



<http://dx.doi.org/10.11646/zootaxa.3918.3.1>

<http://zoobank.org/urn:lsid:zoobank.org:pub:E69AC33B-2E8A-4914-B64F-C2DF918612BE>

## Redescriptions of Hypogastruridae and Onychiuridae (Collembola) described by David L. Wray

ERNEST C. BERNARD

Entomology & Plant Pathology Department, The University of Tennessee, 2431 Joe Johnson Drive, 205 Plant Sciences, Knoxville, TN 37996-4560, USA. E-mail: [ebarnard@utk.edu](mailto:ebarnard@utk.edu).

### Table of contents

Abstract .....	301
Introduction .....	302
Material and methods .....	303
Hypogastruridae.....	303
<i>Ceratophysella hermosa</i> (Wray, 1953) new combination .....	303
<i>Ceratophysella jondavi</i> (Wray, 1946) .....	307
<i>Hypogastrura gami</i> (Wray, 1952), new synonym of <i>Hypogastrura humi</i> (Folsom, 1916) .....	309
<i>Hypogastrura gravesi</i> Wray, 1971 .....	310
<i>Hypogastrura ireneae</i> (Wray, 1953) .....	313
<i>Hypogastrura promatro</i> (Wray, 1950) .....	316
<i>Schaefferia cheoha</i> Wray, 1963 .....	319
<i>Schoettella glasgowi</i> (Folsom, 1916) .....	321
<i>Schoettella (Knowltonella) idahoensis</i> (Wray, 1958) .....	325
<i>Triacanthella copelandi</i> (Wray, 1963) .....	325
<i>Xenylla carolinensis</i> Wray, 1946, new synonym of <i>Xenyllodes armatus</i> Axelson, 1903 .....	328
<i>Xenylla duchesnea</i> Wray, 1958 .....	328
Onychiuridae, Onychiurinae .....	330
<i>Heteraphorura magnina</i> (Wray, 1950) new combination .....	330
<i>Leeonychiurus mai</i> (Wray, 1950) new combination .....	332
<i>Onychiurus wilchi</i> Wray, 1950 .....	335
Acknowledgements .....	336
References .....	336

### Abstract

Species of Hypogastruridae and Onychiuridae described by D. L. Wray were reexamined and redescribed where necessary from type material and other specimens. *Mitchellania hermosa* is redescribed and transferred to *Ceratophysella*. *Hypogastrura ireneae* is redescribed and *H. gravesi* is validated with additional material. *Hypogastrura gami* is synonymized with *H. humi* and *H. utahensis* is synonymized with *H. promatro*. A lectotype is designated for *Schoettella (Knowltonella) idahoensis*. *Achorutes magnoliana* is confirmed as a synonym of *Schoettella glasgowi*. *Xenylla carolinensis* is synonymized with *Xenyllodes armatus* Axelson (Odontellidae). *Onychiurus mai* is transferred to the genus *Leeonychiurus* and becomes *L. mai*, and *O. magninus* is transferred to *Heteraphorura* and becomes *H. magnina*. Additional details are given for *Onychiurus wilchi*.

**Key words:** *Leeonychiurus*, new combination, *Schaefferia cheoha*, synonymy, taxonomy, *Triacanthella copelandi*, *Xenylla duchesnea*

could also be *O. wilchi*. Soto-Adames (2013) examined a type specimen of *O. wilchi* in the Illinois Natural History Survey, Champaign, Illinois, USA, and detected pronotal and Abd. I pseudocelli. The presence of 1+1 pronotal pseudocelli eliminates *O. steinmanni* as a possible synonym. The fact that Wray missed these pseudocelli suggests that numbers for some of the other segments could be wrong, as well; but if Wray's counts of 2+2 pseudocelli on Abd. II and III are correct, these numbers would serve to separate *O. wilchi* from other North American *Onychiurus* spp. In addition, *O. wilchi* was described and illustrated as having 18–20 vesicles in the PAO, whereas none of the *Onychiurus* spp. in Pomorski *et al.* (2009) has more than 17 vesicles in the PAO. Thus, it appears that *O. wilchi* may be a recognizable species and that it is premature to synonymize any of these species. In the key of Pomorski *et al.* (2009) *O. wilchi* should trace to *O. steinmanni*, but may be separable from that species by the number of compound vesicles in the PAO and pseudocelli on the thoracic terga.

