

## Nine Newly Recorded Species of the Family Braconidae (Hymenoptera) New to Korea

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### ABSTRACT

Braconid wasps is second largest family of Hymenoptera. It is comprising more than 18,000 described species. In Korea, a total of 910 species have been recorded to date. In the present study, nine species of the family Braconidae are recorded for the first time from Korea: *Aneurobracon philippinensis* (Musebeck), *Cenocoelius japonicus* (Watanabe), *Rattana sinica* He & Chen, *Adelius clandestinus* (Förster), *Blacometeorus brevicauda* (Hellen), *Centistes minutus* Chen & Achterberg, *Centistes sylvicola* Belokobylskij, *Gnamptodon sichotaealinicus* Belokobylskij, *Cotesia urabae* Austin & Allen. Diagnosis, distribution and host information for the each species are provided.

**Keywords:** Braconidae, Hymenoptera, new record, Korea

### INTRODUCTION

Braconid wasps is second largest family of Hymenoptera, and important insect group in biodiversity. It is comprising more than 18,000 described species (Quicke, 2015), but estimated a total between 42,000 and 43,000 species (Jones et al., 2009).

In Korea, a total of 910 species have been recorded to date (Ku et al., 2001; Choi et al., 2014). Recently, several studies on the family Braconidae have been actively conducted by Kim et al. (2018), Lee et al. (2018a, 2018b) and Papp (2018).

In this paper, nine species of the family Braconidae are recorded for the first time from Korea: *Aneurobracon philippinensis* (Musebeck), *Cenocoelius japonicus* (Watanabe), *Rattana sinica* He & Chen, *Adelius clandestinus* (Förster), *Blacometeorus brevicauda* (Hellen), *Centistes minutus* Chen & Achterberg, *Centistes sylvicola* Belokobylskij, *Gnamptodon sichotaealinicus* Belokobylskij, *Cotesia urabae* Austin & Allen. Diagnosis, distribution, and host information are provided for each species.

### MATERIALS AND METHODS

Material examined in this study was deposited at the Science Museum of Natural Enemies (SMNE), Geochang, Korea. Terminology used in this paper follows that of Achterberg (1993). Abbreviations of Korean province used in the present study are as follows: CB, Chungbuk; GB, Gyeongbuk; GN, Gyeongnam; GW, Gangwon; JN, Jeonnam.

### SYSTEMATIC ACCOUNTS

Order Hymenoptera Linnaeus, 1758

Family Braconidae Nees, 1811

Subfamily Agathidinae Haliday, 1833

Genus *Aneurobracon* Brues, 1930

*Aneurobracon* Brues, 1930: 1002–1003; Shenefelt, 1970b: 422. Type species: (by monotypy): *Aneurobracon behquerti*.

**Diagnosis.** Temple evenly convex subventrally. Prepectal carina normal, complete and rather high on mesopleuron; no-

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tauli impressed; mesopleuron granulate and rather dull. Vein 1-R1 of fore wing about as long as pterostigma or shorter; vein CU1, 2-SR + M, 2-SR and m-cu of fore wing unsclerotized, at most as fold present. Length of 1st tergite 1.5–2.2 times its apical width. Length of ovipositor sheath 0.4–0.5 times fore wing.

<sup>1\*</sup>*Aneurobracon philippinensis* (Musebeck, 1932)

*Mesocoelus philippinensis* Musebeck, 1932: 230.

*Aneruobracon phiilippinensis*: Achterberg, 1990: 39–40; Sharkey, 1996: 27–28.

**Material examined.** Korea: 1♂, JN: Sinan, Jido, 14 Jun 1997, Park JS-coll. SMNE.

**Diagnosis.** Body length 2.3–3.6 mm. Antennal segments 24. Head more narrowed ventrally. Length of mesosoma 1.5 times its height. Vein cu-a of fore wing less oblique than vein 1-M; vein r of fore wing medium-sized; length of pterostigma 1.9 times 1-R1 of fore wing. Length of ovipositor sheath 0.5–0.6 times for wing. Body black; hind trochanter yellowish; middle femur yellowish-brown.

