

# Taxonomy of the Genus *Tremex* Jurine (Hymenoptera: Siricidae) from Korea, with Descriptions of One New Species and One Unrecorded Species

Jong Wook Lee\*, Sung Man Ryu, and Dong Kee Chung

Department of Biology, College of Sciences, Yeungnam University, Kyongsan 712-749, Korea

**Key Words:**

Hymenoptera taxonomy  
Siricidae  
Food plant  
*Tremex nigrocephalus* n. sp.  
Korea

A taxonomic study was made on the genus *Tremex* (Hymenoptera: Siricidae) in Korea. The study was carried out with specimens collected throughout the country from 1996 to 1998 and preserved in museums and laboratories of Universities in Korea and in other countries. As a result of this study, the genus *Tremex* found in Korea now consists of 5 species including one newly recorded species, *Tremex contractus* Maa and one new species, *Tremex nigrocephalus* n. sp.

Members of the family Siricidae are large insects generally over 14 mm long and known as horntails or woodwasps. The abdomen is cylindrical with the 1st tergite medially divided, and the last apparent segment with a hornlike projection. Larva does not have abdominal prolegs, but has vestigial legs. About 97 species in 15 genera are known in the world (Smith, 1978), and 12 species in 5 genera are known from Korea (Togashi, 1989; Kim et al., 1994).

The Korean *Tremex* has been studied by Takeuchi (1938) and Kim (1963, 1970). About 22 species are known in the world (Smith, 1978; Togashi, 1989), and three species are known from Korea (Kim et al., 1994) in this genera. In this paper, the Korean *Tremex* fauna is reviewed through revising previously known and unrecorded species. We describe an unrecorded species and a new species. The key of the Korean species of *Tremex* has been provided.

## Materials and Methods

Specimens examined in this study were collected from 1996 to 1998 in Korea or obtained from Korea University, Sungshin Women's University, Kyungang National University, and National Science Museum Tokyo (NSMT), Japan. The morphological terminology is referred to Ross (1937).

The abbreviations and indices used in this paper are as follows: Ocular-ocellar distance (OOD); Maximum-ocellar diameter (MOD); Inter-ocellar distance (IOD); Postocellar occipital distance (PDO); Fore wing (FW); Hind wing (HW); Sawsheath length (SSL); Basal plate length (BPL); Precornal basin length (PBL); Precornal

basin width (PBW); Cornus length (CL).

## Results

Order Hymenoptera  
Superfamily Siricoidea  
Family Siricidae  
Subfamily Tremecinae

### *Genus Tremex* Jurine

*Tremex* Jurine 1807: 80.

Genotype: *Sirex fuscicornis* Fabricius (Designated by Latreille, 1810)

*Xyloterus* Hartig 1837: 385.

Genotype: *Sirex fuscicornis* Fabricius (Designated by Rohwer, 1911)

*Xyloecematium* Heyden, 1868: 277 (New name for *Xyloterus* Hartig).

Antennae short, slightly swollen in middle, and almost as long as head and thorax combined. Labial palpi with two segments and cerci absent. Forewings lack vein 2<sub>rm</sub>, and with an appendicular vein (3A). Hindwings without an anal cell, and hind tibia with only a single apical spur. Cornus of female triangular. Larvae boring in hardwood trees.

### Key to species of Korean *Tremex*

1. Female ----- 2  
Male ----- 5
2. Pronotum broad, middle length about as long as POD. 8th tergite excessively long, about as long as 4 preceding segments combined ----- 3  
Pronotum narrow, middle length much shorter than POD. 8th tergite normal, about as long as 3 preceding segments combined ----- 4
3. Head and pronotum black. Wing fuscous. Antenna

\* To whom correspondence should be addressed.

Tel: 82-53-810-2376, Fax: 82-53-815-3061

E-mail: jwlee1@yucc.yeungnam.ac.kr

black (except basal and apical 3 segments fulvous)  
----- *nigrocephalus* n. sp.

