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Redescription of the feather mite *Gabucinia delibata* (Robin, 1877) (Astigmata: Gabuciniidae), newly recorded from the hooded crow, *Corvus cornix* (Linnaeus, 1758) (Passeriformes: Corvidae) in Egypt

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Abstract

Background: Faunistic information about feather mites in Egypt is scarce, as well as in the Middle East region.

Results: *Gabucinia delibata* (Robin, 1877) (Astigmata: Pterolichoidea: Gabuciniidae) is recorded for the first time in Egypt from the hooded crow, *Corvus cornix* (Linnaeus, 1758) (Passeriformes: Corvidae). Adult males and females of *G. delibata* are redescribed and illustrated. Examined specimens were compared with previous description and anomalous features were discussed.

Conclusion: The new mite record reported here provides descriptive information for future taxonomic research of feather mites in Egypt. Hopefully, the present work would encourage more comprehensive surveys in the Middle East region since a large number of undiscovered species is expected.

Keywords: Acari, Feather mites, *Gabucinia delibata*, Corvidae, Egypt

Background

Feather mites of the superfamilies Pterolichoidea and Analgoidea (Acari: Astigmata) are bird ectoparasites and commensals, mostly harboring the ventral surface of flight feathers (Gaud & Atyeo, 1996; Mironov, Proctor, Barreto, & Zimmerman, 2007). The feather mite genus *Gabucinia* Oudemans, 1905 was originally described in the content of the family Pterolichidae Trouessart and Ménégnin, 1884. Afterwards, Gaud and Atyeo (1974) removed *Gabucinia* from Pterolichidae to a newly established family Gabuciniidae with 13 genera, of which 11 were established as new. The family Gabuciniidae currently includes about 60 species in 16 genera (De Alzuet, Cicchino, & Abrahamovich, 1988; Gaud, 1978, 1983; Gaud & Atyeo, 1974; Mironov & Galloway, 2003; Mironov, Literak, Sychra, & Capek, 2014; Proctor, Zimmerman, & Meyer, 2006). Gabuciniid mites

clearly differ from other pterolichoids in having the following features: (i) in both sexes, seta *kT* on tibia IV is absent; (ii) in females, the genital papillae (discs of some previous authors) are situated posterior to setae *g* and the oviporus; (iii) the opisthosoma of males with two opisthosomal lobes; and (iv) in males, the genital organ is distant from setae *g* and situated usually posterior to level of trochanters IV (Gaud & Atyeo, 1974, 1996). Main diagnostic features for all currently recognized genera of Gabuciniidae were provided by Mironov et al. (2007); the latest key to genera was provided by Gaud and Atyeo (1996).

Faunistic information about feather mites in Egypt is scarce, as well as for other Middle Eastern countries. In Egypt, the first extensive survey of the feather mite fauna was done by Rakha (1980), reporting 62 species within 14 families. Subsequently, some faunistic studies have been conducted (Abd-Alla, 1993; El-Bishlawy & Oyoum, 1989; Mahgoob, Tharwat, Kilany, & Hafez, 2006; Mazyad, Morsy, Fekry, & Farrag, 1999; Mohamed, 1994; Morsy, Mazyad, & Younis, 1999; Negm, Mohamed, El-Gepaly, &

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Abdelaziz, 2018; Rakha & Mohamed, 1980; Shoker, Tawfek, Ibrahim, & Osman, 2001; Zaher & Rakha, 1981). In neighboring countries, few studies have been also conducted in the past 60 years, of these Gaud (1958) in Morocco, Mohamed (1994) in Yemen, and Negm, Nasser, Alatawi, Al Ahmad, and Shobrak (2013) and Negm, Hernandez, Nasser, Al Ahmad, and Shobrak (2019) in Saudi Arabia.

