

A Taxonomic Note of an Invasive Olive Pest, *Prociphilus (Prociphilus) oleae* (Hemiptera: Aphididae), from South Korea

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ABSTRACT

The genus *Prociphilus* (Hemiptera: Aphididae) encompasses 50 species globally, with eight species documented in South Korea. These aphids exhibit a complex life cycle, alternating between primary hosts from families such as Rosaceae, Caprifoliaceae, and Oleaceae and conifer roots as secondary hosts. *Prociphilus (Prociphilus) oleae*, the sole aphid species associated with *Olea europaea*, was initially observed in Jeju, South Korea, in 2021; however, it has not been given a morphological description. This study complemented the taxonomic information by resampling *P. oleae* in South Korea, based on specimens collected from *O. europaea* in Jeju. Furthermore, we provide a detailed morphological description and illustrations of this species.

Keywords: Pemphigini, leaf nest-conifer root aphids, olive pest, morphology

INTRODUCTION

The genus *Prociphilus* (Hemiptera: Aphididae) includes 50 valid species recorded worldwide (Favret, 2025). In South Korea, eight species from this genus have been documented (National Institute of Biological Resources, 2023). Species within the genus *Prociphilus* exhibit variable body sizes, ranging from small to very large, and are characterized by well-developed glands and the absence of siphunculi (Favret and Aphid Taxon Community, 2025). Although their life cycle remains poorly understood, it is suggested that their sexual generation has recently shifted from their traditional primary host, the genus *Populus*, to plants in the families Rosaceae, Caprifoliaceae, and Oleaceae. Their parthenogenetic generation typically develops on the roots of conifers, which serve as secondary hosts (Favret and Aphid Taxon Community, 2025). Among the species, *Prociphilus (Prociphilus) oleae* is the only aphid known to be associated with the host plant *Olea europaea* (Tzanakakis and Prophetou-Athanasiadou, 1988). Fundatrices of this species in spring are alate, with yel-

low abdomen and body covered in wax (Roberti and Monaco, 1987; Milek et al., 2019; Favret and Aphid Taxon Community, 2025). They are believed to migrate to the roots of the *Vitis vinifera*, their presumed secondary host, during May (Barbagallo and Stroyan, 1980; Tzanakakis and Prophetou-Athanasiadou, 1988; Favret and Aphid Taxon Community, 2025).

In South Korea, this species was first discovered in 2021 by Choi et al. (2023) in an olive field in Topyeong, Jeju. During early spring, a small number of fundatrices form colonies by producing white wax at the tips of olive tree branches (Choi et al., 2023). However, the taxonomic details of this species have not been reported in South Korea. Therefore, this study provides a detailed description and illustration of *Prociphilus (Prociphilus) oleae* in South Korea.

MATERIALS AND METHODS

Samples were collected from Jeju, South Korea in 2023 and then stored in 95% alcohol. Among them, 8 alate adults

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were made the slide glass specimens using Canada balsam for morphological observation, and these voucher specimens were deposited in the Animal Systematics Laboratory of Kunsan National University. Morphological observation was performed with Leica DM2500 microscope (Leica, Germany). Photographs of the specimens were taken using a Leica ICC50 E Camera with Leica Application Suite version 4.11.0 (Leica). Morphological terminology and diagnostic characters were based on Roberti and Monaco (1987) and Favret and Aphid Taxon Community (2025).

Abbreviations for descriptions were as follows: Ant.I, Ant.II, Ant.III, Ant.IV, Ant.V, Ant.VI, Ant.VIb, antennal segments I, II, III, IV, V, VI and the base of Ant.VI, respectively; Ant.IIIbD, basal diameter of antennal segment III; PT, process terminalis; URS, ultimate rostral segment; 2HT, second segment of hind tarsus; AbdT.I, AbdT.II, AbdT.III, AbdT.IV, AbdT.V, AbdT.VI, AbdT.VII, AbdT.VIII, abdominal tergum I, II, III, IV, V, VI, VII, VIII; SIPH, siphunculus; GP, genital plate; al., alate viviparous female, alatae.

SYSTEMATIC ACCOUNTS

Order Hemiptera Linnaeus, 1758

Family Aphididae Latreille, 1802

¹*Genus *Prociphilus* Koch, 1857

Subgenus *Prociphilus* Koch, 1857

Anocaudus Ghosh, Chakrabarti, Chowdhuri & Raychaudhuri, 1969

Bumelifex Amyot, 1847

Holzneria Lichtenstein, 1876

Nishiyana Matsumura, 1917

Type species: *Prociphilus bumeliae* Schrank, 1801

²**Prociphilus* (*Prociphilus*) *oleae* (Leach, 1826)

(Table 1, Fig. 1)

Prociphilus oleae Börner & Heinze, 1957

Material examined. South Korea, 8 al.: Jeju-do, Seogwipo-si, Topyeong-dong, on *Olea europaea* L. (Oleaceae), 14 May 2023, deposited in the Animal Systematics Laboratory, Department of Biological Science, Kunsan National University, Gunsan, South Korea.

