



HAL
open science

A new species of Adactylidium (Acari: Heterostigmata: Acarophenacidae) associated with Phlaeothrips sp. (Thysanoptera: Phlaeothripidae) from European Russia

Alexander A Khaustov, Vladimir V Abramov

► **To cite this version:**

Alexander A Khaustov, Vladimir V Abramov. A new species of Adactylidium (Acari: Heterostigmata: Acarophenacidae) associated with Phlaeothrips sp. (Thysanoptera: Phlaeothripidae) from European Russia. *Acarologia*, 2021, 61 (2), pp.356-364. <10.24349/acarologia/20214435>. <hal-03211950v2>

HAL Id: hal-03211950

<https://hal.science/hal-03211950v2>

Submitted on 3 May 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons CC BY 4.0 - Attribution - International License

Acarologia

A quarterly journal of acarology, since 1959
Publishing on all aspects of the Acari

All information:

<http://www1.montpellier.inra.fr/CBGP/acarologia/>
acarologia-contact@supagro.fr



**Acarologia is proudly non-profit,
with no page charges and free open access**

Please help us maintain this system by
encouraging your institutes to subscribe to the print version of the journal
and by sending us your high quality research on the Acari.

Subscriptions: Year 2021 (Volume 61): 450 €

<http://www1.montpellier.inra.fr/CBGP/acarologia/subscribe.php>

Previous volumes (2010-2020): 250 € / year (4 issues)

Acarologia, CBGP, CS 30016, 34988 MONTFERRIER-sur-LEZ Cedex, France

ISSN 0044-586X (print), ISSN 2107-7207 (electronic)

The digitalization of Acarologia papers prior to 2000 was supported by Agropolis Fondation under the reference ID 1500-024 through the « Investissements d'avenir » programme (Labex Agro: ANR-10-LABX-0001-01)



Acarologia is under **free license** and distributed under the terms of the Creative Commons-BY-NC-ND which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original author and source are credited.

A new species of *Adactylidium* (Acari: Heterostigmata: Acarophenacidae) associated with *Phlaeothrips* sp. (Thysanoptera: Phlaeothripidae) from European Russia

Alexander A. Khaustov^a, Vladimir V. Abramov^b

^a Tyumen State University, Tyumen, Volodarskogo 6, 625003 Russia.

^b Gagarin str. 12, Suvorov, Tula Region, 301430, Russia.

Original research

ABSTRACT

A new species, *Adactylidium europaeum* n. sp. (Acari: Acarophenacidae), is described based on phoretic females collected on thorax of larvae of *Phlaeothrips* sp. (Thysanoptera: Phlaeothripidae) in European Russia. An updated key to the species of *Adactylidium* is provided.

Keywords Heterostigmatina; Pyemotoidea; systematics; morphology; phoresy; parasitoids

Zoobank <http://zoobank.org/E77F0742-DF53-4704-AA60-B17FFEBBBF6C>

Introduction

The family Acarophenacidae includes species that are parasitoids of eggs of various insects, including beetles from the families Cerambycidae, Erotylidae, Tenebrionidae, Nitidulidae, Dermestidae, Curculionidae (Scolytinae), Mycetophagidae and thrips (Thysanoptera) (Goldarazena *et al.* 2001; Katlav *et al.* 2015; Ardjomandi *et al.* 2017; Walter and Seeman 2017; Khaustov and Abramov 2018; Xu *et al.* 2018). At present, the family includes about 40 described species (including three extinct species) from eight genera (Khaustov *et al.* 2021). Khaustov *et al.* (2021) provided the latest key to the genera of Acarophenacidae. Currently six species of acarophenacid mites have been recorded from Russia: *Aethiophenax ipidarius* (Redikortzev, 1947), *Paracarophenax scolyti* Khaustov, 1999 (both associated with bark beetles), *P. bambergensis* (Krczal, 1959) (associated with Nitidulidae), *P. triplaxophilus* Khaustov and Abramov, 2018 (associated with Erotylidae), *Paradactylidium pyemotoformis* Khaustov, 2007 and *Adactylidium absurdum* Khaustov, 2007 (both from unknown hosts) (Khaustov 1999, 2007; Khaustov and Abramov 2018, 2019).

The genus *Adactylidium* Cross, 1965 comprises 16 described species distributed in Europe, North and South Americas, and northern Africa (Goldarazena *et al.* 2001; Antonatos *et al.* 2011). All *Adactylidium* species are egg parasitoids of various thrips species (Thysanoptera). Therefore, they have been suggested to be potential biological control agents of thrips pests in agricultural systems (Antonatos *et al.* 2011).

During the study of insect associated mites, a new species of *Adactylidium* associated with *Phlaeothrips* sp. was revealed from the European Russia. The aim of this article is to describe this new species and provide an updated key to world species of *Adactylidium*.

Received 05 February 2021

Accepted 25 April 2021

Published 29 April 2021

Corresponding author
Alexander A. Khaustov:
alex1973khaustov@gmail.com

Academic editor
Baumann, Julia

DOI
[10.24349/acarologia/20214435](https://doi.org/10.24349/acarologia/20214435)

ISSN 0044-586X (print)
ISSN 2107-7207 (electronic)

© Copyright
Khaustov A. A. and Abramov V. V.

