

Uroobovella phoenicicola sp. n., a New Uropodina Mite (Acari: Mesostigmata) Associated with the African Palm Weevil (Rhynchophorus phoenicis Fabricius, 1801) from Cameroon

Authors: Kontschán, Jen, Tambe, James Tanyi, and Riolo, Paola

Source: African Invertebrates, 53(2) : 593-600

Published By: KwaZulu-Natal Museum

URL: <https://doi.org/10.5733/afin.053.0205>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

***Uroobovella phoenicicola* sp. n., a new Uropodina mite
(Acari: Mesostigmata) associated with the African palm weevil
(*Rhynchophorus phoenicis* Fabricius, 1801) from Cameroon**

Jenő Kontschán¹, James Tanyi Tambe² and Paola Riolo³

¹Plant Protection Institute, Centre for Agricultural Research, Hungarian Academy of Sciences,
H-1525 Budapest, P.O. Box 102, Hungary; jkontschan@gmail.com

²Department of Evolutionary Biology, Via Aldo Moro 2, 53100 Siena (SI), Italy

³Dipartimento SAPROV, Sezione Protezione delle Piante, Via Breccie Bianche, Ancona (AN), Italy

ABSTRACT

A new Uropodina mite was collected from cocoons and the body of the African palm weevil (*Rhynchophorus phoenicis* Fabricius, 1801) in Cameroon. The new species belongs to the *Uroobovella minima* species-group; it differs from the previously described species in the dorsal and ventral setation in both sexes, and in the shape and sculptural pattern of the genital shield of the female. Original drawings and a description are given, accompanied by notes on the presumed biology and possible role in the biological control of African palm weevils.

KEY WORDS: Acari, Uropodina, African palm weevil, Afrotropical, Cameroon, new species, phoresy.

INTRODUCTION

Uropodina mites are well-known members of the soil fauna. They reach maximum diversity in the tropics (Lindquist *et al.* 2009), but currently only 10% of the species are known from these regions. Cameroon, with 39 listed species (Wiśniewski 1993), is one of the better studied countries in the West Afrotropical subregion, but this number is very low compared with the well studied European countries.

The association of mesostigmatid mites with other invertebrates is a well-known phenomenon in acarology (Lindquist *et al.* 2009). Several groups of mesostigmatid mites have been found on the body of insects, especially on beetles. These mites do not parasitise their beetle hosts but use them as a means of transport only, otherwise known as phoresy (Szymkowiak *et al.* 2007). A good number of Uropodina mites constitute a characteristic group of phoretic mites, with their second nymphs (deutonymphs) often attached to their host by the anal pedicel. Nymphs of other phoretic groups attach to the host with their chelicerae (Macrochelidae) or leg claws (Parasitidae) (Szymkowiak *et al.* 2007). During the past hundred years, several new Uropodina species have been described from deutonymphal instars found on the body of beetles (Wiśniewski & Hirschmann 1993). Unfortunately, the described immature stages have fewer characters than the adults; hence exact identification of species based only on nymphs is more difficult or sometimes impossible.

MATERIAL AND METHODS

Specimens were cleared in lactic acid and drawings were made with the aid of a drawing tube. All specimens are stored in alcohol and on slides. The material has been deposited in the Soil Zoology Collections of the Hungarian Natural History Museum, Budapest (HNHM) and in the Natural History Museum, Geneva (NHMG). Abbreviations: h – hypostomal setae, St – sternal setae, V – ventral setae. All measurements and scale bars are given in micrometres (µm).

<http://www.africaninvertebrates.org.za>

urn:lsid:zoobank.org:pub:08E5A76D-F554-41A2-A7F9-2BA107983BB7

TAXONOMY

Genus *Uroobovella* Berlese, 1903***Uroobovella phoenicicola* sp. n.**

Figs 1–17

Etymology: The name of the new species refers to the name of the host species on which the specimens were found.

Description:*Female.*

Length of idiosoma 460–490 μm , width 370–400 μm ($n=4$). Body shape oval, colour reddish brown.

