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# New moss mite of the genus *Camisia* from western Nearctic Region (Acari: Oribatida: Camisiidae)

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Abstract. A new oribatid mite, *Camisia monongahelae* n. sp. is described on the basis of specimens found in forest riparian litter in West Virginia, USA. A key of the Nearctic species of the genus *Camisia* is given.

Key words: acarology, taxonomy, morphology, new species, *Camisia*, Nearctic region.

## INTRODUCTION

There are over 30 described species of the genus *Camisia* von Heyden, 1826 (Camisiidae) occurring in most regions of the world (Subías 2004). Majority of them have been found in the Holarctic and Neotropical regions. Fourteen species are known from USA and Canada but distribution of only five of them (*C. carolli*, C. *presbytis*, *C. oregonae*, *C. orthogonia* and *C. abdosensilla*) is limited only to Nearctic region (Colloff 1993). Knowledge of mites of the genus *Camisia* from that region is still incomplete. It should be expected that both species new for science will be discovered and species that have been recognized so far as Palaearctic or Neotropical only will be found there. The purpose of this paper is to present a description of a new *Camisia* species found in the soil in mixed riparian forest of the Monongahela National Forest (West Virginia, USA) and to discuss the morphological similarities with other species of the genus. A key to the Nearctic species of the genus *Camisia* is also given.

### Methods

The description of *Camisia monongahelae* is based on individuals of one sex (adult females). Samples were cleared in lactic acid and stored in ethanol, dehydrated and

examined with a scanning electron microscope in the Electron and Confocal Microscope Laboratory, at A. Mickiewicz University, Poznań, Poland. Drawings were made with the aid of a camera lucida.

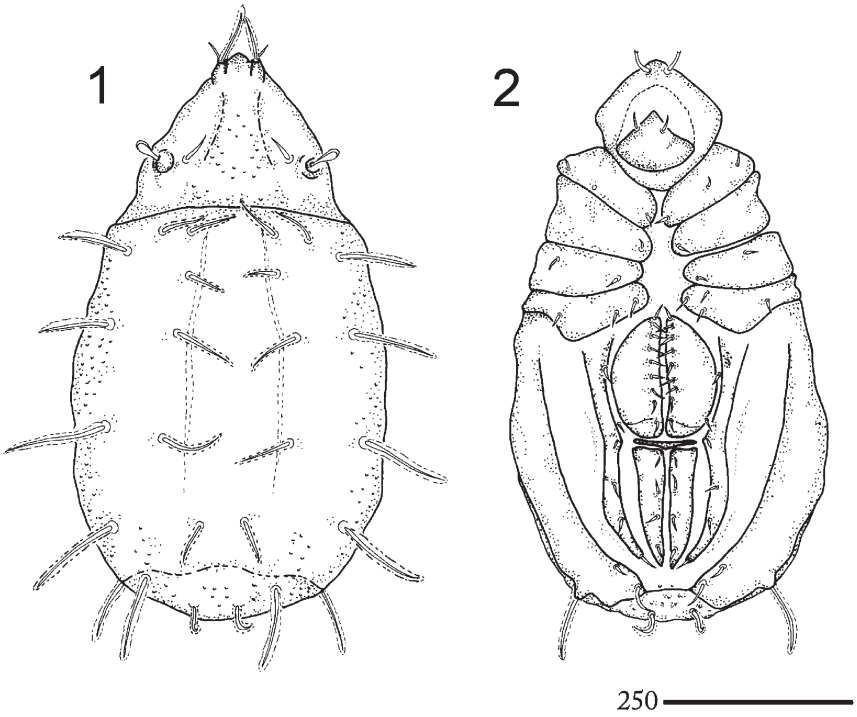
## *Camisia monongahelae* n. sp.

