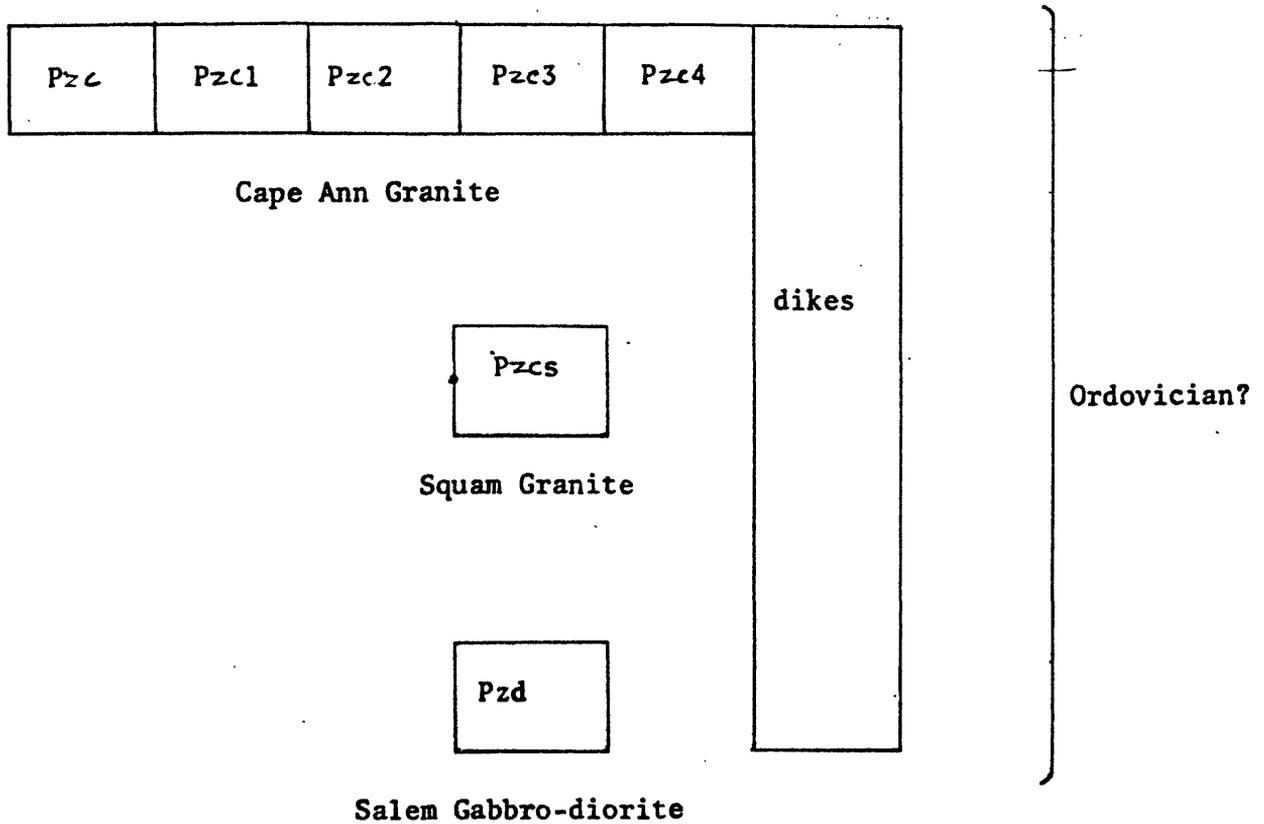


PRELIMINARY BEDROCK GEOLOGIC MAP OF THE GLOUCESTER QUADRANGLE, MASSACHUSETTS

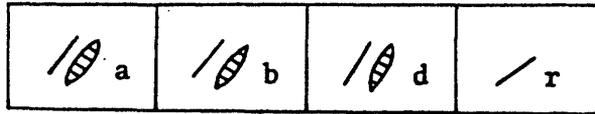
Correlation of Map Units



U. S. Geological Survey  
 OPEN FILE REPORT 75-546  
 This report is preliminary and has  
 not been edited or reviewed for  
 conformity with Geological Survey  
 standards or nomenclature.

PRELIMINARY BEDROCK GEOLOGIC MAP OF THE GLOUCESTER QUADRANGLE, MASSACHUSETTS

Description of Map Units



Dike Rocks - a = syenite; b = basalt or diabro; d = diabase; r = rhyolite. Where appropriate, rock-type symbols are combined with p (= porphyritic) and (or) s (= dike is separated into isolated angular blocks surrounded by unfoliated country rock).

Syenite and feldspathoidal syenite dikes. Texture variable including trachytic, massive, and pegmatitic types. Potash feldspar dominant, 0-10 percent nepheline and sodalite. 5-15 percent mafic minerals. Occasionally well crystallized magnetite.

Fine to medium-grained mafic rocks with granular and porphyritic textures. Texturally and mineralogically variable. Plagioclase altered, commonly labradorite. Hornblende dominant mafic mineral, also pinkish pigeonite, pale green augite, and biotite; rare olivine. Accessory apatite, sphene, magnetite, and pyrite. Often separated and cut by unfoliated granite. Chilled margins typical but fractured ends of separated blocks not chilled.

Medium-grained mafic rock with diabasic texture; otherwise as b.

