A review of the species of *Microphadnus* Cameron in Israel with a description of a new species (Hymenoptera: Pompilidae)

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**ABSTRACT**

Three species of *Microphadnus* are recorded from Israel: *M. brevicornis* is described as new; and *M. insperatus* Priesner and *M. pumilus* Costa are redescribed. All three species are illustrated.

KEY WORDS: Pompilidae, *Microphadnus*, *M. brevicornis* n. sp., *M. insperatus*, *M. pumilus*.

**INTRODUCTION**

*Microphadnus* contains three Palearctic species and at least one species each from Australia and South Africa. However, the exact number of species can be determined only after a comprehensive revision of this genus is prepared. Only one species, *M. pumilus* Costa, was previously known from Israel (Wolf, 1990). Two additional species were recently found among unsorted specimens in the entomological collection of Tel Aviv University. One of them, *M. insperatus* Priesner, was formerly known only from Turkey, and the other one is a new species, described below.

**MATERIAL AND METHODS**

This study is based on specimens deposited in the entomological collection of Tel Aviv University (TAUI). Terminology and abbreviations essentially follow Wolf (1992, 1994), and S. Zonstein (2001). Terminology of wing venation follows Tobias (1978) with minor modifications to match wing vein reduction of *Microphadnus*. Ratios are based on at least five measurements when possible.

Abbreviations, ratios and terms are as follows:

- Head: OOD – ocellar-ocellar line; POD – postocellar line; antennal ratio – length of antennal segments 1–4 divided by length of pedicellus; eye ratio – longest diameter
divided by shortest diameter.

Wing ratios (ratios are based on Wolf, 1994, and wing vein terminology is based on Tobias, 1978): Forewing: MM – ratio between combined lengths of posterior borders of cells 1R1 and 1Rs+2Rs and the distance between the interchange of vein 3rm with vein M and the apex of the forewing. MR – ratio between length of posterior border and length of oblique proximal border of cell 1Rs+2Rs.

Hindwing: RQ – ratio between length of first section of vein Rs and length of vein 1rm.

Foretarsomere ratio – length of each tarsomere of the foreleg divided by the length of the fourth tarsomere.

I use the term “postnotal junction” for metapostnotum following S. Zonstein (2001).

Key to the species of Microphadnus in Israel

1. Abdomen dark red basally; arolium large, distinctly more than half as long as claw (Fig. 21b); postnotal junction long, 0.6–0.7 times as long as postscutellum (Figs. 16, 17), conspicuously wrinkled, subshiny; fourth tarsomere of middle leg 1.6 times as long as wide in female, 2.2 times as long as wide in male.................................................................insperatus Priesner

. Abdomen black to dark brown; arolium small, about half as long as claw (Figs. 20b, 22b); postnotal junction short, 0.1–0.4 times as long as postscutellum (Figs. 14, 15, 18, 19), not conspicuously wrinkled, shiny; fourth tarsomere of middle leg 2.1–2.5 times as long as wide in female, 3.3–4.2 times as long as wide in male.................................................................2

2. Antenna short: third antennal segment in female 3.3–3.5 times as long as wide (Fig. 5), in male 1.7–1.9 times as long as wide (Fig. 8); third segment of maxillary palpus 3.0 times as long as wide (Fig. 11); postnotal junction of male moderately long, with shallow median rounded depression (Fig. 15); legs brown; female tarsi ventrally with short and sparse spines (Fig. 20a); smaller species, length of female 4.4–5.0 mm.................................brevicornis sp. n.

