plied at rates much lower than employed in this study) on some nontarget aquatic invertebrates as reviewed by Mulla et al. (1978). Additionally, the insecticide is economically effective on the target lepidopterous pests at rates lower than the highest rate used in this study (Sousa et al. 1977). Thus, this carbamate insecticide, relatively safe to many aquatic invertebrates could have minimal environmental impacts on aquatic organisms when it is used against several field crop pests.

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ZYGORIBATULA FLORIDANA N. SP. (ACARI: ORIBATULIDAE), WITH A LIST OF SPECIES IN THE GENUS

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Abstract

A description is given of the oribatid mite *Zygoribatula floridana* n. sp. collected from goat pastures in northcentral Florida. This species carries *Moniezia expansa* (Rudolphi) (Cestoda: Anoplocephalidae) cysticercoids. A list is given of all species currently classified in *Zygoribatula* Berlese along with holotype habitat and locality.

Resumen

Se describe la nueva especie de acaro oribatido *Zygoribatula floridana.* Esta especie proviene de dehesas con cabras en Florida (E.U.A.), Y lleva quistes de *Moniezia expansa* (Rudolphi) (Cestoda:Anoplocephalidae). Se incluye una lista de las especies actualmente clasificadas en *Zygoribatula* Berlese en conjunto con la localidad Y habitación de los tipos ejemplares.

Berlese (1917) established the genus *Zygoribatula* and distinguished it from *Oribatula* Berlese by the presence of a strong translamella. Other diagnostic characters include the rudimentary pteromorphae, anteriorly projecting scapulae, true areae porosae, and tridactyl tarsi (Willmann 1931). This paper describes a new species of *Zygoribatula* collected from goat pastures in northcentral Florida, and presents a list of all species courrently classified in the genus.

BODY COLOR AND DIMENSIONS: Color medium to dark brown; body ovate with smooth integument. Mean total length of 10 female specimens 447 μm (range 420-470 μm); mean notogastral length 359 μm (range 340-370 μm); mean notogastral width 289 μm (range 260-310 μm). Mean total length of 10 male specimens 411 μm (range 390-450 μm); mean notogastral length 339 μm (range 320-350 μm); mean notogastral width 252 μm (range 240-270 μm).

PRODORSUM (Fig. 1A, 1B, 2A, 2B, 2C): Rostrum bluntly rounded with medial sharp tooth. Rostral (*ro*), lamellar (*la*), and interlamellar (*in*) setae strongly barbed. The latter equal to lamellar setae in length, insert anteriorly to dorsosejugal suture, and posteriorly to faint transverse ridge; rostral setae 2/3 length lamellar setae and thinner. Lamellae equal in width to translamellae and lack cusps. Sensillae clavate and beset with short barbs, but stalks are smooth. Tuberculous cerotegument extends along lateral edges of dorsosejugal suture, along lateroventral edges of translamella, and ventrally to insertions of legs I-IV. One pair of areae porosae mesal to bothridia and along edge of dorsosejugal suture. Tutoria absent.

NOTOGASTER: Anterior margin convex, humeral extensions short (Fig. 1A, 1B, 2B). Four pairs of areae porosae and 14 pairs of distinctly barbed setae present. Area porosa *Aa* oval, anterior to seta *la*; A_1 long, especially in males, located lateral to seta l_p; A_2 and A_3 small and oval in females, longer in males, especially A_3 (Fig. 1A, 1B). Some females with area porosa A_1 divided into 2 on one or both sides of notogaster. Narrow ridge begins at mid-anterior end of notogaster and extends laterally just posterior to seta l_a.

VENTRAL REGION: Coxisternal ridges of sejugal apodeme fused to broad ridge with setae *3a* inserted at its midpoint; apodemes I fused with posterior edge of camerostome; apodemes II and III small (Fig. 1A, 1B). All ventral setae except those on genital plates visibly barbed at 1,000 X magnification. One pair of oval post-anal areae porosae. Genital plates with 4 pairs, anal plates with 2 pairs of setae.

