

***Fromundus pygmaeus* (Dallas, 1851), the first species of the genus
Fromundus Distant, 1901 (Hemiptera: Heteroptera: Cydnidae) recorded in Egypt**

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Abstract. *Fromundus pygmaeus* is recorded from Egypt for the first time, where eight specimens were collected from Qift road between Qena and El-Quseer. Morphological characters of the collected specimens were illustrated with light and scanning electron microscopic images.

Key words: Hemiptera, Heteroptera, Cydnidae, burrower bug, distribution, first country record, Egypt.

Introduction

The genus *Fromundus* Distant, 1901 belongs to the tribe Geotomini *sensu lato* in the subfamily Cydninae of the family Cydnidae (Lis 1994a; Aukema & Rieger 2006; Pluot-Sigwalt & Lis 2008; Ghahari et al. 2009). Species of this genus are distributed in the Oriental, Australian, Palearctic and Afrotropical Regions (Lis 1994a; Lis 1995; Aukema & Rieger 2006). The genus can be recognized among the cydnid genera by 5-segmented antennae, the paraclypei bearing only hair-like setae, the kidney-like peritreme, the umbones of pronotum not swollen, and large evaporative areas in both, meso- and metapleuron (Lis 1994a; Lis 1995; Aukema & Rieger 2006).

Fromundus pygmaeus (Dallas, 1851) is one of the commonest cydnid species that is very widespread in the Oriental, Australian, and Palearctic Regions; however, it is also known in southern and eastern Asia (Linnavuori 1993; Lis 1994b, 1997, 1998; Rédei & Hufnagel 2005; Linnavuori 2012; Lis & Ziaja 2015). The westernmost records were given by Carapezza (1998) from Cyprus.

This species is best diagnosed by shiny moderately punctured pronotum and scutellum, clypeus without subapical pairs of hair-like setae, compact paramere, and can be easily distinguished from other species in the same genus by the short spermathecal duct and devoid of dilation in the spermatheca (Lis 1994a; Pluot-Sigwalt & Lis 2008).

This species is economically important as it is found among rice seedlings, also attacks sugar cane, roots of *Glycine* and *Trifolium* (*Fabaceae*), and fallen seeds of grasses (*Poaceae*) (Lis 1994a). *F. pygmaeus* has medical importance as it has been reported as a facultative blood sucker for humans (Miller 1931; Lis 1994a; Lis et al. 2000).

Here, we reported the first record of *F. pygmaeus* in Egypt being also the first reports of the genus *Fromundus* for this country. We provided morphological characters for recorded specimens using light and scanning photographic images (SEM).

Material and methods

Study area and sampling: Eight specimens were collected from Egyptian Qift road (Latitude: 26.120654, Longitude: 33.934685) located between Qena and El-Quseer, using a light trap. The geographic coordinate of the collection site was recorded based on a GPS device (Garmin eTrex, Olathe, KS, USA). Collected specimens were stored in a vial containing 70% alcohol for dissection purposes.

Specimens examined: The collected specimens were identified using taxonomic descriptions (Linnavuori 1993; Lis 1994a; Lis & Heyna 2001; Pluot-Sigwalt & Lis 2008; Lis & Zack 2010; Çerçi & Koçak 2016) and examined using the Labomed CZM4 Stereo Microscope with an Am Scope LED-144W-ZK white adjustable. One male and one female were dissected to obtain morphological characteristics under the microscope. For the dissection, specimens were placed in 20% KOH solution for 5 hours. After removing from the KOH solution, the body parts were separated under a stereomicroscope using fine needles and forceps with small-sized tips. The remaining specimens were preserved in Ain Shams University Collection (ASUC) for further research and educational purposes.

Photographs preparation: Species were captured at multiple focal planes using Am Scope MU1000 10MP Microscopic camera fixed in Labomed CZM4 Stereo Microscope. The pictures were merged using CombineZP software (Hadley 2010) and upgraded with Adobe Photoshop CC.



Fig. 1. *Fromundus pygmaeus* (Dallas), (A). Dorsal habitus; (B). Antenna; (C). Rostrum.