Dorsal idiosoma (Fig. 1): Dorsal and marginal shields fused anteriorly. All dorsal setae smooth and needle-like, but differ in size; most setae long (*ca* 30–40 μm), but several central setae short (*ca* 14–15 μm). Marginal shield smooth and bearing long (*ca* 30–35 μm) and needle-like setae (Fig. 2). Dorsal shield smooth, muscle scars present on caudal part of central area.

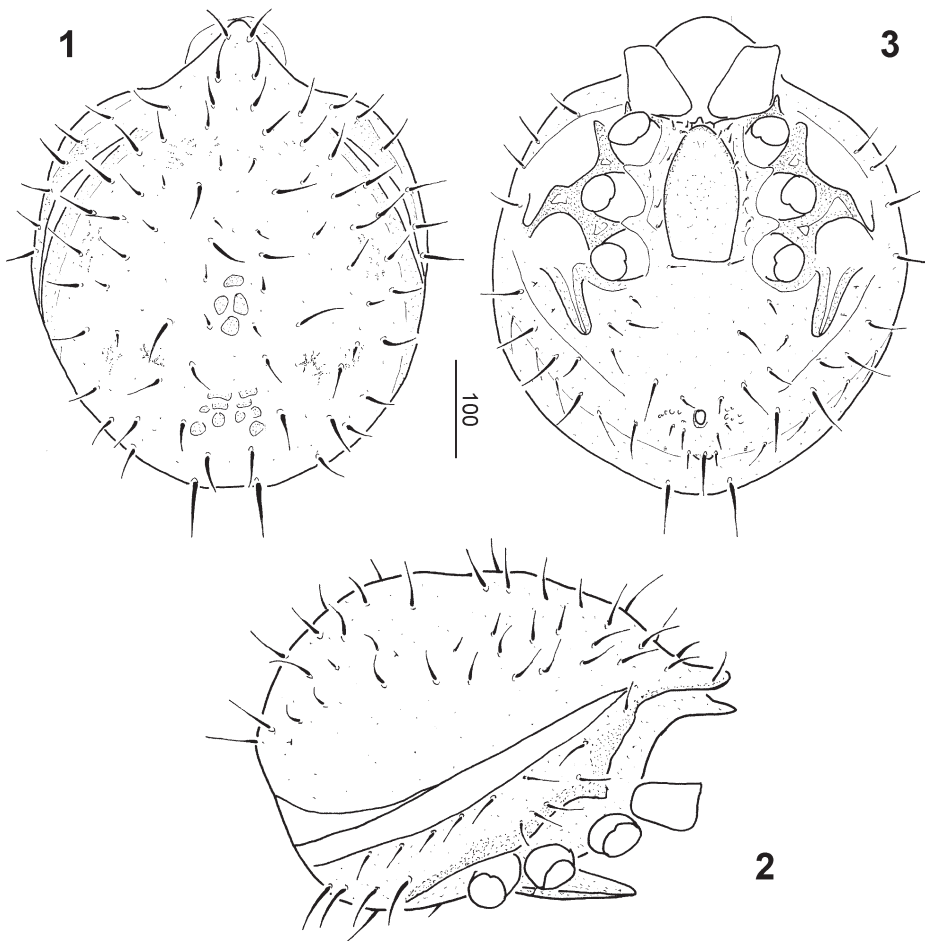
Ventral idiosoma (Fig. 3): Sternal shield smooth, all sternal setae needle-like, St1–St7 short (*ca* 11–12 μm), St8 long (*ca* 22 μm). St1–St3 situated near anterior margin of genital shield, St4 at level of posterior margin of coxae II, St5 at level of anterior margin of coxae III, St6 at level of central area of coxae III, St7 at level of anterior margin of coxae IV, St8 placed near basal edges of genital shield (Fig. 4). Ventral shield smooth, several oval pits situated at level of anal opening. Ventral setae smooth and needle-like, V1, V3 and setae around anal opening short (*ca* 13–17 μm), other setae on ventral idiosoma long, postanal (*ca* 41 μm) and two posterior setae (*ca* 50–55 μm) longer than other ventral setae (*ca* 35–40 μm). Two pairs of lyriform fissures present near pedofossae of leg IV. Stigmata situated between coxae II and III. Peritremes hook-shaped, poststigmatid part short (Fig. 5). Genital shield of female scutiform, placed between coxae II and IV, without sculptural pattern and anterior process (Fig. 4). Pedofossae deep, their surface smooth, with separate furrows for tarsi IV, metapodal lines absent. Base of tritosternum narrow, its laciniae marginally serrate and apically divided into four branches (Fig. 6).

