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Pseudobakerdania gen. n. (Acari, Pygmephoroidea) with the description of two new species and some remarks on the phylogenetic position of the genus

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(With 18 figures)

Abstract

Pseudobakerdania gen. n., and two new species, *P. extrema* and *P. occulta*, are described and illustrated. A key for the determination of all species of *Pseudobakerdania* is given. The systematic position of the new genus is analyzed according to cladistic methodology and discussed. An attempt to predict the systematic characters of the unknown morphs (males and larvae) is undertaken.

Introduction

Kaliszewski (1987a, b) discussed the systematic position and evolution of some species of the subfamily Siteroptinae Mahunka, 1970. He also redescribed the genus *Siteroptes* Amerling, 1861 and described a new genus *Diroptes* within Siteroptinae. The present paper contains description of the third monophyletic group of the subfamily Siteroptinae, the genus *Pseudobakerdania*.

Pseudobakerdania is presently represented by two known species, *Siteroptes adamisi* Mahunka, 1968 from Hungary, *Siteroptes szontaghorum* Mahunka, 1977 from Mongolia, and two new species, *P. extrema* from Siberia, USSR, and *P. occulta* from Poland. Only adult females of these taxa are known.

The terminology and notation follow Lindquist (1986).

Pseudobakerdania gen. n.

Type species: *Pseudobakerdania extrema* sp. n.

Member species of the genus *Pseudobakerdania*:

1. *P. adamisi* (Mahunka, 1968) (examined paratype, slide no A61)69 from ZMH[1)],
2. *P. extrema* sp. n. (types in ZMH),

[1)] Zoologische Museum der Hamburg Universität, 2000 Hamburg 13, Martin-Luther-King-Platz 3, West Germany.

3. *P. occulta* sp. n. (types in ZMH),

4. *P. szontaghorum* (Mahunka, 1977) (examined holotype from HNHM[2]).

Diagnosis: Species of *Pseudobakerdania* are distinguishable from those of all other Pygmephoridea by the combination of the following female features[3]).

1'. Peritremae troughlike, more than three times longer than wide.

2'. Prodorsum shield with setae v_1, sc_2, and sensilli sc_1. Setae v_2 absent.

3. Setae e and f on tergite EF present.

4'. Lateral plates (La) and posterior sternal plate (StPo) fused, their posterior edge forms almost straight line.

5'. Setae 1c of coxae I bifurcate.

6'. Coxal plates II with two pairs of setae. Setae 2c absent.

7'. Coxal plates IV with one pair of setae (4c). Setae 4a absent.

8. Tarsus and tibia of leg I separated.

9. Tarsus I with 13 setae.

10. Femur I with four setae.

11'. Genu I with two or three setae.

12'. Genu II with two setae.

Description (female): Gnathosoma rectangular in outline, slightly longer than wide, with three pairs of setae (Gd_1, Gd_2, Gv_2). Cheliceral stylets small, with bases shorter than half palpal width. Pharynx forming three pharyngeal pumps in diosoma.

Dorsum of idiosoma: Stigmae slit-like. Peritremae long, strongly sclerotized, oriented posteromedially to gnathosoma. Prodorsal shield with setae v_1, sc_2 and sensilli sc_1; setae v_2 absent. Hysterosoma with setae c_1, c_2, d, e, f, h_1, h_2 and cupules ia, im, and ih.

Venter of idiosoma: Apodemes weak. Lateral opisthosomal plates (La) fused with posterior sternal plate (StPo), their posterior edge forming almost straight line. Coxae I with

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[2]) Hungarian National History Museum, Budapest VIII, Baross u.13, Hungary.

[3]) Characters marked with a prime are apomorphic compared with the most primitive character states in Siteroptidae sensu Kaliszewski (in prep.) which includes the following genera: *Asensilla* Rack, 1974, *Diroptes* Kaliszewski, 1987, *Elattoma* Mahunka, 1969, *Pseudobakerdania* gen. n., part of *Pygmephorellus* Cross & Moser, 1971 sensu Savulkina (1981), part of *Siteroptes* Amerling, 1861 sensu Savulkina (1981).

two or three pairs of setae, 1c bifurcate. Coxal plates II with two pairs of setae. Coxal plates III with three pairs of setae. Coxal plates IV with one pair of setae (4c), 4a absent. Posterior sternal plate with or without setae 4b. Tergite Ps with three pairs of setae.