Description

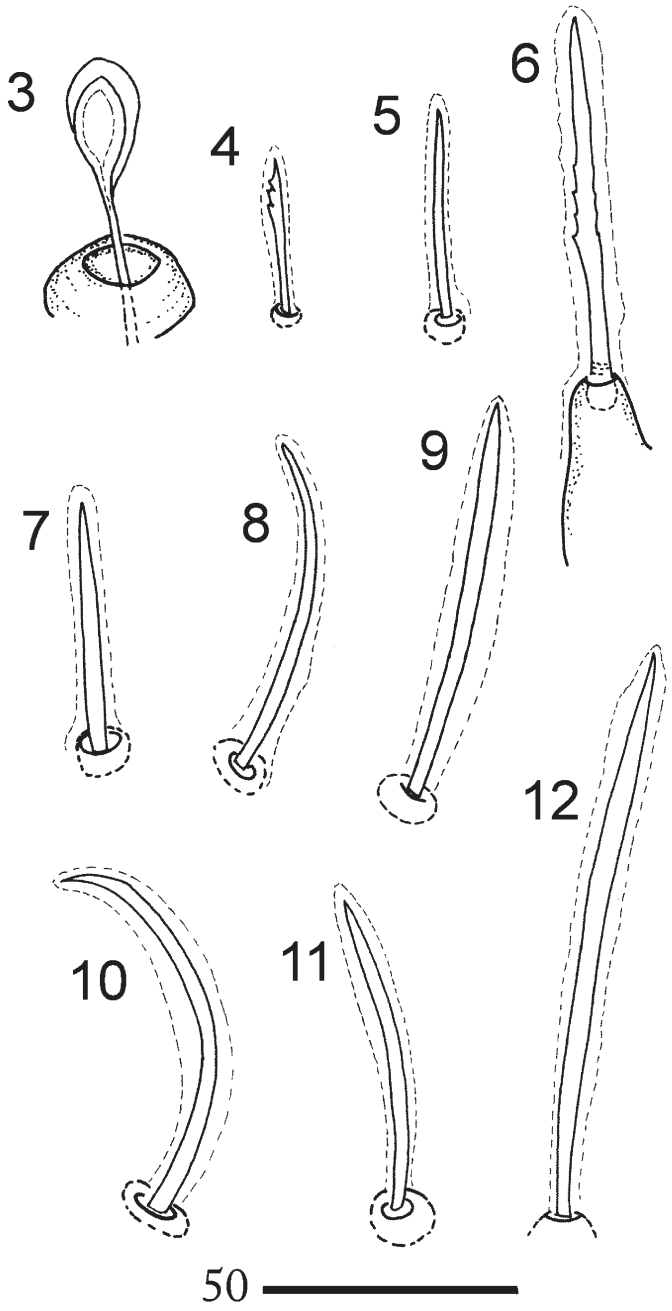
*Adult*

Body length: 702-721 μm (holotype: 708 μm), maximum body width: 390-405 μm (holotype: 400 μm). Colour: light brown to brown. Body oval in shape without remains of tritonimphal exuviae, usually covered with cerotegument, dirt and debris; lateral margins slightly wavy, body surface porose with cavities on dorsal region.

*Prodorsum* (figs. 1, 3-6, 17-19, 21, 22). Surface of prodorsum covered with cavities more distinct in central region; two longitudinal folds between lamellar and interlamellar setae (symmetrical to each other); rostrum rounded with pair of short and distally barbed rostral setae (*ro*); lamellar setae (*le*) long with slight barbs in the middle, covered with cerotegument sheaths, set on apophyses; interlamellar setae (*in*) shorter than lamellar, smooth and spiniform, covered with sheaths. Bothridia cylindrical; sensillus club-shaped, short, with tiny leaf of cerotegument. Exobothridial setae absent.