. Antenna long: third antennal segment in female 4.5 times as long as wide (Fig. 7), in male 2.5–2.8 times as long as wide (Fig. 10); third segment of maxillary palpus 3.5 times as long as wide (Fig. 13); postnotal junction of male short, without median depression (Fig. 19); legs black; female tarsi ventrally with long and dense spines (Fig. 22a); larger species, length of female 6.1–6.4 mm.........................................................pumilus Costa

Microphadnus brevicornis I. Zonstein, n. sp.
(Figs. 1–5, 8, 11, 14, 15, 20, 23–27, 36, 39)

Diagnosis

This species is the smallest in the genus. It differs from all other Palearctic species of the genus in the short antenna and third segment of maxillary palpus, pale coloration of the forewing, mostly brown legs, short and sparse spines on the female tarsi ventrally, and also in the moderately long, shiny male postnotal junction with a shallow rounded median depression.

Description

Female. Structure. Head (Figs. 1, 3): 1.1 times as wide as high and 1.4–1.6 times as wide as pronotum; face as in Fig. 1; eye ratio 1.8–2.0; eye 5.6–6.0 times as long as temple
in dorsal view; malar space 0.25–0.29 times as high as width of third antennal segment apically; POD/OOD ratio 1.16–1.18; anterior ocellar angle 75°; antenna as in Fig. 5; antennal ratio 1.8–2.0 : 1.0 : 1.9–2.1 : 1.9–2.1; third antennal segment 3.3–3.5 times as long as wide apically; apical antennal segment rounded, 2.9–3.2 times as long as wide basally; third segment of maxillary palpus 3 times as long as wide (Fig. 11). **Mesosoma:** Scutellum 2.0–2.5 times as long as postscutellum; postnotal junction (Fig. 14) short, 0.10–0.16 times as long as postscutellum, slightly wrinkled transversely. **Legs:** First tarsomere of foreleg 5.4–5.6 times as long as wide apically; fourth tarsomere of middle leg 2.1–2.3 times as long as wide; first tarsomere of foreleg with 2 short acuminate lateral spines; tarsi ventrally with short and sparse spines (Fig. 20a); claws with tiny ventral tooth (Fig. 20c); arolium small (Fig. 20b). **Wings:** Venation as in Figs. 24, 25; cell 1Rs+2Rs 0.30–0.48 times as wide anteriorly as posteriorly; MM = 0.63–0.68; MR = 1.20–1.25; RQ = 0.35; body length 4.4–5.0 mm.
Coloration. Head: Mostly black; clypeus mostly black, apical 0.33 brown; anterior margin smooth and shiny; mandible blackish basally, brownish-ferruginous medially, dark reddish-brown apically; malar space blackish-brown; labrum brown; palpi yellowish-brown; antenna mostly brown; scapus ferruginous ventrally. Mesosoma: Black; postnotal junction subshiny; tegula brown. Legs: Mostly brown; coxae, trochanters and femora mostly blackish-brown; coxae tips light brown; trochanters with narrow whitish stripes posteroapically; femora light brown apically; tibiae and tarsi brown; fifth tarsomeres blackish-brown; claws brown; arolium brown to blackish-brown; spur
of foreleg yellowish to brown, other spurs dark brown, blackish apically with black bristles; leg spines brown to blackish-brown. **Wings** (Figs. 24, 25): Subhyaline; forewing mostly light brownish, with large light brown apical spot, separated from wing margin by narrow lighter area, with conspicuous transverse hyaline area at level of radial cell and pterostigma; pterostigma, veins C and Sc+R dark brown to blackish-brown; veins Rs, 3rm and 2mcu very light, barely visible; distal part of vein M dark brown; other veins brown to dark brown; hindwing narrowly light brownish apically; veins C, Sc+R, R₃, dark brown; longitudinal part of veins Rs, M distal to 1rm, 1A and Cu, reddish-brown; vein M colored at about basal half, discolored distally. **Abdomen**: Brownish-black; tergites 1–2 or 1–3 dark brown laterally; pygidium dark brown, shiny. **Vestiture. Pubescence**: Body predominantly with short gray pubescence, partially covering integument; abdomen mostly with mixed bronze and gray pubescence; tergites 1–3 with conspicuous wide light marginal fascia, formed by gray pubescence; dorsal parts of head and mesosoma with mixed bronze and gray pubescence. **Setae**: Clypeus, mandible and anterodorsal part of orbit with few long fine dark brown setae; brush of hindtibia with yellowish-brown setae; medial hindspur with blackish setae ventrobasally; first tarsomere of hindleg with brown setae basoventrally; tergite 6 and sternites 2–6 with long and stout erect dark brown setae.