Legs: Leg I with one claw, without empodium. Legs II-IV with paired claws and membranous empodia. Leg setal formula: leg I, 1 - 4 - 3 or 2 - 6(2ϕ) - 13(2ω); leg II, 1 - 3 - 2 - 4(1ϕ) - 7(1ω); leg III, 1 - 2 - 2 - 4(1ϕ) - 7; leg IV, 1 - 2 - 1 - 4(1ϕ) - 6.

Pseudobakerdania extrema sp. n.

Female (Figs 1-8)

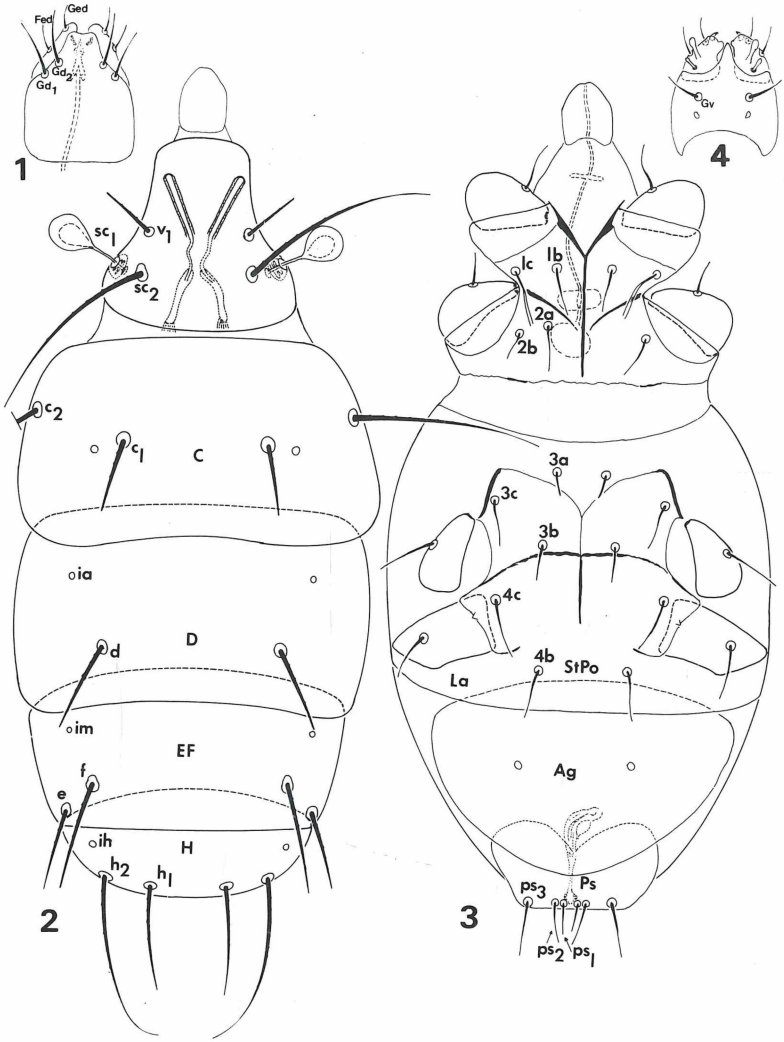
Diagnosis: *P. extrema* seems to be most similar to *P. szontaghorum* and my be distinguished from this species and other species of *Pseudobakerdania* by the presence of only two setae on genu I.

Description: Body length 245 µm, body width 100 µm (all measurements from the holotype).