Morphological nomenclature and measurements: Nomenclature for morphological characters follow the previous literature (Pluot-Sigwalt & Lis 2008; Kment & Vilímová 2010; Avendano et al. 2017). The following morphological abbreviations are used: HW: Head width, HL: Head length, PW: pronotum width, PL: pronotum length, SW: scutellum width, SL: scutellum length, TL: total length, r: seminal receptacle, dd: distal part of the spermathecal duct; dfl: distal flange, ip: intermediate part of the spermatheca, pfl: proximal flange. We measured linear distances between any two landmarks on the image to obtain any distance using tpsDig v2.16 software (Rohlf 2010; Okely et al. 2021) by determining reference length (ruler).

All measurements are in millimeters (mm) scale. Ocular and ocellar indexes were calculated based on the formula provided by the previous study (Lis 1994a).

SEM photographs preparation: Samples were dried and then fixed to scanning electron microscope stubs using double-sided tape (Farag et al. 2022), then coated with fine gold coating apparatus using an S150A Sputter Coater (Edwards, England), to prepare them for examination. SEM images were taken using a scanning electron microscope (QUANTA FEG 250, Holland SEM) at the Electron Microscopy Unit of the National Research Centre Egypt.

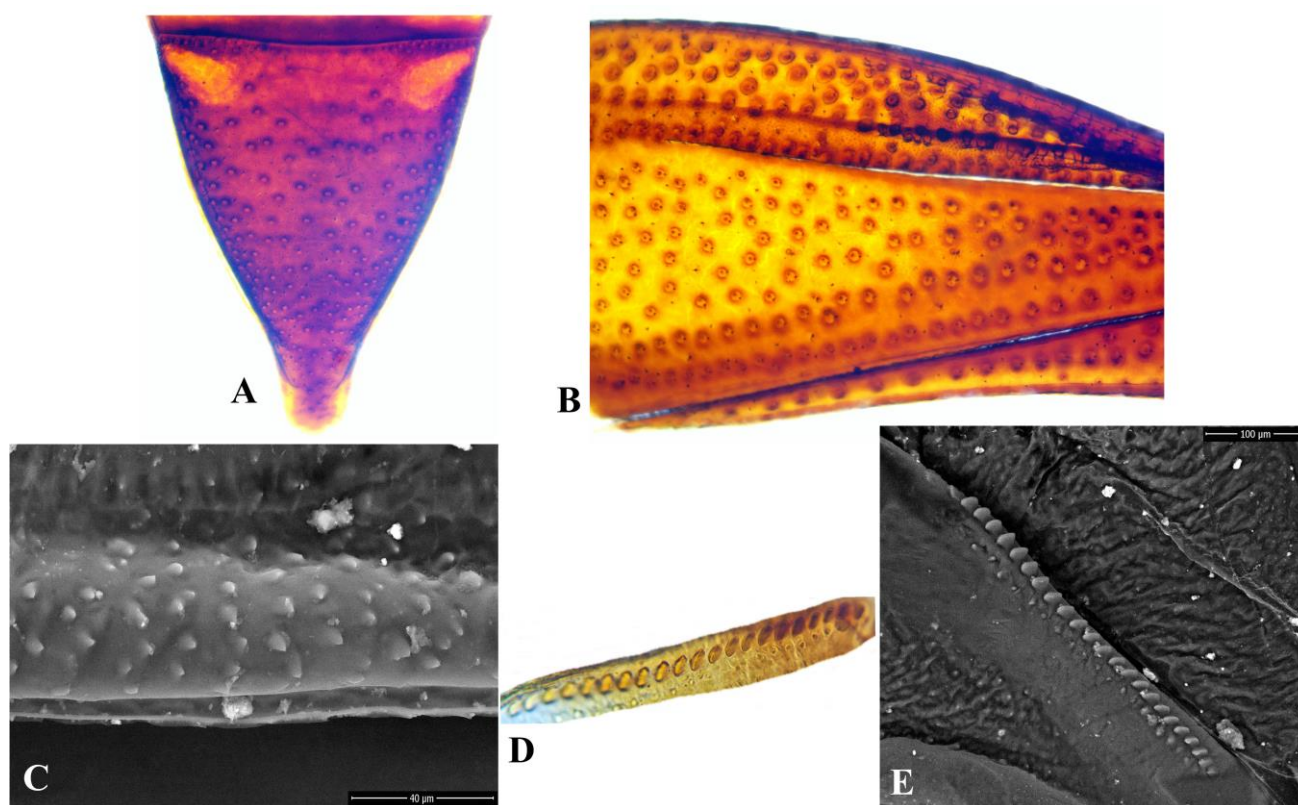


Fig. 2. *Fromundus pygmaeus* (Dallas) Egypt [Qift road], (A). Scutellum; (B). Fore wing; (C) Margin of hind wing; (D, E). Stridulitrum with teeth. (A, B, D): under the light microscope; (C, E): under the scanning electron microscope.

Results

Fromundus pygmaeus (Dallas, 1851)

Aethus pygmaeus Dallas, 1851: 120.

Fromundus pygmaeus: Lis 1994: 181.

Remarks: For details on the species synonymy see: Lis, 1994a, 1997c, 1999a.

Type data: Lectotype female of *Aethus pygmaeus* Dallas, 1851 (designated by Lis 1994a: 182): India (Natural History Museum, London, U.K.).

