63-80

EXPLANATION

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DENVER

Db

Gray and pink quartz monzonite

The main mass of this rock, as exposed in the Springfield quadrangle, and which is informally referred to as the Quartz Monzonite of Bottle Lake (Db), is a gray and pink coarse-grained biotitic or hornblendic and porphyritic quartz monzonite pluton that extends from the Waite quadrangle southwestward into and westward across the Scraggly Lake and Springfield quadrangles into the Wilin quadrangle (Rand, 1958; Boyle, Young, and Wing, 1961). It is well-exposed one mile northwest of Bottle Lake, along the road from Springfield southerly to that lake, in the Springfield quadrangle, where rounded and euhedral phenocrysts of potassic feldspar as large as 1 1/4 inches long and 1 inch wide have rapakivi texture. Porphyritic texture is common, and phenocrysts two inches long and 1 inch across are not uncommon. The northern contact of this rock is exposed in a recent cut along the St. Croix Paper Company pulpwood haulage road northwest of West Musquash Lake, in the Scraggly Lake quadrangle. In the Springfield quadrangle, the contact shown is from the work of Boyle, Young, and Wing (1961). The distribution of the pink and gray rock is random rather than systematic. The hornblende content appears largest near inclusions, as along the road between Middle and Upper Chain Lakes, in the Nicatous Lake quadrangle to the south. The age of a sample taken from the Bottle Lake locality is about 410 million years, as determined by the lead-alpha method (Stern, T. W., written communication, March 23, 1962), or about 342 million years, as determined by the potassium-argon method (Thomas, H., Marvin, R., and Elmore, P., written communication, July 2, 1962). The age of another sample of this rock taken from along the road from West Musquash Lake to Upper Oxbow Lake in the Scraggly Lake quadrangle, is 370 million years by the potassium-argon method, or 380 m.y. by the lead-alpha method (Faul, Stern, Thomas, and Elmore, 1963). The reason for the considerable difference in age of samples from the two localities has not been ascertained.

Sd

Daggett Ridge Formation

Quartzite, metaconglomerate, metasiltstone and slate

The Daggett Ridge Formation is named for the ridge on which the rock is best exposed in the Danforth quadrangle, Maine (Larrabee and Spencer, 1963); its type locality is along and south of the Maine Central Railroad. Chloritic argillaceous quartzite, quartzite metaconglomerate with fractured pebbles and cobbles as large as 8 by 12 inches, gray and gray-green slate and metasiltstone, and thin lenses of magnetite-bearing interbedded black slate and metasiltstone comprise the formation. The slate and metasiltstone unit crops out in the eastern part of the Wyhopitlock quadrangle, and is believed present in parts of the Danforth and nearby quadrangles on aeromagnetic evidence (Griscom, Andrew, written communication, April 12, 1961). Thin green cherty lenses of rhyolitic metatuff occur along Baskahegan Stream near South Bancroft in the Danforth quadrangle. Only a small part of the formation is present in a syncline along the north edge of the Springfield quadrangle. The metaconglomerate crops out on Ellen Wood Ridge a short distance north of the Springfield quadrangle. The formation is exposed over a width of about 8,000 feet in the Danforth quadrangle, where quartzite and metaconglomerate form most of the thickness, which is estimated to be one thousand or more feet. Inadequate exposures and isoclinal folding prevent an accurate determination of thickness of the formation or any of its members. The formation is assigned a Silurian age based upon meager paleontological evidence; a single dorsal valve of an orthoid brachiopod with branching costae and an apparent faint concentric ornamentation was found in the metaconglomerate unit (Newman, R. B., and Cloud, P. E., written communication, December 12, 1957). [illegible]

DEVONIAN

Sk

Kellyland Formation

Gray metasiltstone, metasandstone, and slate

The Kellyland Formation of Silurian(?) age, named for the village closest to its largest and most representative outcrop at Grand Falls of the St. Croix River, in the Kellyland quadrangle, Maine, where it was mapped by the author and S. S. Stevenson, is interbedded sericitic pale gray metasiltstone, arenaceous metasiltstone, argillaceous metasandstone and quartzite, and thin beds of darker gray slate. Most beds contain iron carbonates; the metasiltstone and coarser beds contain more carbonate than does the slate. Some of the coarser beds are tuffaceous. Slate commonly occurs in beds from 1 to 8 inches thick and locally from 1/8 inch to 3 or 4 feet thick. In the Springfield quadrangle, the slates in places have poorly developed cleavage or are phyllitic, in places almost schistose. The metasiltstone and metasandstone beds commonly range from 4 inches to 4 feet in thickness, ranging locally to 20 feet. Rarely, beds of metasiltstone contain thin laminae of light and dark metasandstone. Thin beds of quartz granule metaconglomerate are associated with metasandstone and quartzite beds in places. The metasiltstone beds in many places have good gradation in texture, and cross-bedding. The average content of slate in the formation is about 20 percent, and the thickness of the formation has not been ascertained because of the lack of good key beds, continuous outcrops, and isoclinal folding. However, it appears to exceed 1,000 feet. The Kellyland Formation is the stratigraphic equivalent of at least part of the Pale Argillite Division of the Charlotte Group in New Brunswick (Alcock, 1946), and is believed to be the stratigraphic equivalent of map unit Sas in the Danforth and adjacent quadrangles in Maine. In the Springfield quadrangle, minor shear zones trend northeasterly, and pyrite cubes as large as 1/2 inch in diameter occur in such a zone 1.2 miles east of Cole School. Pyrite and traces of pyrrhotite are found in the hornfels zone of this formation.