Gnathosoma (Fig. 7): Corniculi horn-like, internal malae smooth and as long as corniculi. Labrum marginally pilose. Hypostomal setae: h1 long (*ca* 61 μm), smooth and setiform; h2 short (*ca* 39 μm), robust and marginally serrate; h3 long (*ca* 57 μm) and basally serrate; h4 short (*ca* 20 μm), robust and marginally serrate. Epistome basally serrate and apically pilose (Fig. 8). Chelicerae with internal sclerotised nodes, fixed digit with apical sensory organ and longer than movable digit, both digits bearing a single tooth (Fig. 9).

Legs (Figs 10–13): All legs bear claws on tip of tarsi and have needle-like setae.

Male.

Length of idiosoma 460–470 μm , width 340–360 μm ($n=4$). Shape of idiosoma, ornamentation and chaetotaxy of dorsal parts as in female. Sternal setae short (*ca* 12–13 μm) and needle-like, St1–St4 situated around margins of genital opening, St5 at level of anterior margin of coxae III, St6 posteriorly to St4 and at level of central area of coxae III, St7 at level of central area of coxae III, St8 at level of anterior margin of coxae IV, St9 at level of central area of coxae IV. Sternal shield smooth and bearing one pair of



Figs 1–3. *Uroobovella phoenicicola* sp. n. female, holotype (Cameroon): (1) body, dorsal view; (2) ventral view; (3) lateral view.

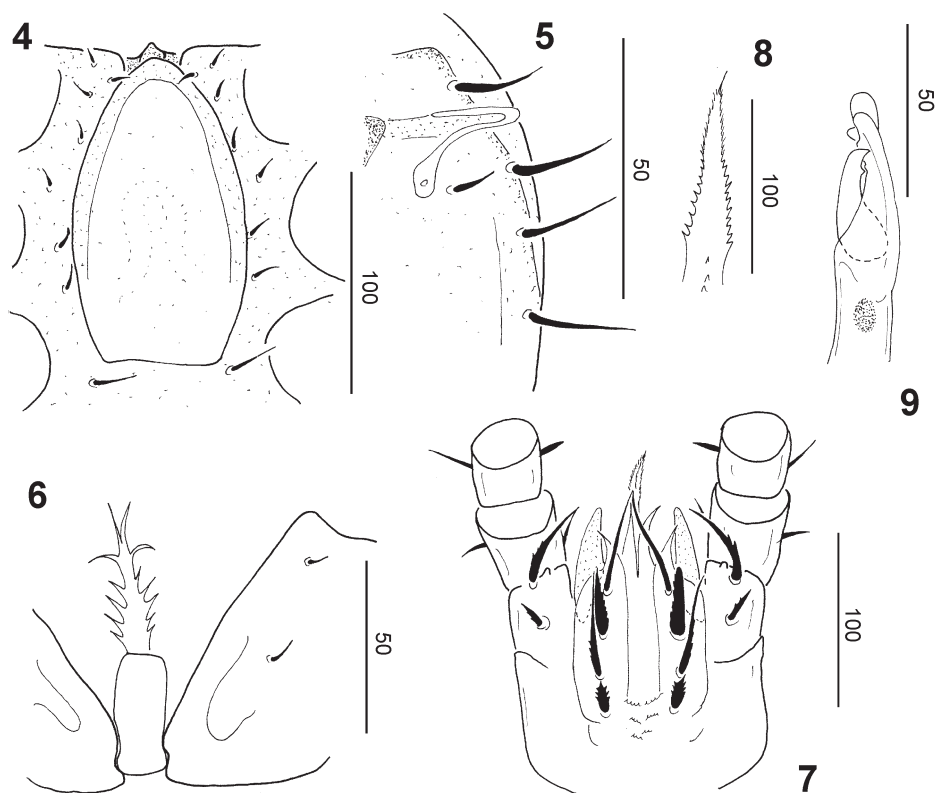
lyriform fissures near base of St1. Genital shield oval and located between coxae II (Fig. 14). Ventral setae and ornamentation similar to those of female.