Head and pronotum fulvous. Wing yellowish hyaline.  
Antenna entirely fulvous ----- *contractus*

4. Fore wings infusate excepting basal half hyaline.  
Head, pronotum, cornus and sawsheath mostly  
black. Abdomen bluish black with a few white spots  
----- *apicalis*

Fore wings yellowish hyaline. Head, pronotum, cornus,  
and sawsheath yellow or fulvous----- *fuscicornis*

5. Legs black except brown claws ----- *apicalis*  
At least, tibia and tarsus of fore and mid legs  
fulvous ----- 6

6. Abdomen with fulvous flecks. Anterior margin of  
pronotum distinctly shorter than posterior margin,  
and middle length about as long as POD-----

----- *longicollis*

Abdomen uniformly black. Anterior margin of pro-  
notum and posterior margin length subequal, and  
middle length distinctly shorter than POD-----

----- *fuscicornis*

*Tremex apicalis* Matsumura, 1912

*Tremex apicalis* Matsumura, 1912: 23; Kim, 1970: 133,  
736; 1971: 85; 1980: 7; Kim et al., 1994: 217.

*Tremex propheta* Semenov. 1921: 93.

Measurements: ♀; OOD/MOD: 0.82-1.05, MOD/IOD:  
1.95-3.13, POD/OOD: 2.98-3.64, OOD/IOD: 1.75-2.88,  
SSL/BPL: 0.82-1.03, CL/BPL: 0.19-0.27, PBL/PBW:  
0.57-1.12, FW M/1m-cu: 0.75-1.15, 2mcu/3rm: 0.70-  
1.08, 3rm/2r-3rm: 0.54-0.66, HW 1rm/3rm: 0.73-1.00,  
1rm/1rm-mcu: 0.42-0.68.

♂; OOD/MOD: 0.48-1.14, MOD/IOD: 1.43-3.80, POD/  
OOD: 2.86-4.50, OOD/IOD: 1.00-3.73, FW M/1m-cu:  
0.69-1.13, 2mcu/3rm: 0.70-1.29, 3rm/2r-3rm: 0.46-0.77,  
HW 1rm/3rm: 0.89-1.38, 1rm/1rm-mcu: 0.49-1.45.

Specimen examined: Seoul Songbuk Kyonae, 21 V  
1986, 1 ♀ (K. S. Chae); Mt. Umyon, 21 V 1991, 1 ♀  
(E. S. An); Taegu Mt. Taedok, 15 V 1996, 4 ♂♂ (J.  
W. Lee); 24 V 1996, 1 ♀ (Y. J. Chang); KG Suigen,  
14 IX 1928, 1 ♂ (S. Maruta) (NSMT); Keijo, 28 V  
1928, 4 ♂♂ (K. Sato) (NSMT); KB Kyongsan Yeung-  
nam Univ., 24 IV 1989, 1 ♀ (J. W. Lee); 8 V 1989, 1  
♀ (Y. K. Lee); 8 V 1989, 1 ♂ (E. J. Kim); 13 V 1989,  
2 ♀♀ (E. J. Kim); 25 V 1990, 1 ♀ (M. S. Lee); 30 V  
1992, 1 ♀ (S. S. Kwon); 30 V 1992, 1 ♂ (M. K. Lee);  
30 V 1992, 1 ♂ (K. S. Jung); 31 V 1992, 1 ♂; 29 V  
1996, 1 ♂ (Y. M. Moon); 30 V 1996, 1 ♀ (I. S. Im);  
Andong Pohhungkyo, 28 V 1989, 1 ♂ (S. H. Chang).

Localities reported: Chingwansa (Kim, 1980), Chongnung  
(Kim, 1980), Kwangnung (Kim, 1980), Mt. Tobong (Kim,  
1980), Janghung (Kim, 1980), Pongwonsa (Kim, 1980),  
Mt. Yongma (Kim, 1980), Yesan (Kim, 1970, 1980).

Distribution: Korea, China, Japan

Food plants: *Abies sachalinensis*, *Acer mono* Maxim,  
*Acer palmatum* Thunb., *Acer* sp., *Cyclobalanoosis*  
*myrsinaefolia* Oerst., *Juglans sinensis* Dode, *Populus*  
sp., *Prunus yedoensis* Matsum., *Prunus* sp.

