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## A new species of *Crotonia* from New Zealand (Acari: Oribatida: Crotoniidae)

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ABSTRACT. The morphology of immature and adult stages of the new oribatid mite *Crotonia longisetosa* sp. n. from New Zealand is described. The new species is compared with the morphologically similar species *C. unguifera* MICHAEL, 1908, *C. oblecta* (PICKARD-CAMBRIDGE, 1875) and *C. flagellata* (BALOGH et CSISZÁR, 1963). Unlike these species, *C. longisetosa* n. sp. possesses longer lateral notogastral setae and has smaller body dimensions. Immature stages of the new species are compared with juvenile stages of *C. pulcher* (BECK, 1962). The adult of *C. longisetosa* sp. n. possesses features of the “*unguifera*” group of *Crotonia*.

Key words: acarology, taxonomy, moss mites, *Crotonia longisetosa* n. sp., morphology, juvenile stages, “*unguifera*” group, New Zealand.

### INTRODUCTION

The present paper is part of a study on the ontogeny of crotoniid species. Almost 50 species of the genera *Crotonia* and *Holonothrus* have been described so far. However, immature stages had been described for only 13 of them, often only a single stage for each species. OLSZANOWSKI (1997, 2000) started studies on immature stages with precise descriptions and drawings. All instars of *Crotonia pulcher* (BECK, 1962) were described and illustrated by KUTY (2005). The analysis of morphology and development of all stages will be useful in phylogenetic analyses, which are planned in the future.

In the Australian region the genus *Crotonia* is represented by 18 species. Most of them are endemic to New Zealand (SUBÍAS 2004). The first two species: *C. cophinaria* and *C. unguifera* were described by MICHAEL (1908). RAMSAY and LUXTON (1967) redescribed *C. oblecta* (PICKARD-CAMBRIDGE, 1875), which is the type species for the genus. In 1966 HAMMER recorded two new species, *C. brachyrostrum* and *C. caudalis*,

and WALLWORK described *C. brevicornuta* from Campbell Island. The last five species from New Zealand, *C. reticulata*, *C. cervicorna*, *C. cupulata*, *C. longibulbula* and *C. tuberculata*, were described by LUXTON (1982). Three year later he synthesised the information on the ten species currently known from New Zealand.

This ample representation in the Australia/New Zealand region, a fossil of *Crotonia* species from the Caenozoic of Victoria and presence of two related genera: *Austronothrus* and *Holonostrus* prove that *Crotonia* has a Gondwanan origin (HAMMER and WALLWORK 1979).

#### MATERIAL AND METHODS

The description of *Crotonia longisetosa* sp. n. presented is based on material borrowed from Prof. Wojciech NIEDBAŁA (Department of Animal Taxonomy and Ecology, A. Mickiewicz University, Poznań, Poland) and the late Prof. J. BALOGH (Eötvös Loránd University, Budapest, Hungary). All specimens of the new species are from 2 samples from New Zealand, and 4 specimens were found: 1 larva, 1 deutonymph and 2 adults.

The mites were preserved in 70% ethanol and cleared in lactic acid. The layer of debris covering specimens was removed with a small hook. During cleaning process legs of mites were damaged. Body measurements were measured in dorsal view from the tip of the rostrum to the end of notogastral plate, excluding posterior apophyses.

The holotype and paratype are stored in the collection of Department of Animal Taxonomy and Ecology, A. Mickiewicz University, Poznań, Poland.

The morphological terminology used in the descriptions follows that developed by F. GRANDJEAN (see TRAVÉ and VACHON (1975) for references).

#### List of localities.

NZ-001: New Zealand, Croydon Bush Gore, litter under ferns, 17.II.1966, R.R. Forster leg. (holotype: adult female).

WN-009: New Zealand, Rotorua, litter from Botanical Garden, 19.XII.1994, W. Niedbała leg. (Paratypes: 1 larva, 1 deutonymph, 1 adult female).