Distributed under
Creative Commons CC-BY 4.0

OPEN ACCESS

How to cite this article Khaustov A. A. and Abramov V. V. (2021), A new species of *Adactylidium* (Acari: Heterostigmata: Acarophenacidae) associated with *Phlaeothrips* sp. (Thysanoptera: Phlaeothripidae) from European Russia. *Acarologia* 61(2): 356-364; DOI [10.24349/acarologia/20214435](https://doi.org/10.24349/acarologia/20214435)

Material and methods

Mites were collected from thorax of larvae of *Phlaeothrips* sp. by the junior author. The mites were mounted in Hoyer's medium. The terminology follows that of Lindquist (1986). All measurements are given in micrometers (µm) for the holotype and two female paratypes (in parentheses). For leg chaetotaxy the number of solenidia is given in parentheses. Differential interference contrast (DIC) micrographs were taken using the Carl Zeiss Axio Imager A2 compound microscope and Hitachi KP-HD20A and Olympus OM-D Em-10 digital cameras.

Abbreviations — ap1-ap5 – apodemes 1-5; appr – prosternal apodeme; appo – poststernal apodeme; apsej – sejugal apodeme; apgn – gnathosomal apodeme.

Results

Systematics

Family Acarophenacidae Cross, 1965

Genus *Adactylidium* Cross, 1965

Type species: *Adactylidium beeri* Cross, 1965, by original designation

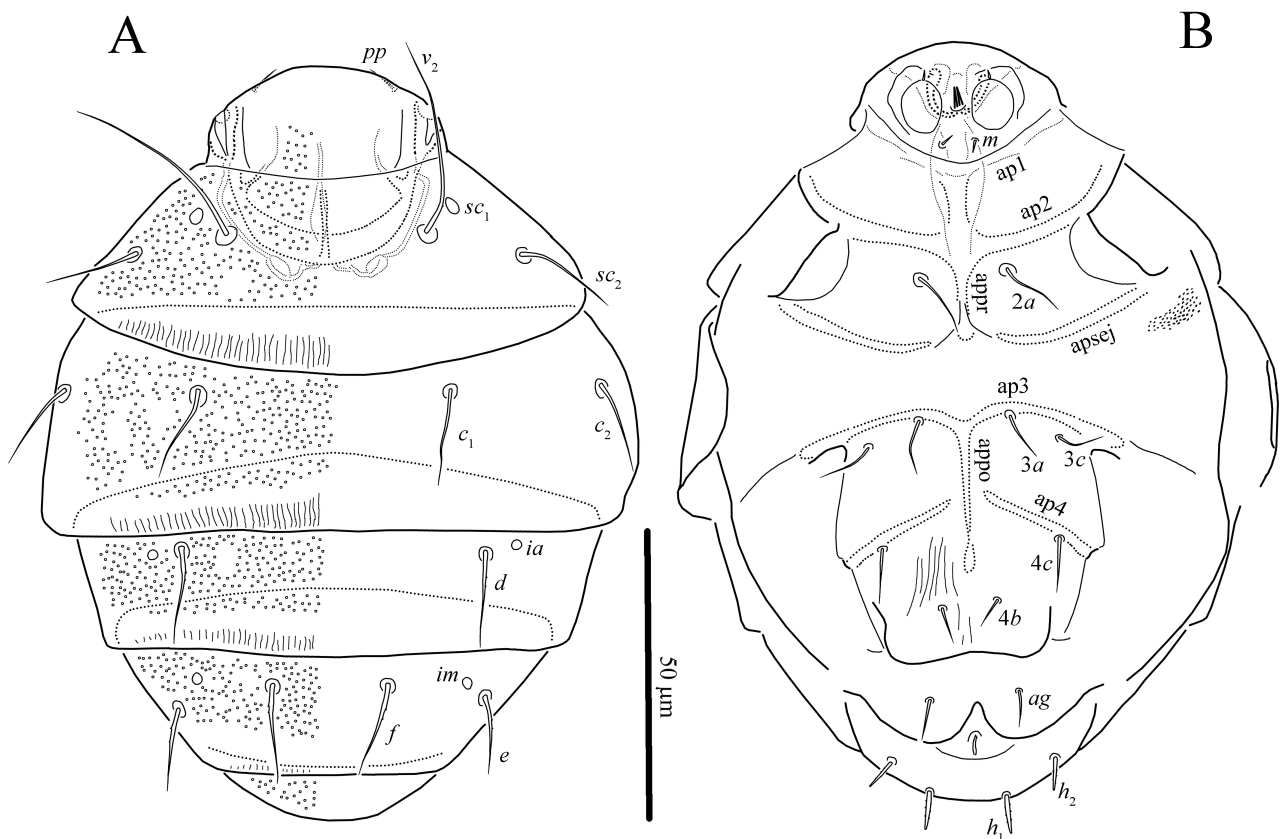


Figure 1 *Adactylidium europaeum* n. sp., female (holotype): A – dorsum of body, B – venter of body. Legs omitted.

