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## DESCRIPTION OF FOUR NEW SPECIES OF THE GENUS *PHYTODIETUS* GRAVENHORST, 1829 (HYMENOPTERA: ICHNEUMONIDAE: TRYPHONINAE) FROM THE EASTERN PALEARCTIC REGION

D.R. Kasparyan

Zoological Institute, Russian Academy of Sciences, Universitetskaya Emb. 1, Saint Petersburg, 199034, Russia;  
e-mail: kasparyan@yandex.ru

### ABSTRACT

Four species of the genus *Phytodietus* are described from material in the Zoological Institute of Russian Academy of Sciences: *Ph. belokobylskii* sp. nov. and *Ph. melanopus* sp. nov. from South Korea, *Ph. intermedius* sp. nov. from south of the Russian Far East and *Ph. dauricus* sp. nov. from Russian Transbaikal Territory. Key to 4 new and 6 related species is given.

**Key words:** Hymenoptera, Ichneumonidae, key, new species, *Phytodietus*, Primorskiy Territory, Russia, South Korea, taxonomy, Transbaikal Territory, Tryphoninae

## ОПИСАНИЕ ЧЕТЫРЕХ НОВЫХ ВИДОВ РОДА *PHYTODIETUS* GRAVENHORST, 1829 (HYMENOPTERA: ICHNEUMONIDAE: TRYPHONINAE) ИЗ ВОСТОЧНОЙ ПАЛЕАРКТИКИ

Д.Р. Каспарян

Зоологический институт Российской академии наук, Университетская наб. 1, Санкт-Петербург, 199034, Россия;  
e-mail: kasparyan@yandex.ru

### РЕЗЮМЕ

Описываются 4 новых вида наездников-ичневмонид рода *Phytodietus* по материалам Зоологического института РАН: *Ph. belokobylskii* sp. nov. и *Ph. melanopus* sp. nov. из Южной Кореи, *Ph. intermedius* sp. nov. с юга Дальнего Востока России и *Ph. dauricus* sp. nov. из Забайкалья. Дан ключ к 4 новым и 6 эволюционно близким видам.

**Ключевые слова:** Hymenoptera, Ichneumonidae, ключ, новые виды, *Phytodietus*, Приморский край, Россия, Южная Корея, таксономия, Забайкалье, Tryphoninae

## INTRODUCTION

*Phytodietus* Gravenhorst, 1829 is a rather large genus of worldwide distribution comprising four subgenera and about one hundred species (Yu et al. 2012). All the new species described here belong to the largest subgenus *Phytodietus* s. str. The Palaearc-

tic fauna of this subgenus was revised by the author (Kasparyan 1993; Kasparyan and Tolkanitz 1999) and includes about 25 described species. The Nearctic fauna is of similar size and it was treated by Loan (1981). The Oriental fauna (about 10 species) was considered by Kaur and Jonathan (1979), with the addition of one species by author (Kasparyan 1998).

The Neotropical fauna was revised by Gauld (Gauld et al. 1997), and by Kasparyan (2007) and Kasparyan and Khalaim (2013). No species of subgenus have been described from the Ethiopian and Australian Regions (see Yu et al. 2012).

Species of *Phytodietus*, as well as other genera of the Tryphoninae, are koinobiont ectoparasitoids; most of them attacking unconcealed hosts. *Phytodietus* species are solitary parasitoids of "Microlepidoptera" larvae living in leaf-spinnings and similar semi-concealed situations. Usually the parasitoid larva delays the final destruction of the host until the latter has prepared its pupation chamber and in this shelter the parasitoid makes its firm, ovoid, sometimes centrally banded or semitranslucent cocoon. Most hosts of *Phytodietus* live and pupate semi-concealed in leaf spinnings, etc., so cocoons of most species are usually formed in these above-ground situations (Kasparyan and Shaw 2008: 183).

Four new ichneumonid species of the of genus *Phytodietus* on material from Zoological Institute, St. Petersburg are described: *Ph. belokobylskii* sp. nov. and *Ph. melanopus* sp. nov. both from South Korea, *Ph. intermedius* sp. nov. from south of the Russian Far East and *Ph. dauricus* sp. nov. from Transbaikal Territory, Russia. A key to the 4 new species and 3 related species is given.