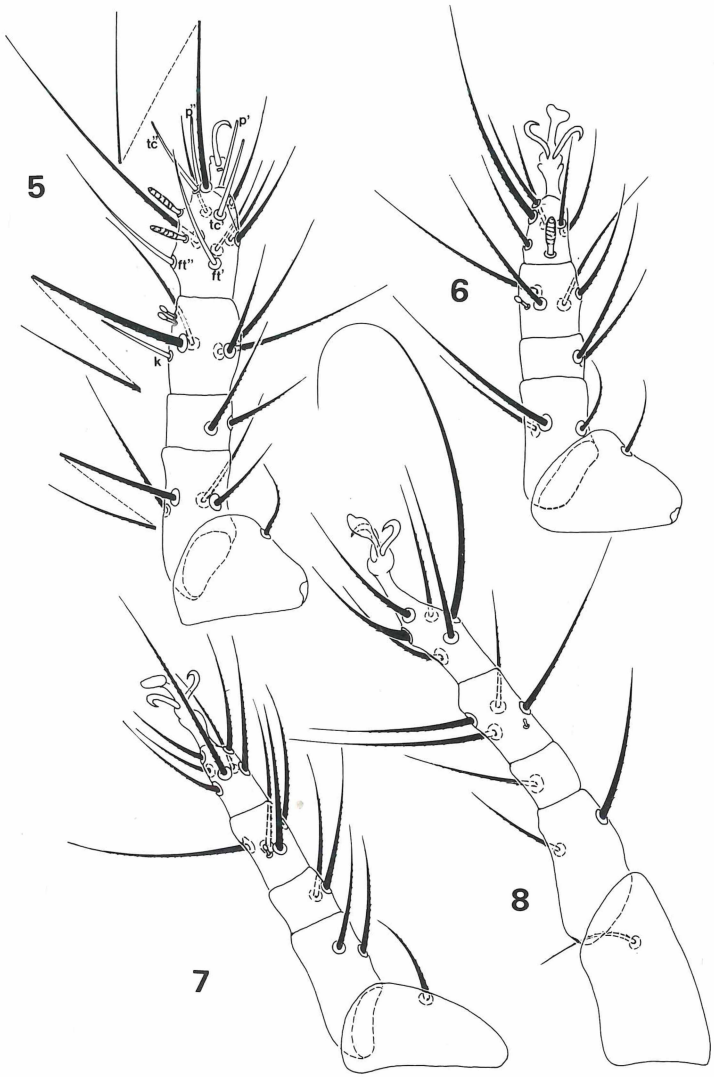
Gnathosoma (Figs 1, 4) 22 µm long, 17 µm wide, rectangular in outline, with two pairs of setae (Gd_1, Gd_2) dorsally and one pair of setae (Gv_2) ventrally. Setae Gd_1 and Gd_2 one and half times longer than setae Gv_2, almost equal to half gnathosomal width. Cheliceral stylets small, with bases directed anteriorly. Palpi directed anteriorly, approximate, with two setae Fed, Ged shorter than setae Gv_2, one solenidion, one modified eupathidial seta, and a single, small, terminal tibial claw each.

Idiosoma with delicate cuticular granulation.

Dorsum (Fig. 2): Stigmae slitlike. Peritremae 23 µm long, 4 µm wide, sides parallel. Distance between anterior ends of peritremae nearly five times longer than between posterior ends. Cupules ia, im and ih present. Length of setae (in µm): v_1 19, sc_1 27, sc_2 66, c_1 22, c_2 59, d 28, e 25, f 35, h_1 35, h_2 60. Distances between setae (in µm): v_1-v_1 30, sc_2-sc_2 32, v_1-sc_2 12, c_1-c_1 45, c_2-c_2 100, f-f 60, e-f 11, h_1-h_1 23, h_1-h_2 14. Sensilli (sc_1) capitate, with delicate striations dorsally and small spines ventrally. Setae v_2 absent. Setae v_1, sc_2, c_1, d, e, f, and h_1 coarse, with relatively blunt tips. Setae c_2 and h_2 coarse with fine tips. Venter (Fig. 3): Apodemes relatively weak. Anteromedian apodeme not joined with posteriorly deflected apodemes II, nor with sejugal apodeme. Posteromedian apodeme well visible posteriorly in relation to apodemes IV. Apodemes III in form of two sections, directed anteriorly to trochanters III. Apodemes V undeveloped. Lateral opisthosomal plates (La) fused with posterior sternal plate (StPo), their posterior edge form almost straight line Length of setae (in µm): 1b 15, 1c 19, 2a 14, 2b 9, 3a 8, 3b 12, 3c 15, 4b 16, 4c 18, ps_1 9, ps_2 14, ps_3 18. Distances between setae (in µm): 3a-3a 15, 3c-3c 53, 3b-3c 20, ps_3-pd_3 26. Setae 1a, 2c, and 4a absent. Setae 1c bifurcate. Setae 3a hairlike, with relatively blunt tips, shorter



