

Reassignment of *Rhyncaphytoptus longipalpis* Xue et Hong, 2005 (Diptilomiopidae) to *Bambusacarus* n. gen. (Eriophyidae) and remarks on shape of oral stylet and orientation of pharynx in Eriophyoidea (Acari: Acariformes)

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Abstract

It is widely accepted in literature that members of Diptilomiopidae possess a “long-form” oral stylet which is usually nearly as long as the cheliceral stylets. However, it is not only the length of the oral stylet itself that is the character to discriminate diptilomiopids, but also its shape and the orientation of the pharynx. We reinvestigated the gnathosoma of *Rhyncaphytoptus longipalpis* Xue et Hong, 2005, a “diptilomiopid” species from China, and demonstrated that this mite has an angled short-form oral stylet and an almost horizontally oriented pharynx, which is not typical for Diptilomiopidae. We reassign “*longipalpis*” to a new genus *Bambusacarus* n. gen. in a different family-group (Eriophyidae, Phyllocoptinae, Anthocoptini) and provide a supplementary description of this species based on the material from Hungary where it was found on six introduced bamboo species of the genus *Phyllostachys* (Poaceae). Similar to members of endoparasitic genus *Novophytoptus* (Phytoptidae), *B. longipalpis* n. comb. has elongate, forceps-shaped gnathosomal structures and it lacks setae *d* and *v* on palps. We conclude that in some “non-diptilomiopid” lineages of Eriophyoidea (1) the elongation of palps and changing of the length and curvature of the gnathosomal stylets may not be correlated with transformation of the shape of the oral stylet and reorientation of pharynx, and (2) when this happens, the mite homoplastically acquires the well-recognized “diptilomiopid-like” phenotype as seen in *B. longipalpis* n. comb. In future, careful reinvestigation of the shape of the oral stylet in Diptilomiopidae may reveal new examples of similar phenotypic convergency in Eriophyoidea.

Key words: Anthocoptini, Diptilomiopidae, *Phyllostachys*, bamboo, monocot, Hungary, feeding apparatus, arthropod structure

Introduction

Rhyncaphytoptus Keifer, 1939 is a large diptilomiopid genus comprising about 80 valid species, most of which live on arboreous dicotyledons (Amrine *et al.* 2003). About 15 years ago a remarkable species, *R. longipalpis* Xue et Hong, 2005 was found in Henan Province of China on an unidentified bamboo, *Bambusa* sp. (Poaceae). This species morphologically does not fit the diagnosis of *Rhyncaphytoptus*: in *Rhyncaphytoptus* the prodorsal shield setae *sc* are directed anteriorly, whereas in

“*longipalpis*” they are directed posteriad. Additionally, the description of *R. longipalpis* is incomplete and needs revision.

Since the beginning of 1997 G. Ripka with collaborators have been exploring the fauna of Eriophyoidea of Hungary. Up to now 10 *Rhyncaphytoptus* species have been recorded in Hungary where they were found on woody hosts of 6 dicotyledonous plant families (Ripka 2007). During 2016–2019 we collected eriophyoids on introduced monocotyledons in the Botanical Garden of Szent István University (Gödöllő Hungary) and found *R. longipalpis* on six bamboo species of the genus *Phyllostachys* (Poaceae, Bambusoideae). Currently 58 eriophyoid mite species are known from bamboos (Amrine & Stasny 1994; Davis *et al.* 1982; Lin *et al.* 2000; Sukhareva 1994; Xue *et al.* 2006). Among them three species *Abacarus korosicsomai* Ripka 2011; *Adventacarus turulae* Ripka, 2011; *Mucotergum nigrum* Ripka, 2015 (in Ripka *et al.* 2015) were described from Hungary from *Phyllostachys viridiglaucescens* A. Rivière et C. Rivière and *P. iridescens* C.Y. Yao et S.Y. Chen.

In this paper we provide a supplementary description of *R. longipalpis* Xue et Hong, 2005 based on material from Hungary. We also report on our unexpected finding during the comparative study of the gnathosoma of this species, which led us to transfer it to a new genus *Bambusacarus* **n. gen.**, and give evolutionary remarks on the shape of oral stylet and pharynx in Eriophyoidea.

Materials and Methods

Plant samples were collected in the Botanical Garden of Szent István University, Gödöllő (Pest county, Central Hungary), Debrecen (Hajdú-Bihar county, East Hungary) and Egerág (Baranya county, South Hungary), in 2016, 2017 and 2019 by E. Kiss, A. Neményi and G. Ripka. The eriophyoid mites were collected from the leaves and shoots, cleared in lactic acid (for two months, at room temperature) and mounted in Keifer’s F-medium (Keifer 1975). Specimens were examined with the aid of a research phase contrast compound microscope (Nikon Eclipse E600, Nikon Instruments, Tokyo, Japan). A Zeiss Axio Imager-A2 microscope (Carl Zeiss AG, Oberkochen, Germany) was used for making digital microscopic images of slide mounted specimens.

For CLSM study mites were collected in Hungary, placed in tubes with 96% ethanol and transferred to ZIN RAS (Russia). In laboratory these mites were rinsed in 70% ethanol for 2 hours and after that rinsed again in hot (+70C°) distilled water for 3 hours to make their exoskeletons softer after dehydration in 96% ethanol. The mites were mounted in Hoyer’s medium (Amrine & Manson 1996, p. 387), which is the medium of choice for capturing autofluorescence of the eriophyoid mite cuticle under CLSM (Kirejtshuk *et al.* 2015). CLSM acquisition was carried out using Spectral confocal & multiphoton system Leica TCS SP2 with objectives 40× N.A. 1.25–0.75 Oil CS HCX PL APO and 63× N.A. 1.4–0.60 Oil IBL HCX PL APO at an excitation wavelength of 405 nm, and an emission wavelength range of 415–750 nm using previously described adjustments (Chetverikov 2012). Volume rendering reconstructions of external morphology of *R. longipalpis* were obtained using Amira® 5.3.2 software, and images were recorded using the “Snapshot” command.