Gnathosoma (Fig. 15): Corniculi horn-like, internal malae smooth and as long as corniculi. Hypostomal setae: h1 long (*ca* 74 μ m), smooth and setiform; h2 (*ca* 50 μ m) robust and marginally serrate; h3 (*ca* 46 μ m) and h4 (*ca* 43 μ m) marginally serrate. Other parts and processes similar to those of female.

Deutonymph.

Length of idiosoma 370–380 μ m, width 270–280 μ m (*n*=2). Dorsal idiosoma (Fig. 16): All dorsal setae smooth and needle-like, but differing in size: most setae long (*ca* 17–20 μ m), but several setae in central area short (*ca* 9–10 μ m). Dorsal shield without sculptural pattern, several muscle scars present on caudal part of central area.

Ventral idiosoma (Fig. 17): Sternal setae short (*ca* 5–6 μ m) and needle-like, St1 situated near anterior margin of sternal shield, St2 at level of anterior margin of coxae II, St3 at



Figs 4–9. *Uroobovella phoenicicola* sp. n. female, holotype (Cameroon): (4) intercoxal area; (5) peritreme; (6) tritosternum and coxae I; (7) ventral view of gnathosoma and palps; (8) epistome; (9) chelicera.

level of posterior margin of coxae II, St4 in central area of sternal shield, St5 at level of anterior margin of coxae III, St6 at level of posterior margin of coxae III, St7 at level of central area of coxae IV, St8 near posterior margin of sternal shield. Sternal shield smooth, without sculptural pattern. Ventrianal shield smooth, with two pairs of setae (ca 5–8 μ m). Peritremes long and S-shaped.

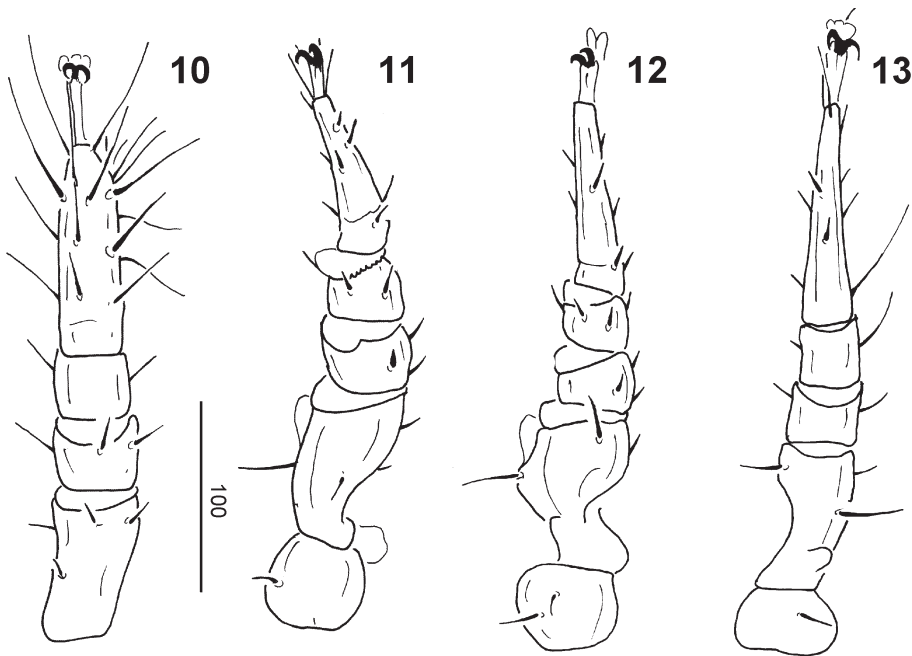
Larva and protonymph. Unknown.

Holotype: ♀ REPUBLIC OF CAMEROON: South West Region, Manyu Division, Ashum Village, from cocoons formed by *Rhynchophorus phoenicis* weevils, 25.iv.2011, J. Tanyi Tambe (HNHM, in alcohol).