If *O. wilchi* is assumed to have 1+1 pseudocelli on Th. I and 3+3 pseudocelli on Abd. I as observed by Soto-Adames (2013) but otherwise follows Wray's observations, then *O. wilchi* will key to *O. polychaetosus* Lee & Park, 1986 in the *Onychiurus* key of Arbea (2012). The two species differ in sense club architecture, with *O. wilchi* having smooth or slightly roughened clubs and *O. polychaetosus* having granulated clubs.

## Acknowledgements

I thank Kenneth A. Christiansen for his advice and encouragement, especially in trying to understand *Onychiurus wilchi*, and for discussions on the limits of various onychiurid genera, and Felipe Soto-Adames for examining the *O. wilchi* specimen in the Illinois Natural History Survey and making his findings available pre-publication. The Museum of Comparative Zoology, Harvard University, kindly loaned a cotype of *Schoettella glasgowi*. I am grateful to Lewis Deitz, Robert Blinn, and Kenneth R. Ahlstrom for the long-term loan of Wray's material from the North Carolina State University Entomology Collection and the North Carolina Department of Agriculture Insect Survey collection. Finally, I am most appreciative of the review efforts of Anatoly Babenko and Dariusz Skarżyński, whose thoughtful comments and constructive criticisms of the manuscript made this a much better paper.

## References

- Absolon, K. (1901) Weitere Nachricht über europäische Höhlencollembohlen und die Gattung *Aphorura* A. D. MacG. *Zoologischer Anzeiger*, 24, 385–389.
- Ågren, H. (1904) Lappländische Collembola. *Arkiv för Zoologi*, 2, 1–30.
- Arbea, J. (2012) Review of the genus *Onychiurus* Gervais, 1841 (Collembola: Onychiuridae) with description of a new cave species from southern Spain. *Zootaxa*, 3564, 33–46.
- Axelson, W.M. (1903) Weitere Diagnosen über neue Collembolen-Formen aus Finland. *Acta Societatis pro Fauna et Flora Fennica*, 25, 1–13.
- Babenko, A.B. (1994) Genus *Hypogastrura* Bourlet, 1839. In: Chernova, N.M. (Ed.), *Collembola of Russia and adjacent countries: Family Hypogastruridae*. Nauka, Moscow, pp. 30–195. [In Russian]
- Becker, E.G. (1905) Novyje dannye po faune Collembola Moskovskoj guberniji, v castnosti jeja juznoj okrajiny. *Izvestiya Imperatorskago Obshchestva Lyubitelej Estestvoznaniya*, 98, 85–100.
- Bellinger, P.F., Christiansen, K.A. & Janssens, F. (1996–2012) *Checklist of the Collembola of the world*. Available from: <http://www.collembola.org>, (accessed 30 September 2012)
- Bernard, E.C. (2006) Redescription of *Cosberella conatoa* Wray (Collembola: Hypogastruridae) and description of *C. lamaralexanderi* n. sp. *Proceedings of the Biological Society of Washington*, 119, 269–278. [http://dx.doi.org/10.2988/0006-324X\(2006\)119\[269:ROCCWC\]2.0.CO;2](http://dx.doi.org/10.2988/0006-324X(2006)119[269:ROCCWC]2.0.CO;2)
- Bonet, F. (1930) Remarques sur les Hypogastruriens cavernicoles avec descriptions d'espèces nouvelles. *Eos*, 6, 113–139.
- Bonet, F. (1945) Nuevos generos y especies de Hipogastruridos de Mexico. *Revista de la Sociedad Mexicana de Historia Natural*, 6, 13–45.
- Carl, J. (1901) Zweiter Beitrag zur Kenntnis der Collembolenfauna der Schweiz. *Revue Suisse de Zoologie*, 9, 243–278.
- Cassagnau, P. (1959) Faune Française des Collemboles (X). Espèces nouvelles ou peu connues des Pyrénées et du Sud-Ouest. *Vie et Milieu*, 10, 68–88.
- Chamberlain, R.W. (1943) Four new species of Collembola. *Great Basin Naturalist*, 4, 39–48.
- Christiansen, K. (1961) The Collembola of Hunters Cave. *Bulletin of the National Speleological Society*, 23, 59–63.
- Christiansen, K.A. & Bellinger, P.F. (1980) *The Collembola of North America north of the Rio Grande*. Grinnell College,

