

Description of *Lyrifissella* gen. n. and Lyrifissellidae fam. n.
(Acari, Oribatei).

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ABSTRACT

Lyrifissella new genus and *Lyrifissellidae* new family (Acari, Oribatei) are described. The type species, *Pedrocortesella latoclava* Hammer, 1966, from Milford, New Zealand, is fully redescribed from the holotype. The congeneric species, *Pedrocortesella cryptonota* Hammer, 1966, Lake Ratoitis, New Zealand, is compared with the type species and transferred to the new genus. *Plateremaeus vestitus* Tragardh, 1931, the species thought to be very close to *Plateremaeus ornatissimus* (Berlese), and which was erroneously used to characterize *Plateremaeus* and *Plateremaeidae*, causing them to be misunderstood for about five decades, is now placed in *Lyrifissella*.

Lyrifissellidae fam. n.

Type Genus: *Lyrifissella* gen. n.

Characteristics – Eupheredermes, i. e., nymphs retain exuviae of previous instars; adults without exuviae. Tracheal system sub-normal, i. e., trachea I missing. Pycnototics, i. e., without areae porosae on notogaster. Body covered by cerotegument, with or without microtubercles; legs covered by a thick reticular cerotegument; notogastral, prodorsal and ventral cuticle foveate or reticulate. **Apo le**, **apo c**, **apo bo** absent; **apo ro**, **apo ex** with mammillate structures. Prodorsum with a transversal furrow on tooth **p** area. **le** lateral, on apophysis, anterior and close to **ro**; **ro** lateral; **ex** short, lateral; **in** very short, on tubercle; bothridium dorso-lateral, dark, covered by cerotegument, very close to notogastral margin; **ss** clavate, the head black, pilose. Centro-dorsal setae absent on notogaster; with five pairs of notogastral setae; **ps1** ventral, closer to its homologous seta than **h1**; **ps2**, **ps3** close together, away from **ps1**, dorso-lateral, at notogastral margin, anterior to **r2**; notogaster distal margin salient between lyrifissures **ip** terminal ends; **h1** latero-ventral, short, close together, at the terminal salience; **r2(1p)** latero-ventral, at notogastral margin, posterior and close to **ip**. Lyrifissures large to median size; **ip** oblique, long. Notogaster flat, almost

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rounded with notogastral tectum between **bng**, **lambda** lines. Median sized mites, ranging from 500 to 800 μ . **Apo I** complete, with no back turned extension; other apodemata incomplete, with strong apodematic bonds as transversal bars; **apo IV** resembling a "hat" over genitalia. Epimeral chaetotaxy: 3: 1: 3: 3; epimeral setae of equal size. Genitalia almost square; anal aperture pyriform to almost cylindrical; genital and anal openings contiguous, completely fused together, the contours no longer seen at the contact area; genital and anal plates foveate; **apo ad**, **apo ag** present. Seven pairs of genital setae on a sole longitudinal row, close to inner margin; **ag** away from genitalia, posterior to **it**, below the joining point of the plates; two pairs of anal setae on a sole longitudinal row; three pairs of adanal setae; **adl** postero-lateral. Tectopodia absent; pedotectal tooth **p** present; lateral carenae present; acetabula I, II cotyloid and integument forming a blunt structure. Leg articulations on proximal sockets, i. e., sockets on proximal ends of tarsi, tibiae and genua; femoral and trochanteral tracheae present; Ts I, II distal apophyses present; tibial apophysis of median size, covering proximal end of tarsus; Tr. and Fe-Tr articulation outside acetabula; femora proximal orientation after trochantera articulation straight; tarsi pedicels not too short, as long as one third of the segment; three strong claws, slightly serrulate on outer margin, the medial one the strongest; famulus enclosed on Ts I; (**it**), (**tc**) on apophyses, with long secondary branches; **ft**" Ts I a little behind **omega**; **ft**' lateral, at the same height as **a**; **pv**" Ts I anterior to **pv**'; (**pl**) Ts I almost at the same level; **v**"A Ts I anterior to **v**"A; **omega** 1 Ts I paraxial, larger than **omega** 2; **d** Tb I at the same direction of **1**'; **fil** long, antiaxial, **fi2** short, paraxial on Tb I; **d** Ge I very close to **sigma**; Fe I, II with **d** absent, **1**', **1**" distal, and **3v**', one proximal, one medial, one distal; **ft**" Ts II, III anterior to **ft**', away from it; **pl**' present on Ts II; **pl**" Ts II, III, IV absent; **pv**" Ts II anterior to **pv**'; **omega** 1 close to **omega** 2 on Ts II; **d** Tb II well anterior to (**1**), at distal end; **fi** Tb II close to **d**; **sigma** Ge II, III close to **d**; **v**' Ge II absent; **pl**' Ts III, IV absent; **ft**' Ts III present, away from **ft**"; **pv**' Ts III anterior to **pv**"; **fi** Tb III close to **d**; Fe III with **d**, **v**' proximal, **1**' distal; **ft**" Ts IV present, **ft**' absent; Fe IV with **d**, **v**' median. Leg chaetotaxy: Ts. 19(2) – 17(2) – 15-14; Tb. 4(2) – 5(1) – 4(1) – 4(1); Ge. 4(1) – 3(1) – 2(1) – 2; Fe. 5 – 5 – 3 – 2; Tr. 1 – 1 – 2 – 1.