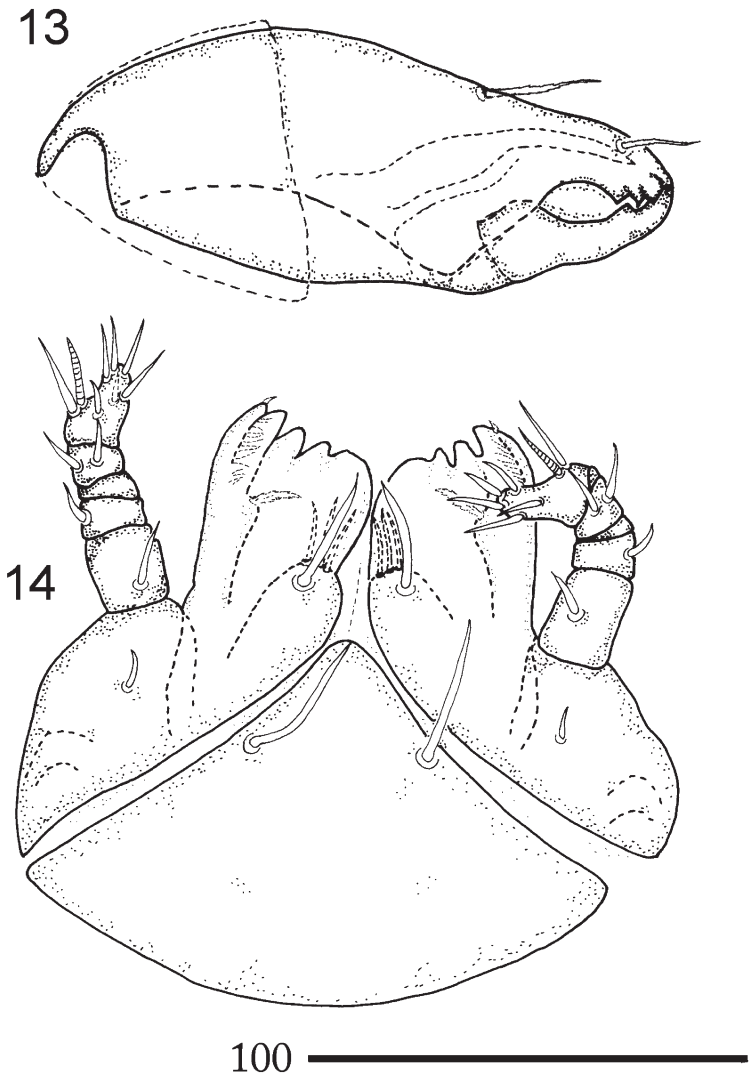



1, 2. *Camisia monongahelae* n. sp., holotype: 1 – dorsal view, 2 – ventral view. Scale bar in μm




3–12. *Camisia monongahelae* n. sp., holotype: 3 – sensillus, 4 – seta *ro*, 5 – seta *in*, 6 – seta *le*; 7 – seta $c_1$; 8 – seta $c_2$, 9 – seta $c_3$, 10 – seta $ps_1$; 11 – seta $d_2$, 12 – seta $f_2$. Scale bar in μm

*Notogaster* (figs. 1, 7-12, 17-20, 22-24). Oval in shape, lateral margin slightly wavy, surface porose with delicate cavities. Two almost symmetrical dorso-central folds well developed, running posteriorly from level of tubercles of setae $c_1$, subtly broadened at level of setae $d_2$, end anteriorly to bases of setae $h_1$, weak transverse dorsocentral fold present posterior of setae $h_1$. With 16 pairs of smooth and spiniform notogastral setae, covered with sheaths of cerotegument; setae $d_1$ and $h_1$ distinctly shorter, setae $c_2$ situated slightly closer to $c_1$ than $c_3$, distance $d_1$-$d_2$ < $d_2$-$d_3$ and $d_2$-$e_1$ almost equal to $d_3$-$e_2$.




13, 14. *Camisia monongahelae* n. sp., paratype: 13 – chelicera, antiaxial view, 14 – subcapitulum, ventral view. Scale bar in μm

*Ventral region* (fig. 2). Epimeres situated close to each other, coxisternal pairs separated by posteriorly expanded medial furrow; epimeral setation: 3-1-2-3; genital plates with 9 pairs of smooth setae; 2 pairs of aggenital setae; 3 pairs of adanal setae; aggenital and adanal plates fused and narrow; anal plates longitudinal with 3 pair of setae subequal in length; caudal margin of notogaster straight.