Parasites: *Ibalia takachihoi* Yasumatsu (Hymenoptera,  
Ibalidae), *Megarhyssa jezoensis* Matsumura (Hymen-  
optera, Ichneumonidae)

*Tremex fuscicornis* (Fabricius, 1787)

*Sirex fuscicornis* Fabricius, 1787: 257.

*Sirex camelogigas* Christ, 1791: 411.

*Tremex fuscicornis*: Ed. Andre, 1879: 560; Takeuchi,  
1962: 4; Kim, 1963: 295; 1970: 133, 736; 1980: 8;  
Chu, 1969: 296; Ko, 1969: 313; Togashi, 1973: 103;  
Kim et al., 1994: 217.

Measurements: ♀; OOD/MOD: 0.42-0.71, MOD/IOD:  
1.48-2.94, POD/OOD: 3.35-5.23, OOD/IOD: 0.92-1.59,  
SSL/BPL: 0.74-0.84, CL/BPL: 0.21-0.25, PBL/PBW:  
0.49-0.72, FW M/1m-cu: 1.00-1.25, 2mcu/3rm: 0.88-  
1.16, 3rm/2r-3rm: 0.58-0.71, HW 1rm/3rm: 0.90-1.09,  
1rm/1rm-mcu: 0.71-2.00.

♂; OOD/MOD: 0.38-0.55, MOD/IOD: 1.82-2.50, POD/  
OOD: 4.45-5.20, OOD/IOD: 0.91-1.25, FW M/1m-cu:  
0.92-1.09, 2mcu/3rm: 1.00-1.22, 3rm/2r-3rm: 0.56-0.66,  
HW 1rm/3rm: 0.90-1.09, 1rm/1rm-mcu: 0.70-1.07.

Specimen examined: Seoul Chongnung, 12 X 1980, 1  
♀ (J. S. Kim); Tobonggu Mt. Pulam, 14 IX 1986, 1 ♀  
(S. H. Kim); KG Ungogae, 24 IX 1983, 1 ♀ (M. J.  
Kim); Pyongnae Mt. Chonma, 19 IX 1981, 1 ♂ (I. S.  
Lee); 20 IX 1981, 1 ♀ (E. J. Lee); 1 X 1981, 1 ♂ (O.  
H. Park); 1 X 1981, 1 ♂ (M. Y. Um); 11 IX 1982, 1 ♀  
(J. K. Park); 7 X 1984, 1 ♀ (M. R. Chae); 3 X 1984,  
1 ♂ (Y. H. Suh); Pukhansansong, 16 IX 1971, 1 ♀ (Y.  
H. Lee); Mt. Pukhan, 29 IX 1991, 1 ♀ (S. H. Im); KB  
Kyongsan Yeungnam Univ., 9 X 1985, 1 ♀ (Ch. Ch.  
R.); 30 IX 1988, 1 ♀ (E. S. Kim); 16 X 1995, 1 ♀ (J.  
H. Kim); 21 X 1995, 1 ♀ (D. K. Chung); 21 X 1996, 3  
♀♀ (D. K. Chung); 25 X 1996, 1 ♀ (Ch. D. K.).

Localities reported: Kapyong (Kim, 1980), Namisom  
(Kim, 1980), Kwangnung (Kim, 1980), Mt. Acha (Kim,  
1980), Illyong (Kim, 1980), Mt. Chonma (Kim, 1980),  
Tupori (Kim, 1980), Seoul (Kim, 1963, 1970; Togashi,  
1973), Wangsimni (Kim, 1970, 1980), Sinchon (Kim,  
1980), Anamdong (Kim, 1980), Tapsimni (Kim, 1980),  
Hapchongdong (Kim, 1980), Huksoktong (Kim, 1980),  
Pukhansansong (Kim, 1980), Paegundae (Kim, 1980),  
Yesan (Kim, 1970, 1980), Chinjusi (Kim, 1970, 1980).

