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REVIEW OF THE GENUS *PANTOLYTA* (HYMENOPTERA: DIAPRIIDAE, BELYTINAE) IN THE SOUTH KOREAN FAUNA WITH DESCRIPTION OF FOUR NEW SPECIES

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Summary. As a result of a project to study parasitic wasps in South Korea the diapriids of the genus *Pantolyta* were revised. Four new species from South Korea, *P. complanata* sp. n., *P. jejuensis* sp. n., *P. ornata* sp. n. and *P. tristis* sp. n., are described and illustrated. The species *Pantolyta flexinervis* (Macek), *P. nixonii* Macek, *P. rufiventris* (Kieffer) and *P. sciarivora* (Kieffer) are newly recorded from the Republic of Korea. An identification key to all Eastern Palaearctic species of the genus *Pantolyta* is given.

Key words: diapriids, parasitoids, Pantolytini, new species, fauna, new records, Republic of Korea, Eastern Palaearctic.

В. Г. Чемырева, Д. Юн, Д-С. Ку. Обзор рода *Pantolyta* (Hymenoptera: Diapriidae, Belytinae) фауны Южной Кореи с описанием четырех новых видов // Дальневосточный энтомолог. 2025. N 531. С. 1-22.

Резюме. В рамках проекта по изучению паразитических ос южнокорейской фауны дан обзор диаприид рода *Pantolyta*. Из Южной Кореи описаны и проиллюстрированы 4 новых для науки вида: *P. complanata* sp. n., *P. jejuensis* sp. n., *P. ornata* sp. n. and *P. tristis* sp. n. Впервые для Республики Корея приведены *Pantolyta flexinervis* (Macek), *P. nixonii* Macek, *P. rufiventris* (Kieffer) and *P. sciarivora* (Kieffer). Для всех восточнопалеарктических видов рода *Pantolyta* составлена определительная таблица.

INTRODUCTION

The genus *Pantolyta* for today comprise only 31 described species known only from Holarctic and Afrotropical Regions. This group of diapriids was more accurately studied in European and Russian fauna (Macek, 1993, 1998; Chemyreva & Kolyada, 2019, 2021) and only few studies were devoted to African (Chemyreva & Kolyada, 2023) and Nearctic (Ashmead, 1893; Whittaker, 1930; Fouts, 1924) species of *Pantolyta*. The South-Eastern part of Palaearctic region was also poorly studied. So, 15 species of *Pantolyta* were recorded from the Russian Far East (Chemyreva & Kolyada, 2019, 2021), three from Japan and only one species – *Pantolyta pallida* Kieffer, was recorded from South Korea (Chemyreva & Kolyada, 2019).

The genus *Pantolyta* is the most species-rich in the Pantolytini tribe. The diagnosis of the tribe was provided by Macek (1989) and later updated by Chemyreva (2023). Macek provided a diagnosis for the genus separately for *Pantolyta* s. str. (Macek, 1993) and *Acropiasta* (Macek, 1998). These two genera were later Synonymized by Chemyreva & Kolyada (2021), who listed and discussed the diagnostic features of both taxa. This study aims to review the species of *Pantolyta* in South Korea and provide an original key to the Palaearctic species of this genus.

MATERIAL AND METHODS

This study is based mostly on the materials from the National Institute of Biological Resources (Incheon, South Korea; NIBR), the Science Museum of Natural Enemies (Geochang, South Korea; SMNE) and Zoological Institute of the Russian Academy of Sciences (St Petersburg, Russia; ZISP).

Morphological terminology and measurements follow Yoder (2004), Hymenoptera Anatomy Ontology (Yoder *et al.*, 2010) and Chemyreva & Kolyada (2019, 2020, 2021). For the morphological structure, the following abbreviations are used: A – antennomeres; MT – Malaise Trap; T and S – metasomal terga and sterna, respectively. Moreover, some abbreviations of the Korean provinces are used: GW – Gangwon-do; JJ – Jeju-do. New for Korean fauna species are asterisked (*).

Most of photographs were taken using a combination of an Olympus SZX10 stereomicroscope and an Olympus OM-D digital camera. Some images were taking with a Nikon stereo microscope SMZ25 equipped with objective lens Plan Apo 1.6X and digital camera DS-10.

DNA extraction and amplification. Hind leg tissue was placed it in a BioMasher (TaKaRa, Japan). It was left in a heating block at 60°C for 10 min to inhibit DNA hydrolase activity. DNA extraction was performed according to the manufacturer's protocol using the MagListo 5M DNA Extraction Kit (BIONEER, Korea). For the PCR reaction, 2 ml of template DNA, 1 ml of forward and reverse primers were added using AccuPower PCR Primix (BIONEER, Korea), and 16 ml of water was added to adjust the final volume to 20 ml. The reaction conditions on the PCR machine were a 3-step PCR and were performed as follows: pre-denaturation at 95°C for 5 min, 35 cycles of 30 s at 95°C, 25 s at 50°C, and 45 s at 68°C, and a final extension at 68°C for 5 min. The primers used for cytochrome oxidase subunit I (COI): forward (5' - GGT CAA CAA ATC ATA AAG ATA TTG G - 3') and reverse (5' - TCA GGG TGA CCA AAA AAT CA - 3'). After the PCR amplification process, samples were stained using Dyne Loading STAR (Dyne Bio, Korea) and electrophoresed on a 0.8% agarose gel at 100 V for 23 min to check for band formation. If bands were present, samples were sent to Macrogen (Daejeon, Korea) for purification and sequencing analysis. The obtained data were uploaded to the National Center for Biotechnology Information (NCBI) database.

TAXONOMY

Genus *Pantolyta* Förster, 1856

Pantolyta Förster, 1856: 128, 130, 135. Type species: *Pantolyta atrata* Förster, 1861.

Acropiesta Förster, 1856: 129, 131, 135. Type species: *Acropiesta flavicauda* Ashmead, 1893. Synonymized by Chemyreva & Kolyada (2021).

Pantopiesta Maneval, 1939: 170. Type species: *Cinetus flaviventris* Thomson, 1858. Synonymized by Nixon (1957).

Pantolyta complanata Chemyreva, Yun et Ku, sp. n.

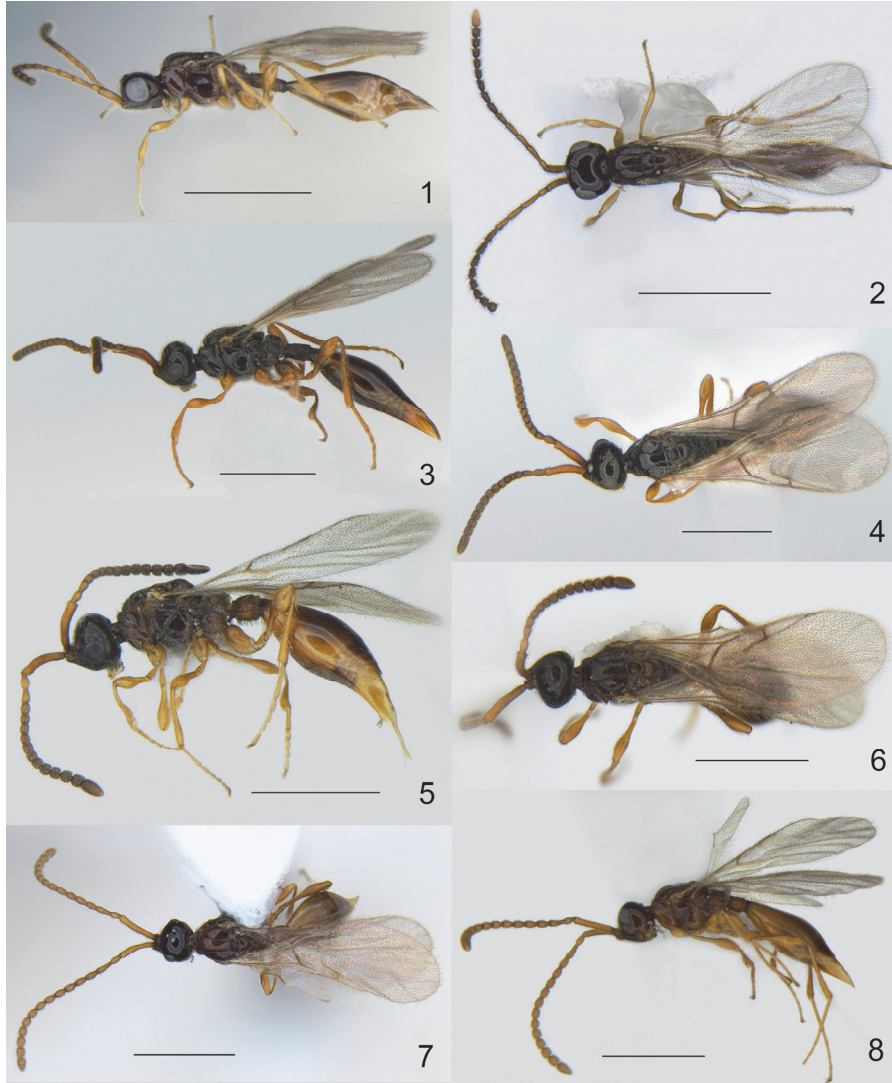
<https://zoobank.org/NomenclaturalActs/60951D75-E965-4291-9FD0-2FDA5F0B8ABE>