- Grinnell, Iowa, 1467 pp.
- Christiansen, K.A. & Bellinger, P.F. (1998) *The Collembola of North America north of the Rio Grande. Revised edition.* Grinnell College, Grinnell, Iowa, 1520 pp.
- Delamare Deboutteville, C. (1945) Sur quelques Collemboles de la région de Banyuls (Pyrénées Orientales) avec la description d'une espèce troglobie. *Bulletin de la Société Entomologique de France*, 6, 70–72.
- D'Haese, C. (1998) *Willemia anophthalma*-group (Collembola: Hypogastruridae): Systematics, new species, distribution and habitats. *European Journal of Entomology*, 95, 581–592.
- Fjellberg, A. (1984) Maxillary structures in Hypogastruridae (Collembola). *Annales de la Société Royale Zoologique de Belgique*, 114, 89–99.
- Fjellberg, A. (1985) Arctic Collembola I – Alaskan Collembola of the families Poduridae, Hypogastruridae, Odontellidae, Brachystomellidae and Neanuridae. *Entomologica Scandinavica*, Supplement No. 21, 1–126.
- Fjellberg, A. (1991) Rediscovery of *Knowltonella idahoensis* Wray, an autapomorphous *Schoettella* Schäffer (Collembola: Hypogastruridae). *Entomologica Scandinavica*, 35, 427–429.
- Fjellberg, A. (1998) The Collembola of Fennoscandia and Denmark. Part 1: Poduromorpha. *Fauna Entomologica Scandinavica*, 35, 1–183.
- Fjellberg, A. (1999) The labial palp in Collembola. *Zoologische Anzeiger*, 237, 309–330.
- Folsom, J. W. (1899) Japanese Collembola. Part II. *Proceedings of the American Academy of Arts and Sciences*, 34, 261–274. <http://dx.doi.org/10.2307/20020884>
- Folsom, J.W. (1916) North American collembolous insects of the subfamilies Achorutinae, Neanurinae, and Podurinae. *Proceedings of the United States National Museum*, 50 (No. 2134), 477–525. <http://dx.doi.org/10.5479/si.00963801.50-2134.477>
- Gama, M.M. da (1969) Notes taxonomiques et lignées généalogiques de quarante deux espèces et sous-espèces du genre *Xenylla* (Insecta: Collembola). *Memorias e Estudos do Museu Zoologico da Universidade de Coimbra*, 301, 1–61.
- Hammer, M. (1953) Investigations on the microfauna of northern Canada, Part II, Collembola. *Acta Arctica*, 6, 1–108.
- Jordana, R. (1993) Two new Poduromorpha from Navarre (Spain) (Insecta: Collembola). *Spixiana*, 16, 19–24.
- Jordana, R., Arbea, J.I., Simón, C. & Lucíañez, M.J. (1997) *Fauna Iberica, Vol. 8. Collembola Poduromorpha*. Museo Nacional de Ciencias Naturales, Madrid, 807 pp.
- Jordana, R., Baquero, E., Reboleira, S. & Sendra, A. (2012) Reviews of the genera *Schaefferia* Absolon, 1900, *Deuteraphorura* Absolon, 1901, *Plutomurus* Yosii, 1956 and the *Anurida* Laboulbene, 1865 species group without eyes, with the description of four new species of cave springtails (Collembola) from Krubera-Voronya cave, Arabika Massif, Abkhazia. *Terrestrial Arthropod Reviews*, 5, 35–85. <http://dx.doi.org/10.1163/187498312X622430>
