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A new species of *Alopecosa* (Araneae: Lycosidae) from Canada: a morphological description supported by DNA barcoding of 19 congeners

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Abstract

A new species, *Alopecosa koponeni* sp. n., is described from the Arctic part of Manitoba. Individuals of *A. koponeni* most resemble those of *A. pictilis* (Emerton, 1885), but are smaller than the latter and differ in the epigynum and in colour pattern in both sexes. DNA barcode results show an interspecific distance of 0.93 between *A. koponeni* sp. n. and *A. pictilis*, a shallow genetic divergence that suggests a recent separation.

Introduction

Spiders of the Canadian Arctic are becoming better known through recent collecting efforts and through published revisions such as those by Dupérré (2013), Marusik *et al.* (2006), Marusik & Koponen (2001), Saaristo & Koponen (1998), and Saaristo & Marusik (2004). Additionally, two recent checklists also included arctic species (Buckle *et al.* 2001; Paquin *et al.* 2010) and a recent study on the spiders of Churchill revealed an undescribed species of *Alopecosa*, which was given the interim name *Alopecosa* sp. 1GAB (Blagoev *et al.* 2013).

Among all 120 valid genera of Lycosidae, *Alopecosa* Simon, 1885 is the fifth largest genus (Platnick 2014). Roughly 75% of *Alopecosa* are restricted to Eurasia, and 9% have a typical Holarctic or Palearctic distribution. To date, only seven species of *Alopecosa* are known from the Nearctic. Based on copulatory organs, these seven species are divided into three main species groups; *Alopecosa pulverulenta* group, *Alopecosa exasperans* group, and *Alopecosa solivaga* group (Dondale, Redner 1979, 1990).

Using morphological and molecular evidence, we describe a new species belonging to the *Alopecosa solivaga* species group from arctic tundra at Churchill, Manitoba.

Methods

Collecting methods

All ten specimens of *A. koponeni* sp. n. were collected during the snow-free months near Churchill (Fig. 1) using pitfall traps. The traps were placed in the soil between moss substrates around the rocks and temporary ponds close to the marine shoreline. Spiders were removed twice weekly from the traps. All specimens were then preserved in fresh 95% ethanol and are now deposited in the Canadian National Collection of Insects & Arachnids, Ottawa, Ontario (CNC), and the Biodiversity Institute of Ontario (BIO), University of Guelph.

The species locality map (Fig. 1) was created with SimpleMapp, <http://www.simplemapp.net> (Shorthouse 2010).

All measurements are given in mm.

Molecular methods

For comparative molecular analysis, COI sequences from 341 specimens from 18 *Alopecosa* species were used to explore relationships (Table 1, Fig. 8).

The DNA barcoding protocols were replicated, following Blagoev *et al.* (2013).

Sloan, Kadir Kunt, Lars Hendrich, Maria Naumova, Marko Mutanen, Monica Young, Robb Bennett, Stoyan Lazarov, Suzanne Bateson, Vadim Zolotuhin, Yuri Alekseenko, and Yuri Marusik. We are grateful to Cor Vink and two anonymous reviewers for their valuable comments on the manuscript.