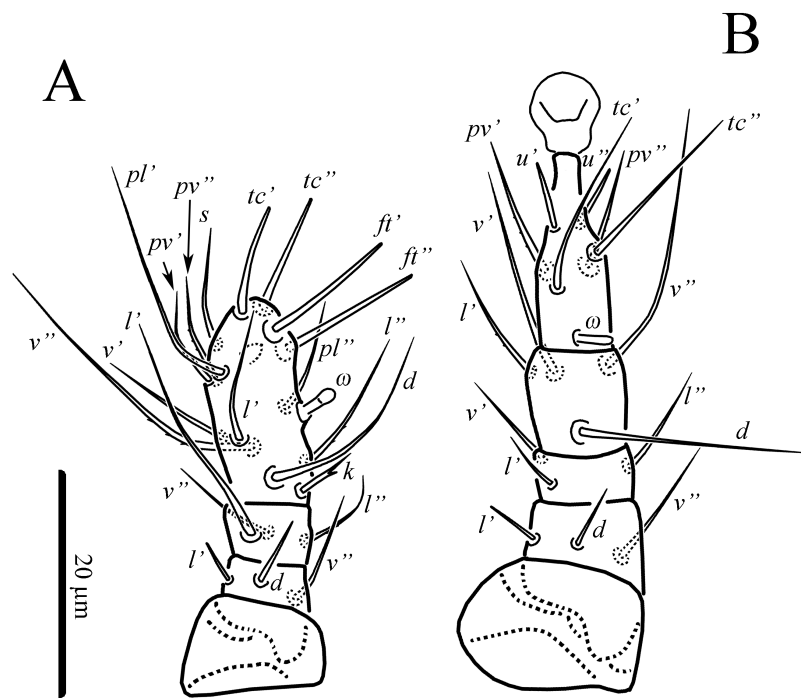


Figure 2 *Adactylidium europaeum* n. sp., female (holotype): A – right leg I, dorsal aspect, B – right leg II, dorsal aspect.

***Adactylidium europaeum* n. sp.**

Zoobank: [227447D6-8908-4C9C-8555-E92E102DC85A](https://zoobank.org/227447D6-8908-4C9C-8555-E92E102DC85A)

(Figures 1–6)

Diagnosis — Apgn with median projections; genua I and III with three and one setae, respectively; tibiotarsus I with ventral subapical indentation; setae (*tc*) and (*ft*) of tibiotarsus I subequal in length; dorsal idiosomal setae with similar shape, elongate; apsej not fused with appr; setae *1b* absent.

Description

Female – Length of idiosoma 130 (130, 135), width 100 (98, 105).

Gnathosoma – Apgn with distinct median projections (Fig. 6 A). Gnathosoma concealed dorsally by prodorsum, ventrally indistinguishable from idiosoma; dorsum with one pair of setae anterolaterally, probably representing postpalpal seta *pp*; venter with mouth flanked by paired, semi-ovular smooth membranous areas; one pair of rod-like ventral setae of unknown homology situated at anterior ends of membranous areas; one pair of blunt-ended subcapitular setae *m* located posteriad membranous areas. Pharynx large, slightly oval, thin walled, distinctly punctate (Fig. 6B).

Idiosomal dorsum (Figs 1A, 4A, 5A) – Ovate. Prodorsal shield delineated into primary plate and prodorsal projection, encapsulating gnathosoma. Stigmata on prodorsal projection; tracheal trunks long, with small atria located posteriad posterior margin of apgn. Prodorsal shield and plates C, D, EF, H distinctly punctate (Fig. 5A). Alveolar pits *sc*₁ situated anterolaterad bases of setae *v*₂. Setae *v*₂, *sc*₂, *c*₁ and *c*₂ thin, smooth and pointed; setae *d*, *e* and *f* with few weak barbs in basal half; setae *h*₁ and *h*₂ located ventrally, slightly thickened, blunt-ended and weakly barbed. Cupuli *ia* small, round, located laterad or anterolaterad bases of setae *d*; cupuli *im* situated anteromesad bases of setae *e*; cupuli *ih* not evident. Lengths of dorsal setae: *v*₂ 38 (38,