*Phytodietus belokobylskii* sp. nov. and two the new species from Russia described below are closely related to *Ph. laevis* Kasparyan and *Ph. pallipes* Kasparyan from the Russian Far East, and *Ph. jatrus* Kaur et Jonathan from the Philippines. All these species are united here in the "*laevis*" species-group. The group may be characterized by the following features: moderate or small size (fore wing 4–6 mm rarely 7 mm long); body usually smooth and very finely punctate; propodeum smooth, without transverse striation and without lateral crests, and in basal half with median longitudinal superficial impression; first metasomal tergite short, 1.1–1.4 times as long as wide at apex. Face black; clypeus entirely, mandibles (except for teeth), pedicel and often first flagellomere ventrally yellow; scutellum with lateral margins (at least at base) and apex yellow; propodeum entirely black; legs predominantly yellow with hind tibia blackish at apex (and often darkened anteriorly) and with hind tarsus almost completely blackish; metasomal tergites black, usually with white epipleura 4–7 and hind margins of tergites (1)2–5(6–7) dorsally; and hypopygium usually extensively white (except for *Ph. pallipes*).

Beside the above mentioned five species to this group perhaps belongs also a new species from South Korea *Ph. melanopus* sp. nov. closely related to the Euro-Siberian *Ph. variegates* Fonscolombe, 1854 (= *Ph. albipes* Holmgren, 1856) and, perhaps, *Ph. femoralis* Holmgren, 1860 and *Ph. obscurus* Desvignes, 1856; these four species differ in having the scutellum completely black dorsally. All mentioned species are included together with the new species in the key.

## MATERIAL AND METHODS

All material, including holotypes of the new species, is deposited in the Zoological Institute RAS, Saint Petersburg, Russia (ZIN). Taxonomy follows the catalogue TaxaPad (Yu et al. 2012). Photographs were taken with a DFC 290 digital camera attached to a Leica MZ16 stereomicroscope, and the partially focused images were combined using Helicon Focus software.

## SYSTEMATICS

### Family Ichneumonidae Latreille, 1802

### Subfamily Tryphoninae Shuckard, 1840

### Tribe Phytodietini Hellén, 1915

### Genus *Phytodietus* Gravenhorst, 1829

### *Phytodietus (Phytodietus) belokobylskii* Kasparyan sp. nov.

(Figs 1–4)

**Type material.** Holotype (female) – SOUTH KOREA: Gyeongsangnamdo, Sancheong-gun, 30 km NNW Jinju (Chinju), forest, 800 m, 12 June 2002 (S. Belokobylskij leg.). Paratypes – 15 females, same data as in holotype; 1 female, same locality, but 28 June 2002 (S. Belokobylskij leg.).

**Etymology.** The species is named after my colleague and friend Sergei A. Belokobylskij (ZIN) who has collected all type specimens of this species.

**Diagnosis.** *Phytodietus belokobylskii* sp. nov. is very similar to *Ph. laevis* in coloration but differs from it by malar space black, mesopleuron often with yellow spot before upper end of prepectal carina, metapleuron usually black with bicolored spot in its hind corner (spot red anteriorly and yellow posteriorly), nervulus interstitial, body length 6.0–8.0 mm (in *Ph. laevis* – 4.0–5.0 mm) and antenna with 33–35 flagellomeres (in *Ph. laevis* 29–32 flagellomeres).



**Figs 1–4.** *Phytodietus belokobylskii* sp. nov., female (1, 2, 4 – holotype; 3 – paratype). 1 – habitus, lateral view; 2 – head, anterior view; 3 – head with antenna; 4 – scutellum, propodeum and first tergite, dorsal view.

**Description.** Female (holotype). Body length 7.5 mm. Fore wing 6.8 mm long. Flagellum 34-segmented, as long as fore wing; length of two basal flagellomeres combined 1.05 times maximum diameter of eye. Malar space 0.5 times as long as basal width of mandible. Face polished, in central part very finely punctate. Clypeus smooth, convex, its lower margin thin and centrally slightly concave. Temples, in dorsal

view, rather narrow, strongly and almost straightly narrowed behind eyes, beyond the middle strongly curved to occiput.