Paratypes: All with same data as holotype: 1♀ 1♂ 1 nymph (NHMG, in alcohol); 2♀ 3♂ 1 nymph (HNHM, in alcohol); 1♀ (HNHM, on slide).

Note: The adults are from one *Rh. phoenicis* cocoon, and nymphs are from the body of the weevil.

Remarks: The new species is placed in the *Uroobovella minima*-group (Hirschmann 1989) on the basis of the shape of the idiosoma and peritremes, number of sternal setae, and the presence of claws on the tip of leg I. Up until now, 23 species have been described in this group, one of which is known only from the deutonymph stage (*U. inhaerens* (Vitzthum, 1921)). The sternal shield of this species is ornamented by oval pits, but it is smooth in the new species. Only male specimens of *U. vietnamvarians* Hirschmann, 1981 are known. The genital shield of this species is situated between



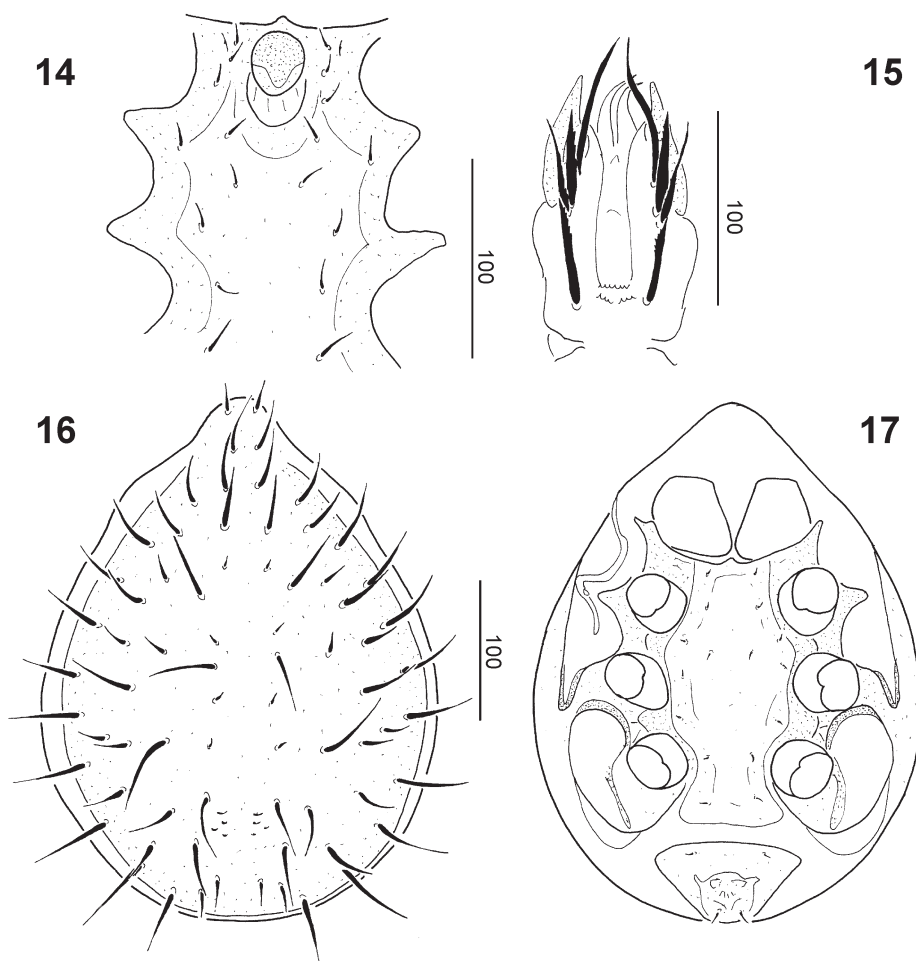
Figs 10–13. *Uroobovella phoenicicola* sp. n. female, holotype (Cameroon): (10) leg I; (11) leg II; (12) leg III; (13) leg IV (all legs in natural position).

coxae III and IV, whereas that of the male of the new species is between coxae II. The characteristic differences between the new species and females of the *Uroobovella minima*-group are given in Table 1.

