A Taxonomical Review of the Genus Aphelopus (Hymenoptera: Dryinidae: Aphelopinae) from South Korea

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ABSTRACT

The species of Aphelopus Dalman (Hymenoptera: Dryinidae) from South Korea are reviewed. Sixteen species are listed, of which fifteen are new records from South Korea: Aphelopus atratus (Dalman, 1823); Aphelopus bennetti Olmi, 2004; Aphelopus camus Richards, 1939; Aphelopus luteiceps Xu & He, 1999; Aphelopus maetoi Olmi, 1995; Aphelopus malayanus Olmi, 1984; Aphelopus melaleucus (Dalman, 1818); Aphelopus nepalensis Olmi, 1984; Aphelopus nigriceps Kieffer, 1905; Aphelopus prolatus Mita & Olmi, 2014; Aphelopus querceus Olmi, 1984; Aphelopus serratus Richards, 1939; Aphelopus spadiceus Xu & He, 1997; Aphelopus urbaui Olmi, 2003; Aphelopus zhaoi Xu, He & Olmi, 1998. Keys to South Korean species of Aphelopus are also provided.

Keywords: Aphelopus, Dryinidae, key, new records, parasitoid, South Korea, taxonomy

INTRODUCTION

The genus Aphelopus belonging to the subfamily Aphelopinae of the family Dryinidae comprised 78 described species (Olmi and Xu, 2015). All of the species are worldwidely distributed, and 18 of them are from the Eastern Palaearctic. Aphelopus can be easily distinguished from other genera in the Dryinidae by the following combinations of characters: fore wing usually with only costal cell enclosed by pigmented veins; tibial spurs formula 1/1/2; occipital carina complete; female head hypognathous and protarsus not chelate.

As natural enemies, members of the Aphelopus are known to be the natural enemy of the Typhlocybinae (Hemiptera: Auchenorrhyncha: Cicadellidae) (Guglielmino and Olmi, 1997, 2006; Guglielmino et al., 2013). Therefore, Aphelopus species are important to natural control of agricultural pests.

Previously only one species was recorded from South Korea (Olmi, 2009). As part of recent study of Dryinidae in South Korea, we here newly report fifteen Aphelopus species from South Korea. Therefore, total 61 species in 10 genera, 5 subfamilies are now officially recognized for the South Korean dryinid fauna (Mita, 2009; Olmi, 2009; Lee and Kim, 2010; Kim et al., 2011, 2012, 2015; Kim and Lee, 2013, 2014, 2015, 2016).

MATERIALS AND METHODS

The morphological terminology used in the present study follows Olmi (1984, 1994, 1999). The images were captured with an Axioom HRc camera through a Discovery V20 stereomicroscope and were produced with the AxioVision 40AC software (Carl Zeiss, Oberkochen, Germany). Final plates were prepared using Adobe Photoshop CS6.

Abbreviations are as follows: 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 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.

The material studied in the present paper is deposited at the Yeungnam University (YNU), Gyeongsan, South Korea.

SYSTEMATIC ACCOUNTS

Order Hymenoptera Linnaeus, 1758
Subfamily Aphelopinae R. Perkins, 1912
Genus Aphelopus Dalman, 1823
Type species: *Aphelopus atratus* Dalman, 1823 (designated by Westwood, 1840).

1. *Aphelopus atratus* (Dalman, 1823) (Figs. 1A, 2A)

_Dryinus* (*Aphelopus*) *atratus* Dalman, 1823: 15. Type locality: Västergötland (Sweden).


*Aphelopus piceipes* Kieffer, part.: Crèvecoeur & Maréchal, 1933: 153.

*Aphelopus holomelas* Richards, 1939: 289.