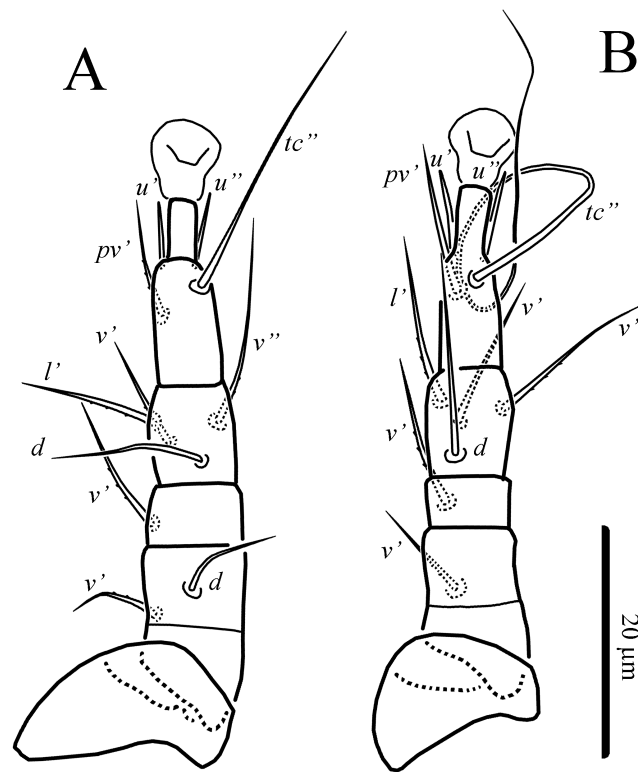


Figure 3 *Adactylidium europaeum* n. sp., female (holotype): A – right leg III, dorsal aspect, B – right leg IV, dorsal aspect.

43), sc_2 18 (18, 19), c_1 17 (18), c_2 17 (18), d 17 (18, 20), e 15 (17, 18), f 17 (18), h_1 7 (8, 9), h_2 6 (7, 8). Distances between setae: v_2-v_2 34 (34, 38), sc_1-sc_1 43 (42, 47), v_2-sc_2 17 (16–18), sc_2-sc_2 66 (65, 71), c_1-c_1 43 (42, 45), c_1-c_2 22 (23, 24), $d-d$ 52 (49, 58), $e-f$ 16 (15, 16), $f-f$ 20 (19, 26), $e-e$ 52 (48, 52), h_1-h_1 13 (11), h_2-h_2 8 (11, 12).

Idiosomal venter (Figs 1B, 4B, 5B) – Ventral plates smooth; small subtriangular areas posteriad trochanters II with rough microsculpture; coxisternal fields IV with weak longitudinal striation (Fig. 5B). All ventral setae smooth and pointed; setae 1b absent. Aggenital plate with deep incision posteriorly. Ap1 weakly sclerotized, fused with well sclerotized appr; ap2 well sclerotized and fused with appr; ap3 well sclerotized, not fused with appr; ap4 well sclerotized, not fused with appo; ap5 absent. Lengths of ventral setae: 2a 11 (12–13), 3a 11 (12, 13), 3c 11 (12), 4b 276 (7, 8), 4c 9 (8, 10), ag 7 (7, 8).

Legs (Figs 2, 3) – Leg I (Fig. 2A) distinctly shorter than other legs. Leg setation: Tr 0, Fe 3, Ge 3, TiTa 15(1). Tibiotarsus with ventral subapical indentation. Solenidion ω 4 (3, 4) clavate, situated in the middle of segment. Seta k bifurcate; eupathidia (tc) and (fi) subequal in length. At least setae l' , v'' and pv'' of tibiotarsus weakly barbed, other leg setae smooth; setae d , l' of femur and eupathidia (tc) and (fi) blunt-ended, other leg setae pointed. Leg II (Fig. 2B). Leg setation: Tr 0, Fe 3, Ge 3, Ti 4, Ta 6(1). Solenidion ω 4 (4, 5) digitiform. Setae l' of femur and (u) of tarsus blunt-ended, other leg setae pointed; at least setae l' of tibia and (pv) of tarsus weakly barbed, other leg setae smooth. Leg III (Fig. 3A). Leg setation: Tr 0, Fe 2, Ge 1, Ti 4, Ta 4. Setae (u) of tarsus blunt-ended, other leg setae pointed; at least setae v' of femur, v' of genu, l' , v'' of tibia and pv' of tarsus weakly barbed, other leg setae smooth. Leg IV (Fig.

