



Foto: Jabier Les

## **Coecobrya kennethi n. sp. (Collembola, Entomobryomorpha) and presence of Arrhopalites caecus (Tullberg, 1871) from Ana Roiho cave (Maunga Hiva Hiva), Rapa Nui-Easter Island.**

RAFAEL JORDANA <sup>1</sup> & ENRIQUE BAQUERO <sup>1</sup>

<sup>1</sup> Department of Zoology and Ecology, University of Navarra, Pamplona, Navarra, Spain.

Correspondence: Enrique Baquero, Department of Zoology and Ecology, University of Navarra, PO Box 177, 31080 Pamplona, Navarra, Spain.

E-mail: ebaquero@unav.es; rjordana@unav.es

**GAKO-HITZAK:** Entomobryidae, Arrhopalitidae, colémbolo, espezie berria.

**PALABRAS CLAVE:** Entomobryidae, Arrhopalitidae, colémbolo, nueva especie, Isla de Pascua.

**KEY WORDS:** Entomobryidae, Arrhopalitidae, springtail, new species.

### LABURPENA

Coecobrya Yosii espezie barri bat deskribatzen da, 1956 (Collembola, Entomobryomorpha, Entomobryidae), Pazko Uhartearen (Rapa Nui) aurkitua. Generoko gainontzeko espezieengandik honako ezaugarrietatik bereizten da: antena nahiko laburra, buruaren diametroa baino 4 bider txikiagoa; Tibiotarsoaren sabelaldean zeta leunen absentsia; atzakalaren barruko hagina sabelaldeko oinaldeko ertzaren 1/3a baino distantzia handiagoa dago; Empodioren kanpoaldeko hagina gainontzeko empodioa baino txikiagoa; bularraldeko II tertikoko 6 taldean makroketen absentsia; IV. abdominalaren atze-erdialdean 4 makroketa; Manubriorearen atzealdean zeta leunak; eta 1+1 zeta leun sabelaldeko hodiaren atzealdeko aurpegian; A Caecus espeziea sarri izan da aipatua Ipar Hemisferioan, bai eta Australian eta Zelanda Barrian ere, baina lehenezgo da aipatua Rapa Nui uhartean. Espezie bi honek aurkitu izana, Pazko Uharteko Parke Nazionalean dagoan Roiho kobazuloan eginko lanen emaitza da.

### RESUMEN

Se describe una nueva especie de *Coecobrya* Yosii, 1956 (Collembola, Entomobryomorpha, Entomobryidae) encontrada en la Isla de Pascua (Rapa Nui). Se separa de las otras especies del género por los siguientes caracteres: antena relativamente corta, menos de 4 veces la diagonal cefálica; ausencia de sedas lisas en la cara ventral del tibiotarso; diente interno de la uña a una distancia mayor de 1/3 del borde basal ventral; diente externo del empodio menor que el resto del empodio; ausencia de macroquetas en el grupo 6 del terguito torácico II; cuatro macroquetas en la parte dorsocentral del abdominal IV; sedas lisas sobre la parte posterior del manubrio; y 1+1 sedas lisas sobre la cara posterior del tubo ventral. La especie *A. caecus* es citada frecuentemente en todo el hemisferio norte, y ha sido citada también en Australia y Nueva Zelanda, pero esta es la primera cita para la Isla de Pascua. El descubrimiento de estas dos especies es resultado de los trabajos espeleológicos llevados a cabo en la cueva de Roiho, en el parque nacional de Isla de Pascua, Chile.

### SUMMARY

A new species of *Coecobrya* Yosii, 1956 (Collembola, Entomobryomorpha, Entomobryidae) from a cave in Rapa Nui (Easter Island) is described. The new species can be distinguished from other species of the genus by the following characters: antenna relatively short, less than 4 times the cephalic diagonal; absence of smooth setae on ventral side of tibiotarsus; inner tooth of unguis at more than 1/3 of distance to basal ventral edge; unguiculus outer tooth smaller than the rest of unguiculus; absence of macrochaetae in group 6 on thoracic tergite II; four macrochaetae on central dorsal abdomen IV; smooth setae on manubrium posterior side; and 1+1 smooth setae on posterior face of ventral tube. The species *A. caecus* is frequently referred in the North hemisphere, and referred too in Australia and New Zealand, but this is the first record to Easter Island. The discovery of this two species resulted from the speleological work that was carried out in the cave Roiho, in the national park of Easter Island, Chile.