- Kinoshita, S. (1916) Hopsan tobimushikwa ni tsuite (On the Japanese Collembola). Tokyo, *Dobutsugaku Zasshi*, 28, 494–500.
- Krausbauer, T. (1898) Neue Collembola aus der Umgebung von Weilburg a. Lahn. *Zoologischer Anzeiger*, 21, 495–504.
- Lee, B.-H. & Park, K.-H. (1986) Three new species of Onychiuridae Collembola from a Korean cave. *Korean Journal of Systematic Zoology*, 2, 11–20.
- Martynova, E.F. (1978) New species of springtails of the genus *Hypogastrura* s.l. in the northeastern Asia fauna. *Novye i Maloizvestnye Vidy Fauny Sibiri*, Supplement No. 12, 27–47.
- McNamara, C. (1922) Two new species of *Achorutes* (Collembola). *Canadian Entomologist*, 52, 173–176. <http://dx.doi.org/10.4039/Ent52173-8>
- Mills, H.B. (1934) *A monograph of the Collembola of Iowa*. Collegiate Press, Ames, IA, 143 pp.
- Mills, H.B. (1935) New Collembola from western North America. *Bulletin of the Brooklyn Entomological Society*, 30, 133–139.
- Pomorski, R.J. (1996) Onychiurinae of Poland (Collembola: Onychiuridae). *Genus*, Supplement, 1–201.
- Pomorski, R.J. (2002) Review of the North American *Heteraphorura* Bagnall, 1948 (Collembola: Onychiuridae) with description of two new species. *Insect Systematics & Evolution*, 33, 457–470. <http://dx.doi.org/10.1163/187631202X00244>
- Pomorski, R.J. (2007) Three new genera of Onychiuridae (Collembola). *Zootaxa*, 1461, 49–58.
- Pomorski, R.J., Furgol, M. & Christiansen, K. (2009) Review of North American species of the genus *Onychiurus* (Collembola: Onychiuridae), with a description of four new species from caves. *Annals of the Entomological Society of America*, 102, 1037–1049. <http://dx.doi.org/10.1603/008.102.0612>
- Salmon, J.T. (1964) *An index to the Collembola, Vol. 2*. Bulletin No. 7, Royal Society of New Zealand, Wellington, 500 pp.
- Skarżyński, D. & Christiansen, K. (2008) *Ceratophysella richardi* sp. n. (Collembola: Hypogastruridae) from USA, with synonymization of the genus *Mitchellania* with *Ceratophysella*. *Annals of the Entomological Society of America*, 101, 989–992. <http://dx.doi.org/10.1603/0013-8746-101.6.989>
- Soto-Adames, F. (2013) New records and new species of springtails (Hexapoda: Collembola) from caves in the Salem Plateau of Illinois, USA. *Journal of Cave and Karst Studies*, 75 (2), 146–175. <http://dx.doi.org/10.4311/2011LSC0257>
- Stach, J. (1920) Vorarbeiten zur Apterygotenfauna Polens. Teil II: Apterygoten aus den Pieniny. *Bulletin International de*