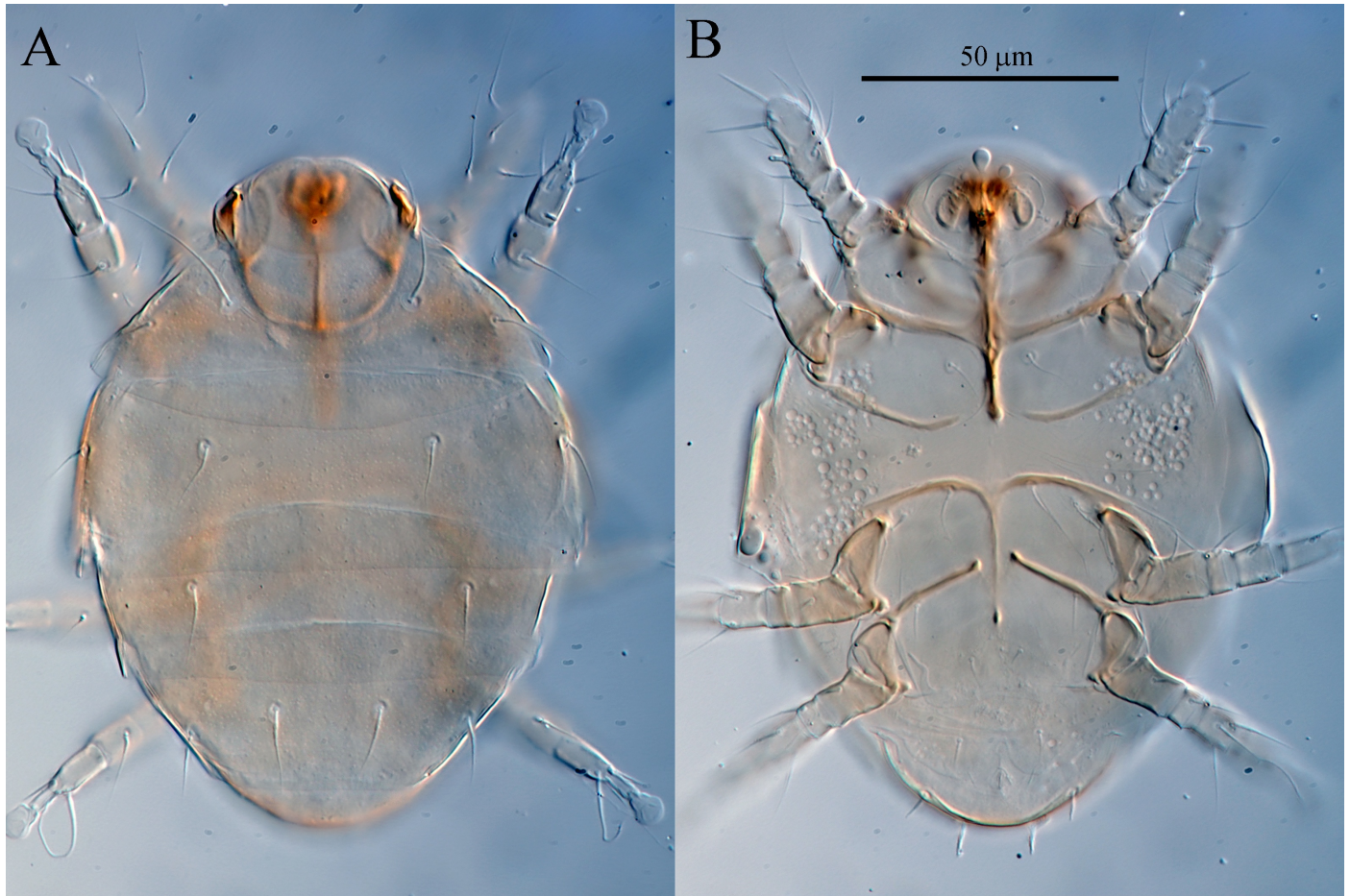


Figure 4 DIC micrographs of *Adactylidium europaeum* n. sp., female (holotype): A – general view dorsally, B – general view ventrally.

3B). Leg setation: Tr 0, Fe 1, Ge 1, Ti 4, Ta 4. Setae (*u*) of tarsus blunt-ended, other leg setae pointed; at least setae *v'* of genu, *l'*, *v''* of tibia weakly barbed, other leg setae smooth; seta *tc''* of tarsus ultralong.

Type material — Female holotype, slide ZISP T-Acaroph-001, Tula Region, vicinity of Suvorov town, 54°07' N, 36°30' E, 10 November 2020, on thorax of larva of *Phlaeothrips* sp. on the bark of thin dead branches of birch, coll. V.A. Abramov. Paratypes: two females, same data, 14 November 2020.

Type deposition — The holotypes of the new species is deposited in the acarological collection of the Zoological Institute of RAS, St. Petersburg, Russia; two female paratypes are deposited in the mite collection of the Tyumen State University Museum of Zoology, Tyumen, Russia.

Etymology — The name of the new species refers to distribution in European part of Russia.

Differential diagnosis — The new species is most similar to *Adactylidium ficorum* Goldarazena and Ochoa, 2001, described from Puerto Rico and Egypt (Goldarazena *et al.* 2001) in having three setae on genu I, one seta on genu III, and well developed appo. The new species differs from *A. ficorum* in having apsej not fused with appr (apsej fused with appr in *A. ficorum*), setae 1*b* completely absent (alveoli of setae 1*b* present in *A. ficorum*) and median projections present on apgn (absent in *A. ficorum*).

