

A younger Proterozoic orogeny about 1,000 million years ago deformed the Grenville province.

The shield was worn down by erosion in late Precambrian times. The sea encroached during the succeeding Paleozoic and Mesozoic eras and deposited sediments. These were largely stripped off by erosion in Cenozoic time. The shield has a characteristically hummocky surface and is low lying except along its eastern margin in Labrador and Baffin and Ellesmere islands.

Orogens. The Appalachian, Cordilleran and Inuitian orogens are mountain belts of deformed and metamorphosed sedimentary and volcanic rocks, mainly of Phanerozoic age, intruded by great masses of granite. Although the orogens mark sites of plate collision, they are of different ages and different complex origins. The Appalachians, for example, were formed by the closure of a Paleozoic ocean basin. The Atlantic continents were in contact 200 million years ago. In Jurassic time the continental plates started to separate to form the present Atlantic Ocean so that a remnant of the Appalachians is now preserved in northwest Europe.

Platforms. The St. Lawrence, Interior, Arctic and Hudson platforms are formed of thick, flat-lying Phanerozoic strata which cover large parts of the Canadian Shield. The Interior platform is a vast flatland extending west from the edge of the shield to the foothills of the Rocky Mountains.

Shelves. The geologically youngest provinces, the submarine Atlantic, Pacific and Arctic continental shelves, are formed of little deformed sediments chiefly of Mesozoic and Cenozoic age that have accumulated and are still accumulating along the margins of the present continental mass.

1.3.3 Origin of leading minerals

Petroleum and natural gas are fluids of organic origin, derived from the remains of marine algae and diatoms, occupying interspaces in rocks chiefly in the Interior platform, foothills of the Cordillera and continental shelves. In Western Canada most production is from Devonian and Mississippian strata, although large reserves of oil occur in the Cretaceous Athabasca oil sands of northeast Alberta.

Copper is associated with nickel or zinc in rich massive deposits in Precambrian volcanic and sedimentary rocks. It also occurs scattered throughout huge Jurassic granite bodies, termed batholiths, in the Cordillera.

The world's largest group of iron ore areas is in the Canadian Shield. These deposits are of Archean age in Superior province and of Apebian age in northern Labrador and northeast Quebec.

Nickel of Apebian age occurs in Southern province in the Sudbury basin of northern Ontario. This exceptionally rich mineral deposit resulted from a meteorite impact about 2,000 million years ago.

Potassium chloride, commonly known as potash, is obtained from horizontal layers of Middle Devonian potassium-bearing ores associated with rock salt in Saskatchewan. Present day potash ores form by the evaporation of salt water in isolated basins in the hottest, driest places on the earth.

Half of Canada's coal (bituminous and anthracite) comes from Pennsylvanian rocks in the Appalachians. Coal is produced from compressed decayed vegetation and in the upper Carboniferous the chief coal-makers were tall forest trees and giant 15-metre high reeds. Lignites and brown coals are common in the Cretaceous and Tertiary coalfields of the Cordillera, Interior platform and foothills.

Zinc is commonly associated with lead, copper or silver. It occurs in basement rocks of the Precambrian Shield; in Helikian strata in Baffin Island, British Columbia and Yukon; in Paleozoic rocks in the Appalachians, and in Middle Devonian rocks on the south shore of Great Slave Lake.

Asbestos is the commercial name for a series of fibrous minerals, but in Canada chrysotile is the only variety mined. It occurs chiefly in the Eastern Townships of Quebec, in the Appalachians, as veins in altered Ordovician and Devonian rocks, remnants of ocean floor material emplaced in the mountains during plate collision.

Uranium, recovered from rocks of Precambrian age in the shield, is of complex origin. It is associated with conglomerates that may represent beach or river deposits of early Apebian age in Southern province, and with Helikian Athabasca sandstones in northern Saskatchewan.

1.4 Climate

Climate depends primarily on radiative exchanges between the sun, the atmosphere and the surface of the earth. Regional climates of Canada are controlled by the geography of North America and by the general movement of air from west to east. The Pacific Coast is cool and fairly dry in summer but mild, cloudy and wet in winter. Interior British Columbia has climates varying more with altitude than latitude: wet windward mountain slopes with heavy snows in winter, dry rainshadow valleys, hot in summer, and high plateaus with marked day to night temperature contrasts. Interior Canada, from the Rocky Mountains to the Great Lakes, has a continental-type climate with long cold winters, short but warm summers and scanty precipitation. Southern portions of Ontario and Quebec have a humid climate with cold winters, hot summers and generally ample precipitation all year. The Atlantic provinces have a humid continental-type climate although in the immediate coastal areas there is a marked maritime effect. On the northern islands, along the Arctic Coast and around Hudson Bay, arctic conditions persist, with long frigid winters and only a few months with temperatures averaging