### SPECIES DESCRIPTION

*Coecobrya kennethi* Jordana & Baquero n. sp.  
(Figs. 1, 2A-L, 3A-D)

**Type locality.** CHILE: Ana Roiho cave, Maunga Hiva Hiva, Rapa Nui, Easter Island. Coordinates: UTM  
X= 657991  
Y= 7000301  
Z= 94 m.

**Type material.** Holotype: female, slide MZNA-Pascua01-01. Allotype: slide MZNA-Pascua01-03. Paratype: slide MZNA-Pascua01-02 and six specimens in ethyl alcohol. Jabier Les & Gaizka Carretero leg. Material deposited in the Museum of Zoology, University of Navarra (MZNA).

### Capture methods

The specimens were captured using a small brush and were located in an old

metal Motor water, all of it covered with a thin film of water. The samples were preserved in alcohol.

### Description

Maximum body length up to 1.1 mm (Allotype); female (Holotype): 1.05 mm. Habitus in figure 1. Colour white. Eyes absent. Antennae 2.0-2.25 times as long as cephalic diagonal. Antennal III organ with two sensillae leaf-shaped (setae 2 and 3), and three

small and slender guard sensillae (1, 4-5) (after Chen and Christiansen, 1997) (Fig. 2A). Labral setae 4/5,5,4, all smooth, two first rows on papillae (Fig. 2B). Outer differentiated seta of labial palp curved, thicker than the normal setae, with tip exceeding apex of same labial papilla by 0.25 of its length (Fig. 2C). Maxillary outer lobe with three sublobal setae (Fig. 2D). Labial triangle with smooth setae; R seta 0.75 times length of M<sub>1</sub>. Mental setae G<sub>1-4</sub> and H<sub>1-4</sub> smooth; X and X<sub>2</sub> setae vestigial; X<sub>3</sub> and X<sub>4</sub> absent (Fig. 2E). Trochanteral organ with 9 setae in two regular rows and 3 additional setae over it (Fig. 2F). Inner differentiated setae of tibiotarsus ciliate on 3 pairs of legs; outstanding macrochaetae of tibiotarsi about 0.33 distance from base, clearly mucronate (Fig. 2G-H). Unguis with 3 inner teeth, basal pair unequal, outer tooth large with tip reaching 50-60% from base to apex of unguis ventral edge; median tooth small, at 50% from base. Unguiculus with strong outer tooth, smaller than the remaining part of unguiculus, truncate distally. Tenent hair thin, acuminate in all legs (Figs. 2I-L). Ventral tube with 5(6)+5(6) setae -one or two ciliated- on lateral flaps, 3+3 anterior ciliated setae arranged in two rows, and with 1+1 posterior smooth setae (Fig. 3A). Tenaculum with 4+4 teeth and a strong rough seta (Fig. 3B). Manubrium with numerous ciliated setae on posterior (dorsal) and anterior (ventral) sides, and 11+11 smooth dorsal setae (Fig. 3C). Manubrial plate with 2 setae and 2 pseudopores on each side. Uncrenulate distal part of dens similar in length to the mucro. Mucronal spine reaching about to the tip of mucronal tooth (Fig. 3D).

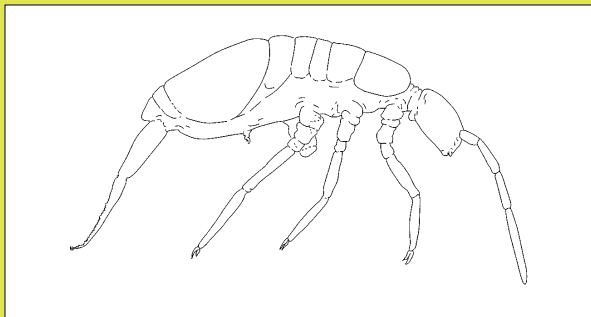


Fig. 1. Habitus of *Coecobrya kennethi* Jordana & Baquero n. sp.

