

A New Record of Parasitoid Wasp *Aleiodes conina* (Hymenoptera: Braconidae) from South Korea

Gyeonghyeon Lee, Juhyeong Sohn, Sangjin Kim, Yeongmo Kim, Jongok Lim¹ and Hyojoong Kim*

Animal Systematics Lab., Department of Biological Science, Kunsan National University, Gunsan 54150, Korea

¹Department of Life and Environmental Sciences, Wonkwang University, Iksan 54538, Korea

한국산 미기록 기생벌 *Aleiodes conina* (벌목: 고치벌과)에 대한 보고

이경현 · 손주형 · 김상진 · 김영모 · 임종옥¹ · 김효중*

군산대학교 생명과학과 동물계통분류학연구실, ¹원광대학교 생명환경학과

ABSTRACT: *Aleiodes conina* (Butcher et al., 2012) belonging to the subfamily Rogadinae in the family Braconidae is first reported from Korea. Diagnosis, distribution, and illustration are provided for this species.

Key words: Braconidae, Morphology, Host range, Classification

조 록: 고치벌과의 송충살이 고치벌아과에 속하는 *Aleiodes conina* Quicke and Butcher, 2012를 국내 최초로 보고한다. 본 종에 대한 진단, 분포 및 삽화를 제공한다.

검색어: 고치벌과, 형태, 숙주범위, 분류

The family Braconidae is one of the most species-rich families in Hymenoptera, with about 1,100 genera and 21,000 valid described species worldwide (Chen and Achterberg, 2019). Within the family, the genus *Aleiodes* is a large genus of the subfamily Rogadinae, which has 632 described species worldwide (Yu et al., 2016). It is difficult to identify the species of *Aleiodes* worldwide because of vast species and few descriptions (Quicke et al., 2012). In current, 32 species of the genus *Aleiodes* have been recorded in the National Species List of South Korea (NIBR, 2020). Compared to the species that have been recorded in the world, the Korean number of *Aleiodes* species are poorly recognized.

It is known that rogadine wasps parasitize lepidopteran larvae,

which are koinobiont-endoparasitic wasp (Zaldívar-Riverón et al., 2008). They are killed and mummified before breeding in the host (Butcher and Quicke, 2011). Species of *Aleiodes* have been discovered from pastures and vegetable gardens between 2010 and 2014 in Turkey (Aydoğdu, 2018), with known hosts as gypsy moths and cutworms (Shaw, 2006). Therefore, they are potential as biological control agents.

In this study, *Aleiodes conina* is reported for the first time from Korea, which has been originally described in Thailand (Yu et al., 2016). Here, redescription, diagnosis, distribution and illustrations are provided.

Materials and Methods

Aleiodes species collected by sweeping, mountain 43, Goseo-ri, Bigeum-myeon, Sinan-gun, Jeonnam, South Korea.

*Corresponding author: hkim@kunsan.ac.kr

Received August 9 2022; Revised August 19 2022

Accepted August 22 2022

The samples were preserved in 75% ethyl alcohol. The species studied are deposited in Kunsan National University (KSNU). The terminology used for morphological characters follows van Achterberg (1988) For observation and photography, LEICA DMC2900 digital camera and LEICA M205 C microscope (Leica Geosystems AG) were used. Images were stacked by using Helicon software (Helicon Soft). Abbreviations are as follows: CU; cubituous vein, SC; subcostal vein, R; radial vein, SR; subradial vein, T; tergite.

Systematic Accounts

Family Braconidae Nees von Esenbeck, 1811

Subfamily Rogadinae Förster, 1863

Genus *Aleiodes* Wesmael, 1838

Aleiodes Wesmael, 1838: 11:1-166.

Petalodes Wesmael, 1838: 11:1-166.

Schizoides Wesmael, 1838: 11:1-166.

Aliodes Agassiz, 1846: 360.

Nebartha Walker, 1860: (3)5:304-311.