Figs 1, 2, 9–13, 29, 31, 37

TYPE MATERIAL. Holotype – ♀, **South Korea:** Gyeongsangnam-do, Oryang-ri, Sadeung-myeon, Geoje-si, 34°52'50.67"N 128°30'30.48"E, MT, 20.VI–04.VII 2017, leg. Hyung-Keun Lee (NIBR). Paratypes: **South Korea:** the same locality, coordinates, collector and data as holotype, 1 ♂ (ZISP); same locality, coordinates and collector as holotype, 04.VII 2017, 1 ♀ (ZISP); **Russia:** Amurskaya Oblast, 30 km SE from Arkhara, 21–24.VII 2003, 1 ♂, leg. S. Belokobylskij (ZISP).

DIAGNOSIS. *Pantolyta complanata* sp. n. can be distinguished from all known species of *Pantolyta* by the combination of the following characters: head not nasi-form (Fig. 12), opisthognathous (Fig. 11) and depressed; mouth conus weakly developed (Fig. 10); eye with scattered short setae; female antennae slender, broadened and slightly compressed apically (Fig. 9); A1–A6 pale brown, A7–A14 dark brown, A15 yellowish; in dorsal view all antennomeres elongate and gradually change from very long A3 (3.5 times as long as wide) to slightly elongate A14 (1.1 times as long

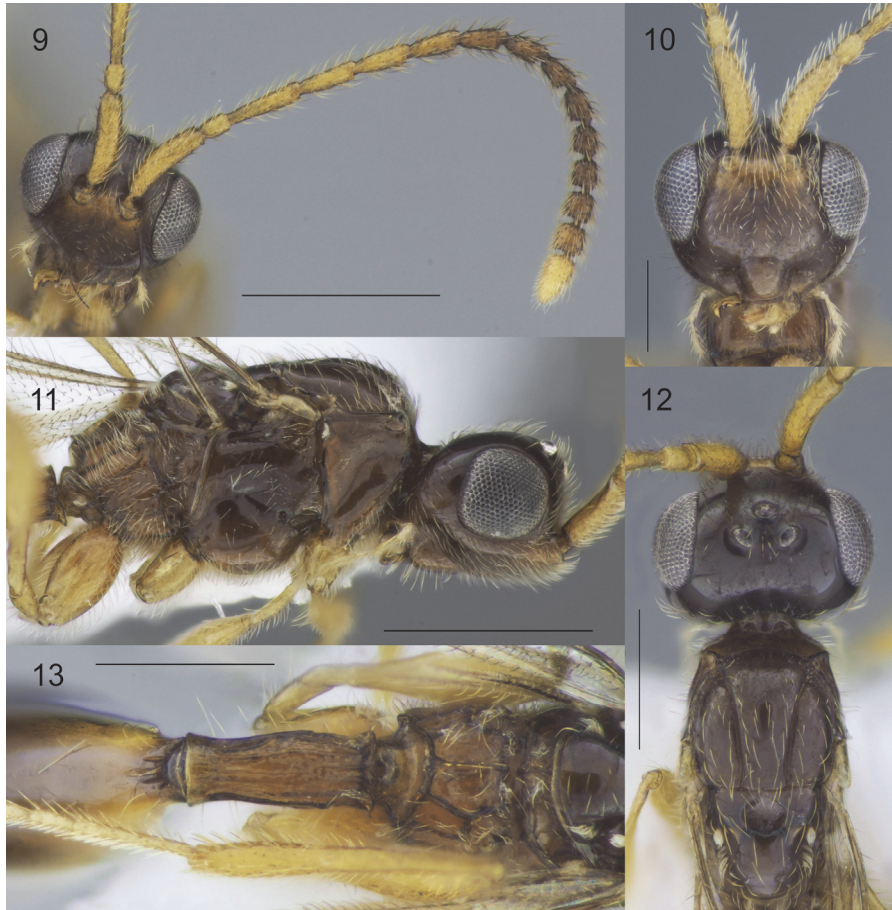
as wide); male A3 with distinct emargination and carina reaching half of this segment length (Fig. 31); mesosoma compressed; pronotal pit bare, with distinct epomia inside (Fig. 11); pronotal collar without transverse carina between pronotal shoulders, smooth (Fig. 12); pronotal shoulders weakly projecting, with sharp epomia on it



Figs 1–8. *Pantolyta* spp., females, holotypes in dorsal (2, 4, 6, 7) and lateral (1, 3, 5, 8) views: 1, 2 – *P. complanata* **sp. n.**; 3, 4 – *P. jejuensis* **sp. n.**; 5, 6 – *P. ornata* **sp. n.**; 7, 8 – *P. tristis* **sp. n.** Scale bar 1 mm.

(Figs 11, 12); each axillar depression with one verruculate tubercle anteriorly and a group of verricules posteriorly (Fig. 12); mesopleural subalar bridge absent (Fig. 11); median propodeal keel simple; upper and lower posterior propodeal projections are not developed (Fig. 13); fore wing with open radial cell; postmarginal vein present like a short trace (Fig. 37).

DESCRIPTION. FEMALE (holotype). Body length 2.5 mm; fore wing length 1.7 mm; antenna length 1.7 mm (Figs 1, 2). Coloration: head dark brown; mesosoma mainly brown; propodeum and metasoma pale brown; mandibles, palpi, legs and tegulae yellowish; antennae coloration as described in diagnosis.



Figs 9–13. *Pantolyta complanata* **sp. n.**, female, paratype: 9 – antenna in lateral view; 10 – face; 11, 12 – head and mesosoma in lateral (11) and dorsal (12) views; 13 – propodeum, petiole and base of T2 in dorsal view. Scale bars: 9, 11 – 0.5 mm; 12, 13, – 0.3 mm; 10 – 0.2 mm.

Head in dorsal view, 0.8 times as long as wide, 1.4 times as wide as mesosoma. Occipital flange (=occipital carina) very narrow, setose. Malar space 0.75 times as long as largest diameter of eye. Eyes enlarged, as wide as high. Antennal shelf in front view and lower face smooth. Labrum semicircular without middle groove. Pleurostomal distance 0.53 times as long as shortest distance between eyes. Mandibles asymmetrical (three-toothed and two-toothed). Distance between antennal foramina as wide as its diameter. Ratios of length to width of A1–A15 in lateral view as in Fig. 9.

Mesosoma 1.4 times as high as wide, in dorsal view 2.1 times as long as wide. Mesoscutum 0.8 times as long as wide, convex. Metanotum narrow, bare laterally but metascutellum setose, with three longitudinal keels, the median keel higher than lateral one. Propodeum sparsely pubescent, smooth dorsally; sides of propodeum and metapleura with three longitudinal carinae below plica: lateral propodeal carina, metapleural carina and metapleural epicoxal carina, and they all almost parallel to each other; plicae and other carinae not projecting posteriorly. Legs slender. Venation as in Fig. 37.

Petiole slightly broadened anteriorly, sparsely pubescent dorsally and laterally, ventrally with a row of verruculae, 2.5 times as long as its median width, longitudinally carinate (Fig. 13). Gaster very narrow, compressed (Fig. 1); T2 anteriorly with three grooves median longer, lateral shorter; T3–T6 short, smooth, with a few setae. T7 and T8 elongate, together as long as S6 and all strongly compressed. S2 mainly smooth, with short striation and a verrucula at base and scattered setae, S2 setae lines distinct anteriorly; S3–S5 short, smooth, with a few erect setae.

