSWU); Gapyeong-gun: Buk-myeon, Mt. Myeongjisan, 26.VI.1983, SM Lee, 1♀ (SSWU); ditto, 18-19.VII.1991, JI Kim, 4♂7♀ (SSWU); ditto, 25.VII.1991, YL Park et al., 4♂2♀ (SSWU); ditto, 28.VII.1991, HS Lee, 1♂1♀ (SSWU); ditto, 9.IX.1991, MW Jeong, 1♂ (SSWU); Ha-myeon, Mt. Cheonggyesan, 27.VI.1991, JI Kim et al., 10♂ 14♀ (SSWU); Goyang-si: Songchu, 26.VII.1983, MJ Kim, 1♀ (SSWU); Gwacheon-si: Munwon-dong, Mt. Cheonggyesan, 6.VI.1994, J Lee, 1♀ (SSWU); ditto, 14.VII.1996, JE Yu, 2♀ (SSWU); Gwangju-si: Junggu-myeon, Eungogae, 7.VI.1980, JI Jang, 1♀ (SSWU); ditto,

22.VII.1980, MH Lee, 3♀ (SSWU); ditto, 26.VII.1980, KH Jin, 1♀ (SSWU); ditto, 6.IV.1981, OH Park, 1♀ (SSWU); ditto, 5.VI.1982, SH Kye, 1♂ (SSWU); Jungbu-myeon, Namhansanseong, 29.V.1982, MH Go, 1♀ (SSWU); ditto, 28.VIII.1993, KS Heo, 1♂ (SSWU); ditto, 30.V.1998, EY Lee et al., 2♀ (SSWU); Songjeong-ri, 13.IV.1985, JH Lee, 1♀ (SSWU); ditto, 12.VI.1985, HJ Kang et al., 8♂11♀ (SSWU); Hanam-si: 31.V.1998, JS Yu, 1♂ (SSWU); Incheon-si: 3.VI.1994, SJ Kim, 1♂ (SSWU); Ongjin-gun: Deokjeok-myeon, Deokjeokdo, Seopo-ri, 5-7.VII.1981, HK Park et al., 71♂95♀ (SSWU); Namyangju-si: Geumgok-dong, 26.VI.1984, KA Jeon, 2♀ (SSWU); Hwado-eup, Geumnam-ri, Seteo, 18.VI.1983, EK Kim, 1♂ (SSWU); ditto, Maseok, 13.VI.1981, HJ Choe, 1♀ (SSWU); ditto, 16.VII.1986, KH Kim, 1♂ (SSWU); ditto, Mt. Cheonmasan, 30.V.1958, ?, 1♂ (SSWU); ditto, 2.VI.1968, ?, 1♀ (SSWU); ditto, 5.VI.1969, MK Cha, 1♀ (SSWU); ditto, 6-13.VI.1981, KM Park et al., 3♂9♀ (SSWU); ditto, 12-13.VI.1982, GS Nam, 3♂ (SSWU); ditto, 4.VI.1983, SH Kang et al., 6♂5♀ (SSWU); ditto, 10.VI.1984, SH Lee, 1♀ (SSWU); Pyeongnae-dong, 19.IX.1981, SK Lee, 1♀ (SSWU); ditto, 19.VI.1982, SS Kim, 2♀ (SSWU); Sudong-myeon, Mt. Chukryeongsan, 12.VII.1980, KS Jang et al., 3♂5♀ (SSWU); ditto, 6.VIII.1980, JI Kim, 1♀ (SSWU); ditto, 11-15.VI.1983, HS Hong et al., 1♂2♀ (SSWU); ditto, 16.VIII.1999, DS Gu, 1♂1♀ (SSWU); Paju-si: Daeseong-dong, 30.VI.1987, JI Kim, 1♀ (SSWU); ditto, 12.IX.1987, HJ Kim, 1♀ (SSWU); Gwangtan-myeon, Temple Bogwang, 29.VI.1975, YJ Heo, 1♂ (SSWU); ditto, 17.VI.1977, Y Kim, 1♀ (SSWU); ditto, 15.VI.1978, JY Song, 1♀ (SSWU); ditto, 9.VI.1979, WY Lee, 1♂ (SSWU);

ditto, 3.VII.1982, SY Won, 1♀ (SSWU); Pocheon-si: Gwangreung, 14.VI.1981, YM Kim, 1♂ (SSWU); ditto, 16.VII.1994, HC Park, 1♂ (SSWU); Mt. Myeongseongsan, 4.VI.1999, JI Kim et al., 2♂ (SSWU); Seongnam-si: Bundang-gu, Imae-dong, 21.VII.1995, SY Kim, 1♂ (SSWU); Yetgol, 30.V.1991, IS Kim, 1♂ (SSWU); Siheung-si: Maehwa-dong, 14.VI.1981, MY Park, 1♂ (SSWU); Seoul-si: Dobong-gu, Mt. Dobongsan, 4.VIII.1982, DH Yoo, 1♀ (SSWU); ditto, 22-28.V.1994, BH Choe & SY Yu, 2♂ (SSWU); ditto, Mt. Choansan, 4.VI.1994, SO Lee, 1♂ (SSWU); Gangnam-gu, Heuninreung, 22.VI.1983, MK Oh, 1♀ (SSWU); ditto, Mt. Mebongsan, 30.V.1991, MJ Im, 1♀ (SSWU); ditto, Wonji-dong, 1-4.VI.1985, YS Kim & KS Jang, 2♂ (SSWU); ditto, 8.VI.1986, HJ Kim, 1♂ (SSWU); ditto, Mt. Cheonggyesan, 15.VI.1977, JJ Song, 1♀ (SSWU); ditto, 7.VII.1986, SM Kim, 1♂ (SSWU); ditto, 11.VI.1987, MS Kim, 1♂ (SSWU); ditto, 18-19.VI.1989, LSY et al., 3♂6♀ (SSWU); ditto, 7.VIII.1990, SY Song, 1♀ (SSWU); ditto, 15.VIII.1991, YH Son, 1♀ (SSWU); ditto, 25.VII.1993, SY Kim, 1♀ (SSWU); Gwanakgu, Mt. Gwanaksan, 15.V.1994, JY Im, 1♀ (SSWU); Nowon-gu, Mt. Buramsan, 24.VI.1988, HJ, 1♂ (SSWU); ditto, Mt. Suraksan, 26.IX.1990, SY Son, 1♂ (SSWU); ditto, 3.VI.1999, K Min, 1♂ (SSWU); Suwon-si: Jangan-gu, Mt. Gwanggyosan, 13.VII.1991, OJ Lee, 1♂ (SSWU); ditto, 24.VII.1991, JY Na, 1♀ (SSWU); ditto, Woncheon, 6.VI.1982, ES Park, 1♀ (SSWU); Yangju-gun: Jangheung-myeon, 19.VI.1982, KJ Kim, 1♂ (SSWU); ditto, 5.VI.1994, BH Choe, 1♂ (SSWU); Yangpyeong-gun: Yongmun-myeon, Mt. Yongmunsan, 28.V.1982, SK Sin, 1♀ (SSWU); ditto, 28-30.V.1991, SL Park et al., 1♂3♀ (SSWU). **GN**

Geoje-gun: Dongbu-myeon, Gucheon-ri, 24-25.VI.1994, SK Hwang & JS Jeon, 2♂ (SSWU); Hamyang-gun: Macheon-myeon, Samjeong-ri, Temple Yeongwon, 12.VII.2002, JS Sin, 1♀ (SSWU); Hapcheon-gun: Mt. Gayasan, 26.V.1990, Sh Jeon, 1♀ (SSWU); Masan-si: Mt. Gaposan, 20.V.1993, SY Kim, 1♂ (SSWU); Sacheon-si: Sadeung-dong, Sadeungsanseong, 21.VIII.1998, JH Seol, 1♂ (SSWU); Sancheong-gun: Sicheon-myeon, Jungsan-ri, 30.VII.1981, JI Kim, 2♀ (SSWU); ditto, 5.VII.1989, SH Jeon, 1♂2♀ (SSWU); ditto, Temple Beopgye, 17.VIII.1992, JS Jeon, 1♀ (SSWU); Samjang-myeon, Temple Naewon, 27.V.1989, SH Jeon, 5♂1♀ (SSWU); ditto, Mt. Jirisan, Naewon-dong, ditto, 30.VII.1981, JI Kim, 1♀ (SSWU); ditto, 5.VI.1989, SH Jeon et al., 9♂9♀ (SSWU); ditto, 25.VI.2001, JB Jeon, 2♂1♀ (SSWU); Wulju-gun: Sangbuk-myeon, Icheon-ri, 23.VI.1987, YC Yang, 1♂ (SSWU); ditto, 27.VI.1989, KS Lee, 1♀ (SSWU); ditto, Mt. Gajisan, 28.VI.1989, JS Jeon, 1♂ (SSWU); ditto, 28.VI.1990, MJ Kang et al., 6♂ (SSWU); Yangsan-si, Habuk-myeon, Temple Tongdo, 12.VI.1965, C Lee, 1♂1♀ (SSWU). **GW** Cheolwon-gun: Mt. Myeongseongsan, 12-17.VIII.1999, DS Gu & JI Kim, 2♀ (SSWU); Donghae-si: Bukpyeong-myeon, Temple Samhwa, 26-27.VI.1984, MA Bang et al., 9♂7♀ (SSWU); Gangreung-si: Wangsan-myeon, Doma-ri, 17.VIII.1987, EJ Oh, 1♀ (SSWU); Yeongok-myeon, Samsan-ri, 31.VII.1986, KA Park, 1♀ (SSWU); ditto, Buyeon valley, 18.VI.2001, AY Kim, 1♂ (SSWU); Goseong-gun: Mt. Geonbongsan, Gojindong, 5.VII.1995, JI Kim, 2♂ (SSWU); Madal-ri, 10.VII.1990, JK Kim, 2♀ (SSWU); Inje-gun: Mt. Bangtaesan, 17.VII.1987, SL An, 1♀ (SSWU); ditto, 23-26.VI.1996, SY Kim et al., 3

♂2♀ (SSWU); Mt. Seoraksan, 10.VIII.1976, ?, 1♂ (SSWU); Pyeongchang-gun: Bongpyeong-myeon, Deokdeo-ri, Mt. Hoeryeongbong, 23.VII.1998, SY Kim, 2♂ (SSWU); Daehwa-myeon, Baegil-dong, 1-2.VII.1985, OK Lee et al., 4♂4♀ (SSWU); Doam-myeon, Yongsan-ri, 29.VI.1985, HJ Kang et al., 3♂1♀ (SSWU); Jinbu-myeon, Dongsan-ri, 2.VII.1985, EY Lee, 1♀ (SSWU); ditto, Geomun-ri, 30.VI.1985, KH Sin et al., 2♂1♀ (SSWU); ditto, Mapyeong-ri, 30.VI.1985, 3♂3♀ (SSWU); Taebaek-si: Sodo-dong, 22-23.VII.1986, GS Jang & JI Kim, 2♂1♀ (SSWU); ditto, Temple Cheongwon, 23.VII.1986, KH Kim, 2♂1♀ (SSWU); Wonju-si: Guirae-ri, 4-5.VII.1996, JI Kim, 3♂1♀ (SSWU); Panbu-myeon, Mt. Baekwunsan, 5.VII.1996, JI Kim, 1♂1♀ (SSWU); Mt. Chiaksan, 15.VIII.1999, TW Kim, 1♀ (SSWU); ditto, Temple Sangwon, 14.VIII.1999, DS Gu, 1♀ (SSWU); Yanggu-gun: Deretgol, Dutayeon, 24.VII.1996, HC Park, 5♀ (SSWU); Yangyang-gun: Yongcheon, 23.VI.1989, P.Y.I., 2♂2♀ (SSWU). **JB** Buan-gun: Byeonsanbando, 24-26.VI.1991, JY Oh, 2♂ (SSWU); Gochang-gun: Temple Seonun, 27.VI.1990, W Park, 1♂ (SSWU); ditto, 25.VI.1991, IS Kim et al., 4♂7♀ (SSWU); Iksan-si: Pyeonghwa-dong, 10.VIII.1987, HJ Kim, 1♂ (SSWU); Jeongeup-si: Mt. Naejangsan, 3-4.VII.1985, JH Sin & DJ Jeon, 2♀ (SSWU); ditto, 26.V.1994, JM Park et al., 1♂3♀ (SSWU). **JN** Gurye-gun, Masan-myeon, Temple Hwaeom, 21.VI.1987, Biology lab., 1♀ (SSWU); Toji-myeon, Mt. Jirisan, 25.VI.1986, IS Phang, 1♀ (SSWU); ditto, Piagol, 23.VI.1987, JI Kim et al., 6♂8♀ (SSWU); ditto, 21.VI.1989, SH Jeon, 2♂ (SSWU); Gwangyang-si: Okryong-myeon, Dapgok-ri, 10.VIII.1993, SH Jeong, 1♂1♀ (SSWU); ditto, Mt.

Baekwunsan, 20.VII.1990, Yeongnam Univ. lab., 1♀ (SSWU); ditto, 11.VIII.1993, SY Kim, 1♀ (SSWU); Seungju-gun: Temple Seonam, 22.VI.1987, HJ Kim et al., 4♂4♀ (SSWU).

Distribution. China, Korea.

Genus *Paraserica* Reitter 회색우단풍뎅이속

Paraserica Reitter, 1896: 183.

Type species: *Serica grisea* Motschulsky, 1866: 171

Diagnosis. Dorsal surface densely covered with hairs. Elytral apex memnranous. Protibia bidentate. Mesocoxae widely separarted, the distance between them subequal. Metatarsi punctate, with several short setae beneath (Yu et al. 1998).

Remark. Only two species included in this genus; *P. grisea* in Japan and *P. taiwana* in Taiwan (Löbl and Smetana, 2006). *P. grisea* reported in 4 main islands in Japan (Sawada, 1937). *P. taiwana, however,* reported only one female individual in Taiwan (Kobayashi and Nomura 1979), no one reported after that.

Paraserica grisea (Motschulsky) 회색우단풍뎅이

Serica grisea Motschulsky, 1866: 171.

Paraserica grisea Reitter, 1896: 183.

Korean records. *Serica grisea*: Sawada, 1937: 12.

Paraserica grisea: Miwa and Chûjô, 1939: 55; Cho, 1957: 296; KZS, 1968: 136 (회색우단풍뎅이); Kobayashi, 1974: 6; Stebnicka, 1980: 206;

Yoon et al., 1985: 159; Kim, 2001: 60.

Description. Body length 7-9mm. Width 4-5mm.

Body oblong, sides parallel, convexed. Dorsal surface metalic shinny, covered with dense gray hairs. Clypeus wide almost as twice as length with dense setaceous punctures. Antenna 9-segments, club 3-segmented; almost twice longer than footstalk and curved in male, slightly shorter than footstalk in female. Pronotum black in male, black or dark yellowish brown in female, surface with fine hairs, lateral margin setaceous. Scutellum triangular with short hairs. Elytra with defined costae. Protibia bidentate. Abdominal sternites covered with fine hairs. Pygidium with fine hairs and punctation. Metafemur flat with some bristles. Metatibia thin with 4-5 groups of bristles. Metatibial spur shorter than the first tarsi. Tarsal claw symmetrical.

Specimens examined. none.

Distribution. Japan, Korea.

Remark. Sawada (1937) reported this species as new to Korea with one female from Ranam (HB) in North Korea. He refered that *P. grisea* is resemble to *S. polita*, and explain the differences of these two species; *P. grisea* has dense hairs on dorsal surface more than *S. polita*. *P. grisea* also has wide clypeus and clear longitudinal elevation on pygidium. Murayama (1954) recognized the Korean distribution of *S. polita*, yet, he had doubted the distribution of *P. grisea*. Most of the references of *P. grisea* are almost citations of Sawada (1937). From the key to the genus of Sericinae, the important diagnostic character

of the genus *Paraserica* is the distance between mesocoxae. Sawada didn't compare with this character at that time, so there is possibility of misidentification. Nevertheless, the specimen of Sawada (1937) was from North Korea, and the distribution of this species is from Taiwan to Japan. I think this species might inhabit in Korea.

Genus *Eumaladera* Nomura, 진우단풍뎅이속(신칭)

Eumaladera Nomura, 1967: 53

Type species: *Maladera nitididorsis* Nomura, 1967: 54

Diagnosis. Head shining. Antennae 10-jointed, with club composed of three lamellae, which are longer than footstalk in male. Each abdominal sternite scattered with hair, lacks a transversal row of bristles. Protibiae bidentate. Anterior margin of metafemur finely serrate. Metatibia broad and flat, with a longitudinal serrated ridge on basal three-fourths of outer side. Metatarsi with short setae on ventral side (Nomura 1967, 1974).

Distribution. This genus distributes in Taiwan, Korea and Japan.

Eumaladera opaciventris (Moser) 아래검은우단풍뎅이

(Pl. II. Fig. II-5: G, H; Pl. III. Fig. III-4: F)

Autoserica opaciventris Moser, 1915b: 355 (Korea, Seoul).

Maladera coreana Kim and Kim, 2003b: 83.

Korean records. *Autoserica opaciventris*: Niijima and Kinoshita, 1923: 29.

Aserica opaciventris: Murayama, 1938: 12; Miwa and Chûjô, 1939: 57; Cho, 1957: 297; KZS, 1968: 136 (아래검은우단풍뎅이).

Serica opaciventris: Murayama, 1954: 26; Cho, 1969: 649; Kim and Kim, 1972a: 83; Kim and Nam, 1982a: 154; Lee et al., 1994: 147.

Maladera (Maladera) opaciventris: Stebnicka, 1980: 207.

Maladera opaciventris: Kim and Yoo, 1987: 505; Kim and Lee, 1997: 129; Kim, 2001: 65; Kim and Kim, 2003: 88; Löbl and Smetana, 2006: 237.

Maladera coreana: Kim and Kim, 2003b: 83.

Eumaladera coreana: Löbl and Smetana, 2006: 230.

Eumaladera opaciventris: Ahrens, 2007: 5.

Description. Body length 7.7-8.55mm; Width 4.8-5.1mm; Club-footstalk ratio 1.21-1.4 (♂), 1.15 (♀); Pronotum ratio 0.56-0.59; Pronotum-elytra ratio 0.34-0.36; Metafemur ratio 0.4-0.44; Metatibia ratio 0.4-0.44; Pygidium ratio 0.55-0.61.

Body short, ovate, reddish brown, shinny.

Labroclypeus trapezoidal, widest at base, sides straight, convergent forward, anterior angles broadly rounded, anterior margin medially weakly sinuated, surface shinny with very dense punctures, medially with a shallow elevation. Frontoclypeal suture distinctly impressed, weakly curved. Ocular canthus triangular, with punctures and one or two bristles. Frons, a little shorter than labroclypeus, densely punctate with a few hairs. Antenna reddish brown, 10-segmented, last three segments lamellated, as long as remaining

segments combined in male, shorter than remaining segments combined in female. Eyes somewhat large, eye to interocular space ratio 0.65-0.77. Mentum elevated, anteriorly with a flattened declivity.

Pronotum convex, narrowed forward, sides weakly and uniformly curved narrowed forward, anterior and lateral margin setaceous, anterior angles sharp, not rounded at apex, and posterior angles not sharp, surface shinny, medially punctated with microscopic hairs in. Scutellum triangular, apically bluntly rounded, punctation similar to that of pronotum, with microscopic hairs in.

Elytra shinny, widest at posterior, intervals convex, striae densely punctate, lateral border setaceous.

Ventral side of thorax shinny, with a pruinose patch at each side. Mesosternum widely separated between mesocoxae, mesocoxal distance as wide as mesofemur. Metacoxae with pruinose patch and some strong hairs laterally. Five abdominal sternite visible, each sternite opaque, setaceous with dense punctures. Pygidium apically weakly convex, with fine and dense punctures and hairs, surface opaque, apical border with some short hairs.

Legs short and robust; metafemur twice as wide as mesofemur, anterior border slightly convex, with sparse punctures between two longitudinal rows of setaceous punctures, posterior angles rounded. Metatibia short and robust, almost smooth. First metatarsomere as long as upper metatibial spur but little shorter than two following segments combined. Middle and hind tarsi ventrally weakly serrated. Protibia short, bidentate, anterior tarsal claws in both sexes symmetrical and

under teeth cut out apically. Aedeagus: Pl. III. Fig. III-4: F.

Specimen Examined. **CB** Chungju-si: Mt. Namsan, 24.VIII.2000, SY Kim & AY Kim, 1♂1♀ (SSWU). **CN** Gongju-si: Mt. Gyeryongsan, 7.VI.1997, MS Lee, 1♂ (KU); ditto, Temple Gap, 29.VII.1979, SH Nam, 1♀ (SSWU). **GG** Dongducheon-si: Mt. Soyosan, 24.VI.1986, YH Kim, 1♂ (SNU); Goyang-si: Ilsan-gu, Jeongbalsan, 13.VI.2000, DH Song, 1♀ (KU); Seoneung, 1.VIII.?, EH Yang, 1♀ (SNU); Seoul-si: Eunpyeong-gu, Bulkwang-dong, 29.VIII.2002, AY Kim, 1♂ (SSWU); ditto, Mt. Bukhansan, 11.VII.1998, TW Kim, 1♂ (SSWU); ditto, Galhyeon-dong, 19.V.1988, EJ Park, 1♀ (SSWU); Gangbuk-gu, Wui-dong, Mt. Dobongsan, 30.IV.1998, Kang & Han, 1♂ (SSWU); Jongro-gu, Myeongryun-dong, 8.VIII.2001, JI Kim, 1♂ (SSWU); Seodaemun-gu, Changcheon-dong, 19.VI.1993, Hwang & Sim, 1♂ (ENHM); ditto, Ehwa Woman's Univ., 12.X.1969, JH Sim, 1♀ (ENHM); ditto, 21.VI.1970, YS Yun, 1♂ (ENHM); ditto, 19-20.VI.1975, YS Kwak et al., 2♂ (ENHM); ditto, Yonsei Univ., 24.VI.?, KH Jeong, 1♂ (ENHM); Seongbuk-gu, Anam-dong, Mt. Gaewunsan, 21.VI.1999, EK Min, 1♀ (KU); ditto, Dongseon-dong, Sungshin Women's Univ., 11-20.VI.2000, AY Kim, 1♂1♀ (SSWU); ditto, 8.VII.2003, KS Park, 1♀ (SSWU); Yongsan-gu, Sinchang-dong, 14.VI.1996, KH Kim, 1♂ (KU); Suwon-si: 20.V.1970, BS, 1♀ (SNU). **GN** Geoje-gun: Dongbu-myeon, 306m Imsanro, 25.VI.1994, BE Mo, 1♂ (GSNU); Hacheong-myeon, Temple Gwangcheon, 27.VIII.1995, SJ Han, 1♂ (GSNU); Nambu-myeon, Dapo-ri, 15.VIII.1994, GY Park, 1♂ (GSNU); Hapcheon-gun: Daeam-myeon, Acheon-ri, 23.VIII.1986, SS Kang, 1♀ (SSWU); Namhae-gun:

Seolcheon-myeon, Namyang-ri, Yonggangmaeul, 17.VII.1994, CK Jeong & YS Kim, 1♂1♀ (GSNU); Sancheong-gun, Obu-myeon, Ojeon-ri, Mt. Songeuisan, 31.VII.1998, JS Jeon, 1♀ (GSNU); Tongyeong-gun, Hansan-myeon, Jeseungdang, 6.VII.1994, GS Ok, 1♂ (GSNU). **JB** Muju-gun: Seolcheon-myeon, Mt. Deokyusan, 23.VII.1990, KH Rim, 1♀ (SSWU). **JN** Yeongam-gun: Gunseo-myeon, Dogap-ri, Mt. Weolchulsan, Temple Dogap, 24.VII.1999, KH Kang, 1♂ (GSNU); Yeosu-si: Odong Is., 8.VIII.1994, YH Baek, 1♀ (GSNU); ditto, 8-9.VIII.1994, YS Kim, 2♂ (SSWU).

Distribution. Korea (Native).

Remark. Moser (1915) reported as new species with the specimens from Seoul. Murayama (1954) examined one female, and other reports were citations of his record, or misidentifications of *Maladera. orientalis* or *Sericania fuscolineata* (Kim, 2001). Because the original description is insufficient to identify, nor note the male aedeagus, Kim (2001a) had doubt to this species. Otherwise, Kim and Kim (2003b) reported *Maladera coreana* as new species. Ahrens (2007) examine the types of this species from Moser Collection, and synonymize *Malaera coreana* as *Eumaladera opaciventris*.

Genus *Maladera* Mulsant and Rey 애우단풍뎅이속

Maladera Mulsant and Rey, 1871: 599

Aserica Lewis, 1895: 394

Autoserica Brenske, 1897b: 377

Type species: *Scarabaeus holosericeus* Scopoli, 1772: 77

Diagnosis. Antennae 9-10 segments, club three segments in both sexes, club of male longer than that of female. Elytral apex membranous. Interval of mesocoxae as wide as, or wider than the width of mesofemur. Metafemur thin and long, or wide. Metatibia with 2-4 short bristles, varied from slender to broad and thick to flat, without longitudinal serrated ridge on outer side, rarely short one. Metatarsus impunctate, generally missing, rarely bears short setae on ventral side (Nomura 1973, 1974).

Remarks. The genus *Maladera* in the Palaearctic region comprises about 162 species in 8 subgenera (Sabatinelli 2008).

Key to the species of Korean *Maladera*

1. Body pale yellow to reddish brown with pearl luster. Clypeus with longitudinal upheaval in the middle ····· 2

- Body brown to black with velvety surface. Clypeus without upheaval, sometimes with weak elevation in the center ····· 5

2. Body pale yellow. Dorsal surface with scattered setae. Midtibia of male with a bunch of setae along the inner line ····· *M. aureola*

- Body reddish brown. Dorsal surface with few setae. Midtibia of male without a bunch of setae ····· 3

3. Body 7.2-7.8 mm. Club-footstalk ratio of male 1.43-1.47 ····· ····· *M. ovatula*

- Body 7.9-9.7 mm. Club-footstalk ratio of male 1-1.43 ····· 4

4. Dorsal surface more pearlescent. Vertex with a row of seta ·····

…… *M. castanea koreana*

- Dorsal surface less pearlescent. Vertex with few of seta ……
…… *M. verticalis*

5. Protarsal claws asymmetric; ventral teeth of inner claw with roundly modified …… *M. infuscata*

- Protarsal claws symmetric …… 6

6. Body somewhat large, over 9.6 mm. 3rd and 4th abdominal sternites elevated in the middle …… *M. gibbiventris*

- Body generally under 10 mm. 3rd and 4th abdominal sternites not elevated in the middle …… 7

7. Body elongated oval. Antenna 10-segmented; club of male 1.3 to 1.9 times longer than footstalk …… 8

- Body oval, usually wider at posterior. Antenna 9 to 10-segmented; club of male 0.75 to 1.3 times compared with footstalk …… 10

8. Hind tarsi with one or several short setae on ventral side …… 9

- Hind tarsi without setae on ventral side …… *M. schoenfeldti*

9. Clypeus rough with coarse punctation. Hind femur and tibia long and slender …… *M. holosericea*

- Clypeus flat with shallow punctation. Hind femur and tibia somewhat short and stout …… *M. renardi*

10. Body small; 6.3-8.6 mm. Antenna 9-segmented. Hind coxae with a row of hairs at the posterior margin …… *M. orientalis*

- Body medium sized; 8.6-10.5 mm. Antenna 10-segmented. Hind coxae without a row of hairs …… 11

11. Frons with a row of hairs. Anterior margin of pronotum with a row

of hairs. Abdominal sternites with short hairs overally ····· ····· *M. cariniceps*

- Frons with scattered hairs. Anterior margin of pronotum with few hairs on each side. Abdominal sternites with short hairs on sides or rare ····· 12

12. Each abdominal sternites with few hairs ····· *M. fusania*

- Each abdominal sternites with short hairs on sides, 3rd to 4th sternites with scattered hairs at the middle ····· *M. laboriosa*

Maladera aureola (Murayama) 금색우단풍뎅이

(Pl. II. Fig. II-5: I)

Aserica aureola Murayama, 1938: 19 (S. and C. Korea)

Korean records. *Serica aureola*: Murayama, 1954: 64; Cho, 1969: 661 (금색우단풍뎅이); Kim and Nam, 1982a: 155.

Maladera (*Maladera*) *aureola*: Stebnicka, 1980: 207.

Maladera aureola: Kim and Lee, 1991a: 67; 1997: 128; Kim, 2001: 65; Kim and Kim, 2003: 92.

Maladera (*Aserica*) *aureola*: Löbl and Smetana, 2006: 234.

Description. Body length 6.7-8.5mm; Width 3.9-5.25mm; Club-footstalk ratio 0.89-1 (♀); Pronotum ratio 0.53; Pronotum-elytra ratio 0.29-0.31; Metafemur ratio 0.41-0.48; Metatibia ratio 0.33-0.35; Pygidium ratio 0.63-0.73.

Body short, ovate, pale yellow to yellowish brown, surface opaque except shinny labroclypeus.

Labroclypeus trapezoidal, widest at base, sides straight, convergent forward, anterior angles broadly rounded, anterior margin medially weakly sinuated, surface shinny with very dense and fine punctures, medially with a shallow longitudinal elevation. Frontoclypeal suture distinct, weakly curved. Ocular canthus triangular, with shallow punctures and a terminal bristle. Frons opaque, as long as labroclypeus, no punctation only few hairs beside eyes. Antenna yellow to yellowish brown, 10-segmented, last 3 segments lamellated, as long as remaining segments combined in male, shorter than remaining segments combined in female. Eyes not large, eye to interocular space ratio 0.5-0.54. Mentum elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at base, narrowed forward, sides weakly and uniformly curved narrowed forward, anterior and lateral margin with few setae, anterior angles sharp, not rounded at apex, and posterior angles bluntly rounded, surface opaque, very shallowly punctate without hair. Scutellum triangular, apically bluntly rounded, punctation similar to that of pronotum, without hair.

Elytra opaque, widest at posterior, intervals weakly convex, striae with a row of punctation, lateral border setaceous.

Ventral side opaque. Mesosternum widely separated between mesocoxae, mesocoxal distance as wide as mesofemur. Metacoxae with some strong hairs laterally. Each abdominal sternite opaque, with a row of setaceous punctures. Pygidium apically weakly convex, with fine scattere punctation, surface opaque, with some short hairs beside apical border.

Legs short and robust; metafemur over twice as wide as mesofemur, anterior border slightly convex, smooth with a longitudinal row of setaceous punctures on posteriorly one fourth, posterior angles rounded. Metatibia short and robust, smooth, with a few of marginal spines. First metatarsomere longer than upper metatibial spur but as long as two following segments combined. Metatarsi ventrally weakly serrated. Mesotibia of male with a bundle of strong hairs along the inner line. Protibia short, bidentate, anterior tarsal claws symmetrical in both sexes.

Specimen Examined. **GG**Incheon-si: Ganghwagun, 1.VI.1987, KS Lee, 1♀ (SSWU). **GN** Hapcheon-gun: Daeam-myeon, Acheon-ri, 16.VIII.1984, SS Gang, 1♀ (SSWU); Jinju-si: Sangbongseo-dong, Mt. Bibongsan, 20.VII.1984, TS Oh 1♀ (SSWU). **GW** Bukpyeong, Temple Samhwa, 27.VI.1984, SI Yang, 1♀ (SSWU),

Distribution. Korea, Taiwan

Remark. This species is very rare among Korean *Maladera*. No collection record reported after the year 1980. It might be thought that this species originally rare or endangered.

Maladera ovatula (Fairmaire) 차색우단풍뎅이

(Pl. II. Fig. II-6: A, B; Pl. III. Fig. III-5: A)

Serica ovatula Fairmaire, 1891: 195.

Korean records. *Autoserica ovatula*: Niijima and Kinoshita, 1927: 5. *Aserica ovatula*: Murayama, 1938: 14; 1941b: 20; Miwa and Chûjô, 1939: 57; Cho, 1957: 297; KZS, 1968: 136; Park and Han, 1992: 138.

Serica ovatula: Murayama, 1954: 64; Cho, 1969: 660; Kim and Kim, 1974: 108; Kim and Nam, 1982a: 155.

Maladera (Maladera) ovatula: Stebnicka, 1980: 207.

M. ovatula: Kim, 1981: 344; 1992: 104; 2001: 67 (차색우단풍뎅이); Yoon et al., 1989: 140; Kim and Lee, 1989: 176; 1991a: 67; 1997: 128; ESK and KSAE, 1994: 151; Kim et al., 1994: 111; 1996: 58; 2002: 120; Kim and Kim, 2003b: 91; Kim et al., 2004: 117.

Description. Body length 7.2-7.8mm; Width 4.2-4.65mm; Club-footstalk ratio 1.43-1.47 (♂), 0.93-1.14 (♀); Pronotum ratio 0.53-0.61; Pronotum-elytra ratio 0.31-0.35; Metafemur ratio 0.38-0.45; Metatibia ratio 0.35-0.5; Pygidium ratio 0.61-0.64.

Body small, ovate, plumpy, reddish brown, surface opaque, pearl shinny, labroclypeus shinny.

Labroclypeus trapezoidal, widest at base, sides straight, convergent forward, anterior angles rounded, surface shinny, medially longitudinal upheaval with dense punctures, labrum part distinct, medially weakly sinuated. Frontoclypeal suture distinct, weakly angled. Ocular canthus triangular, with shallow punctures and a terminal bristles. Frons brown, opaque, shallow punctation with few hairs near eyes. Antenna yellowish brown, 10-segmented, last three segments lamellated, almost 1.4 times longer than the remaining segments combined in male, little shorter than remaining segments combined in female. Eyes large, eye to interocular space ratio 0.59-0.63. Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at base, slightly narrowed forward, sides weakly and uniformly curved, anterior and lateral border with a row of strong setae, anterior angles sharp, not rounded at apex, and posterior angles somewhat rounded, surface opaque, densely punctate with a microscopic hair in. Scutellum triangular, punctation similar to that of pronotum, with a microscopic hair in.

Elytra opaque, surface pearled, widest at posterior, intervals shallowly convex, with fine and dense punctation similar to that of pronotum, lateral border strongly setaceous, sutural angles with a seta.

Ventral side opaque, pearled. Mesosternum widely separated between mesocoxae, mesocoxal distance almost as wide as width of mesofemur. Metacoxae with some strong hairs laterally. Each abdominal sternite opaque, with a row of strong setaceous punctures. Pygidium wide, medially weakly convex, with fine scattered punctation, surface opaque, with some short hairs beside apical border.

Legs short and stout; metafemur almost twice width of mesofemur, anterior border weakly convex, posterior ventral margin blunt basaly, surface punctate with two longitudinal rows of setae, posterior angles rounded. Metatibia robust, little shorter than metafemur, surface smooth, with a few of marginal spines. First metatarsomere as long as upper metatibial spur but shorter than two following segments combined. Metatarsi ventrally weakly serrated. Protibia very short, bidentate, anterior tarsal claws symmetrical in both sexes. Aedeagus: Pl. III. Fig. III-5: A.

Specimen Examined. CB Cheongju-si: Wuncheon-dong, 13.VIII.1991, SM

Kim, 1 (SSWU). **CN** Cheonan-si: Mt. Gwangdeoksan, 16-18.VI.1994, SY Kim, 1 (SSWU); Gongju-si: Mt. Gyeryongsan, Temple Gapsa, Donghak, 28-29.VII.1979, SK Lee et al., 6 (SSWU); Taean-gun: Hakampo beach, 27.VIII.2005, TW Kim, 1 (SSWU). **GB** Daegu-si: Hwanggeum-dong, 22.VII.1989, SH Jeon, 1 (SSWU); Gyeongsan-si: Dae-dong, Yeongnam Univ., 21.VII.1989, KI Cha, 1 (SSWU). **GG** Dongducheon-si: Mt. Wangbangsan, 3.VIII.1975, ?, 1 (SSWU); Goyang-si: 25.V.1975, BW Oh, 1 (SSWU); Baekma-dong, 3.VIII.1982, KS Jang, 1 (SSWU); Gwangju-si: Eungogae, 9.X.1984, HS Kim, 2 (SSWU); Hanam-si: Misa-ri, 12.VIII.1987, SY Choe, 1 (SSWU); Incheon-si: Ongjin-gun, Seopo-ri, Guleopdo, 5-6.VIII.1982, KS Jang & JI Kim, 3 (SSWU); Namyangju-si: Pyeongnae-dong, Mt. Cheonmasan, 3.X.1974, DJ Sim, 1 (SSWU); Sudong-myeon, Mt. Chukryeongsan, 28.IX.1980, OH Park, 1 (SSWU); Paju-si: Temple Bokwang, 3.VII.1982, SY Weon, 1 (SSWU); Pocheon-si: Yeonpyeong-ri, 20.VII.1996, JI Kim et al., 2 (SSWU); Seongnam-si: Changgok-dong, 31.VIII.1986, SY Park, 1 (SSWU); Wunjeong-dong, 14.IX.1987, YL Lee, 1 (SSWU); Seoul-si: Dobong-gu, Mt. Choamsan, 13.IX.1998, JS Jeon, 1 (SSWU); Dongdaemun-gu, hyuikyeong-dong, 20.VIII.1998, SH Son, 1 (SSWU); Gangdong-gu: Sangil-dong, 21.VI.1998, HJ Lee, 1 (SSWU); Gangnam-gu, Dogok-dong, 18.VII.1979, JI Kim, 1 (SSWU); ditto, Heoninreung, 19.VIII.1984, YS Choe, 1 (SSWU); ditto, Mt. Cheonggyesan, 14.VIII.1985, MR Jeon, 1 (SSWU); Gwanak-gu, Mt. Gwanaksan, 1.IX.1993, SK Lee, 1 (SSWU); ditto, Shilim-dong, 12.VII.1993, HY Yun, 1 (SSWU); Jongro-gu, Sinyeong-dong, Segeomjeong, 14.VIII.1972, SH Kim, 1 (SSWU);

Seocho-gu, Banpo-dong, 23.VIII.1990, SH Kuk, 1 (SSWU); ditto, 10.VII.1993, SK Lee, 1 (SSWU); ditto, 17.VII.1996, JE Kim, 1 (SSWU); Seongdong-gu, 23.VII.1975, HK Lee, 1 (SSWU); Songpa-gu, Jamsil-dong, 20.VI.1984, GJ Hwang, 1 (SSWU); Yeongdeungpo-gu, Yeouido-dong, 18.VII.1984, HS Kim, 1 (SSWU); ditto, 31.VIII.1984, YJ Im, 1 (SSWU); Yangpyeong-gun: Mt. Yongmunsan, 16.IX.1990, JH Kim, 1 (SSWU). **GN** Hamyang-gun: Mt. Jirisan, Jungsan-ri, 30.VII.1981, IB Yun, 1 (SSWU); Jinju-si: Sangbongseo-dong, Mt. Bibongsan, 27.VII.1984, TS Oh, 1 (SSWU). **GW** Chuncheon-si: Hyoja-dong, 28.VII.1984, EJ Kang, 1 (SSWU); Seo-myeon, Wuido, 24.VII.1984, JH Son, 2 (SSWU); Hongcheon-gun: Duchon-myeon, 2.VIII.1984, SI Yang, 1 (SSWU); Jeongseon-gun: Sukam-ri: 31.VII.1987, SL Ahn, 1 (SSWU); Wonju-si: Heungeop-myeon, Maeji-ri, ?.VI.1996, JI Kim, 1♀ (SSWU); Seongsan-myeon, 16.VII.1981, SH Choe, 1 (SSWU). **JB** Jeongeup-si: Mt. Naejangsan, 1.VIII.1974, JI Kim, 1 (SSWU); Wanju-gun: Yongdeok-eup, 17.VII.1996, MS Choe, 1 (SSWU); ditto, 26.VII.1996, CH Lee, 1 (SSWU). **JN** Gurye-gun: Mt. Jirisan, Nogodan, 13.VIII.1998, TM Han, 1 (SSWU); Yeocheon-gun: Nam-myeon, Yeondo, 4-5.VIII.1993, ?, 1 (SSWU); Yeongkwang-gun: Anmado, 19-20.VIII.1989, OJ Lee and JI Kim, 16 (SSWU).

Distribution. China, Korea.

Remark. Life cycle rotate by an year. The adults appear from the beginning of July to the middle of August. Third larvae hibernate (Zhang 1984, Liu et al. 1997). Adults nocturnal, often observed near the wetland or sand dunes. Their distributions has been reported in

Japan and Taiwan by Murayama (1954) and Kim (2001), but They are not distribute those regions according to Yu et al. (1998), Masayuki (2001), Löbl and Smetana (2006).

Maladera castanea Arrow 밤색우단풍뎅이

(Pl. II. Fig. II-6: C, D; Pl. III. Fig. III-5: B)

Autoserica castanea Arrow, 1913: 398.

Korean records. *Autoserica castanea*: Cho et al., 1967: 198.

Aserica castanea: Eguchi, 1932: 58; Kôno, 1935: 163; Murayama, 1935: 3; 1937: 33; 1938: 14; Miwa and Chûjô, 1939: 55; Takahashi, 1941: 230; Cho, 1947: 65; 1957: 124.

Serica castanea: Murayama, 1954: 44.

Maladera (Aserica) castanea: Nomura, 1960: 58.

S. castanae [sic]: Cho, 1969: 654.

Maladera castanea: Nomura, 1969: 79; Shin and Choo, 1977: 88; Yoon and Nam, 1980: 149; Nam and Kim, 1982: 129; Kim, 1983: 83; 2001: 75; Kim and Chang, 1984: 169; Kim et al., 1985: 105; Kim and Lee, 1991a: 67; 1997: 127; Park and Kim, 1993: 112; Park et al., 1993: 178; ESK and KSAE, 1994: 151; Kim and Kim, 1998: 170.

Maladera (Maladera) castanea: Stebnicka, 1980: 253.

Maladera castanea koreana: Kim and Kim, 2003b: 90; Kim et al., 2004: 117.

Maladera verticalis: Kim and Kim, 2003b: 90.

Maladera (*Cephaloserica*) *castanea koreana*: Löbl and Smetana, 2006: 234.

Description. Body length 8.6-9.7mm; Width 4.85-5.55mm; Club-footstalk ratio 1.33-1.43 (♂), 0.94-1 (♀); Pronotum ratio 0.56-0.58; Pronotum-elytra ratio 0.32-0.35; Metafemur ratio 0.41-0.42; Metatibia ratio 0.35-0.41; Pygidium ratio 0.53-0.62 (♂), 0.68 (♀).

Body short, ovate, reddish brown, surface opaque except shinny labroclypeus.

Labroclypeus trapezoidal, widest at base, sides straight, convergent forward, anterior angles broadly rounded, anterior margin medially weakly sinuated, surface shinny with very dense and fine punctures, medially with a longitudinal elevation. Frontoclypeal suture distinct, weakly curved. Ocular canthus triangular, with shallow punctures and a terminal bristle. Frons opaque, as long as labroclypeus, shallow punctation with only few hairs beside eyes, surface with a row of setae at posterior. Antenna yellowish brown, 10-segmented, last 3 segments lamellated, as long as remaining segments combined in male, shorter than remaining segments combined in female. Eyes not large, eye to interocular space ratio 0.59-0.62 (♂), 0.5-0.55 (♀). Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at base, narrowed forward, sides weakly and uniformly curved narrowed forward, anterior and lateral margin with few setae, anterior angles sharp, not rounded at apex, and posterior angles bluntly rounded, surface opaque, very shallowly punctate without hair. Scutellum triangular, apically bluntly rounded,

punctation similar to that of pronotum, without hair.

Elytra opaque, widest at posterior, intervals shallowly convex, striae with a row of punctation, lateral border setaceous.

Ventral side opaque. Mesosternum widely separated between mesocoxae, mesocoxal distance as wide as mesofemur. Metacoxae with some strong hairs laterally. Each abdominal sternite opaque, with a row of setaceous punctures. Pygidium apically weakly convex, with fine scattered punctation, surface opaque, with some short hairs beside apical border.

Legs short and robust; metafemur twice as wide as mesofemur, anterior border slightly convex, surface smooth with a longitudinal row of setaceous punctures on posteriorly one fourth, posterior angles rounded. Metatibia short and robust, surface smooth, with a few of marginal spines. First metatarsomere as long as upper metatibial spur but slightly shorter than two following segments combined. Metatarsi ventrally weakly serrated. Protibia short, bidentate, anterior tarsal claws symmetrical in both sexes. Aedeagus: Pl. III. Fig. III-5: B.

Specimen Examined. CB Boeun-gun, Mt. Sokrisan, 6.VIII.1990, JI Kim, 4 (SSWU); Danyang-gun: 21.VII.1981, EY Lee, 1 (SSWU). **CN** Buyeo-gun: Mt. Mansusan, 19.VII.1999, JI Kim, et al., 1 (SSWU); Cheonan-gun: Mt. Gwangdeoksan, 22-23.VIII.1994, JM Park, 1 (SSWU); Cheongyang-gun: Mt. Chilgapsan, 25.VII.1979, IB Yun, 1 (SSWU); Daejeon-si: 20.VIII.1993, SL Ahn, 1 (NSM); Sinsong-dong, 9.VIII.1993, SL Ahn, 1 (NSM); Gongju-si: Mt. Gyeryongsan, 19.VIII.1993, KA Lee, 1 (SSWU); ditto, Temple Donghak, 28.VII.1979, IB Yun, 1 (SSWU); ditto,

Temple Gap, 29.VII.1979, SG Lee & IB Yun, 2 (SSWU); Taean-gun: Anmyeon-eup, 25.VII.1994, LR Kim, 1 (SSWU); Sowon-myeon, Manri-po, 22.IX.1995, SL Ahn, 1 (NSM). GB Bonghwa-gun: Bonghwa, 5.VIII.1998, HY Park, 2 (SSWU); Cheongsong-gun: Mt. Juwangsan, 29.VII.1983, KS Jang, 1 (SSWU); ditto, 26.VII.1984, SH Nam, 1 (SSWU); Daehyeon-ri, 25.VII.1986, KS Jang, 1 (SSWU); Daegu-si: Buk-gu, Gyeongsang Univ., 20.VI.1992, MY Park, 1 (SSWU); Suseong-gu, Hwangum-dong, 22.VII.1989, SH Jeon, 1 (SSWU); Munkyeong-si: Munkyeongsaeje, 10.VII.1977, JK Lee et al., 3 (SSWU); Yeongju-si, Buseok-myeon, Namdae-ri, 1.VII.1998, JI Kim et al., 1 (SSWU); Yeongpung-gun: Mt. Sobaeksan, Temple Hibang, 29.VII.1986, JH Lee, 1 (SSWU); Yeongyang-gun: Mt. Ilwolsan, 22.VII.1997, YB Jo, 1 (SSWU). GG Gapyeong-gun: Mt. Myeongjisan, 23.VIII.1996, YJ Chu, 1 (SSWU); Giheung-si: 12.VII.1999, DS Ku, 1 (SSWU); Gwangju-si: 13.VIII.1972, OJ Lee, 1 (SSWU); Incheon-si: Dong-gu, Songhyeon-dong, 29.VII.1993, JY Im, 1 (SSWU); Nam-gu, Jangsu-dong, 5.VII.1986, HM Park, 1 (SSWU); Ongjin-gun, Daecheong Is., 14.VI.1990, IY Han, 1 (SSWU); ditto, 11.VII.1990, EJ Jo, 1 (SSWU); ditto, Deokjeok Is., 7.VII.1981, HK Park, 1 (SSWU); Namyangju-si: Mt. Cheonmasan, 18.XI.1983, MH Choe, 1 (SSWU); Pocheon-si: Pocheon-eup, 5.VIII.1996, YH Kim, 1 (SSWU); Seoul-si: Eunpyeong-gu, Galhyeon-dong, 16.V.1993, KH Kwon, 1 (SSWU); Gangdong-gu, Dunchon-dong, 14.VII.1994, HE Kim, 1 (SSWU); Gangnam-gu, Gaepo-dong, 1.IX.1990, SW Choe, 1 (SSWU); Gwanak-gu, Bongcheon-1-dong, 16.VIII.1990, EJ Lee, 1 (SSWU); Nowon-gu,

Sanggye-dong, 13.VI.1999, EH Jo, 1 (SSWU); ditto, Mt. Suraksan, 26.IX.1990, HJ Lee, 1 (SSWU); Yongsan-gu, Yongsan, 13.VII.1975, KO Lee, 1 (SSWU); Suwon-si: Umyeon-dong, 16.VII.1985, SY Lee, 1 (SSWU); Uijeongbu-si: Gosan-dong, 13.VIII.1992, EA Choe, 1 (SSWU); Uiwang-si: Mt. Cheongyesan, Temple Cheongye, 27.VIII.1989, JO Yang, 1 (SSWU); Yangpyeong-gun: Mt. Yongmunsan, 13.VIII.1987, SR Lee, 1 (SSWU); ditto, 16.IX.1990, NY Kim, 1 (SSWU). **GN** Geoje-gun: Chilcheon Is., Okkye, 15-18.VIII.1985, JS Jeon, 4 (SSWU); Hamyang-gun: Wungok-myeon, Okhwan-ri, 24.VII.?, ?, 1 (SSWU); Temple, Wungok, 22.VII.1985, ?, 1 (SSWU); Mt. Jirisan, 19.VIII.1982, ML Kim, 1 (SSWU); Hapcheon-gun: Daeam-myeon, Ahcheon-ri, 5.VII.1984, SS Kim, 1 (SSWU); Jinju-si: 6.VII.1984, TS Oh, 1 (SSWU); Sangbonseo-dong, Mt. Bibongsan, 27.VII.1984, TS Oh, 1 (SSWU); Kimhae-gun: Sangrim-myeon, Yeocha-ri, 15.VIII.1987, ?, 1 (SSWU); Sangcheong-gun: Mt. Jirisan, Jungsan-ri, 30-31.VII.1981, JI Kim & HY Han, 3 (SSWU); Yangsan-si: Wondong-myeon, Naepo-ri, 15-16.VIII.1985, ?, 1 (SSWU). **GW** Chuncheon-si: Kangchon, 10.VII.1998, SH Jo, 1 (SSWU); Inje-gun: Mt. Bangtaesan, Bangdong-ri, 15.VIII.1995, JI Kim, 2 (SSWU); Jokyeong-dong, 24-26.VII.2000, SY Kim & AY Kim, 1 (SSWU); Jeongseon-gun: 2-3.VIII.1996, HS Byeon & IS Kim, 3 (SSWU); Taebaek-si: Sodo-dong, 23.VII.1986, KS Jang, 1 (SSWU); Wonju-si: Guirye-myeon, Guirye-ri, 4.VII.1996, JI Kim, 1 (SSWU); Heungeop-myeon, maeji-ri, Yonsei Univ., 15.VII.1989, HW Lee, 1 (SSWU); Seongnam-ri, 31.VII.1975, JI Kim, 1 (SSWU). **JB** Jeongeup-si: Mt. Naejangsan, 1.VIII.1974, CH Kim, 1 (SSWU);

Namwon-si: Gwanganru, 29.VII.1990, SY Choe, 1 (SSWU); Sannae-myeon, 28.VII.1986, KI Kim, 1 (SSWU); Wanju-gun: Wunsan-ri, Mt. Oknyeobong, 22.VII.1997, JI Kim et al., 1 (SSWU). **JJ** Bukjeju-gun: Hamdeok, 20.VIII.1996, HJ Jeong, 1 (SSWU). Jeju-si: Odeung-dong, Gaemimok, 26-27.VII.2003, JS Park, 2 (SSWU). **JN** Gurye-gun: Mt. Jirisan, Cheonghak-dong, 1.VIII.1998, TM Han, 1 (SSWU); Gwangyang-gun: Mt. Baekwunsan, 10.VIII.1993, SY Kim, 1 (SSWU); Namwon-gun: Mt. Jirisan, Baemsagol, 29.VII.1998, TM Han, 1 (SSWU); Wando-gun: Soan Is., 2-3.VIII.1995, MR Yun, 2 (SSWU); Sinji Is., 6.VIII.1987, OJ Lee, 1 (SSWU).