Description. Alate viviparous female. Color (in life): black, yellowish on abdomen, whole body covered in white cotton wax. antennal segments I–VI black. Legs black. Cauda yellowish like the abdomen. Color (in macerated specimens): Head, thorax and near parts dark brown and abdomen pale;

dorsum without spinal sclerites on tergum. Antennae dark brown on Ant.I–VI. URS dark brown. Legs dark brown. Posterior of GP dark brown otherwise pale. Cauda pale.

Morphology. Body ovoid, bulky, 2.94–4.43 mm from antennal tubercle to end of cauda (Fig. 1A). Head: smooth dorsally and ventrally, with one pair of wax gland plates on dorsal submedian; median tubercle on frons not developed, antennal tubercles clearly absent (Fig. 1B). Antennae six segmented, shorter (0.28–0.45 times) than body length with secondary rhinarium; Ant.I smooth with 4–5 setae; Ant.II smooth with 6–8 setae; Ant.III smooth with 14–22 setae, longest seta 0.19–0.31 times as long as Ant.IIIbD and 18–22 transverse secondary rhinaria; Ant.IV smooth with 2–6 setae and 6–9 transverse secondary rhinaria; Ant.V smooth with 2–5 setae and 2–7 transverse secondary rhinaria; Ant.VI smooth with 0–5 setae on Ant.VIb, 3–5 setae including apical setae on PT, PT 0.14–0.28 times as long as Ant.VIb (Fig. 1C). Rostrum reaching to about hind coxae; clypeus with 4–13 setae; mandibular laminae with 22–36 setae on each side; URS 0.50–0.67 times as long as 2HT, 0.71–0.95 times as long as Ant.VIb, bearing 10–16 long accessory setae (Fig. 1D). Thorax: smooth, sclerotized; pro-metathorax with one pair of wax gland plates on dorsal submedian. Hind coxae smooth with approximately four setae; posterior seta on hind trochanter 0.36–0.53 times as long as width of trochanter-femoral joint; hind femur smooth, bearing long setae, longest of posterior setae 0.29–0.58 times as long as middle width of segment; longest seta of tibiae 0.87–1.42 times as long as middle width of segment (Fig. 1E); hind tarsal chaetotaxy; 2HT imbricate with 8–13 setae. Abdomen: dorsum weakly membranous, with one wax gland plate on each lateral segment of terga I–VIII; terga VIII with one pair of submedian wax gland plates (Fig. 1A); longest spinal seta of tergum III 0.39–0.64 times as long as Ant.IIIbD; tergum VIII with 6–7 setae on wax gland plates; genital plate with 6–10 median setae and 20–32 setae on posterior margin. SIPH absent. Cauda stubby hemisphere-shaped, with 7–10 setae (Fig. 1H).

Host plants. *Olea europaea* L., 1753, *Phillyrea latifolia* L., 1753, *Vitis vinifera* L., 1753 (Milek et al., 2019; Favret and Aphid Taxon Community, 2025).

Distribution. Korea, Croatia, France, Greece, Italy, Slovenia, Turkey (Milek et al., 2019; Favret and Aphid Taxon Community, 2025).

Remarks. This species was first discovered by Choi et al. in 2021, during which its Korean name was also given. However, the original paper describing its discovery did not provide taxonomic information. Therefore, in this study, a morphological description and illustration are presented based on speci-

Korean name: ¹*물푸레면충속, ²*올리브면충

Table 1. Biometric data of *Prociphilus (Prociphilus) oleae*

	Body part	Alate vivipara (n=8)
Length (mm)	Body	3.64 (2.94–4.43)
	Whole antennae	1.40 (1.25–1.76)
	Ant.I	0.09 (0.08–0.10)
	Ant.II	0.08 (0.08–0.10)
	Ant.III	0.45 (0.42–0.49)
	Ant.IV	0.23 (0.20–0.25)
	Ant.V	0.22 (0.19–0.25)
	Ant.VIb	0.22 (0.19–0.24)
	PT	0.05 (0.03–0.06)
	URS	0.19 (0.17–0.20)
	Hind femur	0.83 (0.72–0.96)
	Hind tibia	1.42 (1.25–1.58)
	2HT	0.32 (0.28–0.34)
	SIPH	0
	Cauda	0.10 (0.06–0.14)
	Setae on Ant.III	0.01 (0.01–0.01)
	Setae on AbdT.III	0.02 (0.02–0.03)
No. of hairs on	Mandibular lamina	30 (22–36)
	Ant.I	4 (4–5)
	Ant.II	7 (6–8)
	Ant.III	17 (14–22)
	URS (subsidiary)	7 (5–8)
	Tergite between SIPH	16 (10–22)
	Tergite VIII	6 (6–7)
	Median of GP	7 (6–10)
	Posterior margin of GP	26 (20–32)
No. of Rhinaria on	Cauda	8 (7–10)
	Ant.III	19 (18–22)
	Ant.IV	7 (6–9)
	Ant.V	3 (2–7)
Ratio (times)	Whole Antennae/Body	0.38 (0.28–0.45)
	PT/Ant.III	0.11 (0.07–0.14)
	PT/Ant.VIb	0.22 (0.14–0.28)
	URS/2HT	0.57 (0.50–0.67)
	URS/Ant.VIb	0.86 (0.71–0.95)
	SIPH/Body	0
	SIPH/Ant.III	0
	SIPH/Hind femur	0
	SIPH/Cauda	0
	Cauda/Width of cauda	0.50 (0.29–0.65)
	Setae on Ant.III/Ant.IIIbD	0.23 (0.19–0.31)
	Setae on AbdT.III/Ant.IIIbD	0.48 (0.39–0.64)