MALE. Body length 2.6 mm. Similar to female except following characters: antenna filiform, about as long as body (Fig. 29); antennomeres cylindrical, with pubescence as long as width of corresponding antennomere; base of T2 with more grooves: long median and two laterals; T7, S3–S7 short; T8 and S8 subtriangular, rounded apically.

ETYMOLOGY. This species name is derived from the Latin word *complanatus* (flattened) in refers to the depressed head and compressed body of this new species.

BIOLOGY. Unknown.

DISTRIBUTION. Russia (Far East), South Korea.

****Pantolyta flexinervis* (Macek, 1998)**

Acropiasta flexinervis Macek, 1998: 36.

MATERIAL EXAMINED. **South Korea:** [GW] Mt. Jeombong, Jindong-ri, Girin-myeon, Inje-gun, MT, 38°1'58.52"N 128°27'54.19"E, 13.V–22.VI 2017, 1 ♂, leg. Hyung-Keun Lee (NIBR); Gyeongsangbuk-do, Heungpyeong-ri, Guseong-myeon, Gimcheon-si, 36°4'58.6"N 128°30'30.48"E, 25.IV–10.V 2017, 1 ♂, leg. Hyung-Keun Lee (SMNE); [JJ] Yeolnangjoreum san97, Orai-dong, Jeju-si, MT, 15–30.IV 2024, 2 ♂, legs Deokseo Ku & Muncheol Kwon (SMNE).

BIOLOGY. Unknown.

DISTRIBUTION. Czech Republic, Slovakia, Russia (Far East), *South Korea.

***Pantolyta jejuensis* Chemyreva, Yun et Ku, sp. n.**

<https://zoobank.org/NomenclaturalActs/3265E707-FE97-487C-8B14-3B48BA7082CB>

Figs 3, 4, 14–18, 33, 35, 38, 41, 42, 48

TYPE MATERIAL. Holotype – ♀, **South Korea**: [JJ], Seowoobong Peak, Hamdeok-ri, Jocheon-eup, Jeju-si, MT, 15.V–30.IV 2024, legs Deokseo Ku & Muncheol Kwon (NIBR). Paratypes – **South Korea**: the same locality, coordinates and collector as holotype, 1–15.V 2024, 2 ♀; 15.V–30.IV 2024, 1 ♀; 31.V–15.VI 2024, 1 ♀; [JJ] Sinheung-ri, Jocheon-eup, Jeju-si, MT, 15–30.IV 2024 and 1–15.V 2024, legs Deokseo Ku & Muncheol Kwon, 3 ♀; [JJ] Isan Mureung-ri, Daejeong-eup, Seogwipo-si, MT, 15–30.IV 2024, legs Deokseo Ku & Muncheol Kwon, 1 ♀; [JJ] Mt. Sanbang, Sagye-ri, Andeok-myeon, Seogwipo-si, MT, 15–30.IV 2024 and 1–15.V 2024, legs Deokseo Ku & Muncheol Kwon, 2 ♀ and 1 ♂; [GW] Yeongwol-gun, Jungdong-myeon, Hwawon2-ri, Mt. Yemisan, 38°1'58.52"N 128°27'54.19"E, 7–21.VI 2017, leg. Hyung-Keun Lee, 1 ♀. Paratypes in ZISP and SMNE.



Figs 14–18. *Pantolyta jejuensis* sp. n., female, paratype: 14 – antenna in lateral view; 15 – face; 16 – head and mesosoma in lateral view; 17 – head and part of mesosoma in dorsal view; 18 – mesosoma, petiole and base of T2 in dorsal view. Scale bars 0.5 mm.

DIAGNOSIS. *Pantolyta jejuensis* **sp. n.** can be distinguished from all known species of *Pantolyta* by the combination of the following characters: head not nasiform (Fig. 17), hypognathous (Fig. 16), not depressed; mouth conus not developed (Fig. 15); eye with scattered short setae; female antennae stout and filiform, entirely brown (Fig. 14); scapus long, A2–A4 and A14–A15 elongate, A5–A13 subquadrate; male A3 with distinct emargination and carina extending to 0.46 of this segment length (Fig. 35); mesosoma slightly compressed; pronotal pit bare, carinate inside (Fig. 48); pronotal collar sculptured, with interrupted transverse carina and depression medially between pronotal shoulders (Fig. 17); pronotal shoulders weakly projecting, rugulose-carinate; each axillar depression and anterior scutellar pit entirely with numerous small verricules (Fig. 41); mesopleural subalar bridge present (Fig. 48, upper red arrow); median propodeal keel bifurcated posteriorly; upper and lower posterior propodeal projections weakly developed (Fig. 18); fore wing with close radial cell (Fig. 38).

DESCRIPTION. FEMALE (holotype). Body length 3.3 mm; fore wing length 2.4 mm; antenna length 2.0 mm (Fig. 3, 4). Coloration: head, mesosoma and petiole black; gaster dark brown; tegulae, mandibles, legs and antennae mainly brown; palpi yellowish.

Head in dorsal view 0.85 times as long as wide and 0.9 times as wide as mesosoma. Occipital flange narrow, sculptured and setose. Malar space 0.9 times as long as largest diameter of eye. Eyes 0.8 times as wide as high. Antennal shelf in front view pustulate, lower part of face smooth. Labrum semicircular with middle groove. Pleurostomal distance 0.75 times as long as shortest distance between eyes. Mandibles asymmetrical (three-toothed and two-toothed). Distance between antennal foramina 0.4 times as long as its diameter. Ratios of length to width of A1–A15 in lateral view as in Fig. 14.

Mesosoma 1.2 times as high as wide, in dorsal view 1.9 times as long as wide. Mesoscutum 0.8 times as long as wide, convex. Metanotum narrow, bare laterally but metascutellum setose, with three longitudinal keels, the median keel higher than lateral one. Propodeum sparsely pubescent, rugulose in dorsal view; posterior edge arcuate between plicae and straight (not wavy); sides of propodeum and metapleura with three longitudinal carinae below plica: lateral propodeal carina (lpc), metapleural carina and metapleural epicoxal carina; plicae and lpc weakly projecting posteriorly (Fig. 18). Legs slender. Venation as in Fig. 38.

Petiole slightly broadened posteriorly, sparsely pubescent dorsally and laterally, ventrally with a row of verricules, 1.3 times as long as its median width, longitudinally carinate. Gaster slightly wider than mesosoma; T2 anteriorly with long median groove and several short lateral grooves on each side; T3–T6 short, sparsely setose and with fine micropunctuation medially; T7 and T8 elongate, together as long as S6 and all compressed; S2 mainly smooth, with short striation and verricules at base and scattered setae posteriorly, S2 setae lines absent; S3–S5 short, smooth, with a few erect setae.

MALE. Body length 2.7 mm. Similar to female except following characters: antenna filiform, about as long as body (Fig. 33); antennomeres cylindrical, with pubescence shorter than wide of corresponding antennomere; petiole 1.7 times as long as its median width; T7, S3–S7 short; T8 and S8 subtriangular but rounded apically.

ETYMOLOGY. The species is named after the type locality (Jeju Island) where the most specimens of the type series have been found.

BIOLOGY. Unknown.

DISTRIBUTION. South Korea.

REMARK. The cytochrome oxidase I (COI) subunit sequences have been obtained for *P. jejuensis* **sp. n.** The data are available on the NCBI website. The NCBI accession number is PQ662806.

****Pantolyta nixon* Macek, 1993**

Pantolyta nixon Macek, 1993: 46.

MATERIAL EXAMINED. South Korea: Gyeongsangbuk-do, Yeongyang-gun, Irwol-myeon, Mt. Liwol-san, 36°48'29"N 129°05'25"E, 14.VII 2015, 1 ♀, leg. E. Tselikh (NIBR).

BIOLOGY. Unknown.

DISTRIBUTION. Germany, Sweden, Czech Republic, Hungary, Poland (Macek, 1993), Russia (European Part and Far East), Azerbaijan, *South Korea.

