

# Three New Records of the Genus *Anteon* Jurine, 1807 (Hymenoptera: Dryinidae: Anteoninae) from South Korea

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## 한국산 원집게벌속 (벌목: 집게벌과: 원집게벌아과)의 한국 미기록 3종의 보고

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**ABSTRACT:** Three newly recorded species of the genus *Anteon* Jurine (Hymenoptera: Dryinidae: Anteoninae), *A. brachycerum* (Dalman, 1823), *A. confusum* Olmi, 1991 and *A. infectum* (Haliday, 1837), are reported from South Korea. A revised identification key to the South Korean species, diagnosis, illustrations and photographs of the diagnostic characteristics are provided herein.

**Key words:** *Anteon*, key, new records, taxonomy

**초 록:** 한국산 원집게벌속(*Anteon*)의 국내 미기록 3종, 짧은원집게벌(*Anteon brachycerum* (Dalman)) (신칭), 한줄원집게벌(*Anteon confusum* Olmi) (신칭), 광교원집게벌(*Anteon infectum* (Haliday)) (신칭)을 기록한다. 검색표, 식별형질, 주요 형질에 대한 그림 및 사진을 함께 제시한다.

**검색어:** 원집게벌속, 검색표, 미기록종, 분류

Genus *Anteon* Jurine, 1807 is one of the largest genera of the family Dryinidae, including 423 valid species in all world and 48 species in the Eastern Palearctic region (Xu et al., 2013; Olmi & Xu, 2015). In East Asia, 107 species are recorded in China, 18 species in Japan and 10 species in the Russian Far East (Xu et al., 2013; Olmi & Xu, 2015). The South Korean species of *Anteon* were studied in recent years mainly by Kim et al. (2012) and Kim and Lee (2013, 2014), resulting in 31 recorded species.

During our recent studies on Dryinidae, more than 500 *Anteon* specimens were examined. They were collected in various countries of the Eastern Palearctic region (South

Korea, China, Japan, Russian Far East). As result of this, three newly recorded species of *Anteon* were identified in South Korea. They are described and illustrated herein. In addition, an updated identification key to *Anteon* species from South Korea is presented.

## Materials and Methods

All specimens are deposited in the Yeungnam University (YNU), Gyeongsan, South Korea. The terminology used in the present study follows that of Olmi (1984, 1994, 1999). The following abbreviations are used: **OL**, distance between the inner edges of a lateral ocellus and the median ocellus; **OOL**, distance from the outer edge of a lateral ocellus to the compound eye; **OPL**, distance from the posterior edge of a lateral ocellus

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to the occipital carina; **POL**, distance between the inner edges of two lateral ocelli; **TL**, distance from the posterior edge of an eye to the occipital carina; **MT**, Malaise trap.

## Systematic accounts

### Genus *Anteon* Jurine, 1807

*Anteon* Jurine 1807: 302. Type species: *Anteon jurineanum* Latreille, 1809, by monotypy.

*Anteon brachycerum* (Dalman, 1823) 짧은원집계별 (신칭)  
(Figs 1, 4, 7)

*Dryinus brachycerus* Dalman, 1823: 12.

*Anteon brachycerum* (Dalman): Richards, 1939: 250.

**Diagnosis of female.** Body length 2.35 mm. Head, antenna, mesosoma, legs and metasoma black except mandible, tibiae and tarsus brown. Antennal segments in following proportions: 24: 11: 11: 10: 9: 10: 10: 10: 9: 15. Head dull and granulate, frontal line complete and indistinct; POL: 13; OL: 6; OOL: 14; OPL: 5; TL: 8; occipital carina complete. Pronotum, scutum and scutellum shiny and punctate. Notauli incomplete, reaching approximately 0.3× length of scutum. Propodeum reticulate rugose, with strong transverse keel between dorsal and posterior

surface; posterior surface with two longitudinal keels and median area shiny and smooth, rugose near margins. Forewing hyaline, without dark transverse bands; stigmal vein curved, distal part of stigmal vein much shorter than proximal part (11: 20). Segment I of protarsus 3.0× length of segment IV. Enlarged claw with proximal prominence bearing one long bristle. Segment V of protarsus with 10 bristles; distal apex with about 5 lamellae.

