neath the Mendeleyev plain suggest a strong bottom circulation in the past. A zone of bottom erosion along the Mendeleyev Ridge flank may reflect a circulation of water through the Cooperation Gap, a trough which appears to cross the ridge. Two buried channels extending to subbottom depths of 700 m were observed between the Mendeleyev fracture zone and the Mendeleyev plain.

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CONTINENTAL DRIFT IN ARCTIC

Cretaceous and Cenozoic spreading of the northern Atlantic basins steps via transform faults to the Arctic Ocean, where simple spreading of the Eurasia basin appears highly probable, and more complex opening of the polar half of the Amerasia basin by spreading of Alpha and Mendeleyev Ridges appears likely. The Alaskan half of Amerasia basin may have opened behind counterclockwise-rotating Alaska, as proposed by S. W. Carey; this accounts for many features, including the provenance and northern source of clastic upper Paleozoic and lower Mesozoic sediments of northern Alaska.

As no young subduction zones are evident around the Arctic Ocean, these spreading motions must be matched by continental deformation and transform faults in Alaska and northeastern Siberia. A transform fault from the Eurasia basin may cross the East Siberian shelf, displacing the New Siberian Islands from Taimyr and separating Wrangel Island and northeastern Chukotka from mainland Siberia. Further deformation is absorbed by clockwise oroclinal rotation of the Verkhoyansk geosyncline south of this fault.

Reversing these motions indicates that the late Paleozoic and early Mesozoic Verkhoyansk, Wrangel, and Brooks geosynclinal terranes were parts of a continuous continental shelf, facing the open Pacific Ocean. The Laurasian continent fringed by this shelf was an aggregate of North American, European, and Siberian plates that had collided in Paleozoic time as Caledonian and Uralian oceanic plates vanished beneath them.

The stability of the Verkhoyansk-Brooks shelf ended when Jurassic subduction inaugurated conveyor-belt accretion at the Pacific continental margin, and magmatism above Benioff zones. Lena River and northern Alaska foreland basins, superimposed on the old continental shelf, received sediments from the new Pacific mountain systems concurrently with thin-skinned overthrusting. In middle Cretaceous time, the Verkhoyansk belt was wrapped into a compound orocline. Later Cretaceous and Cenozoic subduction produced successively the Okhotsk-Chukotsk, Kamchatka-Koryak, and Kuril-Aleutian systems. Central and southern Alaska may consist largely of debris (including continental fragments and island arcs) swept in since Triassic time on oceanic plates, and of successor-basin deposits and Benioff-zone magmatic rocks.

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MESOZOIC GEOLOGY OF SVALBARD

Mesozoic rocks are known from most of the major islands of Svalbard, namely Spitsbergen, Nordaustlandet, Barentsøya, Edgeøya, Kong Karls Land, Hopen, and Bjørnøya.

Sedimentary rocks range in age from Triassic (early Scythian) through Early Cretaceous (Albian), with facies mostly drab shale, siltstone, and sandstone—generally marine shale and continental sandstone—and comprise 2 lithostratigraphical units: Sassendalen Group (Griesbachian to Toarcian) and Adventdalen Group (Bathonian to mid-Albian). These units contrast markedly with the underlying Permian cherty carbonates, and not so obviously with the resistant overlying Tertiary coal measures. The marine strata are characterized by ammonites, bivalves, and saurians; the continental strata have plant beds, thin coal seams, some bivalves, and vertebrates. The succession and facies are very similar to those of Arctic Canada.

The most conspicuous rocks in the older part of the sequence are the cliff-forming basic igneous sills and flows of latest Jurassic and/or Early Cretaceous age.

The Mesozoic tectonic pattern followed a relatively stable late Paleozoic history with a marked change of facies but conformable strata. The maximum known thickness of Meozoic strata is about 3 km. The first distinguishable disturbance (warping and faulting) accompanied basic igneous activity but with little change of sedimentary facies. The principal unconformity represents a hiatus which took place in late Albian to early? Paleocene time. There is local overstep of Tertiary rocks onto lowermost Triassic, but generally only the uppermost Albian members are missing. These minor distrubances may be related to movements that culminated in the West Spitsbergen Orogeny in early to mid-Tertiary time, and to the mainly Tertiary Arctic Ocean spreading. Svalbard was probably moved from subtropical to temperate latitudes in Mesozoic time, only subsequently achieving arctic latitudes.

Petroleum prospects in the Arctic must take Mesozoic rocks into account as providing source, cap, and reservoir rocks.

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TECTONIC EVOLUTION OF BARENTS SHELF AND RELATED PLATES

In this paper an attempt has been made to reconstruct successively earlier configurations of lithosphere plates and their constituent parts, as related to the Barents Shelf. This involved a brief investigation of some possible past relations between Spitsbergen and the northwestern Eurasian plates, Greenland, the Canadian Arctic Islands, and the intervening seas and ocean basins. The restoration of observed crustal strains from structural and geophysical evidence were tested in each case for stratigraphical consistency of the implied reconstructions.

Working backward in time the study begins by reversing the late Phanerozoic spreading of the Norwegian and Greenland Sea basins of the Atlantic Ocean and the Eurasian basin of the Arctic Ocean. This leads to familiar reconstructions of Triassic/Permian paleogeology, with Spitsbergen adjacent to North Greenland and Ellesmere Island. There are some alternative reconstructions which have been rejected.

The restoration of Paleozoic displacements depend mainly on different interpretations of the Caledonides (especially the amount of closing and the amount of sinistral transcurrence involved). Relations between these structures, the North Greenland and Innuitian fold belts, the Lomonsov Ridge, and the Uralides, for instance, are critical.

There are more speculative possibilities for unraveling late Precambrian movements. The development of