***Pantolyta ornata* Chemyreva, Yun et Ku, sp. n.**

<https://zoobank.org/NomenclaturalActs/8333F1D7-A1A9-4FB3-A24B-B8A09680B49D>

Figs 5, 6, 19–23, 34, 36, 39, 43, 44

TYPE MATERIAL. Holotype – ♀, **South Korea**: Jeollanam-do, Ondang-ri, Gwangui-myeon, Gurye-gun, 35°17'8.87"N 127°27'8.72"E, 16.IV–1.V 2017, MT, leg. Hyung-Keun Lee (NIBR). Paratypes – the same locality, coordinates and collector as for holotype, 1–15.V 2017, 1 ♀ and 3–16. IV 2017, 1 ♂ (ZISP).

DIAGNOSIS. *Pantolyta ornata* **sp. n.** can be distinguished from all known species of *Pantolyta* by the combination of the following characters: head not nasiform (Fig. 22), hypognathous (Fig. 21), not depressed; mouth conus weakly developed (Fig. 20); eye with scattered short setae; female antennae stout, broadened and not compressed apically; antenna entirely pale brown but weakly and gradually darker to the top (Fig. 19); in dorsal view only A2–A4 and A15 elongate, A5–A14 subquadrate; male A3 with distinct emargination and carina reaching half of this segment length (Fig. 36); mesosoma slightly compressed; pronotal pit bare and carinate inside (Fig. 21); pronotal collar with interrupted transverse carina and depression medially between pronotal shoulders, with finely rugulose sculpture (Fig. 22); pronotal shoulders weakly projecting rugulose-carinate; each axillar depression and anterior scutellar pit entirely with numerous small verricules (Fig. 43); mesopleural subalar bridge present; median propodeal keel more or less doubled throughout; upper and lower posterior propodeal projections weakly developed (Fig. 23, 44); fore wing with close radial cell (Fig. 39).



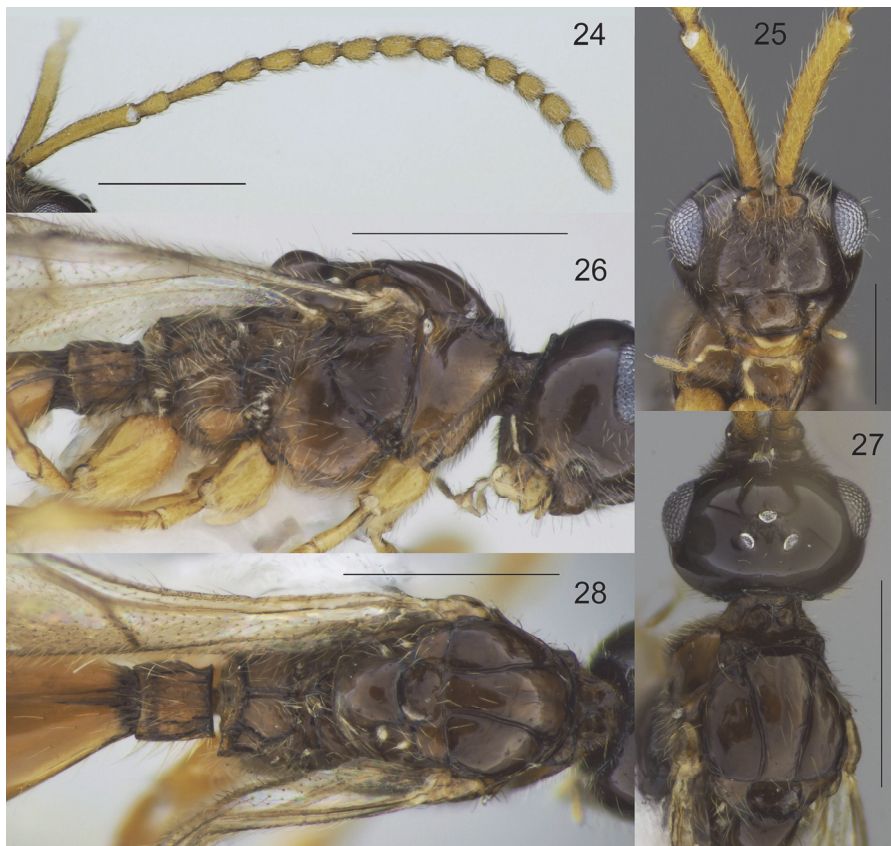
Figs 19–23. *Pantolyta ornata* **sp. n.**, female, paratype: 19 – antenna in lateral view; 20 – face; 21 – head and mesosoma in lateral view; 22 – head and anterior part of mesosoma in dorsal view; 23 – mesosoma, petiole and base of T2 in dorsal view. Scale bars 0.5 mm.

DESCRIPTION. FEMALE (holotype). Body length 3.0 mm; fore wing length 2.3 mm; antenna length 1.7 mm (Fig. 5, 6). Coloration: head dark brown, mesosoma mainly brown; metasoma, tegulae, mandibles and palpi, legs and antennae mainly pale brown.

Head in dorsal view 0.8 times as long as wide and as wide as mesosoma. Occipital flange narrow, sculptured and setose. Malar space as long as largest diameter of eye. Eyes small, 0.9 times as wide as high. Antennal shelf in front view rugulose-lacunose, lower part of face smooth. Labrum semicircular with middle groove. Pleurostomal distance 0.65 times as long as shortest distance between eyes. Mandibles asymmetrical (three-toothed and two-toothed). Distance between antennal foramens twice shorter than its diameter. Ratios of length to width of A1–A15 in lateral view as in Fig. 19.

Mesosoma 1.1 times as high as wide, in dorsal view 1.9 times as long as wide. Mesoscutum 0.83 times as long as wide, convex. Metanotum narrow, bare laterally but metascutellum setose, with three longitudinal keels, the median keel higher than lateral one. Propodeum sparsely pubescent, rugulose in dorsal view and with wavy posterior edge; sides of propodeum and metapleura with three longitudinal carinae below plica: lateral propodeal carina (lpc), metapleural carina and metapleural epicoxal carina; plicae and lpc weakly projecting posteriorly (Figs 21, 23). Legs slender. Venation as in Fig. 39.

Petiole slightly broadened posteriorly, sparsely pubescent dorsally and laterally, ventrally with a row of verruculae, 1.1 times as long as its median width, rugose (Fig. 23). Gaster slightly wider than mesosoma; T2 anteriorly with long median groove



Figs 24–28. *Pantolyta tristis* sp. n., female, paratype: 24 – antenna in lateral view; 25 – face; 26 – mesosoma in lateral view; 27 – head and anterior part of mesosoma in dorsal view; 28 – mesosoma, petiole and base of T2 in dorsal view. Scale bars: 24, 26–28 – 0.5 mm; 25 – 0.3 mm.

and several short lateral grooves on each side; T3–T6 short, sparsely setose and with fine micropunctuation medially; T7 and T8 elongate, together as long as S6 and all compressed; S2 mainly smooth, with short striation and verricules at base and scattered setae posteriorly, S2 setae lines absent; S3–S5 short, smooth, with a few erect setae.

MALE. Body length 2.5 mm. Similar to female except for the following characters: antenna filiform, as long as body; antennomeres cylindrical, with pubescence shorter than wide of corresponding antennomere; petiole 1.3 times as long as wide; T7, S3–S7 short; T8 and S8 subtriangular, rounded apically.

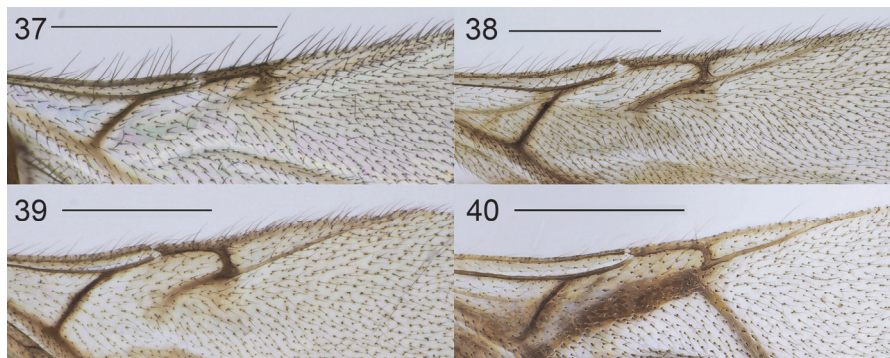


Figs 29–36. *Pantolyta* spp., males, paratypes: 29, 30, 33, 34 – habitus in lateral view; 31, 32, 35, 36 – basal part of antenna in dorsal view; 29, 31 – *P. complanata* **sp. n.**; 30, 32 – *P. tristis* **sp. n.**; 33, 35 – *P. jejuensis* **sp. n.**; 34, 36 – *P. ornata* **sp. n.** Scale bars 1 mm.