Distribution: Korea, Europe, Japan, Saghlien, Siberia

Food plants: *Acer platanoides*, *Acer negundo*, *Alnus*  
*japonica* Steud., *Alnus japonica* var. *arguta*, *Alnus* sp.,  
*Betula* spp., *Carpinus betulus*, *Celtis sinensis* Pers.,

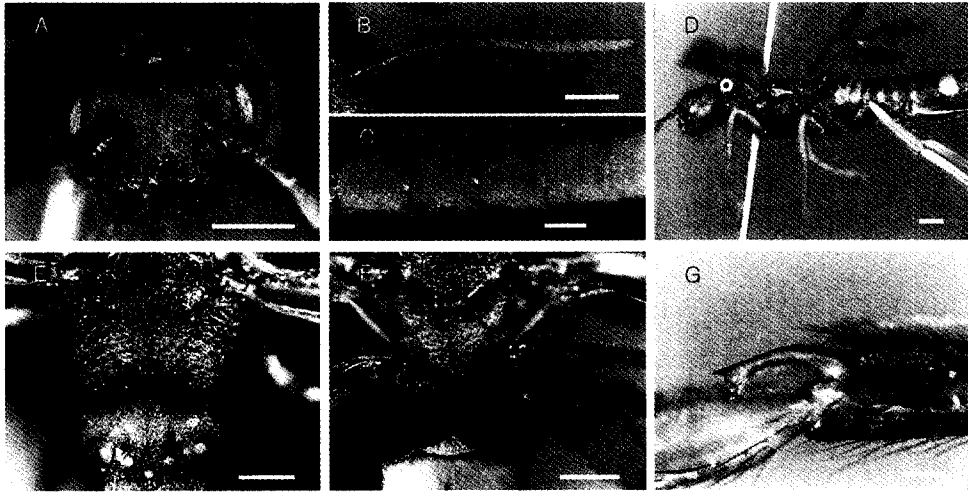


Fig. 1. *Tremex contractus* Maa, 1949. Female. A, Frontal view of head. B-C, Antennae. D, Lateral view of whole body. E, Dorsal view of pronotum. F, Scutellum. G, Tibial spur of foreleg. Scale bars=0.2 mm (C, G) and 1 mm (A, B, D-F).

*Fagus silvatica* (Konow), *Fagus* spp., *Juglans regia*, *Juglans sinensis* Dode, *Populus italica*, *Populus nigra*, *Populus pyramidalis*, *Populus tremula*, *Populus* spp., *Prunus serrulata* var. *spontanea* Wilson, *Prunus yedoensis*, *Prunus* sp., *Pterocarya stenoptera*, *Quercus* sp., *Robinia pseudoacacia*, *Salix* sp., *Ulmus davidiana* var. *japonica* Sarg., *Ulmus japonica*, *Ulmus propinqua* Koidz., *Ulmus* sp., *Zelkova serrata* Mak., *Zelkova* sp.

Parasites: *Thalessa superba* Schrank, *Thalessa clavata* F. (Hymenoptera, Ichneumonidae).

*Tremex longicollis* Konow, 1896

*Tremex longicollis* Konow, 1896: 45; Kim, 1963: 295; 1970: 134, 736; Ko, 1969: 313; Kim et al., 1994: 217. *Tremex similis* Marlatt, 1898: 499.

Measurements: ♂; OOD/MOD: 0.30-0.47, MOD/IOD: 1.69-2.75, POD/OOD: 3.60-6.17, OOD/IOD: 0.75-1.25, FW M/1m-cu: 0.92-1.16, 2m-cu/3rm: 1.10-1.36, 3rm/2r-3rm: 0.56-0.78, HW 1rm/3rm: 0.89-1.13, 1rm/1rm-mcu: 0.59-0.91.

Specimen examined: KN Chinju Kajwadong, 8 IV 1989, 1 ♂ (Y. K. Kim); 8 IV 1989, 1 ♂ (Y. S. Kim); 1 IV 1990, 1 ♂ (J. Y. Park); Chinju Namsongdong, 12 IV 1987, 1 ♂ (D. H. Chung); Jangdan Mt. Jiri, 21-24 VIII 1975, 2 ♂ ♂.