Figs 1-4: *Pseudobakerdania extrema* sp. n., adult female. Gnathosoma: dorsal aspect (1), ventral aspect (4). Idiosoma: dorsal aspect (2), ventral aspect (3).



Figs 5-8: *Pseudobakerdania extrema* sp. n., adult female. Leg I (5), leg II (6), leg III (7) and leg IV (8).

than other propodosomal and metapodosomal setae which are flagellate. Setae ps needlelike, very delicate. Legs (Figs 5-8) relatively robust. Leg I approximately equal to leg IV and longer than leg II and III. Leg I with one claw, without empodium. Legs II-IV with paired claws and stalked membranous empodia. Formula of setae on leg I: 1 - 4 - 2 - 6(2ϕ) - 13(2ω). Tarsus with three eupathidia (p', p", tc") on its termination, one (tc') in its distal third, and two eupathidia (ft', ft") in its third proximal part. Solenidion ω_2 7 µm long, striate, arising in distal third of tarsus. Solenidion w_1 6 µm long, striate, arising in the middle of the tarsus. Solenidia ϕ_1 2.5 µm long and ϕ_2 3 µm long, not striate, both arising in the middle of the segment. Eupathidium k 10 µm long, sharply ended, inserted slightly proximally in relation to the segment middle. Formula of setae on leg II: 1 - 3 - 2 - 4(1ϕ) - 7(1ω). Solenidion ω 6 µm long, striate, inserted at the tarsus base. Solenidion ϕ 2.5 µm long, striate, arising in the middle of the tibia. Formula of setae on leg III: 1 - 2 - 2 - 4(1ϕ) - 7. Solenidion ϕ 2 µm long, similar to solenidion ϕ on leg II, arising slightly proximally to the segment middle. Formula of setae on leg IV: 1 - 2 - 1 - 4(1ϕ) - 6. Solenidion ϕ very short (1.5 µm), not striate, inserted in third proximal of the tibia.

Male and larva unknown.

Type material: Female holotype (slide no. Su - 10 - 0018) and five paratype were collected from soil and litter from larch forest near Lake Udsu-Nur and town Tannu-Olla, Siberia, USSR, on September 5, 1978 by I.W. Stebaew.

All types in the collection of ZMH.

Pseudobakerdania occulta sp. n.

Female (Figs 9-16)