**Diagnosis.** Female: Head black, except mandible yellowish brown; antenna dark brown, except 1–2 segments yellowish brown; mesosoma black; legs yellowish brown; metasoma brown. Head dull, granulated; frontal line complete; occipital carina complete; POL = 12; OL = 5; OOL = 7; OPL = 5; TL

![Fig. 1. Heads of Aphelopus spp. (in dorsal view). A, A. atratus, female; B, A. bennettii, female; C, A. camus, female; D, A. koreanus, female; E, A. luteoceps, male; F, A. maetoei, female; G, A. malayanus, female; H, A. melaleucus, female; I, A. nepalensis, female; J, A. nigriceps, female; K, A. prolatus, female; L, A. querceus, female; M, A. serratus, female; N, A. spadiceus, male; O, A. urbaini, female; P, A. zhaoi, female. Scale bars= 0.1 mm.](image-url)
= 5. Scutum dull, granulated. Notauli incomplete, reaching approximately 0.5 × length of scutum. Posterior surface of propodeum with two complete longitudinal keels.

**Male genitalia.** Distal apex of aedeagus tridentate. Basivolsella with two subdistal bristles, without an outer basal process.

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

**Host.** Unknown in South Korea. About records from other countries, see Guglielmino et al. (2013).

**Parasitoids.** Unknown in South Korea. About records from other country, see Buyckx (1948).

**Remarks.** This species is widely distributed in the Palaearctic. A female specimen from Gangwon Provincial Arboretum is morphologically distinguished from the type and other countries specimens by the following characters: color of antenna dark brown except 1–5 segments yellowish brown; notauli incomplete, reaching approximately 0.6 × length of scutum; posterior surface of propodeum with median area smooth, less rugose than lateral areas and sculptured by weak irregular keels.

2. *Aphelopus bennetti* Olmi, 2004 (Figs. 1B, 2B)

*Aphelopus bennetti* Olmi, 2004: 301. Type locality: Sakhalin Island (Russia).

**Material examined.** South Korea: 1♂, Gangwon-do: Donghae-si, Samhwa-ro, 538, Mureung valley, 37°27′26.28″N, 129°04′57.68″E, 16–28 Jun 2005 (MT), Lee JW; 1♀, Gyeonggi-do: Anyang-si, Manan-gu, Mt. Gwanaksan, 9–24 Jun 2007 (MT), Lim JO; 1♂, Pocheon-si, Soheure-up, Gwangneungsumogwon-ro, 415, Korea National Arboretum, 37°45′1.9″N, 127°08′34.4″E, 1–16 Aug 2012 (MT), Kim IG; 1♂, Gyeongsangbuk-do: Gunwi-gun, Bugye-myeon, Wonhyo-gil, 280-103, 36°01′29.04″N, 128°41′31.11″E, 15 Jul–29 Aug 2014 (MT), Lee JW; 1♂, Gyeongsangnam-do: Danyang-gun, Danyang-eup, 36°57′25.1″N, 128°54′47.6″E, 12 Jun–22 Jul 2008 (MT), Lee JW.

**Diagnosis. Female:** Head brown, except mandible, clypeus, anterior two thirds of face whitish; two yellowish brown spots between ocellar triangle and eyes; antenna brown, except 1–2 segments yellowish brown; mesosoma dark brown; legs whitish; metasoma brown. Head dull, granulated; frontal line complete; occipital carina complete, excavated behind ocellar triangle; POL = 11; OL = 8; OOL = 6; OPL = 7; TL = 7. Scutum dull, granulated. Notauli incomplete, reaching approximately 0.6 × length of scutum. Posterior surface of propodeum with two complete longitudinal keels.

**Male genitalia.** Basivolsella with two subdistal bristles and outer basal process.

**Distribution.** South Korea (new record), Japan, Russia (Far East).
Host. Unknown.

Remarks. A female specimen from Anyang, Gyeonggi shows that body color is much brownish than other specimens, not blackish. The occipital carina excavated behind the ocellar triangle is unique character among other species.

3. *Aphelopus camus* Richards, 1939 (Figs. 1C, 2C)

Material examined. South Korea: 2♂♂, Gangwon-do: Wonju-si, Heungseop-myeon, Yonseidae-gil, 1, Yonsei University, 37°15′46.49″N, 127°53′54.54″E, 21 Apr–29 May 2015 (MT), Han HY; 1♂, ditto, 29 May–5 Jul 2015 (MT), Han HY; 1♂, Gyeonggi-do: Anyang-si, Manan-gu, Yesul-gwon-wo, 280, Gwanak Arboretum, Alt. 175 m, 37°25′14″N, 126°57′01″E, 26 Jun–4 Jul 2007 (MT), Kim JG; 1♀, ditto, Alt. 219 m, 37°18′5.3″N, 127°19′1.5″E, 5–49 Jul 2007 (MT), Lim JO; 1♀, Gyeongsangbuk-do: Cheongdo-gun, Gakbuk-myeon, Mt. Biseulsan, 19 Aug–6 Sep 2015 (MT), Lee JW.