ETYMOLOGY. This species name is derived from the Latin word *ornatus* (decorated) in refers to the rugose sculpture on the propodeum and petiole, and, in particular, the waved posterior margin of propodeum.

BIOLOGY. Unknown.

DISTRIBUTION. South Korea.



Figs 37–40. *Pantolyta* spp., fore wings venation, females, paratypes: 37 – *P. complanata* sp. n.; 38 – *P. jejuensis* sp. n.; 39 – *P. ornata* sp. n.; 40 – *P. tristis* sp. n. Scale bars 0.5 mm.

****Pantolyta rufiventris* (Kieffer, 1909)**

Acropiesta rufiventris Kieffer, 1909: 588.

Pantoclis haesitans Kieffer, 1909: 552. Synonymized by Macek (1998).

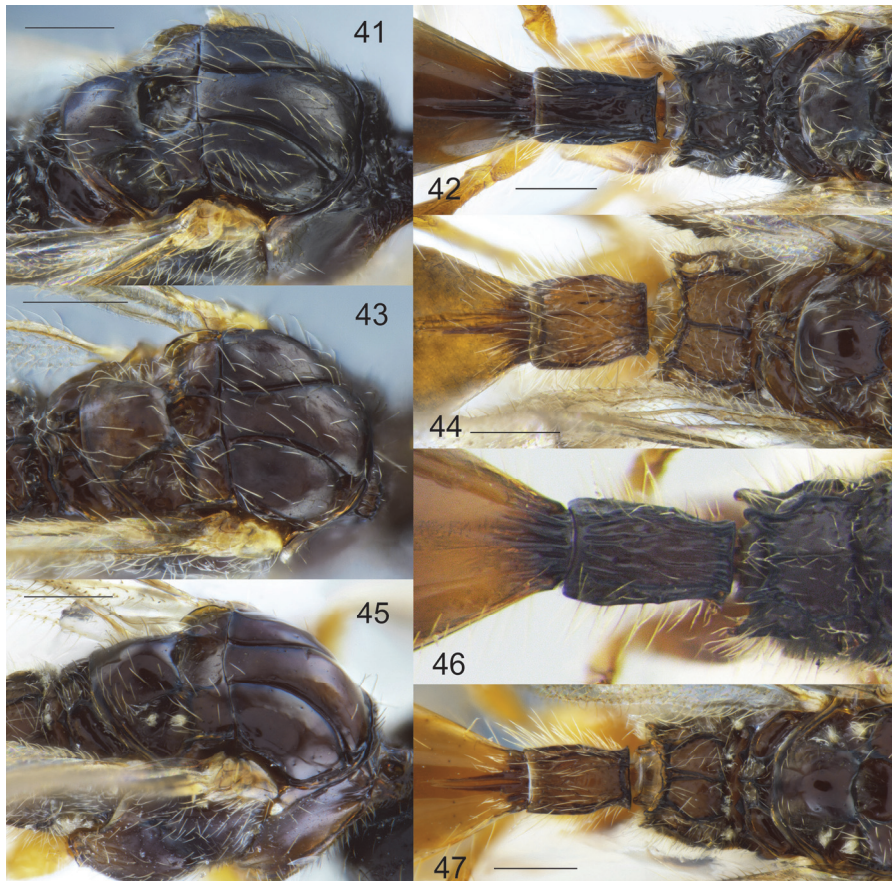
Acropiesta xanthura Kieffer, 1912: 19. Synonymized by Macek (1998).

MATERIAL EXAMINED. **South Korea:** [JJ] Isan Mureung-ri, Daejeong-eup, Seogwipo-si, MT, 15–30.IV 2024, 6 ♂, legs Deokseo Ku & Muncheol Kwon (SMNE); [JJ] Halla-Arboretum, yeon-dong, Jeju-si, Jeju-do, MT, 33°28'13.6"N 126°29'37.45"E, 28.V–11.VI 2017, 7 ♂, leg. Hyung-Keun Lee (SMNE); [JJ] san2-11, Daepo-dong, Seogwipo-si, 15–30.V 2024 and 31.V–15.VI 2024, 6 ♂, legs Deokseo Ku & Muncheol Kwon (NIBR, SMNE); [JJ] Sinheung-ri, Jocheon-eup, Jeju-si, MT, 15–30.IV 2024, 1 ♂, legs Deokseo Ku & Muncheol Kwon (SMNE); [JJ] 972, Tosan-ri, Pyoseon-myeon, Seogwipo-si, MT, 15–30.IV 2024 and 1–15.V 2024, 2 ♂, legs Deokseo Ku & Muncheol Kwon (SMNE); [JJ] Eoseungsaengak, Haeando, Jeju-si, Jeju-do, MT, 33°24'13"N 126°33'62"E, 11–25.VI 2017, 2 ♂, leg. Hyung-Keun Lee, (SMNE); [JJ] Bonggae-dong, San 78-1, Jeolmul Natural Recreation Forest, 15–31.VII 2023, 1 ♀, 1 ♂, legs Deokseo Ku & Muncheol Kwon, (SMNE); Chungcheongnam-do, Hwangnyong-ri, Cheongna-myeon, Boryeong-si, MT, 36°26'30.75"N 126°39'33.15"E, 11–25.V 2017, 25.V–7.VI 2017, 2 ♂, leg. Hyung-Keun Lee, (SMNE); [GW] Mt. Jeombong, Jindong-ri, Girin-myeon, MT, 38°2'58.31"N 128°28'52.10"E, 22.VI–20.VII 2017, 1 ♂, leg. Hyung-Geun Lee, (SMNE).

BIOLOGY. Unknown.

DISTRIBUTION. Western, northern and eastern Europe, Estonia, Moldova, Ukraine Russia (European part, Far East), *South Korea.

REMARK. The cytochrome oxidase I (COI) subunit sequence has been obtained for *P. rufiventris*. The data are available on the NCBI website. The NCBI accession number is PQ662807. This sequence was compared with 63 sequences obtained for European species of *P. rufiventris* and available on the BOLD system dataset (BIN:ACC0804). The average genetic distance between European specimens and the Korean one is 5.2% while the maximal genetic distance between European specimens is 2.2%. See the discussion section for more details.



Figs 41–47. *Pantolyta* spp. males: 41, 43, 45 – mesosoma in dorso-lateral view; 42, 44, 46, 47 – mesosoma and base of metasoma in dorsal view; 41, 42 – *P. jejuensis* **sp. n.**; 43, 44 – *P. ornata* **sp. n.**; 46 – *P. nigrocincta*; 45, 47 – *P. tristis* **sp. n.** Scale bars 0.2 mm.

****Pantolyta sciarivora* (Kieffer, 1907)**

Fig. 50

Zelotypa sciarivora Kieffer, 1907: 264.

Acropiesta filicornis Kieffer, 1909: 590. Synonymized by Macek (1998).

Acropiesta flavipes Kieffer, 1909: 590. Synonymized by Macek (1998).

MATERIAL EXAMINED. **South Korea:** [GW] Mt. Jeombong, Jindong-ri, Girin-myeon, Inje-gun, MT, 38°1'58.52"N 128°27'54.19"E, 22.VI–20.VII 2017, 1♂, leg. Hyung-Keun Lee, (NIBR).

BIOLOGY. Hosts – *Sciara* sp. (Diptera, Sciaridae) (Kieffer, 1907).

DISTRIBUTION. Western, northern and eastern Europe, Azerbaijan, Russia (European part, West and East Siberia, Far East), *South Korea; Canada, USA.

***Pantolyta tristis* Chemyreva, Yun et Ku, sp. n.**

<https://zoobank.org/NomenclaturalActs/F861ED4A-B012-4DE6-8E50-6FF69928CC63>

Figs 7, 8, 24–28, 30, 32, 40, 45, 47, 49, 51

TYPE MATERIAL. Holotype – ♀, **South Korea:** [GW] Mt. Jeombong, Jindong-ri, Girin-myeon, 38°2'58.31"N 128°28'52.10"E, 13.V–22.VI 2017, MT, leg. Hyung-Geun Lee (NIBR). Paratypes – the same locality, coordinates, collector and data as holotype, 1 ♀, 1 ♂ (ZISP).