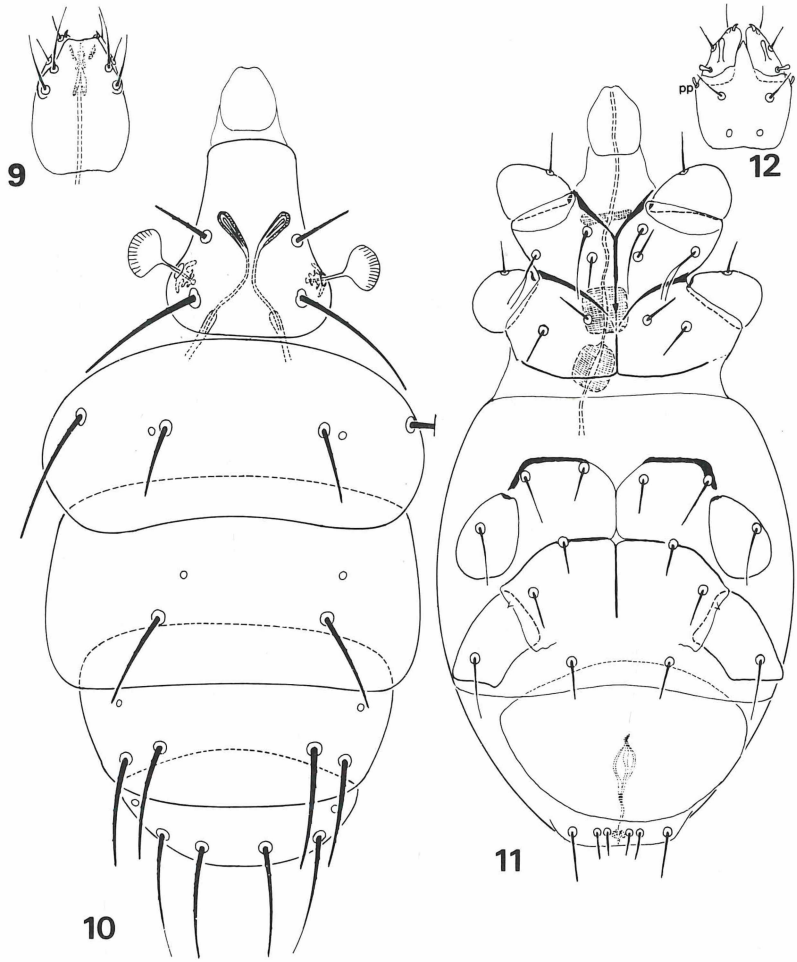
Diagnosis: *P. occulta* ist most similar to *P. adamisi* and can be distinguished from this species by the relatively length of the dorsal setae and the structure of setae 2a and 2b on coxae II (see key).

Description: Body length 217 µm, body width 90 µm (all measurements from the holotype).

Gnathosoma (Fig. 9, 12) 18 µm long, 13 µm wide, rectangular in outline, with two pairs of setae (Gd_1, Gd_2) dorsally, and one pair of setae (Gv_2) ventrally. Setae Gd_1 and Gd_2 almost twice as long as setae Gv_2. Cheliceral stylets small, with bases directed anteriorly. Palpi directed anteriorly, approximate, with solenidion-like seta pp, two setae Fed, Ged slightly longer than setae Gv_2, one solenidion, one modified eupathidial seta and a single terminal tibial claw each.

Idiosoma with delicate cuticular granulation.

Dorsum (Fig. 10): Stigmae slitlike. Peritremae 10 µm long, 3 µm wide, narrowing posteriory. Distance between anterior



Figs 9-12: *Pseudobakerdania occulta* sp. n., adult female. Gnathosoma: dorsal aspect (9), ventral aspect (12). Idiosoma: dorsal aspect (10), ventral aspect (11).

ends of peritremae more than five times longer than between posterior ends. Cupulus ia, im and ih present. Length of setae (in µm): v_1 15, sc_1 20, sc_2 39, c_1 20, c_2 37, d 26, e 30, f 31, h_1 31, h_2 34. Distances between setae (in µm): v_1-v_2 25, sc_2-sc_2 28, v_1-sc_2, c_1-c_1 43, c_2-c_2 90, d-d 45, f-f 42, e-f 9, h_1-h_1 17, h_1-h_2 11. Sensilli with delicate striations. Setae v_2 absent. All dorsal setae coarse. Setae h_2 with more fine endings than other dorsal setae. Venter (Fig. 11): Apodemes relatively weak. Anteromedian apodeme with small knob-like thickening anteriorly to its connection with posteriorly deflected apodemes II. Sejugal apodeme very weak. Posteromedian apodeme well visible posteriorly to apodemes IV. Apodemes IV indistinct in its posterior part. Apodemes V undeveloped. Lateral opisthosomal plates (La) fused with posterior sternal plate (StPo), their posterior edges forming almost straight line. Length of setae (in µm): 1a 19, 1b 10, 1c 16, 2a 10, 2b 10, 3a 10, 3b 10, 3c 13, 4b 10, 4c 10, ps_1 7, ps_2 8, ps_3 14. Distances between setae (in µm): 3a-3a 16, 3c-3c 50, 3a-3b 14, 3b-3c 20, ps_3-ps_3 26. Setae 2c and 4a absent. Setae 1a, 1c, and 4b slagellate, distingtly longer than other propodosomal and metapodesomal setae which are hairlike, relatively bluntly ended. Setae 1c bifurcate. Setae ps coarse, blunt.