Diagnosis. Female: Head black, except mandible, clypeus yellowish brown; antenna blackish brown, except 1–2 or 1–3 segments yellowish brown; mesosoma and metasoma black; legs whitish yellow except metafemur yellowish brown, metatibia dark brown. Head dull, granulated; frontal line incomplete; occipital carina complete; POL = 15; OL = 10; OOL = 8; OPL = 10; TL = 10. Scutum dull, granulated. Notauli incomplete, reaching approximately 0.6× length of scutum. Posterior surface of propodeum with two complete longitudinal keels.

Distribution. Japan, South Korea.

Host. Unknown.

Remarks. The male is unknown. This species is only known in the Eastern Palaearctic: Japan and South Korea.

5. *Aphelopus luteoceps* Xu & He, 1999 (Figs. 1E, 2D)
*Aphelopus luteoceps* Xu & He, 1999: 1. Type locality: Zhejiang, Mt. Tianmushan (China).


Diagnosis. Male: Head yellowish brown, except ocellar region, central area of vertex black; antenna yellowish brown, except 1–2 segments brown; mesosoma black except prothorax yellow; legs yellowish brown; metasoma dark brown. Head dull, granulated; frontal line incomplete; occipital carina complete; POL = 15; OL = 7; OOL = 8; OPL = 7; TL = 7. Scutum dull, granulated. Notauli incomplete, reaching approximately 0.6× length of scutum. Posterior surface of propodeum with two complete longitudinal keels. Basivolsella with two subdistal bristles, without an outer basal process.

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

Host. Unknown in South Korea. About records from other countries, see Guglielmino et al. (2013).

4. *Aphelopus koreanus* Olmi, 2009 (Fig. 1D)
*Aphelopus koreanus* Olmi, 2009: 128. Type locality: Odae-san, near Woljeongsa (South Korea).


Diagnosis. Female: Head yellowish brown, except ocellar area dark brown; antenna brown, except 1–2 or 1–4 segments yellowish brown; mesosoma yellowish brown except metaturnat and dorsal part of propodeum black; legs whitish; metasoma dark brown. Head dull, granulated; frontal line incomplete; occipital carina complete; POL = 15; OL = 10; OOL = 8; OPL = 10; TL = 10. Scutum dull, granulated. Notauli incomplete, reaching approximately 0.6× length of scutum. Posterior surface of propodeum with two complete longitudinal keels.

Distribution. Japan, South Korea.

Host. Unknown.

Remarks. The male is unknown.

6. *Aphelopus maetoi* Olmi, 1995 (Figs. 1F, 2E)
*Aphelopus maetoi* Olmi, 1995: 5. Type locality: Hokkaido, Sapporo (Japan).

Diagnosis. Female: Head dark brown, except mandible, clypeus and gena whitish; anterior third to entire of face whitish; vertex with or without reddish brown spots; antenna brown, except 1−2 or 1−3 segments yellowish brown; mesosoma brown or black except propodeum and lateral part of pronotum or only propodeum yellowish brown; legs whitish yellow; metasoma dark brown. Head dull, granulated; front­al line complete; occipital carina complete; POL = 11; OL = 7; OOL = 6; OPL = 7; TL = 7. Scutum dull, granulated. Notauli incomplete, reaching approxi­mately 0.4−0.7 × length of scutum. Posterior surface of propodeum with two complete longitudinal keels.

Male genitalia. Basivolsella with two subdistal bristles, without an outer basal process.

Distribution. South Korea (new record), Brunei, China, India, Indonesia, Laos, Malaysia, Nepal, Philippines, Thailand.

Host. Unknown in South Korea. About records from other countries, see Guglielmino et al. (2013).

Remarks. This species, widely distributed in the Oriental Region, is now reported for the first time from the Palearctic (South Korea).