Although the hooded crow, *Corvus cornix* (Linnaeus, 1758) (Passeriformes: Corvidae) is of common and wide-spread occurrence in Egypt, previous studies on Egyptian feather mites showed no indication for the presence of *Gabucinia delibata* (Robin, 1877), a widely distributed gabuciniid mite associated with corvids (Canestrini & Kramer, 1899; Galloway, Proctor, & Mironov, 2014; Gaud & Atyeo, 1974; Gaud & Till, 1961; Mironov, 1996). Since the latest illustration and description of this mite given in the middle of the 1970s, therefore, we presumed

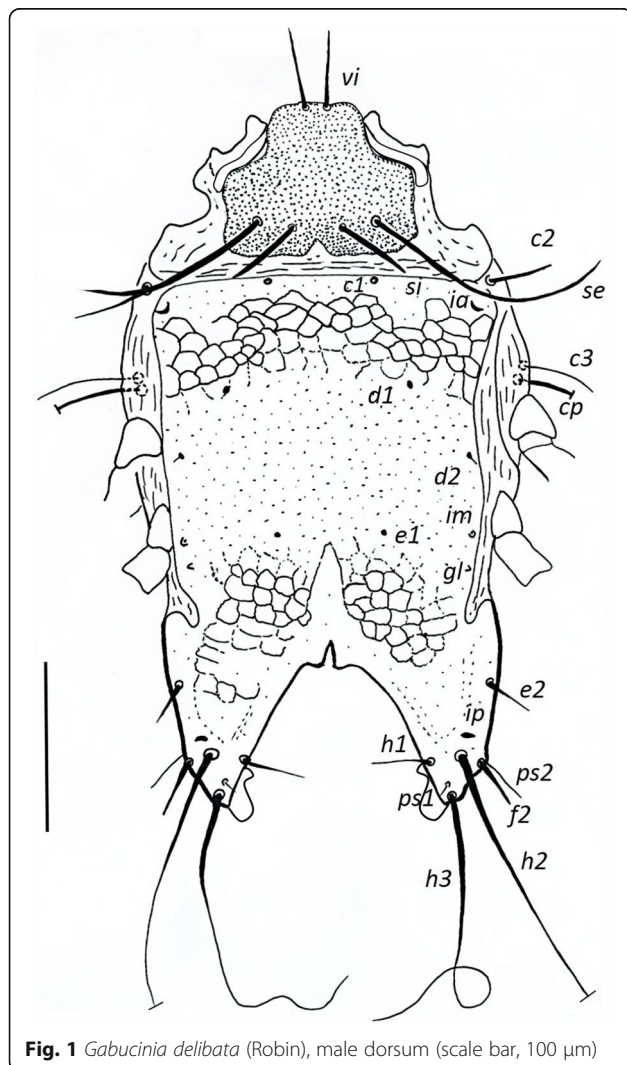


Fig. 1 *Gabucinia delibata* (Robin), male dorsum (scale bar, 100 μ m)

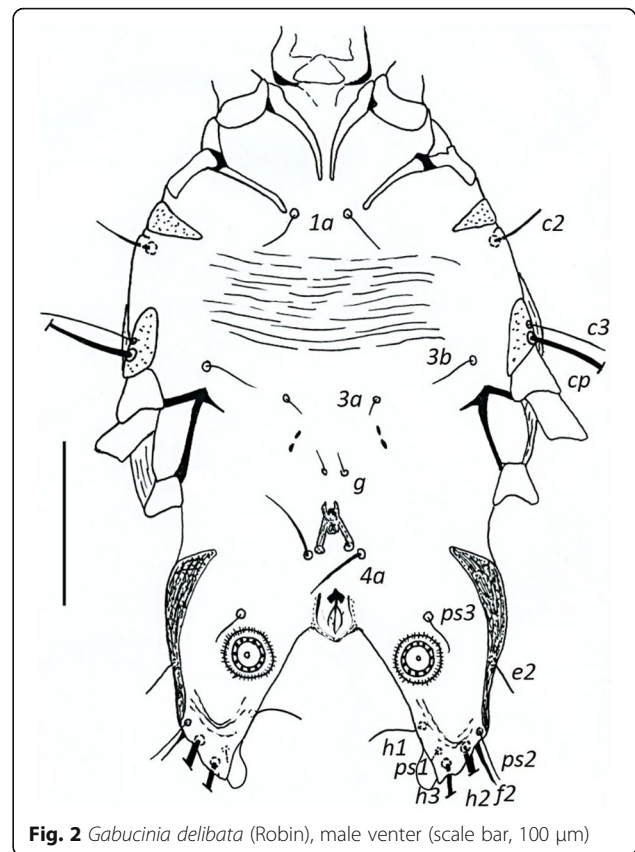


Fig. 2 *Gabucinia delibata* (Robin), male venter (scale bar, 100 μ m)

it worth presenting a morphological redescription of this newly recorded mite species from Egypt.