Lyrifissella gen. n.

Type species: *Pedrocortesella latoclava* Hammer, 1966

Diagnosis – *Lyrifissella* is close to *Hammeriella* Paschoal, from which it differs mainly by the following features: adults without exuviae; **apo c**, **apo bo** absent; prodorsum with a transversal furrow medianly; **le** lateral, close to **ro**; notogaster distal margin prominent; **ps2**, **ps3** away from **ps1**, dorso-lateral, anterior to **r2**; **h1**, **r2** latero-ventral; genital and anal apertures completely joint together; **apo ad** in arc before anal aperture; two pairs of anal setae; genital setae almost equidistant one from the other; **ag** below the joining point of anal

and genital apertures; **adl** postero-lateral; tibial apophysis of median size; tarsi pedicels not too short, with three strong, serrulate claws; **d** Tb I at the same direction of **1'**; **fi** Tb II close to **d**; **v'** Ge II, III absent; **pl'** Ts III, IV absent.

Description — Body of clarified apocimens covered by cerotegument, with or without microtubercles; legs covered by a thick polygonal mass, with no microtubercles generally; notogastral, prodorsal, ventral region foveate or reticulate. Exuviae absent on adults. **Apo le**, **apo c**, **apo bo** absent; **apo ro**, **apo ex** with mammillate protuberances; prodorsum with a transversal furrow medianly at **p** level. **le** lateral, on apophysis, anterior and close to **ro**; **ro**, **ex** lateral; **in** very short, on tubercle; bothridium dorso-lateral, dark, covered by cerotegument, very close to notogastral margin; **ss** clavate, head black, pilose, large to slightly expanded. **ps1** ventral, closer to its homologous seta than **h1**; notogaster distal margin prominent between **ip**; **ps2**, **ps3** close together, away from **ps1**, dorso-lateral, at notogastral margin, anterior to **r2**; **h1** latero-ventral, on tubercle, close to its homologous seta; **r2(1p)** latero-ventral, at notogastral margin, posterior and close to **ip**; **r3 (1m)** absent.

Lyrifissures large to median size; **ip** oblique, large. Notogaster flat, rounded. Median size mites, ranging from 500 to 800 μ . Epimeral apodemata with strong apodematic bonds; **apo IV** as a "hat" over genitalia; epimeral chaetotaxy 3: 1: 3: 3. Genital and anal apertures contiguous, completely fused; anal aperture pyriform to almost cylindrical; genitalia proximal margin at the level of coxae III; genital and anal plates foveate; **apo ag**, **apo ad** present; **apo ad** as an arc before anal plate; genitoanal chaetotaxy 7 - 1 - 2 - 3; genital setae on a sole longitudinal row; **g1 - g2**, **g2 - g3** further away than the other setae; **ag** posterior to genitalia, below the joining point of the apertures, away from them; anal setae on a sole longitudinal row; **adl** postero-lateral. Tibial apophysis I of median size; tarsi pedicels not too short, with - three strong, serrulate claws, the medial one the strongest; Ts I famulus enclosed; (**it**), (**tc**) on apophyses, with long secondary - branches; **d** Tb I at the same direction of **1'**; **fi** Tb II close to **d**; **v'** Ge II absent; **pl'** Ts III, IV absent; all other leg features as for the family. Leg chaetotaxy: Ts. 19(2) - 17(2) - 15 - 14; Tb. 4(2) - 5(1) - 4(1) - 4(1); Ge. 4(1) - 3(1) - 2(1) - 2; Fe. 5 - 5 - 3 - 2; Tr. 1 - 1 - 2 - 1.

