## Oneco Rodgers Bedrock Compilation Sheet (paper)

Map

## NOTICE!

Bedrock quadrangle 1:24,000 scale compilation sheets for the Bedrock Geological Map of Connecticut, John Rodgers, 1985, Connecticut Geological and Natural History Survey, Department of Environmental Protection, Hartford, Connecticut, in Cooperation with the U.S. Geological Survey, 1:125,000 scale, 2 sheets. [minimum 116 paper quad compilations with mylar overlays constituting the master file set for geologic lines and units compiled to the State map, some quads have multiple sheets depicting iterations of mapping]. Compilations drafted by Nancy Davis, Craig Dietsch, and Nat Gibbons under the direction of John Rodgers.

Geologic unit designation table translates earlier map unit nomenclature to the units ultimately used in the State publication.

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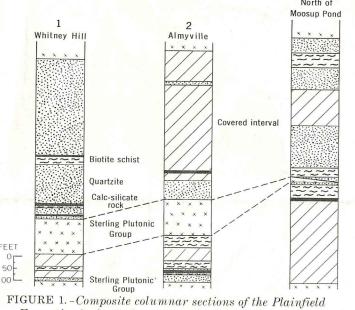
Interbedded quartzite, calc-silicate rock, biotite schist, and metamorphosed volcanic rocks, mapped here as the Plainfield Formation, have been referred to as the Plainfield quartz schist by Gregory (in Rice and Gregory, 1906) and as the Plainfield quartzite by Perhac (1958). The lithic modifiers imply a homogeneity that is not present, however, and the unit was redefined as a formation by Goldsmith (1966) following Lundgren (1962).

The Plainfield Formation in the northwestern part of the area consists of thin- to thick-bedded quartzite (1-15 in. thick) interbedded with thin beds and mappable layers of calc-silicate rock and biotite-muscovite schist. The quartzite conformably overlies dark-gray biotite-muscovite schist which also contains thin beds of quartzite. The contact between the quartzite and schist is exposed on the east slope of the ridge north of Moosup Pond where it is a sharply gradational zone, 1 to 5 feet thick, consisting of alternating layers of quartzite and schist each about 3 inches thick. South of Whitney Hill, the formation is predominantly biotite-muscovite schist that contains thin beds of quartzite and a few mappable layers of quartzite and amphibolite. The biotite-muscovite schist grades laterally into biotite-hornblende schist and amphibolite which compose most of the formation south of the Plainfield Pike The pods and stringers of Plainfield on Pine Hill in the central part of the quadrangle are composed of intensely crenulated quartz-muscovite schist, thin beds of quartzite,

and minor amounts of biotite-muscovite schist. The quartzite and biotite-muscovite schist, and the amphibolite and metatuff exposed on and north of Carbuncle Hill in the northeastern part of the quadrangle are tentatively included in the Plainfield because they are lithologically similar to rocks in the belt of Plainfield to the west. The schist near Moosup Valley is apparently continuous with part of the undifferentiated and unnamed unit of schist and gneiss mapped in the adjacent part of the Coventry Center quadrangle by Moore (1963). Moore (1963, p. A16) tentatively correlated his unit of schist and gneiss with either the Woonasquatucket Formation or the Blackstone Series, both of Precambrian(?) age.

The metatuff associated with the amphibolite is well exposed west of Vaughn Hollow. The rock is layered, lightgray to gray biotite-quartz-feldspar gneiss, some layers containing indistinct fragments of different shade. Other layers contain clusters of mafic minerals and others are muscovitic. In this area the gray metatuff is more abundant than the amphibolite. In many places the metavolcanic rocks appear to overlie the schist, but in other places schist is interlayered with the metavolcanic rocks. The maximum thickness and stratigraphic distribution of