GNATHOSOMA: All setae barbed, and rutellum is lobed. Cheliceral setae *cha* and *chb* present, the latter on the movable digit; area porosa present (Fig. 1C, 2C, 2D). Palpal setal formula is 0-2-1-3-9 (Fig. 1D) (solenidion of "corne double" not included in formula). The palpal tarsus bears 4 eupathidia, the two ultimals, the subultimal and the acroculminal; the latter is associated with the solenidion ω, thus forming the "corne double".

LEGS: Leg I more robust than, but subequal in length to leg II; leg IV longest (Fig. 3). All setae, except prorals strongly barbed. Setal and solenidial (in brackets) formulae for legs I-IV are 1-5-3-4-19 (0-0-1-2-2), 1-5-2-4-15 (0-0-1-1-2), 2-3-1-3-15 (0-0-1-1-0), and 1-2-2-3-12 (0-0-0-1-0), respectively. The presence (+) or absence (—) of areae porosae on segments

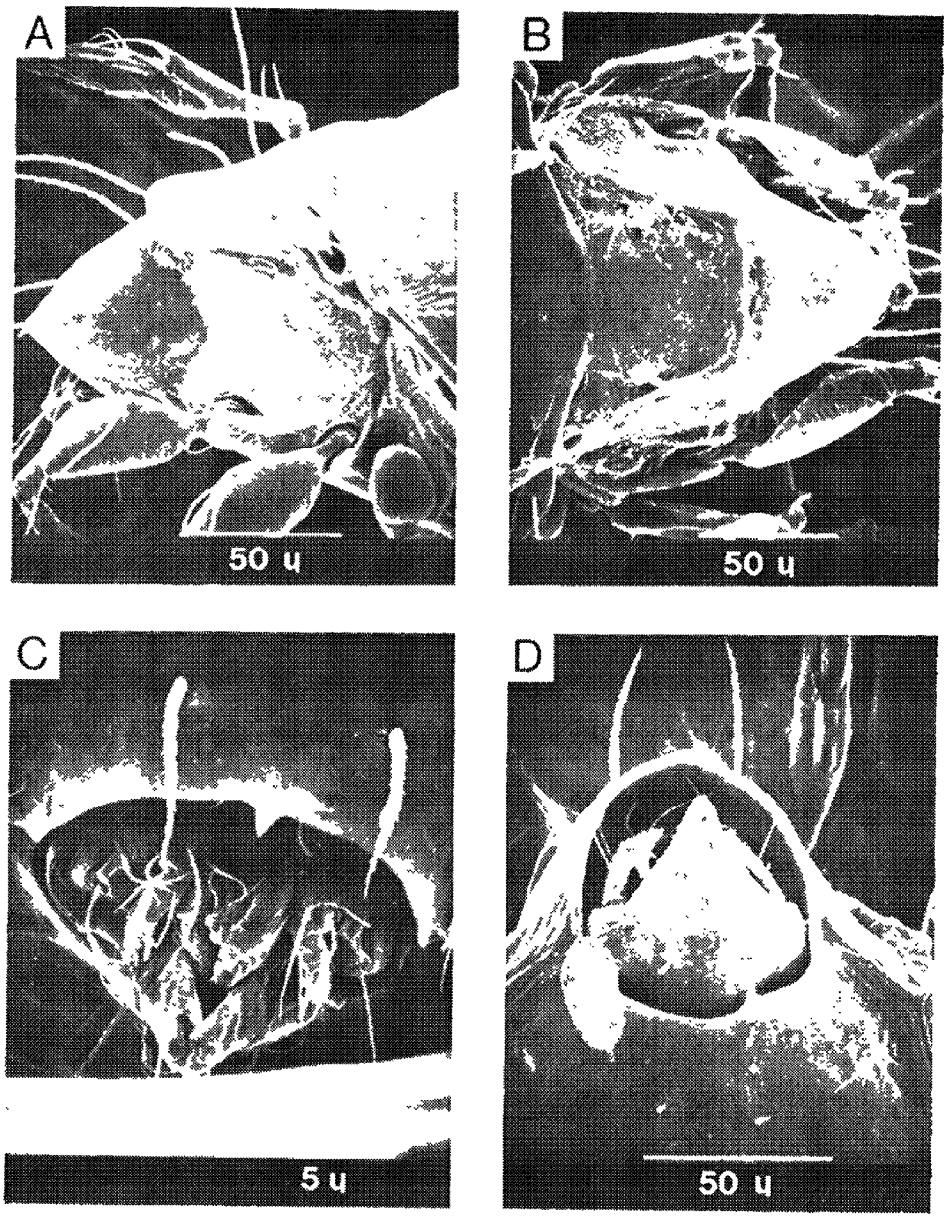

Fig. 1. *Zygoribatula floridana* n.sp.—A) dorsal and ventral aspects of female; B) dorsal and ventral aspects of male; C) chelicera; D. palp.

of legs I-IV are indicated by the following: —,+,—,+,+ for leg I; —,+,—, +,+ for leg II; +,+,—,+,+ for leg III; +,+,—,+,+ for leg IV.

MATERIAL EXAMINED: Thosuands of adult specimens were collected from 3 goat pastures in Florida at various dates throughout 1979-1980. Two pastures are in Alachua County, near Newberry, and 1 in Levy County, near Williston. Most of the mites were dissected for anoplocephalid (Cestoda: Anoplocephalidae) cysticercoids. Female holotype and 70 paratypes were collected 3 May 1981 in Florida, Alachua County, near Newberry, stored in