Distribution. Korea.

Biological note. This is well known species as 'Asiatic Garden Beetle'. The adults nocturnal, feed on more than a hundred plants but prefer about 30 kinds of plant (Ritcher 1966, Tashiro 1987). Their larvae attack the root of turfgrass, strawberries, vegetables and the roots of flowering plant. They have one year life cycle (Ritcher 1966). They can create a medical problem through its habit of invading human ears (Tashiro 1987).

Maladera verticalis (Fairmaire) 빨간색우단풍뎅이

(Pl. II. Fig. II-6: E; Pl. III. Fig. III-5: C)

Serica verticalis Fairmaire, 1888: 118.

Maladera castanea koreana Kim and Kim, 2003b: 90.

Korean records. *Aserica verticalis*: Murayama, 1935: 3; 1938: 14; 1941b: 20; Miwa and Chûjô, 1939: 58; Cho, 1957: 297; KZS, 1968:

136.

Serica verticalis: Tomiura and Tomiura, 1935b: 238; Murayama, 1954: 59; Cho, 1969: 659 (빨간색우단풍뎅이); Kim and Kim, 1974: 107; Kim and Nam, 1982: 155; Kim, 1981: 344.

Maladera (Maladera) verticalis: Stebnicka, 1980: 207.

Maladera verticalis: Kim et al., 1991: 179; 1992: 153; 1996: 58; 1999: 129; 2002: 120; 2003: 126; 2004: 117; Kim and Lee, 1991a: 67; 1997: 127; Kim, 1992: 105; 1996: 174; 2000a: 132; 2001: 66; ESK and KSAE, 1994: 151; Kim and Kim, 1996: 127; 1998: 170; Kim and Kim, 2003b: 90.

Maladera castanea koreana Kim and Kim, 2003b: 90.

Description. Body length 7.9-9.3mm; Width 4.9-5.4mm; Club-footstalk ratio 1-1.36; Pronotum ratio 0.54-0.57; Pronotum-elytra ratio 0.32-0.34; Metafemur ratio 0.41-0.45; Metatibia ratio 0.36-0.38; Pygidium ratio 0.67-0.72.

Body short, ovate, reddish brown to dark reddish brown, surface opaque except shinny labroclypeus.

Labroclypeus trapezoidal, widest at base, sides straight, convergent forward, anterior angles broadly rounded, anterior margin medially weakly sinuated, surface shinny with very dense and fine punctures, medially with a longitudinal elevation. Frontoclypeal suture distinct, weakly curved. Ocular canthus triangular, with shallow punctures and a terminal bristle. Frons opaque, as long as labroclypeus, shallow punctation with only few hairs beside eyes.

Antenna yellowish brown, 10-segmented, last 3 segments lamellated, as long as remaining segments combined in male, shorter than remaining segments combined in female. Eyes not large, eye to interocular space ratio 0.52-0.62. Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at base, narrowed forward, sides weakly and uniformly curved narrowed forward, anterior and lateral margin with few setae, anterior angles sharp, not rounded at apex, and posterior angles bluntly rounded, surface opaque, very shallowly punctate without hair. Scutellum triangular, apically bluntly rounded, punctation similar to that of pronotum, without hair.

Elytra opaque, widest at posterior, intervals shallowly convex, striae with a row of punctation, lateral border setaceous.

Ventral side opaque. Mesosternum widely separated between mesocoxae, mesocoxal distance as wide as mesofemur. Metacoxae with some strong hairs laterally. Each abdominal sternite opaque, with a row of setaceous punctures. Pygidium apically weakly convex, with fine scattered punctation, surface opaque, with some short hairs beside apical border.

Legs short and robust; metafemur twice as wide as mesofemur, anterior border slightly convex, surface smooth with a longitudinal row of setaceous punctures on posteriorly one fourth, posterior angles rounded. Metatibia short and robust, surface smooth, with a few of marginal spines. First metatarsomere as long as upper metatibial spur but slightly shorter than two following segments combined. Metatarsi

ventrally weakly serrated. Protibia short, bidentate, anterior tarsal claws symmetrical in both sexes. Aedeagus: Pl. III. Fig. III-5: C.

Specimen Examined. **CB** Boeun-gun: Naesokri-myeon, Mt. Sokrisan, 6.VIII.1990, JI Kim, 2♂1♀ (SSWU); Jincheon-gun: Baekgok-myeon, Daemun-ri & Yeongok-ri, 7-8.VII.1998, TM Han & TW Kang, 1♂1♀ (SSWU); Yeongdong-gun: Yonghwa-myeon, Mt. Minjusisan, 12.VII.1997, BY Kim, 1♂ (SSWU). **CN** Cheonan-si: Mt. Gwangdeoksan, 22-23.VII.1994, SY Kim, 1♂ (SSWU); Gongju-si: Mt Gyeryongsan, Temple Donghak, 28.VII.1979, SH Nam & SK Lee, 2♀ (SSWU). **GB** Bonghwa-gun: 31.VII.1998, JE Kim, 3♂ (SSWU); 1.VIII.1998, JH Kim, 1♂ (SSWU); Cheongsong-gun: Mt. Juwangsan, 13.VII.1978, JW Lee, 1♀ (SSWU); ditto, 26.VII.1984, SH Nam, 1♀ (SSWU); Dalseong-gun: Mt. Biseulsan, 10-11.VII.2000, AY Kim, 1♂ (SSWU); Daegu-si: Hwanggeum-dong, 22.VII.1989, SH Jeon, 2♂ (SSWU); Mt. Palgongsan, 8.VII.1986, SH Jeon, 1♂ (SSWU); Gyeongju-si: 1.VIII.1996, SL Park, 1♀ (SSWU); Wuljin-gun: Seo-myeon, Mt. Baekamsan, Sokwang-ri, 31.VII-2.VIII.1999, JI Kim et al., 3♂ (SSWU); Yeongdeok-gun: Mt. Naeyeonsan, Temple Bokyeong, 12.VII.1978, JW Lee, 1♀ (SSWU); Yeongju-si: Buseok-myeon, Namdae-ri, Mt. Seondalsan & Eoraesan, 29.VI-1.VII.1998, JI Kim et al., 2♂3♀ (SSWU). **GG** Gapyeong-gun: Buk-myeon, Mt. Hwaaksan, 24.VIII.1998, SY Kim, 1♂ (SSWU); Mt. Cheonggyesan, 27.VI.1991, JI Kim, 2♂ (SSWU); Daeseong-ri, 24.VII.1998, HA Lee, 1♂ (SSWU); Goyang-si: Jangheung-myeon, 8.VIII.1993, SK Lee, 1♀ (SSWU); Mt. Cheonggyesan, 27.VI.1991, JI Kim, 2♂ (SSWU); Hanam-si: Misa-ri, 12.VII.1987, SY Choe, 1♀

(SSWU); Mt. Cheonggyesan, 27.VI.1991, JI Kim, 2♂ (SSWU); Incheon-si: Ongjin-gun, Baekryeong-myeon, Baekryeongdo, 27.VII.1987, HJ Yu, 1♀ (SSWU); Pocheon-si: Yeonpyeong-ri, 20.VII.1996, JI Kim et al., 1♀ (SSWU); Siheung-si: Mokgam-dong, 2.VII.2000, SW Park, 2♀ (SSWU); Seongnam-si: Bundang-gu, 27.VII.1997, JH Lee, 1♀ (SSWU); ditto, Gumi-dong, 4.VII.1998, MK Kim, 1♀ (SSWU); Seoul-si: Gangdong-gu, Sangil-dong, 21.VI.1998, HJ Lee, 1♂ (SSWU); Gangnam-gu, Mt. Daemosan, 13.IX.1998, EK Ahn, 1♀ (SSWU); Guro-gu, Oryu-dong, 23.VII.1998, HH Lee, 1♂ (SSWU); Gwangjin-gu, Mt. Achasan, 26.VI.1998, TM Han & TW Kang, 1♂ (SSWU); Nowon-gu, Mt. Suraksan, 14.V.1999, KH Jo, 1♂ (SSWU); Suwon-si: Paldal-gu, Wuman-dong, 16.VII.1985, SY Lee, 1♂ (SSWU); Yangpyeong-gun: Yongmun-myeon, Mt. Yongmunsan, 31.VII.1976, SS Han, 1♀ (SSWU). **GN** Changnyeong-gun: Wuponeup, 23-31.VIII.1992, JW Lee & CH Park, 1♂1♀ (SSWU); Geoje-gun: Chilcheondo, Okgye, 15.VIII.1985, YK Oh, 1♀ (SSWU); Dongbu-myeon, Jisimdo, 4.VIII.1994, GS Ok, 1♀ (SSWU); Hamyang-gun: Jirisan, Jungsan-ri, 30.VII.1981, IB Yun, 1♂ (SSWU); ditto, 25.VI.2001, JB Jeon, 1♂1♀ (SSWU). **GW** Gangreung-si: Yeongok-myeon, 12.VIII.1995, YJ Baek, 1♂ (SSWU); Inje-gun: Mt. Bangtaesan, Jokyeong-dong, 24-26.VII.2000, SY Kim & AY Kim, 3♀ (SSWU); ditto, Misan-ri, 25.VI.1996, Yeongnam Univ. lab., 1♂ (SSWU); Wonju-si: Heungeop-myeon, meji-ri, ?, VI.1996, JI Kim, 1♀ (SSWU); ditto, Yonsei Univ., 15.VIII.1989, HW Lee, 1♂ (SSWU); Hongcheon-myeon, 9.VIII.1989, HS Bae, 1♀ (SSWU); Mt. Chiaksan, Temple Sangwon, 14.VIII.1999, DS Gu, 1♀ (SSWU). **HN** Pyeongsan-si:

Huchiryeong, 25.VI.1999, ?, 1♂ (NSM). **JB** Jeonju-si: Deokjin, 7.VIII.1969, Y, 1♀ (SSWU). **JJ** Jejudo, 27.VII.1985, MG Baek, 1♂ (SSWU). **JN** Gurye-gun: Seomjin river, 13.VIII.1998, TM Han, 1♀ (SSWU); Jangseong-gun: Mt. Baekyangsan, 5.VIII.1974, JI Kim, 1♀ (SSWU); Namwon-si: Mt. Jirisan, Baemsagol, 29.VII.1998, TM Han, 1♀ (SSWU); Yeocheon-gun: Nam-myeon, Yeondo, 27.VII.1993, ?, 1♀ (SSWU).

Distribution. China (Northern region), Korea.

Biological note. They have one year life cycle and hibernate as the larvae. The adults nocturnal, appear from the end of June (Zhang, 1984; Liu et al., 1997).

Remark. This have very similar morphology and male aedeagus with *M. castanea,* so it is difficult to identify these two without comparing detailed male aedeagus.

Maladera infuscata (Moser) 그을음우단풍뎅이

(Pl. II. Fig. II-6: F, G; Pl. III. Fig. III-5: D)

Autoserica infuscata Moser, 1915b: 340 (China and Korea).

Korean records. *Autoserica koreana* Moser, 1919: 330.

Autoserica infuscata: Niijima and Kinoshita, 1923: 29; 1927: 6; Tomiura and Tomiura, 1935b: 239; Kondo, 1941: 70.

Aserica infuscata: Murayama, 1938: 13; Miwa and Chûjô, 1939: 56; Cho, 1957: 297; KZS, 1968: 136 (그을음빛우단풍뎅이).

Serica okamotoi: Murayama, 1938: 18; 1954: 35; Cho, 1969: 651 (오카모토우단풍뎅이); Kim et al., 1974: 229.

Serica infuscata: Murayama, 1954: 41; Cho, 1969: 653; Kim and Nam, 1982a: 154.

Maladera (Aserica) infuscata: Nomura, 1960: 58.

Maladera (Maladera) infuscata: Nomura, 1974: 109; Stebnicka, 1980: 207.

Maladera (*M.*) *okamotoi*: Stebnicka, 1980: 258.

Maladera okamotoi: Kim and Lee, 1991; 67; Kim, 1992: 105; ESK and KSAE, 1994: 151; Kim et al., 1995: 171; Kim and Kim, 1997: 126; Kim, 2001: 76.

Maladera infuscata: ESK and KSAE, 1994: 151; Kim and Lee, 1997: 122; Kim, 2001: 74; Kim and Kim, 2003b: 89; Ahrens, 2003: 2; Löbl and Smetana, 2006: 237.

Description. Body length 8.85-10.4mm; Width 5.4-6.7mm; Club-footstalk ratio 1.22-1.38 (♂), 1 (♀); Pronotum ratio 0.52-0.56; Pronotum-elytra ratio 0.31-0.32; Metafemur ratio 0.36-0.39; Metatibia ratio 0.3-0.31; Pygidium ratio 0.53-0.58.

Body medium, ovate, plumpy, reddish brown to dark brown, surface opaque, velvety, labroclypeus shinny.

Labroclypeus trapezoidal, widest at base, sides straight, weakly convergent forward, anterior angles rounded, surface shinny, medially weakly upheaval with dense punctures, labrum part indistinct, medially weakly sinuated. Frontoclypeal suture distinct, weakly angled. Ocular canthus triangular, with shallow punctures and one or two terminal bristles. Frons opaque, a little shorter than labroclypeus, shallow

punctation with few hairs near eyes. Antenna yellowish brown, 10-segmented, last 3 segments lamellated, longer than the remaining segments combined in male, almost same or little shorter than remaining segments combined in female. Eyes not large, eye to interocular space ratio 0.53-0.57 (♂), 0.39-0.48 (♀). Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at base, narrowed forward, sides weakly and uniformly curved, anterior and lateral border with a row of setae, anterior angles and posterior angles somewhat rounded, surface opaque, densely shallowly punctate with a microscopic hair in. Scutellum triangular, punctation similar to that of pronotum, with a microscopic hair in.

Elytra opaque, widest at posterior, intervals distinctly convex, with fine and dense punctation similar to that of pronotum, lateral border strongly setaceous, sutural angles somewhat rounded, with a seta.

Ventral side opaque, velvety. Mesosternum widely separated between mesocoxae, mesocoxal distance almost as wide as width of mesofemur. Metacoxae with some strong hairs laterally. Each abdominal sternite opaque, with a row of strongly setaceous punctures. Pygidium wide, medially weakly convex, with fine scattered punctation, surface opaque, with a few hairs beside apical border.

Legs short and stout; metafemur twice width of mesofemur, anterior border weakly convex, posterior ventral margin blunt basally, surface punctate with one longitudinal row of setaceous punctures

ventrally, posterior angles rounded. Metatibia somewhat robust, little shorter than metafemur, surface smooth, with a few of marginal spines. First metatarsomere longer than upper metatibial spur and almost same length with two following segments combined. Metatarsi ventrally weakly serrated. Protibia very short, bidentate, anterior tarsal claws asymmetrical in male; ventral teeth of inner claw with rounded, symmetrical in female. Aedeagus: Pl. III. Fig. III-5: D.

Specimen Examined. **CB** Jincheon-gun: Baekgok-myeon, Daemun-ri, 7.VII.1998, TM Han, 1♀ (SSWU); Yeongok-ri, 8.VII.1998, TM Han & TH Kang, 2♂ (SSWU); Okcheon-gun: Iwon-myeon, Iwon-ri, 26.V.1987, ?, 1♀ (SSWU); **CN** Asan-si: Hyudae-ri, 20.IX.1992, HJ Kim, 1♀ (SSWU); Onyang-dong, Shinjeongho, 7.V.1983, SH Kim, 3♂ (SSWU); Boryeong-gun: Wungcheon-myeon, 18.VI.1988, MY Lee, 1♀ (SSWU); Cheonan-si: Mt. Gwangdeoksan, 16.VI.1994, HS Choe, 1♂ (SSWU). **GB** Cheongdo-gun: Temple Wunmun, 23-24.V.1987, YM Hong, 1♂ (SSWU); ditto, 20.V.1989, HE Lee et al., 3♂ (SSWU); Dalsan-si: Yeongdeok-myeon, Mt. Baedaesan, 24.VII.1997, YB Jo, 1♂ (SSWU); Gyeongsan-si: Yeongnam Univ., 4.VI.1986, SKI, 1♀ (SSWU); ditto, 20.IV.1988, JS Han, 3♀ (SSWU); ditto, 8.V.1989, KJ Hwang, 2♀ (SSWU); ditto, 28.V.1989, CY Son, 1♂ (SSWU); ditto, 28.V.1991, HJ Kim, 1♂ (SSWU); Kimcheon-si: Daehang-myeon, Temple Jikji, 4.VI.1978, JW Lee, 1♀ (SSWU); Munkyeong-si: Munkyeong-eup, Sangcho-ri, Munkyeongsaeje, 11.V.1977, EW Seo. 1♀ (SSWU); ditto, 26.V.1996, JH Ahn, 2♂ (SSWU); ditto, Mt. Hwanghaksan, 4.VI.1978, KS Yu, 1♂ (SSWU); Wuljin-gun: Mt. Baekamsan, 28-29.V.1999, JI Kim et

al., 2♂ (SSWU); ditto, Bulyeong Valley, 14.V.1993, HJ Kwon, 1♀ (SSWU); ditto, 29.V.1999, JI Kim et al., 1♀ (SSWU); Yeongju-si: Pungki-eup, Mt. Sobaeksan, Temple Hibang, 7.VI.1974, JH Park, 1♂ (SSWU). **GG** Gapyeong-gun: Daeseong-ri, 5.V.2000, NN Yu, 1♀ (SSWU); ditto, 3.VI.2000, AY Kim, 1♀ (SSWU); Guri-si: Sano-dong, 27.V.1995, HS Ju, 1♀ (SSWU); Incheon-si: Ongjin-gun, Deokjeokdo, 7.VII.1981, JI Kim, 1♂ (SSWU); Namyangju-si: Pyeongnae-dong, Mt. Cheonmasan, 24.VI.1983, TH Ro, 1♂ (SSWU); Paju-si: Temple Bokwang, 16.VI.1978, HR Lee, 1♀ (SSWU); Mt. Aengmubong, 16.V.1996, HY Park, 1♂ (SSWU); Pocheon-si: Yeongpyeong-ri, 20.VII.1996, JI Kim et al., 1♀ (SSWU); Seongnam-si: Namhansanseong, 19.VI.1974, DJ Sim & JW Gu, 1♂1♀ (SSWU); Seoul-si: Dongdaemun-gu, Mangwu-dong, 22.V.1998, SY Lee, 1♀ (SSWU). **GN** Hapcheon-gun: Samga-myeon, Samga-eup, 23.V.1987, DS Gu et al., 4♂ (SSWU); Tongyeong-gun: Okji-myeon, 30.V.1987, YH Baek, 1♀ (SSWU). **GW** Chuncheon-si: Gangchon, 21.V.1983, SH Park, 1♂ (SSWU); Donghae-si: Bukpyeong-myeon, Temple Samhwa, 25-27.VI.1984, HS Choe et al., 2♂ 2♀ (SSWU); Hongcheon-gun: Bukbang-myeon, Neungpyeong-ri, 1-23.V.2001, SI Han, 1♂ (SSWU); Sokcho-ri, 7.VII.1995, HJ Song, 1♀ (SSWU); Inje-gun: Mt. Gachilbong, 13.VI.1997, HS Ro et al., 1♂ (SSWU); Jeongseon-gun: Mt. Gariwangsan, 21.V.1998, BY Kim et al., 1 ♂2♀ (SSWU); Wonju-si: Mt. Chiaksan, 15.IV.1999, JI Kim et al., 1♂ (SSWU); ditto, 4.V.2003, JK Lee, 1♂ (SSWU). **JB** Jeongeup-si: Naejang-dong, Mt. Naejangsan, 4.VII.1985, SJ Im, 1♀ (SSWU). **JN** Gurye-gun: Mt. Jirisan, Piagol, 7.VII.1976, SH Nam, 1♂ (SSWU);

22.V.1999, TM Han, 1♂ (SSWU); ditto, Temple Hwaeum, 6.VI.1974, YS Yu et al., 3♂1♀ (SSWU); Jangseong-gun: Bukha-myeon, Temple Baekyang, 24-25.V.1994, JM Park et al., 3♂1♀ (SSWU); Suncheon-si: Songgwang-myeon, Mt. Jogyesan, 5.V.1990, JY Lee, 1♀ (SSWU). **PN** Mt. Gabajibong, 14.VI.1995, ?, 1♀ (NSM).

Distribution. China, Korea.

Maladera gibbiventris (Brenske) 주름배우단풍뎅이

(Pl. II. Fig. II-6: H; Pl. III. Fig. III-5: E)

Autoserica gibbiventris Brenske, 1897b: 396.

Korean records. *Autoserica gibbiventris*: Niijima and Kinoshita, 1927: 9; Maruta, 1929: 367.

Aserica gibbiventris: Murayama, 1935: 3; 1938: 12; Miwa and Chûjô, 1939: 56; Nakayama and Okamoto, 1940: 198; Cho, 1957: 296; KZS, 1968: 136 (주름배우단풍뎅이).

Serica gibbiventris: Murayama, 1954: 36; Cho, 1969: 652; Kim and Kim, 1974: 107; Kim and Nam, 1982a: 154.

Maladera (Maladera) gibbiventris: Nomura, 1974: 109; Stebnicka, 1980: 254.

Maladera gibbiventris: Kim and Lee, 1991a: 67; 1997: 126; Kim, 1992: 105; 2001: 74; ESK and KSAE, 1994: 151; Kim et al., 1994: 111; 1999: 129; 2003: 126; Kim and Kim, 1998: 129; Kim and Kim, 2003b: 87.

Description. Body length 9.6-11mm; Width 5.65-7.3mm; Club-footstalk

ratio 1.75-1.88 (♂), 1.11-1.17 (♀); Pronotum ratio 0.53-0.54; Pronotum-elytra ratio 0.3-0.32; Metafemur ratio 0.37-0.39; Metatibia ratio 0.28-0.35; Pygidium ratio 0.49-0.57.

The biggest in size among Korean *Maladera*. Body ovate, plumpy, reddish brown to dark brown, surface opaque, velvety, labroclypeus shinny.

Labroclypeus trapezoidal, widest at base, sides straight, convergent forward, anterior angles rounded, surface shinny, medially weakly upheaval with dense punctures, labrum part distinct. Frontoclypeal suture distinct, weakly angled in female. Ocular canthus triangular, with shallow punctures and a terminal bristle. Frons opaque, almost as long as labroclypeus in length, very shallow punctation with few hairs near eyes. Antenna yellowish brown, 10-segmented, last three segments lamellated, longer than 1.7 times of the remaining segments combined in male, longer than 1.1 times of remaining segments combined in female. Eyes not large, eye to interocular space ratio 0.49-0.71. Mentum weakly elevated, anteriorly with a flattened declivity slightly concaved.

Pronotum convex, widest at base, slightly narrowed forward, sides weakly and uniformly curved, anterior border with few setae, lateral border with a row of setae, anterior angles sharp, posterior angles somewhat rounded, surface opaque, densely shallow punctate with a microscopic hair in. Scutellum triangular, somewhat ogival posteriorly, punctation similar to that of pronotum, with a microscopic hair in.

Elytra opaque, widest at posterior, intervals shallowly convex, second interval flattened, with fine and dense punctation similar to that of pronotum, lateral border setaceous, sutural angles with a seta.

Ventral side opaque, velvety. Mesosternum widely separated between mesocoxae, mesocoxal distance as wide as width of mesofemur. Metacoxae with some strong hairs laterally. Each abdominal sternite opaque, with a row of setaceous punctures, middle of the 3rd and 4th sternites protrude. Pygidium wide, medially weakly convex, with fine scattered punctation same as sternite, surface opaque, with some short hairs beside apical border.

Legs short and stout; metafemur almost twice width of mesofemur, anterior border weakly convex, posterior ventral margin blunt basally, surface punctate with two longitudinal rows of setaceous punctures, posterior angles rounded. Metatibia somewhat robust, shorter than metafemur, surface smooth, with a few of marginal spines. First metatarsomere slightly longer than upper metatibial spur but almost same length with two following segments combined. Metatarsi ventrally weakly serrated. Protibia short, bidentate, anterior tarsal claws symmetrical in both sexes. Aedeagus: Pl. III. Fig. III-5: E.

Specimen Examined. CB Chungju-si: Mt. Namsan, 18.V.2001, SY Kim, 1 ♂ (SSWU). **CN** Cheonan-si: Mt. Gwangdeoksan, 16-18.VI.1994, JM Park, 1♀ (SSWU). **GB** Dalsan-si: Yeongdeok-myeon, Mt. Baedaesan, 24.VII.1997, YB Jo, 1♂ (SSWU); Gyeongsan-si: Yeongnam Univ., 2.VII.1989, WS Park, 1 (SSWU); ditto, 23.V.1990, MO Eom, 1♂ (SSWU); Yeongju-si: Buseok-myeon, Namdae-ri, 1.VII.1998, JI Kim et al., 1♂

(SSWU); Wuljin-gun: Bulyeonggyegok, 24.VI.1990, JW Lee, 1♀ (SSWU). GG Dongducheon-si: Mt. Soyosan, 20.V.1982, MH Yang, 1♂ (SSWU); Gapyeong-gun: 13.VI.1981, SH Choe, 1♂ (SSWU); Goyang-si: Songchu, 7.V.1988, HJ Lee, 1♂ (SSWU); Gwangju-si: Eungogae, 23.X.1982, SH Lee, 1♀ (SSWU); Hanam-si: Kwangam lake, 7.V.1995, ML Yun, 1♂ (SSWU); Namyangju-si: Mt. Bulamsan, 23.IX.1986, HW Yu, 1♀ (SSWU); Pyeongnae, Mt. Cheonmasan, 2.VI.1984, IS Hyeon, 2♂ (SSWU); ditto, 26.VI.1984, KJ Lee, 1♀ (SSWU); ditto, 7.VI.1986, KJ Lee, 1♂ (SSWU); Seoul-si: Gangbuk-gu, Mt. Bukhansan, 17.V.1981, MH Seo, 1♀ (SSWU); Gangdong-gu, Sangil-dong, 17.V.1995, MR Yun, 1♂ (SSWU); Gangnam-gu, Dogok-dong, 4.V.1980, JI Kim, 1♂ (SSWU); Wonji-dong, Mt. Cheonggyesan, 16.IV.1978, MK Go, 1♂1♀ (SSWU); ditto, 24.V.1987, GS Chae, 1♂ (SSWU); ditto, 23.V.1995, SA Lee, 1♂ (SSWU); Mapo-gu, Seongsan, 29.V.1996, IH Eom, 1♀ (SSWU); Seodaemun-gu, Namkajwa-dong, 24.V.1980, MH Lee, 1♂1♀ (SSWU); Seongbuk-gu, Anam-dong, 24.V.1982, HS Kim, 1♀ (SSWU); ditto, 27.V.1990, CS Lee, 1♂ (SSWU); ditto, Bomun-dong, 15-24.V.1986, HW Yu, 2♂ (SSWU); ditto, Dongseon-dong, 6.V.1980, JI Kim, 1♂ (SSWU); ditto, 2.VI.1980, KS Jang, 1♂ (SSWU); ditto, Jangwui-dong, 20.V.1980, JI Kim, 1♂ (SSWU); ditto, 3.VI.1980, JI Kim, 1♂ (SSWU); ditto, Jeongreung, 9.IV.1978, YK Kang, 1♀ (SSWU); ditto, 24.V.1989, HI Jeong, 1♀ (SSWU); ditto, Seongbuk-dong, 24.IV.2005, JI Kim, 1♀ (SSWU); Songpa-gu, Ogeum-dong, 23.V.1998, SJ Song, 1♀ (SSWU); Paju-si: Temple Bokwang, 16.VI.1978, JH Lee, 1♀ (SSWU); Mt. Angmubong, 16.V.1976, JH Lee, 1♂ (SSWU); Pocheon-si: Mt. Wangbangsan,

29.V.1983, MS Joo, 1♀ (SSWU); Seongnam-si: Namhansanseong, 19.VI.1974, BJ Lee, 1♂1♀ (SSWU); ditto, 26.V.1995, YJ Baek, 1♂ (SSWU). **GN** Busan-si: Taejongdae, 18.V.1996, IH Eom, 1♀ (SSWU); Geoje-gun: Dongbu-myeon, 306 mm, 25-26.VI.1994, SD Yeo, 3♀ (SSWU); ditto, Gucheon-ri, 11-12.VI.1994, SG Hwang, 1♀ (SSWU); Goseong-gun: Hai-myeon, Waryong-ri, 2.VII.1994, YS Kim, 2♀ (SSWU); Jinju-si: Gajua-dong, 6.V.1987, YB Kwon, 1♂ (SSWU); ditto, 1.VI.1990, ?, 1♂ (SSWU); ditto, 11.V.1991, ?, 1♂ (SSWU); Sangbongseo-dong, Mt. Bibongsan, 27.IX.1984, TS Oh, 1♂ (SSWU); ditto, 22.IX.1984, TS Oh, 1♂ (SSWU); Milyang-si: Sannae-myeon, Nammyeong-ri, Temple Baekyeon, 18.VII.1990, YJ Kim, 1 (SSWU). **GW** Bukpyeong, Temple Samhwa, 27.VI.1984, MW Kwon, 1♀ (SSWU); Jeongseon-gun: Mt. Gariwangsan, 21.V.1998, BY Kim et al., 1♂2♀ (SSWU); Wonju-si: Mt. Chiaksan, 17.V.1984, KS Jang, 1♂ (SSWU); ditto, 4.V.2003, JK Lee, 1♂ (SSWU); ditto, Geumdae-ri, 7.VI.1974, 1♀ (SSWU); Yeongwal-gun: Nam-myeon, Changwon-ri, 10.VI.1992, ?, 1♀ (SSWU). **JB** Jeongeup-si: Mt. Naejangsan, 4.VII.1985, YS Lee, 1♂ (SSWU); ditto, 26.V.1994, JH Shin, 1♂ (SSWU); Muju-gun: Mt. Deokyusan, 22.V.1983, SS Han, 1♀ (SSWU). **JN** Gurye-gun: Mt. Jirisan, Temple Cheoneun, 6.V.1977, ES Oh, 1♂ (SSWU); Gwangyang-si: Mt. Baekwunsan, 19.V.1991, LJW, 1♂ (SSWU); Jangseong-gun: Temple Baekyang, 23.V.1994, JY Kim, 1♀ (SSWU); Suncheon-si: Mt. Jogyesan, 23.V.1988, SR Lee, 1♀ (SSWU); ditto, 4.V.1990, HY Kim, 1♂ (SSWU). **PN** Mt. Gabajibong, 14.VI.1995, ?, 3♂ (NSM).

Distribution. China, Korea, Taiwan.

Maladera schoenfeldti (Murayama) 스웬휄드트우단풍뎅이

(Pl. II. Fig. II-6: I, Fig. II-7: A; Pl. III. Fig. III-5: F)

Serica schonfeldti Murayama, 1937: 37 (Korea).

Korean records. *Serica schonfeldti*: Murayama, 1938: 11; 1954: 56; Cho, 1957: 295; 1969: 657.

Serica schoenfeldti: Miwa and Chûjô, 1939: 54; Kim and Nam, 1982a: 154.

Maladera (*Maladera*) *schoenfeldti*: Stebnicka, 1980: 258; Löbl and Smetana, 2006: 236.

Maladera schoenfeldti: Kim and Lee, 1991a: 67; 1997: 123; ESK and KSAE, 1994: 151 (스웬휄드트우단풍뎅이); Kim, 2001: 70; Kim and Kim, 2003b: 87.

Description. Body length 8-9.2mm; Width 4.6-5.4mm; Club-footstalk ratio 1.33-1.63 (♂), 0.83 (♀); Pronotum ratio 0.55-0.57; Pronotum-elytra ratio 0.33-0.34; Metafemur ratio 0.35-0.39; Metatibia ratio 0.29-0.31; Pygidium ratio 0.53-0.55.

Body somewhat oblong, ovate, brown to black, surface opaque, velvety, except shinny labroclypeus.

Labroclypeus trapezoidal, widest at base, sides straight, convergent forward, anterior angles rounded, anterior margin medially weakly sinuated, surface shinny, medially weakly upheaval with fine and dense punctures. Frontoclypeal suture distinct, weakly angled. Ocular canthus triangular, with shallow punctures and a terminal bristle.

Frons almost opaque, anterior border somewhat shinny, a little shorter than labroclypeus, shallow punctation with a row of transversal hairs. Antenna yellowish brown, 10-segmented, last three segments lamellated, about 1.4 times of the remaining segments combined in male, shorter than remaining segments combined in female, first antennal segments swollen with some hairs. Eyes not large, eye to interocular space ratio 0.55-0.61 (♂), 0.37-0.38 (♀). Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at base, slightly narrowed forward, sides weakly and uniformly curved, anterior and lateral border with a few setae, anterior angles sharp, not rounded at apex, and posterior angles somewhat rounded, surface opaque, very shallowly punctate with a microscopic hair in. Scutellum triangular, somewhat ogival posteriorly, punctation similar to that of pronotum, with a microscopic hair in.

Elytra long and opaque, widest at posterior, intervals shallowly convex, striae with fine and dense punctation similar to that of pronotum, lateral border setaceous.

Ventral side opaque, velvety. Mesosternum widely separated between mesocoxae, mesocoxal distance almost as wide as mesofemur. Metacoxae with some strong hairs laterally. Each abdominal sternite opaque, with a row of setaceous punctures. Pygidium wide, apically weakly convex, with fine scattered punctation, surface opaque, with some short hairs beside apical border.

Legs long and thin; metafemur almost twice width of

mesofemur, anterior border weakly convex, surface punctate with two longitudinal rows of setaceous punctures, posterior angles rounded. Metatibia somewhat robust, length as long as metafemur, surface smooth, somewhat coarse in female, with a few of marginal spines. First metatarsomere slightly shorter than upper metatibial spur and two following segments combined. Metatarsi ventrally weakly serrated. Protibia short, bidentate, anterior tarsal claws symmetrical in both sexes. Aedeagus: Pl. III. Fig. III-5: F.

Specimen Examined. **CB** Jecheon-si: Mt. Weoraksan, 15.V.1987, BY Jo, 1♀ (SSWU); ditto, 9.VI.1990, HK Kim, 1♀ (SNU); ditto, 27.V.1996, KC Seong, 1♀ (SSWU). **GB** Cheongdo-gun: Wunmun-myeon, Temple Wunmun, 20.V.1989, YL Shin, 1♂ (SSWU); Munkyeong-si: Munkyeong-eup, Munkyeongsaeje, 5.VI.1977, CG Song, 1♂ (SSWU). **GG** Bucheon-si: Mt. Wonmisan, 29.V.1991, KM Go, 1♂ (SSWU); Goyang-si: Jangheung-myeon, 23.VIII.1998, MH Kim, 1♂ (SSWU); Gwacheon-si: Mt. Cheonggyesan, 3.IV.1999, TW Kim, 1♀ (SSWU); Hwaseong-si: Hyangnam-myeon, 12.V.1989, MO Lee, 1♂ (SSWU); Namyangju-si: Geumgok-dong, 25.IV.1982, YS Ryu, 1♂ (SSWU); Pyeongnae-dong, Mt. Cheonmasan, 16.VI.1978, YH Kil, 1♂ (SSWU); Paju-si: Temple Bokwang, 12.VI.1978, WB Lee, 1♀ (SSWU); Seolma-ri, 18.VIII.1984, MJ Kim, 1♂ (SSWU); Pocheon-si: Gwangreung, 17.V.1986, YJ Lee, 1♀ (SSWU); ditto, 18.V.1992, DS Cho, 1♀ (SNU); Seongnam-si: Namhansanseong, 19.VI.1974, BJ Lee et al., 1♂15♀ (SSWU); ditto, 31.V.1987, HY Lee, 1♂ (SSWU); Wunjung-dong, 2.V.1984, MC Kim, 1♂ (SSWU); Seoul-si: Dobong-gu, Mt. Dobongsan, 23.VI.1992, 1♀ (SNU);

Gangdong-gu, Sangil-dong, 3.V.1998, HJ Lee, 1♂ (SSWU); Gangnam-gu, Suseo-dong, Mt. Daemosan, 9.V.1998, JH Kim, 1♀ (SSWU); Gwanak-gu, Mt. Gwanaksan, 8.V.1999, HJ Yun, 1♀ (SSWU); ditto, Seoul National Univ., 14.V.1997, HS Lee, 1♀ (SNU); Seocho-gu, Heuninreung, 24.IV.1983, MJ Jo, 1♂ (SSWU); Seongbuk-gu, Jeongneung, 27.IV.1981, SH Nam, 1♀ (SSWU); Suwon-si: 20.V.1982, K Jeong, 2♂ (SNU); 23.V.1990, BH Kang, 1♀ (SNU); Mt. Gwangkyosan, 13.V.1983, KY Lee, 1♀ (SNU); ditto, 23.VI.1992, GS Ahn, 1♂ (SNU); Gueonseon-gu, Seodun-dong, Agricultural College of Seoul National Univ., 4-9.V.1982, G Jeong, 2♂ (SNU); ditto, 16.IV.1986, DG Lee, 1♀ (SNU); ditto, 21.VI.1992, SJ Park, 1♂ (SNU); Yangju-gun: Sudong-myeon, 16.IX.1979, Biology lab., 1♀ (SSWU); Yeoncheon-gun: Jeongok-myeon, 31.V.1984, SH Jang, 1♂ (SSWU); Yongin-si: Yangji golf course, 3.VI.1996, TJ Kang, 4♂ (SNU). **GN** Goseong-gun: Donghae-myeon, Yangchon-ri, Geumpo, 17.IX.1997, MS Ham, 1♂ (SSWU); Jinyang-gun: Daepyeong-myeon, Hachon-ri, 3-4.VII.1992, JS Park, 1♂ (SSWU). **HN** Pyeongsan-si: Huchiryeong, 25.VI.1999, ?, 1♂2♀ (NSM). **JJ** Jeju-do: 30.IV.1985, HS Lee, 3♂2♀ (SNU); Mt. Hallasan, Yeongsil, 27.IV.1994, SL Ahn, 15♂1♀ (NSM). **JN** Gurye-gun: Mt. Jirisan, Nogodan, 25.VI.1993, LK, 1♂ (SNU); Gwangyang-si: Mt. Chusan, 24.VI.1995, CP Choe, 1♂ (SNU).

Distribution. Korea (Native).

Maladera holosericea (Scopoli) 홀쭉우단풍뎅이

(Pl. II. Fig. II-7: B, C; Pl. III. Fig. III-6: A)

Scarabaeus holoserica Scopoli, 1772: 77

Scarabaeus sulzeri Fuessly, 1775: 3

Scarabaeus pellucidula Sulzer, 1776: 18

Melolontha variabilis Fabricius, 1777: 210

Scarabaeus chrysomeloides Schrank, 1781: 16

Scarabaeus fumosa Geoffroy, 1785: 11

Scarabaeus lamellata Geoffroy, 1785: 11

Melolontha berolinensis Herbst, 1786: 155

Melolontha pellucida Schönherr, 1817: 179

Omaloplia fusca Mulsant, 1842: 462

Korean records. *Serica holoserica*: Eguchi, 1932: 57; Kim et al., 1974: 229.

Serica holosericea: Murayama, 1935: 2; 1937: 33; 1938: 10; 1941b: 19; 1954: 52; Sawada, 1937: 9; Cho, 1969: 656 (홀쭉우단풍뎅이); Kim and Nam, 1982: 154.

Maladera holosericea: Miwa and Chûjô, 1939: 54; KZS, 1968: 136; Kim and Yoo, 1987b: 505; Kim and Lee, 1991a: 67; ESK and KSAE, 1994: 151; Kim and Lee, 1997: 122; Kim, 1992: 105; 2001: 69; Kim and Kim, 1996: 127; Kim and Kim, 2003b: 87.

Maladera holoserica: Cho, 1957: 296.

Maladera (Maladera) holosericea: Stebnicka, 1980: 255.

Description. Body length 7.25-8.7mm; Width 4.4-5mm; Club-footstalk ratio 1.73-1.89 (♂), 0.94-1.27 (♀); Pronotum ratio 0.54-0.59; Pronotum-elytra ratio 0.32-0.36; Metafemur ratio 0.3-0.36; Metatibia

ratio 0.21-0.3; Pygidium ratio 0.54-0.6.

Body somewhat oblong, ovate, brown to black, surface opaque, velvety, except shinny labroclypeus.

Labroclypeus trapezoidal, widest at base, sides straight, convergent forward, anterior angles rounded, anterior margin medially weakly sinuated, surface rough and weakly shinny with very coarse punctures. Frontoclypeal suture distinct, weakly curved. Ocular canthus triangular, with shallow punctures and a terminal bristle. Frons opaque, a little shorter than labroclypeus, shallow punctation with few hairs. Antenna yellowish brown, 10-segmented, last three segments lamellated, slightly shorter than twice of the remaining segments combined in male, shorter than remaining segments combined in female, first antennal segments swollen with some hairs. Eyes not large, eye to interocular space ratio 0.4-0.52. Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at base, slightly narrowed forward, sides weakly and uniformly curved, anterior and lateral border with a few setae, anterior angles sharp, not rounded at apex, and posterior angles somewhat rounded, surface opaque, very shallowly punctate without hair. Scutellum triangular, somewhat ogival posteriorly, punctation similar to that of pronotum, with a microscopic hair in.

Elytra long and opaque, widest at posterior, intervals shallowly convex, striae with fine and dense punctation, lateral border setaceous.

Ventral side opaque. Mesosternum widely separated between mesocoxae, mesocoxal distance almost as wide as mesofemur.

Metacoxae with some strong hairs laterally. Each abdominal sternite opaque, with a row of setaceous punctures. Pygidium wide, apically weakly convex, with fine scattered punctation, surface opaque, with some short hairs beside apical border.

Legs long and thin; metafemur 1.3-1.5 times wider than mesofemur, anterior border weakly convex, surface punctate with two longitudinal rows of setaceous punctures, posterior angles rounded. Metatibia long and thin, as long as metafemur, surface smooth, with a few of marginal spines. First metatarsomere as long as upper metatibial spur but slightly shorter than two following segments combined. Metatarsi ventrally weakly serrated. Protibia short, bidentate, anterior tarsal claws symmetrical in both sexes. Protarsi long and slender. Aedeagus: Pl. III. Fig. III-6: A.

Specimen Examined. **CB** Eumseong-gun, Mt. Gayeopsan, 28.IV.1989, JI Kim, 1♀ (SSWU); Goesan-gun: Hwayang-ri, 5.V.1996, JI Kim, 1♀ (SSWU); Jecheon-si: Songhak, 5.V.1984, HK Jeong, 1♀ (SSWU). **CN** Gongju-si: Gyeryongsan, 24.IV.1983, YM Jo, 1♂ (SSWU). **GB** Cheongsong-gun: Mt. Juwangsan, 15.V.1987, EA Jeong, 1♂ (SSWU); Daegu-si: Mt. Palgongsan, 25.V.1992, YM Kim, 1♀ (SSWU); Munkyeong-si: Mt. Juheulsan, Sangcho-ri, 23.V.1997, JI Kim, 1♂ (SSWU); Yeongju-si: Pungki-eup, Mt. Sobaeksan, Jukryeong fall, 13-14.VIII.1999, DS Gu, 1♂ (SSWU). **GG** Gapyeong-gun: Mt. Cheonggyesan, 27.VI.1991, JI Kim, 1♀ (SSWU); Mt. Myeongjisan, 11.IV.1992, HK Oh, 1♀ (SSWU); ditto, 23.IV.1994, HW Seol, 1♂ (SSWU); Namyangju-si: Hwajeong-dong, 28.IV.1986, JI Kim, 1♀

(SSWU); Jinjeop-eup, Naegok-ri, 4.IV.1998, TH Kang, 1♀ (SSWU); Sudong-myeon, Mt. Chukryeongsan, 16.VIII.1999, DS Gu, 1♂ (SSWU); Pyeongnae-dong, Mt. Cheonmasan, 28.V.1978, KS Lee, 1♀ (SSWU); ditto, 10.VI.1984, SH Lee, 1♀ (SSWU); Paju-si: Temple Bokwang, 25.V.1975, SH Yu, 1♂ (SSWU); ditto, 29.IV.1979, SH Jeong, 1♀ (SSWU); ditto, 23.IV.1988, JE Byeon & OJ Lee, 1♂1♀(SSWU); Mt. Aengmubong, 14.IV.1974, TH Jeong, 1♂ (SSWU); Pocheon-si: Gwangreungnae, 17.V.1986, CJ Lee, 1♀ (SSWU); Seongnam-si: Namhansanseong, 19.VI.1974, BJ Lee et al., 9♂7♀ (SSWU); ditto, 15.V.1997, JY Yu, 1♀ (SSWU); Seoul-si: Dobong-gu, Mt. Dobongsan, 30.V.1992, HJ Choe, 1♀ (SSWU); ditto, 9.V.1997, MJ Park, 1♀ (SSWU); Gangbuk-gu, Uidong, Mt. Bukhansan, 24.V.1996, JE Yu, 1♀ (SSWU); Nowon-gu, Mt. Suraksan, 9.V.1998, SY Im, 1♂ (SSWU); Yangcheon-gu, Shinjeong-dong, 21.V.1995, EY Kim, 1♀ (SSWU); Yangpyeong-gun: Mt. Yongmunsan, 11.VI.1966, JS Yu, 1♂ (SSWU). **GN** Hamyang-gun: Mt. Jirisan, 27.V.1976, ?, 1♀ (SSWU); Hapcheon-gun: Gaya-myeon, Mt. Gayasan, 26.V.1990, SH Jeon, 1♀ (SSWU); Sacheon-si: Guam, 20.V.1986, KS Lee, 1♀ (SSWU); Yangsan-si: Temple Tongdo, 27.V.1989, SH Jeon, 1♀ (SSWU). **GW** Hongcheon-gun: Mt. Gachilbong, 21-23.VI.1984, ES Kang, 1♂ (SSWU); Donghae-si: Bukpyeong-dong, Temple Sanhwa, 26.VI.1984, MI Lee, 1♂ (SSWU); Goseong-gun: Geojin-eup, Temple Geonbong, 22.V.1992, JW Lee, 1♂ (SSWU); Inje-gun: Mt. Bangtaesan, Misan-ri, 23.VI.1996, SY Kim, 1♂ (SSWU); ditto, Binji-dong, 25.VI.1996, Yeongnam Univ., 1♀ (SSWU); Mt. Seoraksan, Temple Baekdam, 4.VI.1979, SK Lee, 1♀ (SSWU);

Jeongseon-gun: Sabuk-eup, Mt. Duwuibong, 10.VI.2000, SL Ahn, 1♀ (NSM); Pyeongchang-gun: Mt. Odaesan, 2.V.2003, JK Lee, 3♂ (SSWU); Wonju-si: Mt. Chiaksan, 4.V.2003, JK Lee, 2♂ (SSWU). **JB** Muju-gun: Mt. Deokyusan, 21.V.1983, KL Choe, 1♀ (SSWU); ditto, 25.V.1993, JI Kim, 1♂ (SSWU). **JN** Hwasun-gun: Hancheon-myeon, Wunsan-ri, Alarigae, 6.IX.2003, JB Jeon, 1♂ (SSWU).

Distribution. Amur, Caucasus, Europe, Kazakhstan, Korea, Manchuria, Russia.

Maladera renardi (Ballion) 레나아드우단풍뎅이

(Pl. II. Fig. II-7: D, E; Pl. III. Fig. III-6: B)

Serica renardi Ballion, 1871: 339

Serica sibirica Brenske, 1897b: 372

Korean records. *Serica motschulskyi*: Brenske, 1897b: 370 (Corea); Niijima and Kinoshita, 1923: 22; Kato, 1935: 112; Murayama, 1937: 33; 1938: 11; 1954: 58; Sawada, 1937: 9; Mochizuki and Tsunekawa, 1937: 93; Miwa and Chûjô, 1939: 53; Cho, 1957: 295; 1969: 658; Kim and Kim, 1972a: 83; Kim and Nam, 1982a: 155.

Serica spissigrada: Brenske, 1897b: 370 (Japan); Niijima and Kinoshita, 1923: 23; Kato, 1935: 112; Sawada, 1937: 29; Murayama, 1938: 12; 1954: 40; Takahashi, 1941: 229; KZS, 1968: 136; Cho, 1969: 652; Kim and Nam, 1982a: 154.

Serica renardi: Murayama, 1935: 2; 1937: 33; 1938: 11; 1941b: 19; 1954: 54; Sawada, 1937: 9; Cho, 1969: 657; Kim and Kim, 1972a: 84; Kim and Nam, 1982: 154.

Serica nakayamai: Murayama, 1938: 16; 1941b: 19; 1954: 57; Cho, 1969: 658; Kim and Kim, 1972a: 83; Kim and Nam, 1982a: 155.

Maladera renardi: Miwa and Chûjô, 1939: 55; Cho, 1957: 296; KZS, 1968: 136 (레나아드우단풍뎅이); Kim, 1983: 83; 1992: 105; 2001: 68; Kim and Lee, 1991a: 67; 1997: 123; Bae and Moon, 1993: 147; Kim et al., 1994: 111; Kim and Kim, 1998: 170; Kim and Kim, 2003b: 84.

Maladera spissigrada: Miwa and Chûjô, 1939: 55; Cho, 1957: 296; Kim, 1981: 344.

Maladera (Aserica) motschulskyi: Nomura, 1960: 58.

Maladera (Aserica) spissigrada: Nomura, 1960: 58.

Maladera (Maladera) renardi: Nomura, 1967: 52; 1973: 128; Stebnicka, 1980: 254.

Description. Body length 8.1-9.7mm; Width 5-5.6mm; Club-footstalk ratio 1.39-1.86 (♂), 0.93-1.09 (♀); Pronotum ratio 0.55-0.58; Pronotum-elytra ratio 0.32-0.34; Metafemur ratio 0.34-0.39; Metatibia ratio 0.26-0.28; Pygidium ratio 0.56-0.6.

Body somewhat oblong, ovate, brown to black, surface opaque, velvety, except shinny labroclypeus.

Labroclypeus trapezoidal, widest at base, sides straight, convergent forward, anterior angles rounded, anterior margin medially weakly sinuated, surface smooth and shinny with fine punctures. Frontoclypeal suture distinct, weakly curved. Ocular canthus triangular, with shallow punctures and a terminal bristle. Frons almost opaque, anterior border somewhat shinny, a little shorter than labroclypeus,

shallow punctation with few hairs. Antenna yellowish brown, 10-segmented, last three segments lamellated, about 1.5 times of the remaining segments combined in male, shorter than remaining segments combined in female, first antennal segments swollen with some hairs. Eyes not large, eye to interocular space ratio 0.49-0.59. Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at base, slightly narrowed forward, sides weakly and uniformly curved, anterior and lateral border with a few setae, anterior angles sharp, not rounded at apex, and posterior angles somewhat rounded, surface opaque, very shallowly punctate with a microscopic hair in. Scutellum triangular, somewhat ogival posteriorly, punctation similar to that of pronotum, with a microscopic hair in.