Distribution: Korea, Japan, China, Tiwan

Food plants: *Celtis sinensis* Pers., *Celtis sinensis* *Tremex similis* Marlatt, 1898: 499.

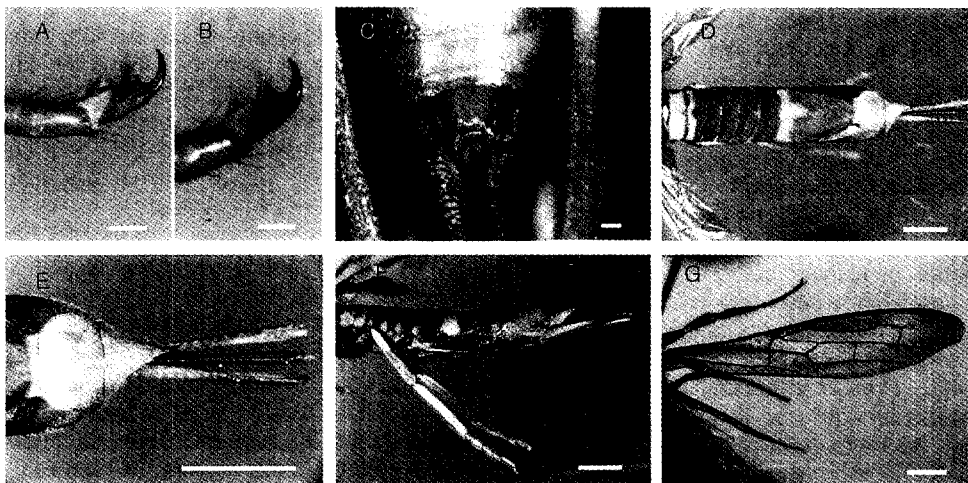


Fig. 2. *Tremex contractus* Maa, 1949. Female. A, Tarsal claw of foreleg. B, Tarsal claw of hindleg. C, Ventral view of ovipositor. D, Dorsal view of abdomen. E, Dorsal view of precornal basin. F, Lateral view of abdomen. G, Right wings. Scale bars=0.2 mm (A, B) and 2 mm (C-G).

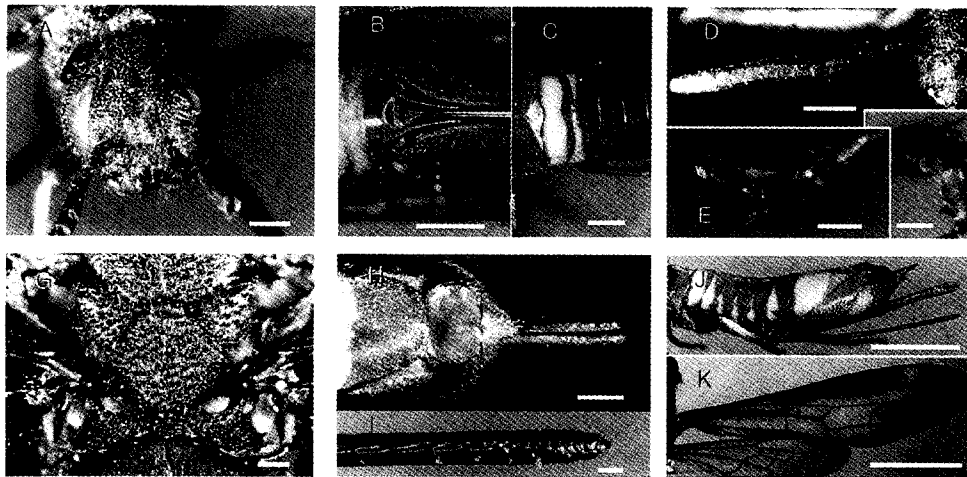


Fig. 3. *Tremex nigrocephalus* n. sp., Female. A, Frontal view of head. B, Ventral view of ovipositor. C, Dorsal view of abdomen. D, Antennae. E, Fore tarsal claw. F, Hind tarsal claw. G, Scutellum. H, Dorsal view of precornal basin. I, Ovipositor. J, Lateral view of abdomen. K, Right wings. Scale bars=0.2 mm (E, F, I), 1 mm (G, J, K) and 4 mm (A-D, H).