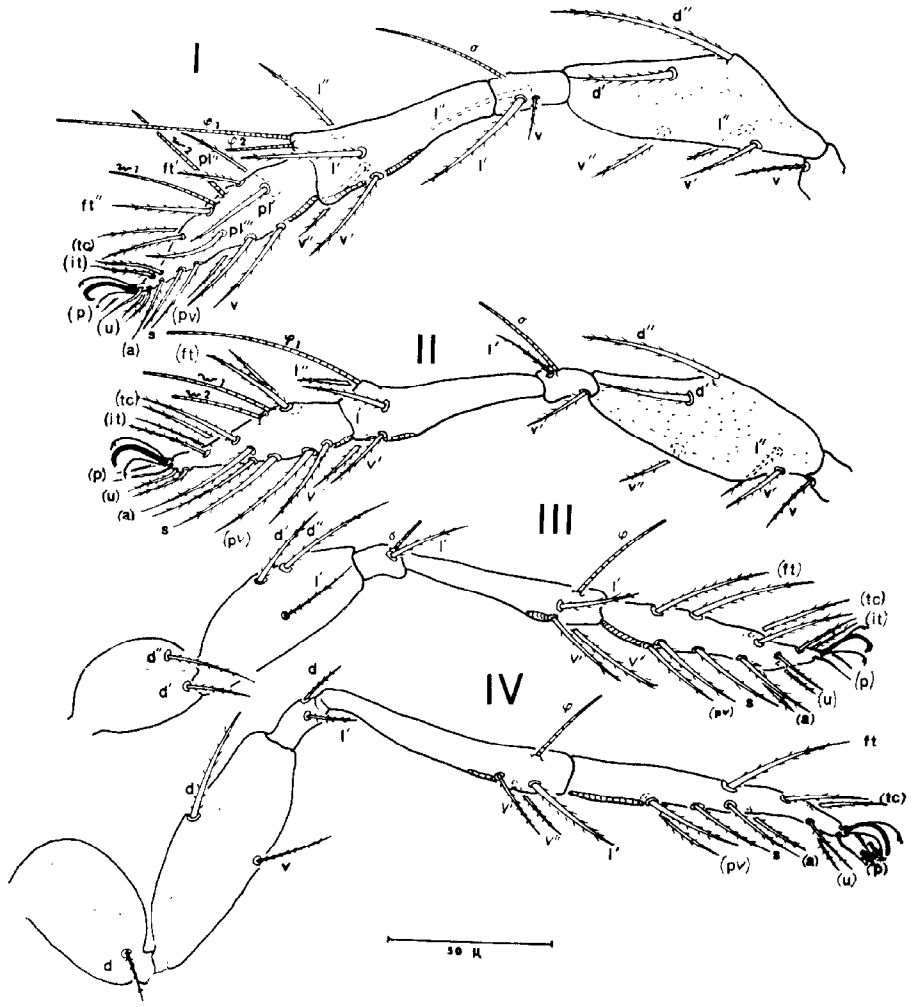

Fig. 2. *Zygoribatula floridana* n.sp.—A) lateral aspect of prodorsum; B) dorsal aspect of prodorsum; C) dorsal aspect of rostrum and gnathosoma; D) ventral aspect of gnathosoma.

alcohol and deposited as follows: holotype and 35 paratypes at the Florida State Collection of Arthropods, Division of Plant Industry, Gainesville, Florida; 35 paratypes at the British Museum of Natural History, London, England.

REMARKS: Grandjean's (see Travé and Vachon 1975 for references) morphological terminology was used in this description.

Zygoribatula floridana n. sp. most closely resembles *Z. meruensis* Mahunka, *Z. rostrata* Jacot, *Z. tadrosi* Popp, *Z. subantarctica* Von Pletzen and Kok, *Z. longiporosa* Hammer, and *Z. heteroporosa* Wallwork. Bhattacharya and Banarjee (1979), however, consider the latter as a synonym of