the various rock types in the northwestern part of the Plainfield Formation are given in figure 1. The total thickness of the formation in the Oneco quadrangle ranges from 800 to 1,000 feet, the upper 600 to 700 feet is predominantly quartzite and the lower 200 to 400 feet is predominantly biotite or biotite-hornblende schist. The Plainfield in this area is only in contact with intrusive rocks; it is difficult, therefore, to determine whether the present thickness represents the original amount deposited. Goldsmith (1966) determined the Plainfield southwest of the Oneco quadrangle to be about 2,100 feet thick and to consist of an upper quartzite part, a middle part composed of biotite-quartz-feldspar gneiss, calc-silicate rock, amphibolite, garnetiferous schist and quartzite, and a lower part composed of thick-bedded quartzite (beds 3 ft thick), mica schist, and feldspathic gneiss. The Plainfield in the western part of the Oneco quadrangle most closely resembles the upper and the middle parts of the Plainfield in the New London area (Goldsmith, 1966).



Formation in the northwestern part of the Oneco quadrangle. Lines of section on map; data on map near lines 1, 2, 3, projected into plane of section. Some units shown above are too small to show on map

The Plainfield is older than the rocks of the Sterling Plutonic Group that intrude it; therefore, it must be pre-Pennsylvanian. Goldsmith (1966) tentatively gives the age of the Plainfield as Cambrian(?) an age accepted in this report.

Several elongate patches of dark-green to black amphibolite occur in igneous gneiss in the southeastern part of the quadrangle. Excellent exposures are found on the west side of Bailey Road northwest of Bailey Pond. The layers of amphibolite commonly contain paper-thin

streaks of white plagioclase in the hornblende matrix, and all the amphibolite is strongly foliated. The foliation is parallel to the foliation in the surrounding granitic gneiss, indicating that the amphibolite was emplaced before or during the early stages of the major regional deformation. The contacts with the enclosing rocks are sharp, but there is no evidence of chilled margins in the amphibolite. The layers of amphibolite may represent dikes or inclusions, or both, of mafic igneous rocks in the granitic gneiss. PONAGANSET GNEISS

The Ponaganset Gneiss in the Oneco quadrangle consists of a dark-gray, conspicuously porphyroblastic, gnarly and nubbly-weathering coarse-grained facies and a fine- to medium-grained, light-gray nonporphyroblastic facies, both ranging in composition from granodiorite to quartz monzonite. In the Coventry Center quadrangle to the east. Moore (1963) mapped the rocks on strike with the Ponaganset Gneiss as unnamed quartz diorite gneiss, and, to the south, Feininger (1965) referred to the unit as the "gneiss at Escoheag Hill.' The Ponaganset Gneiss can be easily distinguished from the rocks of the Sterling Plutonic Group by its darker color. greater biotite and hornblende content, and by its large white porphyroblasts of microcline which commonly deform the folia of biotite and enclose large octahedra of magnetite. Epidote, ilmenite, and, to a lesser extent, garnet are present as megascopic accessory minerals. The Ponaganset Gneiss is cut by dikes and sills of Scituate

Granite Gneiss and therefore is older than the Scituate, but both could belong to the same magmatic sequence. The Ponaganset intrudes the rocks tentatively assigned to the Plainfield Formation in the northeastern part of the Oneco quadrangle. STERLING PLUTONIC GROUP

Sterling Plutonic Group is the name given by Goldsmith (1966) to the extensive and heterogeneous complex of igneous gneisses in southeastern Connecticut and western Rhode Island referred to by Gregory (in Rice and Gregory, 1906) as the Sterling Granite Gneiss. In the Oneco quadrangle, the Sterling Plutonic Group includes the Scituate Granite Gneiss (Quinn, 1951), the Hope Valley Alaskite Gneiss (Moore, 1958), the Ten Rod Granite Gneiss (Moore, 1958) and an unnamed porphyritic granite gneiss that is probably equivalent to the Ten Rod. The Scituate Granite Gneiss in the southeastern part of