Materials and methods

During a field survey of ectoparasites infesting birds at Minia Governorate, mite specimens were collected from two individuals of *C. cornix* birds. Birds were captured using ground nets. The presence of mites was determined through visual examination under a stereoscopic microscope. Mites were collected either by using fine forceps or by cutting a part of infested feather(s). Collected mites were preserved in 70% ethanol, and then brought to the senior author at Assiut University for identification. Mite specimens were mounted in Hoyer's medium and examined under a phase contrast microscope (BH-2, Olympus, Japan). Measurements are given in micrometers (μ m). Pencil drawings were made using a drawing tube (camera lucida) attached to the microscope. The voucher materials were deposited in the Acari collection at the Department of Plant Protection, Faculty of Agriculture, Assiut University (FAAU), Egypt for future investigations.

Results

Family Gabuciniidae Gaud and Atyeo, 1974

Genus *Gabucinia* Oudemans, 1905

Gabucinia delibata (Robin, 1877)

Description

MALE ($n = 1$)—Dorsum (Fig. 1): Idiosoma length 425 (from anterior edge of prodorsal shield to tips of opisthosomal lobes), idiosoma width 240. Prodorsal shield with slightly curved lateral margins, posterior margin with a median notch, surface uniformly punctured, length along midline 85, width 120. Setae *vi* 37, *si* 35, *se* 160 long. Distance between bases of prodorsal setae: *vi*–*si* 77, *si*–*se* 9, *se*–*se* 36. Setae *si* slightly at posterior level to setae *se*. Scapular shields narrow. Humeral shields present, setae *c3* filiform, 37 long and *cp* 95 long, both situated ventrally. Distance between prodorsal and hysteronotal shields 18. Setae *c1* minute, *c2* 28 long, on integument close to the anterior margin of hysteronotal shield. Hysteronotal shield entire, anterior margin slightly straight, small lateral incisions present at the base of opisthosomal lobes, length along midline 318, greatest width 192, surface punctured and with polygonal reticulations anteriorly and at base of opisthosomal lobes. Cupules *ia*, *im*, *ip* and hysteronotal glands *gl* present on hysteronotal shield. Setae *d1* and *e1* indistinct. Setae *d2* minute, *e2* 26 long. Supranal concavity