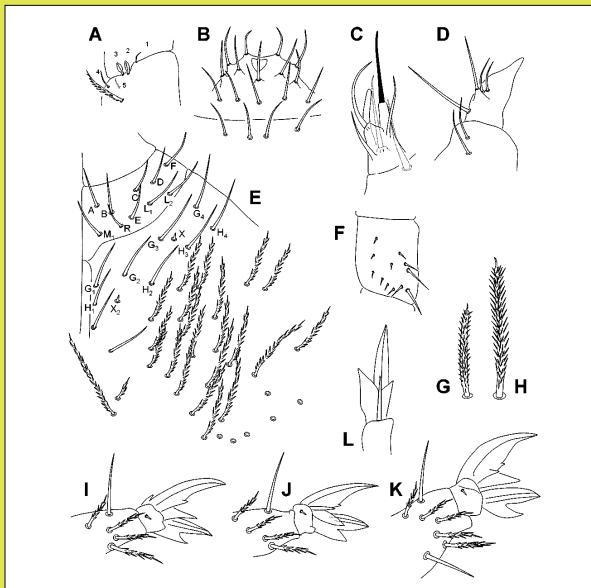


Fig. 2. A, antenna III organ. B, labral setae. C, labial palp, outer part. D, maxillary outer lobe. E, labial triangle. F, trochanteral organ. G, outstanding macrochaetae of tibiotarsi I. H, outstanding macrochaetae of tibiotarsi 3. I-K, tip of tibiotarsi, unguis and unguiculus of legs 1 to 3 respectively. L, inner view of unguis showing the asymmetric development of lateral teeth.

**Macrochaetotaxy.** Macrochaetae -and large mesochaetae- (after Chen & Christiansen, 1997) of head group I=3, group II=5 (Figs. 4A-C); thorax II group I=2, group II=2, group III=3, group IV=4(5), group V=4+3(4), group VI=0; thorax III group I=4, group II=3+5(6), group III=3, group IV=2; abdominal I=3(4)+3(4); abdominal II=2(3) in M3 arch and 1 lateral on each side; abdominal III=1+1 dorso-central and 2 lateral on each side; abdominal IV=4+4 dorso-central and 6 lateral on each side (Fig. 4D).

**Etymology.** The specific name is dedicated to Kenneth Christiansen, the internationally recognized specialist in Collembola.

**Comments.** The diagnostic characters for the new species are: antenna relatively short, less than 4 times the cephalic diagonal; without smooth setae on ventral side of tibiotarsus; inner tooth of unguis at more

than 1/3 of distance to basal ventral edge; unguiculus outer tooth smaller than the rest of unguiculus; without macrochaetae in group 6 on thoracic tergite II; four macrochaetae on central dorsal abdomen IV; smooth setae on manubrium posterior side; and 1+1 smooth setae on posterior face of ventral tube. The species of *Coecobrya* that share with the new

species the presence of smooth setae on posterior side of manubrium can be differentiated by the following characters: *Coecobrya nupa* Christiansen and Bellinger, 1992 has the antennae longer than four times the cephalic diagonal, and seven setae by row on posterior face of ventral tube; *Coecobrya tibiotarsalis* Yosii, 1964, *Coecobrya tenebricosa* Folsom, 1902 and *Coecobrya magyari* Chen et al., 2002 has smooth setae on ventral side of tibiotarsus; *Coecobrya ishikawai* Yosii, 1956, *Coecobrya akiyoshihana* Yosii, 1956, *Coecobrya lua* Christiansen & Bellinger, 1992 and *Coecobrya spinidentata* Yosii, 1942 has the inner tooth of unguis before first third of ventral edge; *Coecobrya papuana* Yosii, 1971 has the unguiculus outer tooth bigger than the rest of unguiculus; *Coecobrya oligoseta* Chen & Christiansen, 1997 and *Coecobrya similis* Deharveng, 1990 has three macrochaetae on central dorsal abdomen IV; *Coecobrya guanophila* Deharveng, 1990 has two macrochaetae on group I on head, one macrochaetae in group VI on thoracic tergite II, and a different distribution of macrochaetae on abdominal segment VI; *Coecobrya kukae* Christiansen & Bellinger, 1992, *Coecobrya borerae* Christiansen & Bellinger, 1992 and *Coecobrya dubiosa* Yosii, 1956 has two macrochaetae in group VI on thoracic tergite II; *Coecobrya kukae* has, in addition, the setae on posterior face of ventral tube not arranged in rows; *Coecobrya dubiosa* has four setae on posterior face of ventral tube.