Pronotum polished. Epomia and notauli absent. Prepectal carina distinct, ending dorsally at level of lower 0.28 of hind lateral margin of pronotum. Mesopleuron smooth and shining, in lower part finely but distinctly and scarcely punctate; speculum large, pol-

ished, without setae. Metapleuron with fine but discernible and rather dense punctures. Submetapleural carina complete (weaker posteriorly). Propodeum smooth, finely punctate with short setae, with superficial longitudinal impression medially (in place of areola). Hind femur 5.5 times as long as its maximum width. Proportions of tarsomeres of hind leg 8.0 : 4.0 : 2.7 : 1.5 : 2.4; second tarsomere 1.65 times as long as tarsomere 5. Tarsal claws with 5 high teeth; fourth tooth is highest but lower than the apex of claw. Fore wing with nervulus interstitial. Hind wing with nervellus intercepted at lower 0.15.

First metasomal tergite 1.1 times as long as wide posteriorly, evenly tapered from apex to base; its dorsolateral margins sharp; dorsal longitudinal carinae short and bordering median basal depression only laterally. Second tergite 0.63 times as long as wide. Ovipositor sheath 0.85 times as long as hind tibia.

Antennae blackish, pedicel and first flagellomere ventrally yellow. Head predominantly black with the following yellow: clypeus completely, palpi, mandible (except for reddish brown teeth), orbital spot from upper 0.3 of frons upward to top of eye (the spot widened here almost to lateral ocellus).

Mesosoma predominantly black with red and yellow pattern. Pronotum black with yellow hind corner. Tegulae yellow. Mesoscutum reddish with a pair of large yellow anterolateral spots and between them anteriorly with blackish spot; prescutellar groove black; scutellum reddish above with triangle yellow basolateral spots and yellow apex. Mesopleuron in lower half red with subtegular ridge, apex of epimeron, a spot before upper end of prepectal carina, and a large spot in hind lower corner of mesopleuron yellow. Metapleuron black with a small bicolorous spot in hind corner along pleural carina (the spot is reddish anteriorly and yellow posteriorly), apex and lateral margins of postscutellum yellow.

Fore and mid coxae and all trochanters yellow (except for blackish dorso-anterior spot on hind trochanter I); fore and mid femora, tibiae and tarsi rufescent yellow; mid tibia and tarsi brownish dorsally, tarsi with tarsomere 5 entirely dark brown. Hind coxa light reddish with a large ventral light yellow spot; hind femur reddish yellow with two small anterior dark blackish spots – one in base and the other before yellow apex. Hind tibia yellowish posteriorly and dorsally, strongly darkened anteriorly and completely in about apical 0.3 (from 0.1 on posterior side – to 0.4 on anterior side); hind tarsus blackish

with basal 0.2 of basitarsus whitish yellow; hind spurs also blackish with basal 0.3 pale. Pterostigma light yellowish with fuscous anterior margin.

Metasomal tergites black, tergites 1–7 with narrow white band on hind margin, tergites 2–7 and their epipleura with white lateral margins; epipleura of tergites 2 and 3 with large blackish median spot, similar spots on subsequent epipleura reduced; tergite 8 black with ventral margins broadly white. Sternites 1–5 brownish with median longitudinal fold and hind margin of sternites 3–5 white, sternite 6 (hypopygium) predominantly whitish with a small median and two small basal brownish spots. Ovipositor sheath black.

**Male.** Unknown.

**Variability.** Fore wing length 5.7–7.0; antenna with 32–35 flagellomeres. Main morphometric parameters weakly variable. Face, malar space and cheeks always entirely black. Mesoscutum occasionally may be black with yellow anterolateral spots; mesopleuron sometimes only ventrally red and without yellow spot before upper end of prepectal carina; bicolor spot on metapleuron can be reduced to a yellow dot in its hind corner.