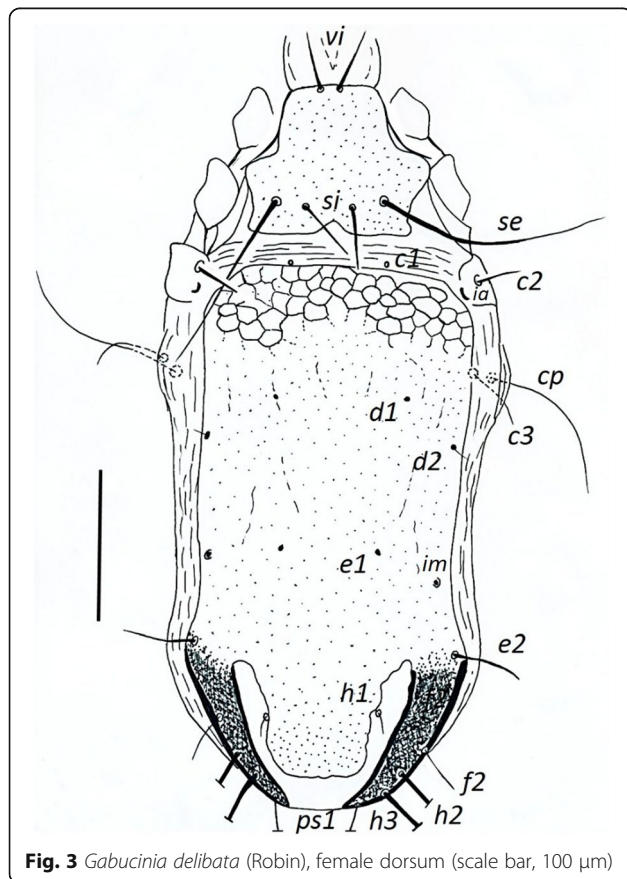


Fig. 3 *Gabucinia delibata* (Robin), female dorsum (scale bar, 100 μ m)

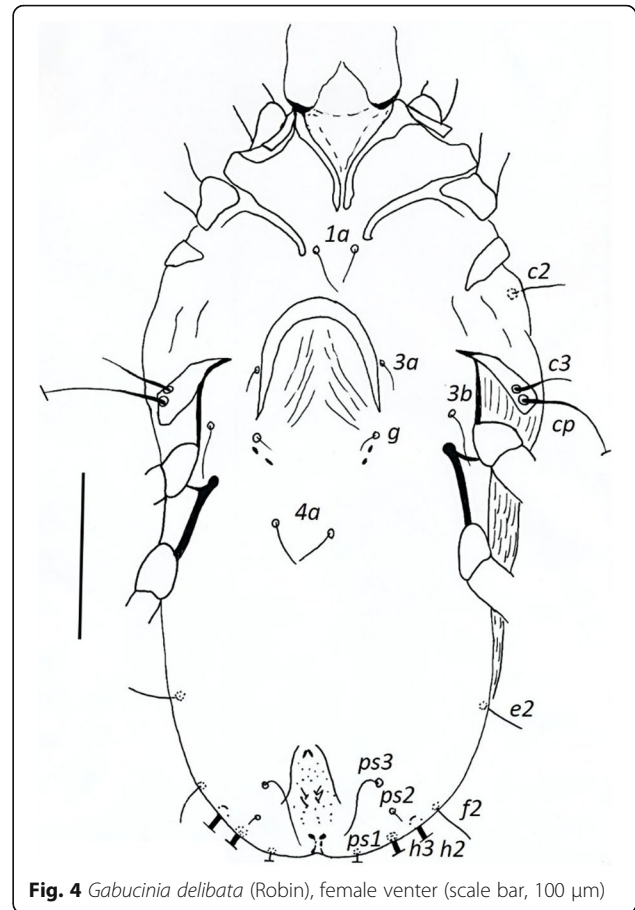


Fig. 4 *Gabucinia delibata* (Robin), female venter (scale bar, 100 μ m)

with median projection anteriorly and open posteriorly into terminal cleft. Setae *h1* 30, *h2* 182, *h3* 205, and *f2* 28 thickened. Setae *ps1* short and spiculiform. Distance between dorsal setae: *c1*–*d1* 60, *d1*–*d2* 58, *d2*–*e1* 68, *e1*–*e2* 95, *h1*–*h1* 110, *h2*–*h2* 142, *h3*–*h3* 131.

Venter (Fig. 2): Setae *1a* filiform, 32 long. Ventral integument smooth, without sclerotized fragments. Genital arch shaped as inverted V, 30 long, 27 wide. Setae *4a* 35 long, close to posterior tips of genital arch. Adanal shields absent. Epimerites IVa present but very short. Setae *ps2* 31 long. Setae *ps3* anterior to adanal suckers, 16 long. Diameter of adanal suckers 25, distance between centers of discs 97. Setae *3a* at posterior level to setae *3b* alike setae *g* to genital papillae. Distance between bases of ventral setae: *1a*–*3a* 112, *3a*–*g* 34, *g*–*4a* 45, *4a*–*ps3* 52, *ps3*–*ps3* 105.