*l'Academie des Sciences de Cracovie. Classe des Sciences Mathematiques et Naturelles*, 2, 133–232.

- Stach, J. (1939) Die Hohlenfauna des Glatzer Schneeberges. II. Collembolenfauna der Salzlocher bei Seitendorf. *Beiträge zur Biologie des Glatzer Schneeberges*, 5, 395–415.
- Stach, J. (1949) *The apterygotan fauna of Poland in relation to the world-fauna of this group of insects. Families: Neogastruridae and Brachystomellidae*. Nakładem Polskiej Akademii Umiejętności, Kraków, 341 pp.
- Stach, J. (1954) *The apterygotan fauna of Poland in relation to the world-fauna of this group of insects. Family: Onychiuridae*. Państwowe Wydawnictwo Naukowe, Kraków, 219 pp.
- Stebaeva, S.K. & Potapov, M.B. (1994) Genus *Xenylla* Tullberg, 1869. In: Chernova, N.M. (Ed.), *Collembola of Russia and adjacent countries: Family Hypogastruridae*. Nauka, Moscow, pp. 250–305. [In Russian].
- Sun, X. & Arbea, J. (2014) *Leeonychiurus*, a new genus from East Asia (Collembola: Onychiuridae: Onychiurini). *Zootaxa*, 3847 (1), 115–124.  
<http://dx.doi.org/10.11646/zootaxa.3847.1.6>
- Sun, X., Yan, H. & Chen, J.-X. (2009) A new species of the genus *Allonychiurus* from China (Collembola: Onychiuridae). *Zootaxa*, 2194, 61–68.
- Sun, X., Chen, J.-X. & Deharveng, L. (2011) Redefinition of the genus *Allonychiurus* Yoshii, 1995 (Collembola, Onychiuridae) with description of a new species from China. *Zookeys*, 78, 27–41.  
<http://dx.doi.org/10.3897/zookeys.78.977>
- Thibaud, J.-M. (1967) Contribution à l'étude du développement postembryonnaire chez les Collemboles Hypogastruridae épigés et cavernicoles (première note). *Annales de Spéléologie*, 22, 167–198.
- Thibaud, J.-M. (1969) Contribution à l'étude du développement postembryonnaire chez les Collemboles Hypogastruridae épigés et cavernicoles (suite). *Revue d'Écologie et de Biologie du Sol*, 6, 209–220.
- Thibaud, J.-M. (1970) *Biologie et écologie des Collemboles Hypogastruridae édaphiques et cavernicoles*. Thèse de Doctorat d'État ès Sciences Naturelles, Faculté des Sciences de Paris, Éditions du Muséum, Paris, 201 pp.
- Thibaud, J.-M., Schulz, H.-J. & Gama Assalino, M.M. da (2004) Hypogastruridae. In: Dunger, W. (Ed.) *Synopses on Palearctic Collembola*. Vol. 4. *Abhandlungen und Berichte des Naturkundemuseums Görlitz*, 75 (2), 1–287.
- Weiner, W.M. (1986) Onychiurinae Bagn. of North Korea: *Formosanochiurus* g. n. Problems concerning the status of the genus *Onychiurus* Gerv. In: Dallai, R. (Ed.), *Second International Seminar on Apterygota*. University of Siena, Siena, Italy, pp. 93–97.
- Weiner, W.M. (1989) Morphological changes during postembryonal development in *Ceratophysella armata* (Gisin, 1949). In: Dallai, R. (Ed.), *Third International Seminar on Apterygota*. University of Siena, Siena, Italy, pp. 47–97.
- Weiner, W.M. (1996) Generic revision of Onychiurinae (Collembola: Onychiuridae) with a cladistic analysis. *Annales de la Société Entomologique de France (N.S.)*, 32 (2), 163–200.
- Wray, D.L. (1946) New Collembola from North Carolina. *Bulletin of the Brooklyn Entomological Society*, 41, 79–85.
- Wray, D.L. (1950) Some new Collembola from Utah and Idaho. *Bulletin of the Brooklyn Entomological Society*, 45, 91–95.
- Wray, D.L. (1950a) Some new Nearctic Collembola. *Psyche*, 57, 95–101.  
<http://dx.doi.org/10.1155/1950/65134>
- Wray, D.L. (1952) Some new North American Collembola. *Bulletin of the Brooklyn Entomological Society*, 47, 95–106.
- Wray, D.L. (1953) Some new species of springtail insects (Collembola). *Nature Notes*, 1, 1–7.
- Wray, D.L. (1958) New forms of North American Collembola. *Nature Notes Afeld, Occasional Papers*, 2, 1–12.
- Wray, D.L. (1963) Collembola of North America: Part I, Hypogastrurinae. *Journal of the Tennessee Academy of Science*, 38, 101–104.
- Wray, D.L. (1971) A unique species of the genus *Hypogastrura* from North Carolina (Collembola, Poduridae). *Entomological News*, 82, 147–150.
- Yoshii, R. (1996) Identity of some Japanese Collembola IV. “*Deuteraphorura*” group of *Onychiurus*. *Annals of the Speleological Research Institute of Japan (Iwaizumi)*, 14, 1–15.
- Yosii, R. (1956) Monographie zur Höhlencollembolen Japans. *Contributions from the Biological Laboratory, Kyoto University*, 3, 1–109.
- Yosii, R. (1960) Studies on the collembolan genus *Hypogastrura*. *American Midland Naturalist*, 64, 257–281.  
<http://dx.doi.org/10.2307/2422661>
- Yosii, R. (1962) Studies on the collembolan genus *Hypogastrura* II. Nearctic forms collected by Prof. F. Bonet. *Contributions from the Biological Laboratory, Kyoto University*, 13, 1–25.