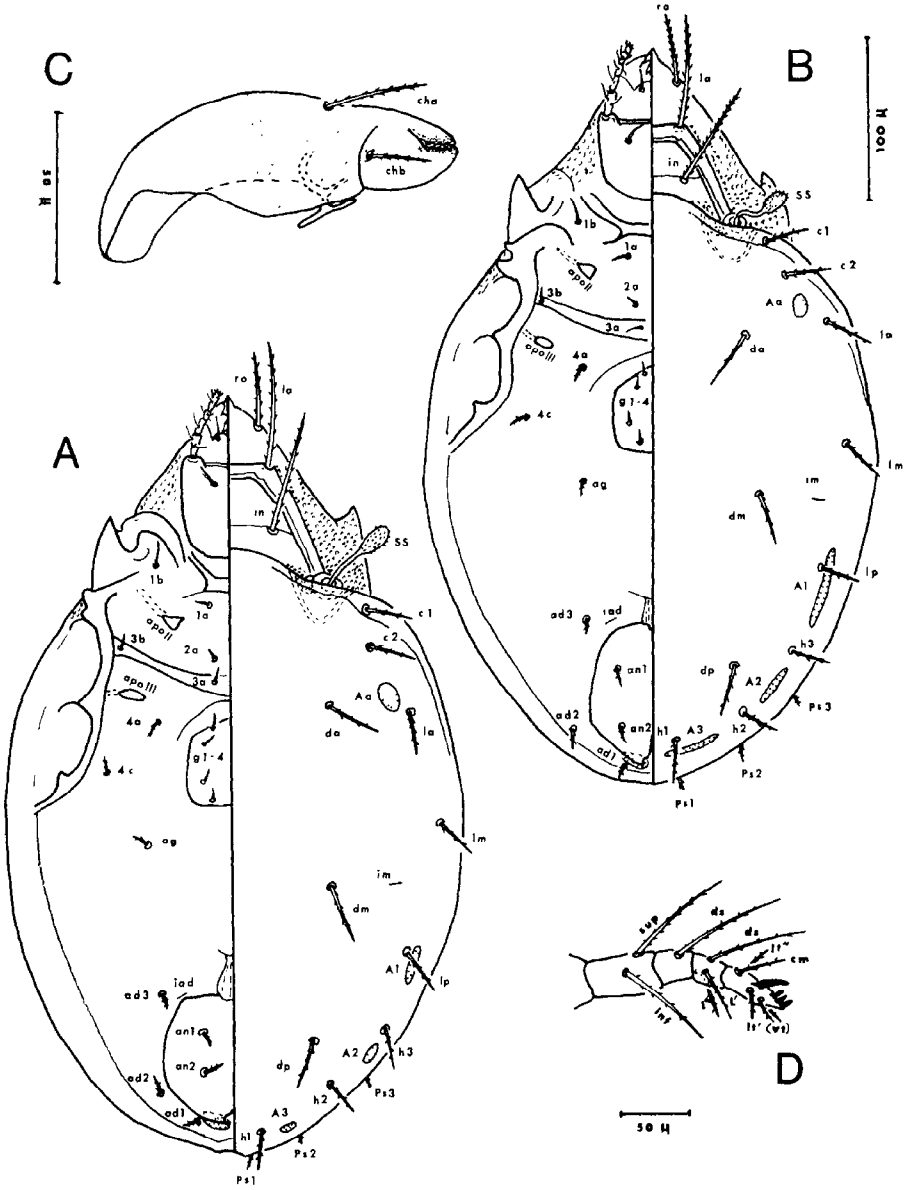

Fig. 3. *Zygoribatula floridana* n.sp.—Legs I, II, III, and IV.

Z. longiporosa. Characters shared by all 7 species include barbed notogastral setae, translamella and lamellae of equal width, translamella straight, and the presence of 4 pairs of notogastral areae porosae. *Z. floridana* differs by one or a combination of the following characters: position and size of areae porosae, length and barbing of notogastral setae, lack of integument sculpturing or pitting, absence of tutoria, and body dimensions.

This species was one of the most common oribatids collected from 3 pastures in northcentral Florida known to contain goats infected with *Moniezia expansa* (Cestoda: Anoplocephalidae). Some specimens contained

cysticercoids. In vitro tests, in which *M. expansa* eggs were provided to cultures of mites, confirmed their capacity to carry this cestode. The only other cestode intermediate hosts in this genus are *Z. magna* Ramsay (Ramsay 1966), *Z. longiporosa* (Roberts 1953), *Z. cognata* (Oudemans) and *Z. frisiae* (Oudemans) (Frank 1965).

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APPENDIX 1. SPECIES AND SUBSPECIES DESCRIBED BETWEEN 1855 AND 1981 CURRENTLY CLASSIFIED IN THE LITERATURE AS *Zygoribatula* BERLESE, WITH HOLOTYPE LOCALITY AND HABITAT.

Eremaeus brauni Sellnick	1908	East Germany, Muhlenbech
Eremaeus cognatus Oudemans	1902	Italy, San Remo, leaf litter
Eremaeus frisiae Oudemans	1900	Netherlands, Sneek, moss