Distribution (Lis 1994a, 1999; Lis & Zack 2010; Çerçi & Koçak 2016): Australia, Bismarck Archipelago (Manus, Mussau, New Ireland, New Britain), Burma, Brunei, Cambodia, Chagos, Archipelago, China (Sichuan, Guangdong, Hainan, Guangxi, Yunnan, Jiangxi, Hubei, Taiwan), Christmas Islands, Cocos-Keeling Islands, Cyprus, **Egypt (new country record)**, Fiji, Hawaii, Hong Kong, India (incl. Andamans and Nicobars), Indonesia, Iraq, Israel, Japan, Jordan, Korea, Laos, Malaysia, Maldive Islands, Marquesas, Micronesia, Nepal, New Caledonia, New Hebrides, Pakistan, Papua New Guinea, Philippines, Reunion, Samoa, Saudi Arabia, Singapore, Sri Lanka, Solomon Islands, Society Islands, Thailand, Turkey, Vietnam, Yemen.

Morphology of the studied specimens: Body length 3.65–4.5 mm, Shiny ochraceous to black, moderately punctured (Fig. 1A). Head ≈ 2.36 times as wide as long, shiny black. Submargins of head with 2–5 hair-like setae.

Clypeus as long as paraclypei, hairless. Eyes reddish brown, reddish gray or blackish brown, apically with a short seta; ocelli reddish brown, ocular index 2.63, and ocellar index 5.21. Antenna brown, with bases and apices of segments 2–4 yellowish, all segments with dense hairs, proportion between segments 1.2: 1:1.25:1.65:1.8 (Fig. 1B). Rostrum brown, reaching middle coxae, proportion between segments 1.4 :1.7: 1.2 :1 (Fig. 1C).

Pronotum ≈ 1.95 times as wide as long, trapezoidal, shiny blackish brown with apex more brownish, minutely punctuated; anterior margin deeply angularly insinuated; lateral margin slightly carinated, with 4–6 submarginal setigerous punctures.

Scutellum ≈ 1.2 times as long as wide, shiny black, base weakly punctuated, with 2 smooth orange patches (Fig. 2A), punctuation getting denser toward tip; apex tongue like, surpassing claval commissure.

Elytra shiny black, almost parallel sided, narrowing at apex, costa with a single setigerous puncture; exocorium evenly punctuated in middle, with a row of punctuation on inner edge; endocorium (Fig. 2B) with two rows of punctuation on inner edge, evenly punctuated in middle; clavus with a row of punctuation. Membrane surpassing tip of abdomen, hyaline, yellowish, with two sub basal round brown spots. Hind wing margin with several protrusions (Fig. 2C). Stridulitrum on lower margin of hind wing's postcubitus with 21–23 stout oblique teeth (Fig. 2D, E).