The generic classification was made according to Amrine *et al.* (2003) together with further updating. The terminology and setal notation used in the morphological descriptions follow Lindquist (1996). The number of measured specimens (n) is given in parentheses following the body length. All measurements of mites were made according to Amrine & Manson (1996) and are given in micrometers. Measurements and means are rounded off to the nearest integer. All measurements, unless specified otherwise, are lengths. For females and males the ranges and the means of nine and five specimens are given, respectively.

The scientific names of host plants are given according to The Plant List (2013).

Results

Family Eriophyidae Nalepa

Subfamily Phyllocoptinae Nalepa

Tribe Anthocoptini Amrine and Stasny

Genus *Bambusacarus* Chetverikov, Amrine et Ripka n. g.

Diagnosis. Prodorsal shield setae *vi* and *ve* absent; setae *sc* directed divergently backward, their tubercles situated on posterior shield margin. Opisthosoma with broader dorsal and narrower and more numerous ventral annuli. All common leg and opisthosomal setae present, oral stylet angled. Palps thin, forming with stylet sheath forceps-like feeding apparatus. Palp setae *d* and *v* absent. A stout thorn-shaped process present on the anterior tip of frontal lobe of prodorsal shield.

Differential diagnosis. The new genus is closest to genus *Aculus* but can be easily separated based on the absence of gnathosomal setae *d* and *v* (present in *Aculus*), thin elongate palps and stylet sheath forming forceps-shaped gnathosoma (gnathosoma not forceps-shaped in *Aculus*), and presence of thorn-shaped process on the anterior tip of frontal lobe of prodorsal shield (absent in *Aculus*).

Etymology. The new generic name is a combination of two Latin nouns: “Bambusa” (genus of host plant) and “acarus” (mite), gender masculine.

Type species. *Bambusacarus longipalpis* (Xue et Hong, 2005) n. comb. (transferred from *Rhyncaphytoptus*).

Bambusacarus longipalpis (Xue et Hong, 2005) n. comb. – Figs 1,2,3,4,5.

Rhyncaphytoptus longipalpis Xue & Hong 2005: 50–51, Figs 1–6.

Rhyncaphytoptus longipalpus (sic) Xue & Hong 2005 in Figs 1–6.

SUPPLEMENTARY DESCRIPTION. FEMALE (n=9, population from *Phyllostachys tianmuensis*). Body fusiform, 162 (133–190), 55 (50–63) wide at level of setae *c*₂, 58 (53–63) thick. **Gnathosoma** 33 (28–37), projecting obliquely postero-ventrally; pedipalps 30 (25–33) curved, attenuate, and bent down, dorsal palp genual setae *d* and *v* non apparent, presumably absent, pedipalp coxal setae *ep* 2 (2–3). Chelicerae usually overlap infracapitular stylets so that it is hard to observe their tips. In one female chelicerae were about 15 µm long (JWA personal observation), however in most specimens chelicerae are likely to be of the same length as infracapitular stylets (about 25–30 µm); neither stylet curved at base. **Prodorsal shield** 43 (38–46), 48 (45–63) wide, subtriangular; with frontal lobe 6 (4–10); a thorn-shaped process from the ventral side of the anterior margin of the frontal lobe projecting forward. Shield pattern composed of two complete admedian lines, diverging to rear, two complete submedian lines, a short subparallel line between the admedian and the first submedian line from rear ½ to rear ¼, irregular and faint dashes and granules; complete median line. Median and admedian lines connected by a V-shaped line at rear 1/4–1/5. All lines are ridges bearing rounded microtubercles. Ornamentation of prodorsal shield variable, e.g. number, size and position of dashes and granules. Tubercles of scapular setae *sc* on rear shield margin, 37 (34–40) apart, diverging, scapular setae *sc* 10 (9–12), directed rearwards. Granules situated in lateral rows on epicoxal areas (sensu Chetverikov & Craemer 2015), i.e. laterally between shield margin and dorsal coxae of legs I and II.