***Phytodietus dauricus* Kasparyan sp. nov.**

(Figs 5, 6)

**Type material.** Holotype (female) – Russia, *Transbaikal Territory*, Nerchinskij Zavod, meadows in black-birch forest, 21 July 1975 (D. Kasparyan leg.).

**Etymology.** Named from the type locality, Transbaikalia (=Dauria).

**Diagnosis.** *Phytodietus dauricus* sp. nov. is very similar to *Ph. laevis* in its small size and colouration. It differs in having flagellum 27-segmented (29 flagellomeres and more in *Ph. laevis*), face and mesosoma laterally mat and finely granulate (shining and smooth in *Ph. laevis*), cheeks beyond mandible black (with yellow spot in *Ph. laevis*). In all these characters *Ph. dauricus* sp. nov. is also similar to *Ph. pallipes* but differs by yellow anterolateral spots on mesoscutum, red colouration of most part of mesopleuron and metapleuron, and strong whitish apical and lateral markings on tergites 3–7 (in *Ph. pallipes* mesoscutum is entirely black; mesopleuron and metapleuron black, without red pattern; and metasomal tergites completely black).

**Description.** Female (holotype). Fore wing 4.4 mm long. Flagellum 27-segmented, as long as fore wing; length of two basal flagellomeres combined





**Figs 5–8.** *Phytodietus dauricus* sp. nov., female (holotype) (5, 6) and *Ph. laevis* Kasparyan, female (paratype) (7, 8): 5, 7 – habitus, lateral view; 6, 8 – head, facial view.

as long as maximum diameter of eye. Malar space 0.4 as long as basal width of mandible. Face mat, very finely granulate (Fig. 6). Clypeus convex, smooth with some moderately large punctures, its lower margin in central part weakly concave; labrum slightly exposed. Temples, in dorsal view, roundly narrowed behind eyes.

Epomia absent; notauli rather sharp and long. Prepectal carina distinct, its dorsal end at level of ventral 0.2 of hind lateral margin of pronotum. Mesopleuron just below subtegular ridge smooth

and shining; speculum not large, polished, with some punctures; lower half of mesopleuron and metapleuron covered with very fine smoothed granulation, without discernible punctures. Submetapleural carina complete. Propodeum smooth, with superficial longitudinal impression medially (in place of areola). Hind femur 5.5 times as long as its maximum width. Proportions of tarsomeres of hind leg 5.8 : 2.8 : 1.9 : 1 : 1.6; third tarsomere 1.2 times as long as tarsomere 5, and second tarsomere 1.75 times as long as tarsomere 5. Tarsal claws with 3–4 very high teeth. Fore wing

with nervulus distinctly postfurcal. Hind wing with nervellus intercepted at lower 0.16.

First metasomal tergite 1.3 times as long as wide; its dorsolateral margins sharp; dorsal longitudinal carinae short and bordering median basal depression only laterally. Second tergite 0.6 times as long as wide. Ovipositor sheath 1.0 times as long as hind tibia.

Antennae blackish dorsally, pedicel and first flagellomere ventrally yellow, apical half of flagellum brownish ventrally. Head predominantly black with yellow clypeus completely, palpi, mandible (except for reddish brown teeth), edge of mouth hollow beyond mandible, orbital spot from middle of frons upward to vertex (the spot is widened opposite lateral ocellus).

Mesosoma black; mesopleuron in lower half and metapleuron predominantly (except for blackish anterior 20%) red (Fig. 5); dorso-posterior and lower corners of pronotum, tegulae, subtegular ridge, apex of epimeron and hind tegulae, small stripe in hind lower corner of mesopleuron, anterolateral spot on mesoscutum, line on notaulus, scutellum dorsally from base to apex and hind margin of mesonotum, apex of postscutellum and hind edge of metanotum – all are yellow.

All coxae and trochanters light yellow, hind coxa dorsally and base of hind trochanter dorsally with light brown markings. Legs beyond trochanters and hind femur pale yellowish; hind femur anteriorly with small fuscous spot in base and before its apex. Hind tibia whitish with completely blackish apex (0.2–0.3) and anteriorly with subbasal fuscous spot; hind tarsus blackish-brown with basal 0.5–0.6 of tarsomere 1 and extreme base of tarsomeres 2 and 3 whitish. Pterostigma light yellowish-rufous.