*Gnathosoma* (figs. 13, 14). Mental setae (*h*) spiniform distinctly longer than genal setae (*a*)*;* three pairs of smooth adoral setae; setae $m_1$ and $m_2$ absent; rutellum with well visible specific ornamentation on ventro-lateral margin; chelicera short and massive

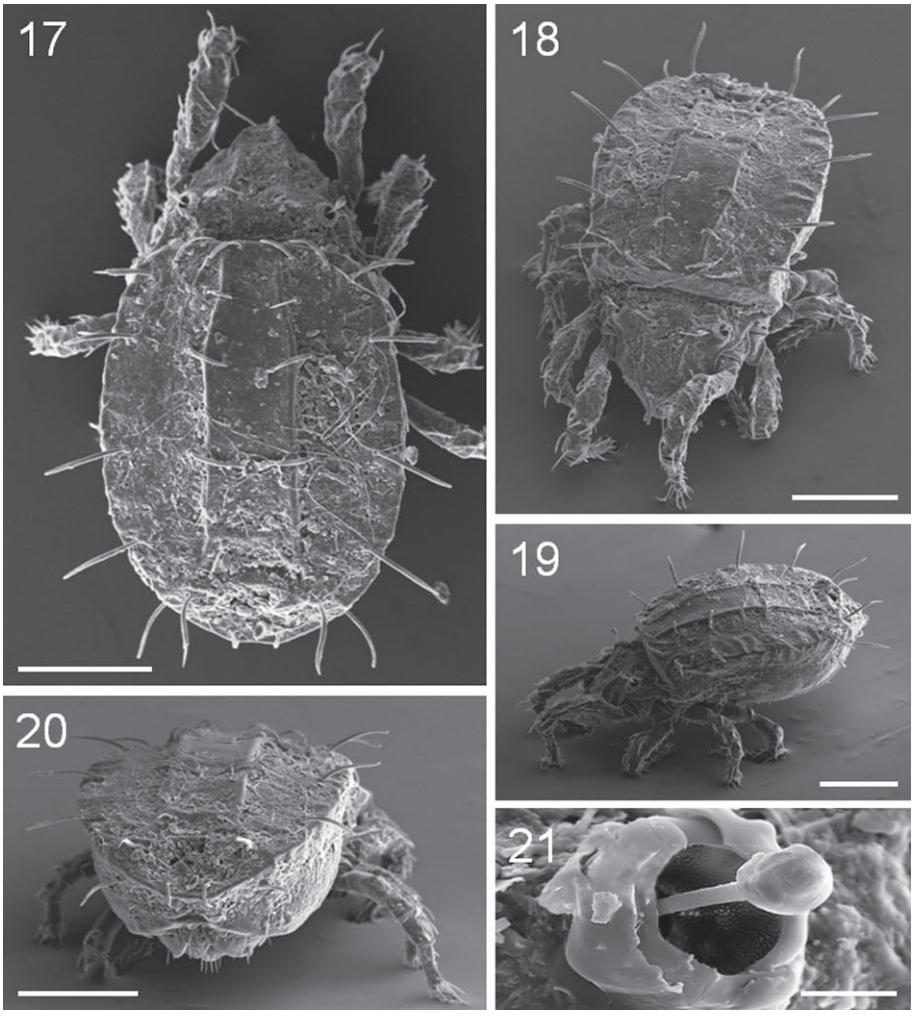

15, 16. *Camisia monongahelae* n. sp., paratype: 15 – leg I (from tarsus to genu), antiaxial view, 16 – leg II (from tarsus to femur), antiaxial view. Scale bar in μm

with two barbed cheliceral setae; setae *chb* minutely shorter then *cha*; palp setation: 0-1-1-2-7(1).

*Legs* (figs. 15, 16). Tarsi monodactylous. Setation (famulus included) and solenidial formulae: I: 1-11-5-6-29 [1-1-2]; II: 1-9-5-6-25 [1-1-1]; III: 3-4-4-4-19 [1-1-0]; IV: 1-2-4-4-17 [1-1-0].

Material examined

The holotype and 2 paratypes were collected in: USA, West Virginia; Randolph Co.; Monongahela National Forest, nr. Bowden; Otter Creek Wilderness trailhead near