Elytra long and opaque, widest at posterior, intervals shallowly convex, striae with fine and dense punctation similar to that of pronotum, lateral border setaceous.

Ventral side opaque. Mesosternum widely separated between mesocoxae, mesocoxal distance almost as wide as mesofemur. Metacoxae with some strong hairs laterally. Each abdominal sternite opaque, with a row of setaceous punctures. Pygidium wide, apically weakly convex, with fine scattered punctation, surface opaque, with some short hairs beside apical border.

Legs long and thin; metafemur 1.3-1.5 times wider than mesofemur, anterior border weakly convex, surface punctate with two longitudinal rows of setaceous punctures, posterior angles rounded.

Metatibia somewhat robust, as long as metafemur, surface smooth, with a few of marginal spines. First metatarsomere slightly shorter than upper metatibial spur and two following segments combined. Metatarsi ventrally weakly serrated. Protibia short, bidentate, anterior tarsal claws symmetrical in both sexes. Protarsi long and slender. Aedeagus: Pl. III. Fig. III-6: B.

Specimen Examined. CN Buyeo-gun: Mt. Mansusan, 10.VI.1999, Han & Kim, 1♂3♀ (SSWU). **GB** Bonghwa-gun: Mulya-myeon, Ojeon-ri, 20.V.1998, BY Kim et al., 1♂ (SSWU); Cheongsong-sun: Mt. Juwangsan, Naewon-dong, 5.VI.1989, G Kim, 1♂ (SSWU); Gyeongsan-si: Dae-dong, Yeongnam Univ., 23.V.1983, DT Yun, 1♂ (SSWU); Mt. Palgongsan, 8.VIII.1997, HS Jang, 1♀ (SSWU); Munkyeong-si: Mt. Juheulsan, Sangcho-ri, 23.V.1997, JI Kim, 1♂ (SSWU); Wuljin-gun: Seo-myeon, Bulyeong valley, 14.V.1993, MS Lee, 1♂ (SSWU); Yeongdeok-gun: Mt. Chilbosan, 11.VI.1990, KTJ, 2♀ (SNU). **GG** Anyang-si, 8.V.1990, MS Park, 1♀ (SNU); Goyang-si: Goyang-dong, 6.IX.1998, JY Ryu, 1♂ (SSWU); Gunpo-si: Mt. Surisan, 8.VI.1968, Paik, 1♀ (SNU); Gwangju-si: 20.IV.1991, SW Park, 1♂ (SNU); ditto, 19.V.1992, IK Park, 1 (SNU); Incheon-si, Yeonsu-dong, 2.V.1991, Lak, 1♀ (SNU); Namyangju-si: Joan-myeon, Mt. Unkilsan, 25.VI.1974, UC Lee, 1♂ (SSWU); Pyeongnae-dong, Mt. Cheonmasan, 28.V.1983, SH Yu, 1♀ (SSWU); Pocheon-si: Mt. Wangbangsan, 23.V.1976, WD Han, 1♂ (SSWU); Pyeongtaek-si: Hyeondeok-myeon, 12.IX.1998, TM Han, 1♂2♀ (SSWU); Seongnam-si: Bundang-gu, Gumi Elementary School, 7.V.1998, MK Kim, 1♂ (SSWU); Namhansanseong, 19.VI.1974, DJ Sim et al., 3♂1♀

(SSWU); Seoul-si: Dobong-gu, Mt. Dobongsan, 20.V.1998, JH Kim, 1♀ (SSWU); Gangnam-gu, Dogok-dong, 6.VII.1979, JI Kim, 1♂ (SSWU); Gwanak-gu, Mt. Gwanaksan, 15.VI.1969, Kim, 1♀ (SNU); ditto, 21.V.1988, SBC, 1♂ (SNU); Songpa-gu, Jamsil-dong, 29.VIII.1977, BS Kim, 1♂ (SSWU); Suwon-si: 2-7.IX.1964, WH Paik, 1♂ (SNU); 12.VI.1987, ITH, 1♂ (SNU); 25.VI.1987, CJK, 1♂ (SNU); ?.VI.1988, CH Park, 1♀ (SNU); Gwangkyo, 27.IV.1985, MS Jeon, 1♀ (SNU); ditto, 5.VI.1990, MS Mun, 1♂ (SNU); Seodun-dong, 19.V.1987, ?, 1♀ (SNU); ditto, Agricultural College of Seoul National Univ., 29.V.1990, SJ Lee, 1♂ (SNU); Woncheon Park, 11.IX.1990, HK Kim, 1♀ (SNU); Yangju-gun, Ilyeong, 28.V.1984, HS Choe, 1♀ (SSWU). **GN** Hapcheon-gun: Gaya-myeon, Mt. Gayasan, 26.V.1990, SH Jeon, 1♂ (SSWU); Samka-myeon, Samka-eup, 23.V.1987, SH Lee, 2♂ (SSWU); Jinju-si: Gajua-dong, 1.V.1987, WH Kim, 1♂ (SSWU); Geumsan-myeon, Soksa-ri, 26.IV.1986, JS Jeon, 1♂ (SSWU); Namhae-gun: Namhaedo, 10.V.1981, Yuh, 1♀ (SNU); Sancheong-gun: Danseong-myeon, Seongnae-ri, 3-4.VI.1992, ?, 1♂ (SSWU); Sindeung-myeon, Yulhyeon-ri, Temple Yulgok, 8.IV.1987, ?, 1♂ (SSWU); Mt. Jirisan, Jungsan-ri, Sunduryu, 5-6.VIII.1989, ?, 1♀ (SSWU); Wulju-gun: Samgok-myeon, Icheon-ri, 27-30.VI.1988, MS Kim, 1♂ (SSWU). **GW** Chuncheon-si: Gangchon-myeon, 18.VI.1983, JI Kim, 1♀ (SSWU); Wonju-si: Mt. Chiaksan, Geumdae-ri, 6.VI.1974, DH Hwang, 1♀ (SSWU). **JJ** Mt. Hallasan, Yeongsil, 27.IV.1994, SL Ahn, 1♂ (SSWU). **JN** Gurye-gun: Mt. Jirisan, 23.V.1990, KH Kim, 1♀ (SNU); ditto, Piagol, 26.IV.1999, KS Woo, 1♀ (SNU); Gwangyang-si: Mt. Chusan, 24.VI.1995, JY Chio & CP

Choe, 2♂ (SNU); Wando-gun: Cheongsando, Dang-ri, 29.V.1982, JI Kim, 1♀ (SSWU). **PN** Tonggori, 2.VI.1995, ?, 1♀ (NSM).

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

Maladera orientalis (Motschulsky) 애우단풍뎅이

(Pl. II. Fig. II-7: F; Pl. III. Fig. III-6: C)

Serica orientalis Motschulsky, 1858: 33

Omaladera cavifrons Reitter, 1896: 188

Omaladera diffinis Reitter, 1896: 188

Serica famelica Brenske, 1897b: 391

Serica pekingensis Brenske, 1897b: 366

Korean records. *Serica orientalis*: Kolbe, 1886: 192; Heyden, 1887: 251; Niijima and Kinoshita, 1923: 21; Okamoto, 1924: 172; Nakayama, 1929: 266; Murayama, 1931: 20; 1938: 10; 1941b: 18; 1954: 48; Kato, 1935: 112; Tomiura and Tomiura, 1935b: 238; Masaki, 1936: 261; Sawada, 1937: 25; Mochizuki and Tsunekawa, 1937: 93; Miwa and Chûjô, 1939: 53; Nakayama and Okamoto, 1940: 200; Takahashi, 1941: 228; Cho, 1957: 295; 1963: 217; 1969: 655; Cho et al., 1967: 197 (애우단풍뎅이); 1968: 264; Kim and Kim, 1972a: 84; 1972b: 196; 1974: 107; Kim et al., 1974: 229; Kim and Nam, 1982a: 154; 1984b: 328.

Aserica orientalis: Reitter, 1902: 145.

Serica salebrosa: Masaki, 1936: 261.

Maladera (Aserica) orientalis: Nomura, 1960: 58.

Maladera orientalis: Dalla Torre, 1912: 18; Wu, 1936: 1016; Nomura, 1969: 79; Kim, 1981: 344; 1992: 105; 2000a: 132; 2001: 71; Kim and

Nam, 1982b: 276; Kim and Chang, 1987: 104; Kim and Yoo, 1987b: 505; Kim and Lee, 1991a: 67; 1997: 124; Kim et al., 1991: 179; 1994: 111; 1999: 129; 2004: 117; Park et al., 1993: 178; Kim and Kim, 1996: 48; Kim and Kim, 2003b: 89.

Maladera (Maladera) orientalis: Stebnicka, 1980: 257.

Maladera (*Omaladera*) *orientalis*: Löbl and Smetana, 2006: 236.

Description. Body length 6.3-8.65mm; Width 4.2-5.2mm; Club-footstalk ratio 0.75-1.17; Pronotum ratio 0.54-0.57; Pronotum-elytra ratio 0.34-0.36; Metafemur ratio 0.37-0.42; Metatibia ratio 0.27-0.32; Pygidium ratio 0.59-0.63.

Body small, ovate, plumpy, reddish brown to dark brown, surface opaque, velvety, sometimes labroclypeus shinny.

Labroclypeus trapezoidal, widest at base, sides straight, convergent forward, anterior angles rounded, surface shinny, medially weakly upheaval with dense punctures, labrum part indistinct, medially weakly sinuated. Frontoclypeal suture distinct, weakly angled. Ocular canthus triangular, with shallow punctures and one or two terminal bristles. Frons opaque, a little shorter than labroclypeus, shallow punctation with few hairs near eyes. Antenna yellowish brown, 9-segmented, last three segments lamellated, as long as the remaining segments combined in male, little shorter than remaining segments combined in female. Eyes not large, eye to interocular space ratio 0.36-0.47. Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at base, slightly narrowed forward, sides weakly and uniformly curved, anterior and lateral border with a row of strong setae, anterior angles sharp, not rounded at apex, and posterior angles somewhat rounded, surface opaque, densely punctate with a microscopic hair in. Scutellum triangular almost linguiform, somewhat ogival posteriorly, punctation similar to that of pronotum, with a microscopic hair in.

Elytra opaque, widest at posterior, intervals shallowly convex, with fine and dense punctation similar to that of pronotum, lateral border strongly setaceous, sutural angles with a seta.

Ventral side opaque, velvety. Mesosternum widely separated between mesocoxae, mesocoxal distance wider than width of mesofemur. Metacoxae with some strong hairs laterally. Each abdominal sternite opaque, punctures with a microscopic hair in. Pygidium wide, medially weakly convex, with fine scattered punctation same as sternite, surface opaque, with some short hairs beside apical border.

Legs short and stout; metafemur almost twice width of mesofemur, anterior border weakly convex, posterior ventral margin sharpen entirely, surface punctate with two longitudinal rows of setaceous punctures, posterior angles rounded. Metatibia somewhat robust, little shorter than metafemur, surface smooth, with a few of marginal spines. First metatarsomere slightly longer than upper metatibial spur but shorter than two following segments combined. Metatarsi ventrally weakly serrated. Protibia very short, bidentate,

anterior tarsal claws symmetrical in both sexes. Aedeagus: Pl. III. Fig. III-6: C.

Specimen Examined. CB Cheongju-si: Mochung-dong, 27.V.1987, KH Hong, 1♀ (SSWU); Chungju-si: 10.V.1989, Kim, 1♂ (SSWU); Danyang-gun: Daekang-myeon, 5.V.1984, SK Kim, 2♂ (SSWU); Mt. Sobaeksan, Temple Hibang, 8.VI.1974, BJ Lee, 1♂ (SSWU); Eumseong-gun: Yongsan-ri, Mt. Gayeobsan, 28.IV.1989, HR No, 3♀ (SSWU); Goesan-gun: Cheongcheon-myeon, Hwayang-ri, 25.V.1996, JI Kim et al., 4♂2♀ (SSWU); Yeonpung-myeon, Wonpung-ri, 25.VI.1986, HS Lee, 1♂ (SSWU); Jecheon-si: Mt. Woraksan, 29-30.V.1987, SJ Jeong et al., 2♂2♀ (SSWU); ditto, 5.V.1989, SJ Kim, 1♀ (SSWU); ditto, 27.V.1996, JI Kim et al., 1♂1♀ (SSWU); ditto, 11.VII.1991, DS Choe, 1♀ (SSWU); Songhak-myeon, 5.V.1984, HK Jeong, 1♂ (SSWU); Susan-myeon, Goegok-ri, 6.VI.1974, BJ Lee et al., 1♂3♀ (SSWU). **CN** Asan-si: Onyang, 19.VI.1983, SH Kim, 1♂ (SSWU); Cheonan-si: Dongnam-gu: Anseo-dong, Dankuk Univ., 9.VI.1987, EJ Oh, 2♂ (SSWU); ditto, 26.VIII.1990, KH Kim, 1♀ (SSWU); Mt. Kwangdeoksan, 16-18.VI.1994, SY Kim, 1♀ (SSWU); Yeonki-gun: Jochiwon-eup, 18.V.1984, JK Lee, 1♀ (SSWU). **GB** Cheongdo-gun: Wunmun-myeon, Temple Wunmun 20.V.1989, EJ Kim, 1♀ (SSWU); Cheongsong-gun: Mt. Juwangsan, 4.VI.1989, EM Park, 1♂ (SSWU); Daegu-si: Dong-gu, Mt. Palgongsan, Temple Donghwa, 30.V.1970, CR Lee, 1♀ (SSWU); Suseong-gu, Beommul-dong, 3.VI.1985, ?, 1♀ (SSWU); ditto, Suseong-dong, 23.VI.1987, Yeongnam Univ. lab., 1♀ (SSWU); Dalsan-si: Yeongdeok-myeon, Mt. Baedaesan, 21.VI.1997, YB Jo, 1♀ (SSWU);

Gumi-si, Mt. Geumosan, 18.V.1978, HH Jeon, 1♂ (SSWU); Gyeongju-si: Jincheon-eup, Moryang-1-ri, 20.V.1991, YS Kim, 1♀ (SSWU); Gyeongsan-si: Dae-dong, Yeongnam Univ., 12-15.V.1987, JY Jin, 2♀ (SSWU); 28.V.1990, HS Baek, 1♀ (SSWU); ditto, 6.V.1991, HJ Lee, 1♀ (SSWU); ditto, 28.V.1991, WY Jang, 1♀ (SSWU); Kimcheon-si: Temple Jikji, 4.VI.1978, ER Park, 1♀ (SSWU); Pohang-si: Mt. Eoyusan, 9,VI.1979, Biology lab., 1♂1♀ (SSWU); Munkyeong-si: Munkyeong-eup, Munkyeongseje, 26.V.1996, JI Kim et al., 7♂1♀ (SSWU); ditto, Mt. Hwanghaksan, 3-4.VI.1978, HJ Jeong et al., 3♂6♀ (SSWU); Wuljin-gun: Mt. Baekamsan, Bulyeong valley, 26.VI.1990, KW Park, 1♀ (SSWU); ditto, 9-10.V.1991, JH Bae et al., 7♀ (SSWU); ditto, 29.V.1999, YW Jeong, 1♀ (SSWU); Yeongju-si: Buseok-myeon, Namdae-ri, Mt. Seondalsan, 29.VI.1998, JI Kim et al., 1♀ (SSWU); Pungki-eup, Mt. Sobaeksan, 8.VI.1974, BJ Lee, 1♂ (SSWU); ditto, 1♂3♀ (SSWU). **GG** Dongducheon-si: 5.V.1982, YS Yu, 1♀ (SSWU); Mt. Soyosan, 6.VI.1974, DH Yang, 1♂ (SSWU); ditto, 22.V.1977, SH Park, 1♂ (SSWU); ditto, 18.VI.1984, SL Oh, 1♂ (SSWU); Ganghwa-gun: Yangseo-myeon, Cheolsan-ri, 2.VII.1987, JI Kim, 1♀ (SSWU); Gapyeong-gun: Daeseong-ri, 4.VI.1977, SH Lee, 1♂1♀ (SSWU); ditto, 6.V.1984, YS Han, 1♂ (SSWU); Ha-myeon, Mt. Myeongjisan, 14.V.1983, KS Jang, 4♂ (SSWU); ditto, 13.IV.1991, ES Ahn, 2♂ (SSWU); ditto, 29.IV.1997, JI Kim, 2♀ (SSWU); Hyeon-ri, 6.V.1984, MJ Kim, 1♂1♀ (SSWU); ditto, 16.V.1987, JE Kim, 1♂2♀ (SSWU); Goyang-si: Madu-dong, 3.V.1997, JY Lee, 2♀ (SSWU); Gunpo-si: Mt. Surisan, 18.VI.1978, MH Jeong, 1♀ (SSWU); Gwacheon-si: 26.VI.1984, MH Lee, 1♂ (SSWU); Juam-dong,

8.VI.1993, HY Kim, 1♂ (SSWU); Mt. Cheonggyesan, 6.VI.1974, YM Ahn, 1♂ (SSWU); ditto, 4.VI.1978, HY Lee, 1♂1♀ (SSWU); ditto, 26.VI.1984, YS Ahn, 1♀ (SSWU); ditto, 23.VI.1987, 1♂ (SSWU); ditto, 2.V.1989, LSR, 1♂1♀ (SSWU); Gwangju-si: Eommi-ri, 23.V.1981, JI Kim et al., 2♂ 3♀ (SSWU); Eungogae, 20.V.1980, KS Kim, 2♂1♀ (SSWU); ditto, 16.X.1981, IO Jeong, 1♂ (SSWU); ditto, 28.V.1983, HS Hong, 1♀ (SSWU); Mt. Mugapsan, 4.IV.2004, JK Lee, 1♀ (SSWU); Hanam-si: Mt. Geumdansan, 12.V.1977, YH Choe, 1♂ (SSWU); Hwaseong-si: Baran-ri, 13.V.1988, MS Oh, 2♀ (SSWU); Hyangnam-myeon, 26.IV.1988, MO Lee, 1♂ (SSWU); Namyangju-si: Geumgok-dong, 8.VI.1974, DJ Sim, 1♂ (SSWU); ditto, Maseok, 18.V.1984, YJ Im, 2♂ (SSWU); Hwajeop-ri, 28.IV.1996, JI Kim, 1♀ (SSWU); Jinjeop-eup, Bamseom, 6.VI.1982, SI Han, 1♀ (SSWU); Joan-myeon, Mt. Unkilsan, 25.VI.1974, UC Lee, 1♂1♀ (SSWU); Palyari, 3.V.1986, S Jegal, 3♂ (SSWU); Pyeongnae-dong, 11.VI.1980, KS Jang, 2♂ (SSWU); ditto, 18.IV.1981, SB Yuk, 1♂ (SSWU); ditto, Mt. Cheonmasan, 7-16.VI.1974, HR Lee et al., 7♂3♀ (SSWU); ditto, 16-17.IV.1977, KO Lee et al.,1♂9♀ (SSWU); ditto, 6.VI.1977, YH Kim, 1♀ (SSWU); ditto, 16-18.VI.1978, YH Kim, 3♂2♀ (SSWU); ditto, 18.IV.1981, SH Lee et al., 2♀ (SSWU); ditto, 11.VI.1981, HM Kim, 1♂ (SSWU); ditto, 13.VI.1981, YM Seo, 2♂1♀ (SSWU); ditto, 22.V.1982, SH Gye, 1♂ (SSWU); ditto, 11.VI.1982, HJ Lee, 1♂ (SSWU); ditto, 20-28.V.1983, MH Ahn, 1♂2♀ (SSWU); ditto, 4.VI.1983, HS Kwak, 1♀ (SSWU); ditto, 20.IV.1984, KJ Lee, 1♀ (SSWU); ditto, 23-27.V.1984, JY Won et al., 1♂3♀ (SSWU); ditto, 24.VI.1984, 1♂ (SSWU); ditto, 7.VI.1986, MK Jeong, 11♀♂ (SSWU); ditto, 5.V.1987, K

Park, 1♀ (SSWU); ditto, 26.V.1990, JH Kim, 2♂1♀ (SSWU); Sudong-myeon, Mt. Chukryeongsan, 12.VII.1980, KS Jang, 1♀ (SSWU); ditto, 11.VI.1983, KJ Park, 1♀ (SSWU); ditto, 18.VI.1983, SM Lee, 1♀ (SSWU); ditto, 6.VI.1984, MJ Kang, 1♂ (SSWU); Pocheon-si: Gwangreung, 14.V.1972, SN Choe, 1♂ (SSWU); Seongnam-si: Namhansanseong, 13.VI.1975, SI Oh, 1♀ (SSWU); Seoul-si: Eunpyeong-gu, Nokbeon-dong, Bukhansanseong, 25.V.1971, KS Park, 1♂ (SSWU); Gangbuk-gu, Uidong, 14.V.1966, JS Yu, 1♂ (SSWU); ditto, 9.VI.1985, YH Kim, 1♂ (SSWU); Gangdong-gu, Godeok-dong, 10.V.1987, SY Choe, 1♀ (SSWU); Gangnam-gu: Heuninreung, 24.IV.1983, JB Lee et al., 2♂1♀ (SSWU); ditto, 21.IV.1984, HS Choe et al., 1♂2♀ (SSWU); ditto, 20.IV.1985, ES Kim, 2♂2♀ (SSWU); Mt. Daemosan, 28.V.1984, SY Lee, 1♀ (SSWU); Wonji-dong, 1.VI.1985, OK Lee, 1♂ (SSWU); ditto, 7.VI.1986, SH Park, 1♂ (SSWU); ditto, Mt. Cheonggyesan, 1.VI.1985, SJ Kim, 1♂2♀ (SSWU); ditto, 24.V.1986, MS Jeong, 1♀ (SSWU); ditto, 7.VI.1986, SY Park, 1♂ (SSWU); Gangseo-gu, Hwagok-dong, 7.V.1989, EJ Jang, 1♀ (SSWU); Gwanak-gu, Mt. Gwanaksan, 27.V.1990, SH Kim, 1♀ (SSWU); Jungrang-gu, Mangwu-dong, 25.VI.1988, Lee, 1♀ (SSWU); ditto, Mt. Mangwusan, 15.V.1988, HS Kim, 1♀ (SSWU); Nowon-gu, Mt. Suraksan, 11.VII.1983, MK Yang, 1♂ (SSWU); Seocho-gu, Wonji-dong, 1.VI.1985, OJ Lee et al., 3♂1♀ (SSWU); ditto, Mt. Cheonggyesan, 15.VI.1977, JJ Song, 1♂ (SSWU); ditto, 1.VI.1986, HM Park, 1♂ (SSWU); ditto, 10.V.1987, JH Yeom, 1♂ (SSWU); ditto, 24.V.1987, SY Oh, 1♂ (SSWU); ditto, 2.V.1989, KJM, 1♂ (SSWU); ditto, 11.V.1990, MS Park, 1♂ (SSWU);

ditto, 19.V.1990, SA No, 1♀ (SSWU); ditto, 28.V.1991, MJ Im, 1♀ (SSWU); Seongbuk-gu, Jangwui-dong, 27.VI.1980, JI Kim, 1♀ (SSWU); ditto, Jeongreung, 1.VI.1986, HW Jo, 1♀ (SSWU). **GN** Hadong-gun: Mt. Jirisan, Temple SSangye, 4.VI.1977, JH Kim & SJ Oh, 2♀ (SSWU); Hamyang-gun: Mt. Jirisan, 27.VI.1996, YJ Lee, 1♂ (SSWU); ditto, Jungsan-ri, 31.VII.1981, HY Han, 1♀ (SSWU); ditto, Temple Naewon, 27.V.1989, SH Jeon, 1♀ (SSWU); Hapcheon-gun: Gaya-myeon, Temple Haein, 12.VII.1970, JB Heo, 1♂ (SSWU); Masan-si: Jung-ri, 3.VIII.1994, SJ Jo, 1♀ (SSWU). **GW** Chuncheon-si: Buksan-myeon, Temple Cheongpyeong, 20.V.1984, YS Choe, 1♂ (SSWU); Cheongpyeong-myeon, 6.VI.1971, KS Park, 1♀ (SSWU); Dong-myeon, 6.VI.1985, YB Eom, 1 (SSWU); Gangchon-myeon, 22.V.1977, BG Jeong et al., 3♂5♀ (SSWU); ditto, 18.VI.1983, GS Jang, 1♀ (SSWU); ditto, 27.V.1995, TH Gu, 2♀ (SSWU); Jung-do, 29.V.1995, BH Kim, 1♂ (SSWU); Mt. Bonguisan, 13.VI.1981, SH Kim, 1♂ (SSWU); Seocheon-ri, 18.IX.1983, JI Kim, 1♀ (SSWU); Sinbuk-myeon, 19.V.2001, HJ Lee, 1♀ (SSWU); Donghae-si: Mt. Dutasan, Samhwa-dong, 26.V.1984, KS Jang, 1♂ (SSWU); Hoengseong-gun: Gungapcheon, Mt. Balgyosan, 6.VI.1998, YJ Choe, 1♀ (SSWU); Hongcheon-gun: 24.IV.1984, SH Lee, 1♀ (SSWU); Mt. Gachilbong, 21-23.VI.1984, HJ Lee, 1♀ (SSWU); Nam-myeon, 28.V.1988, HS Kim, 1♀ (SSWU); Inje-gun: Mt. Seoraksan, Temple Baekdam, 5.VI.1977, CS Kim, 1♀ (SSWU); ditto, 3-6.VI.1979, KM Kim et al., 10♂ (SSWU); Pyeongchang-gun: Daehwa-myeon, Baekil-dong, 2.VII.1985, OK Lee, 1♀ (SSWU); Jinbu-myeon, Geomun-ri, 30.VI.1985, KH Sin, 1♂ (SSWU); Taebaek-si: Cheoram-1-dong, 15.V.1991, JW Kim,

2♀ (SSWU); Mt. Taebaeksan, Dangungak, 30.V.1999, HJ Kim et al., 2♀ (SSWU); Wonju-si: Heungeop-myeon, Meji-ri, ?.VI.1996, JI Kim, 2♀ (SSWU); Munmak, 8.V.1984, L Won, 3♂ (SSWU); Mt. Chiaksan, 6.VI.1974, YM Ahn et al., 4♂ (SSWU); ditto, 3.V.1978, JY Song, 1♀ (SSWU); ditto, 17-18.V.1984, MJ Kim & KS Jang, 2♂ (SSWU); ditto, Geumdae-ri, 6-7.VI.1974, DH Hwang et al., 3♂1♀ (SSWU); **JB** Buan-gun: Byeonsanbando, 24.VI.1991, YA Kim, 1♂ (SSWU); Gochang-gun: Mt. Seonwunsan, 21.V.1992, HJ Kim, 1♂ (SSWU); Jeongeup-si: Mt. Naejangsan, 4.VII.1985, MK Son, 1♀ (SSWU); ditto, 26.IV.1994, JY Seo, 1♂ (SSWU); Muju-gun: Seolcheon-myeon, Mt. Deokyusan, 6.VI.1988, KS Jang, 1♀ (SSWU); ditto, Mujugucheon-dong, 22.V.1983, JS Yoon, 1♂ (SSWU); ditto, Samgong-ri, 24.V.1993, HK Hong, 1♀ (SSWU); ditto, Daebul-ri, 26.V.1993, EY Yun et al., 2♂1♀ (SSWU). **JJ** Namjeju-gun: Seongsan-eup, 5-6.V.1997, YE Kim, 1♂3♀ (SSWU). **JN** Boseong-gun: Beolkyo-myeon, 30.IV.1984, YS Kim, 1♂ (SSWU); Gurye-gun: Mt. Jirisan, Temple Cheoneun, 6.V.1977, SH Park, 1♂1♀ (SSWU); Sunchang-gun: Mt. Naejangsan, 26.V.1994, BH Choe, 1♀ (SSWU). **PN** Mt. Taryusan, 2.VI.1995, ?, 1♀ (NSM).

Distribution. China, Japan, Korea, Mongolia, Siberia, Taiwan.

Biological note. They have one year life cycle and hibernate as adults. The adults appear from the middle of April to the end of June (Zhang, 1984; Liu et al., 1997).

Maladera cariniceps (Moser) 알모양우단풍뎅이

(Pl. II. Fig. II-7: G; Pl. III. Fig. III-6: D)

Autoserica cariniceps Moser, 1915b: 341 (Korea).

Korean records. *Autoserica cariniceps*: Niijima and Kinoshita, 1923: 238; 1927: 7.

Aserica cariniceps: Murayama, 1938: 13; Miwa and Chûjô, 1939: 55; Cho, 1957: 124; KZS, 1968: 136.

Serica cariniceps: Murayama, 1954: 41; Cho, 1969: 653 (알모양우단풍뎅이); Kim and Nam, 1982a: 155.

Aserica fusania: Nomura, 1967: 52.

Maladera (Aserica) cariniceps cariniceps: Nomura, 1967: 52.

Maladera (Maladera) cariniceps: Nomura, 1973: 133; Stebnicka, 1980: 255.

Maladera cariniceps: Kim and Lee, 1991a: 67; 1997: 124; Kim, 1992: 105; 2001: 72; ESK and KSAE, 1994: 151; Kim and Kim, 2003b: 89.

Maladera (*Omaladera*) *cariniceps*: Löbl and Smetana, 2006: 236.

Description. Body length 9.1-10.5mm; Width 5.4-6.1mm; Club-footstalk ratio 1.13-1.33 (♂), 1 (♀); Pronotum ratio 0.53-0.58; Pronotum-elytra ratio 0.31-0.33; Metafemur ratio 0.33-0.37; Metatibia ratio 0.27-0.33; Pygidium ratio 0.58-0.67.

Body ovate, plumpy, reddish brown to dark brown, surface opaque, velvety, except shinny labroclypeus.

Labroclypeus trapezoidal, widest at base, sides straight, convergent forward, anterior angles rounded, surface shinny, medially weakly upheaval with dense punctures, labrum part distinct, medially weakly sinuated but not reflexed. Frontoclypeal suture distinct, weakly

angled. Ocular canthus triangular, with shallow punctures and a terminal bristle. Frons almost opaque, a little shorter than labroclypeus, shallow punctation with a row of transversal hairs posteriorly. Antenna yellowish brown, 10-segmented, last three segments lamellated, about slightly longer than the remaining segments combined in male, shorter than remaining segments combined in female. Eyes not large, eye to interocular space ratio 0.48-0.55. Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at base, slightly narrowed forward, sides weakly and uniformly curved, anterior and lateral border with a row of setae, anterior angles sharp, not rounded at apex, and posterior angles somewhat rounded, surface opaque, very shallowly punctate with a microscopic hair in. Scutellum triangular, somewhat ogival posteriorly, punctation similar to that of pronotum, with a microscopic hair in.

Elytra long and opaque, widest at posterior, intervals shallowly convex, with fine and dense punctation similar to that of pronotum, lateral border setaceous, sutural angles with a seta.

Ventral side opaque, velvety. Mesosternum widely separated between mesocoxae, mesocoxal distance wider than width of mesofemur. Metacoxae with some strong hairs laterally. Each abdominal sternite opaque, with setaceous punctures overally. Pygidium wide, medially weakly convex, with fine scattered punctation, surface opaque, with some short hairs beside apical border.

Legs short and stout; metafemur almost twice width of

mesofemur, anterior border weakly convex, surface punctate with two longitudinal rows of setaceous punctures, posterior angles rounded. Metatibia somewhat robust, little shorter than metafemur, surface smooth, with a few of marginal spines. First metatarsomere slightly longer than upper metatibial spur but shorter than two following segments combined. Metatarsi ventrally weakly serrated. Protibia short, bidentate, anterior tarsal claws symmetrical in both sexes. Aedeagus: Pl. III. Fig. III-6: D.

Specimen Examined. **CB** Cheongju-si: Mochung-dong, 27.V.1987, KH Hong, 1♂ (SSWU); Chungju-si: Tangeumdae, 26.V.1995, YH Jeon, 1♂ (SSWU); Goesan-gun: Hwayang-ri, 26.V.1996, JI Kim, 1♂ (SSWU). **CN** Buyeo-gun: Mt. Mansusan, 10.VI.1999, TM Han & TW Kim, 1♂ (SSWU); Cheonan-si: Dongnam-gu, Danguk Univ., 26.VIII.1990, KH Kim, 1♀ (SSWU); Mt. Gwangdeoksan, 16-18.VI.1994, SY Kim et al., 2♂ 1♀ (SSWU); Cheongyang-gun, Mt. Chilgapsan, 22.V.1994, SL An, 1♂ (NSM); Gongju-si: Mt. Gyeryongsan, Temple Gap, 29.VII.1979, TK Chung et al., 1♂3♀ (SSWU); Nonsan-si: Mt. Oknyeobong, 23.V.1997, SY Kim, 1♀ (SSWU); Seosan-si: 20.V.1985, JK Kim, 1♂ (SSWU); Manripo, 4.VIII.1987, KH Hong, 1♀ (SSWU). **GB** Munkyeong-si: Mt. Hwanghaksan, 3.VI.1978, YS Lee, ♀ (SSWU); Wuljin-gun: Bulyeong valley, 12.VI.1993, JA Ryu, 1♂1♀ (SSWU); ditto, 14.V.1993, CH Park, 1 ♂ (SSWU). **GG** Bucheon-si: Sosa-gu, 11.VI.1982, HJ Pak, 1♀ (SSWU); Yeokgok, 30.V.1984, MJ Kang, 1♂ (SSWU); Dongducheon-si: Mt. Soyosan, 10.V.1984, TY Moon, 1♂ (SSWU); Euiwang-si: Poil-dong, 12.IX.1998, YJ Choe, 1♀ (SSWU); Gapyeong-gun: Gapyeong-eup,

26.V.1995, HY Lee, 1♂ (SSWU); Daeseong-ri, 3.VI.2000, AY Kim, 1♂ (SSWU); Mt. Myeongjisan, 17.VIII.1996, MS Choe, 1 (SSWU); ditto, 4.V.2000, JI Kim et al., 1♀ (SSWU); Goyang-si: Daehwa-dong, 16.V.2000, MJ Wu, 1♀ (SSWU); Jangheung-myeon, Songchu, 7.V.1988, HJ Lee, 1♀ (SSWU); Gwacheon-si: 3.VI.1978, EJ Sin & JY Kim, 2♀ (SSWU); Mt. Cheonggyesan, 24.VI.1984, KA Jeon, 1♀ (SSWU); ditto, 5.VI.1986, ISY, 1♀ (SSWU); Gwangreung, 5.V.1988, HJ Kim, 1♀ (SSWU); ditto, 20.V.1990, JH Kim, 1♂ (SSWU); Seoul Grand Park, 21.V.1993, KE Jeong, 1♂ (SSWU); Gwangju-si: Namhansanseong, 20.V.1998, SH Wu, 1♂ (SSWU); Eommi-ri, 24.V.1981, HY Yun, 1♂ (SSWU); Eungogae, 22.VII.1980, MH Lee, 1♂ (SSWU); Mt. Geumdansan, 12.VI.1977, SH Park, 1♀ (SSWU); Hwaseong-si: Balan-ri, 20.V.1988, MO Lee, 1♀ (SSWU); Incheon-si: Onjin-gun, Daecheong-ri: 11.VII.1990, EJ Jo, 1♂ (SSWU); Namyangju-si: Pyeongnae-dong, 20.V.1984, MI Lee, 1♂ (SSWU); ditto, Mt. Cheonmasan, 18.IV.1981, JI Kim, 1♂ (SSWU); ditto, 13.VI.1981, HJ Im, 1♀ (SSWU); ditto, 24.VI.1983, TH No, 1♂, (SSWU); ditto, 23.V.1984, SY Lee, 2♂1♀ (SSWU); Sudong-myeon, Mt. Chukryeongsan, 16.V.1987, SW Hwang, 1♀ (SSWU); Paju-si: Temple Bogwang, 13.V.1979, SW Kim, 1♀ (SSWU); ditto, 9.V.1982, SY Weon & AR Kim, 4♂ (SSWU); ditto, 22.V.1985, JG Ryu & MK Son, 2♀ (SSWU); Pyeongtaek-si: Hyeondeok, Daean-4-ri, 16.V.1999, TM Han, 1♂ (SSWU); Seongnam-si: Bundang-gu, Gumi-dong, Hayanmaeul, 22.V.2001, JH Lee, 1♂ (SSWU); Gumi Elementary School, 7.V.1998, MK Kim, 2♀ (SSWU); Namhansanseong, 19.VI.1974, BJ Lee & DJ Sim, 1♂1♀ (SSWU); ditto, 24.V.1986, SY Park, 1♂ (SSWU); ditto, 31.V.1987, HY

Lee, 1♀ (SSWU); ditto, 12.V.1991, GY Yun, 1♂ (SSWU); Seoul-si: Dobong-gu, Mt. Bukhansan, 10.V.1992, SY Kim, 1♀ (SSWU); Mt. Dobongsan, 15.VI.1979, JH Jo, 1♂ (SSWU); ditto, 22.V.1980, MH Lee, 1♂ (SSWU); ditto, 25.IV.1987, KH Min, 1♀ (SSWU); ditto, 2.IX.1987, EJ Oh, 1♀ (SSWU); ditto, 25.V.1988, YK Lee, 1♂ (SSWU); Dongjak-gu, Sadang-dong, 15.V.1984, YS Ma, 1♂ (SSWU); Eunpyeong-gu, Galhyeon-dong, 14.VI.1981, HY Jeong, 1♀ (SSWU); ditto, 20.VI.1981, HY Jeong, 1♀ (SSWU); ditto, Jingwanoei-dong, 3.VII.1991, DM Sin, 1♂ (SSWU); ditto, Mt. Bukhansan, 26.IX.1991, ES An, 1♀ (SSWU); ditto, Yeokchon-dong, 20.V.1984, YM Jo, 1♂ (SSWU); ditto, 21.IV.1985, OH Kim, 1♂ (SSWU); ditto, 7.V.1987, MK Lee, 1♀ (SSWU); Gangbuk-gu, Suyu-dong, 7.IX.1997, KH Jo, 1♀ (SSWU); Gangdong-gu, Cheonho-dong, 14.V.1992, HR Son, 1♂ (SSWU); ditto, Godeok-dong, 10.V.1987, SY Choe, 1♀ (SSWU); Gangnam-gu, Gaepo-dong, 30.VII.1997, SJ Lee, 1♀ (SSWU); ditto, Nonhyeon-dong, 7.V.1998, SK Oh, 1♂ (SSWU); ditto, Sinsa-dong, 19.V.1988, JH Kim, 1♂ (SSWU); Gangseo-gu, Balsan-dong, Mt. Ujangsan, 1.VII.1982, SK Sin, 1♂ (SSWU); Guro-gu, Kaebong 3-dong, 20.V.1984, JH Min, 1♂ (SSWU); Gwanak-gu, Bongcheon 1-dong, 20-29.V.1990, EJ Lee, 2♂ (SSWU); ditto, 16.VIII.1990, EJ Lee, 2♀ (SSWU); ditto, Mt. Gwanaksan, 16.V.1975, SI Oh, 1♂ (SSWU); ditto, 3.V.1983, VJ Lee, 1♂ (SSWU); Gwangjin-gu, Gui-dong, 17.VII.1976, ?, 1♀ (SSWU); ditto, Neung-dong, 7.VIII.1995, HY Lee, 1♀ (SSWU); Jongro-gu, Guki-dong, 7.IX.1986, KJ Lee, 1♀ (SSWU); Mapo-gu, Sangsu-dong, 22.VI.1983, YH Go, 1♀ (SSWU); Yeonnam-dong, 15.V.1987, MS Kim, 1♂ (SSWU); ditto,

6.VI.1987, MS Kim, 1♂ (SSWU); Seocho-gu, Mt. Cheongyesan, 20.V.1990, HK Kwon, 1♀ (SSWU); ditto, 6.VI.1994, HK Kim, 1♀ (SSWU); ditto, 26.V.1995, SY Jeong, 1♂ (SSWU); ditto, 30.VIII.1998, SH Son, 1♀ (SSWU); Seodaemun-gu, Mt. Ansan, 13.V.2000, HJ Kim, 1♂ (SSWU); Namkajua-dong, 24.V.1980, MH Lee, 1♂ (SSWU); Seongbuk-gu, Anam-dong, 12.V.1992, HK Yun, 1♂ (SSWU); ditto, Dongseon-dong, 24.V.1989, OJ Lee, 1♂ (SSWU); ditto, 1.VI.1994, JM Park, 1♀ (SSWU); ditto, 27.V.1996, KH Jo, 1♀ (SSWU); ditto, Sungshin Women's Univ., 11.XI.1981, SH Lee, 1♀ (SSWU); ditto, Jeongreung, 4.VI.1989, HS Lee, 1♀ (SSWU); ditto, Seongbuk-dong, 28.V.1976, JW Lee, 1♂ (SSWU); Songpa-gu, Bangi-dong, Olympic park, 29.V.2005, BH Jeong, 1♂ (SSWU); Yangcheon-gu, Geumok women's highschool, 2.V.1995, EM Park, 1♂ (SSWU); Yongsan-gu, Yongsan, 13.VII.1975, GO Lee, 1♀ (SSWU); Suwon-si: Mt. Yeokisan, 9.V.1991, OJ Lee, 2♂2♀ (SSWU); Mt. Chukjisan, 29.V.1992, 1♂ (SSWU); Omokcheon-dong, 27.VI.1987, MK Lee, 1♀ (SSWU); Seongkyunkwan Univ., 29.V.1995, EM Park, 1♀ (SSWU); Yangju-si: Jangheung-myeon, Ilyeong, 11.IV.1976, HJ Lee, 1♂ (SSWU); Yangpyeong-gun, Mt. Yongmunsan, 19.VI.1976, JS Yu, 1♂ (SSWU). **GN** Goseong-gun: Himyeon, Waryong-ri, 30.VII.1994, JY Jeong, 1♀ (SSWU); Hadong-gun: Mt. Jirisan, Temple SSangye, 4.VI.1977, SJ Oh, 1♂ (SSWU); Hapcheon-gun: 14.VI.1984, SS Kang, 1♂ (SSWU); Daeam-myeon, Ahcheon-ri, 13.IX.1984. SS Kang, 1♂ (SSWU); Jinju-si: 6.VII.1984, TS Oh, 1♀ (SSWU); Namseong-dong, Gosubuji, 23.V.1987, DH Jeong, 1♀ (SSWU); Sancheon-gun: Mt. Jirisan, 28.V.1976, ?, 1♂1♀ (SSWU); ditto, Georim, 7.VII.1989, SH Jeon, 1♂

(SSWU); ditto, Jungsan-ri, 25.VI.2001, JB Jeon, 1♀ (SSWU); ditto, Piagol, 8.VII.1986, SH Jeon, 1♀ (SSWU); Sangbongseo-dong, Mt. Bibongsan, 20-27.VII.1984, TS Oh, 1♂1♀ (SSWU); ditto, 1.IX.1984, ditto, 1♂ (SSWU); **GW** Bukpyeong, Temple Samhwa, 26.VI.1984, MA Bang, 1♂ (SSWU); Chuncheon-si: Gajung-ri, 13.V.2003, JG Lee, 1♀ (SSWU); Seosang-ri, Toegol, 17.IV.2003, JG Lee, 1♀ (SSWU); Seocheon-ri, 18.IX.1983, JI Kim, 1♂ (SSWU). **JB** Buan-gun: Junggye-ri, 21.V.1992, YH Kim, 1♂ (SSWU); Gochang-gun: Mt. Seonwunsan, 21.V.1992, JM Park, 1♂ (SSWU); Muju-gun: Seolcheon-myeon, Mt. Deokyusan, 21.V.1983, SS Han, 1♂ (SSWU). **JN** Gurye-gun: Masan-myeon, Mt. Jirisan, Temple Hwaeom, 21-22.VI.1987, JM Park et al., 2♀ (SSWU); ditto, Piagol, 21.V.1999, TM Han, 1♂ (SSWU); Gwangyang-si: Okryong-myeon, Chusan-ri, 19.V.1991, JW Lee, 1♀ (SSWU); Suncheon-si: Songkwang-myeon, Mt. Jogyesan, Temple Songkwang, 8.IX.1976, SH Nam, 1♀ (SSWU).

Distribution. Japan, Korea.

Maladera fusania (Murayama) 부산우단풍뎅이

(Pl. II. Fig. II-7: H; Pl. III. Fig. III-6: E)

Aserica fusania: Murayama, 1934: 35(Pusan).

Korean records. *Aserica fusania*: Murayama, 1935: 3; 1938: 13; Miwa and Chûjô, 1939: 56; Cho, 1957: 296; KZS, 1968: 136 (부산우단풍뎅이).

Serica fusania: Murayama, 1954: 38; Cho, 1969: 652; Kim and Kim, 1972a: 84.

Maladera fusania: Cho, 1957: 296; Nomura, 1974: 107; Kim and Lee,

1991a: 67; 1997: 125; Kim and Park, 1991: 192; ESK and KSAE, 1994: 151; Kim, 2001: 76; Kim and Kim, 2003: 88.

Maladera cariniceps cariniceps: Nomura, 1967: 52.

Maladera (Maladera) fusania: Nomura, 1974: 107; Stebnicka, 1980: 255.

Maladera (*Omaladera*) *fusiana*: Löbl and Smetana, 2006: 236.

Description. Body length 8.6-9.4mm; Width 5.1-5.75mm; Club-footstalk ratio 1-1.08 (♂), 0.8-0.81 (♀); Pronotum ratio 0.51-0.55; Pronotum-elytra ratio 0.32-0.35; Metafemur ratio 0.36-0.4; Metatibia ratio 0.29-0.33; Pygidium ratio 0.57-0.66.

Body ovate, plumpy, reddish brown to dark brown, surface opaque, velvety, except shinny labroclypeus.

Labroclypeus trapezoidal, widest at base, sides straight, convergent forward, anterior angles rounded, surface shinny, medially weakly upheaval with dense punctures, labrum part indistinct, medially weakly sinuated but not reflexed. Frontoclypeal suture distinct, weakly angled. Ocular canthus triangular, with shallow punctures and a terminal bristle. Frons opaque, a little shorter than labroclypeus, shallow punctation with few scattered hairs. Antenna yellowish brown, 10-segmented, last three segments lamellated, as long as the remaining segments combined in male, shorter than remaining segments combined in female. Eyes not large, eye to interocular space ratio 0.41-0.5. Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at base, slightly narrowed forward, sides weakly and uniformly curved, anterior and lateral border with a

few setae, anterior angles sharp, not rounded at apex, and posterior angles somewhat rounded, surface opaque, densely punctate with a microscopic hair in. Scutellum triangular, somewhat ogival posteriorly, punctation similar to that of pronotum, with a microscopic hair in.

Elytra opaque, widest at posterior, intervals shallowly convex, second interval widest, continue to apex, with fine and dense punctation similar to that of pronotum, lateral border setaceous, sutural angles with a seta.

Ventral side opaque, velvety. Mesosternum widely separated between mesocoxae, mesocoxal distance wider than width of mesofemur. Metacoxae with some strong hairs laterally. Each abdominal sternite opaque, punctures with few setae. Pygidium wide, medially weakly convex, with fine scattered punctation, surface opaque, with some short hairs beside apical border.

Legs short and stout; metafemur almost twice width of mesofemur, anterior border weakly convex, surface punctate with two longitudinal rows of setaceous punctures, posterior angles rounded. Metatibia somewhat robust, little shorter than metafemur, surface smooth, with a few of marginal spines. First metatarsomere slightly longer than upper metatibial spur but shorter than two following segments combined. Metatarsi ventrally weakly serrated. Protibia short, bidentate, anterior tarsal claws symmetrical in both sexes. Aedeagus: Pl. III. Fig. III-6: E.