**Male.** Unknown in South Korea (see description in Olmi & Xu., 2015).

**Material examined.** South Korea: 1 ♀, Gyeongsangbuk-do, Cheongdo-gun, Unmun-myeon, Mt. Unmunsan, Ssalbawi (U7), 35°38'08"N, 129°01'27"E, 20.IV-6.VI.2013 (MT), J.W. Lee (YNU).

**Hosts.** Cicadellidae Macropsinae: *Oncopsis flavicollis* (Linnaeus) (Russia), *Oncopsis* sp. (United Kingdom).

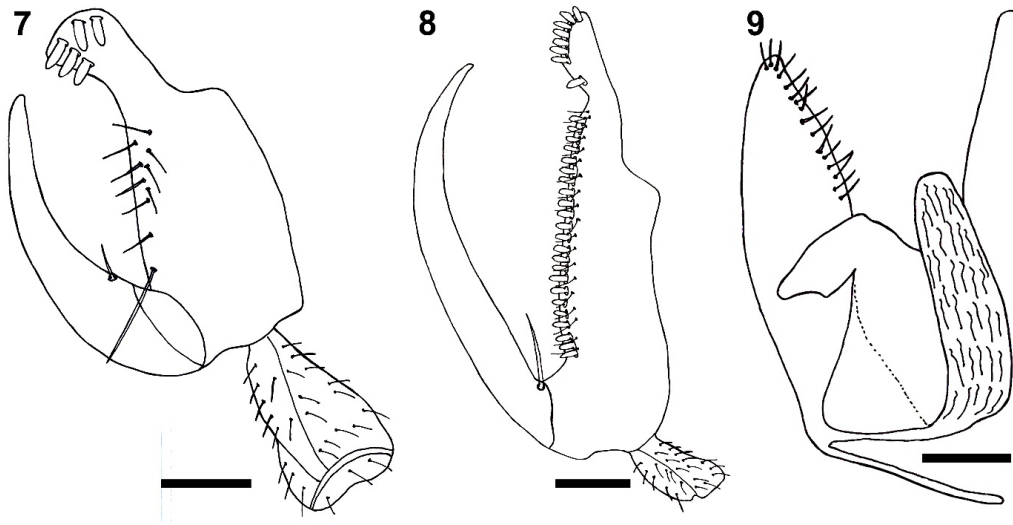
**Distribution.** South Korea (new record), Austria, Belgium, Czech Republic, Denmark, Esthonia, Finland, France, Germany, Hungary, Ireland, Japan, Nepal, Netherlands, Norway, Romania, Russia (European), Sweden, United Kingdom.

**Remarks.** The unique female specimen from South Korean has notauli shorter than in females from other countries (South Korean specimens=3:10; other country specimens=4-5:10).

*Anteon confusum* Olmi, 1991 한줄원집계별 (신칭) (Figs. 2,



**Figs 1-6.** Head in dorsal view (1-3), Scutum in dorsal view (4-6). 1, 4. *Anteon brachycerum*, female; 2, 5. *A. confusum*, female; 3, 6. *A. infectum*, male. Scale bars: 0.2 mm for 2, 3, 5, 6; 0.1 mm for 1, 4.



**Figs 7-9.** 7. Female chela of *Anteon brachycerum*; 8. Female chela of *A. confusum*; 9. Male genitalia of *A. infectum* (right half remove). Scale bars: 0.1 mm for 8, 9; 0.05 mm for 7.

5, 8)

*Anteon confusum* Olmi, 1991: 171.