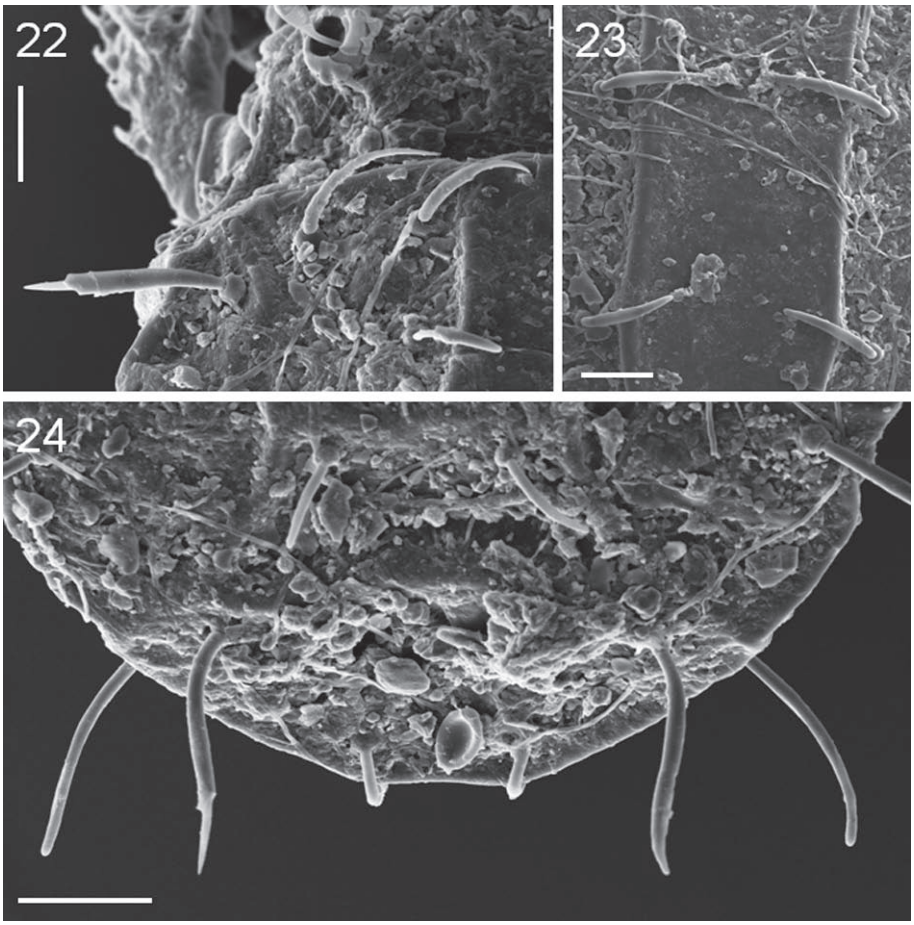



17–21. *Camisia monongahelae* n. sp., paratype: 17 – dorsal view, 18 – anterodorsal view, 19 – lateral view, 20 – caudal region, posterior view, 21 – trichobothrium, dorsal view. Scale bar = 200 μm (figs. 17-20), 10 μm (fig. 21)

Alpena Gap, 3050' elev, 38° 56.505' N, 79° 40.084'W; 24-V-2005; root mat under deep litter of rhododendron, in mixed riparian forest (red maple, yell. Birch, hemlock, white spruce); leg. R.A. Norton [RAN 05-017]. The holotype and paratype are deposited in the Field Museum of Natural History, Chicago, Illinois, USA, the second paratype was used for SEM. All studied specimens were females. It is consistent with thelytokous mode of reproduction known in the genus (Palmer & Norton 1991).

Etymology

The name *monongahela* relates to a tribe of Native Americans, cultural manifestation of Late Woodland peoples in Western Pennsylvania, Eastern Ohio and West Virginia from AD 1050 to 1635 and the Monongahela National Forest where the *locus typicus* is situated.




22–24. *Camisia monongahelae* n. sp., paratype, dorsal view: 22 – latero-anterior part of notogaster, 23 – central part of notogaster (between pairs of setae $d_1$ and $d_2$, 24 – posterior part of notogaster. Scale bar = 50 μm