Discussion: The name *Lyrifissella* is derived from the remarkable lyrifissures present on dorsum and lateral body of these mites.

Lyrifissella latoclava (Hammer) **comb. n.**

Pedrocortesella latoclava Hammer, 1966: 49, fig. 62

Types — Female holotype n^o. 285, collected by Marie Hammer in Milford, New Zealand, from humid moss on a stone, in a *Nothofagus* forest; no collecting date mentioned. Depository: Zoologisk Museum, Copenhagen, Denmark.

Diagnosis — *L. latoclava* is close to *Lyrifissella cryptonota* (Hammer, 1966), from which it differs mainly by the following features: notogaster foveate, forming no reticulum, foveae circular, deep, large, set apart one from the other

on central portion, and smaller and closer together laterally and posteriorly; prodorsum not reticulate, with deep foveae of salient sharp-pointed margins on rostrum; cuticle smooth with no microtubercles on body and legs; **apo bo** without strong transversal bar; **ss** clavate, of small size; larger species.

Description — Integument — Cuticle of clarified specimens smooth, without microtubercles on body and legs; body and legs covered by a thick layer of cerotegument, forming polygonal reticulum; leg cerotegument as high as the width of the segment. Notogastral cuticle foveate, with large, deep circular foveae set apart one from the other on central portion, and with smaller and closer foveae on lateral and posterior notogaster; prodorsum foveae deep, with sharp-pointed margins on rostrum, and shallow foveae of lesser diameter posteriorly; foveae of lateral opistosome, infracapitulum, genitoanal and epimeral regions large to small, deep, with prominent edges; anal and genital plates equally foveate; legs without foveae. Exuviae absent on adults. **Prodorsum** — **Apo le** absent; **apo ro** strong on coxal region, forming no transversal bar on epimeral region; **apo ro** forming a lateral loop without mammillate saliences; **apo c** absent; **apo ex** a strong bar originated on bothridium, pointing to **apo ro** loop, forming no mammillate protuberance; **apo in** a well sclerotized plate resembling an anvil; **apo bo** absent. With a furrow at pedotectal **p** tooth area, between legs I, II. **le** anterior to **ro**, lateral, on apophysis, being smooth, bent to the sagittal plane; **ro** lateral, smooth, close to **le**, bent to the sagittal plane; **ex** short, lateral, ahead and below bothridium; **in** very short, on tubercle, up turned; bothridium dorso-lateral, salient, almost black, with no ventral salience, covered by a deep cerotegumental mass, very close to notogastral margin, the opening turned slightly forward and outward; distance between bothridia 165μ (F); **ss** short, clavate, well expanded — distally, forming a black, pilose club, emerging straight then turning towards the side at an obtuse angle; **ss** length 96μ (F). Prodorsum length 206.3μ (F); width 300μ (F). **Notogaster** — Dorsum flat, excavated, almost circular. With notogastral tectum between **bn**, **lambda** lines. Five pairs of median to large size lyrifissures; **ia**, **im**, **ip** oblique; **ip** large; **ih**, **ips** smaller than the dorsal. Posterior margin of notogaster salient between **ip**. Latero-abdominal gland opening posterior and close to **in**. Five pairs of notogastral setae; **r2** (**1p**) latero-ventral, at notogastral margin, at the same direction of **ip**, bent to the sagittal plane; **hl** latero-ventral, short, pointed downward, on tubercle; **ps1** ventral, further apart from its homologous seta than **h1**, **ps2**, **ps3** dorso-lateral, at notogastral margin, bent to the sagittal plane, anterior to **r2**. Notogaster length 577.5μ (F); width 522.5μ (F); length/width 1.10 (F). **Epimeral region** — **a**, **m** normal; labiogenal apodeme narrow; **h** short, straight; mentotectum narrow. **Apo I** complete, well developed close to acetabulum I, forming a short bar linking the homologous — parts; **apo II** incomplete, as large trapezoidal blades, linked to the homologous part by a transversal bar of undulated borders due to foveae; **apo sj** incomplete, also presenting a transversal bar on epimeral region; **apo III** incomplete with no apodemal bond; **apo IV** reduced, with a curved strong bar resembling a hat over genitalia. Epimeral chaetotaxy 3 : 1 : 3 : 3 ; epimeral setae short, smooth, not on apophysis. **Genitoanal region** — Anal and genital apertures contiguous, fused one into the other, the contours no longer seen at the contact area.