SILURIAN (?)

Os

Dark gray slate, black slate and chert, and metatuff

Graphitic, graptolite-bearing slate and metashale interbedded with thin black chert; white-weathering, commonly silicified, light gray rhyolitic metatuff, in a few places containing lenses and balls of medium-gray chert; brown-weathering metashale, slate, and metasiltstone; and medium-gray slate, metasiltstone, and metasandstone comprise the group of rocks best exposed on the north and northwest slopes of Chew Mountain; the metatuff is also well-exposed on Station Mountain in the Danforth quadrangle. Electromagnetic methods were very useful in mapping the black chert units in the formation (Frischknecht and Ekren, 1960), but there was considerable variation along strike, possibly because of differences in the nature and distribution of carbonaceous material as well as distribution of sulfides. Aeromagnetics also were useful in tracing this group of rocks in the Danforth quadrangle (Griscom, Andrew, written communication, April 12, 1961). Climacograptus and orthograptus fragments found near Danforth village in 1956 were identified and assigned a probably Middle Ordovician age (Newman, R. B., written communication, December 9, 1960). The metatuff, silicified in many outcrops in the Danforth and Springfield quadrangles, is calcareous in some places as along Maine Route 6 at the western edge of the Scraggly Lake quadrangle and eastern part of the Springfield quadrangle. The resistant silicified metatuff and associated black chert and slate underlie most northerly-trending ridges in the area except those underlain by hornfels, and extend southwestward through Station Mountain in the Danforth quadrangle, into the Springfield quadrangle, where they are present on Tolman Hill, Gates Hill, and elsewhere between Tolman School and Albanus Mountain. Pyrite and traces of pyrrhotite have been observed throughout the length of this formation, and the content of these minerals increases within the hornfels zone of the granite, as is to be expected. A 1 by 8 by 12-inch lens of 1/8-inch almandite garnets is parallel with bedding and foliation 0.6 mile southeast of South Springfield.

ORDOVICIAN

Outcrop or group of outcrops

Contact

Solid line where observed; long dashed where approximately located, short dashed where inferred

Approximate limit of hornfels zone

Stippled area has been contact metamorphosed

Shear zone

Arrows indicate directions of relative movement where known

Syncline

Showing trace of axial plane and bearing and plunge of axis. Dashed where approximately located

Anticline and plunge of axis

Strike and dip of beds

Dot indicates top of beds known from sedimentary textures or structures

Strike of vertical beds

Dot indicates top of beds known from sedimentary textures or structures

Strike and dip of foliation

Strike of vertical foliation

Strike and dip of slaty cleavage

Strike of vertical slaty cleavage

Strike and dip of slaty cleavage and beds where parallel. Dot indicates top of bed known from sedimentary textures or structures

Strike of vertical slaty cleavage and beds where parallel. Dot indicates top of beds known from sedimentary textures or structures

Strike and dip of overturned beds and slaty cleavage where parallel. Dot indicates top of beds known from sedimentary textures or structures

Accessible gravelled roads

Located approximately from maps by pulpwood and paper companies

References

Alcock, F. J., 1946, Preliminary map, Moncton, New Brunswick: Canada Geol. Survey Paper 46-3, geologic map with descriptive notes, scale 1 in. = 1 mi.

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Faul, Henry, Stern, T. W., Thomas, H. H., and Elmore, P. L. D., 1963, Ages of intrusion and metamorphism in the Northern Appalachians: Am. Jour. Sci., v. 261, p. 1-19, index map, 1 inch = 50 miles.

Frischknecht, F. C., and Ekren, E. B., 1960, Mapping conductive strata by electromagnetic methods: U. S. Geol. Survey Prof. Paper 400-B, p. B121-B123.

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This report is preliminary and has not been edited or reviewed for conformity with Geological Survey standards or nomenclature.