the Oneco quadrangle is continuous with a large mass of Scituate in western Rhode Island, which Quinn (1951) found to be unconformably beneath rocks of Pennsylvanian age in the Narragansett Basin. Therefore, the Scituate and related rocks of the Sterling Plutonic Group are older than Pennsylvanian. Radioisotope work on the Sterling Plutonic Group and its probable correlatives, however, has thus far produced equivocal results (Quinn and others, 1957; Quinn, 1967; Snyder, 1961, 1964; Zartman and others, 1965). Scituate Granite Gneiss.—The Scituate Granite Gneiss is made up of a fine-grained and a coarse-grained facies; the coarse-grained facies is predominant in the Oneco quadrangle. Both the coarse-grained and fine-grained facies of the Scituate are characterized by a pronounced lineation produced by splotches of coarse-grained biotite that are oriented into discontinuous foliation planes. The lineated splotches of biotite are more segregated in the coarse-grained facies; the lineation, therefore, is generally more distinct in this facies than the foliation, whereas both the foliation and the lineation are conspicuous in the fine-grained facies. Stringers and rods of granular, white to smoky-gray quartz a few millimeters thick are parallel to the biotite foliation in many specimens and commonly stand out as quartz ribs on the weathered surface. Large single crystals or granular aggregates of pink microcline are also oriented in the plane of the foliation parallel to the linear splotches of biotite.

The Scituate Granite Gneiss in and near the quarries southwest of the village of Oneco is somewhat finer grained than the typical coarse-grained variety in the southeastern part of the quadrangle. The rock in the quarries also tends to be gray or bluish-gray rather than pink and contains a strong foliation but a less distinct biotite lineation than the Scituate found elsewhere in the quadrangle. Local variations in grain size and composition, including both aplitic and pegmatitic segregations, are visible in some of the Hope Valley Alaskite Gneiss.—The Hope Valley Alas-

kite Gneiss in the southern and southwestern part of the Oneco quadrangle is a light-gray to flesh-colored, fine- to medium-grained granitic gneiss that contains 5 percent or less fine-grained biotite. The light-gray weathered surface of the alaskite gneiss is studded with conspicuous octahedra of magnetite and ribbed by layers and rods of smoky-gray granular quartz a few millimeters thick. The belt of Hope Valley in the northwestern part of the quadrangle, west of the Plainfield Formation, contains 5 to 10 percent finegrained biotite and is darker gray than the alaskite gneiss to the south and east. This relatively biotite-rich gneiss was mapped as a separate facies of the Hope Valley to the west

(Dixon, 1965) and is continued as such in the Oneco quad-The Hope Valley north of Cedar Swamp grades into the Scituate Granite Gneiss through a zone 5 to 50 feet thick in which the rock becomes coarse grained and the biotite increases in abundance and becomes segregated into elongate

Near the contact with the Plainfield Formation, just east of the south end of Hopkins Hill, for example, the Hope Valley contains dark-gray biotite-rich layers as much as 2 inches thick. These layers are parallel to the bedding in the Plainfield and are interpreted to be of primary igneous origin. Adjacent to the stringers of Plainfield on Pine Hill, the Hope Valley contains as much as 10 percent coarse-grained

Foliation in the Hope Valley Alaskite Gneiss, produced by oriented flakes of biotite and stringers of quartz, is parallel to the bedding in the Plainfield Formation in most of the area. In the low ridge between Ekonk Brook and Hopkins Hill about 2,000 feet north of the Plainfield Pike, however, stringers of alaskite gneiss crosscut compositional layering in amphibolite of the Plainfield Formation, indicating that the Hope Valley is intrusive into the Plainfield. Apparently, the Hope Valley intruded the Plainfield in silllike bodies; the best example is the layer of alaskite gneiss that extends north from Whitney Hill essentially parallel to the schist-quartzite contact in the Plainfield. Ten Rod Granite Gneiss.—The Ten Rod Granite Gneiss

is a fine- to medium-grained, porphyritic rock that occurs as small concordant patches in the coarse-grained Scituate iss in the east-central part of the Oneco quad rangle. Moore (1958, 1963) mapped similar patches of Ten Rod Granite Gneiss in the adjacent quadrangles to the east where he established that the Ten Rod was intrusive into the In the Oneco quadrangle, the contact between the Ten

