

6 Diversity of the Arctic Terrestrial Fauna

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6.1 Number of Species in the Arctic Fauna

It is presently impossible to say exactly how many animal species dwell in the Arctic. The reasons for this are (1) the lack of taxonomic and faunistic knowledge about many groups of arctic animals, especially the Protozoa, Nematoda, terrestrial Oligochaeta, a number of Acari taxa, and insect families of the orders Diptera, Hymenoptera, and Lepidoptera.; (2) incomplete collections and data on regional faunas; (3) a large number of incompatible synonyms used by taxonomists in Russia, North America, and Western Europe.

Exact numbers of species for the Arctic are available only for certain well-studied taxa, such as mammals, birds, and beetles. In these groups, the percentage of species dwelling in the Arctic compared to global numbers illustrate the patterns of species richness of the arctic fauna.

For the Arctic s. 1. (i.e. including forest tundra) Schwartz (1963) recorded 61 terrestrial mammal species. Including arctic marine species, there is a total of about 75 species or 1.8% of the world's mammal fauna, or 12–13% of the number of species found in the temperate zone (Chernov 1978). The avifauna of the tundra zone consists of approximately 200 species (2.3% of all species), but including the forest tundra and the marine polar basin 300 species that nest in the Arctic, including the forest tundra and the marine polar basin (Danilov 1966), i.e. 3.4% of the world's bird species, or 13–15% of the bird fauna of the temperate zone.

Reptiles are generally absent from the Arctic, with only a few species extending into the subarctic (Borkin et al. 1984). Amphibians are also poorly adapted for life in polar environments, but several species are abundant in the forest tundra and the southern tundras. Four *Rana*-frogs and one *Uradela* species are found in the Arctic, or more precisely, in the hypo-arctic fauna (Schwartz and Ishchenko 1971; Borkin et al. 1984).

The evaluation of species richness of the arctic insect fauna is also problematic. Danks (1981) listed about 1362 insect species (excluding collembolans) in northern America and, in a later paper (1990), the list grew to 1650 species. According to his estimate, 50% of the entire arctic insect fauna consists of Diptera, 780 of which were recorded from North America. We estimate that about 1500 Diptera species and 3000 species of insects inhabit the circumpolar

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Arctic, including both the tundra zone and polar desert. This is about 0.3–0.4% of the world's insect fauna, if the global number is assumed to be 800 000 to 1 000 000 species. In the Arctic, most of the insect orders account for only 0.3% of the global species richness of a given taxon. For example, arctic beetles, the largest insect order, total only 0.1% of the total number of species in this order. By contrast, the order Diptera is represented by approximately 1% of the world's species number.

Springtails (Collembola) are an important part of the tundra fauna. Among invertebrates, they show perhaps the greatest potential for adaptation to arctic conditions. According to A. Babenko in my laboratory, 184 species of springtails are known from the northern tundra zone alone. Considering the well-known increase in biodiversity with decreasing latitude, the entire arctic fauna of this group may include 400–500 species or 7–8% of the world fauna of about 6000 species.

The taxonomy of arctic Arachnida is rather incomplete. Danks (1981) mentions 112 species of spiders (Aranei) for arctic America, and Es'kov (1985) lists about 100 species for the Eurasian tundra zone. In contrast, Iu. Marusik (pers. comm.) found 170 spider species in the Chukchi Peninsula alone. The world's Aranei fauna includes at least 33 000 species. With a panarctic spider fauna of about 300 species, about 0.9% of all Aranei live in the Arctic. Data on mites (Acarina) are even less definite. According to Danks (1981), there are 349 mite species in arctic America. This number must at least be doubled for the Whole Arctic. In this case, the arctic mite fauna would comprise about 2% of the world's fauna of the order Acarina (at present time, about 30 000 species are known, but the true number is probably much greater).

The class Myriapoda, which is of great importance in forest ecosystems, is almost absent in the tundra and is represented by only a few Chilopoda species. There are not more than ten species in the arctic fauna; most are found only in the very southern parts of the subarctic.

Very common in tundra soils are tardigrades (Tardigrada) that are well adapted to arctic environments. Already in the 1930s about 40 species were recorded in Russian tundras (Bozhko 1936). However, their taxonomy is so vague that so far it is impossible to estimate even approximately the number of species of these very peculiar animals in the Arctic.

There are only a few molluscs (Mollusca) in the terrestrial tundra fauna, and these are slugs (Limacoidea). Together with freshwater forms, no more than one to two dozens species of molluscs are in the tundra zone, depending on the position of its southern boundary (Clarke 1973).

A very important component of the animal community in the Arctic is the class Oligochaeta. Among these the earthworms (Lumbricidae) are represented in the Eurasian tundra zone by no more than five species, including forms with uncertain status. The absence of earthworms in American tundras is still unexplained. Enchytraeidae have been studied in the Arctic since the beginning of this century, but even now their taxonomy is rather vague and no data on exact species number are available. In the range of habitats at one tundra site, about 20