DIAGNOSIS. *Pantolyta tristis* sp. n. can be distinguished from all known species of *Pantolyta* by the combination of the following characters: head not nasiform (Fig. 27), hypognathous (Fig. 26), not depressed; mouth conus weakly developed (Fig. 25); eye with scattered short setae; female antennae slender, broadened and not compressed apically; antenna entirely yellowish; in dorsal view all antennomeres elongate and gradually change from very long A3 (3.7 times as long as wide) to slightly elongate A10–A14 (about 1.2 times as long as wide), A3–A10 fusiform (Fig. 24); male A3 with very shallow emargination and carina extending to 0.4 of this segment length (Fig. 32); mesosoma slightly compressed; pronotal pit bare, with distinct epomia inside (Fig. 49); pronotal collar with interrupted transverse carina between pronotal shoulders, finely sculptured (Fig. 27); pronotal shoulders weakly projecting, with sharp epomia on it (Figs 27, 45); each axillar depression with two verricules (Figs 28, 45, 47); mesopleural subalar bridge present; median propodeal keel more or less doubled throughout (Figs 28, 47); upper and lower posterior propodeal projections weakly developed (Figs 28, 47); fore wing with close radial cell (Fig. 40).

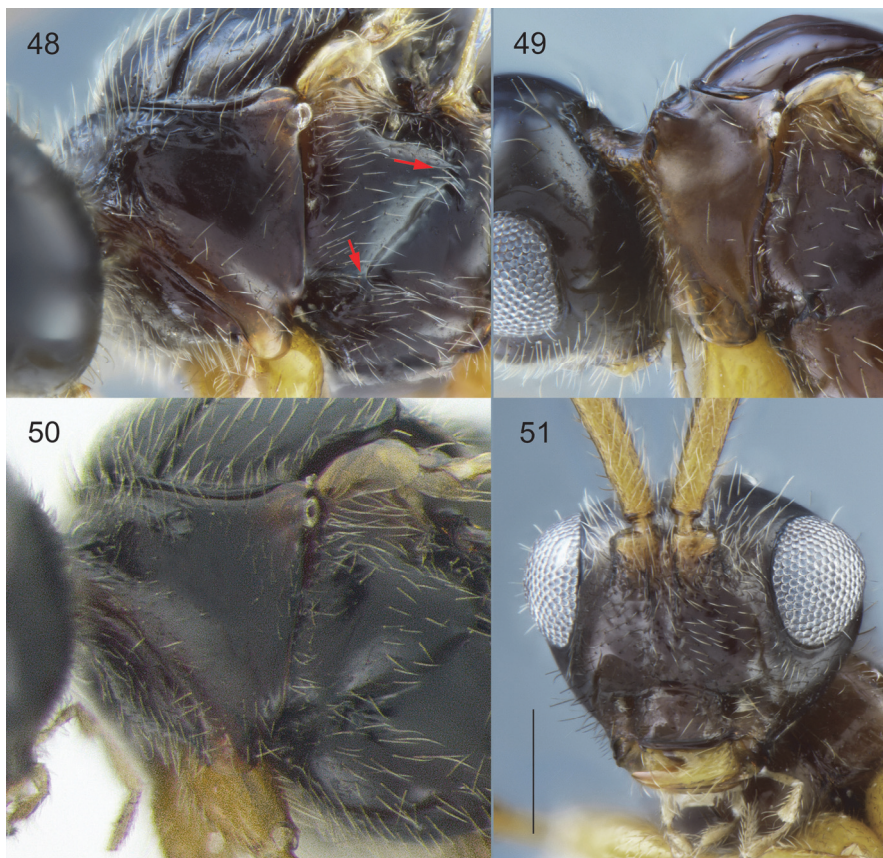
DESCRIPTION. FEMALE (holotype). Body length 2.6 mm; fore wing length 2.1 mm; antenna length 2.2 mm (Figs 7, 8). Coloration: head and mesosoma mainly brown; metasoma, tegulae, mandibles, legs and antennae pale brown; palpi yellowish.

Head in dorsal view as long as wide and as wide as mesosoma. Occipital flange narrow, sculptured and almost bare. Malar space 1.1 times as long as largest diameter of eye. Eye small, 0.8 times as wide as high. Antennal shelf in front view carinate-rugose, lower part of face smooth (Fig. 51). Labrum semicircular with middle groove. Pleurostomal distance 0.72 times as long as shortest distance between eyes. Mandibles asymmetrical (three-toothed and two-toothed). Distance between antennal foramina twice shorter than its diameter. Ratios of length to width of A1–A15 in lateral view shown in Fig. 24.

Mesosoma 1.2 times as high as wide, in dorsal view 1.8 times as long as wide. Mesoscutum 0.86 times as long as wide, convex. Metanotum narrow, bare laterally

but metascutellum setose, with three longitudinal keels, the median keel higher than lateral one. Propodeum sparsely pubescent, almost smooth dorsally; sides of propodeum and metapleura with three longitudinal carinae below plica: lateral propodeal carina (lpc), metapleural carina and metapleural epicoxal carina, and they all almost parallel to each other; plicae and lpc weakly projecting posteriorly. Legs slender. Venation as in Fig. 40.

Petiole slightly broadened posteriorly, sparsely pubescent dorsally and laterally, ventrally with row of verruculae, 0.9 times as long as its median width, longitudinally carinate (Fig. 28). Gaster as wide as mesosoma; T2 anteriorly with long median groove and several short lateral grooves on each side; T3–T6 short, smooth, with a few setae. T7 and T8 elongate, together as long as S6 and all compressed. S2 mainly smooth, with short striation and verruculae at base and scattered setae posteriorly, S2 setae lines absent; S3–S5 short, smooth, with a few erect setae.



Figs 48–51. *Pantolyta* spp. males: 48–50 – propodeum in fronto-lateral view; 51 – face; 48 – *P. jejuensis* **sp. n.**; 49, 51 – *P. tristis* **sp. n.**; 50 – *P. sciarivora*. Scale bar 0.2 mm.

MALE. Body length 2.5 mm. Similar to female except for the following characters: antenna filiform, 1.15 times as long as body (Fig. 30); antennomeres cylindrical, with pubescence shorter than wide of corresponding antennomere; petiole 1.6 times as long as wide; T7, S3–S7 short; T8 and S8 subtriangular, rounded apically.

ETYMOLOGY. This species name is derived from the Latin word *tristis* (sad) in reference to the long vertical wrinkles present on the face of the new species below toruli, which make it look sad.

BIOLOGY. Unknown.

DISTRIBUTION. South Korea.

A key to the Eastern Palaearctic species of the genus *Pantolyta*
(modified from Chemyreva & Kolyada, 2021)

Females

1. Wingless or micropterous parasitoids (wings strongly reduced, with venation indistinct) *P. atrata* Förster (part)
- Alate or brachypterous (venation distinct) 2
2. Radial cell open (Fig. 37) 3
- Radial cell closed (Figs 38–40) 6
3. Antennal shelf slightly prominent, head not nasiform (Figs 12, 17, 22); axillar depression at least with large single verruculate tubercle anteriorly (Fig. 12) 4
- Antennal shelf strongly prominent, head nasiform; axillar depression without such verruculate tubercle anteriorly 5
4. Malar distance 1.6 times as long as height of eye; head about 1.1 times as wide as mesosoma, mesosoma almost as wide as high; petiole 1.1–1.4 times as long as wide *P. pallida* Kieffer
- Malar distance as long as height of eye (Fig. 10); head 1.35 times as wide as mesosoma, mesosoma distinctly compressed (Figs 11, 12); petiole 2.5 times as long as its median width (Fig. 13) *P. complanata* sp. n.
5. Postgenae in dorsal view parallel to each other *P. atrata* Förster (part)
- Postgenae in dorsal view receding posteriorly *P. semirufa* Kieffer
- 6(2). Mesopleuron posterodorsally without subalar bridge (as in Fig. 11); antennal shelf strongly prominent anteriorly 7
- Mesopleuron posterodorsally with subalar bridge (Figs 21, 26); antennal shelf weakly prominent anteriorly 9
7. Pronotal collar smooth; pronotal shoulders rounded; epomia obsolete; A1 with sharply pointed apical flange *P. nixonii* Macek
- Pronotal collar rugose, with transverse keel; pronotal shoulders angular; epomia present; A1 without apical flange 8
8. Genae in frontal view convex; upper posterior propodeal projection (projection of plica) large *P. hadrosoma* Macek
- Genae in frontal view strongly receding to mouthparts; upper posterior propodeal projection small *P. marginalis* (Kieffer)
9. Pronotal collar bare, with complete transverse keel extending from one pronotal shoulder to another *P. elegans* Chemyreva et Kolyada
- Pronotal collar pubescent, transverse keel between pronotal shoulders absent or interrupted medially 10