**Arrhopalites caecus** (Tullberg, 1871) (Collembola, Symphyleona, Arrhopaliidae) (Figs. 5, 6A-L, 7A-D)

**Material studied.** Locality: CHILE: Ana Roiho cave, Maunga Hiva Hiva, Rapa Nui-Easter Island.

Coordinates: UTM  
X= 657991  
Y= 7000301  
Z= 94 m.

One specimen in a slide, code MZNA-Pascua01-04. Jabier Les & Gaizka Carretero leg. Material in the Museum of Zoology, University of Navarra (MZNA).

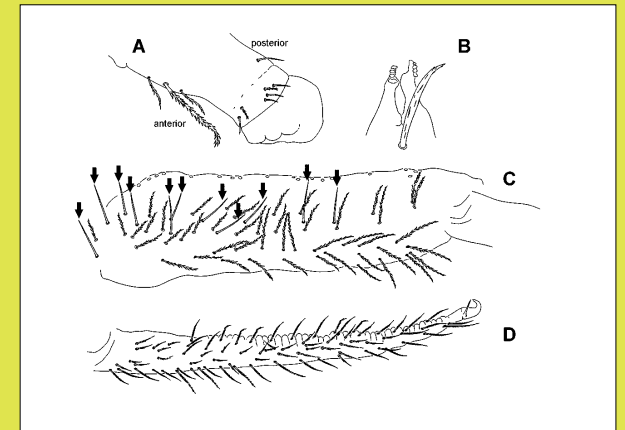


Fig. 3. A, lateral view of ventral tube. B, tenaculum. C, manubrium (the arrows point to smooth setae). D, dens and mucro.

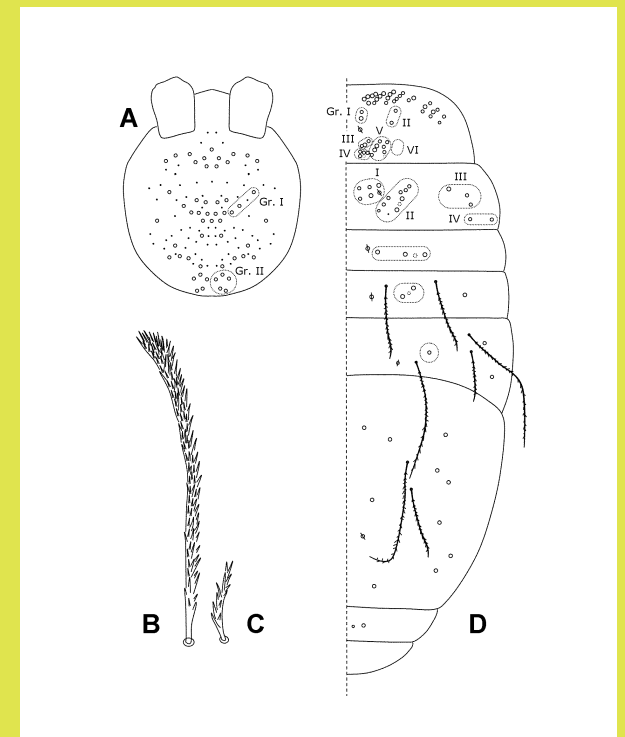


Fig. 4. A, dorsal chaetotaxy of head. B, macrochaeta of head. C, microchaeta of head. D, dorsal macrochaetotaxy of thoracic and abdominal tergites.