Specimen Examined. CB Chungju-si: Danwol-dong, 5.V.1997, YH Jeon, 2 (SSWU); Tangeumdae, 26.V.1995, YH Jeon, 2 (SSWU); Danyang-gun:

Mt. Sobaeksan, 6.VI.1981, ST Kim, 1 (SSWU); Goesan-gun, Hwayang-ri, 25.V.1996, JI Kim, 2 (SSWU); Jecheon-si: Mt. Weoraksan, 11.VII.1991, MJ Kang, 1 (SSWU); Jincheon-si: Baekgok-myeon, Daemun-ri, 7.VII.1998, TM Han, 1 (SSWU). CN Buyeo-gun: Buyeo-eup, Mt. Busosan, 4.VI.1977, SW Baek, 1 (SSWU); Mt. Mansusan, 10.VI.1999, Han & Kang, 4 (SSWU); Cheonan-si: 7.III.1984, JI Kim, 1 (SSWU); Danguk Univ., 26.VIII.1990, KH Kim, 1 (SSWU); Mt. Gwangdeoksan, Temple Gwangdeok, 5.VI.1982, KH Lee, 1 (SSWU); Dangjin-gun: Sudang-ri, 25.VII.1989, SI Kim, 1 (SSWU); Mt. Gyeryongsan, Temple Gapsa, 28-29.VII.1979, SH Nam et al., 4 (SSWU). GB Cheongdo-gun: Temple Wunmun, 23-24.V.1987, JH Yun, 5 (SSWU); Cheongsong-gun: Mt. Juwangsan, 26.VII.1984, SH Nam, 1 (SSWU); ditto, 24.VI.1986, HS Go, 1 (SSWU); Daegu-si: Dong-gu, Bangchon, 10.V.1987, IS Choe, 2 (SSWU); ditto, Shincheon, 26.V.1987, HY Jeon, 1 (SSWU); ditto, Temple Donghwa, 3.VI.1986, HS Kim, 1 (SSWU); ditto, Temple Pagye, 27.VI.1976, CL Lee, 2 (SSWU); ditto, Mt. Apsan, Temple Eunjeok, 4.VI.1986, KS Kim, 1 (SSWU); ditto, Apsan Park, 19-20.V.1990, YH Lee, 4 (SSWU); ditto, Hwanggeum-dong, 22.VII.1989, SH Jeon, 1 (SSWU); Dalsan-gun: Yeongdeok-myeon, Mt. Baedaesan, 21.VI.1997, YB Cho, 1 (SSWU); Kimcheon-si: Gumreung, Apo, 7.VI.1992, KH Dong, 1 (SSWU); Kyeongsan-si: Yeongnam Univ., 27.III.1986, ISK, 1 (SSWU); ditto, 20-26.VI.1986, KJH, 4 (SSWU); ditto, 29.IV-5.VI.1987, EH Seo et al., 7 (SSWU); ditto, 4.VI.1987, EH Mo, 1 (SSWU); ditto, 11.VI.1987, YHJ, 2 (SSWU); ditto, 17.VI.1988, EJ Lee, 1 (SSWU); ditto, 21.V.1990, JH Kim, 1 (SSWU); ditto, 18.V.1991, YA Kim,

2 (SSWU); Munkyeong-si: Munkyeongsaeje, 11.VII.1977, YS Kim & SJ Oh, 2 (SSWU); Wuljin-gun: Mt. Baekamsan, 29.V.1999, MK Lee et al., 7 (SSWU); ditto, Buryeonggyegok, 24-25.VI.1990, KA Kim & SH Choe, 2 (SSWU); Wulreung-gun: Mt. Dodongsan, 13.VI.1981, HK Baek, 1 (SSWU); Yeongcheon-si: Gokyeong-myeon, 3.VIII.1969, ?, 1 (SSWU); Yeongdeok-gun: Mt. Naeyeonsan, 6.VII.1979, JS Park, 1 (SSWU). GG Anyang-si: Beomgye-dong, 15.VI.1999, SY Kim, 1 (SSWU); Bucheon-si: Yeokgok-myeon, 5-11.V.1991, KM Go, 2 (SSWU); Dongducheon-si: Mt. Soyosan, 6.VI.1982, SA Bae, 1 (SSWU); Gapyeong-gun: Misa-ri, 12.VII.1987, SY Choe, 3 (SSWU); Goyang-si: Byeokje-myeon, Temple Bokwang, 12.V.1996, KS Hong, 1 (SSWU); Madu-dong, 18.V.1996, HS Park, 2 (SSWU); ditto, 3.V.1997, JY Lee, 1 (SSWU); Gunpo-si: Mt. Surisan, 18.VI.1978, YS Lee, 1 (SSWU); Gwacheon-si: Seoul Grand Park, 8.V.1993, HJ Kang, 1 (SSWU); Mt. Cheongyesan, 7.VI.1986, JY Kim, 1 (SSWU); Gwangreung-si: 7.V.1984, AS Choe, 1 (SSWU); Eungogae, 6.V.1981, HS Im, 1 (SSWU); Hanam-si: Gwangam lake, 7.V.1995, ML Yun, 2 (SSWU); Incheon-si: Ongjin-gun, Deokjeokdo, Seopo-ri, 5.VII.1981, JI Kim, 1 (SSWU); ditto, Ongjin-myeon, Daecheong-ri, 11.VII.1990, EJ Jo, 1 (SSWU) Yeongjongdo, 7.VI.1974, YS Ju, 1 (SSWU); Namyangju-si: Geumgok-dong, 11.VII.1983, DE Lee, 1 (SSWU); Hwado-eup, Saeteo, 19.VI.1983, EK Kim, 1 (SSWU); Maseok, 13.VI.1981, SH Lee, 1 (SSWU); ditto, 26.IX.1981, JS Kim, 1 (SSWU); Sudong-myeon, Mt. Chukryeongsan, 28.IX.1980, GS Kang, 1 (SSWU); Pyeongnae-dong, Mt. Cheonmasan, 17.IV.1977, SS Park et al., 5 (SSWU); ditto, 18.IV.1978,

NS Jo, 1 (SSWU); ditto, 11.VI.1981, HM Kim, 1 (SSWU); ditto, 17.VI.1981, ES Song, 1 (SSWU); ditto, 3.X.1981, SK Lee, 1 (SSWU); ditto, 2.VI.1984, SM Kim, 1 (SSWU); ditto, 15.VII.1986, HS Go, 1 (SSWU); ditto, 12.VII.1987, SSH, 1 (SSWU); Paju-si: Temple Bogwang, 16.VI.1978, SB Hong, 1 (SSWU); Pocheon-si: Gwangreung, 11.VI.1983, JB Lee, 1 (SSWU); Pyeongtaek-si: Hyeondeok-myeon, Daean-4-ri, 15.V.1999, TM Han, 1 (SSWU); Seongnam-si: Bundang-gu, Gumi elementary school, 7.V.1998, MK Kim, 4 (SSWU); ditto, Hyojachon, 25.IV.1999, SY Kim, 1 (SSWU); Eunhaeng-dong, 3.VI.1986, YS Kim, 1 (SSWU); ditto, 11.VII.1986, YS Kim, 1 (SSWU); Namhansanseong, 19.VI.1974, DJ Sim et al., 8 (SSWU); Seoul-si: Dobong-gu, Mt. Dobongsan, 27.V.1979, WY Lee, 1 (SSWU); ditto, 22.V.1981, MY Eom, 3 (SSWU); ditto, 11.IV.1987, YH Lee, 1 (SSWU); Dongdaemun-gu, Mt. Baebongsan, 27.V.1979, WY Lee, 1 (SSWU); Eunpyeong-gu, Susaek-dong, 16.VI.1974, JH Kwon, 1 (SSWU); Gangbuk-gu, Suyu-dong, 29.IV.1999, KH Jo, 1 (SSWU); ditto, Ui-dong, 8.VII.1975, BW Oh, 1 (SSWU); Gangdong-gu, Godeok-dong, 10.V.1987, HK Kim, 3 (SSWU); ditto, Hail-dong, 17.VII.1984, MI Lee, 1 (SSWU); ditto, Myeongil-dong, 21.VI.1981, JI Kim, 1 (SSWU); ditto, 28.VI.1982, JI Kim, 1 (SSWU); ditto, 25.VII.1998, SJ Song, 1 (SSWU); ditto, Ohgeum-dong, 23.V.1988, K Mun, 1 (SSWU); Gangnam-gu, Apgujeong-dong, 28.VI.1993, SK Lee, 1 (SSWU); ditto, Dogok-dong, ?.VII.1979, JI Kim, 1 (SSWU); ditto, 24.VII.1994, BH Choe, 1 (SSWU); ditto, Shinsa-dong, 19-23.V.1988, JH Kim, 2 (SSWU); ditto, Mt. Daemosan, 22.V.1998, EY Lee, 1 (SSWU); ditto, 30.VII.1998, KN Park,

1 (SSWU); Gangseo-gu, Godeok-dong, 12.V.1987, KY Park, 1 (SSWU); ditto, Hwagok-dong, 30.V.1983, KL Choi, 1 (SSWU); ditto, 15.V.1984, IS Hyeon, 2 (SSWU); Gwangjin-gu, Mojin-dong, 19.VI.1983, KM Lee, 1 (SSWU); Jongro-gu, 17.VI.1979, SH Lee, 1 (SSWU); Nowon-gu, Mt. Suraksan, 14.V.1999, KH Jo, 1 (SSWU); Mapo-gu, Sangsu-dong, 22.VI.1983, YH Go, 1 (SSWU); ditto, Yeonnam-dong, 19.IV.1987, MS Kim, 1 (SSWU); ditto, 15.V.1987, MS Kim, 1 (SSWU); ditto, Yongkang-dong, 26.V.1984, MJ Kim, 1 (SSWU); Seocho-gu, Banpo-dong, 23.VIII.1990, SH Kuk, 1 (SSWU); ditto, Heoninreung, 24.VI.1981, HS Park, 1 (SSWU); ditto, 18.VI.1983, HS Ahn, 1 (SSWU); ditto, Wonji-dong, Mt. Cheonggyesan, 17.IX.1989, HK Ku, 1 (SSWU); Seongbuk-gu, Annam-dong, 27.VI.1988, Byeon, 1 (SSWU); ditto, Dongseon-dong, 11.VI.1981, HY Gu, 1 (SSWU); ditto, Sungshin Women's Univ., 8.VI.1987, SY Gu, 1 (SSWU); ditto, Jangwui-dong, 23.VI.1980, JI Kim, 1 (SSWU); ditto, Jeongreung, 11.VI.1980, YH Kim, 1 (SSWU); Seongdong-gu, Ungbong-dong, Mt. Ungbongsan, 19.VI.1984, MH Lee, 1 (SSWU); Songpa-gu, Bangi-dong, Olympic Park, 29.V.2005, BH Jeong, 1 (SSWU); ditto, Jamsil-dong, 19.VI.1984, GJ Hwang, 1 (SSWU); ditto, 23.V.2001, MH Kim, 1 (SSWU); Yangcheon-gu, Mok-dong, 19.V.1991, HJ Jo, 1 (SSWU); Yongsan-gu, Yongsan, 25.VI.-13.VII.1975, KO Lee, 2 (SSWU); Suwon-si: 21.VI.1956, Lee, 1 (SSWU); Gueonseon-gu, Agricultural College of Seoul National Univ., 6.VI.1984, SM Kim, 1 (SSWU); Mt. Yeokisan, 9.V.1991, OJ Lee, 3 (SSWU); Yangju-si: Jangheung-myeon, Ilyeong, 28.V.1984, YJ Han, 1 (SSWU); Yangpyeong-gun: Mt. Yongmunsan, 19.V.1973, JS Park, 1

(SSWU); ditto, 29.V.1982, SH Sin, 1 (SSWU); ditto, 28.V.1982, SS Park, 1 (SSWU); Yongin-si, Samga-dong, 12.V.1995, MS Kim, 1 (SSWU). **GN** Busan-si: Haeundae, 28.VI.1973, JI Kim, 1 (SSWU); Saha-gu, Molwundae Park, 8-9.VII.1994, SK Hwang, 1 (SSWU); Changryeong-gun, Mt. Hambaksan, 12.VIII.1987, HW Yun, 1 (SSWU); Goseong-gun: Gaecheon-myeon, Temple Okcheon, 3.IV.1988, ?, 1 (SSWU); Hai-myeon, Uwaryong-ri, 23.VII.1994, CK Jeong, 1 (SSWU); Hamyang-gun: Baekjeon-myeon, Mt. Baekunsan, 12-13.VII.1990, JS Jeon, 2 (SSWU); Wungok-myeon, Okhwan-ri, 24.VII.1985, ?, 1 (SSWU); Mt. Jirisan, 30.VI.1976, ?, 1 (SSWU); ditto, 26.VI.1986, AJ Sin, 1 (SSWU); Hapcheon-gun: Samka-myeon, Samka-eup, 23.V.1987, DS Gu, 2 (SSWU); Jinju-si: 7.VII.1984, TS Oh, 1 (SSWU); Gajua-dong, 14.VII.1992, JS Jeon, 1 (SSWU); Jinyang-gun, Geumgok-myeon, 23.V.1982, YS Ryu, 1 (SSWU); Namhae-gun: Seolcheon-myeon, Namyang-ri, Yongkangmaeul, 17-18.VII.1994, YS Kim, 1 (SSWU); Sacheon-si: 1.VI.1983, ?, 1 (SSWU); Sancheong-gun: Danseong-myeon, Seongnae-ri, ?.VI.1992, ?, 1 (SSWU); Sucheol-ri, 8-11.VII.1985, YK Jo, 3 (SSWU); Samcheonpo-si: Sinsu-dong, 7-8.VII.1994, CK Jeong, 4 (SSWU); Tongyeong-gun: Hansan-myeon, Jeseungdang, 6.VII.1994, KY Park, 2 (SSWU); Uichang-gun: Gusan-myeon, Wonjeonmaeul, 30.VI.1987, ?, 2 (SSWU); Uiryeong-gun: Gaye-myeon, Gapul-ri, 25-26.VII.1990, CO Im, 1 (SSWU); Wulsan-si: Wulju-gun, Eonyang-eup, Jakcheonjeong, 29.VII.1990, SY Choe, 1 (SSWU). **GW** Chuncheon-si: 11.VI.1978, MR Kim, 1 (SSWU); Chuncheondam, 24.V.1987, HS Jang, 1 (SSWU); Gangchon-myeon, 24.V.1981, SH Choe, 1 (SSWU); Inje-si: Mt.

Gachilbong, 12.VI.1997, JH Lee et al., 2 (SSWU); Jeongseon-gun: Mt. Gariwangsan, 21.V.1998, BY Kim et al., 2 (SSWU); Sokcho-si: Mt. Seoraksan, 1.VII.1993, HK Hong, 1 (SSWU). **JB** Buan-gun: Byeonsanbando, 24.VI.1991, IS Kim, 1 (SSWU); Sannae-myeon, 23.VI.1990, Wonkwang Univ., 3 (SSWU); Jeonju-si: Mt. Geonjisan, 22.VI.1965, Choe, 1 (SSWU); Jeongeup-si: Mt. Naejangsan, 4.VII.1985, DJ Jeon, 5 (SSWU); Jinan-eup, Mt. Maisan, 18.VIII.1992, YK Kwak, 1 (SSWU); Wanju-gun: Yongdeok-eup, 26.VII.1996, CH Lee, 1 (SSWU). **JJ** Jeju-do, 4-9.VII.1985, SH Jeon, 1 (SSWU); Namjeju-gun: Andeok-myeon, Hwasun-ri, 7.V.1989, JI Kim, 1 (SSWU); Marado, 9.VII.1994, SL Ahn, 1 (NSM). **JN** Gurye-gun: Mt. Jirisan, Temple Hwaeom, 2.V.1984, MJ Seo, 1 (SSWU); Gwangju-si: Seo-gu, Deokheung-dong, 20.V.1998, KO Oh, 1 (SSWU); Haenam-gun: Temple Daeheung, 12.VII.1980, ?, 1 (SSWU); Jangseong-gun: Temple Baekyang, 24-25.V.1994, JI Kim et al., 3 (SSWU); Muan-gun: Imjado, 14.VII.1997, YB Jo, 1 (SSWU); Wando-gun: Jeongdo-ri, 5.VII.1982, Y Kim, 1 (SSWU).

Distribution. Korea, Taiwan.

Maladera laboriosa (Brenske) 대남우단풍뎅이

Autoserica laboriosa Brenske, 1897b: 399.

Korean records. *Serica laboriosa*: Murayama, 1938: 12; 1954: 43; Cho, 1969: 654 (대남우단풍뎅이).

Aserica laboriosa: Miwa and Chûjô, 1939: 57; Cho, 1957: 297.

Description. Body ovate, plumpy, reddish brown to dark brown, surface opaque, velvety, except shinny labroclypeus.

Labroclypeus trapezoidal, widest at base, sides straight, convergent forward, anterior angles rounded, surface shinny, medially weakly upheaval with dense punctures, labrum part indistinct, medially weakly sinuated but not reflexed. Frontoclypeal suture distinct, weakly angled. Ocular canthus triangular, with shallow punctures and a terminal bristle. Frons opaque, a little shorter than labroclypeus, shallow punctation without a row of transversal hairs. Antenna yellowish brown, 10-segmented, last three segments lamellated, as long as the remaining segments combined in male, shorter than remaining segments combined in female. Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at base, slightly narrowed forward, sides weakly and uniformly curved, anterior and lateral border with a few setae, anterior angles sharp, not rounded at apex, and posterior angles somewhat rounded, surface opaque, densely punctate with a microscopic hair in. Scutellum triangular, somewhat ogival posteriorly, punctation similar to that of pronotum, with a microscopic hair in.

Elytra opaque, widest at posterior, intervals shallowly convex, second interval widest, continue to apex, with fine and dense punctation similar to that of pronotum, lateral border setaceous, sutural angles with a seta.

Ventral side opaque, velvety. Mesosternum widely separated between mesocoxae, mesocoxal distance wider than width of

mesofemur. Metacoxae with some strong hairs laterally. Each abdominal sternite opaque, punctures with few setae on sides, third to fourth sternites with scattered hairs at the middle. Pygidium wide, medially weakly convex, with fine scattered punctation, surface opaque, with some short hairs beside apical border.

Legs short and stout; metafemur almost twice width of mesofemur, anterior border weakly convex, surface punctate with two longitudinal rows of setaceous punctures, posterior angles rounded. Metatibia somewhat robust, little shorter than metafemur, surface smooth, with a few of marginal spines. First metatarsomere slightly longer than upper metatibial spur but shorter than two following segments combined. Metatarsi ventrally weakly serrated. Protibia short, bidentate, anterior tarsal claws symmetrical in both sexes.

Specimen Examined. Seoul 3♀ (Brenske).

Distribution. Korea, Taiwan.

Remark. This species had been eliminated from Korean distribution by Kim (2001a). I examined 3 female specimens from Berlin museum.

Genus *Sericania* Motschulsky 다색우단풍뎅이속

Sericania Motschulsky, 1860b: 256

Mesoserica Matsumura, 1911: 118

Sericaria Motschulsky, 1860b: 136

Type species: *Sericania fuscolineata* Motschulsky, 1860b: 137

Diagnosis. Body shinny (sometimes opacue as the male of *S.*

yamauchii). Antennae 9 or 10 segments, club four or more segments and long in male, three segments and short in female. Interval of mesocoxae narrow, 1/2 ~ 2/3 width of mesofemur. Metacoxae transversely sulcate. Protibia bidentate. Metatibia thin and long, with two to three short bristles on the outer margin (Nomura, 1973, 1976).

Remark. *Sericania* is with 65 known species a comparatively diverse sericine taxon (Ahrens 2007a).

Key to the species of Korean *Sericania*

1. Surface very shinny in both sexes. Protibial spur with sharp tip …… …… 2

- Surface velvety in male, shinny in female; Protibia spur with dull tip …… *S. yamauchii*

2. Surface dark reddish brown to black with metallic shine. Elytra short; pronotum-elytra ratio over 0.3 …… *S. koryoensis*

- Suface yellowish brown to dark brown without metallic shine; Elytra long; pronotum-elytra ration under 0.3 …… 3

3. Body large; 11.5-12.3 mm. Antennal club composed 4-segmented …… *S. lucidalis* n. sp.

- Body medium sized; 8.5-11.9 mm. Antennal club composed 5-segmented …… 4

4. Clypeus undulated with transversal groove anteriorly. First antennal club (5th segment of antenna) 1/2 length of rest segments in male …… *S. fuscolineata*

- Clypeus not undulated without transversal groove. First antennal club

(5th segment of antenna) 3/4 length of rest segments in male ·····
····· *S. latisulcata*

Sericania yamauchii Sawada 하세가와다색우단풍뎅이

(Pl. II. Fig. II-7: I, Fig. II-8: A; Pl. III. Fig. III-6: F)

Sericania yamauchii Sawada, 1938: 18.

Serica ussuriensis Medvedev, 1952: 105.

Sericania ussuriensis: Nikolaev, 2002: 96, 97.

Korean records. *Sericania hasegawai*: Murayama, 1941a: 37; 1941b: 21; 1954: 72; Cho, 1969: 662 (하세가와다색우단풍뎅이); Kim, 1978: 383; Stebnicka, 1980: 206.

Sericania yamauchii: Nomura, 1976: 175; Kim and Lee, 1991b: 51; Kim, 1995a: 164; 2001: 59; Löbl and Smetana, 2006: 246.

Serica yamauchii: ESK and KSAE, 1994: 151.

Description. Body length 9.5-11mm; Width 5.1-5.9mm; Club-footstalk ratio 1.5-1.67 (♂), 0.89 (♀); Pronotum ratio 0.54-0.61; Pronotum-elytra ratio 0.27-0.31; Metafemur ratio 0.28-0.33; Metatibia ratio 0.17-0.21; Pygidium ratio 0.45-0.52.

Body ovate, elongated, rather flat, reddish brown to dark brown, surface opaque and velvety in male, shinny in female.

Labroclypeus reddish brown, almost rectangular, widest at base, sides straight, anterior angles rounded, surface shinny, very coarse and dense punctation with few hairs in, anterior margin slightly reflexed, labrum part weakly distinct, medially weakly sinuated. Frontoclypeal

suture distinct, weakly angled. Ocular canthus short and triangular, with shallow punctures and a terminal bristle. Frons dark brown or black, glabrous, basally dense punctation with few hairs near eyes. Antenna yellowish brown, nine-segmented; in male, club four-segmented, about 1.6 times longer than the footstalk; in female, club three-segmented, little shorter than footstalk. Eyes not large, eye to interocular space ratio 0.65-0.68 (♂), 0.53-0.55 (♀). Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at posterior, slightly narrowed forward, sides weakly and uniformly curved, anterior and lateral border with a row of hairs, anterior angles angulated, posterior angles rounded, posterior margin distinctly rounded on the middle one-third, surface with fine punctation densely. Scutellum triangular elongated, punctation similar to that of pronotum.

Elytra widest at posterior, striate distinct, each striae filled with dense and confluent punctures, interstices convex and darken, lateral border strongly setaceous, sutural angles with a seta.

Ventral side opaque in male, glabrous in female, with pruinose part on the sides. Mesosternum not widely separated between mesocoxae, mesocoxal distance almost same as the half width of mesofemur. Metacoxae transversely sulcate, with some strong hairs laterally. Each abdominal sternite densely punctate. Pygidium wide, almost flat in male, medially weakly convex in female, surface shinny, with dense punctation, and some short hairs beside apical border.

Legs long and slender; metafemur over 1.5 times wider than

the width of mesofemur, anterior margin very weakly convex, posterior ventral margin blunted basal two-third, surface punctate with two longitudinal rows of setae, posterior angles rounded. Metatibia slender, almost as long as metafemur, surface punctate, with a few of marginal spines. First metatarsomere longer than upper metatibial spur but much shorter than two following segments combined. Metatarsi ventrally weakly serrated. Protibia relatively long, bidentate, tibial spur blunt at the tip, anterior tarsal claws symmetrical in both sexes. Aedeagus: Pl. III. Fig. III-6: F.

Specimen Examined. **CB** Yeongdong-gun, Mt. Minjujisan, 4.VI.2000, BW Kim, 1♂ (KU). **CN** Gongju-si, Mt. Gyeryongsan, 26.IV.1999, HR Lee, 2♂ (SSWU); ditto, Temple Magoksa, 22.IV.1983, JS Yoon, 1♂ (SSWU). **GB** Yeongju-si, Pungki-eup, Mt. Sobaeksan, 5-7.VI.1981, IH Lee et al., 10♂ 9♀ (SSWU); ditto, Mt. Hwanghaksan, 4.VI.1978, WB Lee, 1♀ (SSWU). **GG** Gwacheon-si, Mt. Cheonggyesan, 10.V.1987, GS Ahn, 1♂ (SSWU); Namyangju-si, Jinjeop-eup, Gwangreung, 30.IV.1961, M Seong, 1♂ (SSWU); ditto, Mt. Chukryeongsan, 4.VI.1999, JI Kim et al., 1♀ (SSWU); ditto, Pyeongnae, Mt. Cheonmasan, 18.VI.1983, MS Kim, 1♂ (SSWU); Paju-si, Temple Bogwangsa, 12.VI.1977, SH Yu, 1♂ (SSWU); Seoul: Gwanak-gu, Mt. Gwanaksan, 8.V.1999, HJ Yun, 1♂ (SSWU); Dongdaemun-gu, Hongreung-dong, 27.IV.1961, MJ Lee, 1♂ (SSWU); Yangpyeong-gun, Mt. Yongmunsan, 6.V.1977, GC No, 1♀ (SSWU). **GN** Hadong-gun, Bukcheon-myeon, Jikjeon-ri, Mt. Imyeongsan, 20.IV.2002, TH Ahn, 1♂ (GSNU); Namhae-gun, Sangju-myeon, Mt. Geumsan, 15.IV.1990, EH Kim, 1♂ (SSWU); ditto, Seo-myeon, Namsang-ri, Mt.

Mangwunsan, 11.V.2002, SE Im et al., 1♂1♀ (GSNU); Milyang-si, Temple Pyochungsa, 4.V.1991, OS Kwon, 1♀ (SSWU); Sangcheong-gun, Sicheon-myeon, Bancheon-ri, 10.V.1997, SH Baek, 1♂ (GSNU); ditto, Jungsan-ri, Sunduryu, 3.VI.1989, SH Lee, 1♀ (GSNU). **GW** Chuncheon-si, Namsan-myeon, Gangchon-ri, 10.V.1970, JI Kim, 1♂ (SSWU); Geumgang-gun, Mt. Geumgangsan, 12.VI.1991, Ronkey & Vojnits, 5♀ (KU); Goseong-gun, Temple Geonbongsa, 22.V.1992, HC Park, 1♀ (KU); Hongcheon-gun, Sambong recreation forest, 8.VI.1995, YH Kim, 1♂ (KU); ditto, Mt. Gachilbong, 23.VI.1984, SH Jeon, 1♀ (SSWU); Inje-gun, Mt. Bangtaesan, Misan-ri, 23.VI.1996, SY Kim, 2♀ (SSWU); ditto, 4.VI.1999, MJ Lee, 1♀ (KU); ditto, 6.VI.1999, HS Jo, 1♀ (KU); ditto, Mt. Seoraksan, Oeseorak, 4.V.1983, JB Lee, 1♂ (SSWU); ditto, Mt. Gachilbong, 13.VI.1997, HS Ro et al., 1♀ (SSWU); Pyeongchang-gun, Mt. Gyebangsan, 15.VI.1995, HC Park, 1♀ (SSWU); ditto, Jinbu-myeon, Mt. Odaesan, 1.VII.1995, TS Kwon, 1♂ (SSWU); Wonju-si, Mt. Chiaksan, 15.VI.1999, JI Kim et al., 1♀ (SSWU); Yangyang-gun, Seo-myeon, Oki-ri, Mt. Seoraksan, 16.VI.1996, ? (GSNU). **HB** Cheonjin, 5.VI.1991, Ronkey & Vojnits, 5♀ (KU). **JB** Muju-gun, Mt. Deokyusan, 20.V.1983, YB Jeong, 1♀ (SSWU); ditto, Mujugucheondong, 21.V.1983, JH Han, 1♀ (SSWU); ditto, Seolcheon-myeon, Daebul-ri, 26.V.1993, JI Kim, 1♀ (SSWU). **JJ** Mt. Hanrasan, 19.V.1989, HK Ku, 1♂ (SSWU). **JN** Gurye-gun, Mt. Jirisan, Tangchi, 5.VI.1998, SH Jo, 1♀ (KU); ditto, 25.VI.1986, HK Je et al., 3♀ (KU); Namwon-gun, Sannae-myeon, Waeun-ri, Baemsagol, 24.VI.1986, ? (SSWU). **PB** Mt. Myohyangsan, 21.V.1985, A Vjnits & L Zombori, 1♀

(KU); ditto, 28.V.1991, Ronkey & Vojnits, 1♀ (KU). **Russia** Siberia, Amur, ?.?.1877, Christoph, 1♂ (HMNH).

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

Sericania koryoensis Murayama 광릉다색우단풍뎅이

(Pl. II. Fig. II-8: B, C; Pl. III. Fig. III-7: A)

Sericania koryoensis Murayama, 1935: 8 (Gwangneung, Korea).

Korean records.

Sericania koryoensis: Murayama, 1938: 15; 1954: 71; Miwa and Chûjô, 1939: 59; Cho, 1957: 297; 1969: 662; Kim, 1981: 344; Stebnicka, 1980: 206; Kim and Lee, 1991a: 67; 1991b: 49; Kim et al., 2004: 117; Löbl and Smetana, 2006: 246.

Serica koryoensis: ESK and KSAE, 1994: 151; Kim and Kim, 1996: 48.

Description. Body length 7.65-9.8mm; Width 4.6-5.5mm; Club-footstalk ratio 1.6 (♂), 0.83-0.94 (♀); Pronotum ratio 0.54-0.57; Pronotum-elytra ratio 0.3-0.32; Metafemur ratio 0.36-0.38; Metatibia ratio 0.19-0.24; Pygidium ratio 0.46-0.56.

Body ovate, rather flat, reddish brown to black, surface shinny.

Labroclypeus blackish, almost rectangular, widest at base, sides straight, anterior angles rounded, surface shinny, very coarse and dense punctation with hairs in, anterior margin slightly reflexed, labrum part indistinct, medially weakly sinuated. Frontoclypeal suture distinct, weakly angled. Ocular canthus short and triangular, with shallow punctures and one or two terminal bristles. Frons black, shinny, basally

dense punctation with few hairs near eyes. Antenna dark brown, 9-10 segments; in male, club four-segmented, about 1.6 times longer than the footstalk; in female, club three-segmented, little shorter than footstalk. Eyes not large, eye to interocular space ratio 0.39-0.44. Mentum very weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at base, slightly narrowed forward, sides weakly and uniformly curved, anterior and lateral border with a row of hairs, anterior angles subangulated, posterior angles not rounded in male, posterior margin distinctly rounded on the middle, surface shinny, densely and deeply punctate. Scutellum linguiform, somewhat ogival posteriorly, punctation similar to that of frons.

Elytra shinny, widest at posterior, distinctly striate, each striae filled with dense and confluent punctures, interstices distinct, lateral border strongly setaceous, sutural angles with a seta.

Ventral side opaque, sometimes glabrous. Mesosternum not widely separated between mesocoxae, mesocoxal distance shorter than the half width of mesofemur. Metacoxae transversely sulcate, with some strong hairs laterally. Each abdominal sternite densely punctate with a row of setae. Pygidium wide, almost flat in male, medially weakly convex in female, with dense punctation, and some short hairs beside apical border.

Legs long and slender; metafemur over 1.5 times wider than the width of mesofemur, anterior margin very weakly convex, posterior ventral margin blunted basal one-third, surface punctate with two longitudinal rows of setae, posterior angles rounded. Metatibia slender,

almost as long as metafemur, surface densely punctate, with a few of marginal spines. First metatarsomere longer than upper metatibial spur but much shorter than two following segments combined. Metatarsi ventrally weakly serrated. Protibia bidentate, anterior tarsal claws symmetrical in both sexes. Aedeagus: Pl. III. Fig. III-7: A.

Specimen Examined. CB Danyang-gun, Daegang, 5.V.1984, SK Kim, 1♀ (SSWU); Jaecheon-gun, Mt. Wolaksan, 30.VII.1987, KS Chae, 1♀ (SSWU). **GB** Cheongsong-gun, Mt. Juwangsan, 14-15.V.1987, JA Yun et al., 12♂2♀ (SSWU); ditto, 4.VI.1989, HJ Han, 2♀ (KU); Daegu-si, Mt. Palgongsan, Temple Pagyesa, 16.V.1976, ?, 1♀ (SSWU); Mungyeong-si, Mt. Hwanghaksan, 4.VI.1978, EH Kim, 1♀ (SSWU); ditto, Mungyeongsaejae, 26.V.1996, JI Kim et al., 2♂3♀ (SSWU); Pohang-si, Buk-gu, Mt. Naeyeonsan, 11.V.2002, SL Ahn, 1♀ (NSM); yeongju-si, Mt. Sobaeksan, Temple Hibangsa, 28.V.1999, JI Kim et al., 1♀ (SSWU); Wuljin-gun, Bulyeongyegok, 9-10,V.1991, OS Kwon et al., 1♂2♀ (SSWU). **GG** Gapyeong-gun, Mt. Myeongjisan, 6.VI.1991, DK Park, 1♀ (SSWU); ditto, 23.IV.1994, JM Park, 2♀ (SSWU); ditto, 10.V.1996, EJ Lee, 1♀ (SSWU); ditto, 4.V.2000, SH Hwang, 1♀ (SSWU); Pocheon-gun, Mt. Baekwunsan, 10.V.1997, SM Heo, 1♀ (KU); Yangpyeong-gun, Temple Yongmunsa, 29.V.1982, GY Jung, 1♀ (SSWU); ditto, Mt. Yongmunsan, 19.V.1973, JI Kim et al., 2♂ (SSWU); ditto, 5.V.1992, BK Ahn, 1♀ (SSWU); ditto, Saneumhyuyangrim, 22.IV.2006, JB Seung, 1♀ (SSWU). **GN** Goseong-gun, Gaecheon-myeon, Temple Okcheonsa, 3.IV.1988, ?, 1♂1♀ (SSWU); ditto, Sangri-myeon, Dongsan-ri, Wunheungsa, Mt. Hyangro-bong, 25.IV.1997, JS Jeon et al., 1♂1♀

(GSNU); Hamyang-gun, Mt. Baekwunsan, 21.IV.1990, JS Jeon, 1♂ (SSWU); Hapcheon-gun, Temple Haeinsa, 10.V.1966, KN Park, 1♀ (SSWU). **GW** Chuncheon-si, Jiam, 15-18.V.1985. JH Hong et al., 2♂ (SSWU); ditto, Mt. Obongsan, 26.V.1995, JI Kim, 1♀ (SSWU); ditto, Gangchon, 22.V.?, HS Kim, 1♀ (SSWU); Hoengseong-gun, Anheung-myeon, Gangrim-ri, 8.VI.1985, JI Kim, 1♂ (SSWU); Inje-gun, Mt. Gachilbong, 30.V.1997, JD Yeo, 1♂ (KU); ditto, Mt. Bangtaesan, 4.VI.1999, JH Park, 1♀ (KU); ditto, Yongdae-ri, 9.V.1999, MK Ham, 1♀ (SSWU); Naeseolak, Temple Baekdamsa, 4.VI.1979, HM Lee et al., 1♂2♀ (SSWU); ditto, 5.VI.1979, OB Kwon, 2♀ (SSWU); ditto, 3.VI.1979, HJ Park, 1♂ (SSWU); Pyeongchang-gun, Jinbu-myeon, Mapyeong-ri, 30.VI.1985, YS Kim, 1♀ (SSWU); ditto, Mt. Gyebangsan, 16.VI.1993, JI Kim, 1♂ (SSWU); Wonju-si, Mt. Chiaksan, 5.VI.1992, MH Shin et al., 2♀ (KU); ditto, Geumdae-ri, 7.VI.1974, WY Lee, 1♂ (SSWU). **JB** Muju-gun, Mujugucheondong, 21.V.1983, TH Ro et al., 1♂4♀ (SSWU); ditto, Mt. Deokusan, 24-25.V.1993, JM Park et al., 2♂6♀ (SSWU); ditto, 6.V.1996, SL Ahn, 1♀ (NSM); ditto, Samgok-ri, 24.V.1993, NL Kim et al., 2♂1♀ (SSWU). **JN** Suncheon-si, Mt. Jogyesan, 21-22.V.1988, JH Kim et al., 2♂ (KU).

Distribution. Korea (Native).

Sericania lucidalis Kim n. sp.

(Pl. II. Fig. II-8: D; Pl. III. Fig. III-7: B)

Korean records. *Sericania latisulcata*: Kim, 2001: 59 (misidentified).

Description. Body length 11.51-12.24mm; Width 6.5-6.6mm; Club-footstalk ratio 1.45 (♂), 0.91 (♀); Pronotum ratio 0.56-0.58; Pronotum-elytra ratio 0.28; Metafemur ratio 0.31-0.33; Metatibia ratio 0.19-0.21; Pygidium ratio 0.55.

Body ovate, elongated, rather flat, reddish brown, surface shinny.

Labroclypeus trapezoidal, widest at base, sides slightly rounded, anterior angles rounded, surface shinny, very dense punctation, anterior margin slightly reflexed, labrum part indistinct in male, distinct in female, medially weakly sinuated. Frontoclypeal suture distinct, weakly angled. Ocular canthus short and triangular, with shallow punctures and a terminal bristles. Frons black, shinny, anteriorly dense punctation with few hairs near eyes. Antenna reddish brown, nine-segmented; in male, club four-segmented, about 1.45 times longer than the footstalk; in female, club three-segmented, little shorter than footstalk. Eyes not large, eye to interocular space ratio 0.54-0.59. Mentum very weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at posterior, narrowed forward, sides weakly and uniformly curved, anterior and lateral border with a row of hairs, anterior angles somewhat rounded in male, acute in female, posterior angles rounded, posterior margin rounded on the middle one-third, surface shinny, densely punctate. Scutellum triangular elongated, punctation on the sides similar to that of frons.

Elytra long, shinny, widest at posterior, distinctly striate, each striae filled with dense and confluent punctures, lateral border strongly

setaceous, sutural angles with a seta.

Ventral side glabrous. Mesosternum not widely separated between mesocoxae, mesocoxal distance shorter than the half width of mesofemur. Metacoxae transversely sulcate, with some strong hairs laterally. Each abdominal sternite densely punctate with few of setae scattered. Pygidium wide, medially weakly convex, surface shinny with dense punctation, and some short hairs beside apical border.

Legs long and slender; metafemur over 1.5 times wider than the width of mesofemur, anterior margin very weakly convex, posterior ventral margin blunted basal one-fourth, surface punctate with two longitudinal rows of setae, posterior angles rounded. Metatibia slender, a little shorter than metafemur, surface wrinkled with punctatrion, with a few of marginal spines. First metatarsomere longer than upper metatibial spur but much shorter than two following segments combined. Metatarsi ventrally weakly serrated. Protibia bidentate, anterior tarsal claws simple, symmetrical in both sexes. Aedeagus: Pl. III. Fig. III-7: B.

Specimen Examined. Holotype. **JN** Gurye-gun: Mt. Jirisan, 5.VI.1998, J Jung, 1♂ (SSWU). Paratypes. **GN** Mt. Jirisan, Georim, 7.VII.1989, SH Jeon, 1♀ (SSWU). **JN** Gurye-gun: Mt. Jirisan, 29.V.1991, IS Song, 1♀ (SSWU).

Distribution. Korea (Native).

Remarks. I found three individuals among *S. yamauchii*. This is very shinny and resemble to *S. yamauchii*, so that it could be confuse with female of *S. yamauchii* with shinny surface. However, this species is

characterized by 1) larger size (over 11 mm) than other *Sericania*, 2) four-segmented club, and 3) distinct male aedeagus. I searched the major reviews of *Sericania* (Sawada 1938; 1955, Nomura 1976, Ahrens 2007a) to identify, but there was no same species with this.

Etymology. This name is derived from the Latin word *lucid* (meaning shining) because of its glossy surface.

Sericania fuscolineata Motschulsky 흑다색우단풍뎅이

(Pl. II. Fig. II-8: E, F; Pl. III. Fig. III-7: B)

Sericania fuscolineata Motschulsky, 1860b: 136.

Korean records. *Sericania fuscolineata*: Heyden, 1887: 251; Niijima and Kinoshita, 1927: 13; Murayama, 1935: 3; 1937: 34; 1938: 15; 1941b: 20; 1954: 68; Doi, 1938: 97; Sawada, 1937: 10; Miwa and Chûjô, 1939: 58; Cho, 1957: 297; 1969: 662 (흑다색우단풍뎅이); Cho et al., 1967: 197; Kim and Kim, 1971: 160; Kim and Nam, 1981: 125; 1982a: 155; 1984b: 328; Kim et al., 1985: 105; Kim, 1978: 383; Stebnicka, 1980: 252; Kim, 1981: 344; 1995a: 164; 1996: 174; 2001: 58; Kim and Lee, 1991a: 67; 1991b: 49; Kim and Kim, 1996: 127; 1998: 170; Park et al., 1993: 178; Kim et al., 2002: 120.

Sericania fuscolineata fuscolineata: Nomura, 1960: 59; 1976: 183; Löbl and Smetana, 2006: 246.

Serica fuscolineata: ESK and KSAE, 1994: 151; Kim and Kim, 1996: 48.

Description. Body length 8.95-9.95mm; Width 4.5-5.25mm;

Club-footstalk ratio 2.14-2.29 (♂), 0.89 (♀); Pronotum ratio 0.54-0.59; Pronotum-elytra ratio 0.27-0.3; Metafemur ratio 0.33-0.35; Metatibia ratio 0.15-0.2; Pygidium ratio 0.52-0.6.

Body ovate, oblong, rather flat, yellowish brown, surface shinny.

Labroclypeus almost rectangular, widest at base, sides straight, anterior angles rounded, surface shinny, densely punctured, transversally depressed behind the anterior margin, with a few hairs upon the depression, labrum part indistinct, medially weakly sinuated. Frontoclypeal suture distinct, weakly angled. Ocular canthus bar shape, with shallow punctures and a terminal bristle. Frons black, shinny, basally dense punctation with few hairs near eyes. Antenna yellowish brown, 9-segmented; in male, club five-segmented, last four segments over twice longer than the footstalk, of which first segment (the fifth antennal segment) around half length of the rest club; in female, club three-segmented, little shorter than footstalk. Eyes not large, eye to interocular space ratio 0.5-0.64. Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at base, slightly narrowed forward, sides weakly and uniformly curved, anterior and lateral border with a row of hairs, anterior angles subangulated, posterior angles rounded, anterior margin more curved in female than that of male, posterior margin distinctly rounded on the middle one-third, surface shinny, densely punctate. Scutellum elongate triangular, punctation similar to that of pronotum.

Elytra shinny, widest at posterior, distinctly striate, each striae

filled with dense and confluent punctures, interstices distinct and smooth, lateral border strongly setaceous, sutural angles with a seta.

Ventral side shinny. Mesosternum not widely separated between mesocoxae, mesocoxal distance shorter than the half width of mesofemur. Metacoxae transversely sulcate, with some strong hairs laterally. Each abdominal sternite densely punctate with a row of setae posteriorly. Pygidium wide, medially weakly convex, with fine scattered punctation, and some short hairs beside apical border.

Legs long and slender; metafemur rather wider than the width of mesofemur, anterior margin very weakly convex, posterior ventral margin blunted basal two-third, surface punctate with two longitudinal rows of setae, posterior angles rounded. Metatibia slender, almost as long as metafemur, surface rather waved, with a few of marginal spines. First metatarsomere longer than upper metatibial spur but much shorter than two following segments combined. Metatarsi ventrally weakly serrated. Protibia bidentate, anterior tarsal claws symmetrical in both sexes. Aedeagus: Pl. III. Fig. III-7: B.

Specimen Examined. **CB** Cheongwon-gun: Hoebuk-myeon, Yeomchigogae, 28.V.1991, JI Kim, 2♀ (SSWU); Jecheon-si: Mt. Woraksan, 29.V.1987, KJ Lee, 1♂ (KU); ditto, 27.V.1996, TH Gu, 1♀ (SSWU); Yeongdong-gun: Mt. Minjujisan, 4.VI.2000, JH Choe et al., 4♂1♀ (KU). **CN** Geumsan-gun: Mt. Daedunsan, 23.V.1997, SL Ahn, 1♀ (NSM); Mt. Gyeryongsan, 24.V.1989, SL Ahn, 1♀ (NSM); ditto, 18.V.1991, EK Choe, 1♂ (SSWU); ditto, 7.VI.1997, YL Jo, 1♂ (KU); ditto, 26.IV.1999, HR Lee & JS Choe, 1♂1♀ (SSWU); ditto, Temple

Gap, 5.VI.1997, JH Han et al., 2♂1♀ (KU). **GB** Bonghwan-gun: Mulya-myeon, Ojeon-ri, 20.V.1998, JI Kim et al., 8♂8♀ (SSWU); Mt. Cheongryangsan, 13.VI.1996, HJ Cha, 1♀ (KU); Cheongdo-gun: Mt. Wunmunsan, Temple Wunmun, 23-24.V.1987, JY Jeon et al., 7♂3♀ (SSWU); ditto, 15.V.1988, HL Lee, 1♂ (SSWU); Cheongsong-gun: Naewon-dong, Mt. Juwangsan, 15.V.1987, YM Hong, 1♀ (SSWU); ditto, 5.VI.1989, KKM, 1♂ (SSWU); ditto, 6.VI.1989, EM Park., 2♀ (KU); Munkyeong-si: Mt. Juheulsan, Sangcho-ri, 23-25.V.1997, AY Kim & JI Kim, 2♂3♀ (SSWU); Seongju-gun: Gacheon-myeon, Masu-ri, Mt. Gayasan, 30.V.1997, TG Kang, 1♀ (GSNU); Wuljin-gun: Mt. Baekamsan, 28.V.1999, JH Kim et al., 2♀ (SSWU); ditto, Bulyeong valley, 9.V.1991, OS Kwon, 1♀ (SSWU); Yeongju-si: Pungki-eup, Mt. Sobaeksan, 5-6.VI.1981, SH Nam et al., 35♂50♀ (SSWU); ditto, 7-8.VI.1974, BJ Lee & SH Nam, 2♀ (SSWU); ditto, 5.VI.1987, SH Lee, 1♀ (SSWU); Yeongyang-gun: Mt. Ilwolsan, 20.VI.1997, YB Cho, 1♂ (SSWU). **GG** Anyang-si: Mt. Gwanaksan, 28.IV.1985, OS Kwon, 1♀ (KU); Dongducheon-si: Mt. Soyosan, 24.V.1981, KY Yoon, 1♂ (KU); Gapyeong-gun: Buk-myeon, Mt. Hwaaksan, 29.V.1998, SY Kim, 1♂ (SSWU); Cheongpyeong-myeon, 11.V.1984, SH Lee, 1♂ (SSWU); Ha-myeon, Hyeon-ri, 2.VI.1991, KSB & HKC, 1♂2♀ (KU); Sang-myeon, Hanghyeon-ri, Achimgoyosumokwon, 13.V.2001, SY Kim, 1♀ (SSWU); Goyang-si: Hyoja-dong, Bukhansanseong, 6.VI.1974, IT Oh, 1♀ (SSWU); Jangheung-gun, Sonchugyegok, 27.V.2005, AY Kim, 1♂4♀ (SSWU); Gwacheon-si: Makye-dong, Mt. Cheongyesan, 19.VI.1989, DLL, 1♀ (SSWU); ditto, 24.VI.1984, YM Kim, 1♀ (KU); Gwangju-si:

Namhansanseong, 19.VI.1974, CS Yu, 1♀ (SSWU); ditto, 6.V.1995, YH Kim, 1♂1♀ (SSWU); ditto, 6.VI.1996, MS Jeon, 1♂ (SSWU); ditto, 23.V.1997, JY Kim, 1♂ (SSWU); Hanam-si: Mt. Geomdansan, 22.V.2001, YW Choe et al., 2♂2♀ (SSWU); Incheon-si: Ongjin-gun, Deokjeok-myeon, 5.VII.1981, JI Kim, 1♂ (SSWU); Namyangju-si: Mt. Chukryeongsan, 4.VI.1999, JI Kim, 1♀ (SSWU); Paldang, 14.V.1961, BW Kim et al., 2♂2♀ (SSWU); Pyeongnae, Mt. Cheonmasan, 4.VI.1983, JI Kim, 1♂ (SSWU); ditto, 31.V.1989, HK Gu, 1♂ (SSWU); Paju-si: Beokje, Temple Bokwang, 25.V.1975, SS Go, 1♀ (SSWU); ditto, 12-19.VI.1977, SM Yeo et al., 3♂1♀ (SSWU); ditto, 22.V.1985, JH Hwang, 4♀ (SSWU); ditto, 12.V.1996, MT Kim, 1♂1♀ (KU); Gwangtan-myeon, Mt. Aengmubong, 9.V.1971, JI Kim, 1♀ (SSWU); ditto, 6.VI.1973, KS Chu & CS Yu, 1♂1♀ (SSWU); Mt. Goryeongsan, 21.VI.1997, SH Jeong, 1♀ (KU); Pocheon-si: Mt. Baekwunsan, 10.V.1997, HJ Choe, 1♂ (KU); Mt. Gwangdeoksan, 21.V.2003, JG Lee, 1♂ (SSWU); Naechon-myeon, Eumhyeon-ri: 12-14.V.1991, LSY & KSS, 2♀ (KU); ditto, 6.VI.1991, KHD, 1♂ (KU); Pocheon-dong, Mt. Wangbangsan, 15.VI.1975, MS Choe, 1♀ (SSWU); ditto, 6.VI.1977, SH Yu, 1♂ (SSWU); ditto, 29.V.1985, MK Son, 1♀ (KU); ditto, 2.VI.1985, DJ Jeon, 1♀ (SSWU); Gwangreung, 30.IV.1961, JI Kim, 1♀ (SSWU); ditto, 6-13.VI.1981, SH Kim et al., 3♀ (SSWU); ditto, 14.VI.1981, DW Jin, 1♀ (KU); ditto, 13.VII.1981, JE Lee, 1♀ (SSWU); ditto, 9.V.1987, K Park, 1♀ (SSWU); Seoul-si: Dobong-gu, Mt. Dobongsan, 6.VI.1961, JG Yu, 1♀ (SSWU); ditto, 29.V.1987, KH Min, 1♀ (SSWU); Eunpyeong-gu, Mt. Bukhansan, 3.VI.1995, SY Jeong, 1♂ (SSWU); Gangbuk-gu, Ui-dong, 5.VI.1983, JO Kim, 1♂1♀ (SSWU);

Gwanak-gu, Sinrim-dong, Mt. Gwanaksan, 22.V.1957, JS Hyeon, 1♀ (SSWU); ditto, 29.V.1993, YM Choe, 2♀ (SSWU); Nowon-gu, Mt. Suraksan, 23.V.1981, KY Yun, 1♂ (SSWU); ditto, 15.V.1997, JY Kim & YS Park, 1♂1♀ (SSWU); Yangpyeong-gun: Danwol-myeon, Saneum-ri, Saneumhyuyangrim, 14.VI.2005, AY Kim, 1♂1♀ (SSWU); Mt. Yongmunsan, 19.V.1973, TS Im & CH Jo, 1♂1♀ (SSWU). **GN** Busan-si: Dongrae-gu, Yeonsan-dong, 21.VIII.1985, HS Kim, 1♂ (SSWU); Geochang-gun: Buksang-myeon, Sojeong-ri, Gyesam, 9.VI.1987, ?, 1♂ (GSNU); Goje-myeon, Gunghang-ri, 6.VI.1987, ?, 1♀ (GSNU); Geoje-gun: Dundeok-myeon, Sambang-ri, Mt. Sambangsan, 17.IX.1995, ?, 1♂ (GSNU); Hamyang-gun: Baejeon-myeon, Mt. Baekwunsan, 30.V.1997, YB Jo, 1♂1♀ (SSWU); Hapcheon-gun: Mt. Gayasan, 25.V.1986, JM Lim, 1♀ (SSWU); ditto, 6.VI.1996, SL Ahn, 1♂ (NSM); Milyang-si: Sannae-myeon, Nammyeong-ri, Temple Baekyeon, 23.V.1990, ?, 1♂1♀ (GSNU); Sajapyeong, 24.V.1987, UY Ahn, 1♀ (SSWU); Temple Cheonwang, 24.V.1987, JH Kim & DB Kim, 1♂1♀ (SSWU); Sangcheong-gun: Sicheon-meyon, Bancheon-ri, 10.V.1997, JS Park & JS Jeon, 2♂1♀ (GSNU); Mt. Jirisan, Jungsan-ri, 25.VI.2001, JB Jeon, 1♀ (SSWU); Wulsan-si: Wulju-gun, Sangbuk-myeon, Icheon-ri, 29.VI.1989, ?, (SSWU); Yangsan-si: Mt. Cheonseongsan, Temple Naewon, 27.V.1989, SH Jeon, 1♂5♀ (SSWU). **GW** Cheolwon-gun: Mt. Myeongseongsan, 17.VIII.1999, DS Gu, 1♀ (SSWU); Chuncheon-si: Gangchon, 5.VI.1977, YS Kim, 1♀ (SSWU); ditto, 10.V.1997, EY Kim, 1♀ (SSWU); Gajeong-ri, 23.V.2003, JG Lee, 1♀ (SSWU); Jiam-ri, 6.V.1994, P. Ronkay, 1♂ (HMNH); Donghae-si: Bukpyeong-myeon,

Temple Samhwa, 26.VI.1984, KH Kim, 1♀(SSWU); Gangreung-si: Yeongok-myeon, 23.VI.1991, JHJ, 1♂ (KU); ditto, Samsan-ri, Buyeon Valley, 18.VI.2001, AY Kim, 1♂1♀ (SSWU); Mt. Gachilbong, 21.VI.1984, SY Lee, 1♂ (SSWU); Goseong-gun: Temple Geonbongsa, 22.V.1992, HC Park, 1♂ (KU); Mt. Gwangdeoksan, 2.V.1999, JS Choe, 1♂ (SSWU); Mt. Hyangrobong, 13.VI.1992, SM Ryu, 2♂3♀ (SSWU); Hongcheon-gun: Duchon-myeon, Mt. Garisan, 28.V.1961, JG Yu, 1♀ (SSWU); Mt. Gachilbong, 21-23.VI.1984, JH Yeo et al., 1♂3♀ (SSWU); Mt. Odaesan, Jogye-dong, 30.VI.1997, JI Kim et al., 3♂2♀ (SSWU); ditto, Myeongye-ri, 29.VI.1997, SY Kim, 2♂1♀ (SSWU); ditto, Sambongyaksu, 5.VI.1998, JI Kim, 1♂ (SSWU); Sambong, Hyuyangrim, 8-10.VI.1995, SS Kim et al., 4♂11♀ (KU); Inje-gun: Bangdong-meyon, Jindong-1-ri, 17.VI.1996, TY Mun, 1♂ (KU); Naeseorak, 4.VI.1979, DJ Ahn, 2♀ (SSWU); Mt. Odaesan, 11.VII.1928, ?, 1♂ (SSWU); ditto, 2.VII.1995, TS Kwon, 3♂4♀ (SSWU); ditto, Bangadari-Yaksu, 22.VI.2005, TW Kim, 5♂2♀ (SSWU); ditto, Temple Bukdae, 27.V.1998, MK Lee, 1♀ (SSWU); ditto, Yongdae-ri, 26.V.1983, KS Jang & JI Kim, 3♀ (SSWU); Mt. Bangtaesan, 4.VI.1999, SK Choi et al., 5♂7♀ (KU); ditto, Misan-ri & Sangnam-ri, 23.VI.1996, SY Kim & JI Kim, 6♂2♀ (SSWU); Mt. Gachilbong, 13.VI.1997, JH Lee et al., 2♀ (SSWU); Mt. Seoraksan, 24.V.1968, JI Kim, 1♀ (SSWU); ditto, 7.VI.1974, KJ Mun, 1♀ (SSWU); ditto, 28.VI.1993, SM Lee, 1♂ (SSWU); ditto, Temple Baekdam, 5.VI.1979, IB Yun & KM Kim, 4♂2♀ (SSWU); ditto, 4.VI.1979, BW Choi & SK Lee, 2♂2♀ (SSWU); ditto, 25.V.1986, KS Jang, 1♀ (SSWU); Jeongseon-gun: Mt. Duwuibong, 10.VI.2000, SL Ahn, 1♀ (NSM);

Pyeongchangun: Doam-myeon, Yongsan-ri, 29.VI.1985, MA Kim, 1♀ (SSWU); Jinbu-myeon, Mt. Odaesan, 26.V.1995, HM Kim, 1♀ (SSWU); ditto, 24-25.VI.1998, TM Han & TH Kang, 2♂1♀(SSWU); ditto, 2.V.2003, JG Lee, 2♂ (SSWU); Mt. Gyebangsan, 16.VI.1993, SY Kim et al., 8♂5♀ (SSWU); Mt. Unduryeong, 17.VI.1993, EJ Lee, 1♂ (SSWU); Taebaek-si: Mt. Hambaeksan, 11-12.VIII.1999, DS Gu, 1♂ (SSWU); Mt. Taebaeksan, 14.V.1992, KH Park, 1♂1♀ (SSWU); ditto, Dangungak, 30.V.1999, HJ Yun et al., 3♀ (SSWU); Sodo-dong, 23.VII.1986, KS Jang, 3♀ (SSWU); Wonju-si: Mt. Chiaksan, 4-6.VI.1992, MJ Eom et al., 3♂8♀ (KU); ditto, 15.VI.1999, JI Kim et al., 1♂3♀ (SSWU); Guirye-myeon, Temple Cheonwun, 31.VII.1997, JI Kim, 1♀ (SSWU); Yanggu-gun: Mt. Daeamsan, Yongneup, 30.V.1992, HC Park, 1♂ (KU); Mt. Gachilbong, 31.V.1992, JW Lee, 1♂2♀ (SSWU). **HN** Pyeongsan-si: Huchiryeong, 25.VI.1999, SL Ahn, 2♂ (NSM). **JB** Muju-gun: Mt. Deokyusan, 21-22.V.1983, DE Lee & YK Min, 1♂1♀ (SSWU); ditto, 30.V.1992, JW Park, 1♀ (SSWU); ditto, 25.V.1993, SY Kim, 1♀ (SSWU); ditto, Mujugucheondong, 11.VI.1972, JH Yu & JI Kim, 2♀ (SSWU); ditto, 20-22.V.1983, YS Lee et al., 7♂3♀ (SSWU); ditto, 25.V.1993, YJ Kang et al., 3♂18♀ (SSWU); Seolcheon-myeon, Daebul-ri~Samgong-ri, 24-25.V.1993, JS Heo, 1♂9♀ (SSWU); Namwon-gun: Sannae-myeon, Whaeun-ri, Baemsagol, 24.VI.1988, ?, 1♀ (SSWU). **JJ** Seoguipo-si: 10.VII.1988, GS Lee, 9♂ (SSWU). **JN** Gurye-gun: Mt. Jirisan, 23-26.VI.1986, JY Kim et al., 4♀ (KU); Imgolryeong, 4-5.VI.1998, YS Sim et al., 1♂2♀ (KU); Gwangyang-gun: Chusan-ri, Mt. Baekwunsan, 18-19.V.1991, JG Seo et al., 3♂ (KU); Haenam-gun, Samsan-myeon,

Mt. Duryunsan, 23.VI.1993, KSH, 1♀ (KU). **Russia** Primorje region, Ussurijsky Nat. Res. Territory, 80 ㎞ NNE Wladivostok, nr Kamenushka, 9.VII.1990, Gy. Sziráki, 1♀ (HMNH).