Porphyritic rhyolite. Medium gray, aphanitic, with sparse, potash feldspar phenocrysts,

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Pzc

Cape Ann Granite: Predominantly unfoliated fine-, medium- to coarse-grained (0.3 to 1.5 cm) leucocratic alkali granite to alkali syenite. Ranges and medians of the principal minerals are: potash feldspar, 58-85 (63) percent; plagioclase ( $An_{6-12}$ ), 0-22.5 (2.8) percent; quartz, 0-41 (24) percent; ferrohornblende, 0.1-17 (4.5) percent; biotite, 0-3.2 (0.8) percent; and opaques 0.2-7.5 (1.0) percent. Augite occasionally present. Accessory minerals include sphene, zircon, apatite, fluorite, allanite, magnetite, and ilmenite. Feldspars in unaltered rock are pale green-gray, have a greasy luster, and weather to a faintly pinkish tan or white. Potash feldspar is the dominant mineral--usually microcline microperthite but sometimes homogeneous microcline; albite or oligoclase is present in minor quantities. Quartz is glassy, shows weak strain shadows, and contains dust-size inclusions. Feldspar and quartz as large single grains and grain clusters partly to completely surrounded by finer grained interstitial quartz and feldspar. Ferromagnesian minerals, variable in amount and appearance, occur as ragged clots, wisps, single subhedral crystals and zonally arranged reaction aggregates. Augite is colorless to pale green as a core partly or completely surrounded by pale-green amphibole, darker-green soda-iron amphibole, and reddish-brown biotite with magnetite granules scattered throughout the reaction aggregate. Isolated crystals and clots of soda-iron amphibole, biotite, or both. Rock fabric is principally uneven granitoid, but varies to subporphyritic and is locally an accumulate.

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Pzc1

Beverly Syenite Facies, Cape Ann Granite: Predominantly unfoliated medium- to coarse-grained, texturally variable alkali syenite. Textural extremes include very coarse-grained (2-5 cm) massive and coarse-grained trachytic phases whose mineral composition, except for lack of quartz and common presence of nepheline and sodalite, is identical with Cape Ann Granite. Modal quartz content measured on outcrop less than 5 percent.

Pzc2

Cape Ann Granite: Modal quartz content measured on outcrop 5-15 percent.

Pzc3

Cape Ann Granite: Modal quartz content measured on outcrop 15-25 percent.

Pzc4

Cape Ann Granite: Modal Quartz content measured on outcrop greater than 25 percent.

*Massachusetts (Gloucester quad). Geol. 1:24,000. 1975  
sheet 2  
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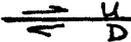
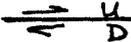
Pzcs

Squam Granite Facies, Cape Ann Granite: Fine- to fine medium-grained, medium-gray granite which weathers brown with a highly siliceous appearance. Texturally and mineralogically variable rock; texture ranges from hypidiomorphic or allotripomorphic granular to subophitic and subporphyritic. Plagioclase as anhedral to subhedral zoned and unzoned equant or bladed grains variable in amount and composition, ranging from <5 to >40% of the rock and from about An<sub>30</sub> to An<sub>55</sub>. In subporphyritic varieties, phenocrysts are more sodic than groundmass plagioclase (An<sub>30</sub> vs. An<sub>40</sub>). The potash feldspar may be orthoclase, microcline, or microcline microperthite either alone or in combination and range from a minor to the dominant constituent. Anorthoclase is often present as an accessory mineral. Grains range from anhedral to subhedral, equant to bladed, and fresh to highly sericitized. Zoning is fairly common. Quartz is in slightly strain-shadowed equant or interstitial glassy grains and makes up 15 to 30% of the rock. Ferromagnesian minerals comprise from <5 to >50% of the rock. Pyroxene (pigeonite) is rare and typically occurs as unreacted cores. Amphibole, both green poikilitic hornblende and ferrohastingsite, together with red brown biotite are the principal dark constituents and are present in roughly equal quantities. Accessories include apatite, zircon, opaque minerals, sphene, allanite, and monazite.

Pzd

Salem Gabbro-diorite: Medium- to medium coarse-grained texturally variable mottled black and greenish-white ferrohornblende-biotite diorite containing variable amounts of augite, pigeonite, and quartz. The rock consists of 55-65% plagioclase as twinned andesine (zoned crystals  $An_{20}$  to  $An_{35}$ ) and untwinned albite or oligoclase, 5% potash feldspar, 1-5% quartz, 0-25% pale-green augite, 0-10% pinkish titaniferous pigeonite, 10-30% green pleochroic iron-rich hornblende, 0-10% reddish-brown biotite, and 1-5% opaques as scattered granules and exsolved blades in pyroxenes. Accessory apatite, zircon, and sphene are also present as grains and as rims on opaque granules. Chlorite, iron oxides, and calcite are present as alteration products. Mafic minerals are always somewhat poikilitic and commonly occur in zonally arranged aggregates that represent a reaction series from augite to biotite with magnetite granules dispersed throughout the aggregate. Biotite occurs as irregularly shaped and scattered flakes. The feldspars are pale gray-green with a greasy luster. The fabric is irregular and uneven. The rock is commonly brecciated and cut by salmon-pink felsic stringers.

SYMBOLS

	Lithologic boundary
	Lithotypic boundary
	Fault showing movement
	Foliation showing attitude
	Inclined
	Vertical
	Joint showing attitude
	Inclined
	Vertical
	Joint showing attitude
	Shearing showing attitude and movement
	Cataclasis
	Macroporphyry inclusion
	Dikes
	Greater than 10 feet wide
	Less than 10 feet wide
	Melange
	Granite and Syenite
	Modal analysis station for quartz content
	Subporphyritic texture
	Aplite or pegmatite present
	Noncognate inclusion
	Cognate inclusion
	Porphyrite
	Pink phase
	Glacial striae

Massachusetts (Gloucester quad.). Geol. 1:24,000. 1975

Sheet 3

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