**Description.**

Total length (with head) 0.9 mm. Habitus in figure 5. Colour completely white yellowish. Posterior setae on large abdomen 0.75 times the unguis III. Head setae on vertex slightly stouter (Fig. 5a) than the rest (Fig. 5b-c). 1+1 unpigmented ommatidia with minute granulation and, in addition, an adjacent area with a particular reticulation (possible in the location of a vestigial eye). Antennal III not modified. Antennal IV undivided (Figs. 6A-C). All unguis with inner tooth, longer in the leg I. Unguiculus with inner tooth and terminal filament; only in leg I the unguiculus > unguis (Figs. 6D-F). Retinaculum with 1 distal setae; corpus posterior very developed (Fig. 6G). Dens with one anterior spine; in addition there are some spiny setae, not really spines (Fig. 7A). Some circumanal setae winged, and 2+2 short spines on dorsal and ventral anal valves (Figs. 7B-C). Appendage anal band-like, slightly curved, with minute fringes on tip.

**Proportions.** Length of antennae : head diagonal = 1.27. Antennal I : II : III : IV = 1 : 2.11 : 3.19 : 6.42. Dens : mucro = 1.55.

**Comments.** Has been identified as *A. caecus* (Tullberg, 1871) sensu Stach, 1956, that is described with 1+1 ommatidia, is white with reddish spots, and has the posterior setae on large abdomen similar in length to unguis III, and unguis with tunica. Bretfeld (1999) say that *A. caecus* has two terminal setae on the retinaculum, but Stach (1956) in the original description of the species only referred one. In the specimen from Easter Island the posterior setae on large abdomen has 0.75 times the unguis III while in *A. caecus* are similar in length. The specimens identified as *A. caecus* from Europe, it is possible to see the same granulated area near the eye.

**Acknowledgements**

We want to show our more sincere gratitude for his inestimable collaboration to Ricardo Crisostomo of CONAF, Lázaro Pakarati Hotus, Government of Easter Island and University of Chile.

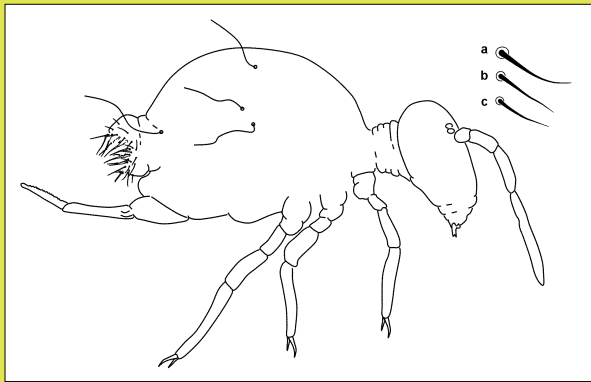


Fig. 5. *Arrhopalites* sp. habitus. a, setae on head vertex; b-c, setae on other parts of the head.

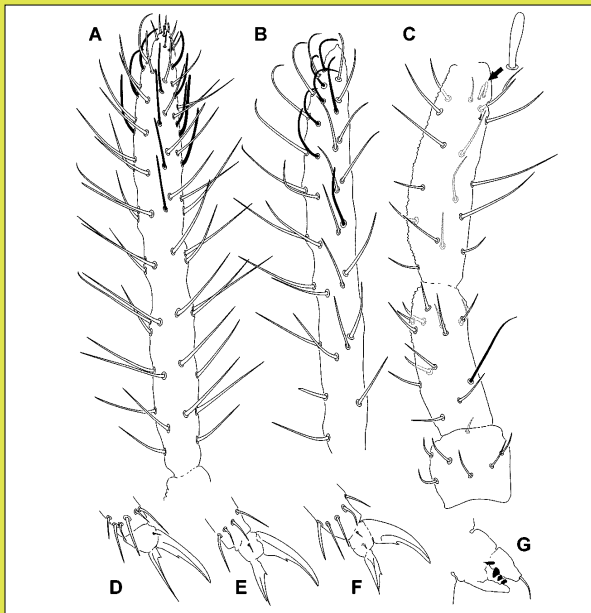


Fig. 6. A-B, fourth antennal segment: A, dorsal; B, ventral. C, first to third antennal segments (dorsal). D, claw and unguiculus of first leg. E, same for second leg. F, same for third leg. G, tenaculum.