#### *Crotonia longisetosa* n. sp.

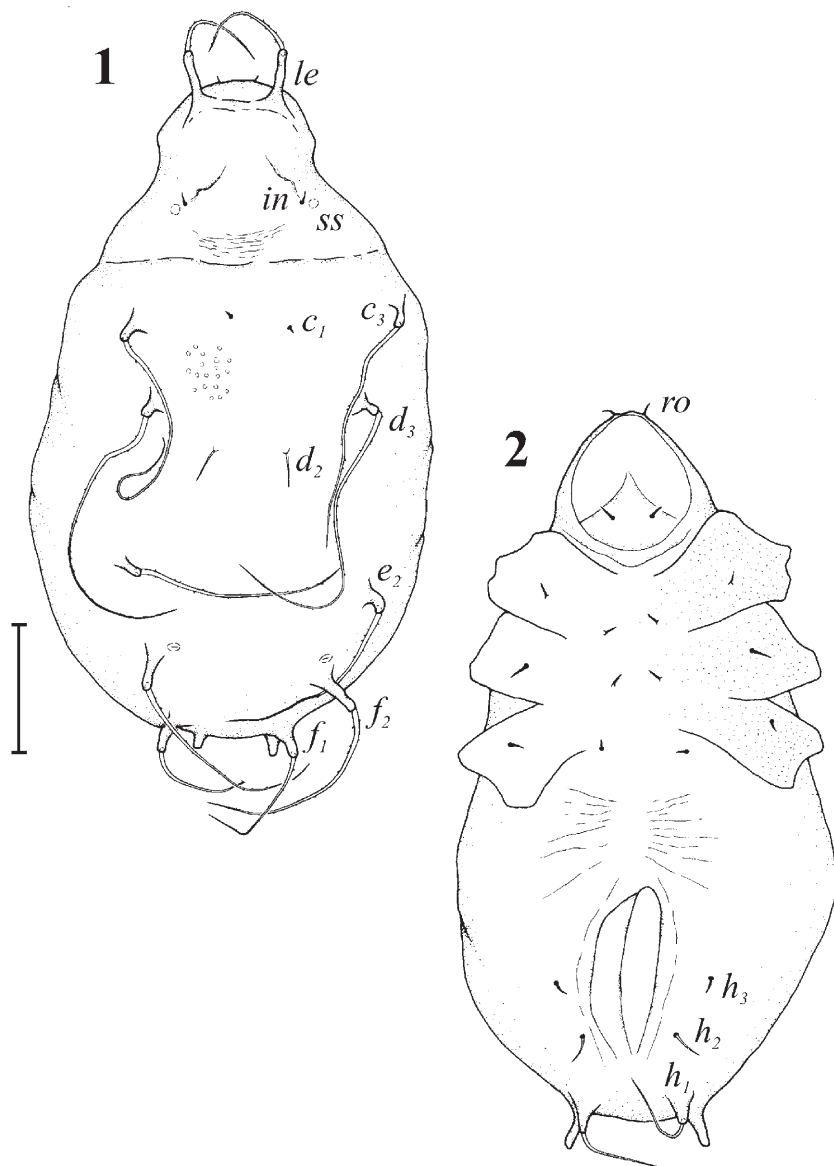
##### DIAGNOSIS

*Crotonia longisetosa* sp. n. can be distinguished from other species of the genus by very long setae  $c_1$  and  $c_3$ , lack of setae  $c_2$ , relatively short setae  $in$ , long centro-lateral notogastral setae and  $f_1$  and  $h$  similar to  $d_2$ .