Eremaeus hessei Oudemans	1902	Republic of the Congo, Banana, *Vesperugo pagenatecheri.*
Eremaeus propinquus Oudemans	1902	Italy, San Remo, leaf litter
Liacarus capitatus Banks	1910	U.S.A., Oklahoma, Stillwater
Notaspis brevisetosa Ewing	1909	U.S.A., Illinois, Topeka, black-walnut tree
Notaspis curviseta Ewing	1909	U.S.A.
Notaspis depilis Ewing	1909	U.S.A., Illinois, Metropolis, exuded peach sap
Notaspis exilis Nicolet	1855	France, Vincennes, Meudon Forest
Notaspis pyrostigmata Ewing	1909	U.S.A., Illinois, Lyons, under soft-maple tree bark
Notaspis pyrostigmata fusca Ewing	1909	U.S.A., Wisconsin, Portage, soil under stone
Oribatula clavata Ewing	1917	U.S.A., Illinois, Arcola, under old board
Oribatula connexa Berlese	1904	Italy, Florence, leaf litter
Oribatula pallida Banks	1906	U.S.A., New Jersey, Fort Lee
Oribatula venustus Berlese	1908	Netherlands, Breda
Scutovertex concolor Banks	1895	U.S.A., New York, Sea Cliff, dead fungi
Zygoribatula andrianovae Bulanova-Zachvatkina	1967	U.S.S.R., Volgrograd
Zygoribatula angulata Berlese	1917	Italy, Sicily, near Palermo, plane-tree bark
Zygoribatula apletosa Higgins, Woolley	1975	U.S.A., Colorado, Hayden, 1/4 mile N.E. of power plant, litter under serviceberry
Zygoribatula arcuata Hammer	1977	N.W. Pakistan, Gahirat between Drosh and Chitral, brown moss on rock
Zygoribatula arcuatissima Berlese	1917	Italy, Taranto, intertidal zone
Zygoribatula bonaivensis Willman	1936	Curacao, Bonaire, Goto, Salinja Grandi, salt-lake shore