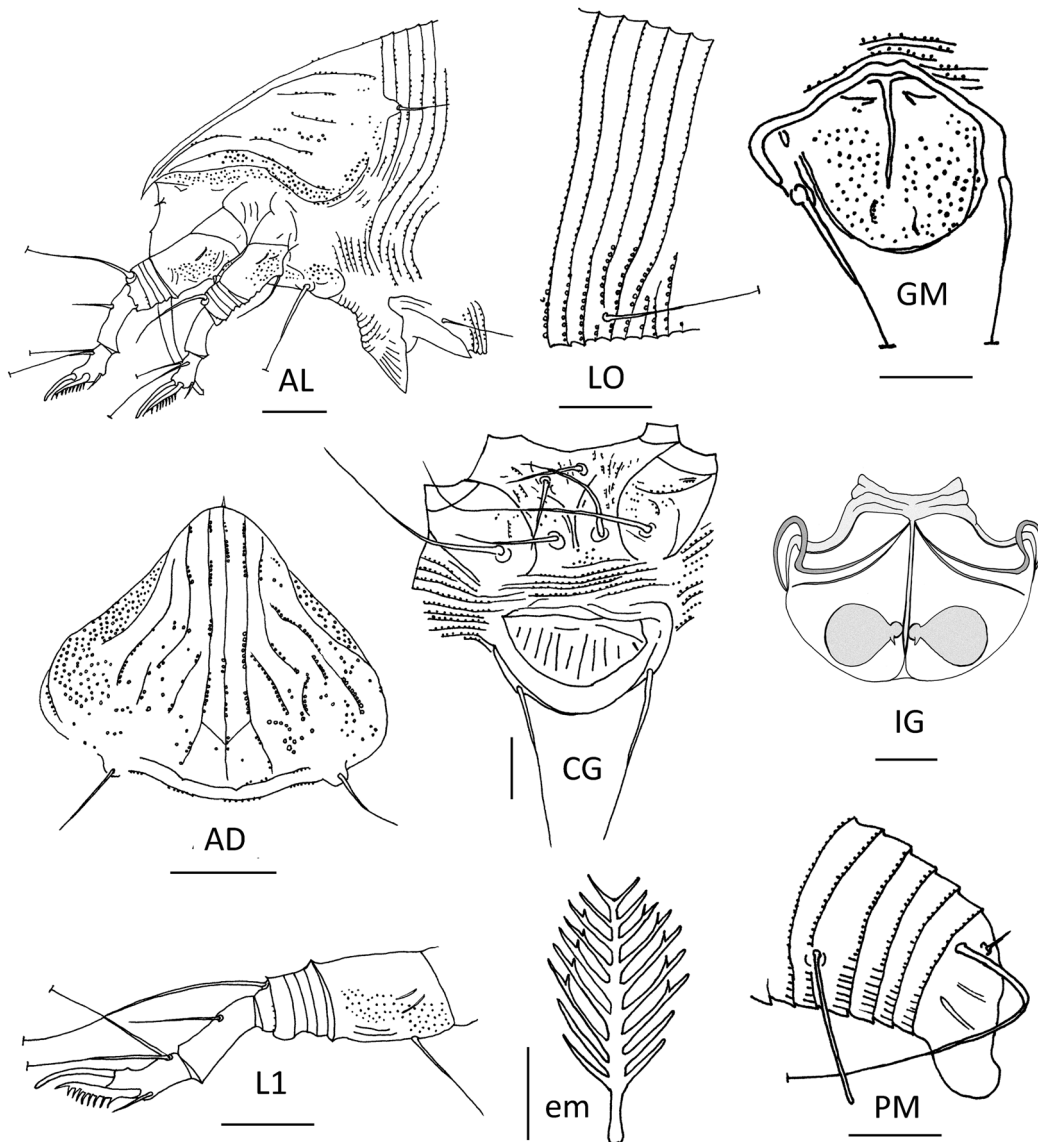


FIGURE 1. Drawings of *Bambusacarus longipalpis* n. comb. AD—Antero-dorsal mite; AL—Lateral view of anterior body region and legs; CG—Female coxigenital region; em—empodium; GM—male genitalia; IG—internal female genitalia; LO—lateral view of annuli; L1—leg I; PM—lateral view of posterior opisthosoma. Scale bars: AD = 20 μ m; IG = 5 μ m; em = 3 μ m; CG, L1, AL, GM, PM, LO = 10 μ m.

Legs with all usual segments and setae present. **Leg I** (foreleg) 38 (33–43), femur 12 (10–13), basiventral femoral seta *bv* 13 (11–16), genu 5 (no range), antaxial genual seta *l''* 33 (29–37), tibia 10 (10–12), paraxial tibial seta *l'* located at 2/5 (1/3–2/5) from dorsal base, 8 (7–10), very thin, tarsus 7 (5–8), unguinal tarsal setae *u'* 4 (4–5), solenidion ω 8 (7–8), distally pointed, slightly curved, empodium 8 (7–8), 9-rayed, each ray of 2–7 basal pairs with additional secondary branches. **Leg II** (rear leg) 33 (28–38), femur 10 (10–12), basiventral femoral seta *bv* 18 (15–20), genu 5 (4–5), antaxial genual seta *l''* 12 (10–15) very thin, tibia 8 (6–10), tarsus 7 (5–8), unguinal tarsal setae *u'* 4 (3–4), solenidion ω 8 (7–8), distally pointed, slightly curved, empodium 7 (7–8), 9-rayed, each ray

of 2–7 basal pairs with additional secondary branches. Small granules and lines laterally and ventrally on femur, and 3 transverse ridges on genu of both leg pairs.