##### DESCRIPTION

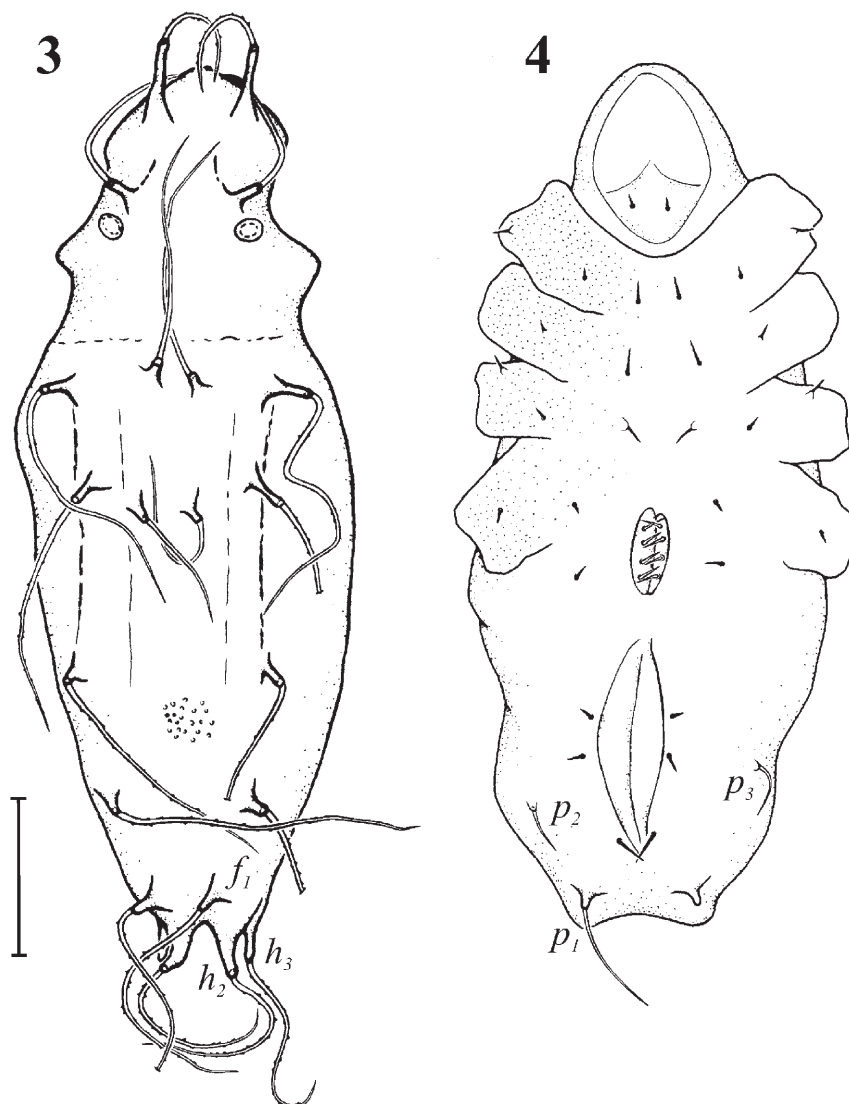
Larva (Figs. 1-2): Body length: 510  $\mu$ m, body width: 310  $\mu$ m; colour: whitish. Whole body thickly covered with dirt. Rostrum rounded. Two folds of thickened chitinous ridges running between bothridia in direction of lamellar apophyses. Surface with small knobs; small folds occurring posteriorly. Rostral setae ( $ro$ ) straight, half as

long as the distance between their tubercles. Lamellar setae (*le*, length: 80  $\mu\text{m}$ ) barbed and curved, longer than the distance between tops of their apophyses, set on large apophyses. Setiform interlamellar setae (*in*) as long as *ro*, originating in alveolae. Small sensilli completely contained within bothridium. Notogastral surface with knobs and folds. Ten pairs of notogastral setae (setae *c*<sub>2</sub>, *d*<sub>1</sub> and *e*<sub>1</sub> absent, seta *f*<sub>1</sub> present). Setae *c*<sub>1</sub>