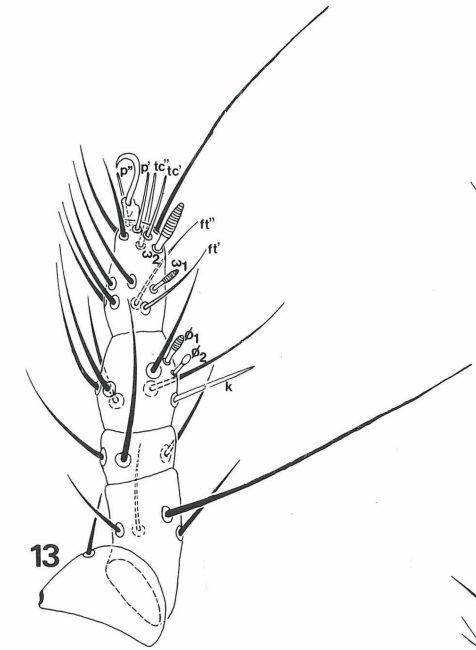
Legs (Figs 13-16) relatively robust. Leg I slightly longer than leg IV and distinctly longer than legs II and III. Leg I with one claw, without empodium. Legs II-IV with paired claws and stalked membranous empodia. All claws similar in size. Formula of setae on leg: 1 - 4 - 3 - 6(2ϕ) - 13 (2ω). Tarsus with four eupathidia (p', p", tc', tc") apically. Eupathidia ft' and ft" arising in proximal forth of tarsus. Solenidion ω_2 7 µm long, striate, arising in distal third of the segment. Solenidion ω_1 4 µm long, striate, arising in proximal third. Tibia with two not striate solenidia, ϕ_1 4 µm long and ϕ_2 3 µm long in its distal forth. Eupathidium k 12 µm long, arising in tibial proximal third. Genu with only three setae. Formula of setae on leg II: 1 - 3 - 2 - 4(1ϕ) - 7(1ω). Solenidion ω 6 µm long, striate, inserted at the tarsal base. Solenidion ϕ 3 µm long, not striate, inserted in tibial proximal third. Formula of setae on leg III: 1 - 2 - 2 - 4(1ϕ) - 7. Solenidion ϕ 3 µm long, similar to its homologe on tibia II.

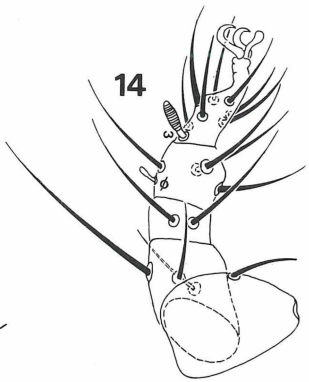
Formula of setae on leg IV: 1 - 2 - 1 - 4(1ϕ) - 6. Solenidion ϕ very short (1.5 µm) arising in tibial proximal fourth.

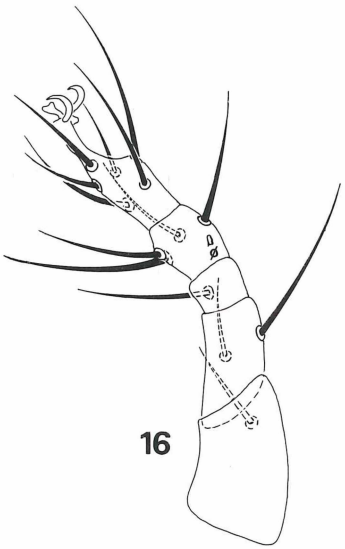
Male and larva unknown.

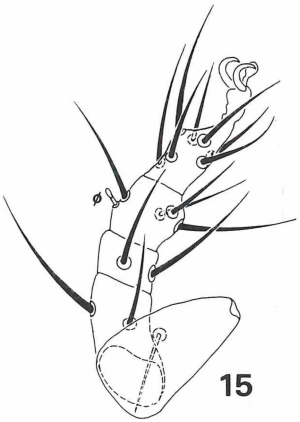
Type material: Female holotype (slide no. P1 - 486 - 0459) and seven paratypes were found in the sample of litter and soil from oak forest near Gliwice, Poland, on August 5, 1975 by J. Błoszyk.