Measurements: ♂; OOD/MOD: 0.30-0.47, MOD/IOD: 1.69-2.75, POD/OOD: 3.60-6.17, OOD/IOD: 0.75-1.25, FW M/1m-cu: 0.92-1.16, 2mcu/3rm: 1.10-1.36, 3rm/2r-3rm: 0.56-0.78, HW 1rm/3rm: 0.89-1.13, 1rm/1rm-mcu: 0.59-0.91.

Specimen examined: KN Chinju Kajwadong, 8 IV 1989, 1 ♂ (Y. K. Kim); 8 IV 1989, 1 ♂ (Y. S. Kim); 1 IV 1990, 1 ♂ (J. Y. Park); Chinju Namsongdong, 12 IV 1987, 1 ♂ (D. H. Chung); Jangdan Mt. Jiri, 21-24 VIII 1975, 2 ♂ ♂.

Distribution: Korea, Japan, China, Tiwan

Food plants: *Celtis sinensis* Pers., *Celtis sinensis* Pers. var. *japonica* Nakai, *Celtis* sp.

*Tremex contractus* Maa, 1949 (Figs. 1, 2)

*Tremex contractus* Maa, 1949: 135, ♀; Takeuchi, 1955: 2,7; 1962: 2-4,10; Xiao and Wu, 1983: 19.

Diagnosis: Head fulvous. Mandible black with three teeth. Eye length 2 times as width; antennae fusiform, 15 segments, ratio of basal five segments 2.8:1.0:2.1:2.8:2.1; Pronotum middle length subequale POD; cenchri fulvous, width about 0.52 times as length inter both; 8th tergite excessively long, about as long as 4 preceding segments combined; basal halves of tibia and basitarsus yellowish white; fore wings hyaline, apical fourth slightly infuscated, hind wing pale fusco-hyaline. Sawsheath shorter than basal plate (about 0.50:0.71). Precornal basin broader than length (ratio between breadth and length about 1.35:1.90). Body length 18.1 mm (except ovipositor).

Measurements: ♀; OOD/MOD: 0.38, MOD/IOD: 2.33, POD/OOD: 5.00, OOD/IOD: 4.44, SSL/BPL: 0.70, CL/BPL: 0.20, PBL/PBW: 0.71, FW M/1m-cu: 0.98,

2mcu/3rm: 1.03, 3rm/2r-3rm: 0.74, HW 1rm/3rm: 0.95, 1rm/1rm-mcu: 1.25.

Specimen Examined: KN Chinju Kajwadong, 3. V. 1990, 1 ♀ (S. M. Ryu).

Distribution: Korea, China, Japan

Remarks: This species is recorded for the first time from Korea. This species differs from other species as follows: ratio between pronotum middle length and OOD; 8th tergite excessively long, about as long as 4 preceding segments combined; color pattern of tibia and basitarsus.

*Tremex nigrocephalus* n. sp. (Fig. 3)

Female: Length of body excepting ovipositor 17.4 mm. Length of antenna 5.1 mm. Head and thorax mostly black except following brown parts: spot of hind orbit, labial palpi excepting apical portion, basal and apical 3-4 segments of antenna. Mandible brownish black. Cenchri fulvous. Wing more or less obscure, vein reddish brown, following parts more obscure: basal portion, apical margin cubital cell, anal cell, environs of cubital vein and medial vein of fore wings, basal and apical portion of hind wings.

Leg black with following parts reddish brown: tibia and tarsus (excepting basal half of tibia and basitarsus yellowish white).

Abdomen black with following parts fulvous: basal 3/4 portion of 1st tergite, middle band of 3rd to 8th tergites, both side spot of 9th tergite, cornus (except apical portion reddish brown). Ventral of abdomen with yellowish white spotted. Base of ovipositor reddish brown. Basal plate fulvous to reddish brown, saw-sheath yellowish white excepting apical half reddish brown.

Head roughly and densely punctated and polished.