APPENDIX 1. CONTINUED

Zygoribatula dentata Balogh	1958	Angola, soil
Zygoribatula diversa Mihelčič[1]	1956	Spain, near El Escorial, rocky dry soil
Zygoribatula dubita Coetzer	1967	South Africa, Kwa-Dlangezwa, compost
Zygoribatula elongata Hammer	1961	Peru, pass between Cuzco and Pisac, moss
Zygoribatula exarata Berlese	1917	Italy, Sardinia, Asuni, moss
Zygoribatula excavata Berlese	1917	Italy, Genoa, animal nest in cultivated field
Zygoribatula frisiae insularis Travé	1961	Balearic Islands, Mallorca, near Soller, olive tree
Zygoribatula gozmanyi Mahunka	1980	Tunisia, Ferme Shitta, Djebel Eddyr, 6 km N.E. from El Kef, grassy soil
Zygoribatula granulata Kunst	1958	Bulgaria, Borovec, wet moss under spruce
Zygoribatula guadarramica Perez-Iñigo	1978	Spain, Segovia Province, Balsain, head of Eresam River, moss on granite in pine-oak forest
Zygoribatula heterochaeta Feider, Vasiliu, Călugăr	1970	Romania, Constanta, dry litter in rodent-nest tunnel
Zygoribatula heteroporosa Wallwork[1]	1972	U.S.A., California, Joshua Tree National Monument, Forty-nine Palms Oasis, litter beneath *Equisetum*
Zygoribatula heterotricha Mahunka	1978	Dominican Republic, Bani, litter
Zygoribatula incurva Michelčič	1969	Austria, Karnten, Maria Worth, moist leaf litter
Zygoribatula interrupta Willman	1939	Poland, Wroclaw, sphagnum by lakeshore
Zygoribatula interrupta major Mihelčič	1963	Austria, Ost Tirol, St. Johann, litter under Rhododendron in forest at 2,000 m.a.s.l.
Zygoribatula lata Hammer	1961	Peru
Zygoribatula laubieri Travé	1961	Spain, Catalan coast, intertidal zone
Zygoribatula laubieri meridionalis Travé	1961	France, Perpignan, plane-tree bark
Zygoribatula lineata Hammer	1979	Java, Selecta Park near Alang, mountain slope at 1,100 m.a.s.l.
Zygoribatula lineola Berlese	1917	Italy, Florence, litter
Zygoribatula longicuspis Balogh	1966	Chad, N'Djamena, near Champ de Tire, sparsely overgrown halitic soil
Zygoribatula longiporosa Hammer	1953	Australia, Queensland, Yeerongpilly, pasture
Zygoribatula longiseta Golosova	1970	U.S.S.R., near Ussuriisk, Kuril Is., meadow
Zygoribatula magna Ramsay	1966	New Zealand, Nelson, Appleby Research Orchard, orchard
Zygoribatula mariehammerae Feider, Vasiliu, Călugăr	1969	Romania