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

Remark. This is the most common species among Korean *Sericania*. The Korean fauna has not much variation compared to Japanese fauna splited to many subspecies.

Sericania latisulcata Murayama 넓은줄우단풍뎅이

(Pl. II. Fig. II-8: G; Pl. III. Fig. III-7: D)

Sericania latisulcata Murayama, 1941a: 36 (Is. Wulleungdo, Korea).

Korean records. *Sericania latisulcata*: Murayama, 1954: 69; Cho, 1969: 662 (넓은줄우단풍뎅이); Kim, 1978: 383; Stebnicka, 1980: 206; Kim and Nam, 1982a: 155; Kim and Lee, 1991b: 51; Kim, 2001: 59; Löbl and Smetana, 2006: 246.

Serica latisulcata: ESK and KSAE, 1994: 151.

Description. Body length 11.9mm; Width 6.1mm; Club-footstalk ratio 1.65 (♂); Pronotum ratio 0.6; Pronotum-elytra ratio 0.29; Metafemur ratio 0.29; Metatibia ratio 0.24; Pygidium ratio 0.58.

Body ovate, elongated, rather flat, reddish brown, surface shinny.

Labroclypeus almost rectangular, widest at base, sides slightly rounded, anterior angles rounded, surface shinny, very coarse and dense punctation with few hairs in, anterior margin slightly reflexed,

labrum part indistinct, medially weakly sinuated. Frontoclypeal suture distinct, not angled. Ocular canthus short and triangular, with shallow punctures and a terminal bristles. Frons black, shinny, anteriorly dense punctation with few hairs near eyes. Antenna brown, nine-segmented; in male, club five-segmented, last four segments about 1.6 times longer than the footstalk, fifth segment about three-fifth length of rest club. Eyes not large, eye to interocular space ratio 0.66. Mentum very weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at posterior, slightly narrowed forward, sides weakly and uniformly curved, anterior and lateral border with few of hairs, anterior angles angulated, posterior angles somewhat rounded, posterior margin distinctly rounded on the middle one-third, surface shinny, densely punctate. Scutellum triangular elongated, punctation similar to that of frons.

Elytra shinny, widest at posterior, distinctly striate, each striae filled with dense and confluent punctures, interstices distinct convex, lateral border setaceous, sutural angles with a seta.

Ventral side shinny. Mesosternum not widely separated between mesocoxae, mesocoxal distance as wide as the half width of mesofemur. Metacoxae transversely sulcate, with some strong hairs laterally. Each abdominal sternite densely punctate with few setae. Pygidium wide, medially convex, with dense fine punctation, and some short hairs beside apical border.

Legs long and slender; metafemur under 1.5 times wider than the width of mesofemur, anterior margin very weakly convex, posterior

ventral margin blunted basal half, surface punctate with two longitudinal rows of setae, posterior angles rounded. Metatibia slender, almost as long as metafemur, surface wrinkled with punctation, with a few of marginal spines. First metatarsomere longer than upper metatibial spur but much shorter than two following segments combined. Metatarsi ventrally weakly serrated. Protibia bidentate, anterior tarsal claws symmetrical in both sexes. Aedeagus: Pl. III. Fig. III-7: D.

Specimen Examined. GB Ulnung-gun: Ulnung-eup, Ulnung Is., 25.V.1995, HC Park, 1♂ (SSWU).

Distribution. Korea (Native).

Remarks. Murayama (1941a) reported as new species with two male from Ulung Island. Most of his materials disappeared after the Korean War, so that nobody couldn't find his collection. All records of this species after his were citations. After the looking over the specimens from Kim (2001a), I found all of them were female of *S. yamauchii*. There were one specimen from Ulung-do during this study. Though I couldn't observe the type of S. latisulcata, this specimen is exactly same with original description and the illustration of male aedeagus by Murayama (1941a). In addition, the collecting site is also same. Therefore, I concluded it is same as *S. latisulcata* and it should be designated as topotype.

Genus *Serica* MacLeay 우단풍뎅이속

Serica MacLeay, 1819: 146

Stilbolemma Harris, 1827: 7

Camptorhina Kirby, 1837: 128

Trichoserica Reitter, 1896: 181

Ophthalmoserica Brenske, 1897b: 356

Podoserica Breit, 1912: 202

Paramaladera Nikolajev, 1979: 191

Type species: *Scarabaeus brunneus* Linnaeus, 1758: 352

Diagnosis. Body, clypeus, Antennae, and legs shinny. Short scale-like hair or fine hair scattered on dorsal surface. Antennae nine segments, club three segments. Two and three segments of male antennae elongated. Interval of mesocoxae narrow, 1/2 width of mesofemur. Protibia bidentate. Protarsal teeth asymmetrical; Inner tooth swollen underneath. Metafemur shining, with posterior margin not serrate, sometimes feebly so near apex. Metatibia with two or three pinose oblique ridges on outer side, without longitudinal ridge. Elytral apex chitinous, rarely membranous. Pro- and mesotarsus with a row of hair below. Generally, 1st to 3rd segments of metatarsus with short hairs (Nomura 1973, 1974).

Distribution. This genus is exclusively distributed in the arboreal Palearctics with highest diversity in the East Asian mountains from Japan to the Himalaya and occur up to 4,000 m with a few taxa so far know in the high mountains of Indochina. One species (*S. brunna*) has a range from Siberia to Europe (Ahrens, 2005c).

Key to the species of Korean *Serica*

1. Body yellowish brown to brown; surface shinny. Eye to interocular space ratio over 0.5 ····· 2

- Body reddish brown to dark brown; surface opacue, velvety. Eye to interocular space ratio under 0.5 ····· 4

2. Elytra with irregular hair line. Compound eyes not large; interocular space almost two times of eye diameter. Distance ratio of each paramere to center of middle piece 1:3 (left: right) ····· *S. hirsuta*

- Elytra with regular hair line. Compound eyes large; interocular space narrower than two times of eye diameter. Distance ratio of each paramere to center of middle piece 1:1.5 (left: right) ····· 3

3. Dorsal surface brown, ventral dark brown. Elytra with fine hairs densely ····· *S. fulvopubens*

- Total body light yellowish brown. Elytra with very short fine hair scattered ····· *S. polita*

4. Body size over 7mm, yellowish brown to dark brown. Tip of maxillary palp dull ····· *S. septentrionalis*

- Body size under 7mm, very dark brown. Tip of maxillary palp sharp ····· *S. monticum* n. sp.

Serica hirsuta Kim and Kim 털보우단풍뎅이

(Pl. II. Fig. II-8: H, I; Pl. III. Fig. III-7: E)

Serica hirsuta Kim and Kim, 2003: 74 (Korea).

Korean records. *Trichoserica polita*: Stebnicka, 1980: 250-252; Kim and Lee, 1991b: 52.

Serica hirsuta: Löbl and Smetana, 2006: 244.

Description. Body length 7.8-8.9mm; Width 4.35-5mm; Club-footstalk ratio 2.1-2.13 (♂), 0.82-1.06 (♀); Pronotum ratio 0.53-0.57; Pronotum-elytra ratio 0.28-0.31; Metafemur ratio 0.38-0.41; Metatibia ratio 0.24-0.27; Pygidium ratio 0.55-0.62.

Body ovate, elongated, rather flat, yellowish brown to dark brown, surface shinny.

Labroclypeus brown, almost rectangular, sides straight in male, slightly rounded in female, anterior angles rounded, surface shinny, dense punctation with fine hairs in, anterior margin slightly reflexed, labrum part indistinct, medially strongly sinuated. Frontoclypeal suture distinct, weakly angled. Ocular canthus short, with rare punctures and one to three terminal bristles. Frons dark brown or black, glabrous, punctations with fine hairs. Antenna yellowish brown, nine-segmented; club three-segmented, over two times longer than the footstalk and bent in male, almost same than footstalk in female. Eyes not large, eye to interocular space ratio 0.52-0.54 (♂), 0.48-0.52 (♀). Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at posterior, slightly narrowed forward, sides weakly and uniformly curved, anterior and lateral border with a row of hairs, anterior angles protrude and angulated, posterior angles rounded, posterior margin curved on the middle, surface with fine dense punctation and hairs. Scutellum triangular elongated, punctation similar to that of pronotum.

Elytra widest at posterior, striate distinct, each striae filled with

dense and confluent punctures, interstices convex and sometimes darken, surface less shinny in male other than in female, lateral border strongly setaceous, sutural angles slightly rounded without seta.

Ventral side opaque. Mesosternum not widely separated between mesocoxae, mesocoxal distance almost three fourth width of mesofemur. Metacoxae with some strong hairs laterally. Each abdominal sternite densely punctate. Pygidium wide, medially convex, surface opaque, with dense punctation and hairs.

Legs long and slender; metafemur over 1.5 times wider than the width of mesofemur, anterior margin weakly convex, posterior ventral margin blunted basal half, surface shinny, punctate with hairs, posterior angles rounded. Metatibia slender, shorter than metafemur, surface longitudinally wrinkled, with a few of marginal spines, three fifth of ventral margin serrated. First metatarsomere longer than upper metatibial spur but almost same as two following segments combined. Metatarsi ventrally weakly serrated. Protibia bidentate, tibial spur sharp pointed at the tip, anterior tarsal claws asymmetrical in male, symmetrical in female. Aedeagus: Pl. III. Fig. III-7: E.

Specimen Examined. Type series: Holotype. **GW** Inje-gun: Mt. Bangtaesan, Hanam-ri, JI Kim & SY Kim, 1♂ (SSWU). Paratypes. **GB** Munkyeong-si: Munkyeong-eup, Mt. Juheulsan, 24.V.1997, JI Kim, 1♂ (SSWU); Yeongju-si: Pungki-eup, Mt. Sobaeksan, 23.VII.1974, CH Kim, 1♀ (SSWU); ditto, 5-6.VI.1981, CS Lee, 2♂ (SSWU). **GG** Pocheon-si: Mt. Wangbangsan, 5.VI.1977, UW Seoh, 4♀ (SSWU); ditto, 29.V.1983, MY Song, 1♀ (SSWU); ditto, 30.VI.1984, HC Park, 1♀ (SSWU). **GW**

Chuncheon-si: Kangchon-myeon, 19.VI.1974, DH Yang, 1♀ (SSWU); Hongcheon-gun: Mt. Gachilbong, 22.IV.1984, KC Lee, 1♀ (SSWU); Inje-gun: Mt. Bangtaesan, Hanam-ri, 24-26.VI.1996, JI Kim, 5♀ (SSWU); Jeongseon-gun: Mt. Gariwangsan, 21.V.1998, BY Kim et al., 1♂ (SSWU). **GN** Jinju-si: Gajua-dong, 4.VI.1986, YH Baek, 1♀ (SSWU). **JN** Gurye-gun: Mt. Jirisan, Piagol, 19.VI.1982, SH Nam, 2♂ (SSWU); ditto, 23.VI.1987, SJ Ban et al., 1♂3♀ (SSWU); ditto, 21.V.1998, SH Jeon, 1♂ (SSWU).

Other materials. **GB** Cheongsong-gun: Mt. Juwangsan, 5.IV.1989, Park, 1♀ (SSWU); Kyeongsan-si: 23.V.1989, Kim, 1♂ (SSWU); Munkyeong-si: Munkyeong-eup, Munkyeongseje, 10.VII.1977, Kim, 1♀ (SSWU); ditto, 26.V.1996, Kim, 1♀ (SSWU); ditto, Hwanghaksan, 4.VI.1978, Lee, 1♀ (SSWU); Yeongju-si: Mt. Seondalsan, 29.VI.1998, Kim, 1♀ (SSWU). **GG** Namyangju-si: Hwado-eup, Mt. Cheonmasan, 8.VI.1968, Kim, 1♀ (SSWU); ditto, 2.VI.1984, Hyeon, 1♂ (SSWU); Paju-si: Temple Bokwang, 12.VI.1978, Lee, 1♀ (SSWU); Pocheon-si: Mt. Wangbangsan, 2.VI.1985, Nam, 12♂ (SSWU); Seoul-si: Dobong-gu, Mt. Dobongsan, 5.VI.1994, Shin, 1♂ (SSWU); ditto, Ui-dong, 19.VI.1982, Bae, 1♀ (SSWU); Suwon-si: 15.V.1994, Shin, 1♀ (SSWU); Yangpyeong-gun: Yongmun-myeon, Mt. Yongmunsan, 28.V.1982, Shin, 1♂1♀ (SSWU); ditto, 31.V.1986, Kim, 1♂ (SSWU). **GW** Wonju-si: Mt. Chiaksan, 6.VI.1974, Hwang, 1♂ (SSWU). **JB** Muju-gun: Mujugucheondong, 90.VI.1972, Yu, 1♂ (SSWU). **JN** Gurye-gun: Mt. Jirisan, 24.VI.1986, Kwak, 1♀ (SSWU); ditto, Baekmu-dong, 16.VII.1984, Gu, 1♀ (SSWU); Suncheon-si: Songkwang-myeon, Mt. Jogyesan, 22.VI.1987, Jang, 1♀

(SSWU).

Distribution. Korea.

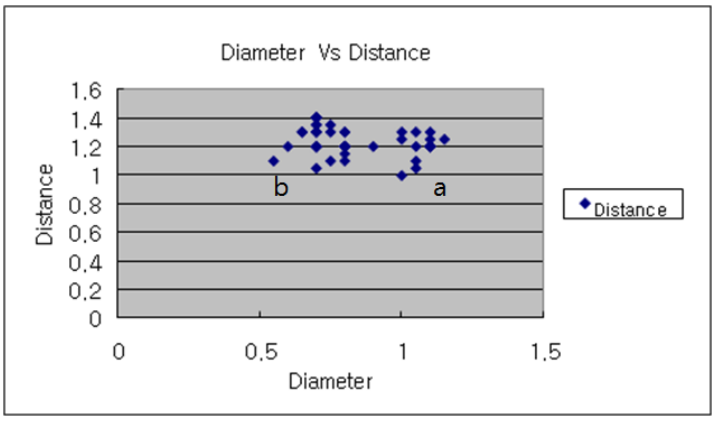

Figure 8. Eye to interocular space ratio between *S. fulvopubens* (a) and *S. hirsuta* (b).

Remarks. This is very resemble to *S. fulvopubens*, but has smaller compound eyes (Fig. 8) with dense hairs on pronotum.

Serica fulvopubens (Reitter) 갈색우단풍뎅이(신칭)

(Pl. II. Fig. II-9: A, B; Pl. III. Fig. III-7: F)

Trichoserica fulvopubens Reitter, 1896: 184 (type locality: 'Siberia or.'). *Serica fulvopubens*: Nikolaev, 2002: 99.

Korean records. *Serica polita*: Murayama, 1935: 2; 1937: 32; 1954: 23; Cho, 1957: 295; 1969: 649; Kim and Kim, 1972a: 83; Kim, 2001: 62; Kim et al, 2002: 120.

Trichoserica polita: Stebnicka, 1980: 250; Kim and Lee, 1991a: 67; Park et al., 1993: 178; ESK and KSAE, 1994: 151; Kim, 1995a: 164;

Kim and Kim, 1998: 170; Kim et al., 1999: 129.

Description. Body length 8.5-9.5mm; Width 4.5-5.2mm; Club-footstalk ratio 1.83-2.15 (♂), 1.12 (♀); Pronotum ratio 0.51-0.56; Pronotum-elytra ratio 0.27-0.3; Metafemur ratio 0.36-0.42; Metatibia ratio 0.23-0.25; Pygidium ratio 0.57-0.65.

Body ovate, elongated, rather flat, yellowish brown to dark brown, surface shinny.

Labroclypeus brown, almost rectangular, sides straight, anterior angles rounded, surface shinny, very coarse and dense punctation with fine hairs in, anterior margin slightly reflexed, labrum part indistinct, medially strongly sinuated. Frontoclypeal suture distinct, weakly angled. Ocular canthus short, with rare punctures and one to three terminal bristles. Frons dark brown or black, glabrous, punctations with fine hairs. Antenna yellowish brown, nine-segmented; club three-segmented, about twice longer than the footstalk and bent in male, almost same than footstalk in female. Eyes large especially in male, eye to interocular space ratio 0.77-0.92 (♂), 0.47 (♀). Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at posterior, slightly narrowed forward, sides weakly and uniformly curved, anterior and lateral border with a row of hairs, anterior and posterior angles rounded, posterior margin distinctly rounded on the middle one-third, surface with fine dense punctation and hairs. Scutellum triangular elongated, punctation similar to that of pronotum.

Elytra widest at posterior, striate distinct, each striae filled with dense and confluent punctures, interstices convex and darken, surface covered with hairs, lateral border strongly setaceous, sutural angles slightly rounded without seta.

Ventral side opaque, covered with hairs except metacoxae. Mesosternum not widely separated between mesocoxae, mesocoxal distance almost three fourth width of mesofemur. Metacoxae with some strong hairs laterally. Each abdominal sternite densely punctate. Pygidium wide, medially convex, surface opaque, with dense punctation and hairs.

Legs long and slender; metafemur over 1.5 times wider than the width of mesofemur, anterior margin weakly convex, posterior ventral margin blunted basal half, surface punctate with hairs, posterior angles rounded. Metatibia slender, almost as long as metafemur, surface longitudinally wrinkled, with a few of marginal spines, three fifth of ventral margin serrated. First metatarsomere longer than upper metatibial spur but almost same as two following segments combined. Metatarsi ventrally weakly serrated. Protibia relatively long, bidentate, tibial spur sharp pointed at the tip, anterior tarsal claws asymmetrical in male, symmetrical in female. Aedeagus: Pl. III. Fig. III-7: F.

Specimen Examined. **GB** Bonghwa-gun: Myeongho-myeon, Mt. Cheongryangsan, 29.VII.1990, HO Kang, 2♂ (SSWU); Munkyeong-si: Munkyeon-eup, Munkyeongseje, 10.VII.1977, JY Kim, 1♀ (SSWU). **GG** Namyangju-si: Sudong-myeon, Mt. Chukryeongsan, 12.VII.1980, KS Jang, 1♀ (SSWU). **GN** Euiryeung-gun: Chilgok-myeon, Naejo-ri,

28.VI.1990, 1♂ (SSWU). Hadong-gun: Hwagae-myeon, 30.VII.1990, SL Kim, 1♂ (SSWU); Hapcheon-gun: Gaya-myeon, Chiin-ri, Temple Hein, 7-8.VIII.1997, TK Kang, 2♂ (SSWU). **GW** Jeongseon-gun: Gohan-eup, Mt. Hambaeksan, 14.VIII.1998, SW Park, 2♂1♀ (SSWU); Pyeongchang-gun: Mt. Odaesan, 27.VII.1958, ?, 1♀ (SSWU); ditto, 2.IX.1995, TS Kwon, 5♀ (SSWU); Taebaek-si: Mt. Hambaeksan, 11-12.VIII.1999, DS Gu, 1♂ (SSWU); Mt. Taebaeksan, Temple Yuil, 13.VIII.1999, DS Gu & SW Park, 4♂1♀ (SSWU); Yangku-gun, Mt. Gachilbong, 24.VII.1981, SH Nam, 1♂ (SSWU). **JB** Muju-gun: Mujugucheondong, 16-21.VIII.1970, KH Kim, 2♀ (SSWU); JJ. Seoguipo-si: Jungmun, 31.VII.1974, EC Lee, 1♀ (SSWU). **JN** Gurye-gun: Mt. Jirisan, Piagol, 23.VI.1987, SY Gu et al., 3♀ (SSWU); ditto, Baekmu-dong, 16.VII.1984, DS Gu, 1♀ (SSWU); Gwangyang-gun: Dapgok-ri, 10.VIII.1993, MA Jang, 1♀ (SSWU).

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

Remark. This species has been known as *S. polita* in Korea since Murayama (1935). However, *S. lutea* Kim et Kim synonymized as *S. polita* Gebler by Ahrens (2005) and this species considered as *S. fulvopubens* Reitter. This is very similar to former species, but has larger compound eyes. Comparing all the ratio of eye to vertex, two taxon are divided into (Fig 8). Further study of numerical analysis about these taxon need be conducted.

Serica polita (Gebler) 북방우단풍뎅이

(Pl. II. Fig. II-9: C; Pl. III. Fig. III-8: A)

Omaloplia polita Gebler, 1832: 53.

Serica lutea Kim and Kim, 2003: 75.

Korean records. *Serica polita*: Murayama, 1954: 23; Löbl and Smetana, 2006: 244.

Trichoserica boops: Kim and Lee, 1991b: 53.

Description. Body length 8.8-9.5mm; Width 4.8-5.2mm; Club-footstalk ratio 0.84-1; Pronotum ratio 0.53-0.56; Pronotum-elytra ratio 0.28-0.3; Metafemur ratio 0.37-0.38; Metatibia ratio 0.27; Pygidium ratio 0.54-0.6.

Body ovate, elongated, rather flat, yellowish brown, surface shinny.

Labroclypeus yellowish brown, almost rectangular, sides straight, anterior angles rounded, surface shinny, dense punctation with fine hairs in, anterior margin slightly reflexed, labrum part indistinct, medially strongly sinuated. Frontoclypeal suture distinct, weakly rounded. Ocular canthus short, with rare punctures and one to three terminal bristles. Frons dark brown, glabrous, punctations with fine hairs. Antenna yellowish brown, nine-segmented; club three-segmented, almost twice longer than the footstalk and bent in male, almost same than footstalk in female. Eyes not large, eye to interocular space ratio. Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at posterior, slightly narrowed forward, sides weakly and uniformly curved, anterior and posterior

angles rounded, posterior margin curved on the middle, surface with fine dense punctation and fine hairs. Scutellum triangular elongated, punctation similar to that of pronotum.

Elytra widest at posterior, striate distinct, each striae filled with dense and confluent punctures, interstices convex and sometimes darken, surface shinny, lateral border strongly setaceous, sutural angles slightly rounded without seta.

Ventral side opaque. Mesosternum not widely separated between mesocoxae, mesocoxal distance almost three fourth width of mesofemur. Metacoxae with some strong hairs laterally. Each abdominal sternite densely punctate. Pygidium wide, medially convex, surface opaque, with dense punctation and hairs.

Legs long and slender; metafemur over 1.5 times wider than the width of mesofemur, anterior margin weakly convex, posterior ventral margin blunted basal half, surface shinny, punctate with hairs, posterior angles rounded. Metatibia slender, almost as long as metafemur, surface longitudinally wrinkled, with a few of marginal spines, three fifth of ventral margin serrated. First metatarsomere longer than upper metatibial spur but almost same as two following segments combined. Metatarsi ventrally weakly serrated. Protibia bidentate, tibial spur sharp pointed at the tip, anterior tarsal claws asymmetrical in male, symmetrical in female. Aedeagus: Pl. III. Fig. III-8: A.

Specimen Examined. Type series: Holotype. GG Paju-si: Temple Bogwang, 29.V.1975, YS Choe, 1♂ (SSWU). Paratype. GG Gunpo-si: Mt.

Surisan, 18.VI.1978, JS Lee, 1♀ (SSWU).

Other materials: **CN** Gongju-si: Mt. Gyeryongsan, 9.VII.1987, yeongnam Univ. lab., 1♀ (SSWU). **JB** Namwon-si: Sannae-myeon, Mt. Jirisan, Bamsagol, 11.VI.2001, JB Jeon, 1♀ (SSWU).

Distribution. Korea.

Remark. This is very similar to *S. polita*. This species differs from other *Serica* by yellow colored and very shinny body and having smaller compound eyes.

Serica septentrionalis (Murayama) 참우단풍뎅이

(Pl. II. Fig. II-9: D, E; Pl. III. Fig. III-8: B)

Serica septentrionalis Murayama, 1935: 7 (Hapsu, Korea).

Korean records. *Serica septentrionalis*: Murayama, 1937: 33; 1938: 9; 1954: 29; Sawada, 1937: 9; Miwa and Chûjô, 1939: 54; Cho, 1957: 295; 1969: 650 (참우단풍뎅이); Stebnicka, 1980: 206; Kim, 2001: 64; Kim and Kim, 2003a: 72; Löbl and Smetana, 2006: 245.

Maladera kamiyai: Kim and Chang, 1987: 104 (misidentified).

Trichoserica septentrionalis: Kim and Lee, 1991b: 53; ESK and KSAE, 1994: 152.

Description. Body length 7.95-8.4mm; Width 4.2-4.5mm; Club-footstalk ratio 1.65-2.12 (♂), 0.88 (♀); Pronotum ratio 0.55-0.59; Pronotum-elytra ratio 0.28-0.34; Metafemur ratio 0.35-0.38; Metatibia ratio 0.22-0.25; Pygidium ratio 0.57-0.62.

Body ovate, reddish brown to dark brown, surface opaque and

velvety.

Labroclypeus brown to dark brown, almost rectangular, sides straight in male, rounded in female, anterior angles rounded, surface shinny, dense punctation with fine hairs in, anterior margin slightly reflexed, labrum part indistinct, medially strongly sinuated. Frontoclypeal suture distinct, weakly rounded. Ocular canthus short, with rare punctures. Frons dark brown to black, glabrous anteriorly, punctations with fine hairs. Antenna brown, nine-segmented; club three-segmented, darker, almost twice longer than the footstalk and bent in male, little shorter than footstalk in female. Eyes not large, eye to interocular space ratio 0.46-0.51 (♂), 0.38 (♀). Mentum weakly elevated, anteriorly with a flattened declivity. Tip of maxillary palp dull.

Pronotum convex, widest at posterior, slightly narrowed forward, sides weakly and uniformly curved, anterior and posterior angles rounded, posterior margin rounded on the middle one third, surface with fine dense punctation and fine hairs in. Scutellum linguiform elongated, punctation similar to that of pronotum with fine hairs in.

Elytra widest at posterior, striate distinct, each striae filled with dense and confluent punctures, interstices convex and darker than striae in male, surface opaque and velvety, lateral border strongly setaceous, sutural angles slightly rounded without seta.

Ventral side opaque and velvety, darker than dorsal surface. Mesosternum not widely separated between mesocoxae, mesocoxal

distance almost half width of mesofemur. Metacoxae with some strong hairs laterally. Each abdominal sternite densely punctate with setae. Pygidium wide, medially convex, surface opaque and velvety, with dense punctation and hairs.

Legs long and slender; metafemur almost 1.5 times wider than the width of mesofemur, anterior margin weakly convex, posterior ventral margin blunted basal two third, surface shinny, shallowly punctate with hairs, posterior angles rounded. Metatibia slender, almost as long as metafemur, with a few of marginal spines, three fifth of ventral margin serrated. First metatarsomere longer than upper metatibial spur but almost same as two following segments combined. Metatarsi ventrally weakly serrated. Protibia bidentate, tibial spur sharp pointed at the tip, anterior tarsal claws asymmetrical in male, symmetrical in female. Aedeagus: Pl. III. Fig. III-8: B.

Specimen Examined. **CB** Danyang-gun: Gosu-myeon, 16.VII.1934, BS Cho, 2♂ (SSWU). **GB** Gumi-si: Mt. Gumhosan, 3.VIII.1933, BS Cho, 1♂ (SSWU). **GN** Sancheong-gun: Mt. Jirisan, Cheonwangbong, 15.VII.1984, DS Gu and UK Oh, 2♂ (SSWU); ditto, 25.VII.1988, MS Jeong, 1♀ (SSWU). **GW** Taebaek-si: Mt. Taebaeksan, 23.VII.1986, JI Kim, 1♀ (SSWU).

Distribution. Korea (Native).

Remark. Murayama (1935) reported as a new species with North Korean specimen. No one had observed it since Murayama, and all the records after him were citations. Because of the possibility that Murayama collection might lost during the Korean War, there was no

way to examine any type or voucher. I found some specimens which were presumed as *S. septentrionalis*. Comparing to Murayama (1935, 1954), following characters are same with *S. septentrionalis*; 1) the body length and width, 2) body yellowish brown to dark brown, not shinny, 3) dense hairs on the hole surface, 4) the male aedeagus.

Serica monticum Kim n. sp.

(Pl. II. Fig. II-9: F; Pl. III. Fig. III-8: C)

Description. Body length 6.1-7mm; Width 3.65-3.9mm; Club-footstalk ratio 1.63-1.73 (♂); Pronotum ratio 0.53; Pronotum-elytra ratio 0.31-0.33; Metafemur ratio 0.35-0.37; Metatibia ratio 0.21-0.26; Pygidium ratio 0.47-0.59.

Body ovate, rather flat, dark brown, surface opaque with hairs.

Labroclypeus dark brown, almost rectangular, sides straight, anterior angles rounded, surface shinny, very coarse and dense punctation with fine hairs in, anterior margin slightly reflexed, labrum part distinct, medially strongly sinuated. Frontoclypeal suture distinct. Ocular canthus short, with rare punctures and one to three terminal bristles. Frons almost black, glabrous anteriorly, opaque posteriorly, punctations with fine hairs. Antenna brown, nine-segmented; club three-segmented, dark brown, about twice longer than the footstalk and bent in male. Eyes not large, eye to interocular space ratio 0.38 (♂). Mentum weakly elevated, anteriorly with a flattened declivity. Tip of maxillary palp sharp.

Pronotum convex, widest at posterior, slightly narrowed forward, sides weakly and uniformly curved, anterior and lateral border with a row of hairs, anterior angles angulated and posterior angles rounded, posterior margin weakly curved on the middle, surface velvety with fine shallow punctation and hairs. Scutellum linguiform elongated, punctation on sides similar to that of pronotum.

Elytra opaque, widest at posterior, striate distinct, each striae filled with shallow punctures densely, interstices convex and darken, surface covered with hairs, lateral border strongly setaceous, sutural angles slightly rounded without seta.

Ventral side opaque, covered with hairs except metacoxae. Mesosternum not widely separated between mesocoxae, mesocoxal distance almost half width of mesofemur. Metacoxae with some strong hairs laterally. Each abdominal sternite densely punctate. Pygidium wide, medially convex, surface opaque, with dense punctation and hairs.

Legs long and slender, shinny; metafemur almost 1.5 times wider than the width of mesofemur, anterior margin weakly convex, posterior ventral margin blunted basal three fifth, surface punctate with hairs, posterior angles rounded. Metatibia slender, almost as long as metafemur, surface longitudinally wrinkled, with a few of marginal spines, three fifth of ventral margin serrated. First metatarsomere longer than upper metatibial spur but almost same as two following segments combined. Metatarsi ventrally weakly serrated. Protibia bidentate, tibial spur sharp pointed at the tip, anterior tarsal claws

asymmetrical in male. Aedeagus: Pl. III. Fig. III-8: C.

Specimen Examined. Holotype. **GW** Yanggu-gun: Mt. Gachilbong, 900m, 24.VII.1996, HC Park, 1♂ (SSWU). Paratype. **GW** Mt. Deamsan, Yongneup, 7.VII.1995, JI Kim, 1♂ (SSWU).

Distribution. Korea.

Remark. It is very similar to *S. septentrionalis* but distinguished by 1) dark color, 2) much smaller (under 7mm) size, 3) tip of maxillary palp sharp, and 4) different male aedeagus. I couldn't find this species through recent review papers of the genus *Serica* (Sawada 1937, Nomura 1972, Ahrens 2005c; 2007b).

Etymology. This name is derived from the Latin *mont* (meaning mountain) because of its high altitude habitat like other *Serica* species.

Genus *Nipponoserica* Nomura 조롱박우단풍뎅이속

Nipponoserica Nomura, 1973: 120

Pseudomaladera Nikolajev, 1980: 40

Type species: *Serica similis* Lewis, 1895: 391

Diagnosis. Body surface velvety, not shinny. Elytra with scattered short hairs. Ocular of male somewhat large and projected. Antennae nine segments, club three segments, longer than footstalk in male. Elytral apex membranous. Interval of mesocoxae narrow, half width of mesofemur. Protibia bidentate. Protarsus and mesotarsus with a row of hair underneath. Metafemur generally opaque, rarely shining, with apical two-thirds of posterior margin finely serrate. Metatibia with a

longitudinal undulating ridge on outer side. Paramere of aedeagus generally asymmetrical (Nomura 1973, 1974).

Distribution. There are 18 species in this genus. Their distribution limited India (west) to Japan (east).

Key to the species of Korean *Nipponoserica*

1. Body length over 9mm. Antennal club 1.2-1.4 times longer than footstalk in male ····· *N. elliptica*
- Body length under 9mm. Antennal club over 1.4 times longer than footstalk in male ····· 2
2. Antennal club 1.8-2 times longer than footstalk in male. Upper line of elytral lateral border indistinct near metacoxae ····· *N. koltzei*
- Antennal club 1.5-1.7 times longer than footstalk in male. Upper line of elytral lateral border very distinct ····· *N. melanosoma* n. sp.

***Nipponoserica elliptica* (Murayama) 조롱박우단풍뎅이**

(Pl. II. Fig. II-9: G, H; Pl. III. Fig. III-8: C)

Serica elliptica Murayama, 1938: 17

Korean records. *Serica elliptica*: Murayama, 1954: 32; Cho, 1963: 217; 1969: 650 (조롱박우단풍뎅이); Cho et al., 1968: 264; Kim and Nam, 1982a: 154; Kim and Lee, 1991a: 67; 1991b: 55.

Nipponoserica elliptica: Nomura, 1973: 139; Kim, 2001: 61; Kim and Kim, 2003a: 76; Löbl and Smetana, 2006: 240.

Description. Body length 9.1-10.2mm; Width 5.3-5.65mm;

Club-footstalk ratio 1.24-1.41 (♂), 0.88-0.94 (♀); Pronotum ratio 0.51-0.57; Pronotum-elytra ratio 0.28-0.3; Metafemur ratio 0.32-0.35; Metatibia ratio 0.19-0.22; Pygidium ratio 0.51-0.59.

Body ovate elongated, reddish brown to dark brown, surface opaque.

Labroclypeus brown to dark brown, almost rectangular, sides straight, anterior angles rounded, surface shinny, dense punctation with few fine hairs in, anterior margin reflexed, labrum part indistinct, medially sinuated. Frontoclypeal suture distinct, weakly angulated. Ocular canthus short, with rare punctures. Frons dark brown to black, opaque or glabrous anteriorly, shallow punctations with few fine hairs near eyes. Antenna yellowish brown, nine segments; club three segments, almost 1.2 to 1.4 times longer than the footstalk in male, little shorter than footstalk in female. Eyes not large, eye to interocular space ratio 0.65-0.67 (♂), 0.56-0.59 (♀). Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at posterior, slightly narrowed forward, sides weakly and uniformly curved, anterior angles protrude, somewhat angulated and posterior angles rounded, posterior margin distinctly rounded on the middle one third, surface with fine shallow punctation. Scutellum triangle elongated, punctation similar to that of pronotum.

Elytra widest at posterior, striate distinct, each striae filled with dense and confluent punctures, interstices convex, surface opaque and sometimes velvety, lateral border setaceous, apex membranous, sutural

angles not rounded with a hair.

Ventral side opaque. Mesosternum not widely separated between mesocoxae, mesocoxal distance almost half width of mesofemur. Metacoxae densely punctated, with a row of strong hairs laterally. Each abdominal sternite shallowly punctate with a row of setae. Penultimate abdominal sternite longitudinally impressed medially. Pygidium wide, medially weakly convex, surface opaque, with dense punctation and some short hairs beside apical border.

Legs long and slender; metafemur almost 1.5 times wider than the width of mesofemur, anterior margin weakly convex, posterior ventral margin curved, sharpen and serrated, surface opaque, with few shallow punctation and hairs, posterior angles rounded. Metatibia slender, almost as long as metafemur, with a few of marginal spines, two third of ventral margin serrated. First metatarsomere slightly longer than upper metatibial spur but shorter than two following segments combined. Metatarsi ventrally weakly serrated. Protibia bidentate, tibial spur thin, sharp pointed at the tip, anterior tarsal claws symmetrical in both sexes. Aedeagus: Pl. III. Fig. III-8: C.

Specimen Examined. **CB** Jincheon-gun: Baekgok-myeon, Daemun-ri, 7.VII.1998, TM Han, 1♂ (SSWU). **CN** Gumsan-gun: Chubu-myeon, Seongdang-ri, Mt. Seodaesan, 18-19.VII.2002, TH An, 1♀ (GSNU). **GN** Busan-si, Geumjeong-gu, Seon-dong, 19.V.?, ?, 1♀ (SSWU); Jinju-si, Gajua-dong, 11.V.1991, ?, 1♀ (SSWU); Wulsan-si: Wulju-gun, Wungchon-myeon, Mt. Jeongjoksan, 18-19.VI.1998, HG Ju, 1♀ (GSNU). **JB** Namwon-gun, Sannae-myeon, Dalgeum-ri, 25.VII.1990, SH Jeon, 1♂

(SSWU). **JJ** Seoguipo-si: Hawon-dong, Mt. Hallasan, Yeongsil ~ Wuitsaeorum, 25-26.VII.2003, SY Lee, 1♂ (GSNU).

Distribution. Korea, Manchuria.

Nipponoserica koltzei Reitter 무테날개우단풍뎅이

(Pl. II. Fig. II-9: I, Fig. II-10, A; Pl. III. Fig. III-8: D)

Serica koltzei Reitter, 1897b: 214.

Pseudomaladera koltzei: Nikolaev, 1980: 40.

Nipponoserica koltzei: Nikolaev, 2002: 98.

Korean records. *Serica brunnea*: Murayama, 1938. Annot. Zool. Japan 17 (1): 9 (Korea); 1954: 30; Cho, 1969: 650; Stebnicka, 1980: 206; Kim and Nam, 1982a: 154; Kim and Lee, 1991a: 67; 1991b: 54; ESK and KSAE, 1994: 151; Kim, 1995a: 164; 2001: 62.

Nipponoserica opacicarina: Kim and Kim, 2003: 76; Löbl and Smetana, 2006: 240.

Nipponoserica koltzei: Ahrens, 2004: 7.

Description. Body length 7-8.65mm; Width 4.2-5.05mm; Club-footstalk ratio 1.83-1.94 (♂), 0.93-1.07 (♀); Pronotum ratio 0.47-0.51; Pronotum-elytra ratio 0.26-0.3; Metafemur ratio 0.3-0.32; Metatibia ratio 0.2-0.23; Pygidium ratio 0.49-0.63.

Body ovate, yellowish brown to dark brown, surface opaque.

Labroclypeus brown to dark brown, almost rectangular, sides straight, anterior angles rounded, surface shinny, dense punctation with few fine hairs in, anterior margin reflexed, labrum part indistinct,

medially sinuated. Frontoclypeal suture distinct, weakly angulated. Ocular canthus short, with rare punctures. Frons brown to black, opaque, shallow punctations with few fine hairs near eyes. Antenna yellowish brown, nine segments; club three segments, almost 1.8 to 1.9 times longer than the footstalk and bent in male, little shorter than footstalk in female. Eyes not large, eye to interocular space ratio 0.54-0.64. Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at posterior, slightly narrowed forward, sides weakly rounded, anterior angles rounded or somewhat angulated and posterior angles rounded, posterior margin distinctly rounded on the middle one third, surface with fine shallow punctation. Scutellum triangle elongated, punctation on sides similar to that of pronotum.

Elytra widest at posterior, striate distinct, each striae filled with dense and confluent punctures, interstices convex, surface opaque and sometimes velvety, lateral border setaceous, upper lateral border line indistinct near metacoxae, apex membranous, sutural angles not rounded with a hair.

Ventral side opaque. Mesosternum not widely separated between mesocoxae, mesocoxal distance almost half width of mesofemur. Metacoxae densely punctated, with a row of strong hairs laterally. Each abdominal sternite densely punctate with a row of setae. Penultimate abdominal sternite longitudinally impressed medially. Pygidium wide, medially weakly convex, surface opaque, with shallow

punctation and some short hairs beside apical border.

Legs long and slender; metafemur almost 1.5 times wider than the width of mesofemur, anterior margin weakly convex, posterior ventral margin curved, sharpen and serrated, surface opaque, with few shallow punctation and hairs, posterior angles rounded. Metatibia slender, almost as long as metafemur, with a longitudinal groove medially, with a few of marginal spines, three fourth of ventral margin serrated. First metatarsomere slightly longer than upper metatibial spur but shorter than two following segments combined. Metatarsi ventrally weakly serrated. Protibia bidentate, tibial spur thin, sharp pointed at the tip, anterior tarsal claws symmetrical in both sexes. Aedeagus: Pl. III. Fig. III-8: D.

Specimen Examined. **CB** Jecheon-si, Mt. Woraksan, 30.V.1987, YS Ha, 1♂ (SSWU). **GB** Yeongju-si: Namdae-ri, Mt. Seondalsan, 29.VI.1998, SY Kim, 1♂ (SSWU); Pungki-eup, Mt. Sobaeksan, Temple Hibangsa, 7.VI.1974, JH Park, 1♂ (SSWU). **GG** Namyangju-si, Jinjeop-eup, Mt. Cheonmasan, 23.V.1984, Lee, 1♀ (SSWU; Paratype); Mt. Cheongyesan, 24.V.1990, SK Lee, 1♂ (KU). **GN** Jinju-si, Sangbongseo-dong, Mt. Bibongsan, 7.V.1984, TS Oh, 1♂ (SSWU); Sancheong-gun, Danseong-myeon, Seongnae-ri, 3.VI.1992, ?, 1♀ (SSWU). **GW** Bukpyeong-gun, 26.V.1984, Bang, 1♀ (SSWU; Paratype). **JN** Jangseong-gun, Temple Baekyangsa, 24.V.1994, JI Kim, 1♂ (SSWU; Paratype). **JB** Gochang-gun, Seonwunsa, 21.V.1992, HK Oh, 1♂ (SSWU).

Distribution. India, Korea, Russia.

Remark. Kim and Kim (2003a) reported it as new by the name of *N.*

opacicarina, though it was synonymized by Ahrens (2005).

Nipponoserica melanosoma Kim n. sp.

(Pl. II. Fig. II-10: B; Pl. III. Fig. III-8: E)

Description. Body length 6.9-9mm; Width 4.2-5mm; Club-footstalk ratio 1.44-1.75 (♂), 1.14-1.33 (♀); Pronotum ratio 0.41-0.49; Pronotum-elytra ratio 0.26-0.3; Metafemur ratio 0.33-0.37; Metatibia ratio 0.19-0.24; Pygidium ratio 0.5-0.52.

Body ovate, dark brown, surface opaque.

Labroclypeus dark brown, almost rectangular, sides straight, anterior angles rounded, surface shinny, dense punctation with few fine hairs in, anterior margin reflexed, labrum part indistinct, medially sinuated. Frontoclypeal suture distinct, weakly angulated. Ocular canthus short, with rare punctures. Frons black, opaque, shallow punctations with few fine hairs near eyes. Antenna brown, nine segments; club three segments, much longer than the footstalk in male. Eyes not large, eye to interocular space ratio 0.42-0.63. Mentum weakly elevated, anteriorly with a flattened declivity.

Pronotum convex, widest at middle, sides rounded, anterior angles rounded and posterior angles rounded, posterior margin weakly rounded on the middle one third, surface with fine shallow punctation. Scutellum triangular, punctation similar to that of pronotum.

Elytra widest at posterior, striate distinct, each striae filled with dense and confluent punctures, interstices convex, surface opaque,

lateral border setaceous, upper lateral border line distinct, apex membranous, sutural angles not rounded with a hair.

Ventral side opaque. Mesosternum not widely separated between mesocoxae, mesocoxal distance under half width of mesofemur. Metacoxae densely punctated, with a few of hairs laterally. Each abdominal sternite densely punctate with a row of setae. Penultimate abdominal sternite longitudinally impressed medially. Pygidium wide, medially weakly convex, surface opaque, with shallow punctation and some short hairs beside apical border.

Legs long and slender; metafemur almost 1.5 times wider than the width of mesofemur, anterior margin weakly convex, posterior ventral margin curved, sharpen and weakly serrated, surface opaque, with few shallow punctation and hairs, posterior angles rounded. Metatibia slender, almost as long as metafemur, with a longitudinal groove medially, with a few of marginal spines, three fourth of ventral margin serrated. First metatarsomere longer than upper metatibial spur but shorter than two following segments combined. Metatarsi ventrally weakly serrated. Protibia bidentate, tibial spur thin, sharp pointed at the tip, anterior tarsal claws symmetrical in both sexes. Aedeagus: Pl. III. Fig. III-8: E.

Specimen Examined. Holotype. **JJ** Hallim, 6.V.1978, SH Nam, 1♂ (SSWU). Paratypes. **GG** Suwon-si: Gueonseon-gu, Seodun-dong, 3.IX.1996, DH Oh, 1♂ (SSWU). **JB** Wanju-gun: Wunju-myeon, Mt. Daedunsan, 7.VIII.1970, KS Park, 1♀ (SSWU). **JJ** Jeju-si: Jocheon-eup, Hamdeok Beach, 28.V.2005, BH Jeong, 1♀ (SSWU).

Distribution. Korea.

Etymology. The name is derived from the Latin words *melano* (meaning black) and *soma* (meaning body) because of its black body color.

Remark. Comparing other Korean *Nipponserica* (*N. elliptica* and *N. koltzei*), this species characterized by 1) body color black, 2) size small, 3) elytra with very distinct interstice, and 4) pronotum widest at the middle. Male aedeagus of this species similar to *N. koltzei*, but very small with different parameres. I couldn't find any matching species through the major review papers of the genus *Nipponserica* (Nomura 1976, Kobayashi 1979, Yu et al. 1998, Ahrens 2005).

4. 고찰

한국산 검정풍뎅이과에 대해 여러 기관 등에 소장되거나 직접 채집된 표본들을 근거로 하여 분류군 별로 형태적 형질 분석을 수행하고, 관련 문헌을 참고하여 종에 대한 타당성을 검토한 결과 2009년 현재까지 적합한 학명을 가진 한국산 검정풍뎅이과 곤충은 긴다리풍뎅이아과 1족 2속 3종, 검정풍뎅이아과 4족 12속 29종, 우단풍뎅이아과 1족 7속 29종으로 총 6족 21속 61종이 분포하는 것으로 정리되었다(Table 5). 여기에는 4 신종, 1 오동정, 6 고유종이 포함되어 있었고, 기록으로만 존재하던 분류군 중에서 4종의 국내분포를 재확인 하였으며 7종은 표본이 확인되지 않은 종 이었다. 각 분류군에 대한 검색표와 형태기재, 문헌기록, 채집지 정보 등은 본문에 제시하였고, 성충사진 및 수컷생식기의 그림 등은 도판(Plates)에 수록하였다. 또한 한국산 검정풍뎅이과 곤충의 국내 분포 양상을 파악하기 위해 채집하고 조사한 표본에 근거하여 분포표를 작성하였다(Table 6).