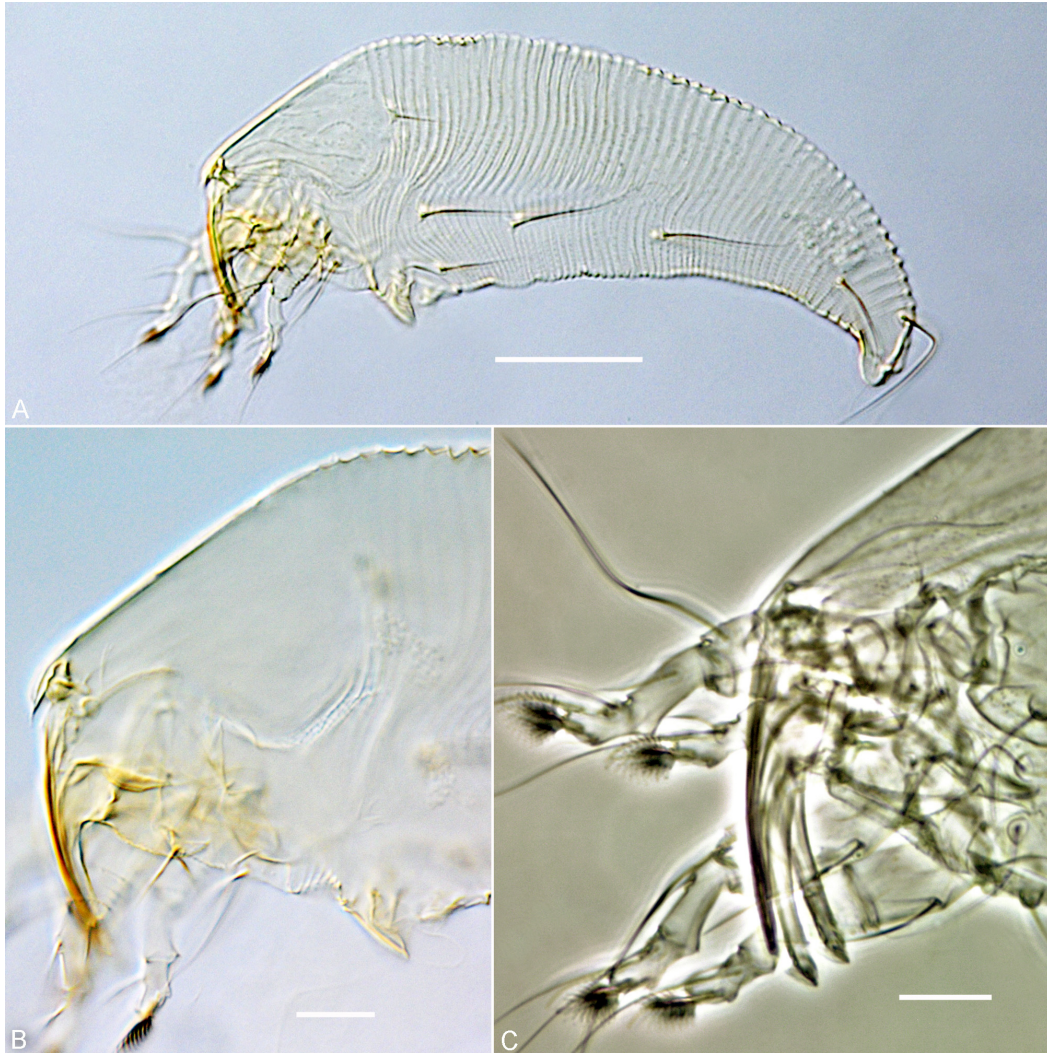


FIGURE 2. DIC LM (A,B) and PC LM (C) images of three females of *Bambusacarus longipalpis* n. comb. in lateral view. Scale bar: A = 30 µm, B,C = 10 µm.

Coxigenital area with 7–10 faint microtuberculate semiannuli. Coxisternae I and II with faint lines of small granules and granules; anterior seta on coxisternum I, *Ib* 13 (12–15), tubercles setae *Ib* 10 (9–12) apart, proximal seta on coxisternum I, *Ia* 20 (15–25), tubercles *Ia* 8 (7–10) apart, proximal seta on coxisternum II, seta *2a* 40 (33–48), tubercles *2a* 22 (19–25) apart. Subcapitular plate with minute granules. Prosternal apodeme 9 (8–11). Genital plate 14 (13–18), 22 (22–23) wide. Female genital coverflap with 12 (11–13) longitudinal to slightly radial ridges; coxisternal III setae *3a* 17 (15–19) apart, 22 (18–26), very thin.

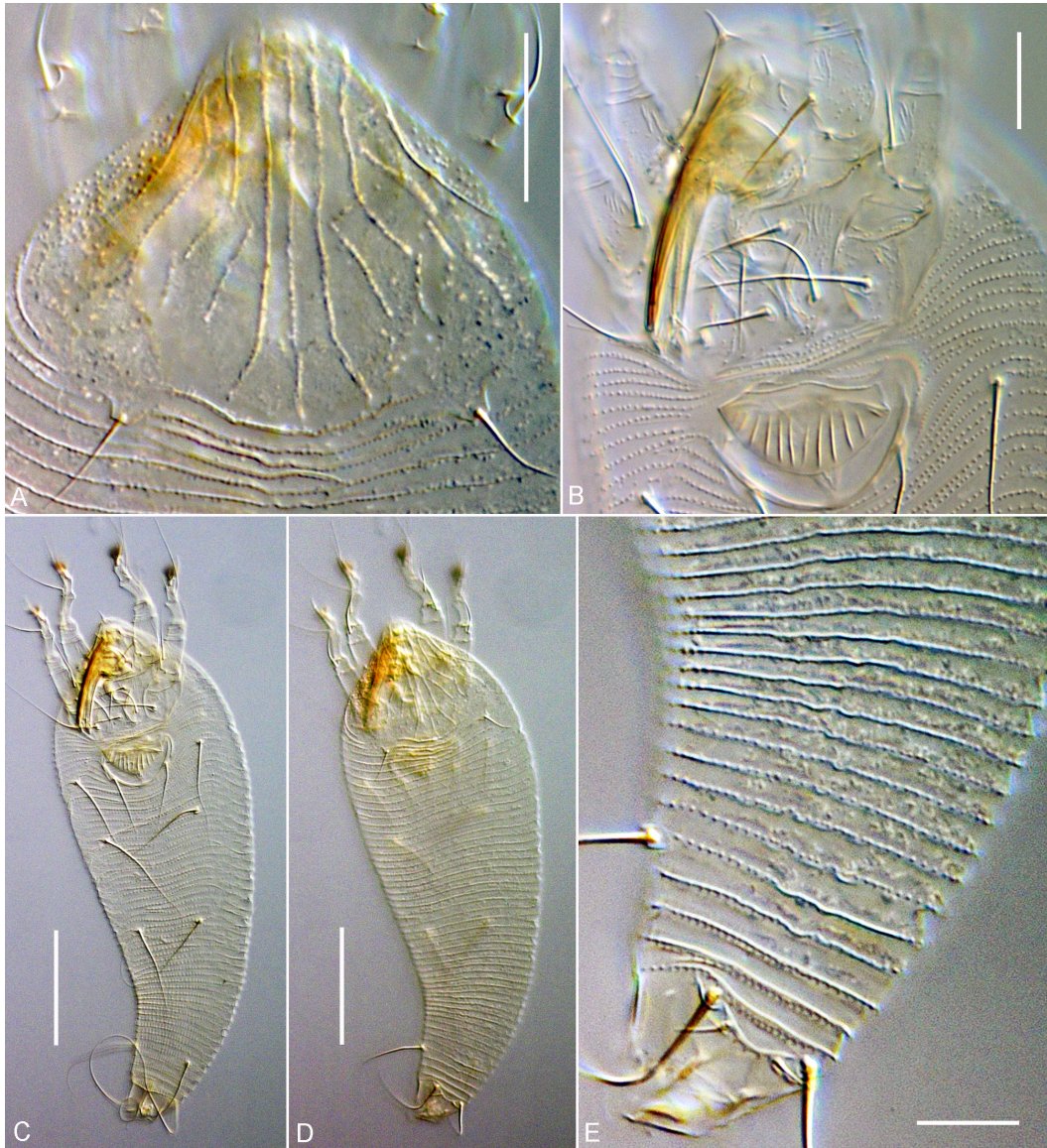


FIGURE 3. DIC LM images of two females of *Bambusacarus longipalpis* **n. comb.** in dorsal-ventral view. A—prodorsal shield, B—coxigenital area, C—entire mite in ventral view, D—entire mite in dorsal view, E—dorsal view of rear part of opisthosoma. Scale bar: A = 20 μm ; B = 10 μm ; C,D = 30 μm ; E = 5 μm .