Biology: Adult mites were obtained from cocoons formed by *Rhynchophorus phoenicis* Fabricius, 1801 weevils, while deutonymphs were collected from the body of this weevil. The deutonymphs are either attached to the body of the weevils or move freely under their elytra. Not much is known about the biology of the mite, but since the adults were collected in cocoons, we assume that the species is a predator and feeds on the eggs and/or other life stages of the weevils. It is also possible that the mites prey on nematodes, maggots, juvenile slugs, fungi and/or organic matter that clusters on and around the cocoons, and use the weevils as a means of transportation only.

NOTES ON POSSIBLE ROLE IN BIOLOGICAL CONTROL

The African palm weevil is a large, reddish brown to black weevil that is distributed throughout tropical Africa and is a true pest of members of Arecaceae (= Palmae) (Gries *et al.* 1994) and Poaceae (= Gramineae). In Cameroon, where the study was carried out, the larvae are commonly known as ‘tumbu’ or ‘tumbu for palm tree’ in pidgin English, but have different appellations according to the 270 spoken dialects. These larvae are eaten as a delicacy when seasonally available. They have a high fatty acid content, and are a source of proteins and carbohydrates (Ekpo & Onigbinde 2005) as well as essential amino acids. Moreover, medicinal value has been ascribed to the larvae (Nzikou *et al.* 2010; Zaid 1999). The pest status of the African palm weevil has already been established



Figs 14–17. *Uroobovella phoenicicola* sp. n. male and deutonymph, paratypes (Cameroon): (14) intercoxal area of male; (15) ventral view of gnathosoma in male; (16) dorsal idiosoma of deutonymph; (17) ventral idiosoma of deutonymph.

(Bong *et al.* 2008). The weevils cause severe damage as a result of active feeding on the palms but also serve as a vector for plant parasitic nematodes (Kanzaki *et al.* 2009). They therefore play a major role in crop damage and yield loss. Several strategies have been tried and implemented for the control of these weevils, such as felling of diseased palms, and the use of pheromone baits and traps. However, the only natural method in trial so far is the use of entomopathogenic nematodes (Zaid *et al.* 2002). If the new mite species is indeed an obligate predator on the eggs and of developmental instars of this beetle, it will be interesting to determine if in the future the mite can be used as a biological control agent.

ACKNOWLEDGEMENTS

We thank the two anonymous reviewers for their constructive suggestions towards the improvement of this manuscript.

TABLE 1

Characteristic differences between the new species and females of the *Uroobovella minima*-group.

Idiosoma ornamented	Idiosoma smooth				
<i>cavernosa</i> Hiramatsu, 1979 <i>nitida</i> Hiramatsu, 1981 <i>okinawaensis</i> Hiramatsu, 1979 <i>vulgaris</i> Hirschmann & Zirngiebl-Nicol, 1972	Peritremes S-shaped	Peritremes hook-shaped			
	<i>crenulata</i> Hirschmann & Zirngiebl-Nicol, 1962	Genital shield egg-like	Genital shield linguliform		
	<i>neovarians</i> Hiramatsu, 1918	<i>browningi</i> Ryke, 1958	Surface of genital shield ornamented <i>minima</i> (C. L. Koch, 1841)	Surface of genital shield smooth	
	<i>nova-teutoniae</i> Hirschmann, 1981	<i>ceylonivarians</i> Hirschmann & Zirngiebl-Nicol, 1975		Ventral setae short, internal malae pilose	Ventral setae long, internal malae smooth
	<i>parvula</i> Berlese, 1913	<i>japanocrenulata</i> Hiramatsu & Hirschmann, 1978		<i>araucariae</i> Hirschmann, 1972	<i>phoenicicola</i> sp. n.
	<i>portalis</i> Hirschmann, 1973	<i>japanovarians</i> Hiramatsu & Hirschmann, 1978		<i>nostras</i> Berlese, 1918	
	<i>portalisimilis</i> Hirschmann, 1981	<i>mexicana</i> Hirschmann, 1979		<i>panamensis</i> Kontschán, 2010	
	<i>similis</i> (Willmann, 1953)	<i>varians</i> Hirschmann & Zirngiebl-Nicol, 1962			