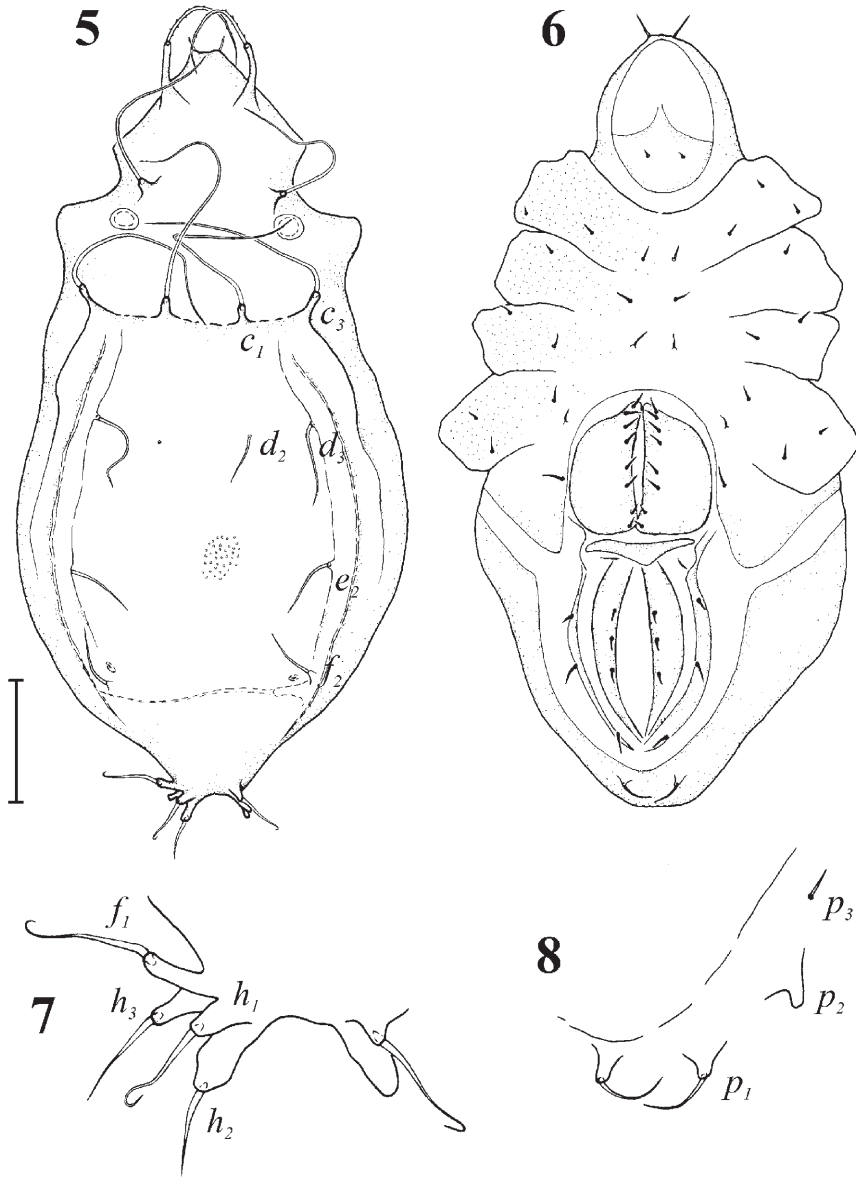
1, 2. *Crotonia longisetosa* n. sp., larva: 1 – dorsal view, 2 – ventral view; scale bar: 100  $\mu\text{m}$

half as short as  $ro$ , smooth, originating in alveolae; setae  $c_3$  (length: 200  $\mu\text{m}$ ) and the longest setae  $d_3$  (length: 245  $\mu\text{m}$ ) barbed, set on apophyses. Setae  $d_2$  (length: 28  $\mu\text{m}$ ) smooth, set on tubercles. Setae  $e_2$  similar to  $c_3$ . Setae  $f_2$  (length: 160  $\mu\text{m}$ ) and  $f_1$  (length: 110  $\mu\text{m}$ ) barbed, set on apophyses. Setae  $h_1$  2/3 length of  $le$ , on apophyses; setae  $h_2$  2/3 length of  $d_2$  and  $h_3$  as long as  $ro$ , both originating in alveolae. Apophyses of setae  $c_3$  and  $d_3$  and apophyses of  $e_2$  and  $f_2$  nearby each other; apophyses of setae  $f_1$  nearby  $h_1$ . Oval



3, 4. *Crotonia longisetosa* n. sp., deutonymph: 1 –dorsal view, 2 – ventral view; scale bar: 200  $\mu\text{m}$

openings of opisthosomal glands (*gla*) situated above seta *f*<sub>2</sub>. Three pairs of epimeres separated. Epimera porose, with formula: 2-2-2 (one seta extra on II epimers). Lack of genital plates, anal and adanal setae. All legs monodactylous (setation not studied).