**Male. Structure: Head** (Figs. 2, 4): 0.9–1.1 times as wide as high and 1.5–1.6 times as wide as pronotum; face as in Fig. 2; eye ratio 1.8–1.9; eye 4.5–5.0 times as long as temple in dorsal view; malar space 0.5 times as high as width of third antennal segment apically; POD/OOD ratio 0.96–1.14; anterior ocellar angle 80°–85°; antenna as in Fig. 8; antennal ratio 1.4–1.7 : 1.0 : 1.0–1.1 : 1.1–1.3; third antennal segment 1.7–1.9 times
as long as wide apically; apical antennal segment rounded, 2.1–2.3 times as long as wide basally. **Mesosoma:** Scutellum 2.1–2.3 times as long as postscutellum; postnotal junction smooth, 0.28–0.44 times as long as postscutellum (Fig. 15), with shallow median rounded depression. **Legs:** First tarsomere of foreleg 5.7–6.3 times as long as wide apically; fifth tarsomere of foreleg 2.4–2.9 times as long as wide medially; fourth tarsomere of middle leg 3.8–4.2 times as long as wide; tarsi ventrally with long and dense spines (Fig. 23a); claws without ventral tooth (Fig. 23c); arolium small (Fig. 23b). **Wings:** Venation as in Figs. 26 and 27; position of vein 1mcu variable: postfurcal in 5 males, antefurcal in 3 males; cell 1Rs+2Rs 0.21–0.50 times as wide anteriorly as posteriorly; MM = 0.49–0.52; MR = 0.81–1.10; RQ = 0.31–0.35; body length 3.6–4.4 mm. **Hypopygium** (Fig. 36): Broadened subapically in dorsal and ventral view; almost straight in lateral view, uniformly and weakly convex in cross section. **Genitalia** (Fig. 39): Gonostylus long, cylindrical, with more or less uniformly distributed and moderately long setae in lateral view (Fig. 39c); aedeagus relatively narrow (darkened in Fig. 39b).

**Coloration.** **Head:** With clypeus black basally, with about apical half brown; mandible blackish-basally, yellowish-brown medially, dark reddish-brown apically; labrum blackish-brown; palpi yellow, slightly blackish basally and apically; antenna blackish-brown dorsally and brown ventrally. **Mesosoma:** Black; postnotal junction shiny; tegula brown. **Legs:** Mostly blackish-brown to dark brown; coxae black to blackish-brown with lighter brown tips; femora dark brown, lighter brown apically; tibiae dark brown; tarsi blackish-brown; claws brownish-black; arolium blackish-brown; spur of foreleg yellowish to light brown; other spurs blackish-brown, with black bristles; leg spines brownish-black. **Wings** (Figs. 26, 27): Subhyaline; forewing mostly light brownish, with large light brown spot apically, and with transverse hyaline area at level of radial cell and pterostigma; forewing: pterostigma, veins C and Sc+R dark brown to blackish-brown; veins Rs, 3m, 2mcu brownish, almost hyaline; distal part of vein M dark brown; other veins brown to dark brown; hindwing narrowly light brownish apically; veins C, Sc+R, R, dark brown; Rs and M distally reddish-brown; vein M colored at about basal half, discolored distally. **Metasoma:** Brownish-black to dark brown; segments 1–4 lighter brown laterally; apical segments darker than basal segments.