REFERENCES

- BONG, C.J., ER, C., YIU, P. & RAJAN, A. 2008. Growth performance of the red-stripe weevil *Rhynchophorus schach* Oliv. (Insecta: Coleoptera: Curculionidae) on meridic diets. *American Journal of Agricultural and Biological Sciences* **3** (1): 403–409.
- EKPO, K.E. & ONIGBINDE, A.O. 2005. Nutritional potentials of the larva of *Rhynchophorus phoenicis* (F). *Pakistan Journal of Nutrition* **4** (5): 287–290.
- GRIES, G., GRIES, R., PEREZ, A.L., GONZALES, L.M., PIERCE, H.D., OEHLISCHLAGER, A.C., RHAINDS, M., ZEBEYOU, M. & KOUAME, B. 1994. Ethyl propionate: synergistic kairomone for African palm weevil, *Rhynchophorus phoenicis* L. (Coleoptera: Curculionidae). *Journal of Chemical Ecology* **20** (4): 889–897.
- HIRSCHMANN, W. 1989. Die Ganggattung *Uroobovella* Berlese 1903. Artengruppen – Bestimmungstabellen – Diagnosen. *Acarologie. Schriftenreihe für Vergleichende Milbenkunde* **36**: 84–196.
- KANZAKI, N., GIBLIN-DAVIS, R.M., ZENG, Y., YE, W. & CENTER, B.J. 2009. *Acrostichus rhynchophori* n. sp. (Rhabditida: Diplogastridae): a phoretic associate of *Rhynchophorus cruentatus* Fabricius and *R. palmarum* L. (Coleoptera: Curculionidae) in the Americas. *Nematology* **11** (5): 669–688.
- LINDQUIST, E.E., KRANTZ, G.W. & WALTER, D.E. 2009. Order Mesostigmata. In: Krantz, G.W. & Walter, D.E., eds. *A manual of acarology. Third edition*. Lubbock, Texas, USA: Texas Tech University Press, pp. 124–232.
- NZIKOU, J.M., MBEMBA, F., MVOUNA-TSIÉRI, M., DIABANGOUAYA-BATÉLA, B., MALELA, K.E., KIMBONGUILA, A., NDANGUI, C.B., PAMBOU-TOBI, N.P., SILOU, T. & DESOBRY, S. 2010. Characterisation and nutritional potentials of *Rhynchophorus phoenicis* larva consumed in Congo-Brazzaville. *Current Research Journal of Biological Sciences* **2** (3): 189–194.
- SZYMKOWIAK, P., GÓRSKI, G. & BAJERLEIN, D. 2007. Passive dispersal in arachnids. *Biological letters* **44** (2): 75–101.

- WIŚNIEWSKI, J. 1993. Gangsystematik der Parasitiformes Teil 549. Die Uropodiden der Erde nach Zoogeographischen Regionen und Subregionen geordnet (mit Angabe der Länder). *Acarologie. Schriftenreihe für Vergleichende Milbenkunde* **40**: 221–291.
- WIŚNIEWSKI, J. & HIRSCHMANN, W. 1993. Gangsystematik der Parasitiformes Teil 548. Katalog der Ganggattungen, Untergattungen, Gruppen und Arten der Uropodiden der Erde. *Acarologie. Schriftenreihe für Vergleichende Milbenkunde* **40**: 1–220.
- ZAID, A. 1999. African palm weevil *Rhynchophorus phoenicis* F. attack on date palm in the Republic of South Africa and Zimbabwe. *Middle East Red Palm Weevil Workshop*, January, 1999, Cairo, Egypt, pp. 26–29.
- ZAID, A., DE WET, P.F., DJERBI, M. & OIHABI, A. 2002. Chapter XII: Diseases and pests of date palm. In: Zaid, A. ed., *Date Palm Cultivation*. FAO plant production and protection paper 165 Rev. 1. Rome: Food and Agricultural Organization of the United Nations. (<http://www.fao.org/docrep/006/Y4360E/y4360e0g.htm#bm16>; accessed 22/08/2012)