5-8. *Crotonia longisetosa* n. sp., adult, holotype: 5 – dorsal view (tritonymphal seta *f*<sub>2</sub> matched with a dashed line), 6 – ventral view, 7 – posterior notogastral setae, 8 – setae *p* of paratype; scale bar: 200  $\mu$ m

Deutonymph (Figs. 3-4): Body length: 1100  $\mu\text{m}$ , body width: 410  $\mu\text{m}$  (specimen has collapsed during examination); colour: light brown. Whole body thickly covered with dirt and debris, particularly on the posterior part (hardly visible setae and apophyses). Prodorsum shape and surface similar to that of larva. Setae *le* (length: 120  $\mu\text{m}$ ) barbed, set on large apophyses. Setae *in* one and half longer than the distance between their bases. Sensilli well developed, completely contained within bothridium. Notogastral surface with folds and knobs, laterally running longitudinal ridges. Thirteen pairs of notogastral setae. Setae *c*<sub>1</sub> (length: 270  $\mu\text{m}$ ) smooth, on tubercles. Setae *d*<sub>2</sub> (length: 135  $\mu\text{m}$ ) smooth, on small apophyses. Setae *c*<sub>3</sub> (length: 290  $\mu\text{m}$ ), *d*<sub>3</sub> (length: 250  $\mu\text{m}$ ), *e*<sub>2</sub> (length: 270  $\mu\text{m}$ ) and *f*<sub>2</sub> (length: 340  $\mu\text{m}$ ) barbed, on apophyses. Setae *f*<sub>1</sub> similar to *d*<sub>3</sub>. Setae *h*<sub>2</sub> 2/3 length of *f*<sub>2</sub>, barbed, set on the biggest apophyses. Setae *h*<sub>3</sub> similar to *h*<sub>2</sub>. Setae *h*<sub>1</sub> not visible. Setae *p*<sub>1</sub> almost as long as *d*<sub>2</sub>, smooth, on apophyses; *p*<sub>2</sub> and *p*<sub>3</sub> half as long as *p*<sub>1</sub>, on tubercles. Apophyses of setae *c*<sub>3</sub> and *d*<sub>3</sub> and apophyses of *e*<sub>2</sub> and *f*<sub>2</sub> nearby each other; apophyses of setae *f*<sub>1</sub> and *h* nearby, forming cluster. Oval openings of opisthosomal glands (*gla*) situated above seta *f*<sub>2</sub>. Four pairs of epimeres separated. Epimera porose, with formula: 3-2-3-2. Four pairs of genital setae, 1 pair of aggenital setae, three pairs of adanal setae. Anal setae lacking. All legs monodactylous (setation not studied).

Adult (Figs. 5-8) (all measurements of female, holotype): Body length: 1220  $\mu\text{m}$ , body width: 670  $\mu\text{m}$ ; colour: amber brown. Whole body thickly covered with dirt and debris, in posterior part with fragments of tritonymphal exuvium as well (setae hardly visible). Rostrum rounded. Two folds of thickened chitinous ridges running between bothridia in direction of lamellar apophyses. Surface smooth; rare small knobs occurring posteriorly. Setae *le* (length: 130  $\mu\text{m}$ ) barbed, set on large apophyses. Setae *in* (length: 300  $\mu\text{m}$ ) smooth, on small apophyses. Notogastral plate covered with knobs, demarcated laterally by longitudinal, plicate ridges. Thirteen pairs of notogastral setae. The longest setae *c*<sub>1</sub> (length: 420  $\mu\text{m}$ ) smooth, on apophyses. Setae *d*<sub>2</sub> (length: 85  $\mu\text{m}$ ) smooth, in alveolae. Setae *c*<sub>3</sub> (length: 355  $\mu\text{m}$ ), *d*<sub>3</sub> (length: 140  $\mu\text{m}$ ), *e*<sub>2</sub> (length: 110  $\mu\text{m}$ ) and *f*<sub>2</sub> (length: 100  $\mu\text{m}$ ) very delicately barbed, on tubercles. Setae *f*<sub>1</sub> and *h* as long or shorter than *d*<sub>2</sub>, very delicately barbed, set on apophyses (the biggest apophyses of *h*<sub>2</sub>). Setae *p*<sub>1</sub> (length: 50  $\mu\text{m}$ ) smooth, on small apophyses. Setae *p*<sub>3</sub> half as long as *p*<sub>1</sub>, in alveolae; visible only apophyses of *p*<sub>2</sub>. Apophyses of setae *c*<sub>3</sub> and *d*<sub>3</sub> and apophyses of *e*<sub>2</sub> and *f*<sub>2</sub> nearby each other; apophyses of setae *f*<sub>1</sub> and *h* forming cluster. Oval openings of opisthosomal glands (*gla*) situated above seta *f*<sub>2</sub>. Epimera porose, with formula: 3(4)-2-3-3. Genital plate with 8 pairs of long setae; 2 pairs of aggenital setae. Three pairs of short anal and 3 pairs of adanal setae. All legs tridactylous (setation not studied).

