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Complementary description of *Kuzinellus niloticus* (El-Badry) (Acari, Mesostigmata) from Egypt

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Original research

ABSTRACT

This paper provides a complementary description of *Kuzinellus niloticus* (El-Badry) based on specimens recently collected on mandarin orange orchards, *Citrus reticulata* Blanco (Rutaceae) at Sohag governorate, Egypt. The mite specimens were extracted using modified Tullgren funnels. This predator could have a role as possible biological control agent for some pests on citrus trees.

Keywords taxonomy; re-description; morphology; Phytoseiidae; biological control

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Introduction

The predatory mite family Phytoseiidae is one of the most diverse mite families distributed world-wide with nearly 2,800 described species in 94 genera and three sub-families (Chant and McMurtry 2007; Demite *et al.* 2021). They mainly prey on spider mites but are also important predators of other mites, small arthropods and nematodes (McMurtry *et al.* 2013, 2015). Some species are commercially produced for controlling spider mites, thrips and whiteflies. Because many phytoseiids are specialized predators of phytophagous mites they are important agents for biological control.

The genus *Kuzinellus* Wainstein (Typhlodrominae) is known from all continents except Antarctica. *Kuzinellus* includes 53 nominal species so far (Demitte *et al.* 2021). Most of the species have been reported from Africa while others have been collected in southern Russia, India, Pakistan, China, Japan, and the US and recently from Saudi Arabia (Alatawi *et al.* 2017; Kamran *et al.* 2017). Up to now, only one species of this genus has been reported from Egypt (El-Badry 1970).

Chant and McMurtry (1994) provided a detailed diagnosis of *Kuzinellus* and separated 27 nominal species in two species groups based on the morphology of most dorsal setae. Moraes *et al.* (2008) provided description, re-description, and illustrations of 22 species of *Kuzinellus* reported from sub-Saharan Africa along with a diagnostic key of these species, not considering the species groups of this genus made by Chant and McMurtry (1994). Later, two species were added in this genus by El-Banhawy and Knapp (2011).


The genus *Kuzinellus* can be distinguished by the absence of seta *Z1* and the presence of setae *z6* and *JV2*; fixed digit of chelicera with 2–4 teeth and seta *z6* inserted halfway between setae *j6* and *s6* (Wainstein 1976; Chant and McMurtry 1994). In seven species in this genus setae *R1* are placed on the dorsal shield while in the remaining species are located on the unsclerotized cuticle (Chant and McMurtry 1994; Moraes *et al.* 2008). Chant and Yoshida-Shaul (1986) and Chant and McMurtry (1994) clarified the identity of this seta as *R1* in those species.

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In this paper, we re-describe *Kuzinellus niloticus* (El-Badry) based on new specimens collected on citrus orchards at Sohage governorate, Egypt. To date, no other species of the genus has been registered for Egypt.

Material and Methods

Mite specimens were collected from leaves of mandarin orange orchards, *Citrus reticulata* Blanco (Rutaceae) at Sohag governorate, Egypt. The samples were kept in polyethylene bags and transferred to the laboratory for later extraction by modified Tullgren funnels (Krantz and Walter 2009). The mites were mounted on microscopic slides in Hoyer's medium and examined under a phase contrast (Olympus, BHA) research microscope. Taxonomically important structures were illustrated with the aid of an eyepiece attached to the phase contrast microscope, measured with a graded eyepiece. Measurements are given in micrometers. Setal nomenclature follows that of Rowell *et al.* (1978) and Chant and Yoshida-Shaul (1991) for dorsal and ventral surfaces of the idiosoma, respectively. The idiosomal setal pattern follows Chant and Yoshida-Shaul (1992). The notation for solenostomes and poroids is based on Athias-Henriot (1975). Coordinates provided are approximate, as these were not taken at the time the samples were collected.

Systematics

Kuzinellus niloticus (El-Badry)

Typhlodromus niloticus El-Badry, 1967: 464, 1970: 500; Chant & Yoshida-Shaul 1986: 464.

Paraseiulus (Hemiseiulus) niloticus, Wainstein 1976: 700.

Seiulus niloticus, Moraes *et al.* 1986: 231.

Kuzinellus niloticus, Moraes *et al.* 2004: 273, 2008: 18; Chant & McMurtry 2007: 143; Abo-Shnaf & Moraes 2014: 38.

Previous records from Egypt

Cairo governorate (El-Badry 1970).