8. Aphelopus melaleucus (Dalman, 1818) (Figs. 1H, 2F)

Gonatopus melaleucus Dalman, 1818: 82. Type locality: Västergötland (Sweden).


Ceraphron albipes Ratzeburg, 1848: 141 (synonymized by Olmi, 1984).


Aphelopus carinatus Kieffer, part.: Crèvecoeur & Maréchal, 1933: 152.

Material examined. South Korea: 1 ♂, Chungcheong­buk­do: Gyeryong-si, Sindo­an-myeon, Mt. Gyeryongsan, Donghaksa upper, 14 Mar−28 Aug 2012 (MT), Jeong JC; 1 ♂, Gyeryong-si, Sindo­an-myeon, Mt. Gyeryongsan, Dongwol, 26 Mar−28 Aug 2012 (MT), Jeong CJ; 1 ♂, 319, Gang­won­do: Hongcheon-gun, Bukhang­myeon, Saengtageong­gong­gil, Gang­won Environment Research Park, 8−16 Aug 2011 (MT), Lee JW; 1 ♂, ditto, 35°45’15.6″N, 127°51’1.7″E, 15−30 May 2012 (MT), Jang SJ; 1 ♂, Wolju-si, Heungeop-
myeon, Yonsei-gil, 1, Yonsei University, 37°16′24″N, 127°54′02″E; 20 Jun–22 Jul 2007 (MT), Lee JW; 1♂, didto, 11 Aug–8 Sep 2007 (MT), Lee JW; 2♀♀, didto, 37°16′ 54.49″N, 127°53′54.54″E, 29 May–5 Jul 2015 (MT), Han HY; 1♂, Pyeongchang-gun, Jinchu-myeon, Odaesan-ro, 2, Odaesan National Park, Alt. 1,109 m, 37°47′46″N, 128°40′45″E, 9 Jul–1 Sep 2012 (MT), Lee JW; 1♂, Gyeongsangnam-do: Jinju-si, Ihansoeng-myeon, 4–11 Jul 2005 (MT), An BG; 1♀, Gyeongsangnamdo Forest Environment Research Institute, didto, Alt. 43 m, 35°09′39.7″N, 128°17′41.3″E, 1–16 Jul 2012 (MT), Hwang JH; 1♂, Jeollabuk-do: Wanju-gun, Dongsan-myeon, Daecumugwon-ro, 94–34, Daegu Arbo- retum, 13–24 Jul 2011 (MT), Lee JW.

**Diagnosis. Female:** Head blackish brown, except mandible, clypeus, gena, lower half of face whitish; vertex with or without reddish brown spots; antenna dark brown, except 1–2 yellowish brown; mesosoma black; legs whitish yellow; metasoma dark brown. Head dull, granulated; frontal line complete; occipital carina complete; POL = 9; OL = 6; OOL = 7; OPL = 7; TL = 7. Scutum dull, granulated. Notauli incomplete, reaching approximately 0.5 × length of scutum. Posterior surface of propodeum with two complete longitudinal keels.

**Male genitalia.** Basivolsella with one subdistal bristle and an outer basal process.

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

**Host.** Unknown in South Korea. About records from other countries, see Guglielmino et al. (2013).

**Remarks.** This species is widely distributed in the Palaearctic.

### 9. *Aphelopus nepalensis* Olmi, 1984 (Fig. 11)

*Aphelopus nepalensis* Olmi, 1984: 57. Type locality: Bokai­ hunde (Nepal).

**Material examined.** Japan: 1♂, Hokkaido, Sapporo, Hil­ sugoka, Hokkaido National Agricultural Experiment Station, Alt. 133 m, 35°00′30″N, 141°24′47.3″E, 30 Jun–2 Jul 2009 (MT), Lee JW; South Korea: 1♀, 94, Ulsan-si, Nam-gu, Daegwallyeong-ro, 9 Sep–7 Nov 2011 (MT), Lee JW.

**Diagnosis. Female:** Head black, except mandible yellowish brown; antenna brown, except 1–3 yellowish brown; meso­ soma and metasoma blackish brown; legs yellowish brown. Head dull, granulated; frontal line incomplete; occipital carina complete; POL = 10; OL = 0; OOL = 7; OPL = 4; TL = 6. Scutum dull, granulated. Notauli incomplete, reaching approximately 0.5 × length of scutum. Posterior surface of propodeum with two complete longitudinal keels.