**Diagnosis of female.** Body length 3.78 mm. Head black, except clypeus, mandible, face between the antennal toruli yellowish brown; antenna yellowish brown except segments I-II yellow, dorsal part of VIII-X darker; mesosoma and metasoma black, except posterior margin of pronotum and lower part of lateral region of pronotum brown; legs yellow. Antennal segments in following proportions: 24: 12: 24: 20: 18: 17: 18: 16: 16: 23. Head shiny and punctate, except ocellar region unsculptured; anterior half of face and vertex behind the ocelli rugose to reticulate, frontal line complete; POL: 10; OL: 8; OOL: 12; OPL: 10; TL: 10; occipital carina complete. Pronotum, scutum and scutellum shiny and sparsely punctate except anterior part of pronotum rugose. Notauli incomplete, reaching approximately 0.9× length of scutum. Propodeum reticulate rugose, with strong transverse keel between dorsal and posterior surface; posterior surface with two longitudinal keels and median area as rugose as lateral areas. Forewing hyaline, without dark transverse bands; stigmal vein curved, distal part of stigmal vein much shorter than proximal part (1: 2). Segment I of protarsus 2.0× length of segment IV. Enlarged claw with proximal prominence bearing one long bristle. Segment V of protarsus with one row of 23 lamellae; distal apex with about 8 lamellae.

**Male.** Unknown.

**Material examined.** South Korea: 1 ♀, Gyeonggi-do, Anyang-si, Manan-gu, Gwanak Arb., Alt. 140 m, 37°25'06"N, 126°56'50"E, 26.VI-4.VII.2007 (MT), J.O. Lim (YNU).

**Hosts.** Unknown.

**Distribution.** South Korea (new record), China (Shanxi, Taiwan).

**Remarks.** *Anteon confusum* is a very rare species, and formerly only three female specimens were collected: 2 ♀♀ from Taiwan (Oriental China) and 1 ♀ from Shanxi (Eastern Palaearctic China).

*Anteon infectum* (Haliday, 1837) 광교원집계벌 (신칭) (Figs. 3, 6, 9)

*Dryinus infectus* Haliday in Walker, 1837: 419.

*Anteon infectum* (Haliday): Richards, 1939: 258.

**Diagnosis of male.** Body length 4.28 mm. Head black, except mandible yellowish brown; antenna brown with dorsal part of segments II-VIII dark banded; mesosoma and metasoma black; legs yellowish brown, except basal half of metacoxa black, apical half of metafemur dark brown. Antenna filiform; antennal segments in following proportions: 16: 8: 10: 9: 9: 9: 9: 9: 9: 14. Head shiny and reticulate rugose, frontal line complete; POL: 16; OL: 8; OOL: 12; OPL: 10; TL: 10; occipital carina complete. Pronotum, scutum and scutellum shiny and punctate. Notauli incomplete, reaching approximately 0.5×

length of scutum. Propodeum reticulate rugose, with strong transverse keel between dorsal and posterior surface; posterior surface with two longitudinal keels and median area shiny and smooth, rugose near margins. Forewing hyaline, without dark transverse bands; stigmal vein curved, distal part of stigmal vein much shorter than proximal part (2: 7). Male genitalia without distal inner process, with dorsal membranous process.

**Female.** Unknown in South Korea (see description in Olmi & Xu., 2015).

**Material examined.** South Korea: 1 ♀, Gyeonggi-do, Suwon-si, Jangan-gu, Sangwanggyo-dong, Mt. Gwanggyosan, 20.IV-5.VIII.2011 (MT), J.W. Lee (YNU).

**Hosts.** Cicadellidae Iassinae: *Iassus scutellaris* (Fieber) (Italy), *Iassus lanio* (Linnaeus) (Italy, United Kingdom).