**Distribution.** Korea (new record), China (Liaoning), Japan, Philippines, Taiwan.

**Host.** *Acrocercops transecta* (Gracillariidae) (Watanabe 1960).

Subfamily Cenocoeliinae Szepliget, 1901

Genus *Cenocoelius* Westwood, 1840

*Cenocoelius* Westwood, 1840: 62; Shenefelt, 1970a: 178; Tobias, 1971: 218; Achterberg, 1994: 18–19. Type species (by original designation): *Cenocoelius flavifrons* Westwood, 1840.

*Laccophrys* Förster, 1863: 257; Shenefelt, 1970a: 178. Type species (by original designation): *Laccophrys magdalini* Förster, 1863.

**Diagnosis.** Vein 1-M of fore wing straight; vein 1-rm of hind wing medium sized, somewhat longer than vein 2-SC + R; marginal cell of fore wing more robust. Propleuron with strong scaly, transverse ridge and area behind ridge rather concave. propodeum beside insertion of metasoma without flange-like carinae or distinct flanges. Second metasomal tergite sculptured basally, rarely completely smooth.

<sup>2\*</sup>*Cenocoelius japonicus* (Watanabe, 1951)

*Capitonius japonicus* Watanabe, 1951: 93.

*Cenocoelius japonicus*; Belokobylskij, 1998: 440.

**Material examined.** Korea: 1♀, GW: Inje, Buk, Yongdae,

Baekdamsa, 1 Aug 2002, LT Ku DS-coll. SMNE.

**Diagnosis.** Body length 6.0–7.0 mm. Antennal segments 33–34. Vein m-cu interstitial; nervulus very slightly postfurcal. First tergite coarsely longitudinally straight, with the sides strongly diverging from the base and the apical margin nearly straight. Second and following tergites smooth and shining. Ovipositor as long as abdomen. Body black; antenna and legs dark brown to black.

**Distribution.** Korea (new record), Japan, Russia (Buryatskaya Republika, Khabarovsk Krai, Primorsk Krai).

**Host.** *Glenea relicta* (Cerambycidae) (Watanabe 1951).

Genus *Rattana* Achterberg, 1994

*Rattana* Achterberg, 1994: 29–30. Type species (by original designation): *Cenocoelius albopilosellus* Cameron, 1911.

**Diagnosis.** Notauli united halfway on mesoscutum and middle lobe of mesoscutum short. Vein 1-M of fore wing slightly curved; vein 1-rm of hind wing comparatively long, much longer than vein 2-SC + R; marginal cell of fore wing comparatively slender. propodeum beside insertion of metasoma with flange-like carinae or distinct flanges.

<sup>3\*</sup>*Rattana sinica* He & Chen, 1996

*Rattana sinica* He & Chen, 1996: 222; Belokobylskij, 1998: 438.

**Material examined.** Korea: 1♀, GW: Yanggu, Nam, Gaojak, 23 May 1993, Ku DS-coll. SMNE.

**Diagnosis.** Body length 7.0 mm. Scapus reaching vertex. Precoxal sulcus distinct and complete. Vein 1-M of fore wing slightly curved; vein cu-a of fore wing postfurcal; vein 1-rm of hind wing comparatively long, marginal cell of fore wing comparatively slender. Body brownish-yellow; propodeum and legs black.

**Distribution.** Korea (new record), China (Zhejiang).

**Host.** Unknown.

Subfamily Adeliinae Viereck, 1918

Genus *Adelius* Haliday, 1833

*Adelius* Haliday, 1833: 262; Wesmael, 1837: 67; Viereck, 1914: 4; Musebeck, 1922: 12. Type species: *Adelius subfasciatus* Haliday, 1833.

**Diagnosis.** Antennal segments 20. Vein 2-SR of fore wing separated from vein r, both vein 2-SR and vein r directly connected with pterostigma. Suture between first and second metasomal tergites absent; metasomal tergites completely smooth.

Korean name: <sup>1\*</sup>굴피가는나방살이고치벌 (신칭), <sup>2\*</sup>설악높은배고치벌 (신칭), <sup>3\*</sup>등나무배높은고치벌 (신칭)

<sup>1</sup>\**Adelius clandestinus* (Förster, 1851)

*Acoelius clandestinus* Förster, 1851: 33.

*Adelius clandestinus*: Fulmek, 1968: 820; Belokobylskij, 1998: 557.

