(Arctides-northern Alaska-Novosibirsk-Chukotsk) join the Pacifides along the zone of the Mackenzie-Lena deep-seated faults. They are characterized by a monocyclic and miogeosynclinal type of development.

Analysis of the available data permits identification of the mineralogenic character of the Pacifides and adjoining Arctides with their diverse late Mesozoic and Cenozoic ore-bearing deposits (gold, mercury, copper and polymetals, tin and tungsten—especially in the Arctides); low-temperature ore deposits prevail. It may be assumed that the possible oil and gas troughs of Arctic Canada, northern Alaska, Chukotsk, Chukotsk Sea, and the East Siberian Sea comprise a single Arctic oil and gas belt related tectonically to the formation of the Arctides. One may also infer the existence of a North Pacific belt of oil and gas accumulations, including oil- and gas-bearing troughs and depressions in the Kamchatka-Koryak and Cordilleran-Alaska areas.

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Franklin Igneous Events, Tension Faulting, and Possible Hadrynian Opening of Baffin Bay, Canada

The Franklin intrusions are an extensive swarm of late Hadrynian (latest Proterozoic) diabase dikes that occur in a giant arc from Great Bear Lake eastward to Melville Peninsula, Baffin Island, and northern Ungava. They are chemically and petrologically classified as tholeiites and are probably co-magmatic. Paleomagnetic pole positions and numerous whole-rock of K-Ar age determinations indicate that the dikes were emplaced at low paleolatitudes 650 m.y. ago. They intrude Hadrynian sedimentary sequences that contain features indicative of deposition under warm climatic conditions.

The Baffin dikes are subparallel with the northeast coastline of Baffin Island and a pronounced northwest-trending fault system. Intermittent, mainly normal, movement along these faults persisted from the Helikian to the Quaternary and produced a series of graben structures which may be due to the same regional tension as the dikes. Thus Baffin Bay and Davis Strait may have started to form as early as the late Hadrynian and may contain Paleozoic strata.

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Arctic Ordovician Cephalopod Faunas

The American Arctic has yielded: (1) generalized ellesmeroceroid faunas of Gasconadian age; (2) a series of later Canadian faunas, of which two from the Seward Peninsula of Alaska are anomalous; (3) a Chazy fauna from Alaska; (4) a Wilderness fauna from Greenland; (5) widespread Red River faunas of Eden-Cobourg age; and (6) less widespread Richmond cephalopod faunas. Correlating with the Baltic section involves many problems, but new evidence suggests that the beds from the Volkhov through the Lasnamägian may be of Whiterock age; and the Valhallfonna of Spitsbergen is equivalent to the Volkhov and, possibly, the earliest Kunda. Cephalopod evolution and some anomalies of ranges are discussed.

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Tectonic Implications of Recently Discovered "Blueschist Facies" Metamorphic Terranes in Alaska

Recent field investigations have defined several Alaskan "blueschist facies" metamorphic terranes, including occurrences in the Baird Mountains, Seward Peninsula, Kaiyuh Hills, and on the shores of Seldovia Bay, confirming the presence of both high- and low-temperature "blueschist facies" metamorphic rocks in Alaska, on a previously unsuspected and unappreciated scale.

A regionally important belt of "blueschist facies" metamorphic rocks has been traced from the Seward Peninsula to the Baird Mountains; and the Seldovia terrane may be a segment of a second, and possibly younger "blueschist facies" metamorphic belt. These terranes may be analogous to the "blueschist facies" metamorphic belts of Japan, the Kamchatka Peninsula, and Siberia as discussed by Dobretsov *et al.*

The recognition of regionally important "blueschist facies" terranes will have some impact on present and future studies of the tectonic framework of Alaska, based on the physicochemical implications of "blueschist facies metamorphic terranes" and their relation to circum-oceanic and plate tectonic processes.

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Regional Geology of Yukon-Tanana Upland, Alaska

The basic geologic framework of the Yukon-Tanana Upland, Alaska, a mountainous region of about 30,000 sq mi between the Yukon and Tanana Rivers, was delineated primarily by L. M. Prindle and J. B. Mertie, Jr., in the early part of this century. The subsequent recognition of large-scale offset along the Tintina fault, which bounds the eastern upland on the north, has required a reconsideration of the regional stratigraphic and structural relations.

The northwestern part of the upland is dominantly underlain by a sedimentary sequence consisting of rocks which range in age from Cambrian to Mississippian. Cretaceous and Tertiary sedimentary rocks unconformably overlie the older sequence. The Cambrian is apparently underlain by a thick section of grits, quartzites, phyllites, and quartz-mica schists. Pre-Silurian volcanic rocks, mafic and ultra-mafic rocks of probable Devonian age, and Permo-Triassic diabase and volcanic rocks are also present. These sedimentary and igneous rocks are cut by granitic plutons of Cretaceous and Tertiary age.

