missions which study and regulate certain fisheries such as salmon, halibut and cod.* All these organizations are primarily interested in regulating fish stocks to give maximum benefit to commercial and sport fisheries. In addition to the Fisheries Research Board of Canada, two other groups are interested in more fundamental research on fishes. The results of these researches are not always immediately evident but, like pure research in electronics or chemistry, there is no doubt that they often have valuable practical results and contribute also to man's knowledge. Universities not only train fisheries biologists and ichthyologists but do independent scientific research, covering such fields as physiology, ecology, ethnology, anatomy, parasitology and population dynamics. The National Museum of Canada and university and provincial museums actively conduct fundamental researches on fishes, their studies dealing primarily with classification and evolution of fish but also with zoogeography, ecology and behaviour. A major product of museum activity is the publication of identification handbooks which contain the results of studies on preserved scientific specimens. In the National Museum of Canada, for example, there are more than 100,000 specimens of over 1,000 species of fishes.

Canada annually harvests about 2,000,000,000 lb. of commercial fishes worth about $250,000,000 from the sea and fresh waters. About two thirds of this is exported and there remains a large potential for expansion. Current studies indicate a valuable market for a highly nutritive, pure protein, fish flour prepared from Canadian fishes. Sport fisheries are also an important economic asset, attracting many fishermen from outside the country. Beyond the value of this sport in dollars and cents, there is another value no less important—the unmeasurable contribution it makes to the physical and mental well being of its participants. Scientifically, fishes also represent an intellectual resource that can add to man's knowledge.

The Arthropods of Canada

The arthropods are a group of mainly small-sized invertebrate animals that have jointed legs and other appendages and grow by periodically shedding their outer skin or exoskeleton. More than three quarters of Canada's 100,000 species (approximately) of animals belong in this group. It includes the largest animal group, the insects, as well as the arachnids, centipedes, millipedes, and the crustaceans.

The insects are much the most numerous and most diverse arthropod group, both in anatomical structure and in their natural occurrence. They occur throughout the Canadian region, from the Pacific to the Atlantic and from the southern border (where most kinds occur) to the sparsely populated islands of the Arctic where visible activity is limited to but a few weeks each year. Insects have invaded or occupied many types of environments, from the sea surface and intertidal shore zone, through land and freshwater habitats of nearly every permanent and temporary kind, to high alpine lakes and streams and glacial surfaces. The fleas, lice and certain flies are parasitic on diverse kinds of vertebrate and invertebrate animals, including other insects. Virtually no green plant, from unicellular alga to giant Douglas fir, is immune to insect attack or consumption. Almost all of the 27 living world orders of insects are represented in Canada, although some by only one or two species. Well represented are the important orders, namely, the primitively wingless springtails (Collembola) of the forest floor; the primitively aquatic hemimetabolous mayflies (Ephemerida), stoneflies (Plecoptera), and dragonflies (Odonata), and the terrestrial cockroaches (Blattaria) and grasshoppers (Orthoptera), all of which have a fossil record stretching back to the late Palæozoic (nearly 250,000,000 years ago); and the holometabolous primarily terrestrial orders of relatively recent evolution, such as the butterflies and moths (Lepidoptera), two-winged flies (Diptera) and the ants, bees and wasps (Hymenoptera). The caddis flies (Trichoptera), the bugs (Hemiptera), and the beetles (Coleoptera) are other major orders, the last being the world's largest insect group, and in Canada about equal to the Diptera in numbers of species. Well-preserved insect remains of about 250 species are now known from the Cretaceous amber deposits of mid-

* See also Chapter XIV, Part I, Section 4.