Genital opening almost square; anal aperture pyriform; genitalia proximal margin posterior to the level of coxae IV. Genitalia length $153. \mu(F)$; width $132.1 \mu(F)$; anal opening length $164.3 \mu(F)$; width $153.5 \mu(F)$; Genitalia inner margin weakly sclerotized; genitalia outer margin and anal outer and inner margins well sclerotized; **apo ad**, **apo ag** present; **apo ad** linked to its homologous apodeme forming a well sclerotized arc before the anal plate. Genitoanal chaetotaxy 7 - 1 - 2 - 3; genital setae on a sole longitudinal row; **g1**, **g2**, **g3** away one from the other; **g1** at distal margin; **g3** through **g7** almost equidistant; anal setae on a sole longitudinal row on small re-entrances of anal plate inner margin; **ag** away from genitalia; posterior to it, below the plates joining point; **ad** well developed, on small apophysis, **ad3** at a height equivalent to half the anal plate, being the farthest from the sagittal plane, **ad2**, **ad1** close together, near genitalia latero-distal margin. **Lateral features** - Tectopia absent; pedotectal tooth **p** present, very similar to a true pedotectum when seen from above, being not auriculiform however; lateral carenae present on proterosome; acetabula I, II integument and cotyloid forming a blunt structure. **Legs** - Ts - Tb, Tb - Ge, Ge - Fe articulations on proximal sockets, i. e., sockets on proximal ends of tarsi, tibiae, genua. Femoral and trochanteral tracheae present. Tarsi I, II with distal apophyses; Tb I apophysis of median size, forming no transparent collar at **fi** base. Tr and Fe - Tr articulation of all legs outside acetabula; proximal femora orientation, after trochantera articulation, almost straight; tarsi pedicels narrow, not too short, about one third the length of the segment; with three strong claws, finely serrulate on outer margin, the medial one slightly stronger than the others; tarsi (**v**), (**p**), (**it**), (**tc**) with long secondary branches; all other with short spines; (**tc**), (**it**) on apophyses. **Ts. I** - **ft**" dorsal, slightly behind **omega**; **ft**' lateral, at the same level as (**a**); **pv**' posterior to **pv**"; **pl**', **pl**" at the same level; **v**"A anterior to **v**'A; **omega** 1 paraxial, larger than **omega** 2, both on a dorsal, antiaxial, apophysis of tarsus; famulus enclosed on tarsus I; Ts. length $132. \mu(F)$. **Tb. I** - **1**" (**d**) at the same direction of **1**'; **v**', **v**' at the same level; tibial apophysis of median size, covering proximal end of tarsus only, being dorsal, antiaxial, Tb. length $142.8 \mu(F)$. **Ge. I** - (**1**), **v**' at proximal half; **d** short, antiaxial; **sigma** slender, setiform, small, very close to **d**; Ge. length $50 \mu(F)$. **Fe. I** - **d** absent; **1**', **1**" at distal end; three **v**" setae, one proximal, one medial, one distal; Fe. length $185.6 \mu(F)$. **Ge. II** - only one seta present; Tr. length $50 \mu(F)$. **Ts. II** - **ft**" anterior to **ft**', away from it; **ft**' dorso-lateral, at half of the segment; **pl**" absent; **pl**' present; **pv**" anterior to **pv**'; **omega** 1 close to **omega** 2, paraxial, slightly larger than it. Ts. length $117.8 \mu(F)$. **Tb. II** - **d** antiaxial, anterior to (**1**) at distal end, close to **fi**; (**v**), (**1**) at the same height; **fi** close to **d**, antiaxial, long, at distal apophysis; Tb. length $114.3 \mu(F)$. **Ge. II** - **d**' medianly set; **1**', **1**" at the same transversal level; **v**' absent; **sigma** setiform, long, antiaxial, close to **d**; Ge. length $50 \mu(F)$. **Fe. II** - as in Fe. I; Fe. length $178.5 \mu(F)$; **Tr. II** - one sole seta, ventral; Tr. length $50 \mu(F)$. **Ts. III** - **ft**' present, lateral, away from **ft**"; **pl**', **pl**" absent; **pv**' anterior to **pv**"; solenidia absent; Ts. length $121.4 \mu(F)$. **Tb. III** - **d**' anterior to **1**', at distal end; **v**', **v**" almost at the same level; **fi** antiaxial, long, close to **d**; Ge. length $60 \mu(F)$. **Fe. III** - **d** well developed; **v**' proximal, **1**' distal; Fe. length $150 \mu(F)$. **Tr. III** - **1**', **v**'; Tr. length $92.3 \mu(F)$. **Ts. IV** - **ft**' absent; (**it**) present; **pl**', **pl**" absent; **pv**'