**Material examined.** Korea: 1♂, GW: Cheorwon, Geunnam, Yukdan, 13 Jun 1992, Ku DS-coll. SMNE.

**Diagnosis.** Body length 2.0–2.2 mm. Posterior coxa dorsally. The ocellus are located in a narrow obtuse triangle, anterior of the ocellus is noticeably distant from the back. Vertex usually (at least laterally) in a dense transverse correct wrinkling. Lateral prothorax in the rear, upper 1/3 slightly sculpted, almost glazing. The whole body is femlae black.

**Distribution.** Korea (new record), Czechoslovakia, Germany, Hungary, Italy, Kazakhstan, Poland, Russia (Kamchatka Oblast, Magadanskaya Oblast, Primorsky Krai), Switzerland, Ukraine.

**Host.** Unknown.

Subfamily Euphorinae Förster, 1863

Genus *Blacometeorus* Tobias, 1976

*Blacometeorus* Tobias, 1976: 28, 228. Type species (by monotypy): *Blacometeorus intermedius* Tobias, 1976.

**Diagnosis.** Antennal segments of female 17, of male 18; sixth and seventh antennal segments of female shorter than following segments. Vein r-m of fore wing present; vein M + CU of hind wing longer than vein 1-M. Length of ovipositor sheath 0.25–0.45 times fore wing.

<sup>2</sup>\**Blacometeorus brevicauda* (Hellen, 1958)

*Diospilus brevicauda* Hellen, 1958: 7, 10.

*Taphaeus brevicauda*; Shenefelt, 1970a: 218.

*Blacometeorus brevicauda*; Tobias, 1982: 620; Achterberg, 1988: 47.

**Material examined.** Korea: 1♀, GN: Sancheong, Samjang, Daepo, Naewonsa, Mt. Jirisan, 3 May 1997, Park JS-coll. SMNE.

**Diagnosis.** Body length 2.1–2.4 mm. Antennal segments 17; length of third antennal segment 3.0–3.3 times its width. 1st metasomal tergite distinctly widened apically, its length about 1.5 times its apical width and extensively sculptured. Length of vein 1-rm of hind wing 1.3–1.6 times vein 1-M. Length of ovipositor sheath 0.25–0.29 times fore wing. Hind tarsus infuscated. Body dark brown.

**Distribution.** Korea (new record), Czechoslovakia, Finland, Germany, Russia (Primorsky kraï), United Kingdom.

**Host.** *Scolytus scotylus* (Scolytidae) (Shaw 1996).

Genus *Centistes* Haliday, 1835

*Centistes* Achterberg, 1977: 27; Achterberg, 1985: 357; Belokobylskij, 1992: 200. Type species (by monotypy): *Ancylus cuspidatus* Haliday, 1833.

**Diagnosis.** Eye with short and sparely setae. vein M + CU1 of fore wing unsclerotized; vein 1-SR of fore wing present; vein 1-SR + M of fore wing present or absent. Coxae and femora usually thick; tarsal claws without tooth. Ovipositor long, flat; ovipositor sheath usually short and flat, sometimes long or thick.

<sup>3</sup>\**Centistes minutus* Chen & Achterberg, 1997

*Centistes minutus* Chen & Achterberg, 1997: 22; Belokobylskij, 2000: 272.

**Material examined.** Korea: 1♀, GN: Jinju, Gajwa, 8 May 1993, Ku DS; 1♀, ditto, 14 May 1993; 1♀, ditto, 15 May 1993; 4♀♀, ditto, 18 May 1993; 1♀, ditto, 20 May 1993, Ku DS-coll. SMNE.

**Diagnosis.** Body length 1.4 mm. Antennal segments 21. Vein 1-R1 of fore wing 1.2 times as long as pterostigma; vein 1-M or hind wing shorter than 1r-m. Ovipositor sheath narrow and setose, length of sheath 4.0–5.0 times its width. Body dark reddish brown; pterostigma brown; legs brownish yellow.

**Distribution.** Korea (South), China (Hubei), Russia (Sakhalin Oblast).

**Host.** Unknown.

<sup>4</sup>\**Centistes sylvicola* Belokobylskij, 1992

*Centistes sylvicola* Belokobylskij, 1992: 213; 2000: 268.

**Material examined.** Korea: 1♀, CB: Gosan, Chongchon, 23 May 1993, Ku DS; 5♀♀, GB: Bongwha, Myongho, Sokpo, 28 May 1993, Ku DS-coll. SMNE.