본 연구는 국내 곤충상 연구에 필요한 올바른 학명의 적용과 풍뎅이류의 분류학적 연구에 필요한 기초 자료로 제공될 수 있을 것이다. 연구 결과에 대한 고찰 내용은 다음과 같다.

1) 신종

Miridiba 1종: *Miridiba yangjuensis* n. sp.

최근 세계적 수준에서 속을 검토 한 Coca-Abia (2008)의 논문을 검토했음에도 불구하고 비슷하게 소속되는 종을 찾을 수 없었으며 현재 Coca-Abia와 논의 중이다.

Sericinae 3종: *Nipponoserica melanosoma* n. sp., *Serica monticum* n. sp., *Sericania lucidalis* n. sp.

Nipponoserica melanosoma n. sp.는 제주도와 수원에서 채집된 개체들로 Nomura (1976), Kobayashi (1979), Yu et al. (1998), Ahrens (2005) 등을 검토하였으나 확인되지 않았다. *Serica monticum* n. sp. 역시 *Serica* 속을 검토한 가장 최근의 논문인 Sawada (1937), Nomura (1972), Ahrens (2007b) 등을 참고해 보았지만 소속되는 분류군이 없었다. *Sericania lucidalis* n. sp.는 Sawada (1938, 1955)와 Nomura (1976), Ahrens (2007a)을 참고했을 때 외부형질과 생식기가 *Sericania kamiyai* Sawada와 가장 유사했으나 일본산 증거표본을 참조해보니 다른 종이었다. *Sericania*속 분류군들의 수컷 생식기 모양이 비슷한 유형을 나타내는 것이 많고 수컷의 더듬이가 주요 진단형질이 되나 본 종에 해당하는 분류군을 찾을 수 없다. 위의 3 우단풍뎅이류에 대해서는 구북구 우단풍뎅이족의 전문가인 Dirk Ahrens과 논의 중에 있다.

2) 오동정

Maladera kamiyai Sawada (= *Serica septentrionalis* Murayama): Kim and Chang (1987)에 의해 처음 보고되었는데, Kim (2001a)은 증거표본을 확인하고 *Serica brunnea* (Linnaeus)의 오동정이라고 판단하였다. Kim and Kim (2003a)은 *S. brunnea* (Linnaeus)의 모식표본을 확인하고 *Nipponoserica*에 속하는 종일 것이라 추정하였다. 그러나 본 연구과정에서 증거 표본을 찾아내어 다시 확인해본 결과 *S. septentrionalis* Murayama로 확인되었다.

3) 재확인종

다음의 4종은 문헌 기록으로만 존재하던 분류군 중 새로 발견된 것들이며, 본 연구에서 국내 분포를 재확인 하였다.

Hoplia djukini Jacobson: Stebnicka (1980)가 북한 표본으로 국내 분포를 보고한 종이다. 대전과학관의 북한 표본들 중에서 본 종으로 추정되는 표본을 확인하여 문헌과 비교 · 대조하여 본 종으로 결론지었다.

Miridiba castanea (Waterhouse): Kim (2001a)은 본 종의 국내 서식 유무를 의심하기도 하였다. 그러나 본 연구과정에서 이대자연사박물관 표본 1점(제주도)을 확인하였고, 또한 본인이 제주도에서 2개체를 직접 채집하여 국내 서식을 확인하였다. 따라서 기존의 정보를 보완하여 새로이 기재하였다.

Serica septentrionalis (Murayama): Murayama (1935)가 북한 표본으로 보고한 종이다. 성신여대 소장 표본 중에서 확인되어 기재하였다.

Sericania latisulcata Murayama: Murayama (1941)가 울릉도산 표본으로 기재하여 신종으로 보고한 종이다. 그러나 그의 표본 및 자료들은 6.25 전쟁 도중에 분실되었을 가능성이 높다. 그동안 *Sericania yamauchii* Sawada의 암컷을 본 종으로 오동정해 왔으나, 본 논문에서 이를 바로 잡는다. 또한 울릉도산 표본 한 개체를 확인하였는데 역시 고유종이라 증거표본은 확인할 수 없었으나 기재와 생식기의 그림이 거의 같은 종으로 보기에 무리가 없었기에 동일종으로 판단하였다. 또한 원기재에 기록된 같은 지역에서 채집된 표본이기에 topotype으로 지정하고자 한다.

4) 한국 분포 고유종

신종과 표본 미확인종을 제외한 다음 6 종은 현재까지 국내에만 분포하는 종으로 확인되었다.

Bunbunius reticulatus (Murayama)

Eumaladera opaciventris (Moser)

Maladera schoenfeldti (Murayama)

Serica hirsuta Kim and Kim

Sericania koryoensis Murayama

Sericania latisulcata Murayama

5) 표본 미확인종

Brahmina crenicollis (Motschulsky), *Brahmina darcis* (Reitter), *Brahmina excissiceps* (Moser), *Brahmina sedakovii* Mannerheim, *Holotrichia kiotoensis* Brenske, *Holotrichia sichotana* Brenske, *Lasiopsis manchurica* Murayama.

이 중에서 *B. crenicollis*와 *B. sedakovii*는 Reitter (1902)에 의해 국내분포 기록이 있었고 이후의 기록은 인용이었기 때문에 국내 분포 여부가 의심되는 실정이다. 그러나 종의 분포 자체가 중국 북부이기 때문에 북한에 서식할 가능성이 있다. *B. darcis*와 *L. manchurica*는 북한에서 기록된 종이므로 역시 북한에 서식할 가능성이 있다. *B. excissiceps*는 Moser (1915)에 의해 서울 표본으로 최초 기재된 종이나 모식이나 증거표본을 찾아내지 못하였고, 원기재문도 설명이 불충분한데다 수컷 생식기가 제시되어있지 않아 실제로 동정하기 어렵다. *H. kiotoensis*도 증거표본을 확인하지 못했고, Kim (2001a) 또한 국내분포를 의심한 적이 있는 종이다. 하지만 종의 분포가 일본, 중국에 걸쳐 있기 때문에 제외시킬 근거도 없다. *H. sichotana*는 Niijima 등(1927)에 의해 서울산으로 처음 기록되었고, Murayama를 비롯한 이후의 기록은 Niijima 등(1927)의 것을 인용한 것이었다. 역시 증거표본을 찾을 수 없으며, Kim(2001a)은 국내 분포를 의심하기도 했다.

Table 6. Distributional patterns of the Melolonthidae based on the collected specimens in Korea

No	Species	HB	HN	PB	PN	HH	GW	GG	CB	CN	GB	GN	JB	JN	JJ
1	*Ectinohoplia rufipes*						+	+	+	+	+	+	+	+	+
2	*Hoplia djukini*		+												
3	*Hoplia aureola*			+			+	+	+		+	+			+
4	*Apogonia cribricollis*						+	+		+	+	+		+	
5	*Apogonia cupreoviridis*						+	+	+	+	+	+	+	+	+
6	*Heptophylla picea*						+	+		+		+			
7	*Hilyotrogus bicoloreus*		+				+	+	+	+	+	+	+	+	
8	*Melolontha incana*		+				+	+	+	+	+	+	+	+	+
9	*Melolontha frater*						+	+			+		+		
10	*Polyphylla laticollis manchurica*			+	+			+		+					
11	*Brahmina rubetra faldermanni*						+	+							
12	*Bunbunius reticulatus*										+				+
13	*Holotrichia koraiensis*						+	+					+		+
14	*Holotrichia diomphalia*						+	+	+	+	+	+	+	+	+
15	*Holotrichia ernesti*						+	+			+				
16	*Holotrichia oblita*							+							
17	*Holotrichia parallela*						+	+	+	+	+	+	+	+	+
18	*Holotrichia picea*						+	+		+	+			+	+
19	*Holotrichia niponensis*		+				+	+	+	+			+		+
20	*Lasiopsis sahlbergi*							+			+	+			+
21	*Miridiba castanea*														+
22	*Miridiba yangjuensis* n. sp.							+							
23	*Pseudosymmachia impressifrons*		+				+	+	+	+	+		+	+	+
24	*Sophrops heydeni*						+	+	+	+	+	+	+	+	
25	*Sophrops striata*						+	+	+	+	+	+	+	+	
26	*Gastroserica herzi*						+	+	+	+	+	+	+	+	

No	Species	HB	HN	PB	PN	HH	GW	GG	CB	CN	GB	GN	JB	JN	JJ
27	*Eumaladera coreana*							+	+	+		+	+	+	
28	*Maladera aureola*						+	+				+			
29	*Maladera ovatula*						+	+	+	+	+	+	+	+	
30	*Maladera castanea koreana*						+	+	+	+	+	+	+	+	+
31	*Maladera verticalis*		+				+	+	+	+	+	+	+	+	+
32	*Maladera holosericea*						+	+	+	+	+	+	+	+	
33	*Maladera renardi*				+		+	+		+	+	+		+	+
34	*Maladera schoenfeldti*		+					+	+		+	+		+	+
35	*Maladera cariniceps*						+	+	+	+	+	+	+	+	
36	*Maladera fusania*						+	+	+	+	+	+	+	+	
37	*Maladera orientalis*						+	+	+	+	+	+	+	+	+
38	*Maladera gibbiventris*				+		+	+	+	+	+	+	+	+	
39	*Maladera infuscata*				+		+	+	+	+	+	+	+	+	
40	*Maladera laboriosa*							+							
41	*Sericania fuscolineata*		+				+	+	+	+	+	+	+	+	+
42	*Sericania koryoensis*						+	+	+		+	+	+	+	
43	*Sericania latisulcata*										+				
44	*Sericania yamauchii*	+		+			+	+	+	+	+	+	+	+	+
45	*Sericania lucidalis* n. sp.											+		+	
46	*Serica septentrionalis*								+		+	+			
47	*Serica polita*						+	+	+			+	+	+	+
48	*Serica hirsuta*						+	+			+	+	+	+	
49	*Serica lutea*							+							
50	*Serica monticum* n. sp.											+			
51	*Nipponoserica elliptica*								+	+		+	+		+
52	*Nipponoserica koltzei*						+	+	+		+	+	+	+	
53	*Nipponoserica melanosoma* n. sp.														+

III. 형태 형질에 의한 수염풍뎅이속(*Polyphylla*)의 분지분석 (Cladistic Analysis)

1. 서론

수염풍뎅이속(*Polyphylla*)은 검정풍뎅이아과(Melolonthinae) 곤충 중에서 몸 크기가 가장 대형인 종들로 이루어진 왕풍뎅이족(Melolonthini)에 속한다. 왕풍뎅이족은 세계적으로 약 250속 정도가 보고되었으며, 많은 종들이 경제적으로 중요하게 논의되는 분류군이다(Ritcher 1966, Rusell 2000). 이 중 수염풍뎅이속은 잘 알려진 분류군 중 하나이며 지금까지 전 세계적으로 72종이 기록되었다(Table 7). 구북구에는 35종이 분포하며(Löbl and Smetana 2006) 주 분포 범위는 북위 6°에서 55°사이이고 수컷 생식기의 분화가 비교적 잘 이루어져 있다(De Wailly 1993). 신북구에는 37종이 북위 15° 에서 56° 사이에 분포하며 형태적인 분화, 특히 수컷 생식기의 분화가 약하게 이루어졌다(Young 1988). 성충의 형태적 특징은 더듬이가 10마디이며 곤봉부는 수컷의 경우 7마디, 암컷의 경우 5마디이다. 대부분의 종에서 인접한 부절 발톱(claws)의 이빨(teeth) 크기가 같다. 수컷 생식기의 교미구(parameres)는 복측 가두리에 돌기가 없으며 끝이 다양하게 눌려서 아래쪽으로 갈고리 모양을 이룬다(Murayama 1954, Yu et als. 1998, Evans 2002, Skelley 2003).

수염풍뎅이들은 큰 몸 때문에 대부분 수년에 걸친 생활사(multi-year life cycle)를 나타내며, 유충은 식물의 뿌리를 먹고 살기 때문에 중요한 농작물 해충으로 알려져 있다(Ritcher 1966, Zhang 1984, Young 1988, Russell 2000). 그러나 이들의 생물학적 정보에 대해서는 아직도 많은 부분이 알려지

지 않았다. 구북구의 종들은 구체적으로 연구된 사례가 적으나 *P. laticollis*와 *P. gracilicornis*의 경우 4년이 1세대를 이룬다. 앞의 2년 동안 1-2령 유충시기를 거치고 뒤의 2년간 3령으로 지내다 마지막 해 6월에 용화 · 우화를 거쳐 6월 말부터 성충이 출현한다. 수컷은 주광성이 더 강하고 성충은 먹이를 취하지 않기 때문에 주로 유충 상태에서 피해를 입힌다. 유충은 대부분 강가의 모래톱이나 숲속의 사양토에 살며 각종 작물, 과일나무의 묘목 및 잡초의 땅속에서 생장기간 내내 먹이를 취하기 때문에 분포지역에서 심각한 피해를 입히기도 한다(Zhang 1984). 신북구에 서식하는 종들은 2년에서 4년까지의 생활사를 보인다(Steenwyk and Rough 1989, Kard and Hain 1988). 대부분 소나무림(Downes & Andison 1941), 강가에 형성된 사구(Hardy & Andrews 1978), 또는 사막지대(La Rue, 1998)를 서식지로 하는 경우도 있으며 사구(Sand dune)에 서식하는 종들의 경우 암컷의 비행능력이 소실된 경우가 흔하다(Russell 2000).

수염풍뎅이속(*Polyphylla*)은 Harris(1841)가 이전에 왕풍뎅이속(*Melolontha*)에 속해있던 종(*M. variolosa*)을 기준종으로하여 설립한 분류군이다. 신북구의 수염풍뎅이속에 대한 연구는 경제적인 중요성 때문에 LeConte (1856)와 Horn (1881), Casey (1914) 등 여러 연구자들에 의해 기재 수준의 분류학적 연구가 많이 이루어져 왔다. Young (1988)은 이들을 통합 정리하여 신북구 수염풍뎅이속 내 4 그룹의 complex (*hammondi, decemlineata, diffracta* and *occidentalis* complexes)를 제안하였는데(Table 7), 23개의 외부형태형질을 사용한 분지분석 결과를 통해 이를 뒷받침했다.

구북구에서의 분류학적 연구는 Kraatz (1882), Reitter (1890a, 1901), Semenov (1900), Medvedev (1951)등에 의해 이루어졌으며, De Wailley (1993)에 의해 분류학적 검토(review)연구가 이루어졌다. 그는 구북구의 수염풍뎅이를 수컷 생식기의 모양(configuration)과 더듬이 곤봉부의 수

Table 7. List of *Polyphylla* species worldwide

Old World *Polyphylla*			
Subgenus *Centralasiobia* Medvedev			
P. shestakowi	Semenow	1900	China
Subgenus *Grananoxia* Brenske			
P. annamensis	(Fleutiaux)	1887	China, Taiwan
P. dahnshuensis	Li et Yang	1997	Taiwan
Subgenus *Granida* Motschulsky			
P. albolineata	(Motschulsky)	1861	Japan
P. jessopi	Dewailly	1993	China
P. minor	Momura	1977	Taiwan
P. schoenfeldti	Brenske	1890	Japan
P. taiwana	(Sawada)	1950	Taiwan
P. nikodymi	Dewailly	1993	Birmanie
Subgenus *Gynexophylla* Medvedev			
P. edentula	(Harold)	1878	Nepal, India, Tibet
P. exilis	Zhang	1984	China (Yunnan)
P. gracilicornis gracilicornis	(Blanchard)	1871	China, Mongolia, Moupin, Tibet
P. gracilicornis licenti	Dewailly	1948	China
P. intermedia	Zhang	1981	China (Western), Tibet
P. laticollis chinensis	Fairmaire	1888	China
P. laticollis laticollis	Lewis	1887	Japan
P. laticollis manchurica	Semenow	1900	China, Korea
P. maculipennis	Moser	1919	China (Yunnan)
P. sikkimensis albosparsa	Moser	1919	India
P. sikkimensis	Brenske	1896	Butan, Nepal, India (Sikkim), Tibet
Subgenus *Mesopolyphylla* Medvedev			
P. irrorata	(Gebler)	1841	Russia, Tibet
P. tridentata	Reitter	1890	Russia
Subgenus *Polyphylla* s.str. Harris			
P. albertischulzi	Kuntzen	1933	Greece
P. boryi	Brullé	1832	Bulgaria, Croatia, Greece, Turkey
P. davidis	Fairmaire	1888	China
P. formosana	Niijima et Kinoshita	1933	Taiwan
P. fullo algirana	Brenske	1986	Algeria, Tunisia
P. fullo fullo	(Linnaeus)	1758	Russia, Sweden, Germany,

			Hungary, Romania, Spain
P. fullo macrocera	Reitter	1891	Morocco
P. maroccana descarpentriesi	Dewailly et Baraud	1982	Algeria
P. maroccana maroccana	Peyerimhoff	1925	Morocco
P. naxiana	Reitter	1902	Greece
P. nubecula	Frey	1962	China
P. olivieri	(Laporte)	1840	Europe, Iran, Syria, Turkey
P. ploceki	Tesar	1944	China (Zhejiang)
P. persica	Brenske	1902	Iran
P. ragusae aliquoi	Massa et Tassi	1977	Italy (Sicilia)
P. ragusae ragusae	Kraatz	1882	Italy (Sicilia)
P. tonkinensis	Dewailly	1945	China (Tonkin, Hanoi, Bao-Lac, Annam)
P. turkmenoglui	Petrovitz	1965	Turkey
Subgenus *Xerosobia* Medvedev			
P. adspersa	Motschulsky	1854	Russia, Afghanistan
P. alba alba	(Pallas)	1773	Russia
P. alba vicaria	Semenov	1900	China
P. sicardi	Bedel	1917	Morocco
New World *Polyphylla*			
Group *occidentalis*			
P. comes	Casey	1914	United States
P. gracilis	Horn	1881	United States
P. occidentalis	(Linnaeus)	1767	United States
P. pubescens	Cartwright	1939	United States
P. variolosa	(Hentz)	1830	United States
Group *hammondi*			
P. anteronivea	Hardy and Andrews	1978	United States
P. cavifrons	LeConte	1854	Mexico, United States
P. erratica	Hardy and Andrews	1978	United States
P. hammondi	LeConte	1856	United States
P. navarretei	Zídek	2006	Mexico
P. petiti	Guérin-Méneville		Mexico, Nicaragua
P. squamiventris	Cazier	1939	Mexico, United States
Group *decemlineata*			
P. aeolus	La Rue	1998	United States
P. arguta	Casey	1914	United States
P. decemlineata	(Say)	1824	Canada, Mexico, United States

P. monohansensis	Hardy and Andrews	1978	United States
Group *diffracta*			
P. avittata	Hardy and Andrews	1978	United States
P. barbata	Cazier	1938	United States
P. brownae	Young	1986	United States
P. crinita	LeConte	1856	Canada, Mexico, United States
P. devestiva	Young	1966	United States
P. diffracta	Casey	1891	Mexico, United States
P. hirsuta	Van Dyke	1933	United States
P. mescalerensis	Young	1988	United States
P. modulata	Casey	1914	United States
P. multimaculata	Hardy	1981	Mexico
P. nigra	Casey	1914	Mexico, United States
P. nubila	Van Dyke	1947	United States
P. pottsorum	Hardy and Andrews	1978	United States
P. ratcliffei	Young	1986	United States
P. rugosipennis	Casey	1914	Mexico, United States
P. sobrina	Casey	1914	United States
P. stellata	Young	1986	United States
species incertae sedis			
P. concurrens	Casey	1889	Honduras
P. conspersa	Burmester	1855	Mexico
P. donaldsoni	Skelley	2005	United States
P. woodruffi	Skelley	2005	United States

Taxa studied for Cladistic Analysis

와 같은 외부 형태적 형질을 이용하여 7아속(*Centralasiobia, Granida, Granonoxia, Gynexophylla, Mesopolyphylla, Polyphylla, Xerosobia*)으로 나누었다(Table 7).

왕풍뎅이족의 세계적 수준의 계통연구는 지금까지 시도되지 않았기 때문에 수염풍뎅이속의 족 내의 계통적 위치는 아직 불명확하다. 그러나 신북구 왕풍뎅이족의 분자계통학적 연구(Russell 2000)에 의하면 *Dinacoma, Hypothyce, Hypotrichia, Thyce, Parathyce, Plectrodes* 등이 수염풍뎅이속의 근연군으로 나타났다. 족 내의 기저군(basal group)으로는 *Phyllophaga*가

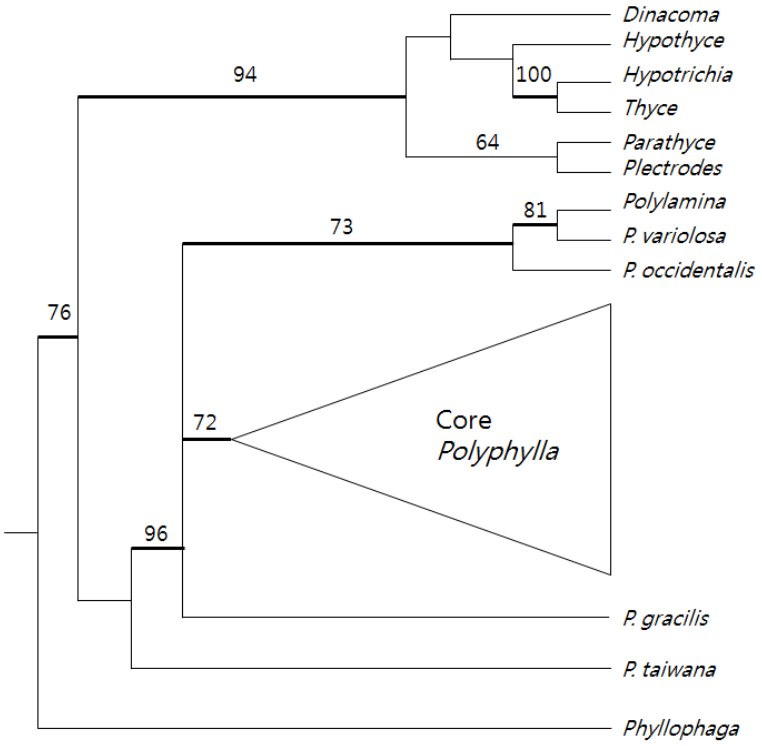

Figure 9. A summary of phylogenetic tree of New World Melolonthini (Russell 2000).

제안되었고 분자적 수준에서 신북구의 수염풍뎅이는 단계통(monophyly)을 이루고 있다(Fig. 9). 또한 왕풍뎅이족 내에서 다른 속으로 분류되어왔던 *Polylamina*는 *occidentalis* complex 가지(clade)에 위치하는 것을 보여주어 기존에 다른 속으로 분류되어왔던 *Polylamina*가 *Polyphylla*의 동물이명(synonym)임을 처음으로 제안하였다. Coca-Abia (2000)는 Russell (2000)과는 별도로 9개의 외부형질에 근거해서 왕풍뎅이족의 분지분석을 수행하여 *Polylamina* 속을 *Polyphylla*의 동물이명으로 처리 했다. 또한 Coca-Abia (2007)는 외부형태적 형질을 이용하여 검정풍뎅이아과(Melolonthinae)의 계

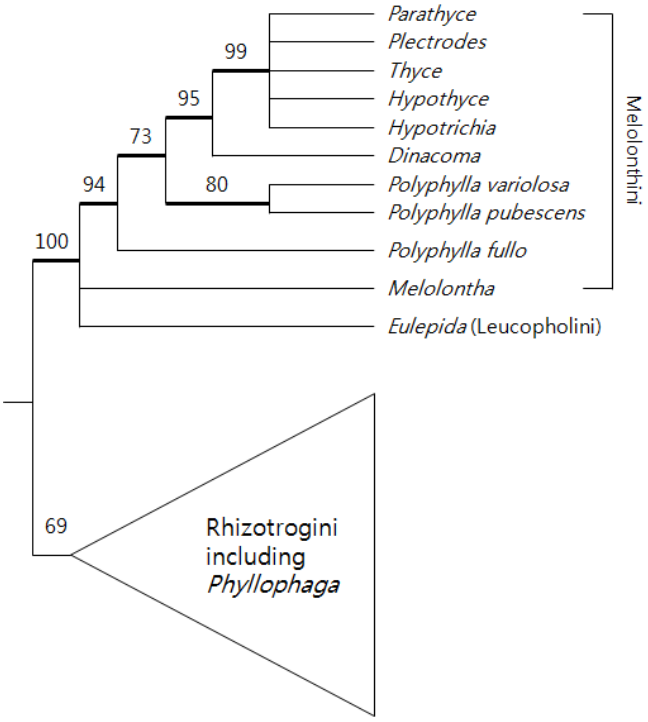

Figure 10. A summary of Bayesian phylogenetic tree of Melolonthini based on 47 morphological characters (Coca-Abia 2007).

통연구를 수행하였다(Fig. 10). 이를 참고하면 *Phyllophaga*는 왕풍뎅이족(Melolonthini)이 아닌 검정다색풍뎅이족(Rhizotrogini)의 clade에 속하며 왕풍뎅이속(*Melolontha*)이 왕풍뎅이족의 기저군으로 자리하고 있다.

수염풍뎅이속의 종들은 뚜렷이 구북구와 신북구로 나뉘어진 분포를 보이고 있으며(Table 7), 이들은 각각의 대륙에서 독자적으로 진화해온 것으로 보인다. 그동안의 수염풍뎅이속에 대한 연구는 위에서 살펴본 바와 같이 구북구과 신북구에서 별도로 수행되어 왔으며, 계통분석은 신북구 분류군들에 한정되어 있었다. 따라서 기존에 수행된 계통분석 결과에서 인정되었던 수염

풍뎅이속의 단계통성은 구북구 분류군의 추가를 통해 검증될 필요가 있다. 본 연구는 분지분석을 통해 전체 수염풍뎅이속의 단계통성을 시험하고, 그룹 간 유연관계를 통해 어느 대륙에 수염풍뎅이속의 기원이 있을지 추론해 보며, 이를 바탕으로 계통분류의 근간을 마련하고자 하는데 목적이 있다.

2. 재료 및 방법

1) 대상분류군들과 외군

본 연구에서는 한국산 수염풍뎅이 및 구북구와 신북구 종들의 계통적인 위치를 파악하기 위하여 2아종을 포함한 총 28 분류군을 내군(ingroup)으로 사용(Table 6)하였다. 전체 수염풍뎅이 분류군이 내군으로 사용된다면 이상적이겠지만 샘플 확보의 어려움으로 인해 그룹 비교라도 가능할 수 있도록 아속 및 complex별로 다양하게 사용하였다(Table 7). 그러나 구북구의 *Centralasiobia* 아속은 1아속 1종의 그룹으로 샘플을 확보하지 못해 분석에서 제외되었다.

수염풍뎅이속과 근연이 되는 분류군으로는 신북구에서는 Young (1988)이 *Phyllophaga*를 이용하였다. 그러나 Russell (2000)에 의하면 *Dinacoma, Hypothce, Hypotrichia, Thyce, Parathyce, Plectrodes* 등이 외군이고, *Phyllophaga*속은 좀 더 먼 외군으로 사용하는 것이 타당해 보인다(fig 9). 그러나 Coca-Abia (2007)의 검정풍뎅이아과 형태형질분석에 의하면 *Dinacoma* 등은 수염풍뎅이속의 외군으로 사용되기 어려워 보이며(fig 10), *Melolontha* (왕풍뎅이속)가 외군으로 생각될 수 있다. 따라서 본 연구에서는 *Phyllophaga*와 *Melolontha*를 외군으로 설정하여 분지분석을 실시하였다.

분석에 사용된 재료는 저자의 표본(CY)과 The Natural History Museum, London (NHM); Paul Lago Collection (CL); Hungarian National History Museum, Budapest (HNHM); Otsuma Women's University, Tokyo (OWU); Sungshin Women's University (SSWU); University of Nabraska State Museum (UNL) 및 관련 학자로부터 대여하거나 기증받아 이용하였다(Table 6).

Table 8. List of the *Polyphylla* species studied for cladistic analysis

Taxa	Distribution	Depository
Melolontha melolontha Linnaeus, 1758	Europe, Turkey	HNHM
M. frater Arrow, 1913	Japan	CY
M. insulana Moser, 1918	South Korea, Taiwan	SSWU
Phyllophaga balia (Say, 1825) *	N. America	CL
P. congrua (LeConte, 1856) *	N. America	CL
Polyphylla adspersa Motschulsky, 1845	Russia, Afghanistan	NHM, CY
P. alba (Pallas, 1773)	Russia	CY
P. albolineata Motschulsky, 1861	Japan	OWU, CY
P. arguta Casey, 1914 *	N. America	CL, CY
P. dahnshuensis Li et Yang, 1997	Taiwan	NHM
P. davidis Fairmaire, 1888	China	NHM
P. decimlineata (Say), 1824 *	N. America	CL, CY, UNL
P. diffracta Casey, 1891 *	N. America	CL, CY, UNL
P. donaldsoni Skelley, 2003 *	N. America	CL
P. fullo Linnaeus, 1758	Russia, Sweden, Germany, Hungary, Romania, Spain	NHM
P. gracilicornis Blanchard, 1871	China, Mongolia, Moupin, Tibet, Turkey	NHM, CY
P. hammondi LeConte, 1856 *	N. America	CL, CY, UNL
P. irrorata Gebler, 1841	Russia	NHM, CY
P. laticollis laticollis Lewis, 1887	Japan	OWU, CY
P. laticollis manchurica Semenow, 1895	Manchuria, Korea	SSWU
P. maculipennis Moser, 1919	S.W. China, Yunnan	NHM
P. monahansensis Hardy, 1978 *	N. America	CL, CY
P. occidentalis (L.), 1767 *	N. America	CL, CY
P. olivieri (Castelnau, 1840)	Iran, Persia, Turkey	NHM, CY
P. pottsorum Hardy, 1978 *	N. America	CL, CY
P. ragusae Kraatz, 1882	Italy (Sicilia)	HNHM
P. rugosipennis Casey *	N. America	CL, CY
P. schoenfeldti Brenske, 1890	Japan	OWU
P. sikkimensis Brenske, 1894	Sikkim	NHM
P. taiwana Sawada, 1950	Taiwan	HNHM
P. tonkinensis Dewailley, 1945	Oriental	HNHM
P. tridentata Reitter, 1890	Russia	CY
P. variolosa Hentz, 1830 *	N. America	CL, CY

* New world taxa

2) 분지분석(Cladistic analysis)

종간 유연관계를 알아보기 위한 형태학적 형질에 대한 계통분석은 PAUP* (Phylogenetic Analysis Using Parsimony) Macintosh version 4.0b10 (Swofford, 2001)을 사용하였다. 선정된 53개의 형질(38 binary and 15 multistate)은 똑같은 비중을 두어 특정한 형질을 강조하지는 않았다. 그리고 형질상태간의 진화의 방향을 명확히 추정하기 힘들기 때문에 모든 형질들을 unordered type으로 설정하였다. 적용 불가한 형질은 inapplicable (-)로 취급 하였다(Strong & Lipscomb 1999). 분지계통도(cladogram)를 작성하는 방법은 검약분석(parsimony)을 사용하였다.

분석은 1,000번의 무작위 추가에 의한 heuristic search로 수행하였고, branch-swapping algorithm은 tree-bisection-reconnection (TBR) 방법을 이용하였다. 각각의 step에서 10개의 tree를 hold 하였고, 시작 'Maxtrees'는 100으로 설정하였다. 도출된 여러 개의 동일한 최소가정수들(equally parsimonious trees)의 종합을 위해 PAUP*에 내장된 options을 이용하여 strict consensus tree를 도출하였다. 형질 분포(Fig. 11)는 WinClada 0.99 (Nixon, 1999)를 이용하여 알아보았다. 계통수의 각 node들의 안정성 검사를 위해 TNT (Goloboff et al. 2008) 프로그램을 이용하여 Bremer support를 알아보았다.

3) 형질과 형질상태(Characters and character states)

수컷 성충의 형태적인 형질을 기반으로 분지분석을 실시하였다. 형질(characters)의 선정은 Young (1988)이 신북구 종들의 연구에 사용했던 23개의 형질 중 21개를 본 연구에 맞게 일부 변형하여 사용하였고, 이밖에도

32개의 새로운 형질을 추가하여 전체 53개의 형태적 형질을 선정하였다. 형질상태(character states)는 도판에 제시 하였다(Plate IV).

형질 선정의 기준은 종 내에서 변이가 심하지 않으면서 다른 종들과 뚜렷한 차이가 나는 것으로 하였고 한 종에서만 독자적으로 나타나는 형질(autapomorphy)은 계통적인 유연관계를 분석하는데 아무런 정보를 주지 못하므로 제외하였다. 또한 몸의 길이와 머리의 길이 같이 형질의 발현과정에서 서로 연관되어 발현될 것으로 추정되는 형질은 하나의 형질만을 선정하였다. 선정된 53개의 형질과 형질상태는 아래와 같으며 자료행렬(data matrix)은 표 9에 수록하였다.

Body

1. Size, length: (0) smaller than 23 mm, (1) larger than 23 mm.

2. Dorsal surface, coloration: (0) yellowish brown, (1) reddish brown, (2) dark brown.

Head

3. Clypeus, surface concavity: (0) slightly swollen, (1) flat, (2) concave, (3) rough.

4. Clypeus, hair/seta on disc: (0) absent, (1) present.

5. Clypeus, anterior angles (Pl. IV, Fig. IV-1): (0) rounded (A-C, E, F), (1) angulated (D, G-I).

6. Clypeus, anterior margin (Pl. IV, Fig. IV-1): (0) linear (D, G, I), (1) concave (A, F), (2) convex (B, C, E, H).

7. Clypeus, lateral margins (Pl. IV, Fig. IV-1): (0) parallel (E, G, H, I), (1) anteriorly narrowed (A, B) (2) anteriorly widen (C, D, F).

8. Clypeus, apical angles in frontal view (Pl. IV, Fig. IV-1): (0) sharp (K), (1) cut or rounded (J, L).

9. Frontoclypeal suture (Pl. IV, Fig. IV-1): (0) entire (A-G, I), (1) reduced (H).

10. Frons: (0) dull (1) shinny.

11. Frons, hair on disc (Pl. IV, Fig. IV-2): (0) absent (C), (1) present: erect(B), (2) present: not erect (A).

12. Labrum, in frontal view (Pl. IV, Fig. IV-1): (0) 'U' shape medially (≦ 90°) (L), (1) 'V' shape (> 90°) (J, K).

13. Maxillary palp, terminal segment: (0) smooth, (1) flatten.

14. Maxillary palp, tip of terminal segment: (0) dull, (1) sharp pointed.

15. Antenna, first to second and third antennomeres: (0) first as long as rest, (1) first antennomere longer, (2) first antennomere shorter.

16. Antenna, club (Pl. IV, Fig. IV-2): (0) 3-segmented (D), (1) 7-segmented (E-G).

17. Antenna, club: (0) dull, (1) shinny.

18. Antenna, seta on club: (0) absent or rare, (1) present.

19. Antenna, puncture of club: (0) overall distribution, (1) absent medially.

20. Antenna, club to footstalk ratio (Pl. IV, Fig. IV-2): (0) under twice (D-F), (1) over twice (G).

21. Antenna, curve (Pl. IV, Fig. IV-2): (0) absent (D, F), (1) present (E, G).

Thorax

22. Pronotum, scale (Pl. IV, Fig. IV-2): (0) absent (I), (1) present (H, J-M).

23. Pronotum, hair/seta: (0) absent, (1) present; erect, (2) present; not erect.

24. Pronotum, puncture: (0) fine, (1) coarse; rounded, (2) coarse; scale-like.

25. Pronotum, anterior angles (Pl. IV, Fig. IV-2): (0) rounded (J), (1) angulated (H, I, K-M).

26. Pronotum, lateral margins: (0) slender, (1) toothed.

27. Pronotum, posterior half of sides (Pl. IV, Fig. IV-2): (0) parallel (J, K), (1) widen posteriorly (L), (2) narrowed posteriorly (H, I, M).

28. Scutellum, scale and puncture (Pl. IV, Fig. IV-3): (0) rare (A), (1) on sides (D), (2) overally (C), (3) centrally (B).

29. Elytra, scale: (0) absent, (1) present.

30. Elytra, hair/seta: (0) absent, (1) present.

31. Elytra, pattern (Pl. IV, Fig. IV-3): (0) absent (E), (1) random (G), (2) defined vittae (F).

32. Propleuron, scale (Pl. IV, Fig. IV-3): (0) absent (I), (1) present (H).

33. Prosternum, puncture: (0) centrally, (1) overall along posterior line, (2) central and sides

34. Mesosternum between mesocoxae: (0) adjecent, (1) almost same as the half width of mesofemur.

Legs

35. Protibia, dentition (Pl. IV, Fig. IV-3): (0) unidentate (J), (1)

bidentate (K), (2) tridentate (L).

36. Mesotibia, marginal dentition (Pl. IV, Fig. IV-4): (0) absent (A), (1) unidentate (B), (2) bidentate (C).

37. Metafemora, scale (Pl. IV, Fig. IV-4): (0) absent (D), (1) present (E).

38. Metafemora, posterior ventral margin: (0) not toothed, (1) toothed.

39. Metafemur, puncture: (0) fine, (1) coarse.

40. Metatarsomere I in relation to superior spine of metatibia (Pl. IV, Fig. IV-4): (0) shorter in length (G), (1) same (F).

Abdomen

41. Sternites, scale (Pl. IV, Fig. IV-4): (0) absent (J), (1) present; overall (I), (2) present; sides (H).

42. Sternites, hair/seta (Pl. IV, Fig. IV-4): (0) absent (I), (1) present (H, J).

43. Pygidium, scale (Pl. IV, Fig. IV-5): (0) absent (A, D), (1) present (B, C, E, F).

44. Pygidium, hair/seta (Pl. IV, Fig. IV-5): (0) absent (A, C, D), (1) present (B, E, F).

45. Pygidium, midline (Pl. IV, Fig. IV-5): (0) not defined (A-D, F), (1) defined (E).

46. Pygidium, sides (Pl. IV, Fig. IV-5): (0) straight (B-D), (1) curved or rounded (A, E, F).

47. Propygidium (Pl. IV, Fig. IV-5): (0) not exposure (A, C-E), (1) exposure (B, F).

48. Pygidium: (0) flat, (1) convex medially.

Aedeagus

49. Aedeagal shape: (0) broad, robust, (1) thin, elongated.

50. Parameres (Pl. IV, Fig. IV-5): (0) symmetrical (I), (1) asymmetrical (G, H).

51. Parameres: (0) simple, (1) complicated with teeth.

52. Parameres, separation (Pl. IV, Fig. IV-5): (0) shallow (G, H), (1) deep (I).

53. Parameres, lateral edges of tip: (0) parallel, (1) narrowed, (2) widen.

Table 9. Character data matrix

Char. Number (10)											1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	5	5	5	5
Char. Number	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3
Melolontha melolontha	1	1	1	1	0	0	0	0	0	1	1	1	1	1	0	1	0	1	0	0	0	0	2	0	1	1	2	0	0	1	0	0	1	1	2	1	0	1	0	1	2	1	0	1	1	1	0	1	0	0	1	1	1
M. frater	1	1	1	1	0	0	0	0	1	1	1	0	1	1	0	1	0	1	0	0	0	0	2	0	1	0	0	2	0	1	0	0	1	1	1	1	1	0	1	1	0	2	1	0	1	0	0	1	0	0	0	1	1
M. insulana	1	1	1	1	0	0	0	0	0	1	1	0	1	1	0	1	0	1	0	1	0	0	2	0	1	1	0	2	0	1	0	0	1	1	1	1	1	0	1	1	0	2	1	0	1	1	0	0	1	0	0	1	1
Phyllophaga balia	0	1	0	0	0	1	1	0	0	1	1	1	0	0	1	0	0	1	0	0	0	0	0	0	1	0	2	1	0	0	0	0	2	0	2	1	0	0	0	1	0	1	0	0	0	1	1	1	0	1	1	1	-
Phy. Congrua	0	2	0	0	0	0	1	0	0	1	0	0	0	1	1	0	0	1	0	0	0	0	0	0	1	1	1	2	0	0	0	0	2	0	2	1	0	0	0	1	0	1	0	1	0	1	0	1	0	0	1	1	-
Polyphylla adspersa	1	1	1	0	0	0	0	1	0	0	0	0	1	1	2	1	0	1	0	0	1	1	0	1	1	1	2	2	1	0	0	1	0	0	2	2	1	0	1	0	1	0	1	0	1	0	0	0	1	0	0	0	0
P. alba	1	1	1	0	0	1	0	1	0	0	0	1	1	1	0	1	0	1	0	1	1	1	0	1	1	0	2	2	1	0	0	1	0	0	2	2	1	0	1	0	1	0	1	0	0	0	0	0	1	0	0	0	0
P. albolineata	1	2	1	1	0	0	2	0	0	1	2	0	1	1	0	1	0	0	1	1	1	1	0	1	1	0	0	1	1	0	2	0	1	1	0	0	0	0	0	0	0	1	0	1	1	0	1	0	1	1	0	0	0
P. arguta	1	2	1	1	1	0	2	0	0	1	1	0	0	0	2	1	1	0	0	1	1	1	0	1	0	1	0	3	1	0	2	1	0	0	1	2	1	0	0	0	1	1	1	0	0	0	0	0	1	0	0	1	0
P. dahnshuensis	0	0	1	1	0	0	0	0	0	1	2	0	1	1	0	1	1	1	0	1	1	0	2	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	1	1	0	0	0	1	0	0	0	0
P. davidis	1	2	1	0	1	0	0	1	0	1	0	1	0	0	0	1	1	1	1	1	1	1	0	1	0	1	0	1	1	1	1	0	1	1	1	0	1	2	1	1	0	0	0	1	0	1	1	0	0	0	1	0	0	1
P. decimlineata	1	2	0	0	1	0	0	0	1	1	1	0	0	0	0	0	1	1	0	0	1	1	1	1	1	1	1	2	3	1	0	2	1	1	0	1	1	1	0	0	0	1	1	1	0	1	0	0	0	1	0	0	1	1
P. diffracta	1	2	1	1	1	0	2	0	0	1	1	0	0	0	2	1	1	0	0	1	1	1	1	0	1	2	3	1	0	2	1	0	0	1	1	1	1	0	0	0	1	1	1	0	1	0	0	0	1	0	0	1	0
P. donaldsoni	0	1	1	1	0	0	0	0	0	1	1	0	1	0	2	1	1	1	0	0	0	0	2	0	1	0	2	0	0	1	0	0	1	0	1	1	0	0	0	0	0	1	0	1	0	0	0	1	1	0	0	1	0
P. fullo	1	2	1	0	0	0	2	1	0	1	0	0	0	0	0	0	1	1	0	0	1	1	0	1	1	0	0	1	1	0	1	1	1	1	1	1	1	1	0	0	1	0	1	0	0	0	1	0	1	1	0	0	1
P. gracilicornis	1	2	1	1	1	0	0	0	1	1	1	0	0	0	0	1	0	1	1	1	1	1	1	0	0	1	2	1	1	0	1	0	1	0	0	1	0	0	1	0	0	0	1	0	1	1	0	0	0	1	1	0	1
P. hammondi	1	1	1	1	1	0	2	0	0	1	1	0	0	0	2	1	1	0	0	1	1	1	1	0	1	2	3	1	0	2	1	0	0	2	2	1	0	0	0	1	1	1	0	0	0	1	1	1	0	0	1	0	0
P. irrorata	1	1	1	0	0	2	0	0	0	1	1	0	1	1	0	1	1	0	1	1	1	1	0	1	0	1	0	2	1	0	1	1	0	0	2	2	1	0	1	0	1	1	1	0	1	0	0	0	1	0	0	1	0
P. laticollis laticollis	1	1	1	1	1	0	2	1	0	0	1	1	0	1	0	1	0	0	1	1	1	1	1	0	1	2	1	1	0	1	0	0	0	1	1	0	0	1	0	0	0	1	0	1	1	1	0	0	1	1	0	1	0
P. laticollis manchurica	1	2	1	1	1	0	2	0	0	1	1	0	0	0	0	0	1	0	0	0	1	1	1	1	0	1	2	1	1	0	1	0	0	0	1	1	0	0	1	0	0	0	1	0	1	1	1	0	0	1	1	0	1	0
P. maculipennis	1	2	0	1	0	0	0	0	1	1	1	0	1	0	0	1	0	1	0	1	1	1	1	0	1	0	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	1	0	1	1	0	1	0
P. monahansensis	1	1	1	1	1	0	2	1	0	1	1	0	0	1	0	1	1	0	1	1	1	1	1	0	1	2	2	1	0	2	1	1	0	2	2	1	0	0	0	1	1	1	1	1	1	0	1	1	1	0	0	1	0
P. occidentalis	1	0	1	1	0	0	0	0	0	1	1	0	0	1	2	1	1	0	0	1	1	1	2	1	1	0	2	2	1	1	2	1	1	0	0	1	0	0	1	0	0	1	0	1	0	0	1	0	1	0	0	0	2
P. olivieri	1	2	1	0	1	0	2	1	1	0	0	0	0	1	0	1	0	1	0	1	1	1	0	1	1	1	1	2	1	1	0	1	1	0	0	1	2	1	0	1	0	1	0	1	1	1	0	0	0	1	1	0	1
P. pottsorum	0	0	1	1	1	0	2	0	1	1	1	0	0	0	0	1	1	0	0	1	1	1	2	2	0	1	-	2	1	0	0	1	0	0	2	2	1	0	0	0	1	1	1	0	1	0	1	1	1	0	0	0	0
P. ragusae	1	1	2	0	1	0	2	1	0	1	0	0	1	0	0	1	1	1	0	1	1	1	0	2	1	0	0	1	1	0	0	1	1	0	0	1	0	1	0	1	0	1	0	1	0	0	0	1	0	1	0	0	1
P. rugosipennis	1	2	1	1	1	0	2	0	0	1	1	0	0	0	2	1	1	0	0	0	1	1	1	1	1	1	2	3	1	0	2	1	0	0	1	2	1	0	1	0	1	1	1	1	1	0	1	0	1	0	0	1	0
P. schoenfeldti	1	1	1	0	0	0	2	0	0	1	0	0	1	0	0	1	1	0	1	1	1	1	0	0	1	0	2	1	1	0	2	0	1	0	0	0	1	0	1	0	0	1	1	1	0	0	0	0	1	1	0	1	0
P. sikkimensis	1	2	1	1	0	1	0	0	1	1	1	0	0	0	0	1	0	1	0	0	0	1	1	1	-	1	2	1	1	0	0	0	0	0	1	1	1	0	1	0	1	1	1	1	0	0	0	1	1	1	0	1	0
P. taiwana	1	2	1	0	0	0	2	0	0	1	0	0	1	0	2	1	1	0	0	1	1	1	0	1	1	1	2	1	1	0	2	1	1	0	0	1	1	0	1	0	1	1	1	0	1	0	0	0	1	1	0	1	0
P. tonkinensis	1	1	0	0	1	0	0	1	0	0	0	0	0	0	2	1	0	1	1	1	1	1	0	1	1	0	1	1	1	0	1	0	1	0	1	2	1	0	1	0	0	1	1	0	1	1	0	1	1	0	0	0	0
P. tridentata	1	2	1	1	0	2	0	0	0	1	1	0	1	1	2	1	1	1	0	0	1	1	0	1	1	1	2	2	1	0	1	1	0	0	2	2	1	0	1	0	1	0	1	1	0	0	1	0	0	1	0	1	0
P. variolosa	-	1	1	1	0	0	2	0	0	1	1	0	0	0	2	1	0	0	0	0	1	1	1	0	1	1	2	3	1	1	1	0	1	0	1	0	1	0	1	0	0	1	0	1	0	0	1	1	1	0	0	0	0

3. 결과

본 연구의 결과는 수염풍뎅이속이 단계통 그룹임을 보여주었으며, 수염풍뎅이속에 속하는 분류군들은 다른 근연의 분류군들이 갖지 않는 공유파생형질(synapomorphic characters)을 갖고 있었다.

수염풍뎅이속 28 분류군의 53개 외부 형질을 이용한 분지분석결과 12개의 최소가정수(most parsimonious trees)를 얻었다(tree length = 279, consistency index = 0.251, retention index = 0.593). 그림 11은 12개의 최소가정수 중 하나이며 각각의 절(node)을 지지하는 형질이 배치되어 있다. 최소가정수들에 대한 strict consensus tree는 그림 12와 같으며 Bremer support 를 함께 표시하였다.

수염풍뎅이속은 전체적으로 두 개의 공유파생형질(synapomorphy: 49-1, aedeagal shape thin, elongated; 51-0, parameres simple)과 하나의 상사형질(homoplastic character: 17-1)에 근거하여 잘 지지되고 있었다. *P. donaldsoni*는 *P. dahnshuensis* - *P. alba*와 자매군의 관계로 나타났다. 단계통군 *P. dahnshuensis* - *P. alba*는 하나의 공유파생형질(21-1, antennal curve absent)과 세 개의 상사형질(20-1, 48-0, 52-0)에 의하여 지지된다. *P. dahnshuensis*는 나머지 분류군(*P. occidentalis* - *P. alba*)와 자매군 관계이며, 단계통군인 *P. occidentalis* - *P. alba*는 두 개의 공유파생형질(22-1, pronotum scale present; 29-1, elytral scale present)및 다섯 개의 상사형질(1-1, 13-0, 18-0, 39-1, 47-1)에 의하여 지지되었다. *P. occidentalis*는 나머지 분류군(*P. variolosa* - *P. alba*)과 자매군 관계이며, 단계통군인 *P. variolosa* - *P. alba*는 하나의 공유파생형질(23-1, pronotal hair/seta present; erect)과 세 개의 상사형질(7-2, 14-0, 26-1)에 의하여 지지된다. *P. variolosa*는 나머지 분류군(*P. laticollis laticollis* - *P. alba*)과 자매군 관

계이며, 단계통군인 *P. laticollis laticollis* - *P. alba*는 하나의 공유파생형질(5-1, anterior angles of clypeus angulated)과 네 개의 상사형질(30-0, 33-0, 45-1, 52-1)에 의해 지지된다. *P. laticollis laticollis* - *P. sikkimensis* 군과 *P. rugosipennis* - *P. alba* 군은 자매군 관계를 나타내고 있었으며 *P. laticollis laticollis* - *P. sikkimensis* 군은 네 개의 상사형질(15-0, 28-1, 47-0, 50-1)에 의해, *P. rugosipennis* - *P. alba* 군도 네 개의 상사형질(32-1, 36-2, 41-1, 43-1)에 의해 지지되고 있다. 이들 두 군에 속하는 분류군들의 관계는 대부분 상사형질들로만 지지되고 있으나 *P. irrorata* 와 *P. tridentata*의 경우에는 하나의 공유파생형질(6-2, anterior margin of clypeus convex)과 두 개의 상사형질(8-0, 11-1)로 지지되고 있다.