All types in the collection of ZMH.









Figs 13-16: *Pseudobakerdania occulta* sp. n., adult female. Leg I (13), leg II (14), leg III (15) and leg IV (16).

Key to the Species of the Genus *Pseudobakerdania* gen. n.

1. Genu I with two setae (Fig. 5) . . . . . *P. extrema* sp. n.
- Genu I with three setae (Fig. 13) 2

2. Coxal plates I with two pairs of setae (1a absent); setae 4b absent from posterior sternal plate (StPo) (Mahunka 1977, Fig. 2) . . . . . *P. szontaghorum* (Mahunka, 1977)
- Coxal plates I with three pairs of setae; setae 4b present 3

3. Setae 2a and 2b on coxal plates II flagellate, similar to setae 1a on coxae I; setae c_1 almost equal setae c_2 (Mahunka 1968, Fig. 7) . . . . . *P. adamisi* (Mahunka, 1968)
- Setae 2a and 2b on coxal plates II hairlike, similar to setae 1b (Fig. 11); setae c_1 about half as long as setae c_2 (Fig. 10) . . . . . *P. occulta* sp. n.

Discussion

The new genus *Pseudobakerdania* seems to be closely related to *Diroptes* Kaliszewski (1987b) and *Siteroptes* Amlering, 1861 sensu Kaliszewski (1987a), sharing with them such synapomorphic characteristics of females as: (1) peritremae trough-like,(2) coxal plates II with two pairs of setae, (3) setae 1c bifurcate, (4) genu II with two setae. The phylogenetic relationships ammong *Diroptes, Siteroptes,* and *Pseudobakerdania* are difficult to asses with certainty as we do not know any larvae of the genera *Diroptes* and *Pseudobakerdania,* and any males of the genus *Pseudobakerdania*. *Diroptes* and *Pseudobakerdania* may be sister groups (Fig. 18) since they share such a synapomorphic as the fused lateral plates (La) with the posterior sternal plate whose posterior edges form almost a straight line. On the other hand one can not exclude that *Siteroptes* and *Pseudobakerdania* may be sister groups (Fig. 17) since they share the absence of setae 4a on coxal plates IV as a synapomorphic.

To some extent one can predict some of the characters for the unknown males and larvae of the genus *Pseudobakerdania* based on analysis of the common systematic features for the females, males and larvae in the other pygmephorid genera. Theoretically, males of the genus *Pseudobakerdania* should share the following apomorphic characters with the females: (1) prodorsal shield with only three pairs of setae (setae v_2 absent), (2) coxae II with two pairs of setae (setae 1a absent), (3) setae 4a absent from coxae IV, (4) genu I with two or three setae, (5) genu II with two setae. Larvae my share with females the following apomorphic characters: (1) prodorsal shield with only three pairs of setae (setae v_2 absent), (2) genu I with three or two setae, (3) genu II with two setae.

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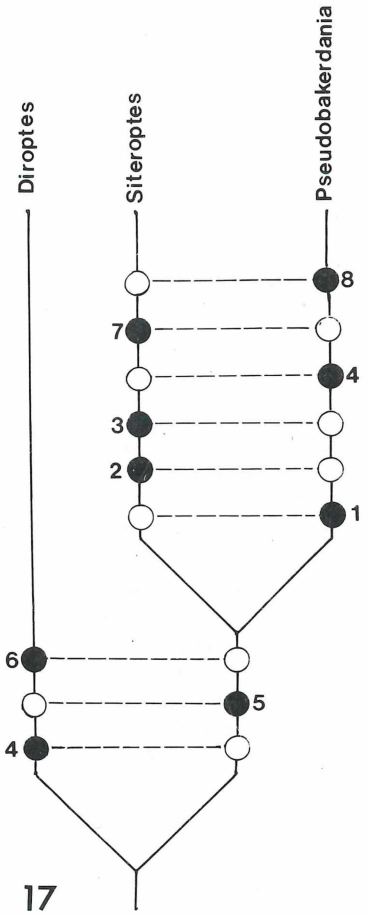