**Diagnosis.** Body length 3.3 mm. Antennal segments 24. Vein M + CU of hind wing 3.5 times 1-M. Marginal cell of fore wing weakly shortened. 1st metasomal tergite very weakly and roundly widened from base to apex. Ovipositor sheath short, slightly widened apically, obtuse, sparsely shortly setose; length of sheath 1.6 times its maximum width. Body black; legs light brown.

**Distribution.** Korea (South, new record), Russia (Primorsky Krai).

**Host.** Unknown.

Subfamily Gnamptodontinae Fischer, 1970

Korean name: <sup>1</sup>\*비밀고치벌 (신칭), <sup>2</sup>\*짧은꼬리고치벌 (신칭), <sup>3</sup>\*작은넓은칼집고치벌 (신칭), <sup>4</sup>\*숲고치벌 (신칭)

Genus *Gnamptodon* Haliday, 1833  
*Gnamptodon* Haliday, 1833: 265. Type species (by original designation): *Bracon pumilio* Nees, 1834.

**Diagnosis.** Apex of antenna with short spine. Maxillary palp with 6 segments; apical margin of clypeus narrowly differentiated from clypeus. Mesopleuron completely smooth. 1st metasomal tergite basally present. Length of ovipositor sheath 0.03–0.12 times length of fore wing.

<sup>1</sup>\**Gnamptodon sichotaealinicus* (Belokobylskij, 1987)  
*Gnamptodon sichotaealinicus* Belokobylskij, 1987: 80.

**Material examined.** Korea: 1♀, GN: Hamyang, Macheon, Samjeong, Chotdaebong, Mt. Jirisan, 12–13 Jul 2002, An TH; 1♀, GW: Goseng, Ganseong, Heulri, 2 Aug–19 Oct 2002, Ku DS-coll. SMNE.

**Diagnosis.** Body length 5.5–7.5 mm. Antennal segments 41–45. Vein cu-a of fore wing somewhat inclivous, slightly curved, interstitial or slightly postfurcal; vein 1-CU1 of fore wing very short; vein 1-SR of hind wing rather long, 0.40–0.65 times as long as vein 2-SR. Hind femur stout, 5.5–6.0 times as long as wide. Ovipositor sheath rather short, 0.1–0.14 times as long as fore wing. Body blackish to blackish brown.

**Distribution.** Korea (new record), Russia (Primorsky krai).

**Host.** Unknown.

Subfamily Microgastrinae Förster, 1863

Genus *Cotesia* Cameron, 1891  
*Cotesia* Cameron, 1891: 185; Shenefelt, 1972: 430; Austin & Dangerfield, 1992: 21. Type species (by monotype): *Cotesia flavipes* Cameron, 1891.

<sup>2</sup>\**Cotesia urabae* Austin & Allen, 1989  
*Cotesia urabae* Austin & Allen, 1989: 171.

**Material examined.** Korea: 15♀♀, GN: Geochang, Jeongjang, 24 Oct 2015, Ku DS; 17♀♀, ditto, 14 Nov 2017, Ku DS-coll. SMNE.

**Diagnosis.** Body length 2.8–2.9 mm. Metapleuron smooth anteriorly, rugose-punctate posteriorly. Vein r of fore wing and vein 2-SR sharply angled, vein r slightly longer than 2-SR; vein cu-a almost striate; discal cell sparsely covered with hairs; vein r of hind wing present. Ovipositor sheath with few hairs. Body black; palps yellow; legs yellowish-brown.

**Distribution.** Korea (new record), Australia.

**Korean host.** *Samia cynthia* (Saturniidae).

**Host.** *Uraba lugens* (Nolidae) (Austin & Allen 1989).

**Hyperparasitoid.** <sup>3</sup>\**Eurytoma koreana* Zerova et Fursov (Solitary pupal parasitoid of *Cotesia urabae* and gregariously pupal parasitoid of *Monema flavescens* Walker).

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## CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

## ACKNOWLEDGMENTS

This work was supported by a grant from the National Institute of Biological Resources (NIBR), funded by the Ministry of Environment (MOE) of the Republic of Korea (NIBR2017 01203) and (NIBR201801201).

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Received October 30, 2019  
Revised December 9, 2019  
Accepted December 10, 2019