**References**

**Bretfeld, G.** 1990. Chaetotaxy of four species of genera *Heterosminthurus*, *Bourletiella*, *Deuterosminthurus*, and *Prorastriopes* (Insecta, Collembola, Symphyleona). *Zoologische*

*Jahrbuecher Abteilung Fuer Systematik Oekologie Und Geographie Der Tiere*, 117: 441-489.

**Bretfeld, G.** 1999. Synopses on Palaearctic Collembola, Volume 2. *Symphyleona. Abhandlungen und*

*Berichte des Naturkundemuseums Goerlitz*, 71(1): 1-318.

**Chen, J.X., Wang, F., Christiansen, K.A.** 2002. A new species of the subgenus *Coecobrya* from Hungary (Collembola: Entomobryidae). *Journal of the Kansas Entomological Society*, 75, 43-47.

**Chen, J-X. and Christiansen, K.** 1997. Subgenus *Coecobrya* of the genus *Sinella* (Collembola: Entomobryidae) with special reference to the species of China. *Annals of the Entomological Society of America*, 90: 1-19.

**Christiansen, K., Bellinger, P.** 1992. *Insects of Hawaii: volume 15: Collembola*. University of Hawaii Press, Honolulu 1992, p.i-viii, 1-445.

**Deharveng, L.** 1990. Fauna of Thai caves. 2. New Entomobryoidae Collembola from Chiang Dao Cave, Thailand., *Bishop Museum Occasional Papers* 30 1990, p.279-287.

**Folsom, J.W.** 1902. Collembola of the grave. *Psyche*, 9: 363-367.

**Stach, J.** 1956. The Apterygotan fauna of Poland in relation to the world-fauna of this group of insects. Family: Sminthuridae. *Kraków*, pp. 1-287.

**Yosii, R.** 1942. *Japanische Entomobryinen* (Ins., Collemb.). *Archiv. F. Naturgesch.*, 10 : 479-495.

Yosii, R. 1956. Höhlencollembolen Japans II. *Japanese Journal of Zoology*, 11(5): 609-627.

**Yosii, R.** 1964. Some Collembola from Okinawa caves, with notes on *Sinella-Coecobrya* complex of Japan. *Bulletin of the Akiyoshi-dai Science Museum*, 3: 25-34.

**Yosii, R.** 1971. Cave Collembola of New Guinea collected by the Explorer's Club of the Nanzan University. *Contributions for the Biological Laboratory Kyoto University*, 23(2): 77-80.

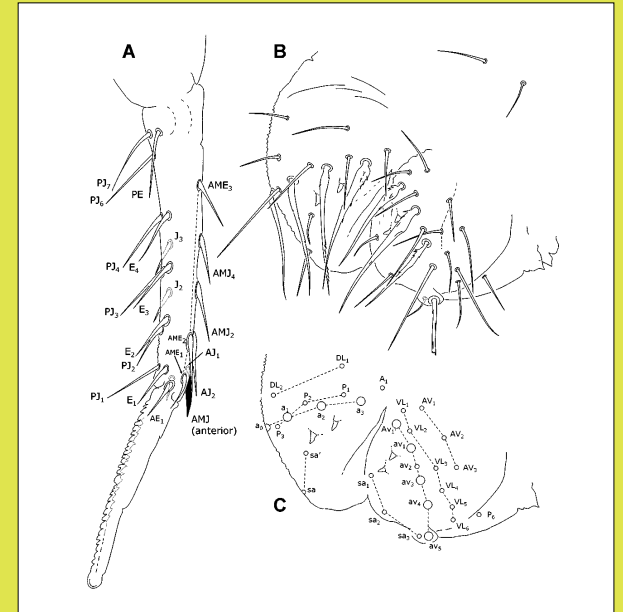


Fig. 7. A, dens and mucro (external view). B-C, abdominal segment with detail of circumanal setae. B, aspect of the setae; C, nomenclature (after Bretfeld, 1990).



Map. Roiho Cave Map





Foto: Jabier Les



Foto: Jabier Les

Photo: Clay sediment in the Roiho cave.  
Foto: Sedimentos arcillosos en la cueva de Roiho.



Foto: Iñaki Alvario

Photo: A place where the catches were taken in the cave Roiho.  
Foto: Lugar donde se realizaron las capturas en la cueva de Roiho.