slightly ahead of **pv**"; solenidia absent; Ts. length 126 μ (F); **Tb. IV** – as in Tb. III; Tb. length – 142.8 μ (F). **Ge. IV** – as in Ge. III; solenidia absent; Ge. length 61 μ (F). **Fe. IV** – **d** long, **v**' median: Fe. length 157.1 μ (F). **Tr. IV** – one sole seta, ventral; Tr. length 121.4 μ (F). Leg chaetotaxy: Ts. 19(2) – 17(2) – 15–14; Tb. 4(2) – 5(1) – 4(1) – 4(1); Ge. 4(1) – 3(1) – 2(1) – 2; Fe. 5 – 5 – 3 – 2; Tr. 1 – 1 – 2 – 1.

Geographical distribution and habitat – Milford, New Zealand, on humid moss on stones, *Nothofagus* forest.

Discussion – In describing *P. latoclava*, Hammer (1966) reported its peculiar features not found in the other species of the genus; postero-dorsal seta in a ventral position; **ip** long, reaching notogastral margin; notogaster distal margin pointed; outer margins of the claws serrulate; genital and anal plates completely joint together. She also found these characteristics to occur in *P. cryptonota* Hammer, 1966, a related species also collected in Milford. It was her observation that these two species could be placed in a different genus from *Pedrocortesella*; however she decided by keeping them under this genus. Hammer was not able to see the **ps1** setae, which in fact do exist as shown in the description above.

The present redescription of *L. latoclava* is based on the holotype sent on loan from the Zoologisk Museum, Copenhagen, Denmark.

Lyrifissella cryptonota (Hammer, 1966) **comb. n.**

Arthrodamaeus cryptonotus Ramsay, 1962:5 (unpublished)

Pedrocortesella cryptonotus (Ramsay, 1962): Hammer, 1966: 48, fig. 61.

Pedrocortesella cryptonota Hammer, 1966; Aoki & Suzuki, 1970:117

Types – One syntype specimen n^o. 236, in mosses and bryophytes close to a spring in a *Nothofagus* forest, Lake Ratoitis, New Zealand; three syntypes with no data, in mosses grown on the soil, on dead branches, in a *Nothofagus* forest, Milford, New Zealand. Depository: Zoologisk Museum, Copenhagen, Denmark.

Diagnosis – *L. cryptonota* is close to *L. latoclava* (Hammer, 1966) by presenting a mediam furrow on prodorsum; **ss** clavate; notogaster almost circular, ending in a remarkable salience; five pairs of short notogastral setae; **hl** ventral; **r2** (**lp**) latero-ventral, at **ip** height; **ps2**, **ps3** dorso-lateral, anterior to **r2**; **ip** long reaching notogastral margin; epimeral formula 3 : 1 : 3 : 3 ; genitoanal chaetotaxy 7 – 1 – 2 – 3 ; anal and genital plates fused together; **ag** below unifying point of genital and anal plates; genital setae not all equidistant; three strong claws with serrulate outer margins; tarsi pedicels not too short. It can be separate from *L. latoclava* by the following characteristics: smaller species (500 μ against 784 μ); notogaster reticulate with hexagonal foveae presenting – large, dark microtubercles at central portion, becoming irregular laterally; prodorsum also reticulate, irregular; sensillum with large, flat, almost rounded

club; **apo ex** with a strong – transversal bar.

Geographical distribution and habitat – Lake Ratoiti and Milford, New Zealand, on mosses and bryophytes, in a *Nothofagus* forest.

Discussion – *L. cryptonota* was firstly described as *Arthrodamaeus cryptonotus* in a non published dissertation by Ramsay, 1962. In 1966, Hammer published its description and figure, transferring it to *Pedrocortesella* with the following indication: *Pedrocortesella cryptonotus* (Ramsay) (= *Arthrodamaeus cryptonotus* Ramsay). Aoki & Suzuki (1970), in following the Rules of Nomenclature, correctly referred the species as *Pedrocortesella cryptonota* Hammer, 1966, since Ramsay actually did not publish his dissertation.