Area just in front of anterior ocellus with a short depression. Ocello-ocular area with deeply longitudinal depression. Mandible shallowly indented excepting right's apical tooth distinctly. Basal area with punctures and hairs excepting apical portion. Eye ellipsoidal, length about 2 times than width. Hind orbit area distinctly convexed with especially large punctures but hairs not. Area between antennal socket, frontal margin of eyes, clypeus densely with yellowish white hair, lateral margin of antennal fovea and labial palpi densely with blackish brown long hair. Labial palpi 2 segments. Antenna fusiform, 14 segments, apical margin of all segments with hair, relative length of basal five segments about 2.4:1.0:1.9:2.0:1.4, scape trapezoid (=apical margin wider than basal margin) and longer than 3rd segment. Length of antenna shorter than head thorax combined. Pronotum and mesonotum with wave-like convex line so large punctures. Pronotum trapezoid narrowed forward with shallow median furrow, anterior and posterior margin concaved inner, both posterior margin especially elongated, middle length subequale POD. Mesopleura with large puncture and polish. Width of cenchri about 0.47 times as length inter both. Fore wing without 2<sub>rm</sub>, Cu<sub>1</sub>. Anterior margin including stigma with dental teeth. Hind wing without anal cell. All legs with only one tibial spur. Length of hind femora about 1.64 times width and as long as basitarsus. Claws with only one inner tooth. Tergite with densely gem-like small granules. 8th tergite excessively long, about as long as 4 preceding segments combined. Sawsheath with seven dental teeth, and longer than half of basal plate. Precornal basin broader than length (ratio between breadth and length about 1.7:1.0). Cornus triangular and apical portion with spine.

Male: Unknown.

Measurements: ♀; OOD/MOD: 0.40-0.47, MOD/IOD: 2.00, POD/OOD: 4.00-4.81, OOD/IOD: 0.80-0.83, SSL/BPL: 0.59-0.70, CL/BPL: 0.18-0.19, PBL/PBW: 0.55-0.59, FW M/1m-cu: 0.88-0.89, 2m<sub>cu</sub>/3<sub>rm</sub>: 0.89-1.27, 3<sub>rm</sub>/2<sub>r</sub>-3<sub>rm</sub>: 0.63-0.72, HW 1<sub>rm</sub>/3<sub>rm</sub>: 0.70-0.90, 1<sub>rm</sub>/1<sub>rm</sub>-m<sub>cu</sub>: 0.60-0.63.

Specimen examined: Holotype: KB Kyongsan Yeungnam Univ., 2. VI. 1997, 1 ♀ (W. H. Lee)

Paratype: KG Ongjin Sopori, 7. VII. 1981, 1 ♀ (J. I. Kim)

Remarks: This new species is similar to *Tremex contractus* Maa, but differs from the latter species in some features such as black, head ratio of sawsheath and basal plate, color of abdomen and wings.

The type specimens are deposited in the Animal Taxonomy Laboratory, College of Science, Yeungnam University, Korea (YUK).

## Acknowledgements

This study was supported by the Korea Science and Engineering Foundation (Grant No. 971-0510-053-1). We are grateful to Dr. Akihiko Shinohara, National Science Museum Tokyo (NSMT), who loaned some specimens examined in this paper.