**Hyperparasitoids.** Ismaridae: *Ismarus halidayi* Förster (United Kingdom).

**Distribution.** South Korea (new record), Transpalearctic from Europe to Russian Far East, Japan.

**Key to the South Korean species of *Arteon***

**Females** (unknown in *A. albonigrum* Olmi, *A. autumnale* Olmi, *A. devriesi* Olmi, *A. ingenum* Olmi, *A. peterseni* Olmi, *A. pilosum* Xu, Olmi & He, *A. songyangense* Xu, He & Olmi, *A. sulawesianum* Olmi, *A. yuani* Xu, He & Olmi, *A. worakense* Kim & Lee)

1. Segment IV of protarsus at most 0.50x as long as or much shorter than segment I; protarsal segment III or IV produced into hook ..... 2
  - Segment IV of protarsus as long as, or longer than, or little shorter than segment I (in the last case, at least 0.66x as long as segment I); usually protarsal segment 2 produced into hook ..... 11
2. Posterior surface of propodeum without longitudinal keels ..... 3
  - Posterior surface of propodeum with two longitudinal keels ..... 4
3. Notauli absent or hardly shortly visible near anterior margin of scutum ..... *A. metuendum* Olmi
  - Notauli reaching about 0.30-0.50x length of scutum ..... *A. jurineanum* Latreille
4. Segment V of protarsus laterally expanded and forming

- wide lamina ..... 5
- Segment V of protarsus normally shaped, not expanded to form wide lamina ..... 6
- 5. Notauli reaching approximately 0.50x length of scutum; head with POL about as long as OOL ..... *A. magnatum* Kim & Lee
  - Notauli very short, only shortly visible near anterior margin of scutum; head with POL longer than OOL ..... *A. wushense* Olmi
- 6. Head completely and strongly reticulate rugose; segment IV and occasionally also segment III of protarsus produced into hook ..... 7
  - Head not or partly reticulate rugose; segment III of protarsus produced into hook ..... 8
- 7. Notauli reaching about 0.30x length of scutum; head with OOL about as long as OL ..... *A. reticulatum* Kieffer
  - Notauli reaching about 0.40-0.50x length of scutum; head with OOL much longer than OL ..... *A. esakii* Yasumatsu
- 8. Notauli reaching approximately 0.65-0.90x length of scutum ..... 9
  - Notauli at most reaching 0.30-0.60x length of scutum ... 10
- 9. Head black, except mandible testaceous ... *A. medium* Olmi
  - Head black, except mandible, clypeus and part of face testaceous ..... *A. nanlingense* Xu, Olmi & He
- 10. Distal part of segment V of protarsus approximately as long as proximal part ... *A. septentrionale* Xu, He & Olmi
  - Distal part of segment V of protarsus much shorter than proximal part ..... 11
- 11. Antenna black; OOL much longer than OL; notauli reaching 0.40-0.50x length of scutum ..... *A. brachycerum* (Dalman)
  - Antenna yellow; OOL shorter than OL; notauli reaching 0.30x length of scutum ..... *A. flavicorne* (Dalman)
- 12. Posterior surface of propodeum without longitudinal keels ..... *A. achterbergi* Olmi
  - Posterior surface of propodeum with two longitudinal keels ..... 13
- 13. Posterior surface of propodeum with median area shining, mostly smooth and unsculptured or partly rugose ..... 14
  - Posterior surface of propodeum with median area dull, completely rugose, approximately as rugose as lateral regions ..... 15