Values are presented as means (min.–max.).

AbdT.I, AbdT.II, AbdT.III, AbdT.IV, AbdT.V, AbdT.VI, AbdT.VII, AbdT.VIII, abdominal tergum I, II, III, IV, V, VI, VII, VIII; Ant.I, Ant.II, Ant.III, Ant.IV, Ant.V, Ant.VI, Ant.VIb, antennal segments I, II, III, IV, V, VI and the base of Ant.VI, respectively; Ant.IIIbD, basal diameter of antennal segment III; GP, genital plate; PT, processus terminalis; SIPH, siphunculus; URS, ultimate rostral segment; 2HT, second segment of hind tarsus.

mens resampled in 2023. Since no DNA data for *Prociphilus (Prociphilus) oleae* is available in GenBank, we were unable to match the *cytochrome c oxidase subunit I* (COI) barcode sequence for molecular identification of this species. However, we determined approximately a 1% genetic difference between *P. oleae* and *P. oriens* in the COI barcode. Morpho-

logical identification was confirmed by referring to Roberti and Monaco (1987) and Favret and Aphid Taxon Community (2025). Furthermore, it was verified that this is the only aphid species associated with *Olea europaea*, as supported by Tzanakakis and Prophetou-Athanasiadou (1988) and Favret and Aphid Taxon Community (2025).

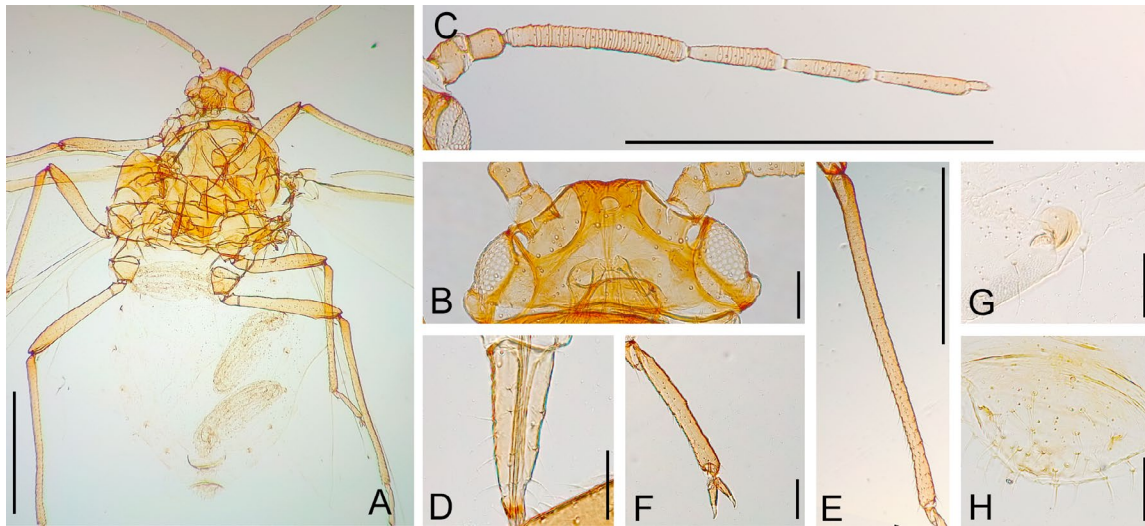


Fig. 1. *Prociphilus* (*Prociphilus*) *oleae*. Alate viviparous female: A, Body; B, Head; C, Antennal segments (I–VI); D, Ultimate segment of rostrum; E, Hind tibia; F, Hind tarsal segment II; G, Spiracle on abdominal tergum VIII; H, Cauda. Scale bars: A, C=1 mm, B, D, F–H=0.1 mm, E=0.5 mm.

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CONFLICTS OF INTEREST

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

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