## References

- Christ JL (1791) Naturgeschichte, Klassifikation und Nomenclatur der Insecten von Beinen, Wespen, und Ameisengeschlecht. Frankfurt, pp 1-535.
- Chu TL (1969) The Animal Kingdom of Korean Insects. Gwahakwon Pub Co, P'yongyang, pp 1-589.
- Enslin E (1917) Die Tenthredinoidea Mitteleuropas. *Deutsch Entomol Zeit* 10: 539-741.
- Fabricius JC (1787) Mantissa Insectorum. II. Hafinace, Impensis Christ, Paris, pp 1-348.
- Hartig T (1837) Die Familien der Blattwespen und Holzwespen, nebst einer allegemeinen einleitung zur Naturgeschichte der Hymenopteren. Haude und Spener'sche Buchhandlung, Berlin, pp 1-416.
- Heyden L (1868) Ueber das sither unbekannte Mannchen von *Xyloterus fuscicornis* F. *Berliner Entomol Zeit* 1: 227-230.
- Jurine (1807) Nouvelle Méthode de classer les Hyménoptères et les Diptères. I. Hyménoptères. Geneva, pp 1-319.
- Kim CW (1963) Hymenoptera of Korea. *Humanit Sci (Nat Sci)* 6: 243-296.
- Kim CW (1970) Illustrated Encyclopedia of Fauna and Flora of Korea. 11. Insect. Samhwa Pub Co, Seoul, pp 115-208.
- Kim CW (1971) *Tremex apicalis* Matsumura as a Host of an Ichneumon-fly, *Megarhyssa jezoensis* Matsumura. *Korean J Zool* 14: 85-86.
- Kim CW (1980) Hymenoptera and Diptera. Distribution Atlas of the Insects of Korea. Series 3. Korea University Press, Seoul, pp 1-356.
- Kim CW, Lee JW, Park JS, Kim BJ, and Baek JC (1994) Hymenoptera. In: The Entomological Society of Korea and Korean Society of Applied Entomology (eds), Check List of Insects from Korea, Kon-kuk University Press, Seoul, pp 216-269.
- Ko JH (1969) A List of Forest Insect Pests in Korea. Forest Research Institute, Seoul, pp 1-458.
- Konow W (1896) Verschiedenes aus der Hymenopteren-Gruppe der Tenthrediniden. *Wien Entomol Zeit* 15: 41-59.
- Maa TC (1949) A synopsis of Asiatic Siricoidea with notes on certain exotic and fossil forms (Hymenoptera, Symphyta). *Notes Entomol China* 13: 11-189.
- Marlatt MS (1898) Japanese Hymenoptera of the family Tenthredinidae. *Proc US Nat Mus* 21: 493-507.
- Okutani T (1967) Food plants of Japanese Symphyta. *Jpn J Appl Entomol Zool* 11: 43-49.
- Rohwer SA (1911) The genotypes of the sawflies and woodwasps, or the superfamily Tenthredinoidea. *Tech US Dept Agr Bur Entomol* 20: 69-110.
- Ross HH (1937) A generic classification of the nearctic sawflies (Hymenoptera: Symphyta). *Illinois Biol Mong* 15: 1-173.
- Semenov-Tian-Shanskij A (1921) Praecursoriae Siricidarum novorum diagnoses (Hymenoptera). *Rev Russe Entomol* 17: 81-95.
- Smith DR (1978) Suborder Symphyta (Xyelidae, Parachelyelidae, Parapamphiliidae, Xyelydidae, Karatavitidae, Giga-siricidae, Sepulcidae, Pseudosiricidae, Anaxyelidae, Siricidae, Xiphidiidae, Paroryssidae, Xyelotomidae, Blasticotomidae, Pergidae). In: Vecht J and Shenefelt RD (eds), Hymenopterorum Catalogues Part 14, Dr W Junk BV Publishers, Hague, pp 43-128.
- Takeuchi K (1938) A systematic study on the suborder Symphyta (Hymenoptera) of the Japanese Empire (I). *Tenthredo* 2: 173-229.

*Taxonomy of the Genus Tremex from Korea*

- Takeuchi K (1955) Siricidae of Japan. *Trans Kyoto Entomol Soc* 4: 1-27.
- Takeuchi K (1962) *Insecta Japonica* (Hymenoptera: Siricidae). Hokuryukan, Tokyo, pp 1-12.
- Togashi I (1973) Tenthredinoidea of Korea collected by Prof K Tsuneki in 1941-43 (Hymenoptera). *Life Stud* 17: 103-112.
- Togashi K (1989) Temporal pattern of the occurrence of weakened *Pinus thunbergii* tree and causes for mortality. *J Jpn Forest Soc* 71: 323-328.
- Xiao GR and Wu J (1983) The siricid wood wasps of China (Hymenoptera, Symphyta). *Sci Silv Sinicae* 19: 1-29.

[Received June 29, 1998; accepted July 20, 1998]