Opisthosoma with a median and two submedian ridges; 51 (46–54) dorsal, 63 (56–71) minute microtuberculate ventral semiannuli. Dorsal semiannuli with very tiny and faint microtubercles. Last 4–5 dorsal annuli almost smooth. Last 6–8 annuli with linear microtubercles on ventral side. Opisthosomal setae *c*2 40 (37–45), on annulus 10 (9–10), 41 (35–43) apart; opisthosomal setae *d* 45 (38–51), on annulus 20 (19–22), 28 (25–31) apart; opisthosomal setae *e* 43 (33–53), on annulus 38 (35–44), 19 (18–19) apart; opisthosomal setae *f* 33 (31–36), on annulus 58 (52–67), or 4 (4–5) from the rear, 16 (15–19) apart. Opisthosomal setae *h*2 74 (58–95), very thin at apex, 10 (9–10) apart, opisthosomal setae *h*1 3 (no range), 6 (6–7) apart, thin. Caudal lobes normal. Opisthosomal seta *c*2, *d*, *e* and coxisternal III setae *3a* reach the tubercles of the adjacent setae to rearwards.

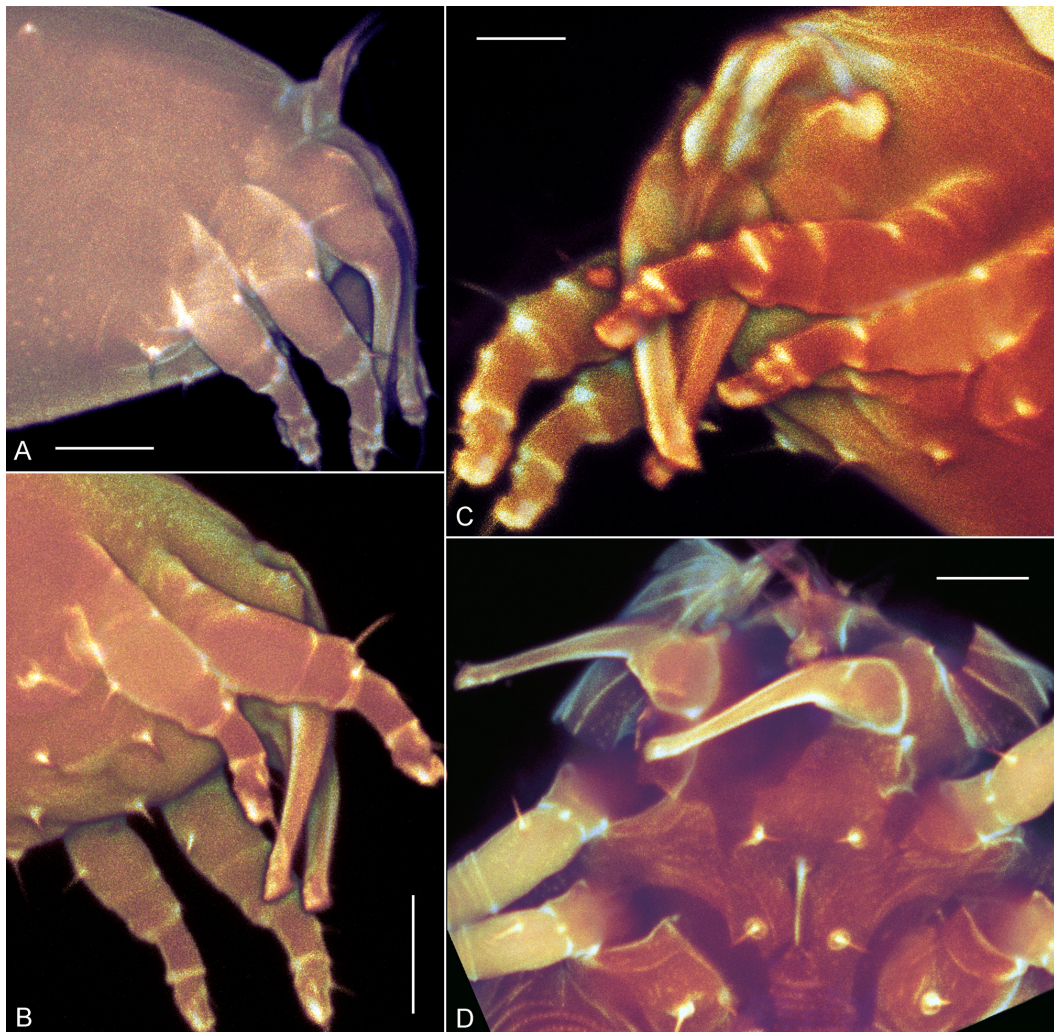


FIGURE 4. CLSM images showing prosoma in larva (A), nymph (B), and female (C,D) of *Bambusacarus longipalpis* n. comb. Scale bar = 10 μ m.

MALE—Similar to female, body fusiform, 143 (128–150, n = 5), 47 (47–48) wide, 50 (no range) thick. Gnathosoma 29 (25–32), projecting obliquely postero-ventrally; pedipalps 24 (21–26) curved, attenuate and bent down, dorsal palp genual setae *d* absent, pedipalp coxal setae *ep* 2 (2–3). Prodorsal shield 39 (36–40), 48 (45–50) wide, subtriangular; with frontal lobe 5 (4–7), a thorn-shaped process from ventral side of anterior margin of frontal lobe projecting forward. Shield pattern similar to that of female. Tubercles of scapular setae *sc* on rear shield margin, 25 (21–27) apart, diverging, scapular setae *sc* 10 (9–10), directed rearwards. Granules situated in lateral rows on epicoxal areas.

