***Ambio***

Electronic Supplementary Material

This supplementary material has not been peer reviewed.

Title**: Circumpolar terrestrial arthropod monitoring: a review of ongoing activities, opportunities and challenges, with a focus on spiders**

**Spider species data collation**

To assess the species richness of spiders, we aimed to classify species richness counts to the three Arctic zones delineated by the CBMP: High-, Low- and Sub-Arctic alpine (Figure 2, main text). However, this was not possible for all regions due to a lack of information or differences in data quality. For Norway and Sweden, species records are contained in a digital database with geographic coordinates (Norway: https://www.artsdatabanken.no/, Sweden: https://www.artdatabanken.se). For these countries, spider species records were isolated for the Sub-Arctic alpine areas (areas above the potential treeline). For Finland, the spider list was based on the Finnish spider database of the Zoological Museum, University of Turku, the Finnish Expert Group on Araneae and literature (Kleemola 1962, Palmgren 1965, Koponen 1977). The resulting lists from these three countries were checked against the Spiders of Europe database (Nentwig et al. 2018) for distribution information. Widespread species, those also known to occur in lowland habitats, or those with unknown distributions were removed from the list. A similar database, managed by the University of Alaska Museum, exists for Alaskan spiders maintained in the online database Arctos (<https://arctos.database.museum/archive/alaskaspiders>). Species records were isolated for the three Arctic zones of Alaska using latitude-longitude data associated with each record, to calculate species richness. However, there is no state-wide treeline altitude information for Alaska, so to isolate only the alpine sub-arctic species, an elevation of 938 m was used. This figure was derived by extracting all arthropod records for specimens that were recorded as having been collected in alpine habitats from the database and using the average of the minimum elevation of these records (n=6565). This approach only resulted in 3 species being identified, suggesting that much more alpine sampling is required in Alaska and that a more detailed (e.g., case by case) approach would provide more results. For Greenland, distribution information was summarised from the Greenland Entomofauna (Marusik 2015), and those occurring in the N, NE and NW regions of the country were counted as High Arctic species. The remaining regions were classified as Low Arctic, although there is some overlap in the NW region, so these species richness figures may be slightly inaccurate. For Canada, we used the majority of available information on the distribution of species from primary literature (e.g., (Bowden and Buddle 2010, Loboda 2013)) and books (i.e., (Dondale and Redner 1978, Dondale and Redner 1982, 1990, Dondale et al. 2003). We classified species as belonging to High-, Low- and/or Sub-Arctic alpine as above, but were unable to differentiate between alpine and non-alpine in the Sub-Arctic zone due to a dearth of data. For Iceland, most of the information comes from Agnarsson (1996) with some from the Icelandic Institute of Natural History database. The data for Russian spider species were drawn solely from the literature as there is no comprehensive digital database operating in this country. Similarly, the literature on Russian spiders does not make the same distinctions between the Arctic zones as the CBMP, rather making distinctions between biome types (Typical tundra, Arctic tundra and Polar desert; (Makarova 2000, Chernov 2002)) so it was not possible to summarise species richness in the same way. Rather the richness summaries for Russia concern the Arctic tundra ecosystems only. Finally, where data were available, we have included species richness counts for the High Arctic archipelagoes (Svalbard, Novaya Zemlya, Wrangel Island), although Franz Josef is omitted from the map (but not from Table 2, main text).

**References**

Agnarsson, I. 1996. Íslenskar köngulær. Fjölrit Náttúrufræðistofnunar 31.

Bowden, J. J., and C. M. Buddle. 2010. Spider Assemblages across Elevational and Latitudinal Gradients in the Yukon Territory, Canada. Arctic **63**:261-272.

Chernov, Y. I. 2002. Arctic biota: Taxonomic diversity. Zoologichesky Zhurnal **81**:1411-1431.

Dondale, C. D., and J. H. Redner. 1978. The insects and arachnids of Canada. Part 5. , NRC Research Press, Ottawa, Canada.

Dondale, C. D., and J. H. Redner. 1982. The insects and arachnids of Canada. Part 9. , NRC Research Press, Ottawa, Canada. .

Dondale, C. D., and J. H. Redner. 1990. The insects and arachnids of Canada. Part 17. , NRC Research Press, Ottawa, Canada.

Dondale, C. D., J. H. Redner, P. Paquin, and H. Levi. 2003. The insects and arachnids of Canada. Part 23. , NRC Research Press, Ottawa, Canada. .

Kleemola, A. 1962. Spiders from the northernmost part of Enontekiö. . Archivum Societatis Zoologicae Botanicae Fennicae ’Vanamo’ **16**:128-135.

Koponen, S. 1977. Spider fauna (Araneae) of Kevo area, northernmost Finland. Reports from the Kevo Subarctic Research Station **13**:48-62.

Loboda, S. 2013. Multi-scale patterns of ground-dwelling spider (Araneae) diversity in northern Canada. McGill University, Montréal, Québec, Canada.

Makarova, O. L. 2000. To studying mites of the genus Arctoseius (Parasitiformes, Ascidae) from the Far North. 3. Species areas and ecological preference. Zoologichesky Zhurnal **79**:1045-1052.

Marusik, Y. M. 2015. Araneae.*in* J. Böcher, K. Kristensen, T. Pape, and L. Vilhelmsen, editors. The Greenland Entomofauna: An Identification Manual of Insects, Spiders and Their Allies. Koninklijke Brill, Leiden, The Netherlands.

Nentwig, W., T. Blick, D. Gloor, A. Hänggi, and C. Kropf. 2018. Spiders of Europe.

Palmgren, P. 1965. Spinnenfauna der Gegend von Kilpisjärvi in Lappland. . Acta Zoologica Fennica **110**:1-70.