Tergites of metasoma black with hind margin of tergites 1–6 white; this white band rather broad on tergites 2–4 and narrow on tergites 5–7 but on tergites 3–7 broadened laterally, epipleura of tergite 4–7 white. Sternites 2–5 brown with median longitudinal folds white, hypopygium white with median V-shaped brown spot. Ovipositor sheath black.

**Male.** Unknown.

**Note.** The species can be distinguished by characters given in key and on Figs 7–8.

***Phytodietus intermedius* Kasparyan sp. nov.**  
(Figs 9–11)

**Etymology.** The name of new species refers to its intermediate position between *Ph. laevis* and *Ph. belokobylskii* sp. nov.

**Type material.** Holotype (female) – RUSSIA, *Primorskij Territory*, 30 km east of Spassk, forest, 13 June 1989 (S. Belokobylskij leg.). Paratypes – RUSSIA, *Primorskij Territory*: 1 female; Mikhailovskij District, Lyalichi, river Ilistaya, forest, 4 June 1990 (S. Belokobylskij leg.), 1 female; Ternejskij District, but near Ternej, forest, 20 June 1979 (S. Belokobylskij leg.).

**Diagnosis.** *Phytodietus intermedius* sp. nov. closely related to *Ph. laevis* and *Ph. belokobylskii* sp. nov. but differs in entirely black colouration of mesoscutum and mesopleurum (except for usual small yellow markings on subtegular ridge and apex of epimeron).

**Description.** Female (holotype). Fore wing about 6.0 mm long. Antenna filiform, flagellum 6.5 mm (1.08 times as long as fore wing), with 33 flagellomeres. Body smooth and mostly polished. Face in central part with distinct fine punctures laterad of median longitudinal almost impunctate area. Malar space 0.5 times basal width of mandible. Clypeus evenly convex with preapical median depression; lower margin of clypeus at median 0.5 with a weak notch. Mandibles with upper tooth slightly wider. Lateral ocellus separated from eye by about its diameter. Temples strongly narrowed backward (Fig. 11), polished, finely punctate. Frons with sparse and very fine punctures above smoothed and hardly visible alutaceous sculpture.

Mesosoma polished with rather dense fine distinct punctures on mesoscutum, on lower half of mesopleuron and on prepectus; average distances between punctures on mesopleuron about 2 their diameter; punctures on metapleuron much finer. Pronotum without epomia. Notauli very superficial. Prepectal carina distinct. Submetapleural carina strong in anterior 0.7, obliterated posteriorly. Propodeum subpolished, without any carinae, dorsally without transverse wrinkles and with median longitudinal shallow groove; apical area polished, impunctate; other parts of propodeum covered with moderately dense fine punctures. Nervulus interstitial; nervellus intercepted on lower 0.12. Hind femur 5.7 times as long as wide. Hind tarsal claw with 4 high teeth.

Metasomal tergites smooth, more or less evenly covered with rather dense fine short hairs. First tergite 1.2 times as long as wide; its median basal pit moderately deep, its lateral margins (dorsal carinae) strong, but short and widely separated behind pit; dorsolateral margins of tergite sharp and complete. Second tergite about 0.65 times as long as posteriorly broad. Ovipositor sheath 1.0 times as long as hind tibia.





**Figs 9–13.** *Phytodietus intermedius* sp. nov., female (holotype) (9–11) and *Ph. melanopus* sp. nov., female (holotype) (12–13): 9, 12 – habitus, lateral view; 11 – head and anterior part of thorax, dorsal view; 10, 13 – head, facial view.