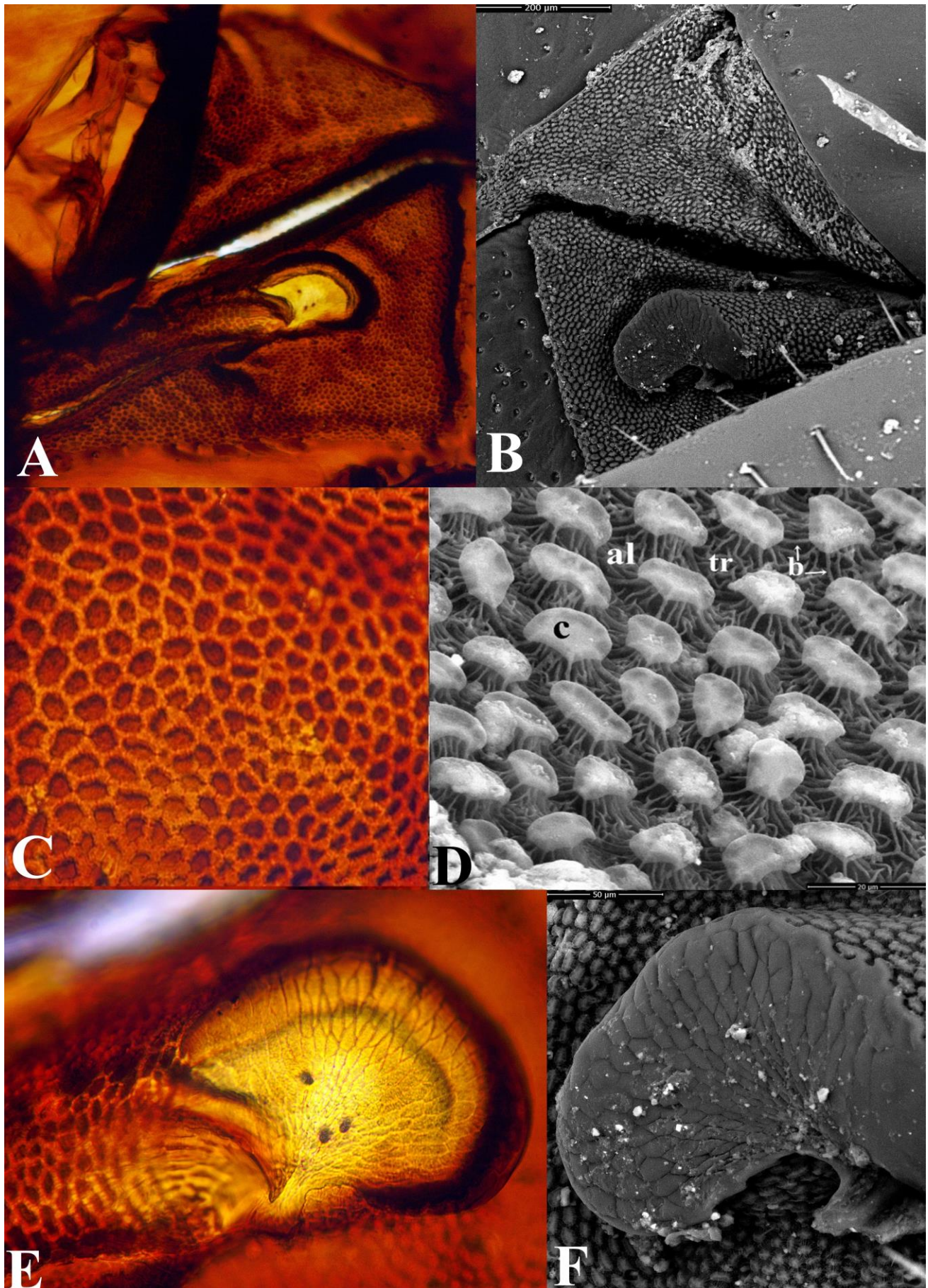


Fig. 3. *Fromundus pygmaeus* (Dallas), Egypt [Qift road], (A, B) Evaporative areas on meso- and metapleuron; (C, D). Mycoid surface of evaporatorium; (E, F). Apex of peritreme with detail of peritremal surface. Abbreviations: c – cap of mushroom body, al – alveole, b – bridges interconnecting mushroom bodies, tr – trabeculae. (A, C, E): under the light microscope; (B, D, F): under the scanning electron microscope.