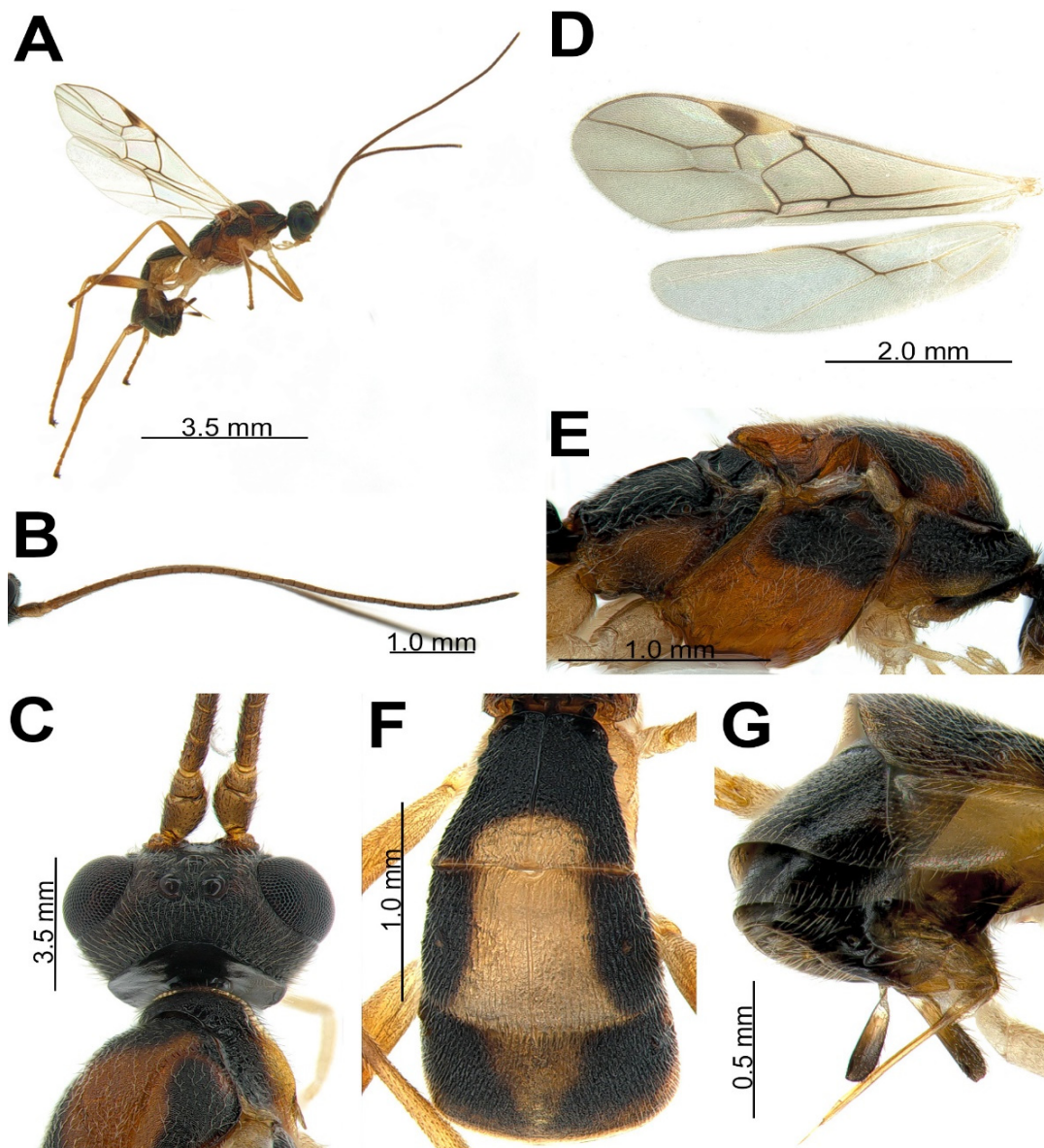


Fig. 1. Habitus of *Aleiodes conina* (Butcher et al., 2012): A, whole body in lateral view; B, antenna; C, head dorsal view; D, wings; E, mesosoma in lateral view; F, metasoma in dorsal view; G, metasoma lateral view.