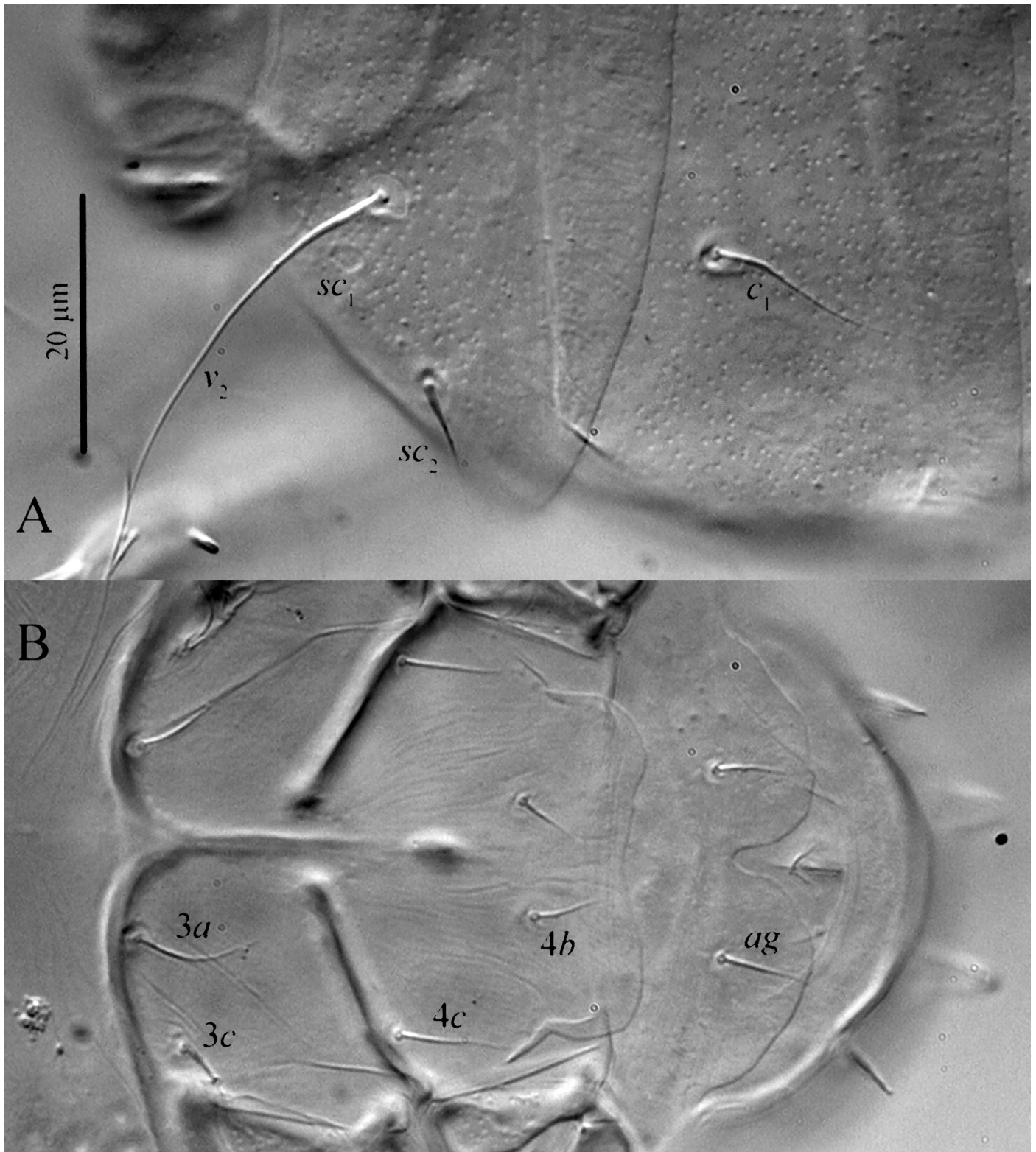


Figure 5 DIC micrographs of *Adactylidium europaeum* n. sp., female (holotype): A – left parts of prodorsum and tergite C, B – hysterosoma, ventral aspect.