Evaporative areas triangular, largely extending on meso and metapleuron, evaporatorium usually appears as a dull area (Fig. 3A, B), covered with mushroom-like microsculpture, each composed of irregular polygonal concave caps at the same level of surrounding pleural membrane surface. Bridges connected the polygonal caps, four to six caps with bridges surround an alveole area; mushroom-like microsculpture connected to each other by numerous trabeculae (Fig. 3C, D). Peritreme of metathoracic scent gland reniform, with shiny sha-greened surface, peritremal surface with polygonal microsculpture (Fig. 3E, F).

Legs reddish brown (Fig 4). Femora incrassate, with long thin spines on upper and lower margins (Fig 4A, E); tibiae laterally marginated with stout spines interspaced with thin short ones, tibia of fore leg expanded and terminated with comb, middle and posterior tibia not expanded terminally (Fig. 4A-D, F, G). Tarsi yellowish brown, 3-segmented, basal and terminal segments subequal in length, 2nd segment the shortest (Fig. 4A, B).

Abdomen brownish, plectrum seen as dark sclerite sublateral on first tergum, with striations parallel at basal 2/3, thicker and intersected at apical 1/3 (Fig. 5A).

Paramere as in Fig (5B); spermatheca (Fig. 5C) with spherical receptacle, long neck, short duct, devoid of dilation; intermediate part long, delimited by two well developed flanges, distal flange cup-like widened.

Discussion

Fromundus pygmaeus is recorded from Egypt for the first time. It is a very widely distributed species in the Oriental and Australian Regions (Lis 1999), but recently was also recorded in the Palaearctics, i.e., in Cyprus (Carapezza 1998), Iran (Linnavuori 2004), and Turkey (Çerçi & Koçak 2016). The present investigation provided morphological information illustrated with light and scanning photographic images of the Egyptian specimens, that can be used to facilitate species identification.

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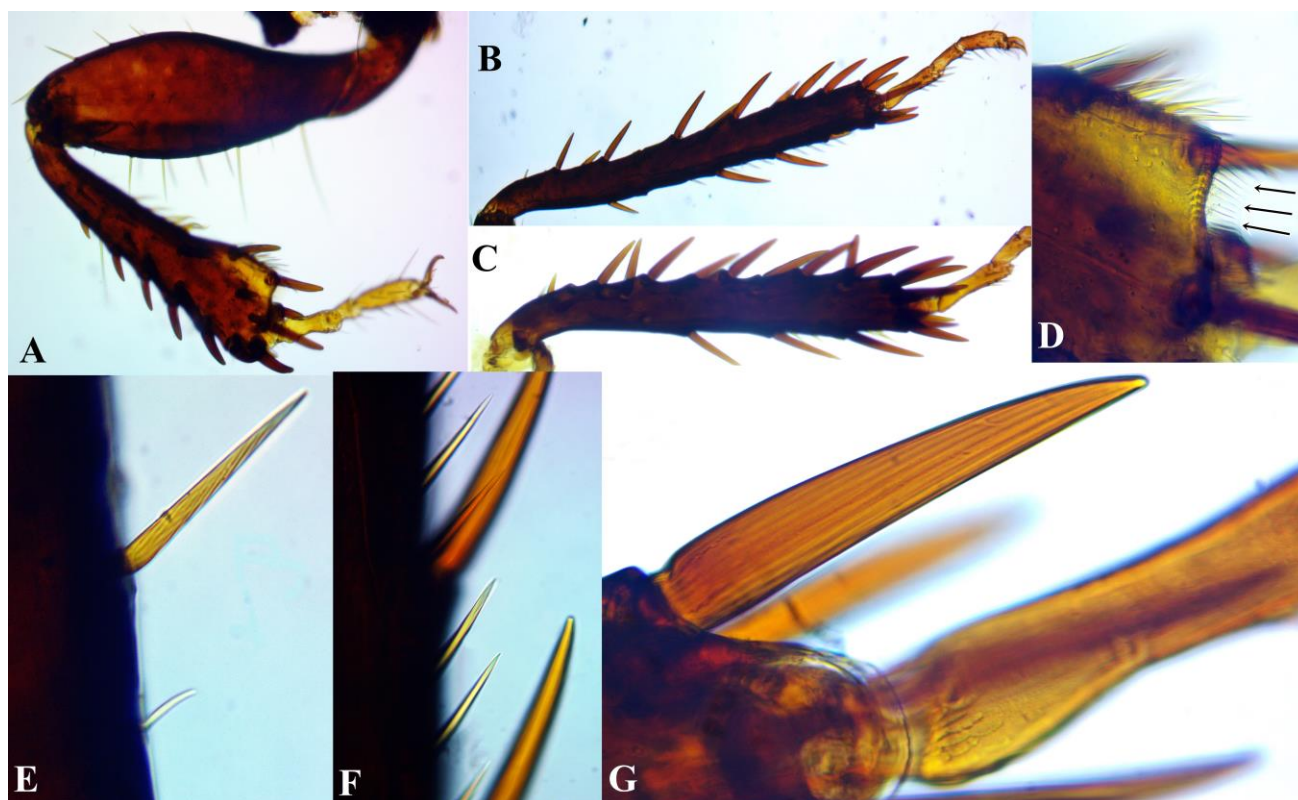