Legs with all usual segments and setae present. Leg I 32 (30–35), femur 10 (no range), basiventral femoral seta *bv* 11 (10–12), genu 5 (no range), antaxial genual seta *l''* 29 (28–30), tibia 7 (6–8), paraxial tibial seta *l'* located at 2/5–1/2 from dorsal base, 9 (8–12), very thin, tarsus 6 (6–7), unguinal tarsal setae *u'* 4 (3–5), solenidion ω 8 (7–8), distally pointed, slightly curved, empodium 7 (6–8), 8-rayed, each ray of 2–7 basal pairs with additional secondary branches. Leg II 29 (28–30),

femur 8 (7–10), basiventral femoral seta *bv* 14 (13–16), genu 5 (4–5), antaxial genual seta *l''* 12 (10–14) very thin, tibia 6 (5–7), tarsus 5 (5–6), unguinal tarsal setae *u'* 4 (3–4), solenidion ω 8 (7–8), distally pointed, slightly curved, empodium 6 (6–7), 8-rayed, each ray of 2–7 basal pairs with additional secondary branches. Small granules and lines laterally and ventrally on femur, and 3 transverse ridges on genu of both leg pairs.

Coxigenital area with 5–8 faint microtuberculate semiannuli. Coxisternae I and II with faint lines of small granules and granules; anterior seta on coxisternum I, *Ib* 10 (10–11), tubercles setae *Ib* 9 (8–9) apart, proximal seta on coxisternum I, *Ia* 15 (14–16), tubercles *Ia* 7 (7–8) apart, proximal seta on coxisternum II, seta *2a* 35 (35–36), tubercles *2a* 18 (17–19) apart. Subcapitular plate with tiny granules. Prosternal apodeme 8 (8–10). Genitalia 15 (14–16), 19 (18–20) wide, smooth; setae *3a* 19 (17–20), 18 (15–20) apart; in progenital chamber tiny eugenital setae present. Opisthosoma with a median and two submedian ridges; 44 (42–48) dorsal, 60 (58–61) minute microtuberculate ventral semiannuli. Dorsal semiannuli with very tiny and faint microtubercles. Last 4–5 dorsal annuli almost smooth. Last 6–8 annuli with linear microtubercles on ventral side. Opisthosomal setae *c2* 31 (30–33), on annulus 10 (9–10), 36 (35–36) apart; opisthosomal setae *d* 46 (37–52), on annulus 19 (18–20), 21 (20–21) apart; opisthosomal setae *e* 39 (36–42), on annulus 35 (34–37), 19 (18–19) apart; opisthosomal setae *f* 28 (24–31), on annulus 55 (54–57), or 4–5 from the rear, 14 (13–15) apart. Opisthosomal setae *h2* 63 (58–68), very thin at apex, opisthosomal setae *h1* 3 (2–3). Caudal lobes normal. Opisthosomal setae *c2*, *d*, *e* and coxisternal III setae *3a* reach the tubercles of the adjacent setae to rearwards.

Host plant. Red bamboo, *Phyllostachys tianmuensis* Z.P. Wang et N.X. Ma (Poaceae: subfamily Bambusoideae: tribe Bambuseae). An ornamental bamboo species native to temperate China, Zhejiang province. Other hosts in Hungary: *Phyllostachys angusta* McClure, *P. aureosulcata* McClure, *P. fimbriiligula* T.H. Wen, *P. rubromarginata* McClure, *P. tianmuensis* Z.P. Wang et N.X. Ma, *P. yunhoensis* S.Y. Chen et C.Y. Yao. Other hosts reported from China: *Phyllostachys bambusoides* Sieb. et Zucc., *P. glauca* McClure f. *yunzhu* J. L. Lu., *P. propinqua* McClure, *Phyllostachys* sp. (Xue *et al.* 2012).

Relationship to the host. This mite caused no discernible symptoms on the host plants. The vagrant mite was found on the underside of the leaves of the host.

Distribution. This mite species was originally described from *Bambusa* sp. in Henan Province, China (this host may have been a *Phyllostachys*), suggesting Asian distribution of *B. longipalpis*. We found *B. longipalpis* on *Phyllostachys* spp. in the Botanical Garden of Szent István University (Gödöllő, Pest county, Central Hungary, 241 m elev., 47°35'37.99" N, 19°21'59.95" E) and in Denver Botanic Gardens, USA (June 2019, J. Amrine and P. Chetverikov unpublished data).

Material examined – the re-described female among 4 females and 3 males and one female of an *Aceria* species, one female of a *Cecidophyes* species and one female of *Adventacarus turulae* Ripka on slide # 1469a, 2 July 2019, coll. G. Ripka. Other specimens: 3 females and 3 males, and 5 females of *Adventacarus turulae* Ripka and one female of an Anthocoptini species on slide # 1469b, 2 July 2019, coll. G. Ripka; on slide (# 1405a) prepared from material collected from *Phyllostachys rubromarginata* McClure in the same locality, 9 November 2016, containing 1 female coll. E. Kiss; on slide (# 1429a) containing 2 females and one nymph from the same host, in the same locality, 24 August 2017, coll. E. Kiss; on slide (# 1402a) collected from *Phyllostachys tianmuensis* Z.P. Wang et N.X. Ma, in the same locality, 30 September 2016, containing 1 female, coll. E. Kiss; on slide (# 1404a) from *Phyllostachys fimbriiligula* T.H. Wen, containing 2 females, and 3 females and one male of wax-producing *Abacarus korosicsomai* Ripka in the same locality, 13 October 2016, coll. E. Kiss; on slide (# 1406a) collected from *Phyllostachys yunhoensis* S.Y. Chen et C.Y. Yao, one female, and one female of an Acaridae species, in the same locality, 19 September 2016, coll. E. Kiss; on slide (# 1431a) from *Phyllostachys angusta* McClure, Debrecen (Hajdú-Bihar county), 19 October 2017,