14. Posterior surface of pronotum as long as, or longer than scutum ..... *A. munitum* Olmi  
 - Posterior surface of pronotum transverse, much shorter than scutum ..... 15
15. Segment V of protarsus with lamellae not extending continuously to distal apex ..... *A. koreanum* Kim & Lee  
 - Segment V of protarsus with lamellae extending continuously to distal apex ..... *A. infectum* (Haliday)
16. Basal part of segment V of protarsus longer than distal part ..... *A. confusum* Olmi  
 - Basal part of segment V of protarsus shorter than distal part ..... 17
17. Basal part of segment V of protarsus slightly shorter than distal part ..... *A. insertum* Olmi  
 - Basal part of segment V of protarsus much shorter than distal part ..... 18
18. Segment IV of protarsus about twice as long as segment I ..... *A. hilare* Olmi  
 - Segment IV of protarsus as long as, or shorter than, or less than twice as long as segment I ..... 19
19. Pronotum with posterior surface transverse, more than twice as broad as long ..... 20  
 - Pronotum with posterior surface approximately as long as broad; occasionally broader than long, but then never more than twice as broad as long ..... 21
20. Prothorax reddish-brown; posterior surface of pronotum less than three times as broad as long ..... *A. hikense* Olmi  
 - Prothorax black; posterior surface of pronotum at least three times as broad as long ..... *A. exiguum* (Haupt)
21. Head black; scutum completely or mainly black; pronotum reddish, or yellow, or testaceous; segment V of protarsus with two rows of lamellae ..... *A. gaullei* Kieffer  
 - At least head partly yellow, or reddish; occasionally head and scutum dark brown or black, then pronotum dark brown, or black, or blackish; segment V of protarsus with 1-2 rows of lamellae ..... 22
22. Head and mesosoma usually partly or totally testaceous, or yellow, or reddish, never totally black with frons partly testaceous ..... *A. ephippiger* (Dalman)  
 - Head and mesosoma black, occasionally with mandible or frons partly testaceous ..... 23
23. Notauli reaching approximately 0.40x length of scutum ..... *A. takenoi* Olmi  
 - Notauli at most reaching 0.50-0.70x length of scutum ..... *A. japonicum* Olmi
- Males** (unknown in *Anteon confusum* Olmi, *A. hikense* Olmi, *A. koreanum* Kim & Lee, *A. magnatum* Kim & Lee, *A. medium* Olmi, *A. metuendum* Olmi, *A. nanlingense* Xu, Olmi & He, *A. wushense* Olmi)
1. Posterior surface of propodeum without longitudinal keels ..... 2  
 - Posterior surface of propodeum with two longitudinal keels ..... 4
2. Paramere without distal inner process ..... *A. jurineanum* Latreille  
 - Paramere with distal inner process ..... 3
3. Distal inner process of paramere very large and extended along entire paramere ..... *A. devriesi* Olmi  
 - Distal inner process of paramere smaller ..... *A. achterbergi* Olmi
4. Head black, with anterior half of face testaceous ..... *A. albonigrum* Olmi  
 - Head completely black or brown; at most mandible testaceous; occasionally clypeus testaceous; face always completely black ..... 5
5. Paramere without distal inner more or less pointed process ..... 6  
 - Paramere with distal inner more or less pointed or rounded process ..... 25
6. Posterior surface of propodeum with median area smooth, almost completely not rugose ..... 7  
 - Posterior surface of propodeum with median area as rugose as lateral areas ..... 15
7. Head more or less finely punctate and unsculptured among the punctures or granulate, not rugose; face without areolae or strong punctures resembling areolae ..... 8  
 - Head more or less reticulate rugose (at least on vertex behind ocelli or temples); occasionally head apparently not reticulate rugose, but with strong punctures resembling areolae on the anterior region of the frons ..... 14
8. Head granulate ..... *A. brachycerum* (Dalman)  
 - Head more or less finely punctate and unsculptured among

