THE SPIDER FAUNA OF THE CLIFFS IN EASTERN FINNISH LAPLAND

OSSI V. LINDQVIST

Department of Zoology, University of Turku,
Turku, Finland

1. *Introduction*

The present investigation is based on spider specimens collected in the Utsjoki and Inari communes during the summers of 1962 and 1963. The specimens were collected from 12 cliffs ("pahta" in Finnish), one at Peldoaivi (Inari) and the others alongside the Utsjoki and Teno Rivers near their confluence. As to exposition, the cliffs face south or north.

The concept of a south bluff was proposed by ANDERSSON & BIRGER (1912), who were the first to study the influence of a southern exposure on the flora in high latitudes. The exceptional microclimate due to the exposition, the steepness of the slope, the soil type, and many other factors facilitate the spread of many plant and animal species into areas where the macroclimate is not favourable for the survival of the species. Our knowledge of the fauna of such cliffs is very limited. The question has been discussed by KROGERUS (1939), PALM (1931), and ANDERSSON (1961). ANDERSSON found that southern fauna lives on south slopes very far in the north of Sweden; his studies dealt chiefly with the mollusc fauna. We know very little about the spider fauna in Fjeld Lapland. PALMGREN (1939, 1943, 1950) reported some data from Utsjoki commune in his publications. The only study expressly relating to the spider fauna in Utsjoki was published by HACKMAN (1951 a). He reports 99 species. The spider fauna of Enontekiö has been described by HACKMAN (1951 b) and KLEEMOLA (1962). HOLM (1950) has made some quantitative observations on the spiders in the Torneå lake district of northern Sweden.

As a cliff species we define a species whose ecological preference is for cliff conditions and which hence lives only or for the most part on cliffs. The factors that have contributed to the development of a cliff species will be discussed in the following.

2. *Climatic conditions*

Climatic factors such as temperature, humidity and light conditions on a cliff fulfill the general requirements of a cliff species.

a. A special group is formed by the species for which only the cliffs provide optimal conditions of survival at the boundaries of their normal areas of distribution or outside these areas. The primarily thermophilous species that live only on cliffs in Utsjoki on the northern boundary of their distribution areas include *Zelotes subterraneus* (C. L. Koch), *Neon reticulatus* (Blackwall), and *Abacoproeces saltuum* L. Koch.

b. Species that occur on cliffs almost throughout their area of distribution are often extremely thermo-, xero-, hygro- or scotophilous; for them the cliffs are able to provide a favourable habitat.

These thermophilous species include *Titanoeca nivalis* Simon and *Micaria alpina* Simon as well as other *Micaria* species which are boreoalpine as to their distribution. The thermophilous *Argenna prominula* Tullgren seems to be a cliff species also, although its ecology is less well known. There exist several thermophilous species that favour cliffs, although they may also live in other habitats. These are *Zora nemoralis palmgreni* Holm, *Oxyptila trux* (Blackwall), *Oxyptila rauda* Simon, *Thanatus formicinus* (Clerck), *Pardosa agricola* (Thorell), *Pardosa eiseni* Thorell, *Cercidia prominens* (Westring), *Acantholycosa norvegica* (Thorell) and *Arcotosa alpigena* (Doleschal). The last two species were not found in the collection from the Kevojoki area (cf. HOLM 1950). Nearly all of the *Pardosa* species are thermophilous and favour sunny places.

Many hygrophilous species common in birch zones live in the litter and vegetation of moist cliffs that face north, but hardly any of them can be considered as true cliff species. These include *Robertus scoticus* Jackson, *Enidia bituberculata* (Wider), *Hilaira* sp. and *Sisicus apertus* (Holm). LEHTINEN (oral communication) has found *Arctobius agelenoides* (Emerton) only on the moss-covered, moist, lower slopes of cliffs in Lapland, and it can hence be called a cliff species. It may also be mentioned that HOLM (1950) has encountered *Bathyphantes rupestris* Holm and *Lepthyphantes abiskoensis* Holm in Abisko, Sweden, but only on moist and shady walls. The latter species may be regarded mainly as a cave species.

3. *The structure of the cliff*

The structure of a cliff is an important factor determining the habitat of a spider, although it is often impossible to distinguish between its influence and that of the above-mentioned microclimatic factors.

a. Vertical cliff walls harbour typical species of their own. *Cryphoeca silvicola* (C. L. Koch) lives not only on the trunks of trees but also on damp rock walls. An eurytopic *Hilaira frigida* (Thorell) is found in the lichens and mosses on the walls (cf. HOLM 1950). *Steatoda bipunctata* (Linne) which is common on walls and tree trunks nearly all over the country (cf. LEHTINEN & KLEEMOLA 1962) and which HACKMAN (1951 a) found on a cliff wall at Poddusvaara is probably a species of the shadowy steep cliffs also in Lapland (LEHTINEN, unpubl.), although it was not found by the present writer. *Theridion bellissimum* L. Koch, which is continental in distribution, seems to live on shady, damp walls (cf. HACKMAN 1953), and *Theridion bellicosum* Simon, which is an alpine species, lives almost exclusively in crevices in warm walls (BRAENDEGAARD 1958). Both of these species have been found also in Fjeld Lapland (LEHTINEN, unpubl.), although they were not present among the species the writer collected in the summer of 1962.