Leluthinus Enderlein, 1912: 78(A:94-100).
Heterogamoides Fullaway, 1919: 80:39-59.
Hyperstemma Shestakov, 1940: 32A(19):1-21.
Hyperstemma [homonym] Telenga, 1941: 5(3) 466.
Jirunia Malác, 1941: 4:136-139.
Dimorphomastax Shenefelt, 1979: 81(1):125-134.
Vietorogas Long and van Achterberg, 2008: 82(24-41): 313-329.

***Aleiodes coninina* (Butcher et al., 2012) 종무늬두렁고치벌(신칭) (Fig. 1A-G)**

First and second tergites combined white pattern resembles a bell shape and present dorsal midlongitudinal carina like a rip. For this reason, it was named as follows.

Redescription

Morphology. BODY (Fig. 1A) Length of body 5.7 mm, **HEAD** (Fig. 1B, C) Length of Antenna 6.0 mm, Antenna light brown, with 42 flagellomeres, flagellomeres sensillae of antenna evenly spaced around and dark towards the apex, terminal flagellomere weakly acuminate; head almost black, purple around the eyes, ocellus is evenly spaced, occipital carina weak, ocellus dark.; **Wing** (Fig. 1D) Length of forewing 4.8 mm, absent fore wing vein CU1b, not meet vein cu-a of 1-1a, vein R not right angle with pterostigma, middle of pterostigma dark brown, not reach edge, vein 1-M and vein CU-a do not meet; hind wing vein 2-M weak, vein 1M+CU 1.46x vein 1-M **Mesosoma** (Fig.1C, E) Absent pronope of pronotum, mesopleuron wider 1.75× its height; anterior part of metapleuron hardly present; precoxal sulcus hardly differentiated; mesosternum is smooth. **Leg** (Fig. 1A, E) Length of mid tibia 1.5 times longer than mid femur, mid coxa is cylindrical. **Metasoma** (Fig. 1F, G) first tergite is white semicircle pattern exist, second tergite is white bell shape pattern present, third tergite is white long triangle pattern present, third tergite dorsal midlongitudinal carina weakly present, present spiracles at first tergite and second tergite of dorsal, second tergite with distinctly differentiated semi-circular area medio-basally; ovipositor is acuminate, length of ovipositor 2.3 times longer than that of ovipositor sheath.

Distribution. South Korea (new), Thailand

Biology. Unknown.

Specimens examined. 1 ♀, 1640-1, Yunnam-dong, Jung-gu, Incheon (37°28'46.5, 126°32'56.8), South Korea, 31. VII. 2021, Hyojoong Kim (sweeping).

Remarks. This species is characterized by that the third white long triangle pattern present, vein cu-a dose not meet 1-1a, and vein R does not from right angle with pterostigma.

Acknowledgments

This research was supported by Honam National Institute of Biological Resources (HNIBR) of the Republic of Korea (Project No. HNIBR202101101). This research was also supported by Korea Environment Industry & Technology Institute (KEITI) through Exotic Invasive Species Management Program, funded by Korea Ministry of Environment (MOE)(2018002270005).

Statements for Authorship Position & Contribution

Lee G.: Kunsan National University, Student in M.S.;
Designed the research, wrote the manuscript and conducted the experiments
Sohn, J.: Kunsan National University, Student in Ph.D.;
Collected and examined specimens
Kim, S.: Kunsan National University, Student in Ph.D.;
Collected and examined specimens
Kim, Y.: Kunsan National University, Student in M.S.;
Collected and examined specimens
Lim, J.: Wonkwang University, Professor, Ph.D.; Examined specimens and designed the research
Kim, H.: Kunsan National University, Professor, Ph.D.;
Examined specimens and designed the research

All authors read and approved the manuscript.