**Distribution.** South Korea (new record), China, Japan, Nepal.

**Host.** Unknown.

### 10. *Aphelopus nigriceps* Kieffer, 1905 (Fig. 1J)


*Aphelopus nigriceps* Kieffer; Kieffer, 1914: 216.

*Aphelopus piceipes* Kieffer, part.: Crèvecoeur & Maréchal, 1933: 153.

**Material examined.** South Korea: 1♀, Gangwon-do: Wonju-si, Heunggoep-myeon, 1, Yonsei-gil, Yonsei University, 37°16′54.49″N, 127°53′54.54″E, 29 May–5 Jul 2015 (MT), Han HY; 1♂, Pyeongchang-gun, Jinchu-myeon, Odaesan-ro, 2, Odaesan National Park, Alt. 1,109 m, 37°47′46″N, 128°40′45″E, 22 May–12 Jun 2013 (MT), Park JY; 1♀, Gyeonggi-do: Pocheon-si, Soheur-up, Gwangneungsumugwon-ro, 415, Korea National Arboretum, 37°45′9.1″N, 127°09′4.7″E, 31 May–14 Jun 2013 (MT), Kim IG; 1♂, Gyeongsangbuk-do: Cheongdo-gun, Unmun-myeon, Mt. Unmunsan, 35°38′45″N, 128°57′33″E, 23 May–6 Jun 2008 (MT), Kim CJ.

**Diagnosis. Female:** Head black, except mandible yellowish brown; antenna dark brown, except 1–2 yellowish brown; mesosoma and metasoma black; legs yellowish brown except metacoxa, metafemur and part of metatibia brown. Head dull, granulated; frontal line incomplete; occipital carina complete; POL = 15; OL = 8; OOL = 8; OPL = 8; TL = 7. Scutum dull, granulated. Notauli incomplete, reaching approximately 0.65 × length of scutum. Posterior surface of propodeum with two complete longitudinal keels.

**Distribution.** South Korea (new record), Transpalaearctic from Europe to China and Japan.

**Host.** Unknown in South Korea. About records from other countries, see Guglielmino et al. (2013).

**Remarks.** This species is widely distributed in the Palaearctic.

### 11. *Aphelopus prolatus* Mita & Olmi, 2014 (Figs. 1K, 2G)

*Aphelopus prolatus* Mita & Olmi, 2014: 95. Type locality: Zennyûji-tô Island (Japan).

**Material examined.** South Korea: 2♀♀, 1♂, Uiryong-­gun, Bongsu-myeon, Daehan-ro, 24 Jun–22 May 2013 (MT), Lee JW.

**Diagnosis. Male:** Fully winged; body length 1.80 mm. Head black, except mandible yellowish brown; antenna brown, except 1–2 segments yellowish brown; mesosoma black; legs yellowish brown; metasoma brown. Antenna filiform;
Male genitalia. Basivolsella with two subdistal bristles and an outer basal process.

**Distribution.** South Korea (new record), Transpalaearctic from Europe to China and Japan.

**Host.** Unknown in South Korea. About records from other countries, see Guglielmino et al. (2013).

**Remarks.** This species is widely distributed in the Palaearctic.

13. *Aphelopus serratus* Richards, 1939 (Figs. 1M, 2I)

*Aphelopus serratus* Richards, 1939: 284. Type locality: Norwood (UK).

**Material examined.** South Korea: 1 ♂, Gwangju-do: Donghwa-si, Samhwa-ro, 538, Mureung valley, 10–31 Aug 2005 (MT), Lee JW; 1 ♂, Gyeongsangbuk-do: Cheongdo-gun, Unmun-myeon, Simsim valley, 35°37′44″N, 128°59′01″E, 17 May–22 Jun 2014 (MT), Lee JW.

**Diagnosis.** Female: Head dark brown, except mandible whitish; antenna brown, except 1–2 yellowish brown; mesosoma dark brown; legs whitish yellow except metatibia brown; metasoma brown. Head dull, granulated; frontal line complete; occipital carina complete; POL = 11; OL = 6; OOL = 5; OPL = 4; TL = 4. Scutum dull, granulated. Notauli incomplete, reaching approximately 0.75× length of scutum. Posterior surface of propodeum with two complete longitudinal keels.