In 1979, Dr. H. Enghoff, from the Zoologisk Museum, Copenhagen, Denmark, send on loan for this revision work, a vial labeled *P. cryptonotus* (Ramsay), No. 236, Lake Ratoiti, by Hammer, which unfortunately only contained the syntype exuviae (specimen probably lost). Because of that misfortune, the redescription of *L. cryptonota* was not possible. Its great similarity with *L. latoclava*, as noticed by Hammer, was enough reason for transferring it to *Lyrifissella*.

Lyrifissella vestita (Tragardh, 1931) **comb. n.**

Plateremaeus vestitus Tragardh, 1931: 567, fig. 20-31; Balogh, 1962: 421; Csiszar & Jeleva, 1962: 282.

Types – Syntypes in Masatierra, the Juan Fernandez Islands, Chile, from dead leaves, in August 16, 1917. Depository: unknown.

Diagnosis – *L. vestita* is close to *L. latoclava* (Hammer), by presenting dorsal and ventral cuticle foveate; abundant cerotegument, forming reticula; prodorsum with a medial transversal furrow at tooth **p** area; with no transversal apodemata on anterior prodorsum; **le** lateral; bothridium dorso-lateral, with no ventral salience, very close to notogaster, the opening pointing to the outside and slightly forward; **ss** short, clavate, bent on obtuse angle to the outside; notogaster circular, with a remarkable salience posteriorly; **apo II**, **apo sj** with strong apodematic bonds as transversal bars; **apo III** reduced; **apo IV** resembling a hat over genitalia; epimeral formula 3 : 1 : 3 : 3; genital and anal plates united; genitoanal chaetotaxy 7 – 1 – 2 – 3; genitalia proximal margin posterior to the level of coxae IV; tarsi pedicels narrow, not too short; three strong claws; (**p**), (**it**), (**tc**) with strong branches. It can be well apart from *L. latoclava* mainly by its larger size (880 μ against 784 μ); by the presence of mammillate protuberances on **apo ro**, **apo ex**; by **ss**, which forms a poorly expanded club; and by notogaster, which presents no foveae laterally.

Geographical distribution and habitat – Masatierra, Juan Fernandez Islands, Chile, on dead leaves.

Discussion – *L. vestita* has its historical great importance because Tragardh (1931) featured *Plateremaeus* on the characteristics presented by this species, which he thought was close to the type species *Plateremaeus ornatissimus* (Berlese). This erroneous interpretation of Tragardh led to decades of mistakes

on the exact nature of the Plateremeidae and related families, which only recently was ordered by Paschoal (1979, 1987 b) . The first to question *P. vestitus* as a true *Plateremaeus* were Balogh (1962) and Csiszár & Jeleva (1962), who also guessed that it could be cogenetic with *Pedrocortesia* Hammer; they failed, however, to precise its proper taxonomic position.

Tragardh's description, although incomplete, lacking most details, is comprehensible enough to permit the transference of this species to *Lyrifissella*.

REFERENCES

- AOKI, J. & K. SUZUKI, 1970. A new species of the genus *Pedrocortesella* from Japan (Acari, Cryptostigmata). **Bull. Nat. Sci. Mus. Tokyo** 13(2): 117-120.
- BALOGH, J. 1962. New oribatids from Madagascar (Acari). **Ann. Hist. Nat. Mus. Hung.** 54. Zool.: 419-423.
- CSISZÁR, J. & M. JELEVA, 1962. Oribatid mites (Acari) from Bulgarian soils. **Acta Zool. Budapest**, 8:273-301.
- HAMMER, M. 1966. Investigations on the oribatid fauna of New Zealand. Part I. **Biol. Skr. Dan. Vid. Selsk.** 15(2): 5-108.
- PASCHOAL, A. D. 1979. Revisão da família Plateremaeidae e recharacterização da superfamília Gymnodamaeioidea (Acari, Oribatei). Tese Livre Docência, E. S. A. "Luiz de Queiroz", U. S. P., Piracicaba, 373 pp.
- PASCHOAL, A. D. 1987. A revision of the Plateremaeidae (Acari, Oribatei) **Revta bras. Zool.** 3(6): 327-356.
- TRAGARDH, I. 1931. Pacific mites: Acarina from the Juan Fernandez Islands. **Natural History of Juan Fernandez and Eastern Islands**, Uppsala, 3(4): 553-628.