Literature Cited

Agassiz, L.J.R., 1846. Nomenclator Zoologicus, Index Universalis. Biodiversity Heritage Library, United Kingdom, p. 360.

- Aydođdu, M., 2018. Parasitoid species of *Aleiodes* Wesmael, 1838 (Hymenoptera: Braconidae: Rogadinae) from Bozcaada (Tenedos) Island, Turkey. *Türkiye Biyolojik Mücadele Dergisi* 9, 38-47.
- Butcher, B.A., Quicke, D.L.J., 2011. Revision of *Aleiodes* (Hemigyroneuron) parasitic wasps (Hymenoptera: Braconidae: Rogadinae) with reappraisal of subgeneric limits, descriptions of new species and phylogenetic analysis. *J. Nat. Hist.*, 45, 23-24.
- Butcher, B.A., Smith, M.A., Sharkey, M.J., Quicke, D.L.J., 2012. A turbo-taxonomic study of Thai *Aleiodes* (*Aleiodes*) and *Aleiodes* (*Arcaleiodes*) (Hymenoptera: Braconidae: Rogadinae) based largely on COI barcoded specimens, with rapid descriptions of 179 new species. *Zootaxa*. 3457, 211.
- Chen, X.X., Achterberg, C.V., 2019. Systematics, Phylogeny, and evolution of Braconid Wasps: 30 years of progress, *Annu. Rev. Entomol.*, 64, 335-358.
- Achterberg, C.V., 1988. Revision of the subfamily Blacinae Foerster (Hymenoptera, Braconidae). *Zool. Verh.* 249, 1-324.
- Enderlein, G., 1912. Neue gattungen und arten von braconiden. *Arch. Naturgesch.* 78, 94-100.
- Fullaway, D., 1919. New genera and Species of Braconidae, Mostly Malayan. *J. Straits Branch Roy. Asiat. Soc.* 80, 39-59.
- Long, K.D., van Achterberg, C., 2008. One new genus and seven new species of Rogadinae (Hymenoptera: Braconidae) from Vietnam. *Zool. Meded.* 82, 313-329.
- Malác, A., 1941. *Heterogamus* (*Jirunia*) *farmakena* n. subgen. et. n. sp. Braconidae. Hymenoptera. *Folia Ent.* IV, 136-139.
- National Institute of Biological Resources (NIBR), 2020. National list of species of Korea. <http://kbr.go.kr> (accessed on 3 August 2022).
- Shaw, S.R., 2006. *Aleiodes* wasps of eastern forests: a guide to parasitoids and associated mummified caterpillars. U.S. Department of Agriculture, Forest Service, FHTET, Morgantown, WV.
- Shenefelt, R.D., 1979. Some unusual Braconidae (Hymenoptera). *Proc. Entomol. Soc. Wash.* 81, 125-134.
- Shestakov, A., 1940. Zur kenntnis der braconiden ostsibiriens. *Ark. Zool.* 32, 1-21.
- Telenga, N., 1941. Family Braconidae, subfamily Braconinae (continuation) and Sigalphinae. *Fauna USSR, Hymenoptera* 5, 466.
- Walker, F., 1860. Characters of some apparently undescribed Ceylon insects. *J. Nat. Hist. (Third Series)* 5, 304-311.
- Wesmael, C., 1838. *Nouveaux mémoires de l'Académie royale des sciences et belles-lettres de Bruxelles*, Natural History Museum Library, London, V11, 1-166.
- Yu, D., Van Achterberg, K., Horstmann, K., 2016. Taxapad 2016, World Ichneumonoidea 2015. Taxonomy, database on flash-drive. <http://www.taxapad.com> (accessed on 27 January, 2022).
- Zaldívar-Riverón, A., Shaw, M.R., Sáez, A.G., Mori, M., Belokobylskij, S.A., Shaw, S.R., Quicke, D.L.J., 2008. Evolution of the parasitic wasp subfamily Rogadinae (Braconidae): phylogeny and evolution of lepidopteran host ranges and mummy characteristics. *BMC Evol. Biol.* 8, 329.