containing 2 females, and 4 females and one nymph of *Abacarus korosicsomai* Ripka, coll. András Neményi; on slide (# 1430a) from *Phyllostachys aureosulcata* McClure, Egerág (Baranya county), 11 September 2017, containing 1 female, coll. András Neményi. All *Phyllostachys* species are new hosts for *B. longipalpis*, additionally this species is a newly recorded mite species in the European and North American mite fauna. The majority of the slides are in the last author's collection and deposited in the National Food Chain Safety Office, Directorate of Plant Protection, Soil Conservation and Agri-environment, Budapest, Hungary. Some slides are deposited in the Laboratory of Parasitology (ZIN RAS, Russia).

Remarks. The type material of *B. Longipalpus* **n. comb.** from China was not available for investigations. According to literature, the mites from Hungary differ from the population from China in four morphometrics: they have longer *c*2 (37–45 vs 30), longer tibia I (10–12 vs 7), longer femur I (10–13 vs 10), and longer femur II (10–12 vs 8).

Oral stylet, pharynx, and suboral fork in *B. longipalpis* (Fig. 5)

We observed the oral stylet in 4 immatures and 22 adults of *B. longipalpis*. All stages have an angled oral stylet. It was hard to observe the distal part of oral stylet in most studied specimens because it was hidden within the stylet sheath and overlapped other gnathosomal stylets. We made pressed slides and got several specimens with disjointed palps and gnathosomal stylets (e.g. CLSM Fig. 4D), but the distal part of the oral stylet was still indiscernible. However, in three laterally oriented females and one male we observed the tip of oral stylet and concluded that in *B. longipalpis* the oral stylet is approximately 11–12 μm long. The angle between the longitudinal axis of the pharynx and the longitudinal axis of the opisthosoma (measured in non-deformed laterally oriented mites only, $n=9$) ranged from 15° to 25° in all stages. A short slightly curved suboral fork (*sensu* Chetverikov & Bolton (2016), = ? *pump brace* of Keifer 1959, fig. 2D) was clearly seen below the pharynx in all laterally oriented adult mites under CLSM and PC LM. Weakly developed paired terminal leaf-shaped plates of the suboral fork were observed between the anterior margin of subcapitulum and disjointed folds of the stylet sheath in two dorso-ventrally oriented females (not shown).

Evolutionary remarks on the shape of oral stylet and pharynx in Eriophyoidea

It is widely accepted in eriophyidological literature that members of Diptilomiopidae possess a “long-form” oral stylet which is nearly as long as cheliceral stylets (Keifer 1959; Lindquist 1996, p. 6; Amrine *et al.* 2003, p. 8). However, it is not the length of the oral stylet itself that is the character to discriminate diptilomiopids, but (**a**) its shape and (**b**) the orientation of the pharynx. According to Keifer (1959, fig. 2C,D), in diptilomiopids, the pharynx is directed more vertically at about 57° from the long axis of the mite and the oral stylet, being a dorsal continuation of pharynx, is basally abruptly curved and nearly as long as chelicerae whereas in all other eriophyoids the pharynx is oriented almost horizontally and the oral stylet is slightly “angled” and at least one half the length of the chelicerae. Remarkably, in Diptilomiopidae all major gnathosomal components (palps, stylets, and stylet sheath) are enlarged and form a beak-shaped feeding-apparatus directed downward, hence the vernacular name of diptilomiopids—“big-beaked” mites. Remarkably, although the characters (**a**, **b**) are quite obvious in slide-mounted eriophyoids, only a few of about 500 currently known diptilomiopid species have been shown to have the classic “long-form” oral stylet and a more vertically oriented pharynx. The data on these characters in most diptilomiopid species are absent in literature.