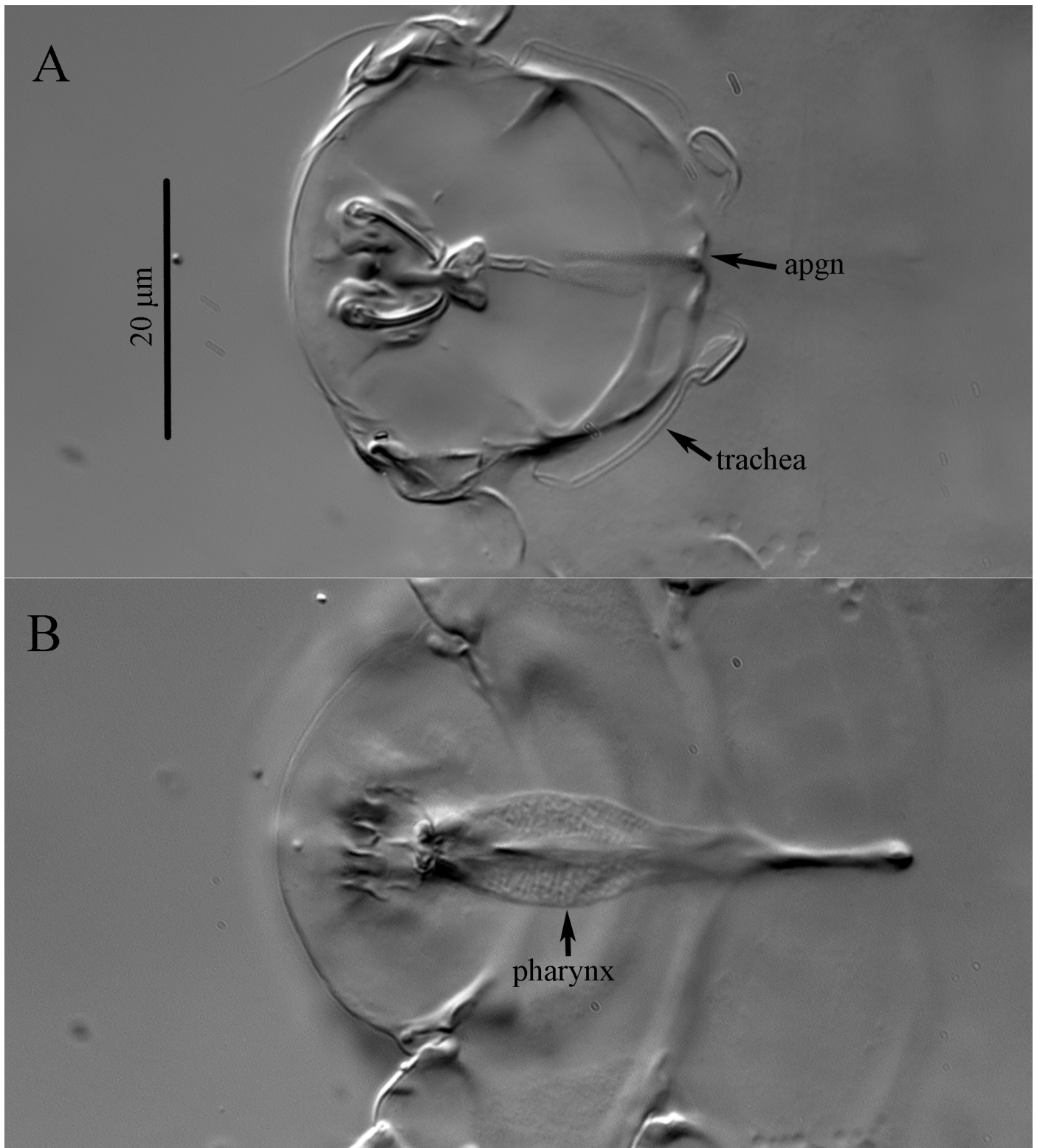


Figure 6 DIC micrograph of *Adactylidium europaeum* n. sp., female (holotype): A – gnathosomal apodeme and tracheae, B – pharynx.

Key to world species of *Adactylidium* (females)

1. Tibiotarsus I with solenidion 2
 — Tibiotarsus I without solenidion *A. absurdum* Khaustov, 2007

2. Tarsus III without solenidion 3
 — Tarsus III with solenidion *A. nicolae* (Krczal, 1959)

3. Setae *4b* present 5
 — Setae *4b* absent 4

4. Genu I with three setae; genu II with two setae; dorsal hysterosomal setae short, thickened and distinctly barbed *A. brasiliensis* Goldarazena and Ochoa, 2001
 — Genu I with four setae; genu II with three setae; dorsal hysterosomal setae long, thin and weakly barbed in basal part *A. flechtmani* Goldarazena and Ochoa, 2001

5. Genu I with three setae 6
 — Genu I with four setae 8

6. Poststernal apodeme well developed 7
 — Poststernal apodeme absent *A. irregularis* Goldarazena and Ochoa, 2001

7. Sejugal apodeme fused with prosternal apodeme; setae *1b* present
 *A. ficorum* Goldarazena and Ochoa, 2001
 — Sejugal apodeme not fused with prosternal apodeme; setae *1b* completely absent *A. europaeum* **n. sp.**

8. Genu III with one seta 9
 — Genu III with two setae 10

9. Coxisternal fields I with tiny setae *1b* *A. morazae* Goldarazena and Ochoa, 2001
 — Coxisternal fields I without setae *A. beeri* Cross, 1965

10. Femur II with three setae 11
 — Femur II with two setae *A. rumanicus* Jordana and Goldarazena, 2001

11. At least setae *f* similar in shape and length to *d* 12
 — Setae *e* and *f* short, thick and distinctly barbed, much shorter than *d* *A. gynaikeithripsi* Antonatos *et al.*, 2011

12. Setae *e* much shorter than *f* 14
 — Setae *e* and *f* subequal 13

13. Bases of setae *e* located distinctly anterior to setae *f*
 *A. lindquisti* Jordana and Goldarazena, 2001
 — Bases of setae *e* located slightly posterior to setae *f* *A. moundi* Goldarazena *et al.*, 1997

14. Aggenital plate striated 15
 — Aggenital plate smooth 16

15. Gnathosomal apodeme with a distal notch; tergite C longer than wide; setae h_1 as long as h_2 *A. costarricensis* Goldarazena *et al.*, 1997
 — Gnathosomal apodeme smooth distally; tergite C wider than long; setae h_1 three times longer

than h_2 *A. mooniensis* Goldarazena and Jordana, 2001

16. Setae v_2 and sc_2 subequal; apodemes 3 not fused with poststernal apodeme
..... *A. smileyi* Goldarazena and Ochoa, 2001

— Setae v_2 three times longer than sc_2 ; apodemes 3 fused with poststernal apodeme
..... *A. crespilii* Goldarazena and OConnor, 2001

Acknowledgements

The authors thank Dr. V.I. Rozhina (Section of Research of Quarantine Materials, Kaliningrad Interregional Veterinary Laboratory, Kaliningrad, Russia) and Dr. Halina Kucharczyk (Department of Zoology and Nature Protection, Maria Curie-Skłodowska University, Lublin, Poland) for the identification of host thrips larvae. The present research was supported by the Russian Science Foundation, grant No. 20-64-47015.