Remarks

Colloff in his redesription (1993) delineated five species-groups within the genus *Camisia*. According to this author "they have no taxonomic status, nor are they intended to indicate relatedness but serve merely as a useful means of grouping species that have combinations of characters in common". The combination of characters distinguished by Colloff is endlessly problematic, the used sets of characters are unclear and difficult to define in the form of a clear diagnosis. The sceptical view of the validity of delineating species-groups in the genus *Camisia* and *Crotonia* has alreadybeen repeatedly presented (Olszanowski *et al.* 2001, 2002, Łochyńska 2010). According to Colloff's (1993) subdivision, *Camisia monongahelae* n.sp. is a member of the species-group 'invenusta' containing both monodactylous species (*C. lapponica*, *C. solhoeyi*, *C. presbytis* and *C. sibirica*) and tridactylous species (*C. invenusta*, *C. foveolata* and *C. polytricha*). The last group should also include *C. tatrica* reported so far from only one locality in the Tatra Mts., Poland (Olszanowski 1994, 1996). Monodactyly, a common character for a group of five morphologically related species, does not necessarily imply a special relationship of these taxa. According to Colloff (1993) the evolution of monodactyly from tridactyly has taken place several times within Oribatida and is not sufficient for separating supraspecific taxa.

*Camisia monongahelae* is morphologically similar to *C. presbytis* Colloff, 1993, and both taxa occur in the Nearctic region. The characters differentiating these two species are listed in Table 1. Both species have smooth, porose surface of prodorsum and epimeres, long straight notogastral setae, covered with leaf of cerotegument and monodactylous tarsi. However, there are a few important differences in combination of characters between them. Primarily the surface and shape of notogastral margin and form of dorsal setae. Moreover the two species differ in the number of genital setae. All notogastral setae of *C. monongahelae* are spiniform, and almost equal in length,

Table 1. Characters distinguishing *Camisia presbytis* Colloff and *C. monongahelae* n. sp.

| ***C. presbytis* Colloff** | ***C. monongahelae* n. sp.** |
|---|---|
| Setae *ro* spinose apically | Setae *ro* distally barbed |
| Setae *le* long, spinose | Setae *le* long with barbs in the middle |
| Surface of prodorsum smooth, porose | Surface of prodorsum with cavities, distinct in central region |
| Notogastral setae setiform, subequal in length, smooth, lacking cerotegument | Notogastral setae spiniform, different in length with sheaths of cerotegument |
| Surface of notogaster tuberculate | Notogastral surface porose |
| Distance $c_1$-$c_2$=$c_2$-$c_3$ | Distance $c_1$-$c_2$<$c_2$-$c_3$ |
| Setae *a* setiform, *h* spiniform | Setae *a* and *h* spiniform |
| Epimeral setation: 3-1-3-3 | Epimeral setatiom: 3-1-2-3 |
| 15-17 pairs of genital setae | 9 pairs of genital setae |
| Caudal margin of notogaster convex | Caudal margin of notogaster straight |

except setae $d_1$ and $h_1$ that are distinctly shorter than other setae. Setae of *C. presbytis* are setiform and subequal in length. *C. monongahelae* with straight caudal margin of notogaster and 9 pairs of genital setae can be easily distinguished from *C. presbytis* that has concave caudal margin and 15-17 pairs of genital setae.

Furthermore, there are considerable differences in shape of prodorsal setae. *C. monongahelae* in opposition to *C. presbytis* have distally barbed setae *ro* and long setae *le,* with barbs in the middle. From the three remaining monodactylous species of the genus *Camisia* (*C. solhoeyi*, *C. lapponica* and *C. sibirica*) *C. monongahelae* n. sp. differs in possessing spiniform (not phylliform) notogastral setae (Figures 7-12, 17, 22-24).

KEY TO NEARCTIC SPECIES OF THE GENUS *CAMISIA* (ADULTS)