Fig. 4. Legs of *Fromundus pygmaeus*, Egypt [Qift road], (A). Fore leg; (B) Tibia of hind leg (C) Tibia of mid leg (D) Tibial comb of fore leg (E) Spines of femur of hind leg (F-G). Spines of tibia of hind leg.

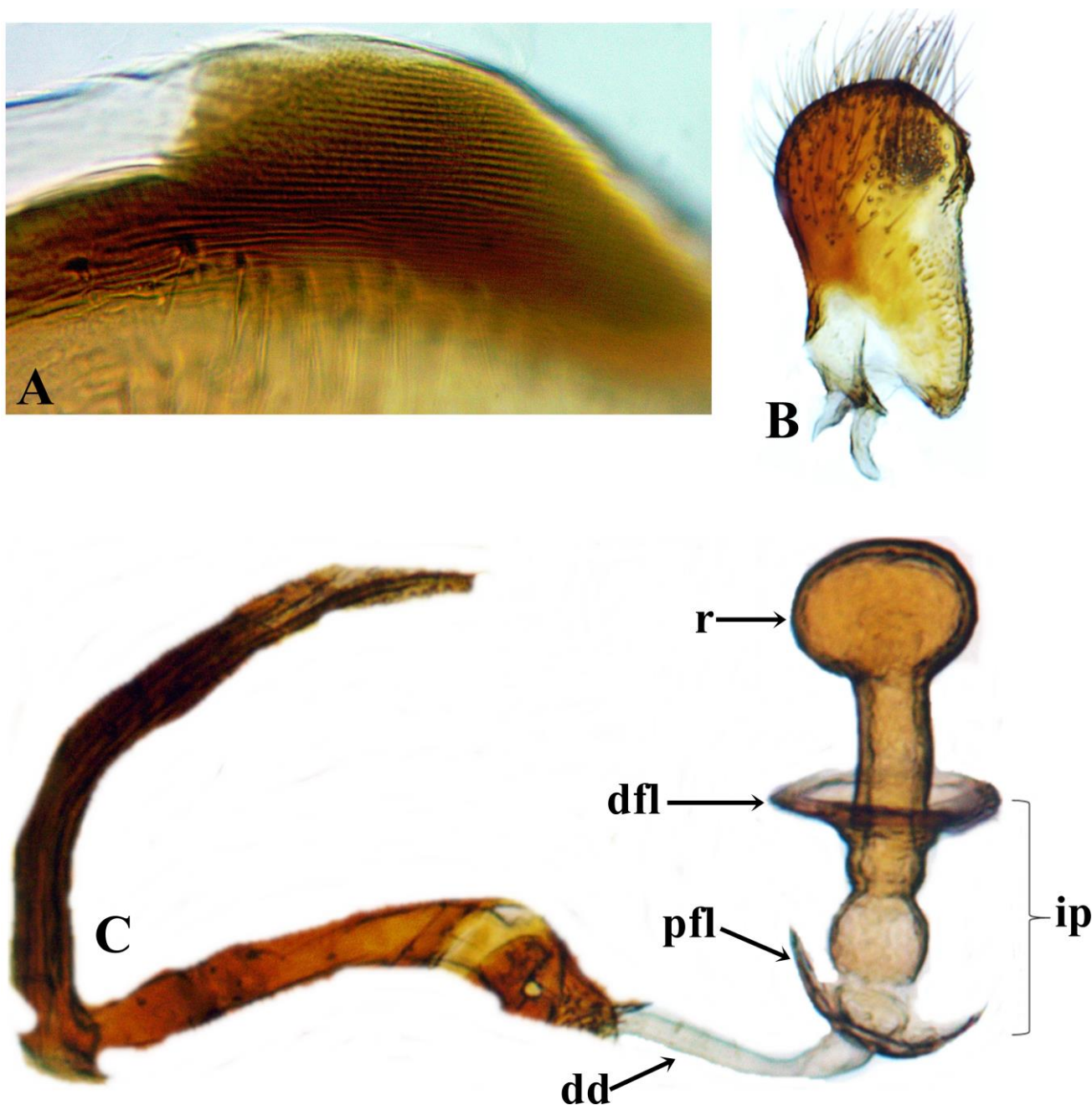


Fig. 5. *Fromundus pygmaeus* (Dallas), Egypt [Qift road], (A). plectrum; (B). paramere; (C). spermatheca. Abbreviations: dd – distal part of the spermathecal duct, dfl distal flange, pfl – proximal flange, r – seminal receptacle, ip – intermediate part of the spermatheca.

References

- Aukema B., Rieger C. (eds.). 2006. *Catalogue of the Heteroptera of the Palaearctic region, Vol. 5*. Netherlands Entomological Society, Amsterdam, 550 pp.
- Avendano J.M., Grazia J., Schwertner C.F. 2017. Cydninae (Hemiptera, Heteroptera, Cydnidae) in Brazil: updated checklist, new records, and description of *Tominotus undulatus* sp. nov. *Zootaxa* **4329**(5): 401–435. <https://doi.org/10.11646/zootaxa.4329.5.1>
- Carapezza A. 1998. New species and new records of Heteroptera from Cyprus (Insecta). *Atti dell'Accademia Roveretana degli Agiati* **7** (8): 29–40.
- Çerçi B., Koçak Ö. 2016. Contribution to the knowledge of Heteroptera (Hemiptera) fauna of Turkey. *Journal of Insect Biodiversity* **4**(15): 1–18. <https://doi.org/10.12976/jib/2016.4.15>
- Ghahari H., Chérot F., Linnavuori R., Ostovan H. 2009. Annotated catalogue of Iranian burrower bugs (Heteroptera, Pentatomoidea, Cydnidae). *ZooKeys* **26**: 1–31.