*Phyllophaga*속은 수염풍뎅이속과 자매군(sister group)을 형성하고 있었으며, 이들은 두 개의 파생형질(34-0, mesosternum between mesocoxae adjecent; 38-0, metafemoral posterior ventral margin not toothed)과 두 개의 상사형질(1-0, 41-0)에 의해 단계통을 형성하고 있었다.

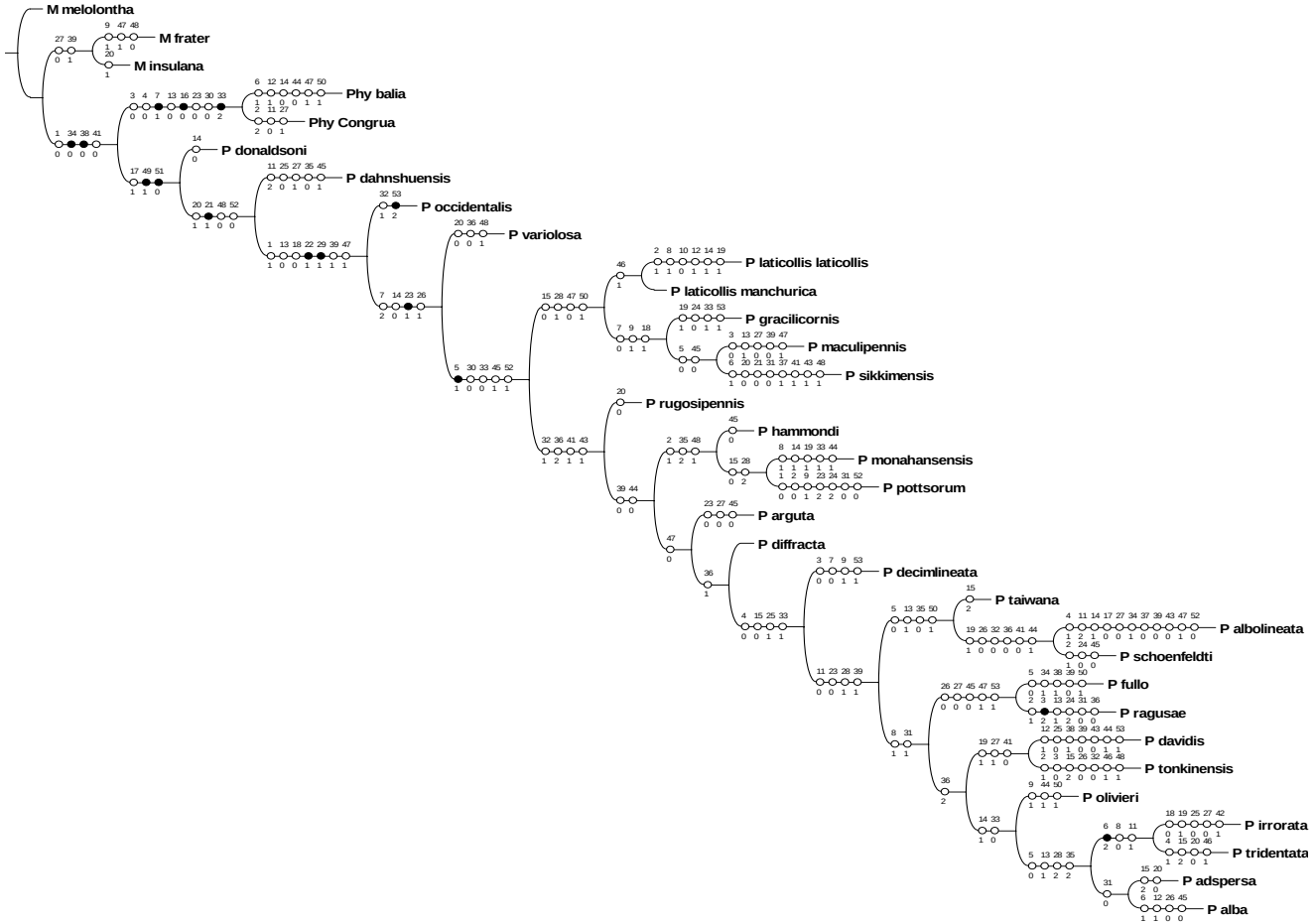

Figure 11. One of 12 most parsimonious trees based on morphological characters. Statistics: tree length = 279; consistency index (CI) = 0.251; retention index (RI) = 0.593. Numbers above the branches indicate the number of character changes supporting each branch. *P*: *Polyphylla, Mel*: *Melolontha*, *Phy*: *Phyllophaga*.

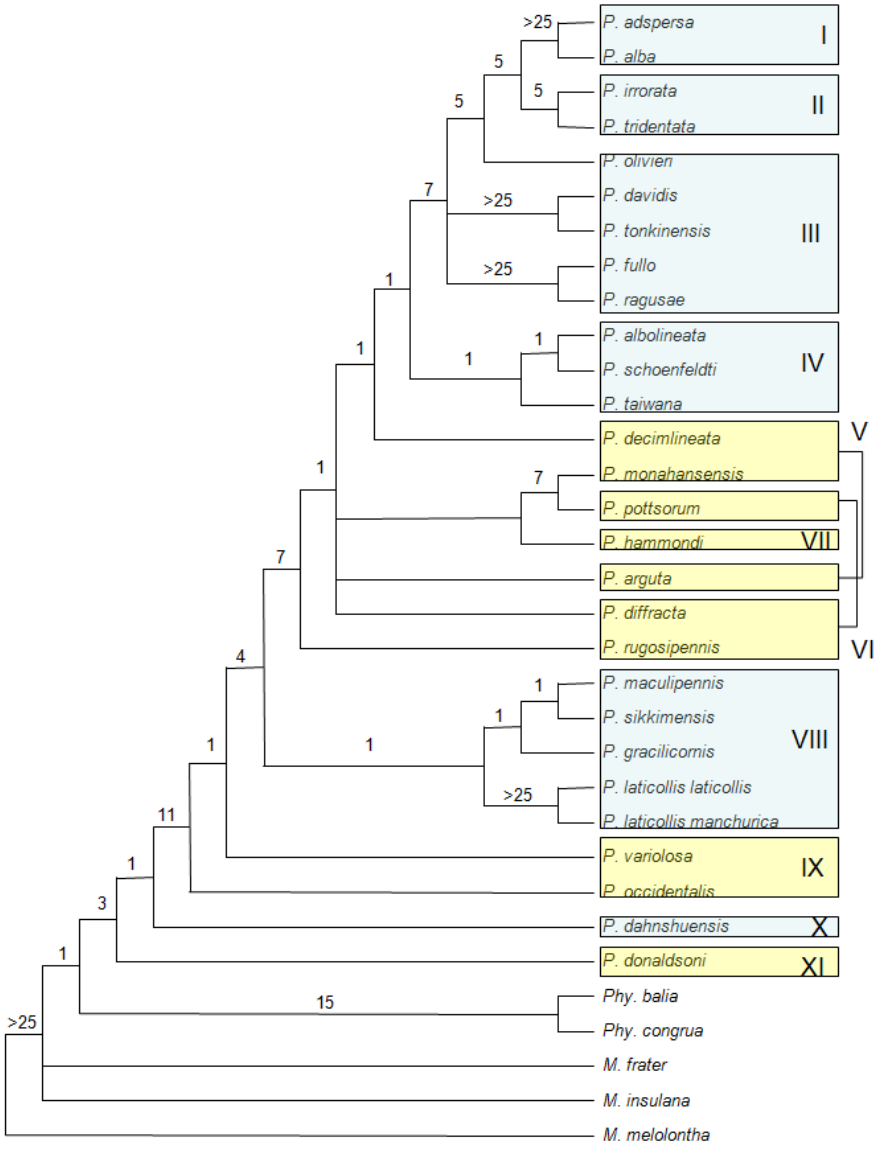

Figure 12. A strict consensus tree of 12 most parsimonious trees with Bremer support. *P*: *Polyphylla, Mel*: *Melolontha*, *Phy*: *Phyllophaga*. I: Subgenus *Xerosobia*, II: Subgenus *Mesopolyphylla*, III: Subgenus *Polyphylla*, IV: Subgenus *Granida*, V: Group *decemlineata*, VI: Group *diffracta*, VII: Group *hammondi*, VIII: Subgenus *Gynexophylla*, IX: Group *occidentalis*, X: Subgenus *Grananoxia*, XI: incertae sedis.

4. 고찰

수염풍뎅이속은 서론에서 언급한 바와 같이 구북구와 신북구에서 독자적으로 연구가 이루어졌기 때문에 전체 속을 대상으로 한 단계통성은 검증되지 않았었다. 그러나 본 연구를 통해 구북구의 아속들과 신북구의 그룹들을 포함한 수염풍뎅이속이 단계통을 형성한다는 결과를 얻었다. 이들은 가늘고 긴 수컷생식기의 모양과 가시 같은 복잡한 구조가 없는 단순한 부절(parameres)을 갖고 있는, 두 개의 공유파생형질에 의해 정의될 수 있었다.

수염풍뎅이속 내의 종간 관계는 잘 해결되지 않았으나 주요한 패턴은 다음과 같다: (*P. donaldsoni* (*P. dahnshuensis* (*P. occidentalis* (*P. variolosa* (((*P. laticollis laticollis, P. laticollis manchurica*) (*P. gracillicornis* (*P. maculipennis*, *P. sikkimensis*))) (*P. rugosipennis* (((*P. hammondi* (*P. monahansensis*, *P. pottsorum*)) (*P. arguta* (*P. diffracta* (*P. decimlineata* (((*P. taiwana* (*P. albolineata*, *P. schoenfeldti*)) ((*P. fullo*, *P. ragusae*) ((*P. davidis*, *P. tonkinensis*) (*P. olivieri* ((*P. irrorata*, *P. tridentata*) (*P. adspersa*, *P. alba*)))))))))))))). 그리고 기존에 *occidentalis* group으로 분류되었던 *P. occidentalis*와 *P. variolosa*는 측계통군을 형성하고 있다. 이들을 제외한 나머지 분류군들은 두순의 앞쪽 각이 직각을 이루고 있는 공유파생형질에 의해 단계통을 형성하고 있다. 그러나 이들의 종간 또는 그룹 간 관계를 지지하고 있는 절들에는 상사형질이 주를 이룬다.

최소가정수들로부터 도출된 strict consensus tree를 참고하면, *Xerosobia* 아속(group I: *P. adspersa, P. alba*), *Mesopolyphylla* 아속(group II: *P. irrorata, P. tridentata*), *Granida* 아속(group IV: *P. albolineata, P. schoenfeldti, P. taiwana*), 그리고 *Gynexophylla* 아속(group VIII: *P. gracilicornis, P. laticollis, P. maculipennis, P. sikkmensis*)에 속하

는 구북구의 분류군들은 기존의 분류체계와 같이 무리지어 졌다. 그러나 나머지 구북구와 신북구의 그룹에서는 구성원들이 측계통이거나 다계통적인 양상을 보이고 있었다.

수염풍뎅이속과 자매군의 관계에 있는 속은 *Phyllophaga*로, 이들은 중기절 사이의 복판이 인접해 있고, 후퇴절의 복측 가두리에 톱니모양을 갖지 않는 두 공유파생형질에 의해 단계통을 형성하고 있었다.

이번 연구는 수염풍뎅이속의 분류군들 중에서 구북구의 *Centralasiobia* 아속을 제외한 나머지 그룹에 속하는 분류군들이 골고루 확보되어 분석되었기 때문에 전체 수염풍뎅이속 내의 관계에 대한 정보를 어느 정도 포함하고 있다고 생각된다. 그러나 미확보 된 분류군이 여전히 많이 남아 있기 때문에 속 내의 진화적 기원에 대한 해석을 내리기엔 무리가 있을 것으로 사료된다. 후에 그룹별로 더 많은 샘플을 추가로 확보하여 분석이 이루어져야 할 것이다.

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Abstract

A taxonomy of Korean Melolonthidae (Coleoptera, Scarabaeoidea) and Cladistic analysis of *Polyphylla* based on morphology

KIM, A-Young
Department of Biology
Graduate School
Sungshin Women's University

1. Taxonomy of Korean Melolonthidae

The taxonomic review of the Korean Melolonthidae is presented. As a result, 6 tribes, 21 genera, and 61 species is distributed in Korea. Among them, 4 (*Miridiba yangjuensis* n. sp., *Nipponoserica melanosoma* n. sp., *Serica monticum* n. sp., *Sericania lucidalis* n. sp.) are considered as new, 1 (*Maladera kamiyai* Sawada= *Serica septentrionalis* Murayama) is misidentified, and 4 (*Hoplia djukini* Jacobson, *Miridiba castanea* (Waterhouse), *Serica septentrionalis* (Murayama), *Sericania latisulcata* Murayama) are reconfirmed Korean distribution. In addition, 6 (*Bunbunius reticulatus* (Murayama), *Eumaladera opaciventris* (Moser), *Maladera schoenfeldti* (Murayama),

Serica hirsuta Kim et Kim, *Sericania koryoensis* Murayama, *Sericania latisulcata* Murayama) are native, 7 (*Brahmina crenicollis* (Motschulsky), *B. darcis* (Reitter), *B. excissiceps* (Moser), *Brahmina sedakovii* Mannerheim, *Holotrichia kiotoensis* Brenske, *H. sichotana* Brenske, *Lasiopsis manchurica* Murayama) are not discovered the specimens.

A key for the separation of the subfamilies, tribes, genera, and species is provided. Description, habitus, and male aedeagus of each species are presented.

2. Cladistic analysis of *Polyphylla* based on morphology

Cladistic analysis of the 28 taxa of *Polyphylla* based on 53 morphological characters is conducted to test the monophyly. As result, we obtained 12 most parsimonious (MP) trees with 279 steps and *Polyphylla* shows monophyly. They are defined by two synapomorphy: 1) thin and elongated aedeagus, 2) simple parameres.

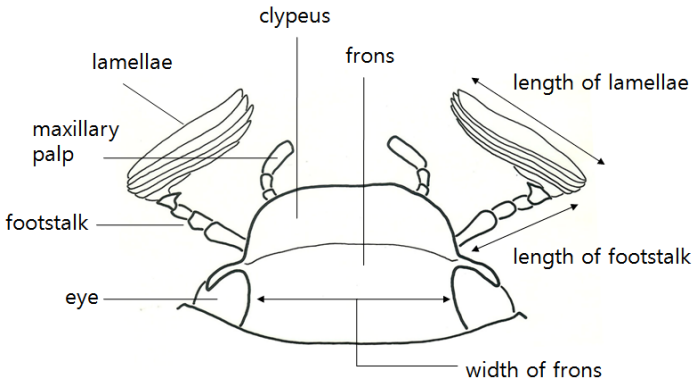
The major pattern of *Polyphylla* is as follow: (*P. donaldsoni* (*P. dahnshuensis* (*P. occidentalis* (*P. variolosa* (((*P. laticollis laticollis, P. laticollis manchurica*) (*P. gracillicornis* (*P. maculipennis*, *P. sikkimensis*))) (*P. rugosipennis* (((*P. hammondi* (*P. monahansensis*, *P. pottsorum*)) (*P. arguta* (*P. diffracta* (*P. decimlineata* (((*P. taiwana* (*P. albolineata*, *P. schoenfeldti*)) ((*P. fullo*, *P. ragusae*) ((*P. davidis*, *P. tonkinensis*) (*P. olivieri* ((*P. irrorata*, *P. tridentata*) (*P. adspersa*, *P. alba*)))))))))))))).

Plate I. Terminology and Mensuration of Melolonthidae

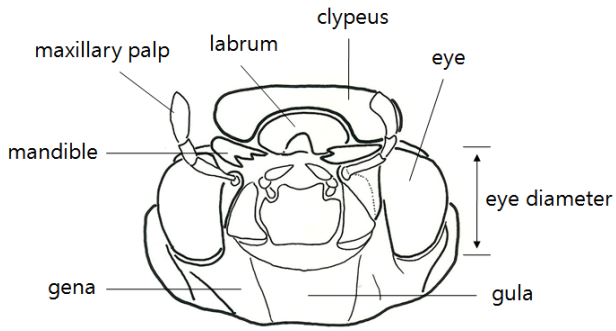
Figure I-1

Figure I-2

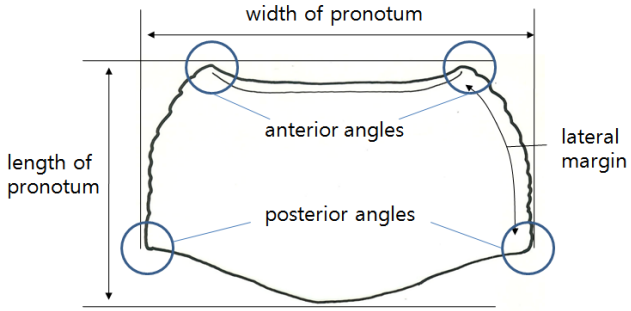
Figure I-3



A

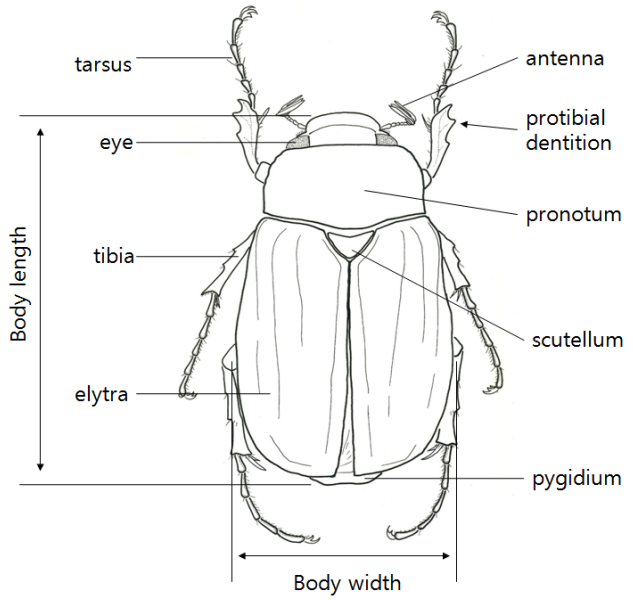


B

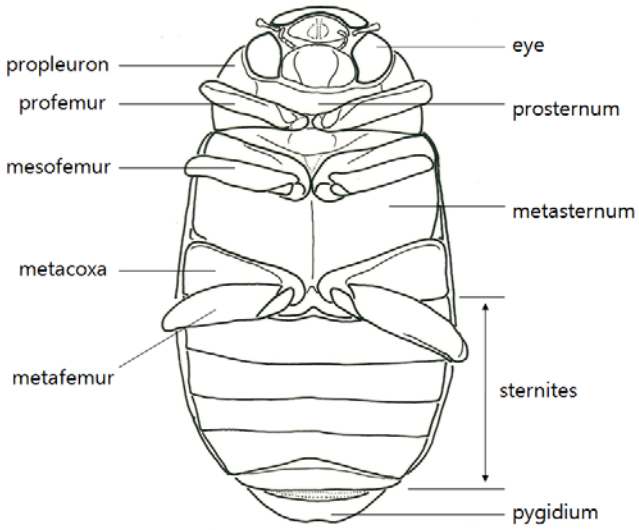


C

Figure I-1. A. Head (dorsal; *Hilyotrogus bicoloreus*); B. Head (ventral; *Lasiopsis sahlbergi*); C. pronotum (*Holotrichia parallela*).

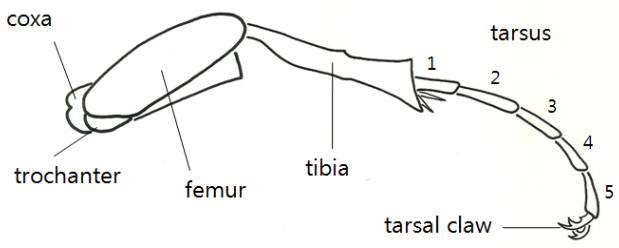


A

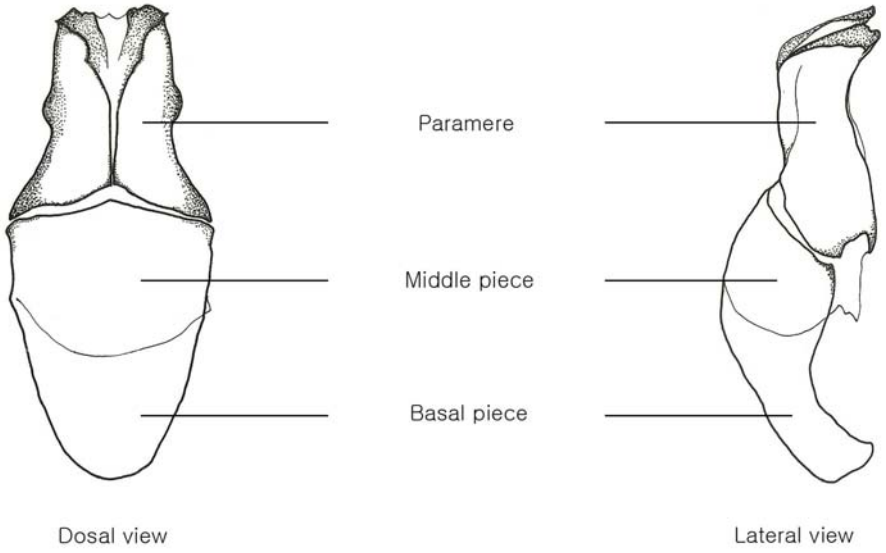


B

Figure I-2. A. Body (dorsal; *Holotrichia diomphalia*); B. Body (ventral; *Holotrichia diomphalia*).



A



B

Figure I-3. A. Leg; B. Male aedeagus (*Melolontha incana*).

Plate II. Habitus

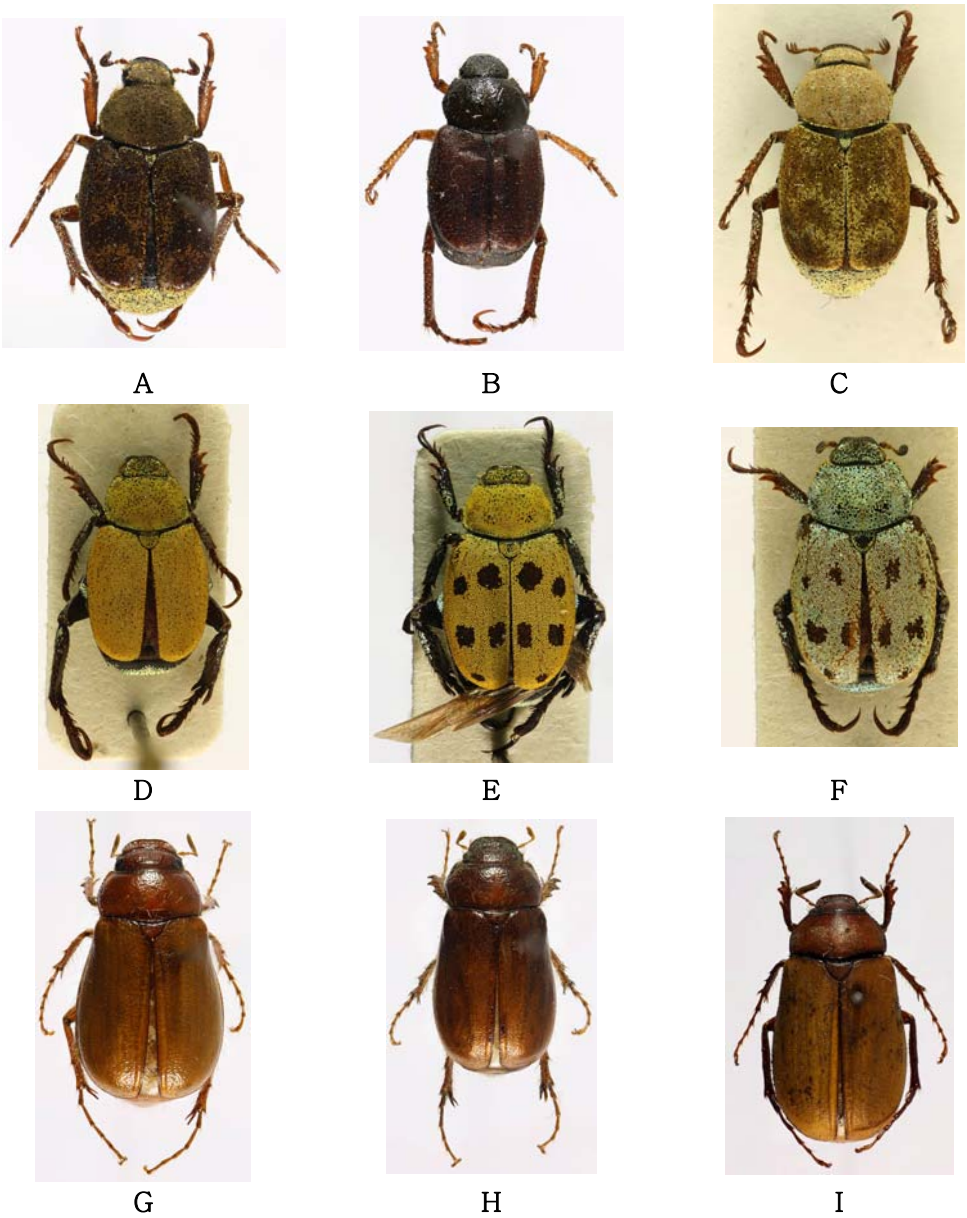


Figure II-1. Hopliinae: A-C. *Ectinohoplia rufipes*; D-F. *Hoplia aureola*; **Melolonthinae:** G,H. *Heptophylla picea* (male, female); I. *Hilyotrogus bicoloreus* (male).

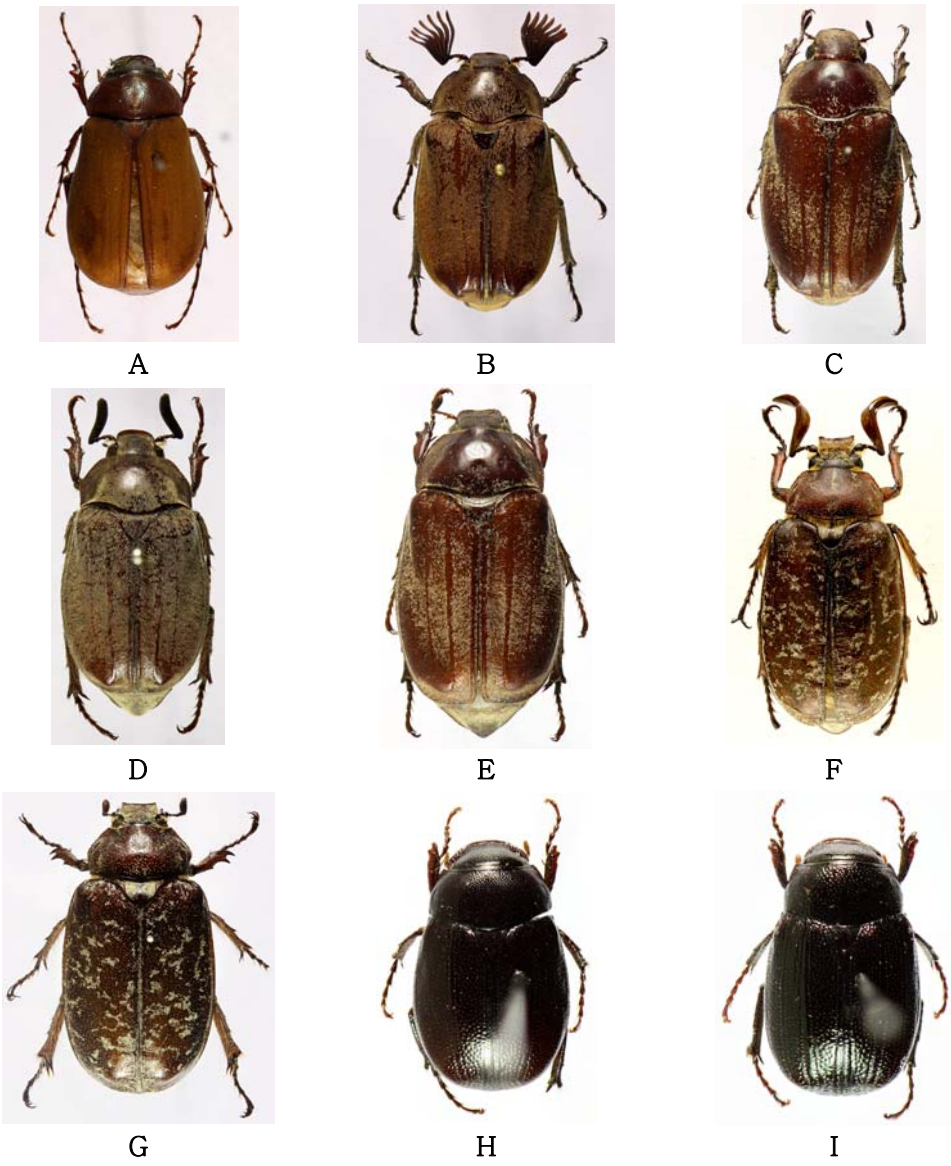


Figure II-2. Melolonthinae: A. *Hilyotrogus bicoloreus* (female); B,C. *Melolontha incana* (male, female); D,E. *Melolontha insulana* (male, female); F,G. *Polyphylla laticollis manchurica* (male, female); H. *Apogonia cibricollis*; I. *Apogonia cupreoviridis.*

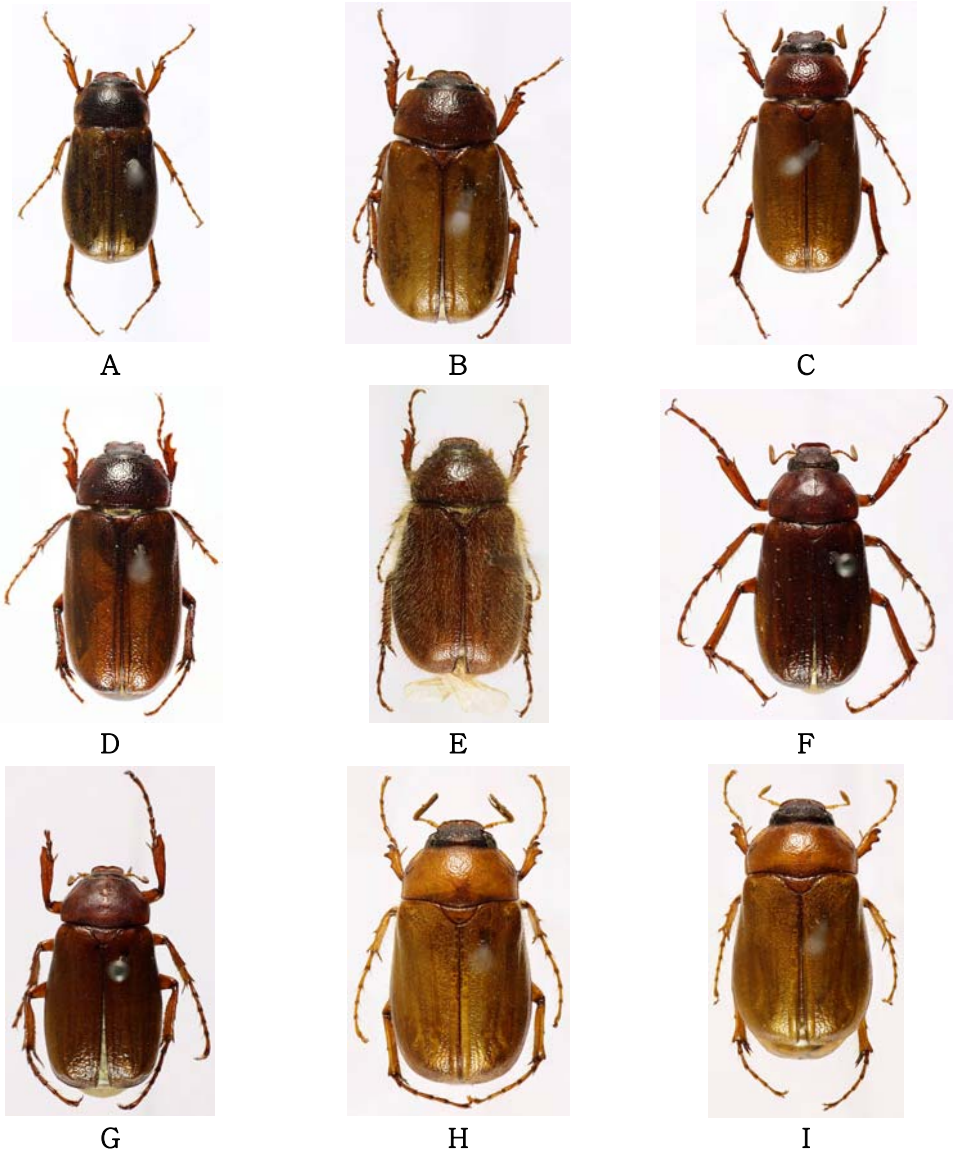


Figure II-3. Melolonthinae: A,B. *Sophrops heydeni* (male, female); C,D, *Sophrops striata* (male, female); E. *Brahmina rubetra faldermanni*; F,G. *Bunbunius reticulatus* (male, female); H,I. *Pseudosymmachia impressifrons* (male, female).

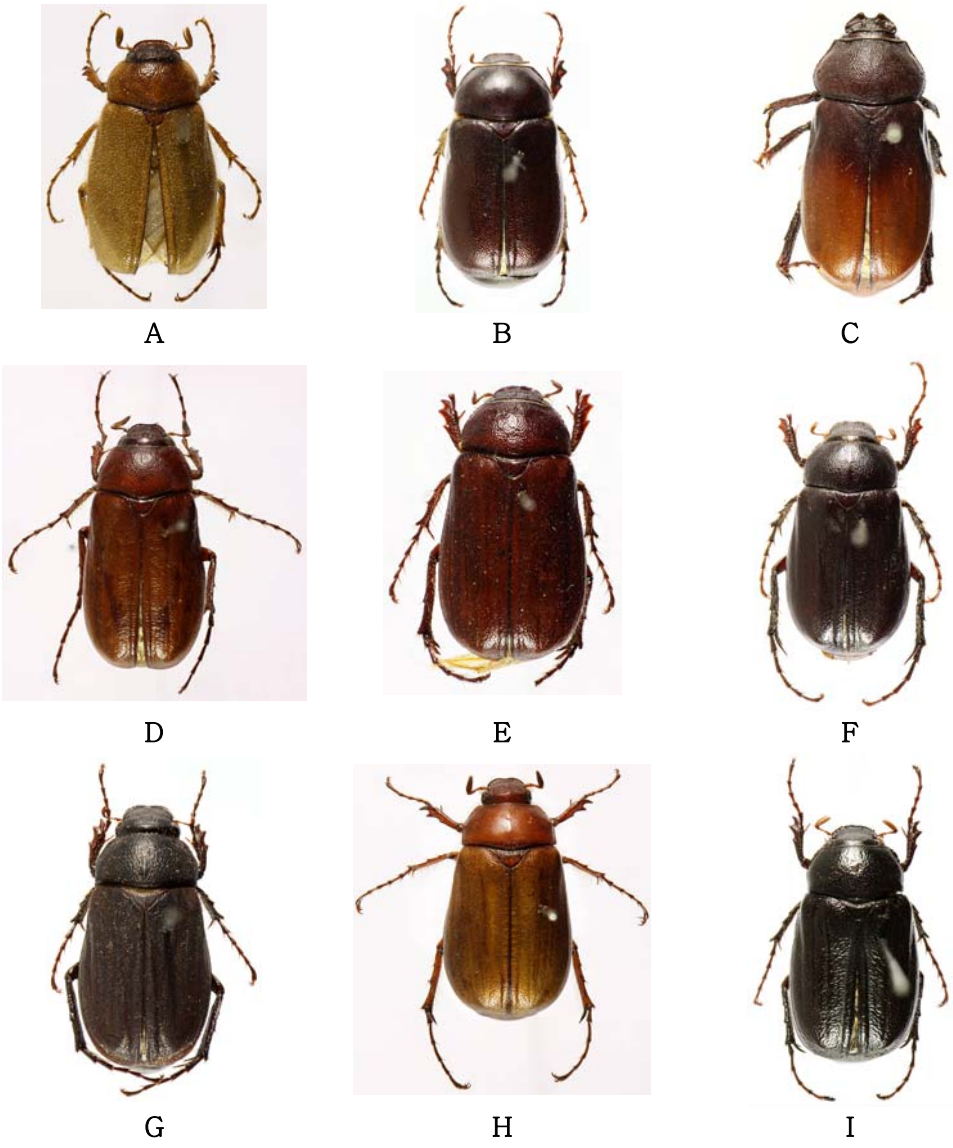


Figure II-4. Melolonthinae: A. *Lasiopsis sahlbergi*; B. *Miridiba castanea*; C. *Miridiba* sp. nov.; D,E. *Holotrichia koraiensis* (male, female); F. *Holotrichia picea*; G. *Holotrichia parallela*; H. *Holotrichia nipponensis*; I. *Holotrichia diomphalia* (male).

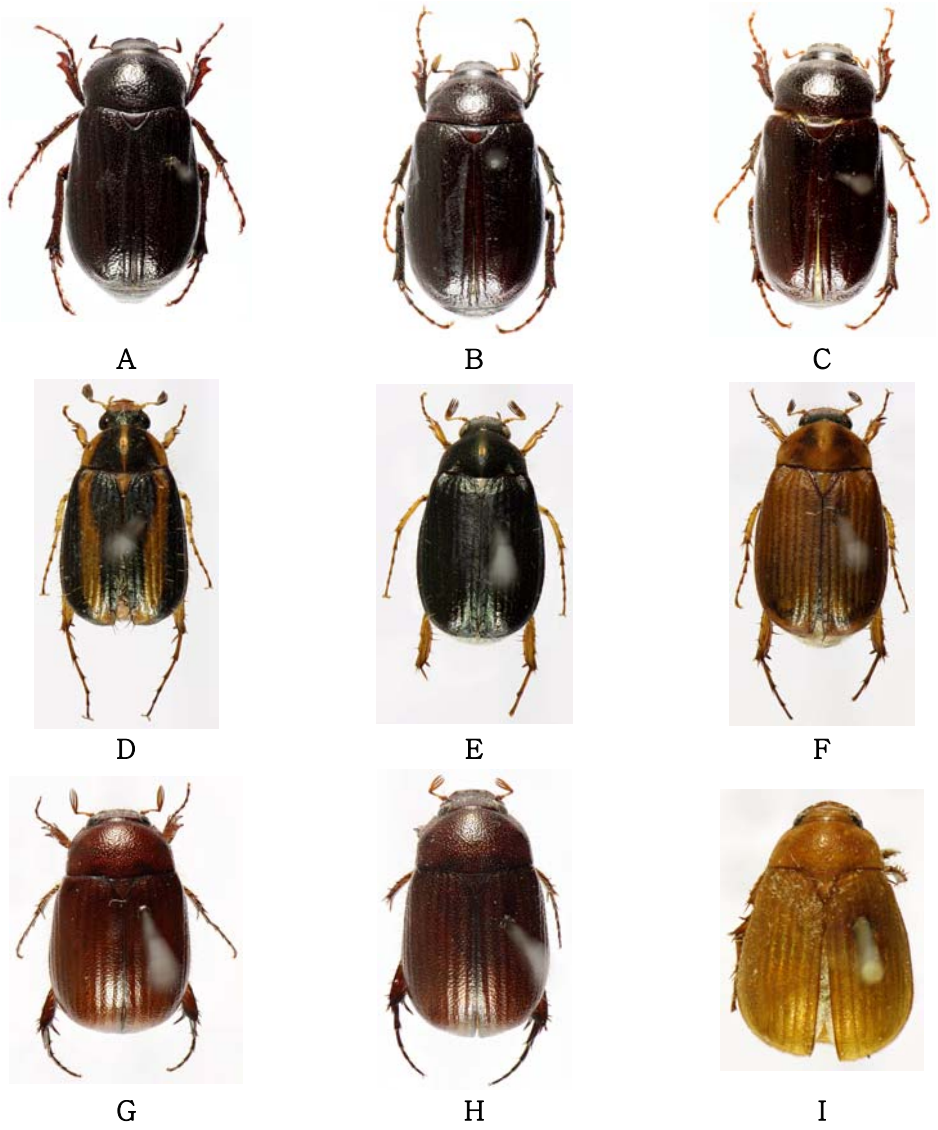


Figure II-5. Melolonthinae: A. *Holotrichia diomphalia* (female); B,C. *Holotrichia ernesti* (male, female); **Sericinae:** D-F. *Gastroserica herzi* (D, E; male, F; female); G, H. *Eumaladera opaciventris* (male, female); I. *Maladera aureola.*

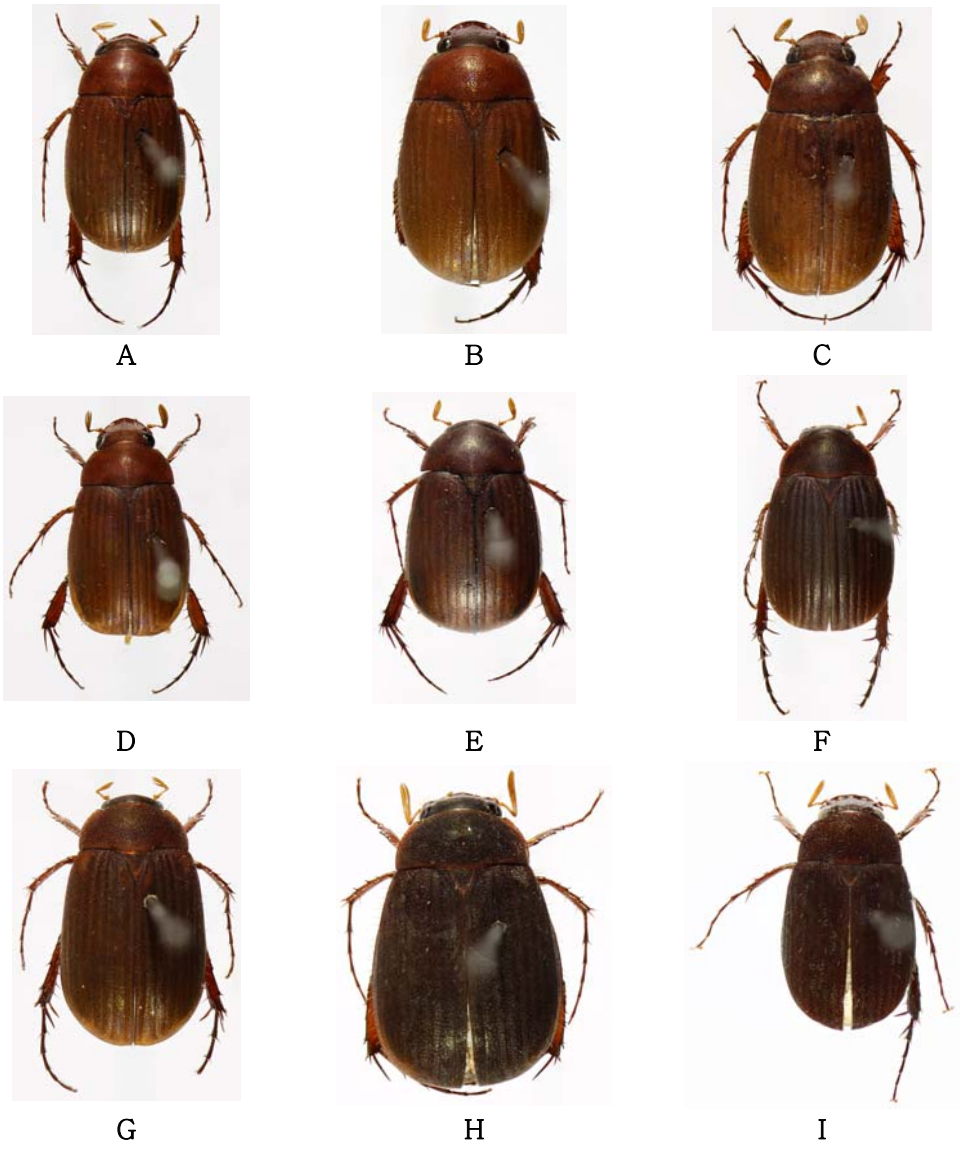


Figure II-6. Sericinae: A, B. *Maladera ovatula* (A; male, B; female); C, D. *Maladera castanea koreana* (C; male, D; female); E. *Maladera verticalis*; F, G. *Maladera infuscata* (male, female); H. *Maladera gibbiventris*; I. *Maladera schoenfeldti* (male).

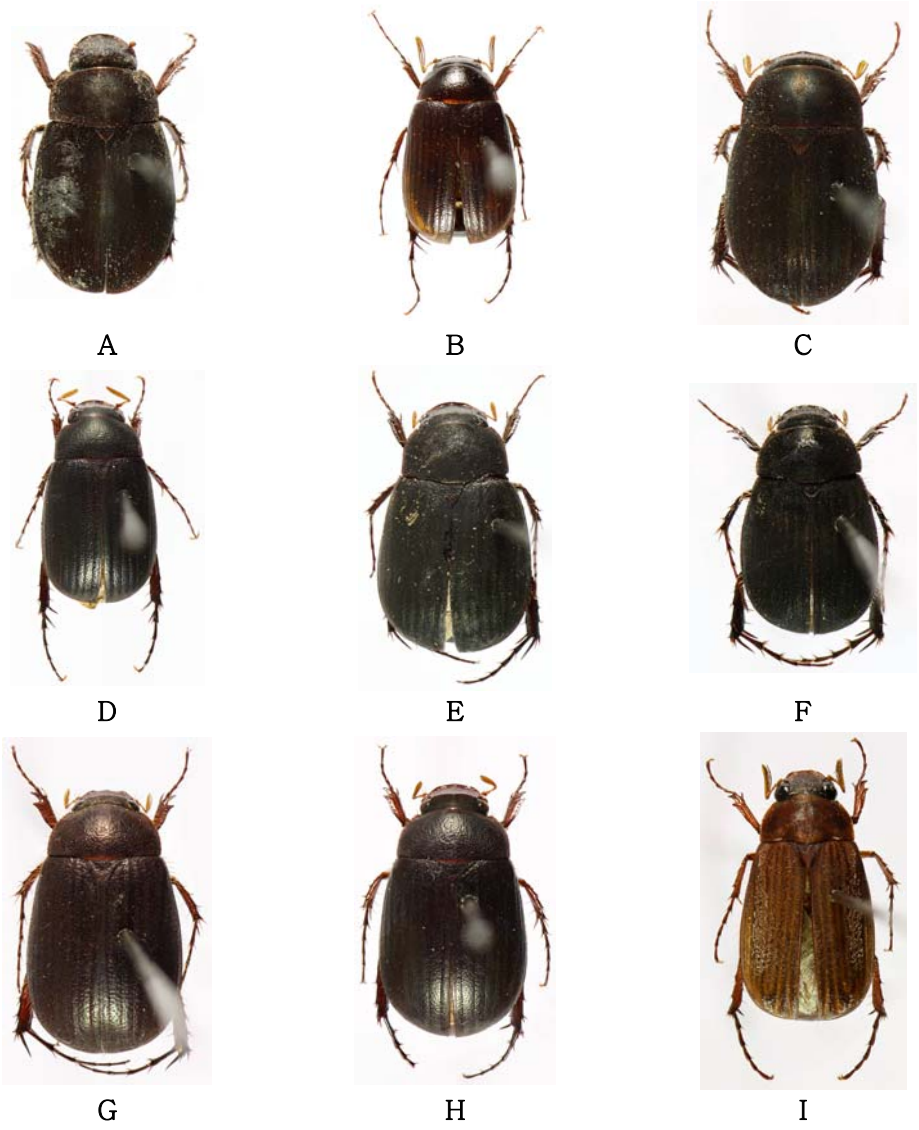


Figure II-7. Sericinae: A. *Maladera schoenfeldti* (female); B,C. *Maladera holosericea* (male, female); D,E. *Maladera renardi* (male, female); F. *Maladera orientalis*; G. *Maladera cariniceps*; H. *Maladera fusania*; I. *Sericania yamauchii* (male).

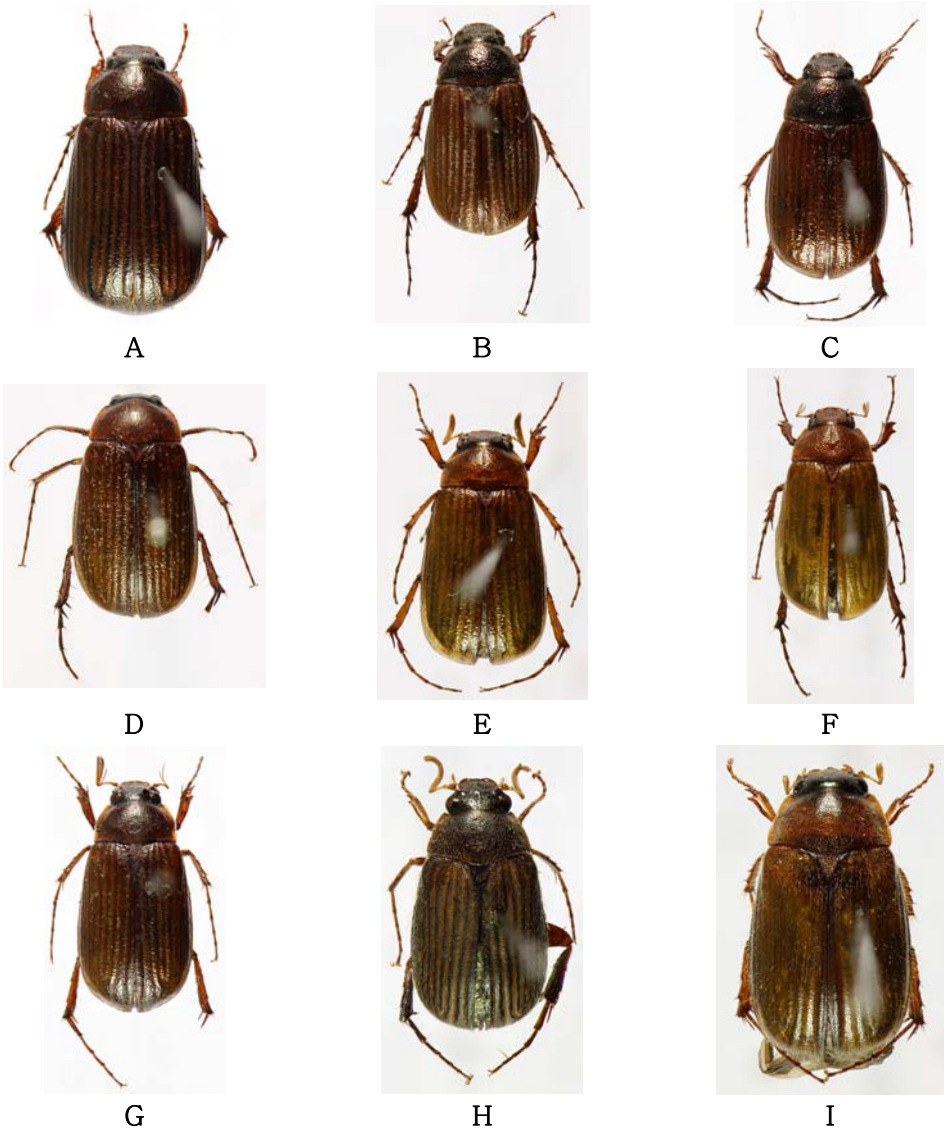


Figure II-8. Sericinae: A. *Sericania yamauchii* (female); B,C. *Sericania koryoensis* (B; male, C; female); D. *Sericania* sp. nov. (male); E,F. *Sericania fuscolineata* (male, female); G. *Sericania latisulcata* (male); H,I. *Serica hirsuta* (male, female).