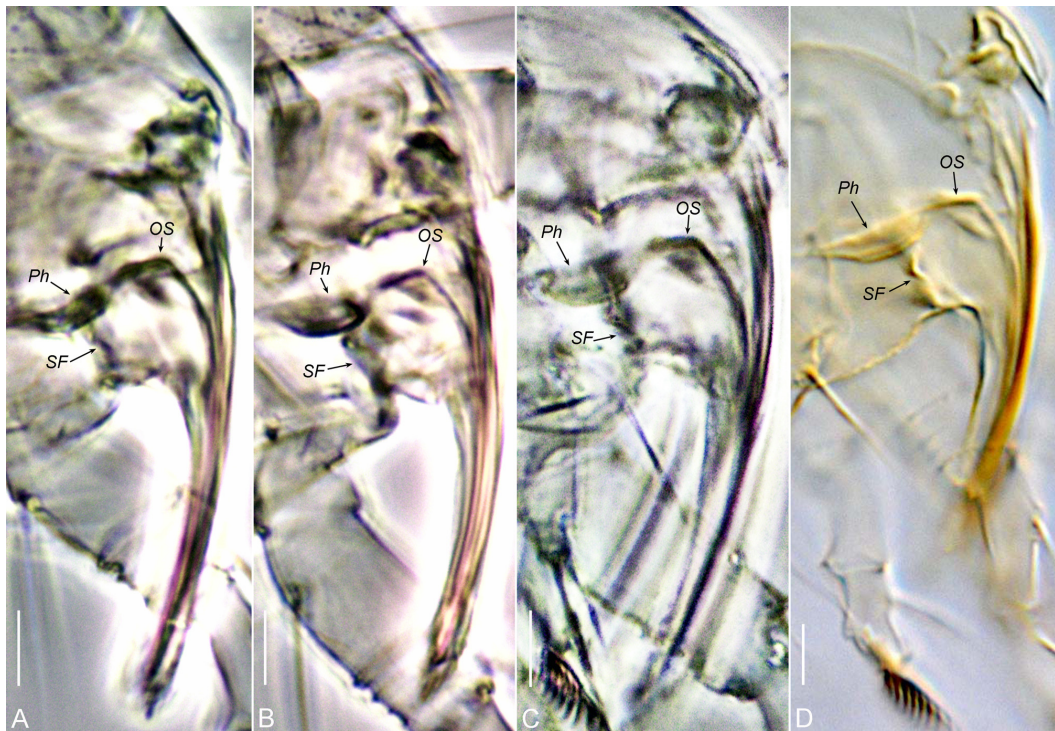


FIGURE 5. PC LM (A,B,C) and DIC LM (D) images showing pharynx (*Ph*), oral stylet (*OS*), and suboral fork (*SF*) in a male (A) and three females (B,C,D) of *Bambusacarus longipalpis* n. comb. Scale bar = 4 μ m.

Recently Li *et al.* (2014) reconstructed an evolution of Eriophyoidea based on analysis of two rDNA genes (18S and two fragments of 28S) and performed ancestral character state reconstruction analysis to map morphological traits onto a molecular phylogeny of Eriophyoidea. The resulting 18S, 28S and combined 18S+28S trees were very poorly resolved; however several well-supported clades were still present (Li *et al.* 2014, fig. 1 and Supplementary figs 1, 2). Based on statistical analyses of these trees Li *et al.* (2014) demonstrated homoplastic evolution of several key morphological characters which are used in current classification of Eriophyoidea: shape of oral stylet, direction and presence/absence of *sc*, shape of empodium, fusion of tibia with tarsus, and shape of body. They also discovered that Diptilomiopinae (diptilomiopids with divided empodia, including *Diptacus*, *Diptilomiopus* and *Dialox* in the Li's data set) is monophyletic whereas Rhyncaphyoptinae (diptilomiopids with entire empodium, including *Asetacus*, *Cheiracus*, *Rhynchphytoptus*, *Rhinotergum*, and *Rhynchphytoptus* in the Li's data set) is not.

In their data set Li *et al.* (2014) coded the oral stylet in all diptilomiopids (including *R. longipalpis*) as “long-form”. Our data suggest that in “*Rhynchphytoptus longipalpis*” the oral stylet is angled and intermediate to short and better fits the “short-form” type which is typical for members of Phytoptidae and Eriophyidae. It also has the pharynx directed much more horizontally than vertically, which is also typical for phytoptids and eriophyids but not for diptilomiopids. Additionally, neither the chelicerae nor the infracapitular stylets have the typical strongly recurved base of the diptilomiopid stylets. Therefore, based on these fundamental gnathosomal characters, “*longipalpis*” should not be treated as a true diptilomiopid mite.

The shape of the palps is a distinct character, separating “*longipalpis*” from other eriophyoids and providing habitual resemblance to diptilomiopids. In this species the palps are thin, elongate

(forceps-shaped), strongly oriented postero-ventrally, and lack gnathosomal setae *d* and *v*. The apical surface of each palp is formed into a flange that extends a short distance dorsally (Fig. 2C). Among non-diptilomiopid eriophyoids, a similar state, when *d* is absent and palps are forceps-shaped is observed in *Novophytoptus* Roivainen, an endoparasitic phytoptid genus from monocots (Chetverikov 2015; Chetverikov *et al.* 2017, fig. 3C). However in *Novophytoptus* the gnathosoma is directed not so much downward, but more obliquely anteriorly and the chelicerae are shorter and not strongly curved basally as in diptilomiopids. Remarkably, both species have angled short oral stylet and semi-horizontally oriented pharynx. These examples indicate that in some “non-diptilomiopid” lineages of Eriophyoidea (1) the elongation of palps and change of the length and curvature of the gnathosomal stylets may not be correlated with transformation of the shape of the oral stylet and reorientation of pharynx, and (2) if this happens, the mite homoplastically acquires similarity to the well-recognized “diptilomiopid-like” phenotype.

Interestingly, in the phylogenetic trees presented by Li *et al.* (2014) “*Rhyncaphytoptus longipalpis*” is nested within a well-supported clade consisting of two lineages of anthocoptines, one of which includes mites associated with Poaceae (grass-associated members of genera *Abacarus*, *Aculodes*, *Aculus*, *Neotetra*, *Tegolophus*, *Tetra*, and “*R. longipalpis*”). The data from the literature suggest that mite species that infest closely related host plants have closely related relationships (Li *et al.* 2014, p. 196) and that major generic groups of eriophyoid mites may be clustered in accordance with their host plant lineages (Chetverikov *et al.* 2019, p. 900). We consider the species “*longipalpis*” to be a member of a new anthocoptine genus, *Bambusacarus* n. g., which might be phylogenetically close to genera *Aculodes*, *Aculus*, and *Abacarus* from monocots and represent a lineage of eriophyid mites that have evolved on bamboos and acquired the “intermediate” shape of their gnathosoma: with elongated palps (apomorphic state), but with “angled”, non-abruptly curved short oral stylet (plesiomorphic state) and semi-horizontally oriented pharynx (plesiomorphic state).

Acknowledgements

Comparative light microscopy of diptilomiopid gnathosoma was partially supported by Russian Foundation for Basic Research (RFBR grant 19–04–00127) and research project of ZIN RAS (AAAA–A17–117030310209–7). CLSM study was carried out using the equipment of the “Center for Microscopy and Microanalysis” at St. Petersburg State University and was supported by Russian Science Foundation (project 16–16–10011). Thanks are expressed to Dr. Árpád Szabó (Department of Entomology, Faculty of Horticultural Science, Szent István University, Budapest, Hungary) for help in preparation of digital micrographs and Dr. András Neményi (Botanical Garden of Szent István University, Gödöllő, Hungary) for providing some plant samples.

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Submitted: 16 Dec. 2019; accepted by Eddie Ueckermann: 17 Mar. 2020; published: 30 Apr. 2020