Legs (Fig. 5a–d): Seta *cG* on genu I filiform. Lengths of solenidia: $\omega 1$ of tarsus I 17, $\omega 3$ of tarsus I 40, ω of tarsus II 15. Setae *d* at midlength of tarsus IV.

FEMALE ($n = 1$)—Dorsum (Fig. 3): Idiosoma length 520, idiosoma width 265. Prodorsal shield relatively as in male, length along midline 108, greatest width 138. Scapular setae *si* and *se* approximately at same level. Setae *vi* 43, *si* 50, *se* 180 long. Distance between bases of prodorsal

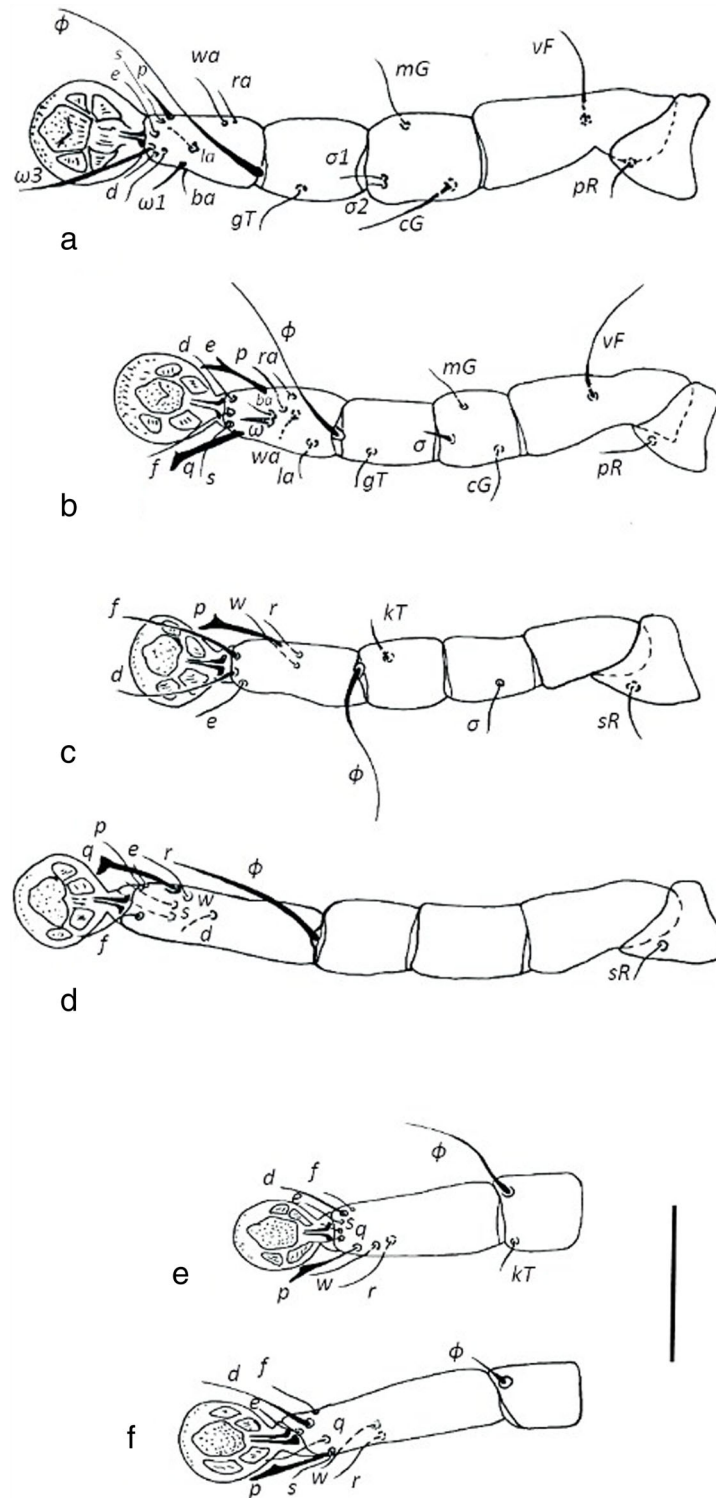


Fig. 5 *Gabucinia delibata* (Robin): **a–d** legs I–IV in male (scale bar, 100 μ m); **e–f** tibia and tarsus of legs III–IV in female (scale bar, 50 μ m)

setae: *vi–vi* 13, *si–si* 39, *se–se* 75. Humeral shields present. Setae *c3* filiform, 30 long and *cp* 118 long. Distance between prodorsal and hysteronotal shields 18. Hysteronotal shield with anterior margin straight, posterior part with