- Farag S., Alakeel K.A., GadAllah S., Nasser M., Okely M., Ahmed A.E., Soliman S.M., Saad A.M., El-Saadony M.T., Al Ashaal S. 2022. Polychromatism in adult *Deroplax silphoides* (Heteroptera: Scutelleridae) and a morphological examination of the immature stages. *Saudi Journal of Biological Sciences* (in press).
<https://doi.org/10.1016/j.sjbs.2022.01.044>
- Hadley A. 2010. Combine ZP Software, New Version. www.hadleyweb.pwp.blueyonder.co.uk/CZP/News.htm [accessed 26 June 2012].
- Kment P., Vilímová J. 2010. Thoracic scent efferent system of the Tessaratomidae sensu lato (Hemiptera: Heteroptera: Pentatomoidea) with implication to the phylogeny of the family. *Zootaxa* **2363**(1): 1–59.
<https://doi.org/10.11646/zootaxa.2363.1.1>
- Linnavuori R. 1993. Cydnidae of West, Central and North-East Africa (Heteroptera). *Acta Zoologica Fennica* **192**: 1–148.
- Linnavuori R.E. 2004. Heteroptera of the Hormozgan province in Iran. III. Cimicomorpha (Anthoridae, Cantacaderidae, Tingidae), Pentatomorpha (sic). *Acta Universitatis Carolinae, Biologica* **48**: 273–286.
- Linnavuori R.E. 2012. Studies on Pyrrhocoroidea, Coreoidea and Pentatomoidea of Khuzestan and the adjacent provinces in Iran (Hemiptera: Heteroptera). *Acta Entomologica Musei Nationalis Praegae*, **52**(1): 67–88.
- Lis J.A. 1994a. *A revision of Oriental burrower bugs (Heteroptera: Cydnidae)*. Upper Silesian Museum, 349 pp.
- Lis J.A. 1994b. Studies on Cydnidae (Heteroptera) of the Australian Region VI. Material collected by I. Lansbury in Papua New Guinea in 1990 and 1992. *European Journal of Entomology* **91**: 321–321.
- Lis, J.A., 1995. A synonymic list of burrower bugs of the Australian Region (Heteroptera: Cydnidae). *Genus (Wrocław)* **6**:137–149.
- Lis J.A. 1997. Studies on the Cydnidae of the Australian Region XI. A review of species from New Caledonia, with descriptions of *Chilocoris neocaledonicus* n. sp. and *Macroscyrtus matilei* n. sp. (Hemiptera: Heteroptera). *Genus (Wrocław)* **8**: 591–602.
- Lis J.A. 1998. An annotated checklist of burrower bugs (Cydnidae) of Thailand. *Amemboa* **2**: 43–46.
- Lis J.A. 1999. Burrower bugs of the old world—a catalogue (Hemiptera: Heteroptera: Cydnidae). *Genus (Wrocław)* **10**(2), 165–249.
- Lis J.A., Heyna J.O. 2001. The metathoracic wing stridulitrum of the Cydnidae [Hemiptera: Heteroptera]. *Polskie Pismo Entomologiczne* **70**(4), 221–245.
- Lis J.A, Zack R.S. 2010. A review of burrower bugs (Hemiptera: Heteroptera: Cydnidae sensu lato) of Guam. *Zootaxa* **2523**(1): 57–64.
<https://doi.org/10.11646/zootaxa.2523.1.4>
- Lis J.A., Ziaja, D.J. 2015. An annotated checklist of burrower bugs (Hemiptera: Heteroptera: Cydnidae) from Bali (Indonesia) with new records. *Polish Journal of Entomology* **84**(4): 305–310.
- Lis J.A., Becker M., Schaefer C.W. 2000. *Burrower bugs (Cydnidae)*. [in:] *Heteroptera of Economic Importance*. CRC Press, Boca Raton, 405–419.
- Miller N.C.E. 1931. *Geotomus pygmaeus* Dallas (Heteroptera-Cydnidae) attempting to suck human blood. *The Entomologist* **64**: 214.
- Okely M., Anan R., Gad-Allah S., Samy A.M. 2021. Hard ticks (Acari: Ixodidae) infesting domestic animals in Egypt: Diagnostic characters and a taxonomic key to the collected species. *Medical and Veterinary Entomology* **35**(3): 333–351.
<https://doi.org/10.1111/mve.12502>
- Pluot-Sigwalt D., Lis J.A. 2008. Morphology of the spermatheca in the Cydnidae (Hemiptera: Heteroptera): Bearing of its diversity on classification and phylogeny. *European Journal of Entomology* **105**(2): 279–312.
- Rédei D., Hufnagel L. 2005. Cydnidae (Heteroptera) from the Oriental Region and New Guinea. *Rovartani közlemények - Folia entomologica Hungarica* **66**, 9–15.
- Rohlf F. 2010. *tpsDig v. 2.16*. Department of Ecology and Evolution. State University of New York, Stony Brook, NY.
- Schaefer C.W., Dolling W.R., Tachikawa S. 1988. The shieldbug genus *Parastrachia* and its position within the Pentatomoidea (Insecta: Hemiptera). *Zoological Journal of the Linnean Society*: **93**(4), 283–311.



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