Rod and the Scituate is sharp, suggesting an intrusive relationship, but the exposures are too small to establish this Porphyritic granite gneiss.—Three thin, discontinuous sills of porphyritic granite gneiss extend into the southeast-

ern part of the Oneco quadrangle from the adjacent part of the Voluntown quadrangle (Feininger, 1965). Although the predominant rock is a porphyritic granite gneiss containing as much as 30 percent pink microcline phenocrysts, alaskite and aplite layers as much as 5 feet thick are present in different proportions. The contacts between the porphyritic granite gneiss and the various units of the Sterling Plutonic Group are sharp and conformable with the trend of the regional foliation.

The porphyritic granite gneiss is lithologically similar to the Ten Rod Granite Gneiss, and both have sharp contacts with the Scituate. For these reasons, the porphyritic granite gneiss and the Ten Rod are tentatively considered to be LEUCOCRATIC GRANITE

Several small concordant to strikingly discordant bodies of fine- to medium-grained, light-gray to flesh-colored leucocratic granite intrude the Ponaganset Gneiss and the rocks tentatively assigned to the Plainfield Formation in the northeastern part of the quadrangle. The rock is generally equigranular, weakly foliated in the larger bodies and massive in the smaller bodies. Thin stringers of light-gray to white quartz and microcline are present in scattered localities and generally have concentrations of biotite and (or) muscovite at their borders. Biotite makes up less than 5 percent of the rock and is evenly distributed as oriented flakes, except near the quartz-microcline stringers. Muscovite ranges from a trace to about 3 percent. The leucocratic granite resembles the fine-grained granite described by Moore (1963) that intrudes the coarse-grained

Scituate Granite Gneiss and intrudes or grades into the finegrained Scituate in the Coventry Center quadrangle to the east. The leucocratic granite is tentatively correlated with the fine-grained granite of Moore (1963) and is therefore considered to be younger than or possibly synchronous with a late stage of the Scituate Granite Gneiss.

A few outcrops of black to purplish-black, coarse-grained gabbro are found on both sides of the Moosup Valley Road and 1/2 mile southwest of Barbs Hill in the northeast part of the quadrangle. The main body of gabbro extends into the Coventry Center quadrangle to the east (Moore, 1963) and into the East Killingly quadrangle to the north (G. E. Moore, written commun., 1968). The gabbro forms low rounded hills and swampy valleys in contrast to the broad hills formed by the surrounding rocks. Outcrops of the gabbro show a punky, spheroidal

weathering habit, and the rock is commonly disaggregated to a depth of several feet. Tabular crystals of plagioclase as much as 15 mm long, laths of apatite as much as 3 mm long, small black grains of biotite, and black to dark-green aggregates of pyroxene and hornblende can be recognized megascopically in the gabbro. Moore (1963, p. A13) reports that the plagioclase grains are characteristically oriented to produce a distinct foliation, but this was not observed in the Oneco quadrangle. In thin section, the gabbro is composed of calcic plagio-

clase, augite, blue-green hornblende, biotite, magnetite-il-

menite, apatite, epidote, and zircon. Augite, intergrown with

magnetite or ilmenite, or both, forms fine-grained aggregates

that appear to be pseudomorphs after larger, equant grains

1200'

800'-

that were probably olivine. Moore (1963) reports olivine in the gabbro, but none was found in the Oneco quadrangle. The augite is separated from plagioclase by a rim of hornblende. Hornblende also forms euhedral crystals and crystal aggregates not spacially associated with the augite. Epidote and minor quartz occur as scattered grains smaller than the other minerals and between grains of plagioclase and horn-

The gabbro is younger than the Ponaganset Gneiss and the leuocratic granite which it intrudes. It lacks the pronounced gneissic foliation common in varying degrees to all of the other metamorphosed igneous rocks in the quadrangle; therefore, it is probably younger than the major regional deformation.