**Vestiture. Pubescence:** Body predominantly with short gray flattened appressed pubescence, partially covering integument; clypeus and ventral part of face with pubescence longer than that on other head parts; pronotum in posterior half and sometimes scutum dorsally with mixed bronze and gray pubescence; abdominal segments 1–3 with gray pubescence; abdominal segments 4–6 with mixed brown and gray pubescence; tergites 1–3 and sternites 1–2 with wide conspicuous fascia formed by dense pubescence; fascia on other abdominal segments absent or barely visible. **Setae:** Mandible and anterodorsal part of orbit with few long fine brown setae.

**Material examined**
malaise trap (1♀); 19.iv.1999 (1♂); 12.v.1999 (1♀); 24.v.1999 (1♀); 27.vi.1999 (1♂); Nahal Shezaf, Shezaf Nat. Res., 17.vi.1997, 30°43’N 35°16’E, S. Plotkin (1♂); Hageva Field School, 8.vii. 1997, 30°43’N 35°15’E, S. Plotnik (1♂); Hageva Field School, 29.viii. 1997, 30°43’N 35°15’E, S. Plotnik, malaise trap (1♂); Timna, 3.iv.1997, Y. Malichi (1♂). All the paratypes are deposited in TAUI.

Distribution
Israel.

Microphadnus insperatus Priesner, 1967
(Figs. 6, 9, 12, 16, 21, 32–35, 37, 40)


Redescription

Female. Structure. Head: 1.2 times as wide as high and 1.5 times as wide as pronotum; eye ratio 1.8; eye 8 times as long as temple in dorsal view; malar space 0.26 times as high as width of third antennal segment apically; POD/OOD ratio 1.15; anterior ocellar angle 70°; antenna as in Fig. 6; antennal ratio 1.9 : 1.0 : 2.7 : 2.5; third antennal segment 4.6 times as long as wide apically; apical antennal segment rounded, 4 times as long as wide basally; third segment of maxillary palpus 3.3 times as long as wide (Fig. 12).

Mesosoma: Scutellum 2.1 times as long as postscutellum; postnotal junction (Fig. 16) long, 0.6 times as long as postscutellum, conspicuously wrinkled. Legs: First tarsomere of foreleg 6.3 times as long as wide apically; fourth tarsomere of middle leg 1.6 times as long as wide; first tarsomere of foreleg with two short acuminate lateral spines; tarsi ventrally with long and dense spines (Fig. 21a); claws with conspicuous ventral tooth (Fig. 21c); arolium large (Fig. 21b). Wings: Venation as in Figs. 32 and 33; cell 1Rs+2Rs 0.32–0.41 times as wide anteriorly as posteriorly; MM = 0.65–0.66; MR = 0.93–1.00; RQ = 0.41; body length 6.5 mm.

Coloration. Head: Mostly black; clypeus black basally, red apically with dark red smooth and shiny anterior margin; mandible blackish-brown basally, reddish-brown medially, dark reddish-black apically; malar space black; labrum reddish-brown; palpi reddish-brown; antenna mostly brownish black; scapus slightly reddish-brown ventrally; pedicellus slightly reddish-brown apically. Mesosoma: Predominantly black, except red anterior and lateral margins of pronotum and ventral edge of propleuron; postnotal junction subshiny; tegula brownish-red. Legs: Mostly red, darkened by brown dorsally; coxae blackish-brown posteriorly; tarsi dark reddish-brown; claws blackish-brown basally, reddish-brown apically; arolium blackish-brown; leg spines dark reddish-brown to reddish-black. Wings (Figs. 32, 33): Subhyaline, brownish; forewing with large light brown spot apically, and with inconspicuous lighter transverse area at level of radial cell and pterostigma; hindwing brownish in apical half; vein M in hindwing light brown, moderately long: shorter than in M. pumilus and longer than in M. brevicornis. Metasoma: Segments 1–2 and basal part of segment 3 dark red; remaining parts dark blackish brown; pygidium dark brown, shiny.
Vestiture. Pubescence: Body predominantly with short gray appressed pubescence, partially covering integument; anterior and dorsal part of head, dorsal part of mesosoma, and abdominal segments 4–6 predominantly with bronze pubescence; tergite 1–2 or 1–3 with weak but wide marginal fascia formed by light gray pubescence.