1. Caudal ledge bearing seta $p_1$ absent ..... 2.
–. Seta $p_1$ inserted on caudal ledge protruding past bases of seta $h_2$ ..... 7.
2. Lateral notogastral setae long, whip-like; apophysis of seta $h_2$ shaped sleeve-like, bearing tubercle of $h_1$ medially ..... *C. spinifer* (C.L. Koch)
–. Lateral setae not long, whip-like; tubercle of seta hl on dorsal notogastral plate ..... 3.
3. Seta $h_2$ spiniform; $h_2$ apophysis with lateral tubercle or lobe ..... 4.
–. Seta $h_2$ curved; $h_2$ apophysis without lateral tubercle or lobe ..... 6.
4. Apophysis of seta $h_2$ with lateral tubercle; seta $c_3$ shorter than $c_1$ ..... ..... C. *biurus* (C.L. Koch)
–. Apophysis of seta $h_2$ with distinct lateral lobe; seta $c_3$ as long as $c_1$ ..... 5.
5. Sensillus protruding from within bothridium ..... ..... *C. orthogonia* Olszanowski, Szywilewska, et Norton
–. Sensillus completely enclosed within bothridium ..... ..... C. *abdosensilla* Olszanowski et Clayton
6. Seta *in* extending anteriorly as far as base of apophysis of seta *le* ..... ..... C. *carolli* André
–. Seta *in* extending anteriorly well beyond base of apophysis of seta *le* ..... ..... C. *segnis* (Hermann)
7. Lamellar apophysis reaching rostrum; setae *in* minute, shorter than *ro* ..... 8.
–. Lamellar apophysis longer than broad; setae *in* longer than *ro* .....11.
8. Tubercle of seta $p_1$ projecting from pair of funnel-shaped caudal lobes ..... ..... *C. biverrucata* (C.L. Koch)
–. Caudal ledge without funnel-shaped lobes bearing seta $p_1$ ..... 9.
9. Notogastral setae narrowly phylliform, denticulate; epimeral setae denticulate ..... *C. oregonae* Colloff
–. Notogastral setae setiform, spinose; epimeral setae smooth ..... 10.
10. Transverse dorsocentral ridge at level of seta $e_1$; posterolateral margin of notogaster forming obtuse angle ..... *C. horrida* (Hermann)
–. Transverse dorsocentral ridge absent; posterolateral margin of notogaster forming right angle ..... *C. dictyna* Colloff

11. Tarsi with 3 claws ..... *C. foveolata*
–. Tarsi with 1 claw ..... 12.
12. With 9 pairs of genital setae; seta $h_1$ marcedly shorter than all other notogastral setae ..... 13.
–. With more than 9 pairs of genital setae; seta $h_1$ subequal in length to other notogastral setae ..... 14.
13. Marginal notogastral setae equal in length to central setae, seta $c_3$ shorter than distance $c_3$-$d_1$ ..... *C. solhoeyi* Colloff
–. Marginal notogastral setae distinctly longer than central setae, seta $c_3$ as long as distance $c_3$-$d_1$ ..... ***C. monongahelae* n. sp.**
14. Notogastral setae strongly phylliform; epimera with tuberculate microsculpture ..... *C. lapponica* (Trägårdh)
–. Notogastral setae setiform; epimera smooth, porose ..... *C. presbytis* Colloff

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## REFERENCES

Colloff, M. J., 1993. A taxonomic revision of the oribatid mite genus *Camisia* (Acari: Oribatida). Journ. Nat. Hist., **27**: 1325-1408.

Łochyńska, M., 2010. The ontogeny description of two Neotropical species of *Crotonia* (Acari: Oribatida: Crotonioidea). Journ. Nat. Hist., **44**: 969-992.

Olszanowski, Z., 1994. A new species of *Camisia* von Heyden from Poland (Acari: Oribatida: Camisiidae). Genus, **5**(3): 209-214.

—, 1996. A monograph of the Nothridae and Camisiidae of Poland (Acari: Oribatida: Crotonioidea). Genus (Supplement), Wrocław, 201 pp.

Olszanowski, Z, Szywilewska, A., Norton, R. A., 2001. New moss mite of the *Camisia* from western Nearctic region (Acari: Oribatida: Camisiidae). Genus, Wrocław, **12**(3): 395-406.

Olszanowski, Z., Clayton, M. R., Humble, L. M. 2002. New species of the genus *Camisia* (Acari: Oribatida): an arboreal mite with enclosed sensilli. Canadian Entomol., **134**: 707-721.

Palmer, S. C, Norton, R. A., 1991. Taxonomic, geographic and seasonal distribution of thelytokous parthenogenesis in the Desmonomata (Acari: Oribatida). Exper. Appl. Acarol., **12**: 67-81.

Subías, L. S., 2004. Listado sistemático, sinonímico y biogeográfico de los ácaros oribátidos (Acariformes: Oribatida) del mundo (excepto fósiles). Graellsia, 60 (número extraordinario). Pp. 3-305. Online version accessed in July 2010. 557 pp.; http:/www.ucm.es/info/zoo/Arthropodos/Catalogo.pdf.