STRUCTURE

The Onego quadrangle is near the western edge of an igneous gneiss complex that extends from easternmost Connecticut across western Rhode Island to the Narragansett Basin where the complex is unconformably overlain by metamorphosed sedimentary rocks of Pennsylvanian age (Quinn and others, 1949). The igneous gneiss complex contains septa of quartzite, schist, and metamorphosed volcanic rocks that have been assigned to the Plainfield Formation in the western part of the region and to the Blackstone Series (Quinn and others, 1949) in the eastern part. The western border of the gneiss complex has been mapped by Dixon (1965, 1968) as a major, north-trending, west-dipping thrust fault 500 to 10,000 feet west of the Oneco quadrangle. The thrust fault separates rocks of the Sterling Plutonic Group and the enclosed Plainfield Formation from a thick, west-dipping sequence of metamorphosed sedimentary and volcanic rocks assigned by Dixon (1964) to the Putnam Group of Middle(?) Ordovician or older age.

Near the western border of the Oneco quadrangle, folia-

tion in the Sterling Plutonic Group parallels bedding in the Plainfield Formation and both generally dip 35° or less west. In the valley east of Hopkins Hill, however, the bedding, igneous layering, and formation contacts dip steeply east or west and are intensely crenulated by a cleavage that dips about 30° W. The attitudes of the bedding, the rotation sense of the minor folds, and the bedding-cleavage relationships indicate that there is a major asymmetric anticline in the valley east of Hopkins Hill, but the map pattern of the Plainfield does not conform to this simple fold interpretation. Furthermore, the broad folds outlined by the foliation and the map units east of Ekonk Hill are truncated to the northwest by the western belt of Plainfield, suggesting that this belt of Plainfield is in fault contact with the rocks to the east. Although the rocks in the western part of the quadrangle are more highly fractured than those to the east, no unequivocal direct evidence for the faults, other than the one south of Whitney Hill, was recognized in the field, and the fault pattern is inferred to answer the perplexing problems outlined

The thrust fault at or just below the western belt of Plainfield dips about 30° W, and has a dominant west over east movement sense consistent with the rotation sense of minor folds in the Plainfield. From the area east of Hopkins Hill south to Snake Meadow, the thrust fault and the adjacent rocks are warped into an asymmetric drag fold whose axial surface dips west approximately parallel to the thrust fault. he steeply dipping rocks of the Plainfield east of Hopkins Hill form the overturned short limb of the drag fold. They are truncated to the south by Hope Valley Alaskite Gneiss in the upper limb of the fold which was transposed eastward over the short, overturned limb. The alaskite gneiss and the schist and amphibolite of the Plainfield on the west slope of Ekonk Hill form the lower or eastern limb of the drag fold. The thrust fault and the drag fold are crosscut by a westdipping normal fault inferred to extend at least from Hell Hollow northward through the Snake Brook valley. The upper plate of the thrust, which overlies the overturned limb of the drag fold south of the Plainfield Pike, is truncated by the normal fault and, as far as can be determined, does not ap-

pear in the footwall of the normal fault. An alternative interpretation to having the thrust fault extend completely under the Plainfield would be to have simply the upper limb of the drag fold shear off and override the overturned and east limbs of the fold which would be in normal intrusive contact with the Sterling Plutonic Group. This interpretation cannot be refuted, but it is not preferred because both the amphibolite unit and the schist of the Plainfield appear to be in contact with the Scituate on the west slope of Ekonk Hill, and the schist apparently ends abruptly against the Scituate near the intersection of Plainfield Pike and the New Ekonk Hill Road. Therefore, the thrust is inferred to underlie the Plainfield on the west slope of Ekonk