Antenna blackish; pedicel and first flagellomere yellow ventrally. Head black with clypeus completely, mandible (except for brownish teeth), palpi and lateral spot on upper 0.3 of frons to top of eye (spot does not touch lateral ocellus) yellow (Figs 10, 11). Mesosoma black without red pattern and with yellow spot in hind corner of pronotum, on subtegular ridge, on upper part of mesepimeron; both pair of tegulae yellow; mesoscutum entirely black (Figs 9, 11); scutellum black with yellow basolateral wedge-like spots and a spot on apex; hind edges of mesonotum and metanotum, and apex of postscutellum yellowish. Metapleuron and propodeum entirely black.

Fore and mid legs with coxae and trochanters light yellow (except for blackish markings at extreme base of coxae, and anterodorsal brown spot on hind trochanter I); fore and mid legs beyond trochanters rufescent yellow, mid tarsi with tarsomere 5 entirely dark brown. Hind coxa reddish, with base and stripe on dorsal depression blackish; hind femur reddish with anterior blackish spot in base and a dorsoanterior one before yellow apex; hind tibia dull yellowish white posteriorly and greyish yellow anteriorly with infuscate subbasal spot, its apical 0.2–0.35 entirely blackish; hind tarsus blackish-brown with basal 0.35 of first tarsomere and extreme base of tarsomere 2 yellowish; hind spurs pale rufous. Wings hyaline. Pterostigma uniformly honey-yellow.

Metasomal tergites black with dorsal narrow white band on hind margin of tergites 1–7 interrupted laterally; epipleura of tergites 1–3 separated by sharp crease, blackish brown, bordered with white; hind corners and epipleura of tergites 4–7 predominantly white with small rounded brown spot on epipleura 4 and 5. Sternites 1 and 2 brownish (including median longitudinal fold); sternites 3–5 brownish at base laterally with membranous yellowish median fold and yellowish on hind margin. Sternite 6 (hypopygium) brownish with hind margin narrowly yellow. Ovipositor sheath black with its apex brownish.

**Male** unknown.

**Variability.** Fore wing 5.5–7.0 mm long. Antenna with 32–35 flagellomeres. Face, cheeks and propodeum always completely black, 4 yellow spots usually present on lateral side of thorax – hind corner of pronotum, tegula, subtegular ridge, apex of mesepimeron. Mesoscutum black; scutellum black with yellow basolateral wedge-like spots and a spot on apex; in paratype from Ternej scutellum reddish dorsally with lateral margins and apex yellow; in this

specimen weak yellow anterior spots on mesoscutum also present. Colouration of legs and metasoma weakly variable.

***Phytodietus (Phytodietus) melanopus***

**Kasparyan sp. nov.**

(Figs 12–13)

**Etymology.** From greek “melanopus” that means “black-footed”, referring to completely blackish brown hind tarsus of new species.

**Type material.** Holotype (female) – SOUTH KOREA, Gyeongsangnamdo, Sancheong-gun, 30 km NNW Jinju (Chinju), forest, 800 m, 12 June 2002 (S. Belokobylskij leg.). Paratype (female) – RUSSIA, *Primorskij Territory*, Pogranichnyj District, Barabash-Levada, 25 May 1989 (S. Belokobylskij leg.).

**Diagnosis.** *Phytodietus melanopus* sp. nov. is very similar to *Ph. variegatus* in coloration but differs in having the hind basitarsus entirely blackish brown (Fig. 12) (always whitish basally in *Ph. variegatus*), malar space shorter (*i. gen.* 0.3–0.4), and clypeus yellow. From most other congeners the new species differs by its scutellum blackish dorsally, without yellowish basolateral spots. *Ph. femoralis* Holmgren, 1860 with similar colouration of scutellum differs in having the first tergite slender, ovipositor longer and hind coxae, femora and hypopygium fuscous.

**Description.** Female (holotype). Body length 6.7 mm long. Fore wing 6.7 mm long. Flagellum 34-segmented, as long as fore wing; two basal flagellomeres combined as long as maximum diameter of eye. Malar space 0.4 basal width of mandible. Face mat, finely granulate with very fine punctures. Clypeus convex, with smoothed granulation, its lower margin thin and almost straight. Temples rather narrow, in dorsal view strongly and almost straightly narrowed behind eyes, beyond the middle strongly curved to occiput.

