and extrusive rocks. It is assumed that the intrusives were the origin of the mineral deposits in the volcanic rocks. Some mineralization occurs in Cretaceous limestone by contact metasomatism.

3. The Sierra Madre Oriental province, a 379,000-sq km area, occupies the great Mexican geosynclinal folded belt of Laramide age. Intrusive rocks and some volcanoes establish the metallogenic processes, which are mostly by contact metasomatism and vein filling. Metallogenesis appears to be of late Tertiary age.

4. The Sierra Madre del Sur area extends for 114,000 sq km from the State of Michoacan ESE toward the State of Oaxaca. Geologically it is very similar to the Sierra Madre Occidental province, but seems to constitute a different block of generally lower topography and with more sedimentary Cretaceous limestone. Limestone remnants overlie extensive intrusive rocks. Some are mineralized. Large areas of metamorphic rocks seem to carry mineralization of Precambrian or pre-Paleozoic age. Mineralization in the volcanic and sedimentary rocks seems to be of late Tertiary age.

5. The Mesa Central province extends over an area of 105,000 sq km from the northern edge of the volcanic axis on the south to northern Zacatecas and to part of the Durango on the Central Plateau. The geology is made up of very vast flows of andesite in the southern part, and predominantly rhyolite in the northern part. The thick sequence of volcanic rocks shows low-temperature and pressure mineralization. This is specially noticeable where intrusives, as in Guanajuato and Pachuca, affect the extrusive rocks. Mercury and fluorite deposits are abundant.

6. Eje Neo-Volcanico, a 190,000-sq km volcanic zone or volcanic chain crosses the continent from Bahia Banderas, in the vicinity of Puerto Vallarta, on the Pacific coast, to the Sierra of San Andres Tuxtla on the Gulf of Mexico.

Some authors have postulated the thesis that a large transverse fault crosses the continent, as a continental expression of the Clarion fault. The author's recent paper on ERTS-1 image interpretation does not show evidence of this effect.

The famous "Taxco," "Pachuca," "Angangueo," "El Oro and Tlalpujagua" silver deposits are along this volcanic belt. Much more research on their origin is needed, and the Metallogenic Chart of Mexico will enhance this research.

SCHOLL, D. W., and M. S. MARLOW, U.S. Geol. Survey, Menlo Park, Calif., and E. C. BUFFINGTON, Marine Geology Branch, Naval Undersea Center, San Diego, Calif.

CENOZOIC AND MESOZOIC PETROLEUM PROSPECTS, ALEUTIAN-BERING SEA REGION

Petroleum prospects of the extensive Aleutian-Bering Sea region include: (1) thick sections (basins) of Cenozoic and, in some areas, Cretaceous strata underlying broad areas of the Bering shelf; (2) deformed Mesozoic rocks unconformably underlying these basins; (3) domal and diapiric structures associated with the more deeply submerged (water depth of 2,000 m) Umnak plateau area; (4) thick masses of Neogene beds in summit basins along the crestal region of the Aleutian Ridge; and (5), in very deep water (4,000 m), thick wedges of slightly to moderately deformed beds flanking its northern and southern sides.

The most promising prospects are the thick (2-6 km) accumulations of early Tertiary through Holocene beds that underlie the shallow submerged floor of the Bering shelf. For example, Norton, Anadyr, and Bristol basins are large inner-shelf basins of little-deformed coastal plain and neritic beds that underlie the shelf's major bays and gulfs. Pribilof, St. George, Zhemchug, Navarin, and other associated but unnamed basins, are elongate outer-shelf basins of broadly deformed and faulted marine deposits. These basins parallel the northwest trend of the adjacent continental slope; several of them are more than 200 km long. Whereas the inner-shelf basins are large structural sags, many of the outer-shelf basins appear to be fault-controlled grabens or half-grabens. Some of the shelf basins (*e.g.*, Anadyr and probably Navarin) may include a basal sequence of Late Cretaceous strata. However, many of the outer-shelf basins are underlain by folded Cretaceous and Jurassic(?) beds, stratigraphic units that are not only prospects in themselves but may have supplied hydrocarbons to overlying Cenozoic structures.

Other promising prospects are the fairly large (as much as 30 x 80 km) summit basins of the 2,200-km-long Aleutian Ridge. Roughly rectangular in shape, these structures are physiographic as well as geologic basins. The floors of two of them, neighboring Amukta (171.7°W) and Amlia (173°W) basins, are overlain by about 1,000 m of water; they are underlain by a 3-4-km-thick section of sedimentary beds, chiefly of late Miocene and younger age. These basins, elongate parallel with the ridge, are bordered by major normal faults. The infilling section is broadly folded and disrupted along high-angle growth faults.

SEKINE, Y., Geol. Survey Dept., Metal Mining Agency of Japan

NATIONAL EXPLORATION PROGRAM FOR BASE-METAL DEPOSITS IN JAPAN

In Japan considerable discrepancy exists between annual demand and domestic supply of base metals which are indispensable raw materials for industrial development. This gap has been filled with an importation of raw metals and ores. Recent trends of demand and supply and the changeable economic conditions have been exerting a serious influence on the metal-mining industry of Japan. The domestic resources of base metals, though their production ratios to demand are fairly low, have been and will be quite a stable source of supply.

Beside a long-continued subsidy policy for minor-scale mines, the national exploration program for domestic base-metal deposits was set up by the government, and put into operation in 1963 by the Metal Mining Agency of Japan under the auspices of the Ministry of International Trade and Industry. The program consists of three kinds of projects: regional geologic survey, detailed geologic exploration, and financial aid for direct exploration by companies. The principle of these projects is to promote prospecting for, and efficiently to discover, new ore deposits of copper, lead, and zinc in the districts which cover potential ore-bearing areas.

The regional geologic survey project has been and is now being carried out in the planned 48 districts where there are expected high potential resources of Kuroko, pyrometasomatic, cupriferous pyritic deposits, and ore veins of different geologic terranes. The geologic field survey, in combination with airborne magnetic survey, ground geophysical and geochemical explorations, and deep structural core drillings, is conducted by using a 1:10,000 topographic base map. The detailed geologic