#### REMARKS

The adult of the new species possesses all features of the “*unguifera*” group of *Crotonia* (WALLWORK 1978):

1. posterior setae inserted on short, bulbous apophyses, paired (dorsal and ventral pair) and joined basally to the small, common stem of the ventral pair;

2. notogastral plate narrow, elongated and demarcated from lateral field by a plicate strip;
3. lamellar apophyses approximately as long as their mutual distance;
4. straight setae *ro*;
5. setae *c*<sub>2</sub> lacking;
6. long setae *c*<sub>1</sub> and *c*<sub>3</sub> set on apophyses;
7. three pairs of anal setae.

*Crotonia longisetosa* sp. n. is similar to the New Zealand species *C. unguifera* MICHAEL, 1908 and *C. obtecta* (PICKARD-CAMBRIDGE, 1875) and the Argentinian species *C. flagellata* (BALOGH et CSISZÁR, 1963). These species have a caudal apophyseal cluster, 2 pairs of setae *c* and long setae *c*<sub>1</sub>. However, unlike these known species, *C. longisetosa* sp. n. possesses longer setae *c*<sub>3</sub>, *d*<sub>2</sub>, *e*<sub>2</sub> and *f*<sub>2</sub>. Moreover, the new species is different from *C. unguifera* by longer prodorsal setae (*C. unguifera* possesses setae *le* slightly shorter than distance between tips of their apophyses and setae *in* reach only to tips of *le* apophyses). In addition it has smaller body dimensions (*C. unguifera* body length: 1391 µm, body width: 706,2 µm; after WALLWORK 1978).

Unfortunately, juvenile stages are not described for any of these three known species. However, the studied instars may be compared with described earlier juvenile stages of *C. pulcher* (BECK, 1962). The comparison of selected characters is given in Table 1.

This new species was found in material from two localities: Croydon Bush, near Gore, South Island and Rotorua, North Island. These two localities are over 1200 km apart and characterised by very different habitat (Rotorua – a botanic garden; Croydon

Table 1. The comparison of selected characters of *Crotonia longisetosa* sp. n. and *C. pulcher* (BECK, 1962) immatures (after KUTY 2005 and present studies).

Stage	Characters	<i>Crotonia longisetosa</i> sp. n.	<i>C. pulcher</i> (BECK, 1962)
Larva	Body length	510 µm	395 µm
	Body width	310 µm	150 µm
	Number of notogastral setae	10 pairs	10 pairs
	Epimeral setation	2-2-2	2-1-2
	Openings of opisthosomal glands location	above to seta <i>f</i> <sub>2</sub>	close to seta <i>f</i> <sub>2</sub>
Deutonymph	Body length	1100 µm	585 µm
	Body width	410 µm	315 µm
	Number of notogastral setae	13 pairs	13 pairs
	Genital setae	4 pairs	4-6 pairs
	Epimeral setation	3-2-3-2	3-1-1-3
	Openings of opisthosomal glands location	above to seta <i>f</i> <sub>2</sub>	close to seta <i>f</i> <sub>2</sub>

Bush – a dense rainforest). The author supposes that South Island locality is native and new species was introduced to the North Island, probably during transporting plants with soil.

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