**Male genitalia.** Basivolsella long and narrow and distally pointed with two subdistal bristles.

**Distribution.** South Korea (new record), Transpalaearctic from Europe to China and Japan.

**Host.** Unknown in South Korea. About records from other countries, see Olmi (2000).

**Parasitoids.** Unknown in South Korea. About records from other country, see Olmi (2000).

**Remarks.** This species is widely distributed in the Palaearctic.

14. *Aphelopus spadiceus* Xu & He, 1997 (Figs. 1N, 2J)

*Aphelopus spadiceus* Xu & He in Xu et al., 1997: 8. Type locality: Mt. Fanjingshan (China).

**Material examined.** South Korea: 5♂♂, Daejeon-si: Dongdu, Daehak-ro, 62, Daejeon University, 1–15 Jun 2006 (MT), Lee JW; 2♂♂, Gangwon-do: Pyeongchang-gun, Yongpeoyang-myeon, Mt. Gyeongsan, 28 Jun–1 Aug 2012 (MT), Park KY; 1♂, Gyeongsangbuk-do: Gwagju-si, Docheok-myeon, Mt. Taehwasan, Alt. 243 m, 37°17′45″N, 127°19′25″E, 15 May–22 Jun 2014 (MT), Lee JW.

**Diagnosis.** Female: Head brown, except mandible,clypeus, lower half of face whitish; vertex with or without reddish brown spots; antenna brown, except 1–2 whitish; mesosoma black; legs whitish; metasoma brown. Head dull, granulated; frontal line complete; occipital carina complete; POL = 12; OL = 7; OOL = 7; OPL = 8; TL = 9. Scutum dull, granulated. Notauli incomplete, reaching approximately 0.65× length of scutum. Posterior surface of propodeum with two complete longitudinal keels.

**Diagnosis. Male:** Head black, except mandible whitish; antenna blackish brown; mesosoma and metasoma black; legs yellowish brown except all coxae dark brown, all femora and metatibia brown. Head dull, granulated; frontal line incomplete; occipital carina complete; POL = 14; OL = 7; OOL = 7; OPL = 4; TL = 6. Scutum dull, granulated. Notauli incomplete, reaching approximately 0.8× length of scutum. Posterior surface of propodeum with two complete longitudinal keels. Basivolsella with two subdiscal bristles and an outer basal process.

**Distribution.** South Korea (new record), Brunei, China, Thailand.

**Host.** Unknown.

**Remarks.** The male is unknown.

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

Females (female of *Aphelopus luteoceps* is unknown and female of *A. spadiceus* has not been found in South Korea)

1. Head entirely yellowish brown ........................................ 2
   2. Head entirely black or brown ...................................... 3

2. Mesosoma yellowish brown, except dorsal regions brown or black; OL slightly longer than OOL (Fig. 1G) ........................................ 3
   3. Head with clypeus black ............................................. 4
   4. Notauli absent .................................................. 4
   5. Frontal line complete (Fig. 1P) .......................... 5
   6. Notauli reaching 0.75–0.85× length of scutum ................. 5
      a. A. serratus Richards ........................................ 7
      b. A. nigriceps Kieffer ........................................ 7

3. Head with clypeus black ............................................. 4
   4. Notauli absent .................................................. 4
   5. Head with clypeus whitish yellow; antenna brown, except 1–3 yellowish brown; mesosoma black except scutellum reddish brown; fore and midlegs whitish; hindleg yellowish brown except tibia brown; metasoma dark brown. Head dull, granulated; frontal line complete; occipital carina complete; POL = 12; OL = 7; OOL = 6; OPL = 6; TL = 5. Scutum dull, granulated. Notauli incomplete, reaching approximately 0.65× length of scutum. Posterior surface of propodeum with two complete longitudinal keels.

