

abundant. The absence of green leaves for nine months in the year may be a contributing cause, but the permanently frozen ground is probably the main factor. Grasshoppers lay their eggs in the ground, and as the surface, except in bare, sandy places, thaws for only a few inches, it may be impossible for grasshoppers to develop. Mr. Norman Criddle, of Treesbank, Man., states that the grasshoppers known to go farthest north in Canada hibernate as nymphs, and that the eggs are laid about a month after the beginning of spring. In the Arctic this would be about July 1, and the two remaining summer months are perhaps not sufficient for the nymphs to grow large enough to withstand the winter, even if the eggs were laid in the ground and hatched out.¹

The absence of true bees in the Arctic is perhaps due to the scarcity of flowers from which pollen and honey can be secured, and to the absence of suitable trees, etc., for nest-building. Sawflies (*Neodatus*) were collected at latitude 72 degrees north, longitude 94 degrees east ("Fox" Expedition), and on Ellesmere island (2nd Fram Expedition). "*Formica rubra*" from Parry's and Ross's voyage was probably introduced, if the identification is correct.

As to the beetles found beyond the tree limit in the American Arctic, it is probable that those dependent on decaying matter, and those directly (chrysomelidae, rhynchopora, elateridae) or indirectly (plant-lice-feeders, coccinellidae) dependent upon green leaves do not go as far north as the predaceous families (carabidae, staphylinidae) and the water beetles (dytiscidae).² None of the four first-named families have, it is believed, been found in the Canadian Arctic archipelago. Of the three families of predaceous beetles, it may be assumed that those (Carabidae, Dytiscidae) depending upon larger prey do not go so far north as the family (staphylinidae) feeding upon more minute organisms.

Micralymna was collected at cape Sabine; *Lethridius* in Alexandra fjord; *Cryptophagus* in Foulkes fjord (2nd Fram Expedition). The diminishing periods in which fresh water is ice-free as the high north is approached may be related to the eventual disappearance of the dytiscids and other aquatic insects. Dytiscids were collected on Parry's and Ross's voyages.

Of the hemiptera (hemiptera were collected on Parry's and Ross's voyages) the families (aphidae, etc.), depending upon juicy, green leaves probably do not go as far north as the more agile or occult living families (saldidae, etc.). Aquatic hemiptera seem to find the arctic ponds unsuited for their development, though some of them (*Corixa*) go as far north as Port Clarence, Alaska.

Of neuropteroids, dragon-flies hardly approach the limit of trees, perhaps owing to the same reason as the aquatic hemiptera; and ephemerids and perlids are not known in the Canadian Arctic archipelago. The trichoptera is probably the family of neuropteroids which reaches farthest north (trichoptera collected on Parry's and Ross's voyages), though only in certain species (*Lipania*, etc.); probably because their larvae seem to be little influenced by their surroundings, and are found in both still and running water of high or low temperature.

Spiders (*Opilio* known from Ponds inlet), mites, and collembola, and insects parasitic upon mammals and birds have been found as far north as there is land; and the same seems to be the case with at least some of the lepidoptera (both butterflies and moths) preferring certain plants. It may be assumed that at the highest latitudes (say beyond latitude 80 degrees north) on both sides of Kennedy-Robeson channels these latter orders comprise the bulk of the insect fauna together with sawflies, bumblebees, and parasitic wasps, diptera, and minute hemiptera and beetles.³

¹ Professor E. M. Walker, of Toronto, claims that all the *Melanoplus* species pass the winter in the egg-stage. The northward distribution of grasshoppers on this continent is treated in his Canadian Arctic Expedition report, vol. III, Part J.

² Beetle (*Platyderus*) known from lat. 72° N., long 94° W. ("Fox").

³ See the insects secured by the *Polaris* expedition, and identified by A. S. Packard, Jr., in "The American Naturalist," Vol. XI, 1877, pp. 51-53.