the punctures .....	9	- Head more or less reticulate rugose, at most with smooth area in front of anterior ocellus .....	23
9. Proximal membranous process of parameres with inner margin provided of numerous bristles .....		19. Paramere with inner fold provided of mosaic drawing .....	
..... <i>A. pilosum</i> Xu, Olmi & He		..... <i>A. worakense</i> Kim & Lee	
- Proximal membranous process of parameres with inner margin not provided of numerous bristles .....	10	- Paramere without inner fold provided of mosaic drawing .....	20
10. Notauli reaching approximately 0.3-0.55x length of scutum .....	11	20. Notauli reaching about 0.25-0.35x length of scutum .....	
.....		..... <i>A. takenoi</i> Olmi	
- Notauli reaching approximately 0.6-0.8x length of scutum .....	12	- Notauli reaching about 0.4-0.8x length of scutum .....	21
11. Notauli reaching approximately 0.3-0.55x length of scutum; paramere much shorter than penis .....		21. Notauli reaching about 0.6-0.8x length of scutum; POL less than twice as long as OL .....	
..... <i>A. peterseni</i> Olmi		..... <i>A. hilare</i> Olmi	
- Notauli reaching approximately 0.50-0.55x length of scutum; paramere approximately as long as penis .....		- Notauli reaching about 0.4-0.6x length of scutum; POL more than twice as long as OL .....	22
..... <i>A. autumnale</i> Olmi		22. Vertex of head behind ocellar triangle not rugose .....	
12. Notauli reaching approximately 0.7-0.8x length of scutum .....		..... <i>A. septentrionale</i> Xu, He & Olmi	
..... <i>A. songyangense</i> Xu, He & Olmi		- Vertex of head behind ocellar triangle slightly rugose .....	
- Notauli reaching approximately 0.5-0.6x length of scutum .....	13	..... <i>A. insertum</i> Olmi	
13. Paramere approximately as long as penis .....		23. Notauli reaching about 0.5-0.6x length of scutum .....	
..... <i>A. munitum</i> Olmi		..... <i>A. esakii</i> Yasumatsu	
- Paramere much shorter than penis .....		- Notauli reaching about 0.25-0.30x length of scutum .....	24
..... <i>A. yuani</i> Xu, He & Olmi		24. Frontal line complete .....	
14. Metafemur completely or partly black or brown .....	15	..... <i>A. reticulatum</i> Kieffer	
- Metafemur wholly testaceous .....	16	- Frontal line incomplete, distinct only in front of anterior ocellus .....	
15. Vertex behind the ocellar triangle with two oblique keels connecting posterior ocelli to occipital carina .....		..... <i>A. takenoi</i> Olmi	
..... <i>A. esakii</i> Yasumatsu		25. Scutum granulated .....	
- Vertex behind the ocellar triangle without keels .....		..... <i>A. jurineanum</i> Latreille	
..... <i>A. infectum</i> Haliday		- Scutum punctate, unsculptured among punctures, with anterior half, or third, or fourth, rugose .....	26
16. Paramere with inner fold provided of mosaic drawing .....		26. Scutum with anterior half rugose; remaining area punctate and unsculptured among the punctures .....	
..... <i>A. worakense</i> Kim & Lee		..... <i>A. japonicum</i>	
- Paramere without inner fold provided of mosaic drawing .....		- Scutum with anterior third or fourth rugose; remaining area punctate and unsculptured among the punctures .....	
..... <i>A. ingenuum</i> Olmi		..... <i>A. takenoi</i> Olmi	
17. Scutum punctate, unsculptured among punctures, not granulated .....	18	27. Distal inner process of paramere extended medially and with inner margin excavated .....	
- Scutum granulated, or with anterior half or fourth strongly reticulate rugose and with posterior region strongly punctate .....	27	..... <i>A. flavicorne</i> (Dalman)	
18. Head shiny, punctate, unsculptured among punctures, at most very slightly rugose on temple and behind ocellar triangle .....	19	- Distal inner process of paramere extended apically and with inner margin convex or straight, rarely slightly excavated .....	28
		28. Genitalia with dorsal membranous process short, reaching about 0.5x length of parameres .....	
		..... <i>A. exiguum</i> (Haupt)	
		- Genitalia with dorsal membranous band long, reaching about 0.6-0.8x length of parameres .....	29
		29. Head more strongly punctate, unsculptured among punctures, with a short or long frontal line .....	

- ..... *A. gaullei* Kieffer
- Head finely punctate, smooth, unsculpture among punctures, without frontal line ..... 30
30. Head with POL as long as OOL; notauli reaching 0.5x length of scutum ..... *A. ephippiger* (Dalman)
- Head with POL much shorter than OOL; notauli reaching about 0.6-0.7x length of scutum ... *A. sulawesianum* Olmi

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