Redescription

Female (Two specimens measured, Figs. 1 a–f)

Gnathosoma — Corniculi parallel to each other; 18, 17 long, basal width of corniculus 5, 3; distance between tips of corniculi 7, 4. Fixed cheliceral digit 22, 21 long, with three teeth; movable digit 22, 20 long, with one tooth; dorsal and antiaxial lyrifissures are visible (Fig. 1a).

Dorsum (Figs. 1b and 1c) — Dorsal shield strongly reticulate; 339, 325 long and 166, 163 wide at *s4* level; with 20 pairs of tuberculate setae, twelve pairs of poroids (*id1*, *id2*, *id4*, *idx*, *idl1*, *idl3*, *idl4*, *idm2*, *idm3*, *idm4*, *idm5* and *idm6*) and five pairs of solenostomes (*gd1*, *gd2*, *gd5*, *gd8* and *gd9*). Length of dorsal setae: *j1* 25; *j3* 36, 34; *j4* 31, 29; *j5* 29; *j6* 55, 52; *J2* 68, 62; *J5* 13; *z2* 31, 30; *z3* 39, 36; *z4* 39; *z5* 36, 35; *z6* 49, 46; *Z4* 73, 69; *Z5* 70, 69; *s4* 47, 43; *s6* 48, 47; *S2* 64, 62; *S4* 68, 66; *S5* 48, 47; *r3* 39, 31; *R1* 47, 44. All setae smooth, except *Z4* and *Z5*, which are serrated. Peritreme extending forward to level of *j3*.

Venter (Fig. 1d) — Anterior region to *st1* smooth; sternal shield smooth; with anterolateral corners fused with endopodal plates, with a pair of pores (*gst1*) on distal end of extension between coxae I-II; posterior margin indistinguishable; with three pairs of setae (*st1-st3*) and two pairs of poroids (*iv1* and *iv2*). Distances between *st1-st1* 42, 31; *st2-st2* 53, 51; *st3-st3* 83, 73; *st4-st4* 100, 82; *st1-st3* 73, 65. Setae *st3*, *st4* and poroid *iv3* of each side on unsclerotized cuticle. Genital shield smooth with dense muscle scars and with lateral extensions; distance between *st5-st5* 60, 57. Ventrianal shield vase-shaped, smooth with a few striae lateral to the