APPENDIX 1. CONTINUED

Zygoribatula marina Fujikawa	1972	Japan, Hokkaido, Ishikari-Hama
Zygoribatula matvitensis Mihelčič	1966	Spain, Casa del Campo, dry clay soil
Zygoribatula meruensis Mahunka	1969	Tanzania, Mt. Meru (eastern slope), dry dung
Zygoribatula microporosa Bulanova-Zachvatkina	1967	U.S.S.R., Caucasus to Armenian S.S.R. and near Teberdi
Zygoribatula niliaca Bayoumi	1980	Egypt, Tanta, apple orchard soil
Zygoribatula novazealandica Hammer	1967	New Zealand, Keri-Keri, plantation
Zygoribatula oceana Hammer	1972	Tahiti, mountains above Papeete, moist leaf litter
Zygoribatula prodorsissima Feider, Vasiliu, Călugăr	1970	Romania, Constanta, dry litter in rodent-nest tunnel
Zygoribatula rostrata Jacot	1938	U.S.A., Ohio, Chillicothe, Mt. Logan, blue-grass sod
Zygoribatula ruchljadevi Bulanova-Zachvatkina	1967	U.S.S.R., Dagestan A.S.S.R.
Zygoribatula rugifrons Sellnick[1]	1943	Romania
Zygoribatula sabulosa Balogh	1966	Chad, Bekao, south from Moundou, grass on sandy soil
Zygoribatula salina Balogh	1966	Chad, N'Djamena, near Champ de Tire, sparsely overgrown halitic soil
Zygoribatula saxicola Kunst	1959	Bulgaria, Maladesko, Strandza Plain, dry moss on limestone
Zygoribatula sayedi Eldbadry, Nasr	1974	Egypt, Kanater El-Khaira, El-Kalyoubia Governorate, tomato soil
Zygoribatula schaunbergi Mahunka	1978	Mauritius, Ile Ronde
Zygoribatula setosa Evans	1953	Tanzania, Mt. Kilimanjaro, Shira Plateau, heath formation soil
Zygoribatula skryabini Bulanova-Zachvatkina	1960	U.S.S.R., Caucasus, Kirgizia and Tadzhikistan
Zygoribatula smirnovi Bulanova-Zachvatkina	1978	U.S.S.R., Don River Basin, soil
Zygoribatula socia Berlese	1917	Italy, Florence, soil
Zygoribatula spinosissima Mihelčič	1956	Spain, Villalba, litter
Zygoribatula striatissima Hammer[1]	1962	Chile, Polpaico, meadow of *Juncus*, *Ranunculus*, *Triglochin* and grass
Zygoribatula subantarctica Van Pletzen, Kok	1971	Prince Edward Is., Marion Is., *Poa cookii* old inflorescence
Zygoribatula tadrosi Popp	1960	Egypt, Cairo, Giza, west bank of Nile, cultivated air-strip of *Zea mays*, *Linium*, and *Triticum*
Zygoribatula tameya Eldbadry, Nasr	1974	Egypt, Tameya, El-Fayoum Governorate, wheat field soil
Zygoribatula tenuelamellata Mihelčič	1956	Spain, Valle del Moro, humus
Zygoribatula tenuiseta Hammer	1977	N.W. Pakistan, Chitral Valley,

APPENDIX 1. CONTINUED

		Lawari Pass, 3,400 m.a.s.l., *Pinus* cones
Zygoribatula terricola Hammen	1952	Netherlands, Maasland, meadow
Zygoribatula thalassophila Grandjean	1935	France, Tregastel, intertidal zone
Zygoribatula tortilis Hammer	1977	N.W. Pakistan, Bombret Valley S.W. of Chitral, moss, grass and clover
Zygoribatula transitans Berlese	1917	U.S.A., Florida, Lake City, moss
Zygoribatula trichosa Mihelčič[1]	1956	Spain, Casa del Campo, litter
Zygoribatula trigonella Bulanova-Zachvatkina	1967	U.S.S.R., Turkmenia
Zygoribatula tritici Eldbadry, Nasr	1974	Egypt, Tameya, El-Bayoum Governorate, wheat field soil
Zygoribatula truncatia Aoki	1962	Japan, Yamaguchi-Ken
Zygoribatula undulata Berlese	1917	Italy, Florence, soil
Zygoribatula undulata Balogh	1966	Tanzania, Mt. Kilimanjaro (s.w. side), moss, lichen and bark under *Senecio*
Zygoribatula vulgaris Bulanova Zachvatkina	1967	U.S.S.R., Moldavian S.S.R.
Zygoribatula zicsii Bayoumi	1979	Hungary, Vertes, hornbeam-oak mixed forest, soil