b. Many *lapidophilous* species which are often thermophilous (cf. TRETZEL 1952) live in the crevices and on the walls of cliffs. These include *Titanoeca nivalis, Zelotes subterraneus, Micaria aenea* (Thorell), *Micaria alpina, Acantholycosa norvegica,* and *Theridion bellicosum.*

The actual cliff species of spiders in Utsjoki are *Argenna prominula, Titanoeca nivalis, Zelotes subterraneus, Micaria alpina, Neon reticulatus* and *Abacoproeces saltuum.* To these may be added *Arctobius agelenoides, Micaria aenea, Steatoda bipunctata* (HACKMAN 1951 a), *Theridion bellissimum, Theridion bellicosum* and *Bathyphantes rupestris,* which were absent from the present collection, but have been found in Fjeld Lapland (LEHTINEN, unpubl.). *Lepthyphantes abiskoensis* may also be one of these species.

Of these species *Zelotes subterraneus, Neon reticulatus* and *Abacoproeces saltuum* are cliff species only in northern Finland; their normal distribution is more or less southern. The other species occur on cliffs throughout their distribution areas. In choosing their habitats, they are attracted either to the structural features and/or to the microclimatic conditions on cliffs. The present analysis of cliff species relates only to species found in eastern Fjeld Lapland, and an investigation carried out elsewhere in Finland might reveal a quite different collection of species. The variation would mainly concern those species whose cliff habitats lie outside their normal areas of distribution as determined by the macroclimate.

The Kevo canyon in eastern Fjeld Lapland forms an exclave where the conditions are more southern and differ greatly from those in the Utsjoki subalpine birch forest. Its exceptional conditions are reflected in the cliff species. The vegetation of the canyon is determined by the favourable micro-

climate; the conifer forests are evidence of the physiognomy. The canyon is an interesting area for the study of not only fauna but also of evolution. The climatic conditions vary greatly in the canyon in relation to the environment. It would be interesting to study whether the spider species of the canyon differ in their measurable properties from the spiders in the surrounding areas. Ecological and genetic relationships of species populations could be studied at the same time.

Other related problems are whether southern species that live only on cliffs in northern Finland form a separate subspecies and the geographical distribution of the variant. The most interesting species in this respect is *Neon reticulatus* whose northern population may represent a special subspecies that has adapted itself to cliff conditions.

Acknowledgements. — I wish to express my deep gratitude to Mr. PEKKA T. LEHTINEN, Lic. Phil., for his valuable advice, especially in the identification of the specimens. The Kevo Subarctic Research Station has been a pleasant base for the trips; I extend my thanks for this to Professor PAAVO KALLIO. Scholarships for the expeditions in Lapland were awarded by The Zoological and Botanical Society in Turku.

REFERENCES

ANDERSSON, G. & BIRGER, S., 1912: Om norrländska florans geografiska fördelningen och invandringshistoria med särskild hänsyn till dess sydskandinaviska arter. — Norrl. handbibl. 5, 1—416.

ANDERSSON, J. S., 1961: The occurrence of some invertebrate animal groups in the south bluffs in northern Sweden. — Oikos 12: 1, 12—156.

BRAENDEGAARD, J., 1958: Araneida. — The Zoology of Iceland. III, 54, 1—113.

HACKMAN, W., 1951 a: Spindlar samlade under sommaren 1949 i Utsjoki socken. — Mem. Soc. F. Fl. Fenn. 26, 86—93.

„ 1951 b: Spindlar insamlade av W. Hellen och N. E. Saris i Kilpisjärvi. — Ibid. 27, 65—67.

„ 1953: Dipoena hamata Tullgr. och Theridion bellissimum L. Koch funna i Finland. — Ibid. 28, 70.

HOLM, A., 1950: Studien über die Spinnenfauna des Torneträskgebietes. — Zool. Bidr. Uppsala 29, 103—213.

KLEEMOLA, A., 1962: Spiders from the northernmost part of Enontekiö. — Arch. Soc. 'Vanamo' 16: 2, 128—135.

KROGERUS, H., 1939: Om insektbeståndet vid ett sydberg i Lojo. — Not. Entomol. 18, 135—138.

LEHTINEN, P. T. & KLEEMOLA, A., 1962: Studies on the spider fauna of the southwestern archipelago of Finland. I. — Arch. Soc. 'Vanamo' 16: 1, 97—114.

PALM, T., 1931: Om coleopterfaunan i Ombergstrakten. — Entom. Tidskr. 1, 13—80.

PALMGREN, P., 1939: Die Spinnenfauna Finnlands I. — Acta Zool. Fenn. 25, 1—86.

„ 1943: Id. II. — Ibid. 36, 1—112.

„ 1950: Die Spinnenfauna Finnlands und Ostfennoskandiens. — Ibid. 62, 1—43.

TRETZEL, E., 1952: Zur Ökologie der Spinnen (Araneae). Autökologie der Arten im Raum von Erlangen. — Sitz. ber. phys.-med. Soz. Erlangen 75, 36—131.