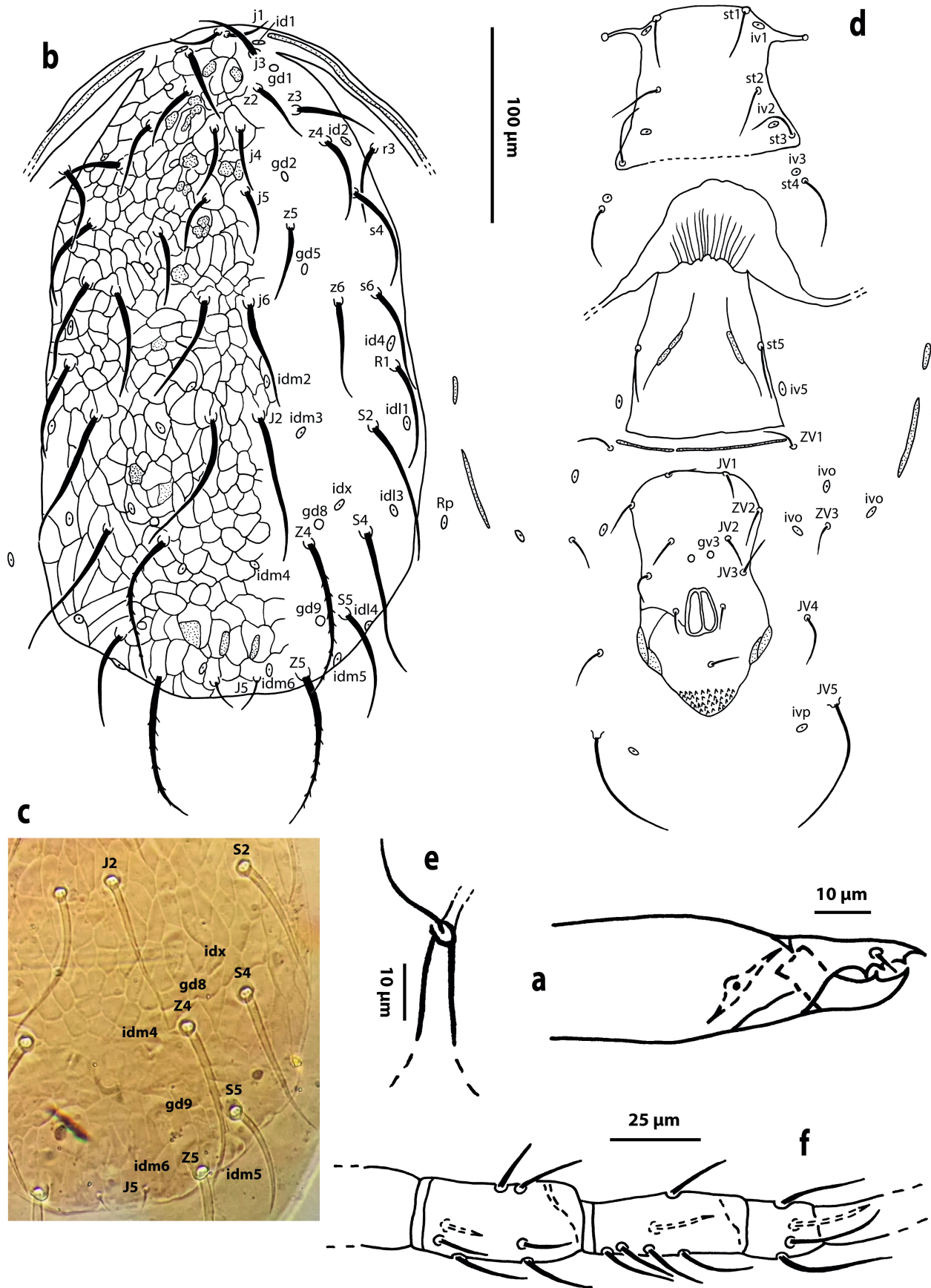


Figure 1 *Kuzinellus niloticus* (El-Badry, 1967) adult female. a – Chelicera, b – Dorsal shield, c – Posterior part of idiosoma showing the poroids (*idx*, *idm4*, *idm5* and *idm6*) and the solenostomes (*gd8* and *gd9*), d – Ventral shields, e – Spermatheca, f – Genu, tibia and basitarsus of leg IV.

anal opening; 114, 112 long; 66, 62 wide at *ZV2* level and 65, 64 wide at level of anus; with four pairs of pre-anal setae and a pair of pre-anal solenostomes (*gv3*) posteroparaxial to setae *JV2*. Seta *JV5* tuberculate, 57, 53. Ventral setae smooth. With two pairs of filiform metapodal plates.

Spermatheca (Fig. 1e) — Calyx of spermatheca tubular, flaring distally, 13, 10 long; atrium distinct.

Legs (Fig. 1f) — Leg IV with one sharp-tipped macroseta on basitarsus IV: *St IV* 30, 29; chaetotaxy of genu II: 2, 2/0, 2/1, 1; genu III: 1, 2/1, 2/0, 1.

Specimens examined

Two females from mandarin orange orchards, *Citrus reticulata* Blanco (Rutaceae), collected by the junior author of this paper at Sohag governorate (26°44'38" N, 32°15'9" E), Egypt, December 04, 2018. Slides are deposited in the mite reference collection of the Egyptian Society of Acarology Museum (ESAM), Zoology and Agricultural Nematology Department, the Faculty of Agriculture, Cairo University, Giza governorate, Egypt.

Remarks

This species was originally described from the holotype female and one paratype female collected from Khartoum, Sudan. The original description was reasonably detailed, with illustrations and setal measurements. Measurements of the females examined fit those in the original description and the re-description given by Chant and Yoshida-Shaul (1986), except for the longer setae *J2*, *z3*, *Z4*, *Z5*, *s4*, *S4* and *S5*, which are about 1.1–1.3 in comparison to those reported in the two above mentioned publications and the shorter *j5* and *s6* setae (38 and 60 long according to those authors). The dorsal shield bears two pairs of solenostomes (posterolaterad *j4* and anteriad *Z4*) according to Chant and Yoshida-Shaul (1986) (five in the examined females in the current work). Peritreme reaching to the level of *j1* according to the original description, but to *j3* in the examined females in the current work. Fixed cheliceral digit with five teeth in the original description and the re-description given by Chant and Yoshida-Shaul (1986). We found three teeth in the examined females in the current work. Shorter macroseta on *St IV* (23) according to the original description, instead to 30 and 29 in the examined females in the current work.

Biological investigations under laboratory condition to confirm the ability of feeding of *Kuzinellus niloticus* on some citrus pests would be desirable in order to use the phytoseiid predators in Integrated Pest Management approaches, thus reducing pesticide usage by growers. The importance of systematics in biological control programs is well known. Mite pests and their associated predators must be correctly identified before adequate control measures can be considered.

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