[1]Species considered in the literature as *nomina dubia.*

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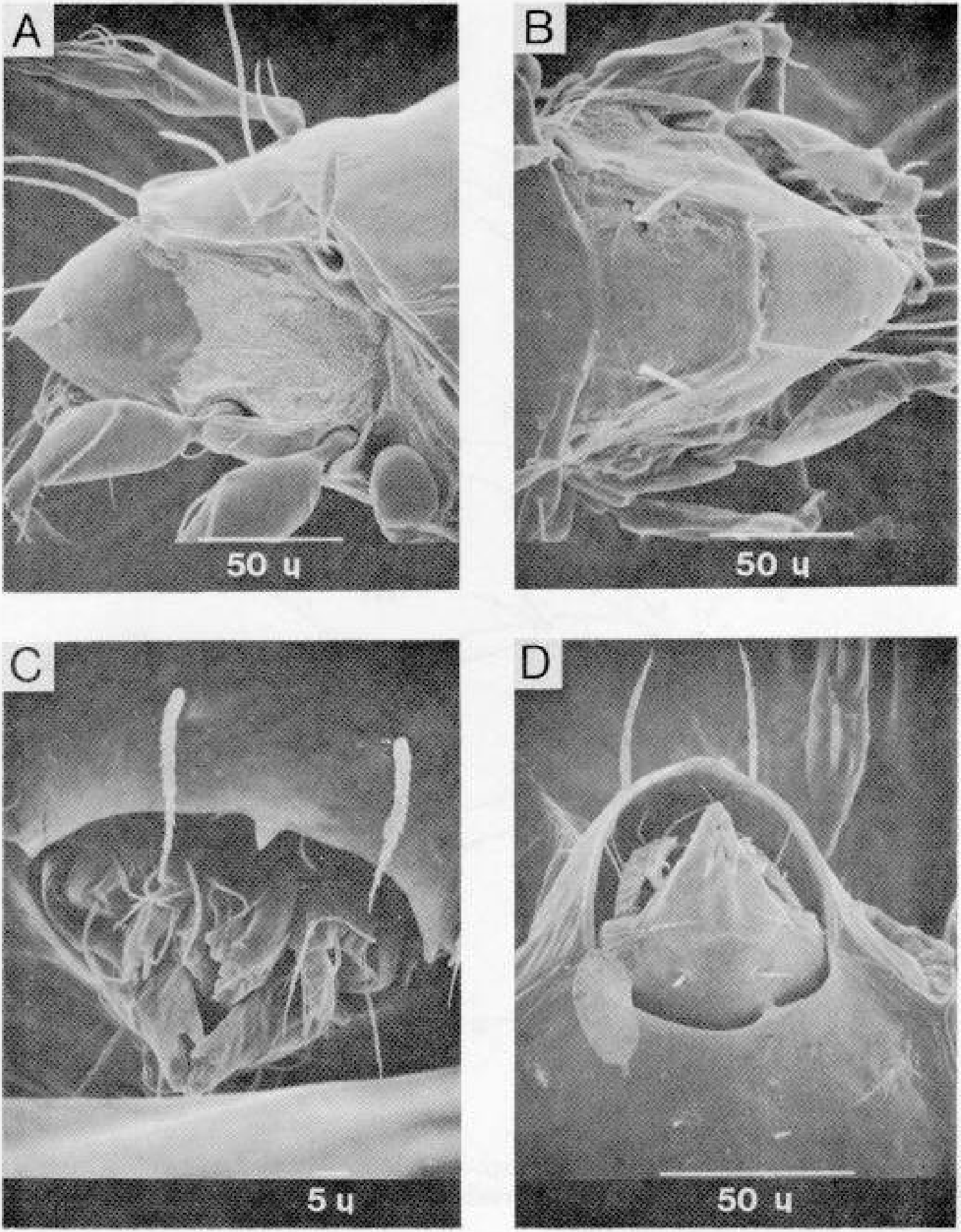
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