U-shaped unsclerotized area holding setae *h1*, length along midline 372, greatest width 215, surface punctured and with polygonal reticulation anteriorly, cupules *ia* and *im* present. Distance between dorsal setae: *c1–d1* 82, *d1–*

d2 47, *d2-e1* 90, *e1-e2* 87, *e2-h1* 73, *h1-h1* 83, *f2-f2* 150, *h2-h2* 98, *h3-h3* 55.

Venter (Fig. 4): Epigynum thickened, bow-shaped, 76 long, 80 wide. Setae *3a* situated adjacent to epigynum and closer to tips than base. Setae *3b* at posterior level to setae *3a*. Setae *g* situated between epigynum free tips and genital papillae. Distance between bases of ventral setae: *1a-3a* 87, *3a-g* 70, *g-4a* 80, *4a-ps3* 185, *ps2-ps3* 18.

Legs (Fig. 5e, f): Tarsus IV extending beyond posterior end of opisthosoma, 95 long. Tibia III with setae ϕ 49 long.

Material examined

Hooded crow, *Corvus cornix*, Minia city, Egypt (4♀; 2♂); 15 February 2010; coll. H.M.H. and A. Abdelhady.

Remarks

Gaud and Atyeo (1974) depicted opisthosomal lobes in males covered with subtriangular shields separated from hysteronotal shield (see Figure 9b, pg. 545); however, in the current specimens and other specimens collected from Canada and Poland (personal communication with Heather Proctor), only one hysteronotal shield covers the whole body. Also, Gaud and Atyeo (1974) depicted prodorsal shield with deep incisions laterally connected to bases of setae *se*, while absent in the present specimens. These differences may be considered as intraspecific variations. *Gabucinia delibata* is worldwide in distribution, with some records as follows: USA (Jones Jr., 1968), France (Gaud & Atyeo, 1974), India (Kapoor & Kaur, 1975), Switzerland (Mironov, 1997), Canada and Poland (personal communication with H. Proctor), Slovakia (Zamec & Fenda, 2012), and Egypt (present study).

Discussion

The present study reports the feather mite *G. delibata* for the first time in Egypt. Unfortunately, this study describes the mite species based on a very few numbers of specimens, bearing in mind that crows carry lots of mite individuals. This is because crows are notoriously wary and smart making difficulties in catching in addition to not stress or harm the examined birds. Also, Zamec and Fenda (2012) reported *G. delibata* from the same bird host in Slovakia. Faunistic and taxonomic studies of feather mites in the Middle East region are inadequate due to the very limited numbers of high-level taxonomists. Moreover, there is a quite insufficient understanding of the ecological traits and distributional patterns of these mites. Taxonomic studies of feather mites in the Middle East region are limited (Aksin, 2007; Negm et al., 2013, 2018, 2019; Rassouli, Darvishi, & Lima, 2016; Shreef & Rakha, 1981; Zaher & Rakha, 1981) and with more focus on domesticated birds rather than wild bird hosts.

Conclusion

The new mite record reported in the present study provides descriptive information for future taxonomic research of feather mites in Egypt. The large number of unknown species to be discovered in the Middle East region emphasizes the need for more faunistic studies. Hopefully, this work would encourage more comprehensive surveys of feather mites not only in Egypt, but also in the whole region.

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Availability of data and materials

Permanent slides of the examined mites are deposited and available in the Acari collection at the Department of Plant Protection, Faculty of Agriculture, Assiut University (FAAU), Egypt.

Authors' contributions

HMH contributed to the sample processing and extraction. MWN contributed to research guide and manuscript preparation. Both authors read and approved the final manuscript.

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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