10. Flagellum slightly incrassate (Figs 9, 19, 24)	11
– Flagellum filiform (Fig. 14)	17
11. Pronotal pit bare, with short and low (Fig. 48) or distinct epomia inside (Fig. 49)	12
– Pronotal pit shortly pubescent, totally without epomia inside (Fig. 50)	16
12. Apical segments of antenna not compressed (same wide in dorsal and lateral view); A15 small, less than twice as long as A14 (Fig. 24); epomia high, pronotal pit indistinct (Fig. 49)	<i>P. tristis</i> sp. n.
– Apical segments of antenna compressed (wider in lateral view); A15 large, distinctly more than twice as long as A14 (Fig. 19); epomia low, pronotal pit distinct (Fig. 48)	13
13. Anterior scutellar pit with numerous verricules (Figs 41, 43); radial cell distinctly longer than 1.5 times of the marginal vein (Fig. 39); A5–A8 as long as wide to slightly transverse (Fig. 19); upper and lower posterior propodeal projections small (Figs 21, 24)	<i>P. ornata</i> sp. n.
– Anterior scutellar pit bare or pubescent but without verricules (Figs 28, 45, 47); radial cell distinctly shorter than 1.5 times of the marginal vein; A5–A8 distinctly elongate; upper and lower posterior propodeal projections strong (Fig. 46)	14
14. Petiole as long as wide or slightly elongate; antennae bicolor, with A3–A10 yellowish and two or three apical segments dark brown	<i>P. dichromia</i> Chemyreva et Kolyada
– Petiole transverse; antennae with monochrome flagellum	15
15. A15 as wide as A14 in lateral view; genae strongly convex in frontal view	<i>P. nigrocincta</i> (Kieffer)
– A15 distinctly wider than A14 in lateral view; genae slightly convex in frontal view	<i>P. melniki</i> Chemyreva et Kolyada
16(11). Antenna stout, A12–A14 subquadrate, A5 and A6 less than 1.5 times as long as wide; temples in dorsal view and genae in frontal view strongly receding; median propodeal keel distinct	<i>P. rufiventris</i> (Kieffer)
– Antenna slender, all flagellomeres elongate, A5 and A6 about 2.5 times as long as wide; temples in dorsal view and genae in frontal view convex; median propodeal keel vague	<i>P. simplicior</i> Chemyreva et Kolyada
17(9). Radial cell as long as marginal vein or slightly longer (Fig. 38); A5–A11 subquadrate or slightly transverse (Fig. 14)	<i>P. jejuensis</i> sp. n.
– Radial cell about twice as long as marginal vein; A5–A11 elongate at least in dorsal view	18
18. Median keel of propodeum simple; anterior scutellar pit bare inside; antenna more stout, at last A9–A11 as long as wide in lateral view	<i>P. flexinervis</i> (Macek)
– Median keel of propodeum bifurcate or doubled; anterior scutellar pit pubescent and with verricule inside; antenna slender, all flagellomeres distinctly elongate in dorsal and lateral views	19
19. Gaster strongly compressed laterally and strongly elongated; in dorsal view A14 about twice as long as wide, A7–A13 even more elongate	<i>P. flaviventris</i> (Thomson)
– Gaster fusiform and at most in apical third laterally compressed; in dorsal view A14 about 1.6 times as long as wide, A7–A13 same to more stout	<i>P. sciarivora</i> (Kieffer)

Males (unknown for *P. simplicior*)

1. Radial cell open (Fig. 37)	2
– Radial cell closed (Figs 38–40)	5

2. Antennal shelf slightly prominent, head unspecialised (as in Figs 12, 17, 22); axillar depression with at least large single verrucate tubercle anteriorly	3
– Antennal shelf distinctly prominent, head nasiform; axillar depression without such verrucate tubercle anteriorly	4
3. Malar distance 1.6 times as long as the eye height; head about 1.1 times as wide as mesosoma, mesosoma almost as wide as high; petiole 1.1–1.4 times as long as wide	<i>P. pallida</i> Kieffer
– Malar distance as long as the eye height (as in Fig. 10); head 1.35 times as wide as mesosoma, mesosoma distinctly compressed (as in Figs 11, 12); petiole 2.5 times as long as its median width (as in Fig. 13)	<i>P. complanata</i> sp. n.
4. Postgenae in dorsal view parallel to each other behind eyes; fore tibia curved, with a row of long stout setae; A3 thickened, deeply emarginate	<i>P. atrata</i> Förster
– Postgenae in dorsal view receding behind eyes; fore tibia straight, with homogeneous pubescence; A3 slender, with shallow emargination	<i>P. semirufa</i> Kieffer
5(1). Mesopleuron posterodorsally without subalar bridge (as in Fig. 11); antennal shelf strongly prominent anteriorly	6
– Mesopleuron posterodorsally with subalar bridge (as in Fig. 21, 26); antennal shelf weakly prominent anteriorly	8
6. Pronotal collar smooth; dorsal posterior corner of pronotum rounded, epomia obsolete; A1 with sharply pointed flange	<i>P. nixonii</i> Macek
– Pronotal collar rugose, with transverse keel; dorsal posterior corner of pronotum angular; epomia present; A1 without apical flange	7
7. Genae in frontal view convex; antenna stout, A13 2.0–2.7 times as long as wide	<i>P. hadrosoma</i> Macek
– Genae in frontal view strongly receding to mouthparts; antenna slender, A13 3.3–3.7 times as long as wide	<i>P. marginalis</i> (Kieffer)
8 (5). Pronotal collar bare, with complete transverse keel between pronotal shoulders	<i>P. elegans</i> Chemyreva et Kolyada
– Pronotal collar pubescent, with transverse keel absent or interrupted medially between pronotal shoulders (Figs 17, 22, 27)	9
9. Pronotal pit bare, with short to distinct epomia inside (Figs 48, 49)	10
– Pronotal pit shortly pubescent, epomia completely absent (Fig. 50)	16
10. Median propodeal keel simple (Fig. 46)	11
– Median propodeal keel bifurcate (Fig. 18) or doubled (Figs 23, 28)	13
11. Upper and lower posterior propodeal projections almost absent; radial cell distinctly longer than marginal vein; genae in frontal view no convex, sharply receding to mouth parts	<i>P. flexinervis</i> (Macek) (part)
– Upper and lower posterior propodeal projections large; radial cell as long as to shorter than marginal vein; genae in frontal view slightly to distinctly convex	12
12. A3 with deep emargination overreaching mid-length of segment	<i>P. melniki</i> Chemyreva et Kolyada
– A3 with shallow emargination, which not overreaching mid-length of segment	<i>P. nigrocincta</i> (Kieffer)
13. A3 with shallow emargination (Fig. 32); axillar depression posteriorly with single verrucate tubercle (Fig. 45)	14
– A3 with deep emargination (Figs 35, 36); axillar depression posteriorly with numerous verrucules (Figs 41, 43)	15

14. Face below toruli without vertical wrinkles, pustulate; anterior scutellar pit bare posteriorly; petiole carinate dorsally *P. dichromia* Chemyreva et Kolyada
 – Face below toruli with long vertical wrinkles (Fig. 51); anterior scutellar pit pubescence posteriorly; petiole rugose dorsally *P. tristis* sp. n.
15. Petiole 1.53 times as long as wide, carinate dorsally; dorsal side of propodeum mainly smooth and shining (Fig. 42) *P. jejuensis* sp. n.
 – Petiole 1.25 times as long as wide, rugose dorsally; dorsal side of propodeum rugose *P. ornata* sp. n.
- 16(9). Metasoma beyond petiole narrow, slightly compressed; fore tibia widened interiorly, with somewhat stouter bristles *P. flaviventris* (Thomson)
 – Metasoma beyond petiole wide and slightly depressed; fore tibia simple, with weaker, unspecialised pubescence 17
17. Occiput behind ocelli with dense pubescence *P. rufiventris* (Kieffer)
 – Occiput behind ocelli with sparse pubescence 18
18. Petiole stout, less than 1.5 times as long as wide; marginal vein distinctly longer than distance from it to basalis *P. flexinervis* (Macek) (part)
 – Petiole more elongate, about twice as long as wide; marginal vein shorter (occasionally slightly longer) than distance from it to basalis *P. sciarivora* (Kieffer)