The central and eastern parts of the upland are underlain by a metamorphic complex with rocks that range from lower greenschist to amphibolite facies. Fossils date the parent sediments of some green-schist facies rocks as Paleozoic. Radiometric dates from several localities in the metamorphic complex indicate that Precambrian, Ordovician, and Jurassic-Cretaceous thermal events are recorded in the metamorphic history. Mesozoic granodiorite and quartz monzonite batholiths and smaller granitic plutons of Mesozoic and Tertiary ages intrude the crystalline schists. Locally, unmetamorphosed Cretaceous and/or Tertiary sedimentary rocks are in unconformable or fault contact with the older rocks. Tertiary volcanic rocks which range in composition from rhyolite to basalt overlie the older rocks in small but significant parts of the eastern upland. Ultramafic intrusions, mostly small and serpentinized, also are present.

Work has progressed to the point where the sedimentary rocks in the upland can be correlated reasonably well with those in other parts of Alaska, but interregional correlation of the metamorphic terranes must await additional clarification of structural and petrologic relations.

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DEVONIAN ROCKS OF GREENLAND AND SVALBARD

In Greenland and Arctic Scandinavia, Devonian sedimentary rocks crop out in only two areas: (1) east Greenland between lat. 71½°N and 74½°N; and (2) Svalbard, between lat. 76½°N and 80°N in Vestspitsbergen. These strata are nonmarine clastics. Aggregate thicknesses are large, up to 7,000 m in Greenland and 5,000–6,500 m in Vestspitsbergen. In both areas, the successions are unconformable on deformed pre-Devonian, Caledonian rocks. Both areas are well known for their fossil vertebrates, on which the following age determinations depend.

In Greenland the successions can be assigned to 5 major units, each with a maximum thickness of 1,000–3,000 m: (1) A unit that includes the Vilddal Group, of red and gray siltstone, conglomerate, sandstone, volcanic rock, and granite intrusions; (2) a unit of conglomerates, and red and gray-green sandstone; (3) the Kap Kolthoff Formation of gray-green sandstone; (4) Kap Graah Group of red sandstone, siltstone, and volcanic rock; and (5) the Mt. Celsius Supergroup of red and gray-green siltstone with some sandstone. Units (1) and (2) are dated as Givetian (late Middle Devonian), and units (4) and (5) are dated as Famennian (late Upper Devonian). Unconformities between and within these units occur, particularly in the northeast part of the area, and the rocks were folded again before deposition of the nonmarine Carboniferous.

In Svalbard, the succession consists of 4 major units, each with a maximum thickness of 1,000–3,000 m: (1) the Siktefjellet Group of conglomerate and sandstone beds; (2) the Red Bay Group of conglomerates and sandstone beds; (3) the Wood Bay Formation of sandstone and red siltstone; and (4) a supergroup (Grey Hoek and Wijde Bay Formations, Mimer Valley Group) of gray conglomerate, sandstone, and siltstone. There is no fossil evidence for the date of (1) which was strongly folded before the deposition of (2). Unit (2) is dated as Gedinnian (early Lower Devonian), and the succession is continuous through (3) to (4), which ranges up to Givetian (late Middle Devonian) in age. These units were folded strongly before the deposition of Carboniferous sediments.

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AIRBORNE AND GROUND ELECTRICAL RESISTIVITY STUDIES ALONG PROPOSED TRANS-ALASKA PIPELINE SYSTEM (TAPS) ROUTE

Experimental surveys were made in two test areas using a recently developed airborne technique by which several parameters, including wave tilt, of very-low-frequency (VLF) radio waves from distant transmitters are measured. Ground measurements were made using direct-current resistivity sounding and horizontal profiling methods, the slingram method, and an electromagnetic depth sounding method in which variations in the coupling between 2 horizontal loops is measured as a function of frequency. In each test area—one near Glennallen in the Copper River basin and the other near the Yukon River—at least 1 ice-free locality was located using the airborne VLF data and was corroborated by resistivity measurements. The airborne data appear to reflect the presence of gravel deposits near some of the large rivers near Glennallen, but the data are complicated by topographic effects. In the Yukon River test area the airborne data indicate differences in resistivity between deeply weathered and relatively fresh bedrock.

Good quality resistivity depth soundings, which are not seriously affected by lateral effects, were obtained in both areas. Near Glennallen typical resistivities for fine-grained sediments are 40–80 ohm-meters in the active layer, greater than 2,000 ohm-meters in the frozen layer, and 150 ohm-meters in the underlying sediments except in localities where the presence of saline water reduces the resistivity to 10–20 ohm-meters. Resistivities of wet unfrozen gravel are about 200–500 ohm-meters. The depth to the top of the frozen layer can be determined quite accurately; determination of the depth to the bottom cannot be determined as closely. Similar resistivity data were obtained in the Yukon River test area except that the resistivity of the unfrozen material was found to be more variable. Where bedrock is near the surface, the resistivity appears to be inversely proportional to the degree of weathering. The electromagnetic depth soundings substantiate the resistivity results and for some geoelectric sections the electromagnetic data add supplementary information.

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CALEDONIAN GEOLOGY OF ARCTIC NORWAY

(No abstract submitted)

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INUVIK TEST LOOP—AN ARCTIC PROTOTYPE INVESTIGATION

In June of 1969, Mackenzie Valley Pipeline Research Ltd. retained Canadian Bechtel Ltd. to assist in researching the practicability of constructing a large-diameter crude oil pipeline from the North Slope of Alaska to Edmonton, Alberta. Part of the research