Male. Structure. Head: 1.1 times as wide as high and 1.4 times as wide as pronotum; eye ratio 1.9; eye 5 times as long as temple in dorsal view; malar space 0.4 times as high as width of third antennal segment apically; POD/OOD ratio 1.2; anterior ocellar angle 75°; antenna as in Fig. 9; antennal ratio 1.9 : 1.0 : 1.9 : 1.8; third antennal segment 3
times as long as wide apically; apical antennal segment rounded, about 3.8 times as long as wide. **Mesosoma:** Scutellum 2.1 times as long as postscutellum; postnotal junction (Fig. 17) long, 0.7 times as long as postscutellum, conspicuously wrinkled transversely. **Legs:** First tarsomere of foreleg 6.9 times as long as wide apically; fifth tarsomere of foreleg twice as long as wide medially; fourth tarsomere of middle leg 2.2 times as long as wide; claws with vestigial ventral tooth; wing venation as in Figs. 34 and 35; cell 1Rs+2Rs 0.43 times as wide anteriorly as posteriorly; MM = 0.47; MR = 0.7; RQ = 0.4; body length 4.7 mm. **Hypopygium** (Fig. 37): Broadened medially in dorsal and ventral view, almost straight in lateral view, and slightly keeled in cross section. **Genitalia** (Fig. 40): Gonostylus long, flattened, with fringe of long setae in lateral view (Fig. 40c); aedeagus (darkened in Fig. 40b) relatively narrow. **Coloration.** **Head:** Mostly black; clypeus mostly black, yellowish-brown apically; mandible blackish basally, yellowish medially, dark reddish-brown apically; labrum yellowish-brown; palpi blackish-brown; antenna mostly brownish-black, lighter brown ventrally. **Mesosoma:** Black; postnotal junction subshiny; tegula brown. **Legs:** mostly
dark brown; coxae reddish anteriorly; femora reddish apically, claws dark brown. **Wings** (Figs. 34, 35): Subhyaline, brownish; forewing with large dark brown spot apically, and with inconspicuous transverse more hyaline area at level of radial cell and pterostigma; hindwing brown in apical half. **Metasoma**: Segments 1–2 and segment 3 basally dark red; other parts of abdomen dark blackish-brown.

**Vestiture. Pubescence**: Similar to that of female.

**Material examined**

ISRAEL: Har Meron, 1100m, 26.vi.1999, O. Manheim (1♀); Yericho, PALESTINE, 27.8.1941, Bytinski-Salz (1♀; in bad condition: head and foretarsi absent, anterior part of mesosoma destroyed); Nizzanim, 26.vii.2005, C. Grach (1♂). All the specimens are deposited in TAUI.

**Distribution**

Turkey (Wolf, 1990, 2003), Israel.

*Microphadnus pumilus* (Costa, 1882) (Figs. 7, 10, 13, 18, 22, 28–31, 38, 41)

*Aporus pumilus* Costa, 1882: 54.

*Microphadnus pumilus*: Wolf, 1965: 37 (synonymy); 1990: 640 (list).

**Redescription**

**Female. Structure. Head.** Head: 0.9 times as wide as high and 1.5 times as wide as pronotum; eye ratio 1.7–1.8; eye 7.6 times as long as temple in dorsal view; malar space 0.25–0.29 times as high as apical width of third antennal segment; POD/OOD ratio 1.03–1.36; anterior ocellar angle 80°; antenna as in Figs. 7 and 10; antennal ratio 1.9 : 1.0 : 2.5 : 2.5–2.6; third antennal segment 4.5 times as long as wide apically; apical antennal segment rounded, 4.3 times as long as wide basally; third segment of maxillary palpus 3.5 times as long as wide (Fig. 13). **Mesosoma**: Scutellum 2.3–2.5 times as long as postscutellum; postnotal junction (Fig. 18) short, 0.13–0.19 times as long as postscutellum. **Legs**: First tarsomere of foreleg 6.6–6.9 times as long as wide apically; fourth tarsomere of middle leg 2.4–2.5 times as long as wide; claw with tiny ventral tooth (Fig. 22c); arolium small (Fig. 22b); tarsi ventrally with long and dense spines (Fig. 22a). **Wings**: Venation as in Figs. 28 and 29; cell 1Rs+2Rs 0.29–0.42 times as wide anteriorly as posteriorly; MM = 0.48–0.56; MR = 0.97–1.19; RQ = 0.37–0.40; body length 6.1–6.4 mm.