DISCUSSION

As we noted in the introduction above the genus *Pantolyta* is the most species rich genus of the tribe Pantolytini. This tribe was divided into two subtribes (Pantolytina and Psilommina) by Macek (1989). The subtribe Pantolytina includes the following three genera: *Anommatium* Förster, *Pantolyta* (together with its junior synonym *Acropiesta*) and *Opazon* Haliday (together with its junior synonym *Meuselia* Kieffer). The subtribe *Psilommina* currently combines five genera: *Acanopsilus* Kieffer, *Acanosema* Kieffer (together with its junior synonym *Cardiopsilus* Kieffer), *Polypeza* Förster, *Psilomma* Förster and *Synacra* Förster. This paper is the first part of the review of the tribe Pantolytini in the South Korean fauna. Originally, we planned to dedicate this paper to the first subtribe – Pantolytina, however, of the three known genera of this subtribe, only *Pantolyta* species have been discovered in the South Korea. The only known species of the genus *Anommatium* – *A. ashmeadi* Mayr has not yet been found in the fauna of the Russian Far East and in the South Korea (Chemyreva & Kolyada, 2021). Two species of the genus *Opazon* – *O. frigidum* Macek and *O. parvulum* (Haliday) – have been recorded from the Far East of Russia, but we have not yet been able to find either these or any other species of this genus in the fauna of South Korea.

During this study, cytochrome oxidase I (COI) subunit sequences were obtained for two species: *Pantolyta jejuensis* sp. n. and *P. rufiventris* (Kieffer). Analysis of the data and comparison with COI sequences known for other European *Pantolyta* species showed that the new species is most closely related to *P. flaviventris*, *P. rufiventris* and *P. sciarivora*. The average genetic distance between *P. jejuensis* sp. n. and these species is approximately 7.0%, 7.3% and 6.0%, respectively, which is consistent with the average genetic distances observed between morphologically similar

species within the genus *Pantolyta*. The genetic distance between *P. jejuensis* **sp. n.** and the other (not close) *Pantolyta* species amounts to 11% or more. Such significant genetic distances between species are probably typical of the subfamily Belytinae (Hübner *et al.*, 2024).

The average genetic distance between European specimens of *P. rufiventris* and the Korean specimen determinate in this research as *P. rufiventris* is 5.2%. This distance is very close to the level of interspecific differences which exists between the closely related species *Pantolyta* listed above. Although the maximal genetic distance between European specimens (65 sequences were analyzed) is 2.2%, we do not know enough about the COI variation of this common and widely distributed species (Chemyreva & Kolyada, 2021). Based on this reasoning and due to insufficient morphological differences between European, Siberian, Far Eastern and Korean specimens of *P. rufiventris* we believe that the Korean specimens determinate here as *P. rufiventris* are actually belongs to this species.

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REFERENCES

- Ashmead, W.H. 1893. A monograph of the North American Proctotrypidae. *Bulletin of the United States National Museum*, 45: 1–472.
- Chemyreva, V.G. 2023. *Masnerosema* is a new junior synonym of *Acanopsilus* (Hymenoptera: Diapriidae: Pantolytini). *Zoosystematica Rossica*, 32(2): 245–251. DOI: 10.31610/zsr/2023.32.2.245
- Chemyreva, V.G. & Kolyada, V.A. 2019. Review of the *Pantolyta* genus (Hymenoptera: Diapriidae: Pantolytini) from Russia, with description of a new species. *Zoosystematica Rossica*, 28 (1): 163–176. DOI: 10.31610/zsr/2019.28.1.163
- Chemyreva, V.G. & Kolyada, V.A. 2020. Review of the genus *Synacra* Foerster (Hymenoptera, Diapriidae: Pantolytini) in the Palaearctic region, with description of new species. *Entomological Review*, [2019], 99(9): 1339–1358. DOI:10.1134/S0013873819090124
- Chemyreva, V.G. & Kolyada, V.A. 2021. Taxonomy of the genera *Acropiesta*, *Anommatium*, *Erasikea* and *Pantolyta* (Diapriidae: Belytinae) with review of species occurring in Russia. *Zoosystematica Rossica*, 30 (1): 137–162. DOI:10.31610/zsr/2021.30.1.137
- Chemyreva, V.G. & Kolyada, V.A. 2023. The description of five new species of the genus *Pantolyta* (Hymenoptera, Diapriidae) from Africa. *Zootaxa*, 5325 (2): 261–273. DOI: 10.11646/zootaxa.5325.2.7
- Förster, A. 1856. Hymenopterologische Studien. II. Heft. Chalcidiae und Proctotrupii. Aachen: Ernstter Meer. 152 pp.
- Fouts, R.M. 1924. New bethylid and serphoid parasites from North America (Hymenoptera). *Proceedings of the Entomological Society of Washington*, 26: 159–166.

- Hübner, J., Chemyreva, V., Macek, J. & Kolyada, V. 2024. A review of the genus *Zygota* (Hymenoptera, Diapriidae) in Germany with taxonomic notes on this genus and its distinction from *Pantoclis*. *ZooKeys*, 1207: 325–353. DOI:10.3897/zookeys.1207.121725
- Johnson, N.F. 1992. Catalog of World species of Proctotrupoidea, exclusive of Platygasteridae (Hymenoptera). *Memoirs of the American Entomological Institute*, 52: 1–825.
- Kieffer, J.-J. 1907. Beschreibung neuer im Naturhistorischen Museum zu Hamburg aufbewahrter Proctotrypiden [sic!] und Evaniiden. *Berliner entomologische Zeitschrift*, 51: 258–278.
- Kieffer, J.-J. 1909. Proctotrypidæ (suite). In: André E. (Ed.). *Species des Hyménoptères d'Europe et d'Algérie*, 10: 449–592. Paris: Hermann & Fils.
- Kieffer, J.-J. 1912. Ceraphronidae, Serphidae, Belytidae, Diapriidae, Platygasteridae und Bethyidae. *Nyi Magazin for Naturvidenskaberne*, 50: 15–22.
- Macek, J. 1989. Studies on the Diapriidae (Hymenoptera, Proctotrupoidea). Part 1. Taxonomic remarks on the subfamily Belytinae with particular reference to the Pantolytini. *Annales Zoologici*, 42: 353–362.
- Macek, J. 1993. Revision of European *Pantolyta* Foerster (Hymenoptera, Diapriidae). *Folia Heyrovskyana*, 1(5): 41–51.
- Macek, J. 1998. Revision of European species of *Acropiasta* (Hymenoptera: Diapriidae). *Folia Heyrovskiana*, 6(2): 21–42.
- Maneval, H. 1939. Deux nouveaux genres et un nouvelle espece de Diapriidae (Hym.). *Bulletin de la Société Entomologique de France*, 44: 168–172
- Nixon, G.E.J. 1957. Hymenoptera, Diapriidae, subfamily Belytinae. *Handbooks for Identification of British Insects*, 8 (3dii): 1–107. London: Royal Entomological Society of London. DOI: 10.5281/zenodo.23920
- Whittaker, O. 1930. Some new species and a new genus of parasitic Hymenoptera from British Columbia. *Proceedings of the Entomological Society of Washington*, 32: 67–76.
- Yoder, M.J. 2004. Revision of the North American species of the genus *Entomacis* (Hymenoptera: Diapriidae). *The Canadian Entomologist*, 136(3): 323–405. DOI: 10.4039/n03-061
- Yoder, M.J., Mikó, I., Seltmann, K.C., Bertone, M.A. & Deans, A.R. 2010. A gross anatomy ontology for Hymenoptera. *PLoS ONE*, 5(12): e15991. DOI: 10.1371/journal.pone.0015991