References

- Antonatos S.A., Kapaxidi E.V., Papadoulis G.Th. 2011. *Adactylidium Gynaikothripsi* n. sp. (Acari: Acarophenacidae) associated with *Gynaikothrips Ficorum* (Marshall) (Thysanoptera: Phlaeothripidae) from Greece. *Internat. J. Acarol.*, 37: suppl., 18-26. doi:10.1080/01647954.2010.531763
- Arjomandi E., Hajiqanbar H., Joharchi O. 2017. *Aethiophenax mycetophagi* sp. nov. (Acari: Trombidiformes: Acarophenacidae), an egg parasitoid of *Mycetophagus quadripustulatus* (Coleoptera: Mycetophagidae) from Iran. *Syst. Appl. Acarol.*, 22: 541-549. doi:10.11158/saa.22.4.9
- Cross E.A. 1965. The generic relationships of the family Pyemotidae (Acarina, Trombidiformes). *Univ. Kans. Sci. Bull.*, 45: 29-215.
- Goldarazena A., Jordana R., Zhang Z.-Q. 1997. *Adactylidium moundi* and *Adactylidium costarricensis*, two new species of Acarophenacidae (Acari: Tarsonemida) parasitic on Thysanoptera. *Internat. J. Acarol.*, 23: 261-268. doi:10.1080/01647959708683575
- Goldarazena A., Ochoa R., Jordana R., OConnor B.M. 2001. Revision of the genus *Adactylidium* Cross (Acari: Heterostigmata: Acarophenacidae), mites associated with thrips (Thysanoptera). *Proc. Entomol. Soc. Wash.*, 103: 473-516.
- Katlav A., Hajiqanbar H., Talebi A.A. 2015. First record of the genus *Aethiophenax* (Acari: Acarophenacidae) from Asia, redefinition of the genus and description of a new species. *J. Asia-Pac. Entomol.*, 18: 389-395. doi:10.1016/j.aspen.2015.03.011
- Khaustov A.A. 1999. Redescription of *Pediculoides* *ipidarius* Redikortsev, 1947, and a description of a new species from the genus *Paracarophenax* (Acari: Heterostigmata: Acarophenacidae). *Acarina*, 7: 57-59.
- Khaustov A.A. 2007. Two new species of mites of the family Acarophenacidae (Acari, Heterostigmata) from Crimea (Ukraine). *Vestn. Zool.* 41: 549-553.
- Khaustov A.A., Abramov V.V. 2018. A new species of *Paracarophenax* (Acari: Heterostigmata: Acarophenacidae) associated with *Triplax scutellaris* (Coleoptera: Erotylidae) from European Russia. *Acarologia*, 58: 332-341. doi:10.24349/acarologia/20184245
- Khaustov A.A., Abramov, V.V. 2019. First record and redescription of *Paracarophenax bambergensis* (Acari: Heterostigmata: Acarophenacidae) associated with *Amphotis marginata* (Coleoptera: Nitidulidae) from European Russia. *Acarina*, 27: 45-51. doi:10.21684/0132-8077-2019-27-1-45-51
- Khaustov A.A., Vorontsov D.D., Perkovsky E.E., Lindquist E.E. 2021. Review of fossil heterostigmatic mites (Acari: Heterostigmata) from late Eocene Rovno Amber. I. Families Tarsocheylidae, Dolichocybidae and Acarophenacidae. *Syst. Appl. Acarol.*, 26: 33-61. doi:10.11158/saa.26.1.3
- Krczal H. 1959. Systematik und Ökologie der Pyemotiden. *Beitr. Syst. Ökol. Mitteleurop. Acarina*, 1: 385-625.
- Lindquist E.E. 1986. The world genera of Tarsonemidae (Acari: Heterostigmata): a morphological, phylogenetic, and systematic revision, with a reclassification of family-group taxa in the Heterostigmata. *Mem. Entomol. Soc. Can.*, 118: 1-517. doi:10.4039/entm118136fv
- Redikortzev V.V. 1947. The mite *Pediculoides ipidarius* sp. n. (Acari: Pediculoididae), a parasite of bark beetles. *Entomol. Obozr.*, 29: 247-249. [In Russian]
- Walter D.E., Seeman O.D. 2017. A new species of *Paracarophenax* (Acariformes: Acarophenacidae) with a new means of phoretic attachment. *Internat. J. Acarol.*, 43: 329-335. doi:10.1080/01647954.2017.1287216
- Xu Y., Li Y.-C., Huang B.-R., Cai M.-L., Wu J.-Q., Wu S.-Q., Zhang, F.-P. 2018. First record of the genus *Paracarophenax* (Acari: Acarophenacidae) from China, with description of a new species. *Syst. Appl. Acarol.*, 23: 2411-2419. doi:10.11158/saa.23.12.10