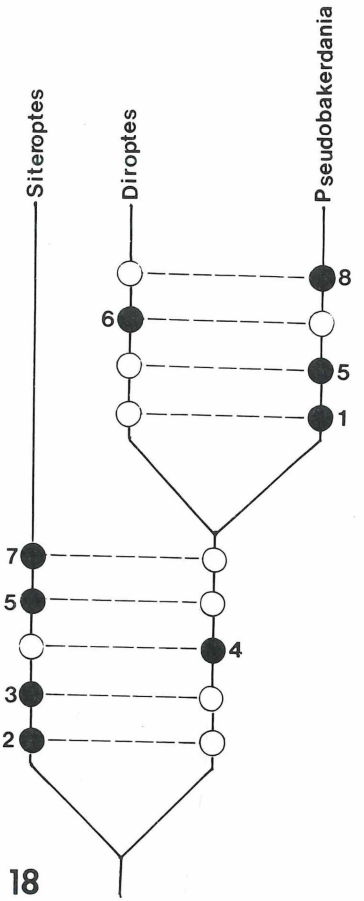

Figs 17-18: Tentative cladograms for females of the following genera: *Diroptes* Kaliszewski,1988, *Siteroptes* Amerling,1861 and *Pseudobakerdania* gen. n. Plesiomorphic characters marked as empty circles: (1) setae v_2 present (2) setae e present, (3) body relatively robust, (4) posterior edges of lateral plates (La) and posterior sternal plate (StPo) form wavy line, (5) setae 4a present, (6) setae 4c present, (7) tarsus I with 13 setae, (8) genu I with four setae. Apomorphic characters marked as closed circless: (1) setae v_2 absent, (2) setae e absent, (3) body relatively long and slim, (4) posterior edge of joined lateral plates with posterior sternal plate forms almost straight line, (5) setae 4a absent, (6) setae 4c absent, (7) tarsus I with 12 setae, (8) genu I with three or two setae.

References

Cross, E.A. & Moser, J.C., 1971: Taxonomy and biology of some Pyemotidae (Acarina: Tarsonemoidea) inhabiting bark beetle galleries in North American Cornifers. - Acarologia, *13:* 47-64. Paris.

Kaliszewski, M., 1987a: *Siteroptes longisomus* sp. n. (Acari: Pygmephoridea) from Siberia, with remarks on the genus and key to the species. - Ent. Mitt. zool. Mus. Hamburg, *9* (130): 21-36. Hamburg.

Kaliszewski, M., 1987b: *Diroptes* gen. n. (Acari: Pygmephoroidea) with a key to the species. - Ent. Mitt. zool. Mus. Hamburg, *9* (132): 115-122. Hamburg.

Kaliszewski, M. (in prep.): Revision of the lower Pygmephoroidea (Acari: Tarsonemina).

Lindquist, E.E., 1986: The world genera of Tarsonemidae (Acari: Heterostigmata): a morphological, phylogenetical and systematic revision, with a reclassification of family-group taxa in the Heterostigmata. - Mem. ent. Soc. Can., *136:* 517 pp., Ottawa.

Mahunka, S., 1968: *Xystrorostrum* gen. nov. und eine neue *Siteroptes*-Art aus Ungarn (Acari). - Reichenbachia, *10:* 127-131. Dresden.

Mahunka, S., 1977: Neue Tarsonemida Arten aus Ungarn (Acari). - Folia ent. Hung., *30:* 67-73. Budapest.

Rack, G., 1974: Neue und bekannte Milbenarten der Überfamilie Pygmephoroidea aus dem Saalkreis bei Halle (Acarina, Tarsonemida). - Ent. Mitt. zool. Mus. Hamburg, *4* (87): 499-521. Hamburg.

Savulkina, M.M., 1981: Sistema, ekologiya i rasprostranenie kleshchei sem. Pygmephoridae Cross, 1965 (Trombididormes). - Ent. Obozr., *60:* 654-450. Moskva. (In Russian).

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