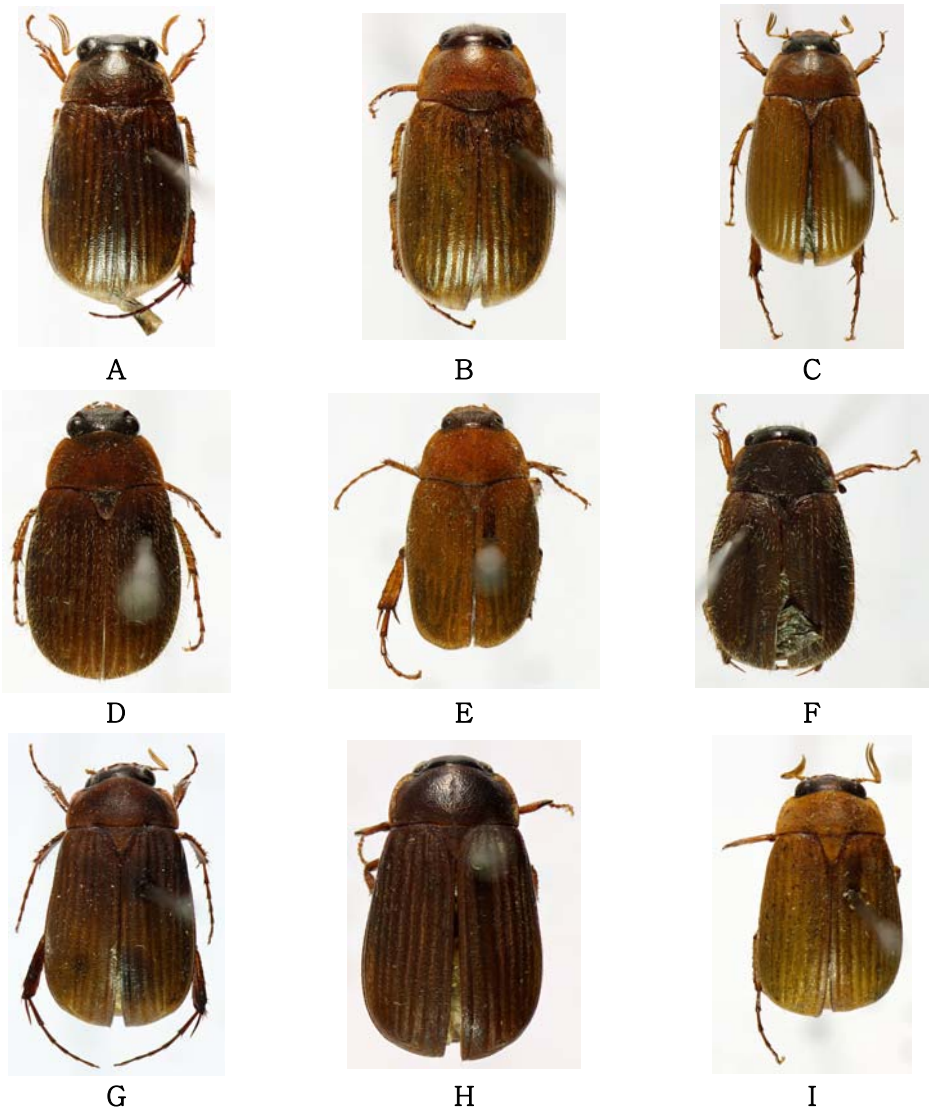


Figure II-9. Sericinae: A,B. *Serica fulvopubens* (male, female); C. *Serica polita*; D, E. *Serica septentrionalis* (male); F. *Serica* sp. nov. (E; male, F; female); G, H. *Nipponoserica elliptica* (G; male, H; female); I. *Nipponoserica koltzei* (male).

A

B

Figure II-10. Sericinae: A. *Nipponoserica koltzei* (female); B. *Nipponoserica* sp. nov. (male).

Plate III. Aedeagus

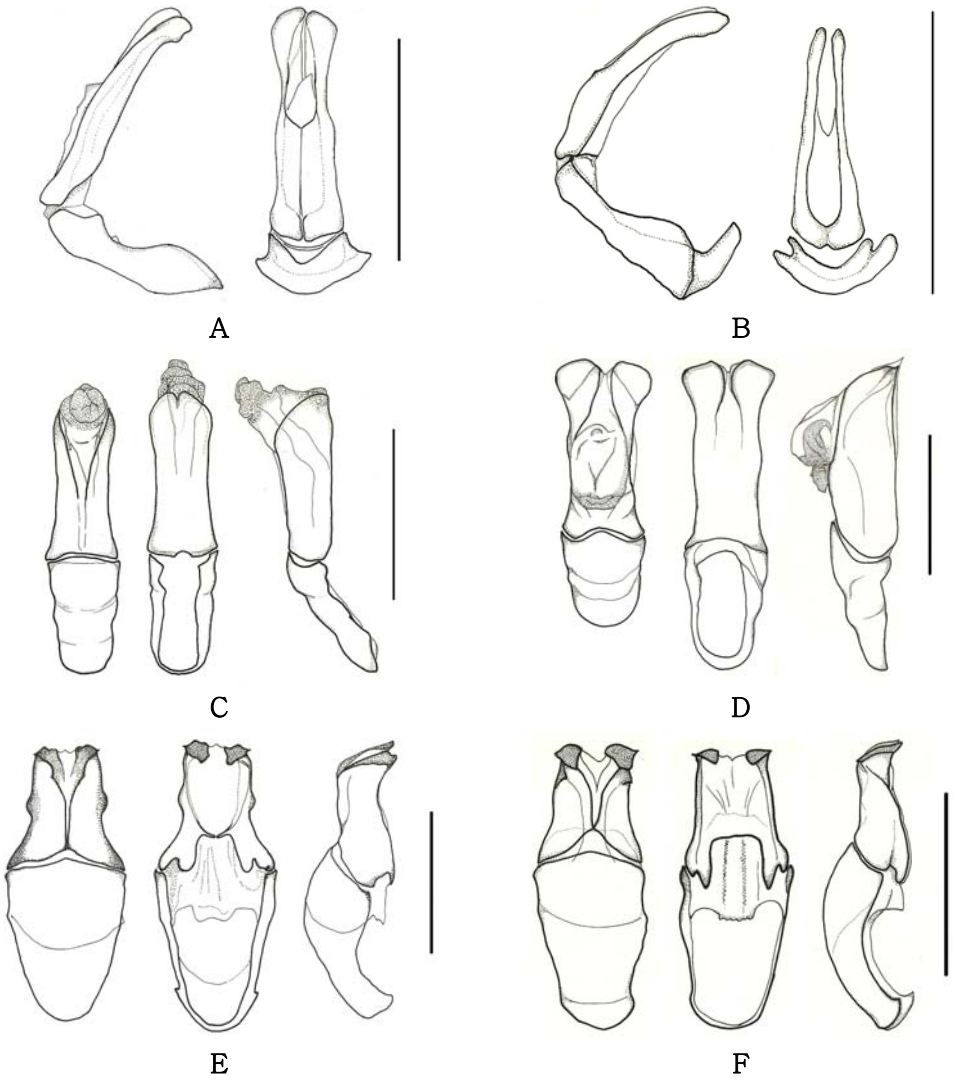


Figure III-1. Hopliinae: A. *Ectinohoplia rufipes* (lateral, parameres); B. *Hoplia aureola* (lateral, parameres); **Melolonthinae:** C. *Heptophylla picea* (dorsal, ventral, lateral); D. *Hilyotrogus bicoloreus* (dorsal, ventral, lateral); E. *Melolontha incana* (dorsal, ventral, lateral); F. *Melolontha insulana* (dorsal, ventral, lateral). Scale: 5 mm.

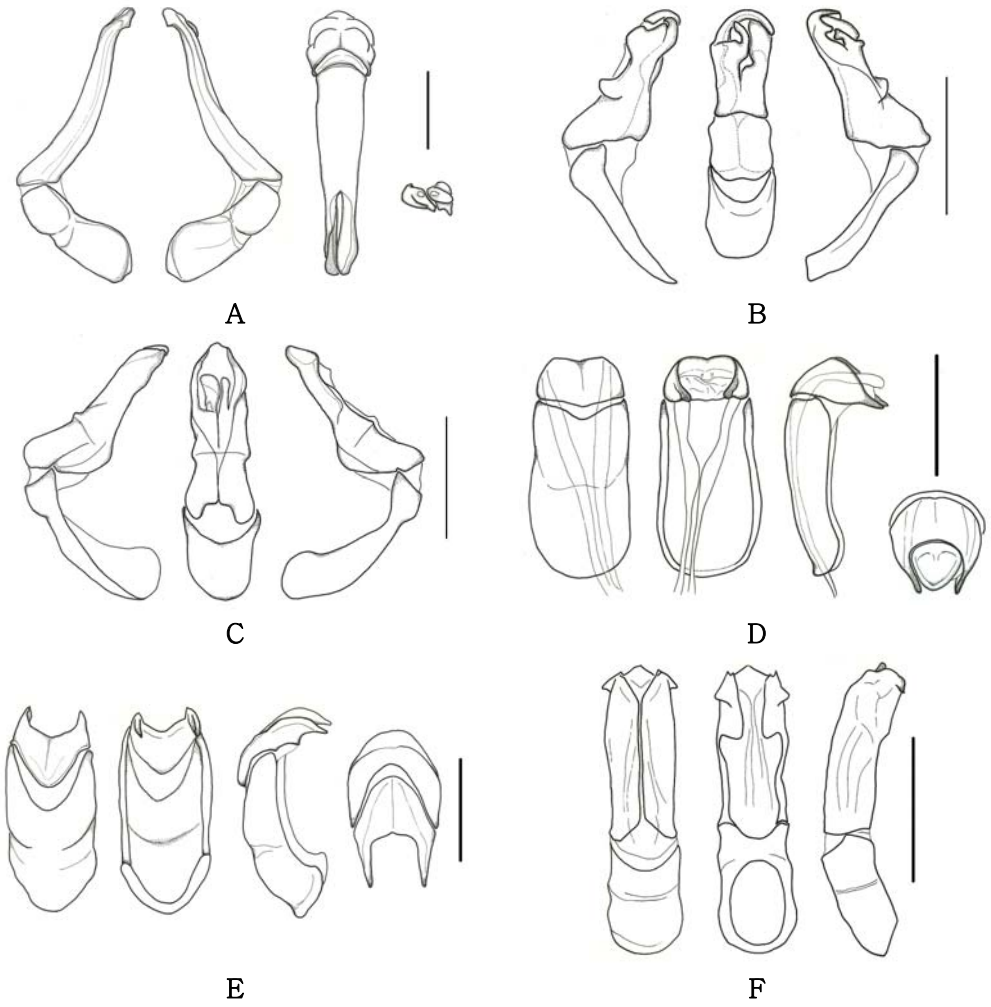


Figure III-2. Melolonthinae: A. *Polyphylla laticollis manchurica* (left, right, parameres, tip of parameres); B. *Apogonia cibricollis* (left, parameres, right); C. *Apogonia cupreoviridis* (left, parameres, right); D. *Sophrops heydeni* (dorsal, ventral, lateral, parameres); E. *Sophrops striata* (dorsal, ventral, lateral, parameres); F. *Brahmina rubetra faldermanni* (dorsal, ventral, lateral). Scale: 5 mm.

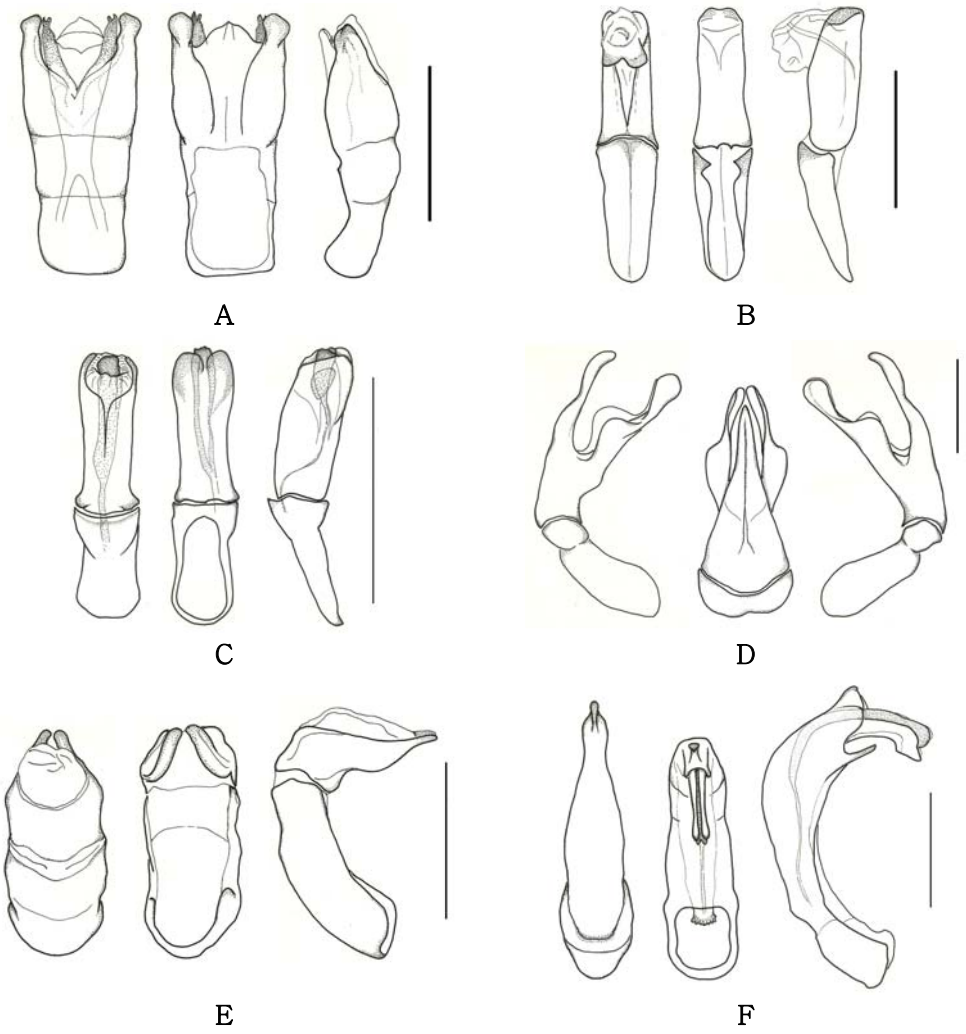


Figure III-3. Melolonthinae: A. *Bunbunius reticulatus* (dorsal, ventral, lateral); B. *Pseudosymmachia impressifrons* (dorsal, ventral, lateral); C. *Lasiopsis sahlbergi* (dorsal, ventral, lateral); D. *Miridiba* sp. nov. (left, right, parameres); E. *Holotrichia koraiensis* (dorsal, ventral, lateral); F. *Holotrichia picea* (dorsal, ventral, lateral). Scale: 5 mm.

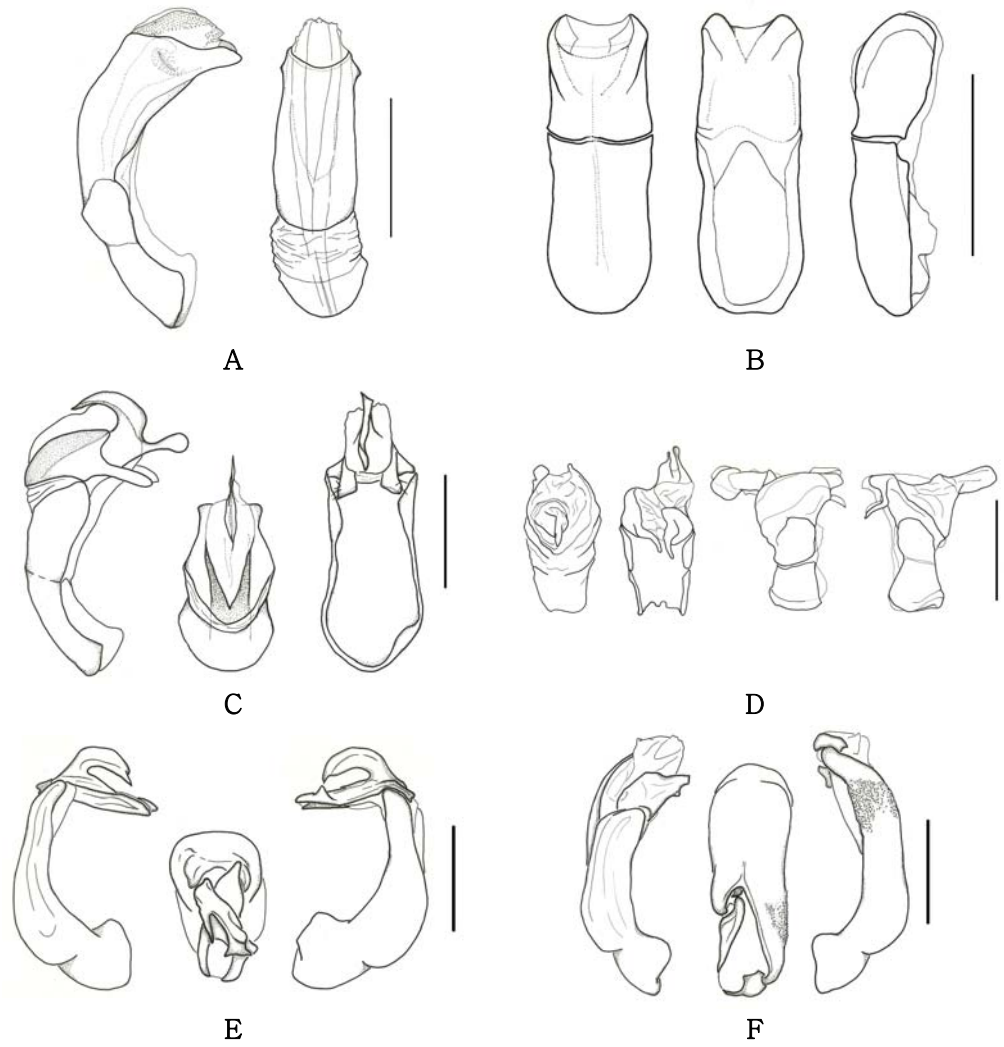


Figure III-4. Melolonthinae: A. *Holotrichia parallela* (lateral, dorsal); B. *Holotrichia niponensis* (dorsal, ventral, lateral); C. *Holotrichia ernesti* (lateral, parameres, ventral); D. *Holotrichia diomphalia* (dorsal, ventral, left, right); **Sericinae:** E. *Gastroserica herzi* (left, parameres, right); F. *Eumaladera opaciventris* (left, parameres, right). Scale: 5 mm.

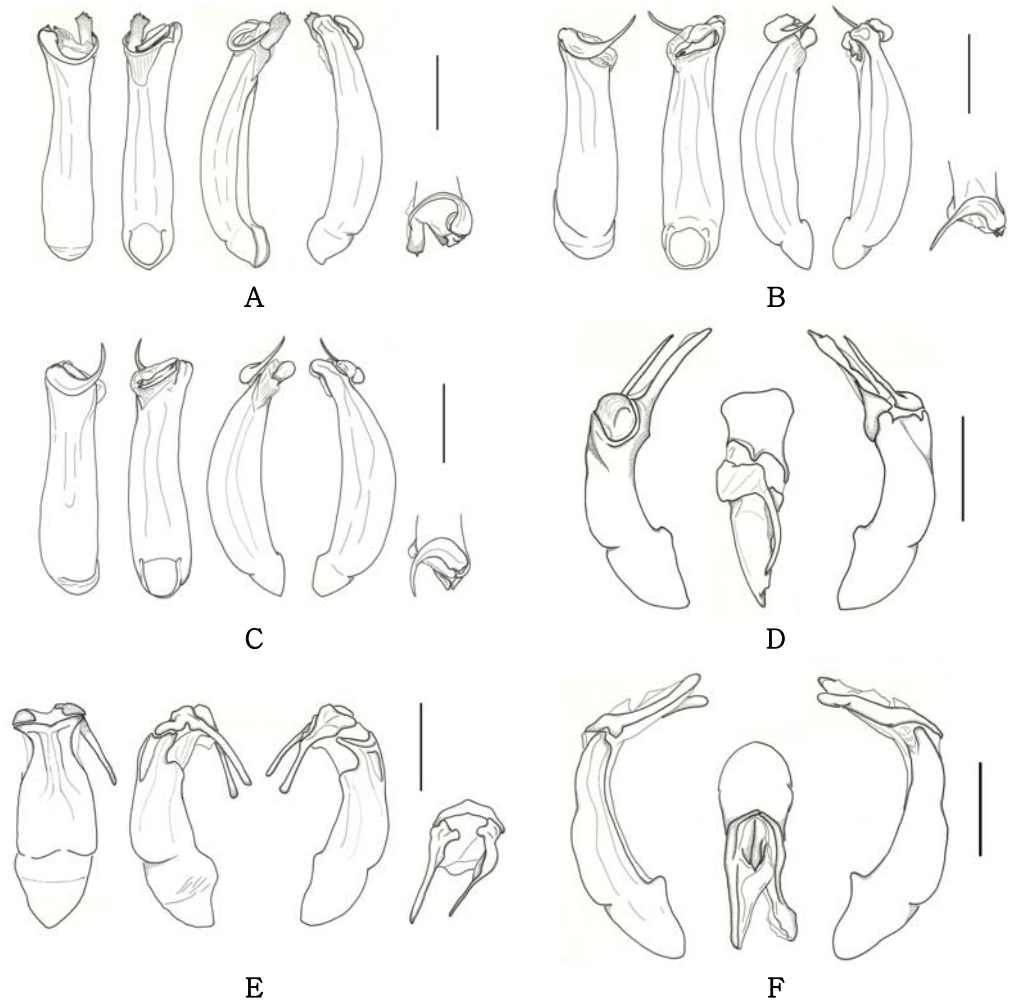


Figure III-5. Sericinae: A. *Maladera ovatula* (dorsal, ventral, left, right, paramere); B. *Maladera castanea koreana* (dorsal, ventral, left, right, paramere); C. *Maladera verticalis* (dorsal, ventral, left, right, paramere); D. *Maladera infuscata* (left, parameres, right); E. *Maladera gibbiventris* (dorsal, left, right, parameres); F. *Maladera schoenfeldti* (left, parameres, right). Scale: 5 mm.

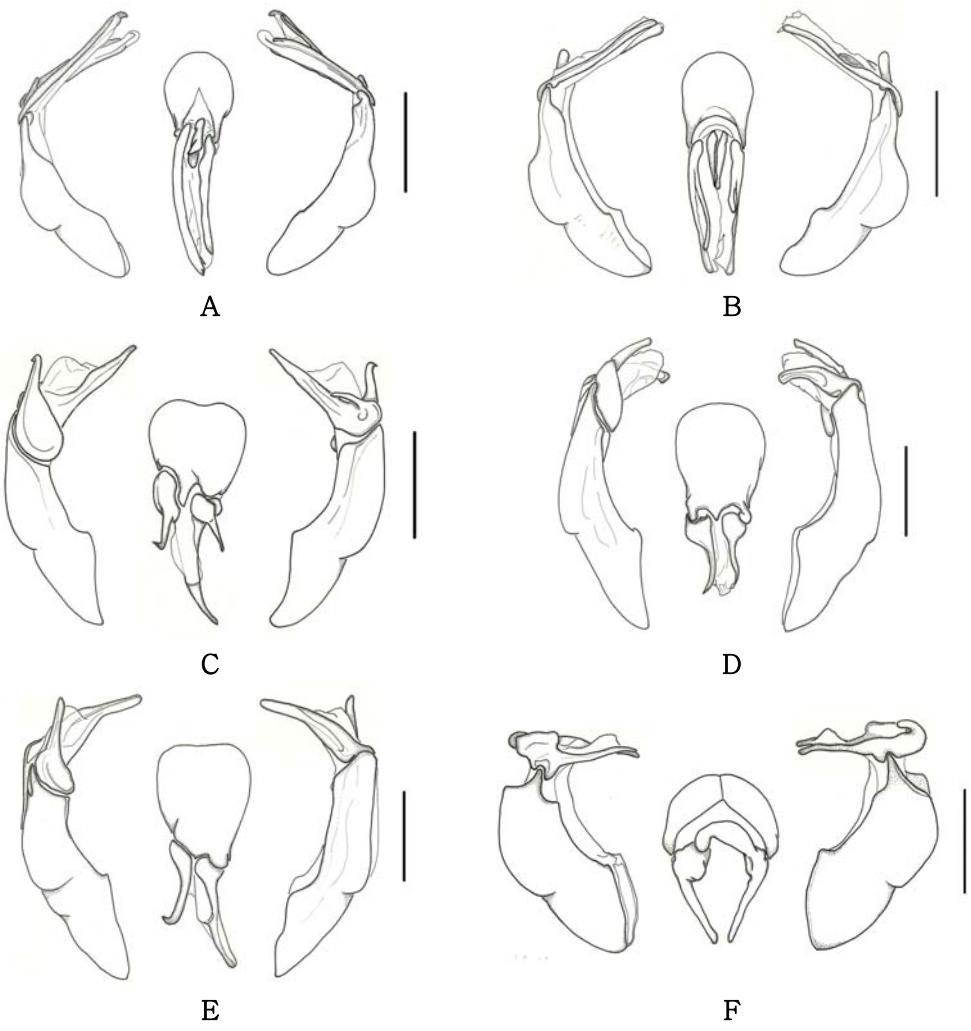


Figure III-6. Sericinae: A. *Maladera holosericea* (left, parameres, right); B. *Maladera renardi* (left, parameres, right); C. *Maladera orientalis* (left, parameres, right); D. *Maladera cariniceps* (left, parameres, right); E. *Maladera fusania* (left, parameres, right); F. *Sericania yamauchii* (left, parameres, right). Scale: 5 mm.

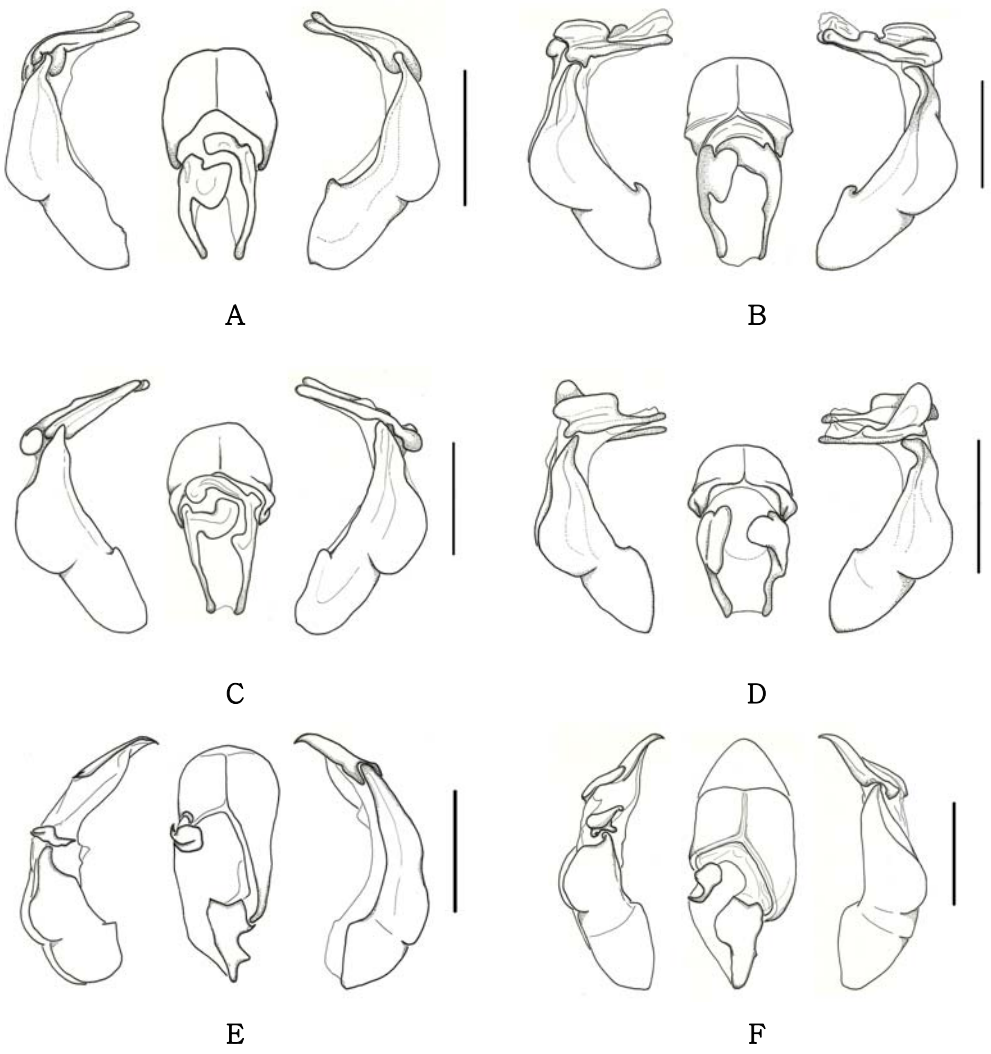


Figure III-7. Sericinae: A. *Sericania koryoensis* (left, parameres, right); B. *Sericania* sp. nov. (left, parameres, right); C. *Sericania fuscolineata* (left, parameres, right); D. *Sericania latisulcata* (left, parameres, right); E. *Serica hirsuta* (left, parameres, right); F. *Serica fulvopubens* (left, parameres, right). Scale: 5 mm.

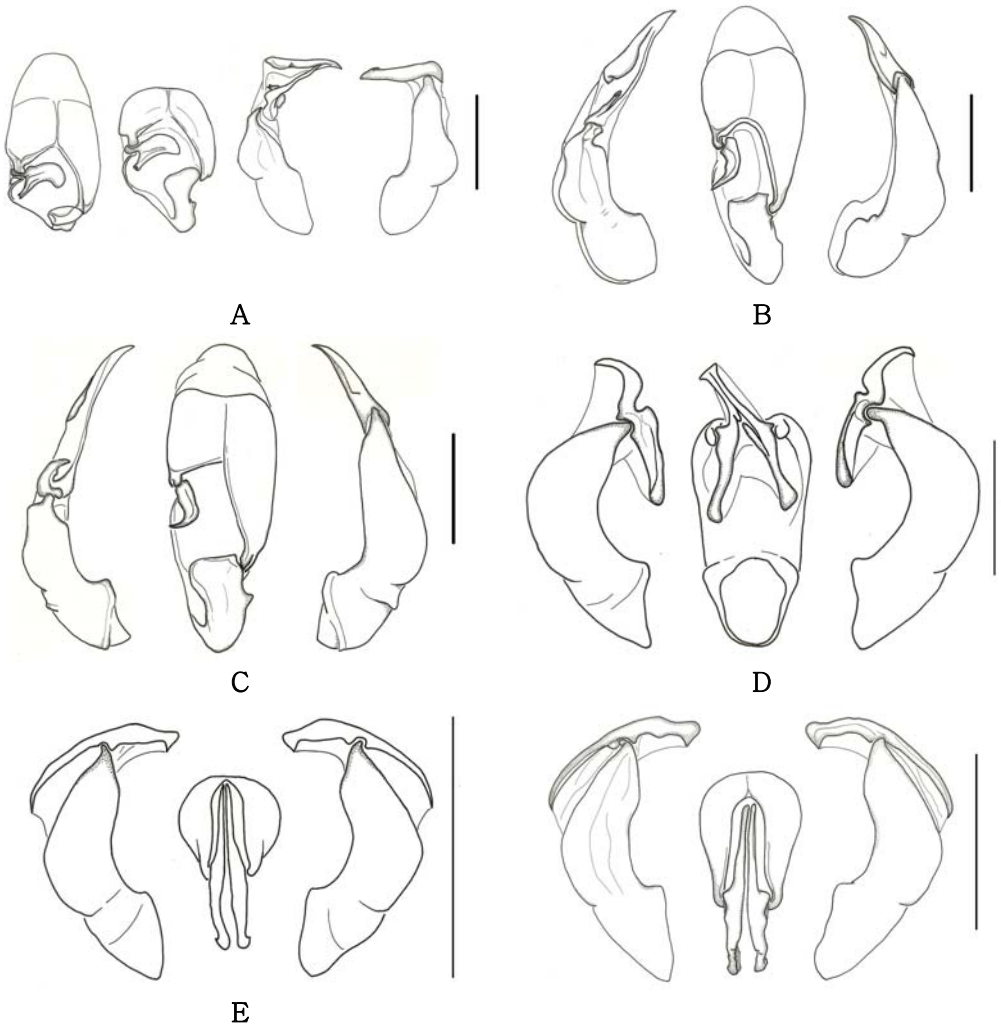


Figure III-8. Sericinae: A. *Serica polita* (dorsal, parameres, left, right); B. *Serica septentrionalis* (left, parameres, right); C. *Serica* sp. nov. (left, parameres, right); D. *Nipponoserica elliptica* (left, parameres, right); E. *Nipponoserica koltzei* (left, parameres, right); F. *Nipponoserica* sp. nov. (left, parameres, right). Scale: 5 mm.

Plate IV. Characters used in cladistic analysis

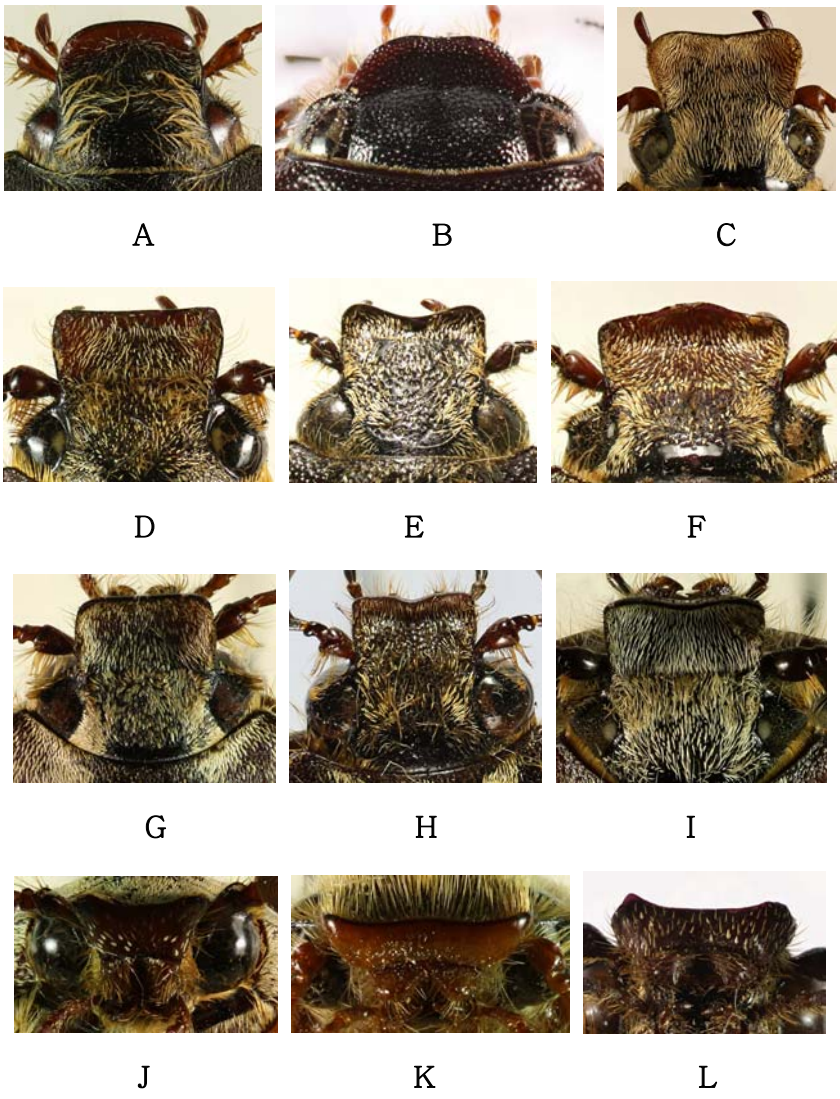


Figure IV-1. A. *Melolontha melolontha*; B. *Phyllophaga congrua*; C. *Polyphylla albolineata*; D. *P. laticollis laticollis*; E. *P. sikkimensis*; F. *P. tridentata*; G. *P. adspersa*; H. *P. gracilicornis*; I. *P. laticollis manchurica*; J. *P. alba*; K. *P. donaldsoni*; L. *P. olivieri*; A-I. head, clypeus; J-L. head, clypeus and labrum, frontal view.

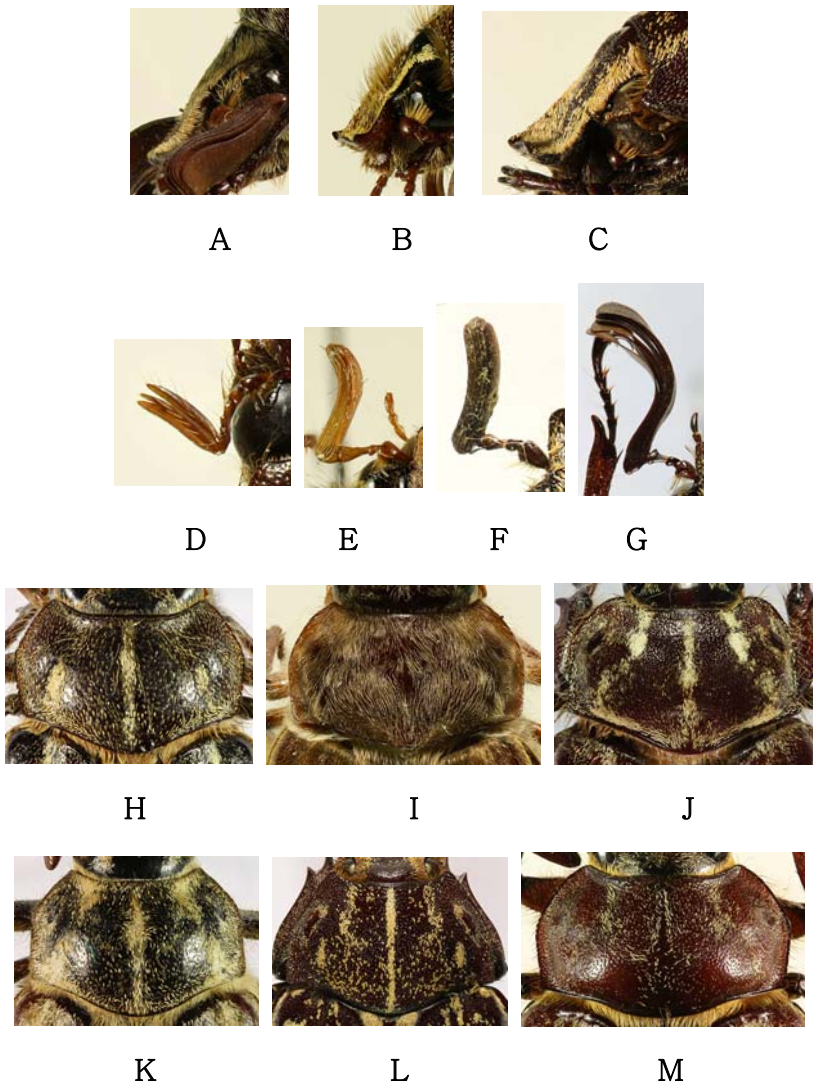


Figure IV-2. A. *Polyphylla albolineata*; B. *P. hammondi*; C,L *P. tonkinensis*; D. *Phyllophaga balia*; E. *P. variolosa*; F. *P. sikkimensis*; G. *P. gracilicornis* H. *P. diffracta*; I. *P. donaldsoni*; J. *P. irrorata*; K. *P. ragusae*; M. *P. laticollis laticollis*; A-C. frons, lateral view; D-G. antenna; H-M. pronotum, dorsal view.

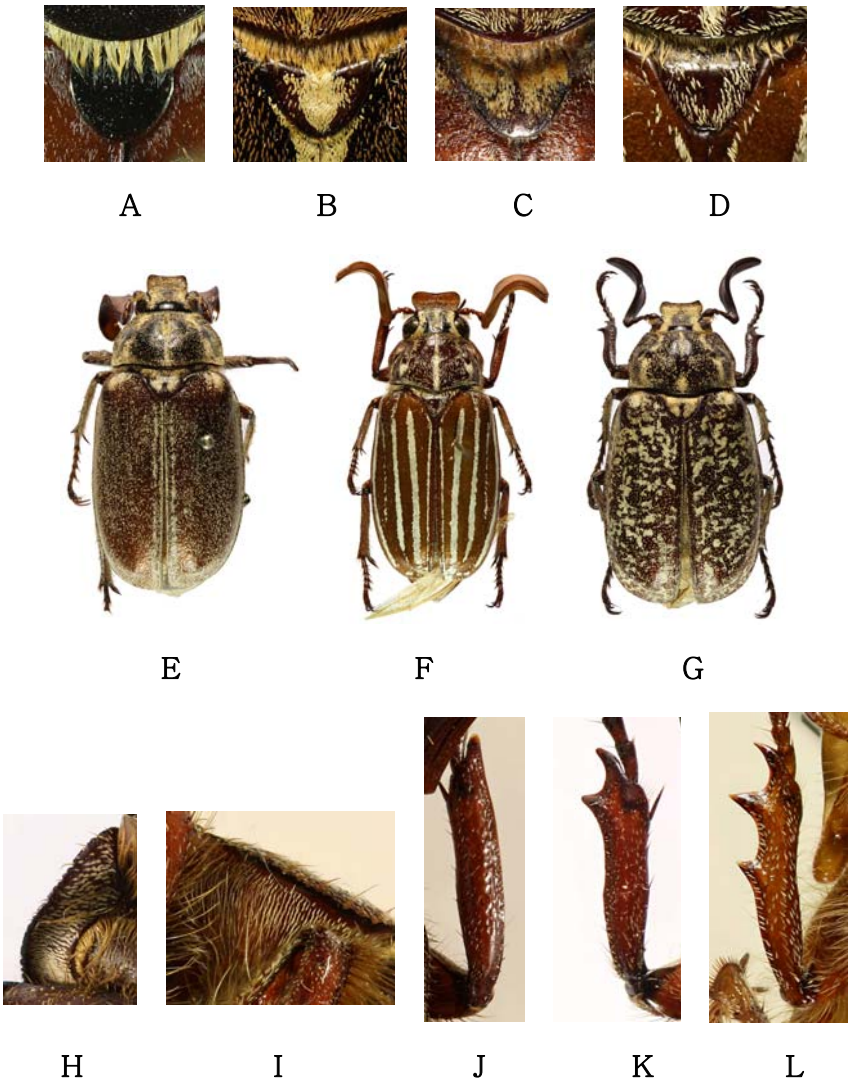


Figure IV-3. A. *Melolontha melolontha*; B. *Polyphylla dicimlineata*; C. *P. irrorata*; D, F. *P. schoenfeldti*; E. *P. ragusae*; G, H. *P. olivieri*; I, K. *P. laticollis laticollis*; J. *P. albolineata*; L. *P. monahansensis*; A-D. scutellum; E-G. habitus, dorsal view; H, I. propleuron; J-L. protibia, dorsal view.

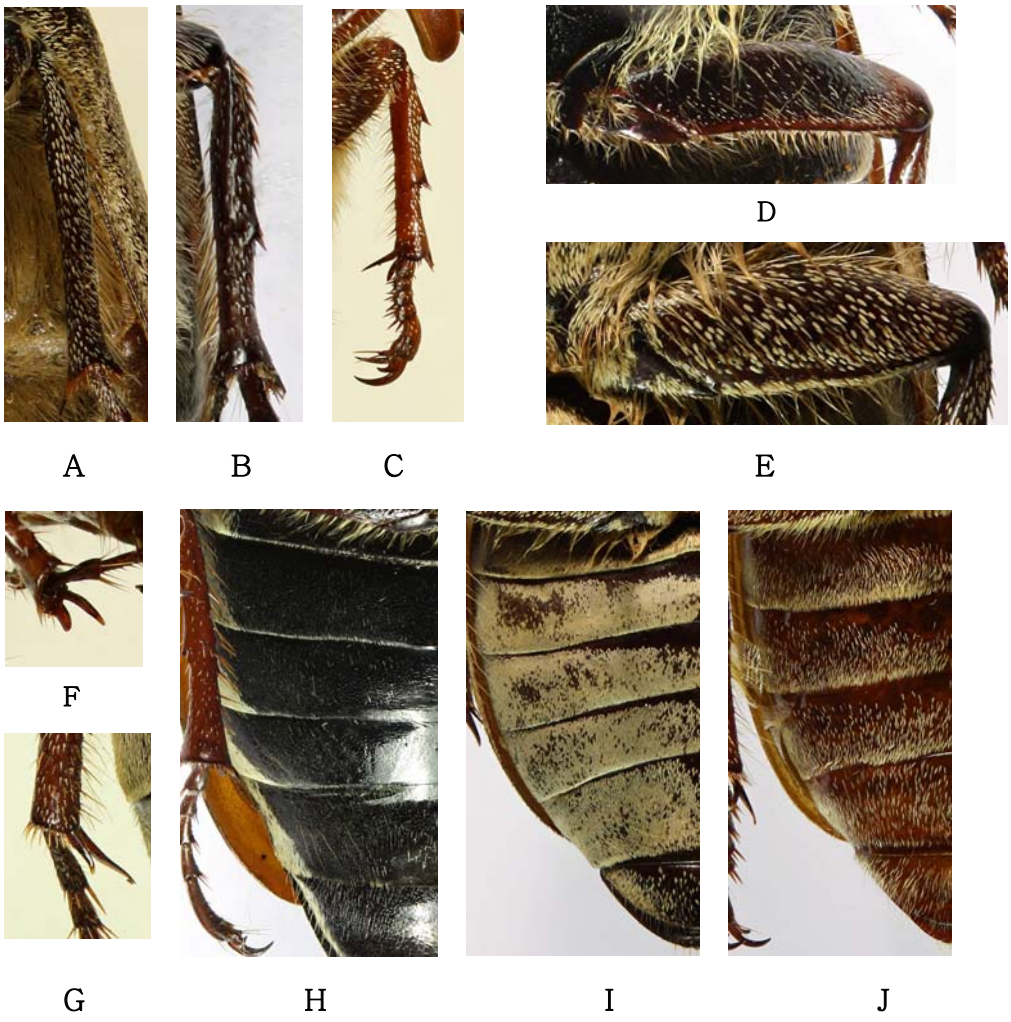


Figure IV-4. A. *Polyphylla ragusae*; B. *P. laticollis manchurica*; C. *P. hammondi*; D, H. *Melolontha melolontha*; E, I. *P. adspersa*; F. *P. balia*; G. *P. albolineata*; J. *P. schoenfeldti*; A-C. mesotibia, ventral view; D, E. metafemur, ventral view; F, G. metatibial spur; H-J. Sternites, ventral view.

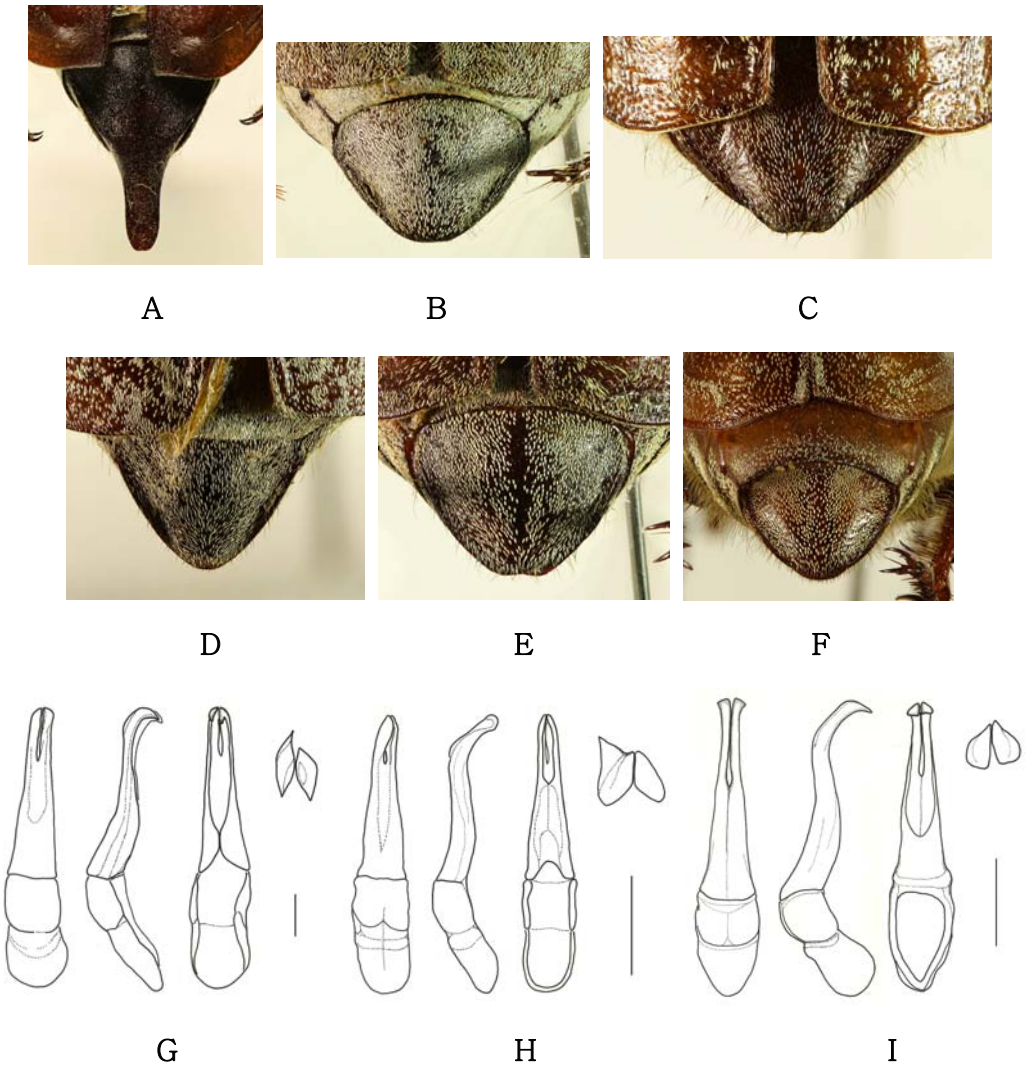


Figure IV-5. A. *Melolontha melolontha*; B. *Polyphylla alba*; C. *P. gracilicornis*; D. *P. olivieri*; E. *P. tridentata*; F. *P. hammondi*; G. *P. dahnshuensis*; H. *P. fullo*; I. *P. davidis*; A-F. pygidium, posterior view; G-I. aedeagus (dorsal, lateral, ventral view; tip of parameres).