LITERATURE CITED

- Blagoev, G.A., Nikolova, N.I., Sobel, C.N., Hebert, P.D.N. & Adamowicz, S.J. (2013) Spiders (Araneae) of Churchill, Manitoba: DNA barcodes and morphology reveal high species diversity and new Canadian records. *BMC Ecology*, 13, 1–44.
<http://dx.doi.org/10.1186/1472-6785-13-44>
- Buckle, D.J., Carroll, D., Crawford, R.L. & Roth, V.D. (2001) Linyphiidae and Pimoidae of America north of Mexico: checklist, synonymy, and literature. *Fabrerics*, Supplement 10, 89–191.
- Dondale, C.D. & Redner J.H. (1979) Revision of the wolf spider genus *Alopecosa* Simon in North America (Araneae: Lycosidae). *The Canadian Entomologist*, 111, 1033–1055.
<http://dx.doi.org/10.4039/Ent1111033-9>
- Dondale, C.D. & Redner, J.H. (1990) The insects and arachnids of Canada, Part 17. The wolf spiders, nurseryweb spiders, and lynx spiders of Canada and Alaska, Araneae: Lycosidae, Pisauridae, and Oxyopidae. *Research Branch Agriculture Canada Publication*, 1856, 1–383.
- Dupérré, N. (2013) Taxonomic revision of the spider genera *Agyneta* and *Tennesseellum* (Araneae, Linyphiidae) of North America north of Mexico with a study of the embolic division within Micronetinae sensu Saaristo & Tanasevitch 1996. *Zootaxa*, 3674 (1), 1–189.
<http://dx.doi.org/10.11646/zootaxa.3674.1.1>
- Esyunin, S.L. & Tuneva, T.K. (2012) On two rare spider species of the genus *Alopecosa* Simon, 1885 (Aranei: Lycosidae) from the south Urals. *Arthropoda Selecta*, 21, 269–272.
- Hebert P.D.N., Ratnasingham S. & deWaard, J.R. (2003) Barcoding animal life: cytochrome c oxidase subunit 1 divergences among closely related species. *Proceedings of the Royal Society*, 270 (B), S596–S599.
<http://dx.doi.org/10.1098/rsbl.2003.0025>
- Kimura, M. (1980) A simple method for estimating evolutionary rate of base substitutions through comparative studies of nucleotide sequences. *Journal of Molecular Evolution*, 16, 111–120.
<http://dx.doi.org/10.1007/BF01731581>
- Kronstedt, T. (1990) Separation of two species standing as *Alopecosa aculeata* (Clerck) by morphological, behavioural and ecological characters, with remarks on related species in the pulverulenta group (Araneae, Lycosidae). *Zoologica Scripta*, 19, 203–225.
<http://dx.doi.org/10.1111/j.1463-6409.1990.tb00256.x>
- Logunov, D.V. (2013) A new species of the genus *Alopecosa* Simon, 1885 (Aranei: Lycosidae) from south-east Kazakhstan. *Arthropoda Selecta*, 22, 163–169.
- Lugetti, G. & Tongiorgi, P. (1969) Ricerche sul genere *Alopecosa* Simon (Araneae-Lycosidae). *Atti della Società Toscana de Scienze Naturali di Pisa*, 76, 1–100.
- Marusik, Y.M., Gnelitsa, V.A. & Koponen, S. (2006) A survey of Holarctic Linyphiidae (Aranei). 4. A review of the erigonine genus *Lophomma* Menge, 1868. *Arthropoda Selecta*, 15, 153–171.
- Marusik, Y.M. & Koponen, S. (2001) Revision of the Holarctic spider genus *Procerocymbium* Eskov 1989 (Araneae: Linyphiidae). *Acta Arachnologia (Tokyo)*, 50 (2), 145–156.
<http://dx.doi.org/10.2476/asjaa.50.145>
- Marusik, Y.M., Logunov, D.V. & Koponen, S. (2000) *Spiders of Tuva, south Siberia*. Institute for Biological Problems of the North, Magadan, 253 pp.
- Mutanen, M., Hausmann, A., Hebert, P.D.N., Landry, J.-F., deWaard, J.R. & Huemer, P. (2012) Allopatry as a Gordian knot for taxonomists: Patterns of DNA barcode divergence in arctic-alpine Lepidoptera. *PLoS One*, 7 (Supplement10), e47214.
<http://dx.doi.org/10.1371/journal.pone.0047214>
- Nazari, V., Larsen T.B., Lees, D.C., Brattström, O., Bouyer, T., Van de Poel, G. & Hebert, P.D.N. (2011) Phylogenetic systematics of *Colotis* and associated genera (Lepidoptera: Pieridae): evolutionary and taxonomic implications. *Journal of Zoological Systematics and Evolutionary Research*, 49, 204–215.
<http://dx.doi.org/10.1111/j.1439-0469.2011.00620.x>
- Paquin, P., Buckle, D.J., Dupérré, N. & Dondale, C.D. (2010) Checklist of the spiders (Araneae) of Canada and Alaska. *Zootaxa*, 2461, 1–170.
- Platnick, N.I. (2014) The world spider catalog, version 15. American Museum of Natural History. Available from: <http://research.amnh.org/entomology/spiders/catalog/index.html> (Accessed 3 July 2014)
<http://dx.doi.org/10.5531/db.iz.0001>
- Ratnasingham, S. & Hebert, P.D.N. (2007) BOLD : The Barcode of Life Data System. *Molecular Ecology Notes*, 7, 355–364.
<http://dx.doi.org/10.1111/j.1471-8286.2007.01678.x>

- Saaristo, M.I. & Koponen, S. (1998) A review of the northern Canadian spiders of the genus *Agyneta* (Araneae: Linyphiidae), with descriptions of two new species. *Canadian Journal of Zoology*, 76 (3), 566–583.
<http://dx.doi.org/10.1139/z97-217>
- Saaristo, M.I. & Marusik, Y.M. (2004) [“2003”] Revision of the Holarctic spider genus *Oreoneta* Kulczyński, 1894 (Arachnida: Aranei: Linyphiidae). *Arthropoda Selecta*, 12 (3/4), 207–249.
- Sauer, J. & Hausdorf, B. (2010) Reconstructing the evolutionary history of the radiation of the land snail genus *Xerocrassaonon* Crete based on mitochondrial sequences and AFLP markers. *BMC Evolutionary Biology*, 10, 1–299.
<http://dx.doi.org/10.1186/1471-2148-10-299>
- Savelyeva, L.G. (1972) New and little-known species of spiders of the fam. Lycosidae (Aranei) from the East Kazakhstan region. *Entomologicheskoe obozrenie*, 51, 454–462.
- Shorthouse, D.P. (2010) SimpleMapppr, an online tool to produce publication-quality point maps. Available from: <http://www.simplemapppr.net> (Accessed 28 July 2014)
- Tamura, K., Stecher, G., Peterson, D., Filipowski, A. & Kumar, S. (2013) MEGA6: Molecular Evolutionary Genetics Analysis version 6.0. *Molecular Biology and Evolution*, 30, 2725–2729.
<http://dx.doi.org/10.1093/molbev/mst197>