Epomia present as a very short wrinkle. Notauli not deep, but distinct and rather sharp. Mesosoma mat but almost smooth (covered with very fine inconspicuous punctures over very fine granulation). Speculum small, smooth, with fine scarce setiferous punctures. Prepectal carina distinct, its dorsal end at level of ventral 0.25 of hind lateral margin of pronotum. Submetapleural carina complete (thin posteriorly). Propodeum without any carinae, with fine short pubescence, and with a superficial longitudinal impression medially, in the place of apical area polished. Hind femur about 6 times as long as



its maximum width. Proportions of tarsomeres of hind leg 9.0 : 5.0 : 3.6 : 1.7 : 2.4; second segment 2.1 times as long as tarsomere 5. Tarsal claws with 5–6 high teeth; subbasal (highest) tooth as high as apex of claw. Fore wing with nervulus interstitial. Hind wing with nervellus intercepted at lower 0.2.

Metasoma smooth and shining, covered with very fine and rather dense punctures. First tergite 1.2 times as long as wide, evenly tapered to base; its dorsolateral margins sharp; dorsal longitudinal carinae short and border median basal depression only laterally. Second tergite 0.57 times as long as wide. Ovipositor sheath about 1.0 times as long as hind tibia.

Antennae blackish; apical margin of pedicel and first flagellomere yellow ventrally. Head predominantly black with yellow clypeus in its lower 0.7 (Fig. 13), palpi, mandible (except for reddish brown teeth), orbital spot on upper part of frons (the spot widened opposite lateral ocellus).

Mesosoma predominantly black with reddish and yellow pattern (Fig. 12). Hind corner of pronotum, tegulae, subtegular ridge, apex of epimeron, a pair of large yellow anterolateral spots on mesoscutum, apex of scutellum and postscutellum, hind margins of mesonotum and of metanotum, a pair of apico-lateral spots on propodeum yellow. Metapleuron beyond the level propodeal spiracle reddish.

Fore coxa and all trochanters yellow (except for weak blackish basal marking of hind trochanter I); fore and mid femora, tibiae and tarsi rufescent yellow with 5th tarsomere brown. Mid and hind coxae light reddish, mid coxa with large dorso-apical light yellow spot; hind femur light reddish with extreme base and apex yellow. Hind tibia dull whitish yellow, slightly greyish anteriorly, completely blackish about at apical 0.35 and with subbasal dark spot; hind spurs and tarsus entirely dark brown (Fig. 12). Pterostigma yellowish.

Tergites of metasoma black with narrow white band on hind margin of tergites 1–7; these bands on tergites 1–3 distinct and slightly interrupted laterally; epipleura of these tergites wide, separated by sharp crease, dark brown and completely bordered with white; on tergites 4–7 the apical bands very narrow but hind corners of these tergites widely white (Fig. 12). Sternites 1–5 brownish with hind margin of sternites 3–6 white. Ovipositor sheath black with its apex brownish.

**Male.** Unknown.

**Variability.** Paratype from Russia (Primorsky territory) is strongly damaged; it very similar in co-

louration to holotype, but smaller, (fore wing 5.1 mm long) and tibiae less armed by spines.