**Coloration. Head.** Mostly black; clypeus mostly black, apical 0.25 dark brown; anteriorly narrowly smooth and shiny; mandible black in basal half, light reddish-brown medially; dark reddish-brown apically; malar space black; labrum black; palpi blackish-brown; antenna black. **Mesosoma**: Black; postnotal junction shiny; tegula blackish-brown. **Legs**: Mostly entirely black, except tips of coxae and forefemur narrowly brown; claws blackish-brown basally, pale-brown apically; arolium black; leg spines black. **Wings** (Figs. 28, 29): Subhyaline, brownish; forewing with large dark brown spot apically and
inconspicuous transverse hyaline area at level of radial cell and pterostigma; hindwing conspicuously brown in apical half; vein M in hindwing dark brown, nearly reaching wing margin. **Metasoma**: Black; pygidium black, shiny.

**Vestiture. Pubescence**: Head, mesosoma, coxae, trochanters and femora mostly with short gray flattened appressed pubescence, partially covering integument; other leg segments and dorsal parts of head and mesosoma with mixed bronze and gray pubescence; abdomen mostly with mixed bronze and gray pubescence; tergites 1–2 with conspicuous wide light marginal fascia, formed by gray pubescence.

**Male. Structure. Head**: 0.9–1.1 times as wide as high and 1.5–1.6 times as wide as pronotum; eye ratio 1.7–1.9; eye 4.8–5.2 times as long as temple in dorsal view; malar space narrow, 0.5–0.6 times as high as apical width of third antennal segment; POD/ OOD ratio 1.09–1.30; anterior ocellar angle 85°–90°; antenna as in Fig. 10; antennal ratio 1.6–1.9 : 1.0 : 1.5–1.7 : 1.5–1.8; third antennal segment 2.5–2.8 times as long as wide apically; apical antennal segment rounded, 2.8–3.5 times as long as wide basally. **Mesosoma**: Scutellum 2.0–2.2 times as long as postscutellum; postnotal junction (Fig. 19) short, 0.17–0.25 as long as postscutellum. **Legs**: Claws without visible ventral tooth; arolium small; first tarsomere of foreleg 6.9–7.3 times as long as wide apically; fifth tarsomere of foreleg 3.3–3.8 times as long as wide medially; fourth tarsomere of middle leg 3.3–3.8 times as long as wide. **Wing**: Venation as in Figs. 30 and 31; position of vein 1mcu in forewing variable: in 8 males antefurcal; in 4 males – interstitial, one male has postfurcal position of this vein; cell 1Rs+2Rs 0.13–0.46 times as wide anteriorly as posteriorly; MM = 0.49–0.56; MR = 0.68–1.00; RQ = 0.4–0.5; body length 3.7–5.0 mm. **Hypopygium** (Fig. 38): Broadened subapically in dorsal and ventral view; curved in lateral view, uniformly and weakly convex in cross section. **Genitalia** (Fig. 41): Gonostylus short, wider basally in lateral view, narrower distally, with more or less uniformly distributed and moderately long setae (Fig. 41c); aedeagus strongly broadened apically (darkened in Fig. 41b).

**Coloration and vestiture**: Similar to those of female, but claws black.
Material examined


Distribution

Southern Europe and Mediterranean to Mongolia (Wolf, 1990).

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