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

**Host.** Unknown.

**Remarks.** This species is restricted to Eastern Palearctic.

15. *Aphelopus urbaini* Olmi, 2003 (Fig. 1O)


**Material examined.** Japan: 1♀, 7♂♀, Hokkaido, Minamifurano-cho, Ikutora, Alt. 520 m, 43°04′N, 142°41′E, 25 Jun–16 Jul 2009 (MT), A. Ueda leg; South Korea: 1♂, Jeollabuk-do, Dongsang-myeon, Daesumogwon-ro, 94-34, Dae Arbotum, 25 Apr–4 May 2011 (MT), Lee JW.

**Diagnosis. Female:** Head black, except mandible and clypeus yellowish brown; antenna dark brown, except 1–2 brown; mesosoma black; legs brown except foreleg and mesocoxa yellowish brown; metasoma brown. Head dull, granulated; frontal line incomplete; occipital carina complete; POL = 14; OL = 8; OOL = 9; OPL = 8; TL = 9. Scutum dull, granulated. Notauli incomplete, reaching approximately 0.6× length of scutum. Posterior surface of propodeum with two complete longitudinal keels.

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

**Host.** Unknown.

**Remarks.** This species is restricted to Eastern Palearctic.

16. *Aphelopus zhaoi* Xu, He & Olmi, 1998 (Fig. 1P)

*Aphelopus zhaoi* Xu et al., 1998: 22. Type locality: Mt. Wuyishan (China).

**Material examined.** South Korea: 1♀, Gyeongsangbuk-do: Cheongdo-gun, Gakbuk-myeon, 35°58′N, 128°47′E, 9 Jul–1 Sep 2012 (MT), Lee JW.

**Diagnosis. Female:** Head black, except mandible and clypeus whitish yellow; antenna brown, except 1–3 yellowish brown; mesosoma black except scutellum reddish brown; fore and midlegs whitish; hindleg yellowish brown except tibia brown; metasoma dark brown. Head dull, granulated; frontal line complete; occipital carina complete; POL = 12; OL = 7; OOL = 6; OPL = 6; TL = 5. Scutum dull, granulated. Notauli incomplete, reaching approximately 0.65× length of scutum. Posterior surface of propodeum with two complete longitudinal keels.

**Distribution.** South Korea (new record), Brunei, China, Japan, Russia (Far East).
Males (male of *Aphelopus koreanus, A. zhaoi* are unknown and male of *A. malayanus, A. nepalensis, A. nigriceps, A. urbaiisi* has not been found in South Korea)

1. Head with clypeus black ........................................... 2
   – Head with clypeus yellowish brown or whitish ............... 4
2. Notauli absent .......................................................... 2
   – Notauli present .................................................... 3
3. Notauli reaching 0.50–0.60 × length of scutum; aedeagus tridentate (Fig. 2A) ......................... *A. atratus* (Dalman)
   – Notauli reaching 0.75–0.80 × length of scutum; aedeagus not tridentate (Fig. 2I) ................... *A. serratus* Richards
4. Occipital carina with a notch behind ocellar region (Fig. 1B) .......................................................... *A. bennetii* Olmi
   – Occipital carina without a notch behind ocellar region ... 5
5. Basivolsella with one bristle ........................................ 6
   – Basivolsella with two or more bristles ....................... 7
6. Aedeagus with distal apex trumpet-shaped (Fig. 2C); notauli reaching 0.65 × length of scutum .......................................................... *A. camus* Richards
   – Aedeagus with distal apex not trumpet-shaped (Fig. 2F); notauli reaching 0.50 × length of scutum .......................................................... *A. melaleucus* (Dalman)
7. Basivolsella with an outer basal process ......................... 8
   – Basivolsella without an outer basal process ............... 9
8. Frontal line complete; notauli reaching 0.40–0.70 × length of scutum ........................................ *A. querceus* Olmi
   – Frontal line incomplete, present in anterior half of face; notauli reaching 0.60–0.80 × length of scutum .......................................................... *A. spadiceus* Xu & He
9. Head yellowish brown except ocellar region and part of occiput black or brown (Fig. 1E); frontal line incomplete; notauli reaching 0.50 × length of scutum .......................................................... *A. luteoceps* Xu & He
   – Head black or brown except mandible, clypeus, gena, part of face whitish; frontal line complete; notauli reaching 0.50–0.70 × length of scutum .......................................................... *A. maetoi* Olmi

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REFERENCES