#### Key to *Phytodietus* species of *laevis*-group and related species

1. Scutellum with dorsolateral yellow markings (at least at base) ..... 2
  - Scutellum dorsally black (without any yellow markings at base) ..... 7
2. Face polished with fine punctures (Figs 2, 8, 10), thorax polished (Figs 1, 9). Antenna with 29–35 flagellomeres ..... 3
  - Face mat, finely shagreened with very fine punctures (Fig. 6), mesopleuron and metapleuron mat, finely granulate. Antenna with 26–28 flagellomeres. Fore wing about 4.5 mm long ..... 6
3. Mesosoma usually with extensive red pattern on mesopleuron, metapleuron and scutellum dorsally; mesopleuron with a large yellow spot in hind lower corner (Figs 1, 7); scutellum with wedge-like yellow basolateral spots (Fig. 4). Cheek black or just behind mandible yellow (Figs 2, 8). Nervellus intercepted at lower 0.12. All coxae yellow ..... 4
  - Mesosoma almost entirely black, without red pattern (Fig. 9); mesopleuron without yellow spot in hind lower corner (except *Ph. jatrus* which has a small yellow spot). Cheek just behind mandible black (Fig. 10). Hind coxa yellow or red ..... 5
4. Malar space and cheek entirely black (Figs 2, 3). Mesopleuron usually with anterior yellow spot before upper end of prepectal carina (Fig. 1). Metapleuron just under pleural carina usually 30% reddish (Figs 1, 4) or black, with posterior yellow stripe. Fore wing 5.5–7.0 mm; antenna with 33–35 flagellomeres ..... *Ph. belokobylskii* sp. nov.
  - Malar space and cheek just behind mandible yellow (Fig. 8). Mesopleuron without anterior yellow spot before upper end of prepectal carina (Fig. 7). Metapleuron 50–80% reddish, without posterior yellow spot (Fig. 7). Fore wing 4.5–5.3 mm; antenna with 29–31 flagellomeres ..... *Ph. laevis* Kasparyan
5. Mesoscutum usually entirely black, without anterolateral yellow spot (Figs 9, 11); scutellum black dorsally, with a pair of yellow basal spots and apical spot. Mesopleuron black, without yellow spot in hind lower corner. Hind tarsomere 3 about 1.3–1.4 times as long as tarsomere 5. Nervellus intercepted at lower about 0.1. Sternites 1 and 2 brownish; sternites 3–5 brownish at base laterally, with yellowish membranous median fold and hind margin; sternite 6 (hypopygium) brownish with hind margin whitish yellow. Fore wing length about 6 mm, antenna with 31–33 flagellomeres ..... *Ph. intermedius* sp. nov.

- Mesoscutum black, with anterolateral yellow spot. Mesopleuron black with yellow spot in hind lower corner. Nervellus intercepted at lower about 0.2. Sternites predominantly whitish (Fig. 8 in Kaur, Jonathan, 1979: 62). Small insects with fore wing length about 5 mm; ovipositor length 2.5 mm . . . . . *Ph. jatrus* Kaur et Jonathan
- 6. Mesopleuron and metapleuron black without red pattern; scutellum black dorsally with basolateral yellow spots. Mesoscutum entirely black (without anterolateral yellow spot). Metasomal tergites black, without white apical band and lateroapical spots. Fore wing length 4.2–4.5 mm, antenna with 26–28 flagellomeres . . . . . *Ph. pallipes* Kasparyan
- Mesopleuron and metapleuron black with extensive red pattern (Fig. 5), scutellum reddish dorsally with basolateral yellow spots. Mesoscutum with anterolateral yellow spot. Metasomal tergites black, with strong whitish apical and lateral markings on tergites 3–7 . . . . . *Ph. dauricus* sp. nov.
- 7. Hind coxa reddish, hind femur light red with yellow apex and without black markings. Fore coxa and fore and mid trochanters yellow. Hind tibia predominantly whitish yellow with black apical 0.3 and anterior surface usually darkened (greyish-white) . . . . . 8
- Hind coxa black, hind femur red with blackish markings to black. Other characters not entirely as above . . . . . 9
- 8. Hind tarsus completely blackish brown. Clypeus yellow. Hind tibia yellow at extreme base . . . . . *Ph. melanopus* sp. nov.
- Hind tarsus blackish with basal 0.3–0.5 of basitarsus white. Clypeus yellow or brownish. Hind tibia in East-Palaearctic specimens usually without yellow spot at extreme base . . . . . *Ph. variegates* Fonscolombe
- 9. Mandible (except for teeth) yellowish brown. Hind femur black or at least with black apex and base; hind tibia yellow at extreme base. Mesopleuron granulate, without distinct punctures. Ovipositor sheath 1.3–1.4 times as long as hind tibia . . . . . *Ph. femoralis* Holmgren
- Mandible black at least basally. Hind femur red; hind tibia predominantly black. Mesopleuron granulate, with distinct punctures. Ovipositor sheath 0.9–1.0 times as long as hind tibia . . . . . *Ph. obscurus* Desvignes

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