The normal fault at the south end of Whitney Hill clearly offsets the formation contacts and the inferred normal fault and thus postdates the intrusion of the Sterling Plutonic Group and the major period of folding and faulting in the Oneco quadrangle. There are numerous fractures, joints, and minor faults in the belt of rocks north of Whitney Hill, and an excellent example of this type of brittle deformation is found in the large roadcut on the west side of the bridge over the Moosup River in Almyville. Brittle deformation is characteristically associated with the major thrust fault mapped by Dixon (1965, 1968) along the western edge of the igneous gneiss complex, but is not evident along the inferred thrust fault in the western belt of Plainfield in the Oneco quadrangle. The postulated north-trending thrust and normal fault along the western part of the Oneco quadrangle might be older than the major thrust to the west, and the northwesttrending faults at Whitney Hill and Moosup Pond might be related to the younger thrust movement.

The dip of the foliation in the rocks along section B-B'generally increases from the west toward the belt of Ponaganset Gneiss in the central part of the quadrangle. Changes in the direction of dip of the foliation are abrupt and are interpreted in section B-B' as folds with vertical to steeply west-dipping axial surfaces. Foliation within the Ponaganset and in the fine-grained facies of the Scituate to the east dips to the west and north and tends to flatten out around the north end of the lobe of coarse-grained Scituate in the southeastern part of the quadrangle. The structural feature thus formed is a structural nose of foliation plunging to the northwest. Although the foliation and the axial surfaces of the minor folds vary considerably in dip, the prominent biotite lineation in the Sterling Plutonic Group and the minor fold axes in the Plainfield Formation throughout the quadrangle

plunge 10°-25° NNW., indicating that the folding was about a common axis. In the few exposures of minor folds in the northeastern corner of the map, folded bedding with axial-plane foliation is present. This axial-plane foliation dips generally moderately west, but locally east. Axial planes of folded foliation dip steeply both east and west. It is quite likely that one or the other of two generations of foliation in the quadrangle becomes dominant in different places. This, coupled with difficulty in distinguishing between the two in outcrop, particularly in the plutonic rocks, leads to local discrepancies between map pattern and attitudes of foliation symbols and to

Base by U.S. Geological Survey, 1953

Contours deleted from ponded areas

Rhode Island coordinate systems

zone 19, shown in blue

10,000-foot grids based on Connecticut and

APPROXIMATE MEAN DECLINATION, 1971

equivocal interpretations of the structure.

THE STATE OF CONNECTICUT GEOLOGICAL AND NATURAL HISTORY SURVEY

GEOLOGIC QUADRANGLE MAP BEDROCK GEOLOGY ONECO QUADRANGLE, CONNECTICUT-RHODE ISLAND GQ-930

Dark-gray, black to purplish-black, coarse-grained, weakly oliated gabbro composed of hornblende, plagioclase, augite, biotite, epidote, chlorite, apatite, magnetite-ilmenite, and zircon. Granular aggregates of augite, possibly pseudomorphous after olivine, are separated from plagioclase by fibrous aggregates of hornblende. Laths of plagioclase and apatite visible megascopically in black matrix of granular hornblende, augite, and biotite. Outcrops show spheroidal weathering and are disaggregated to a depth of several feet

EXPLANATION

Leucocratic granite Light-gray to flesh-colored, fine- to medium-grained, weakly foliated to massive leucocratic granite composed of about equa amounts of quartz, microcline, and plagioclase and lesser amounts of biotite (1 to 5 percent), magnetite, apatite, and

zircon. Contains stringers of quartz and microcline that

locally show concentrations of biotite and (or) muscovite near

Ten Rod Granite Gneiss Fine- to medium-grained, porphyritic, gray to flesh-colored, strongly foliated and lineated granite gneiss composed of approximately equa amounts of microcline, quartz, and sodic plagioclase, 2 to 8 percent biotite, and minor amounts of magnetite, apatite, zircon, allanite chlorite, and epidote. Contain

from 5 to 30 percent of microcline

phenocrysts commonly 10 to 15 mm

Porphyritic granite gneiss Fine- to medium-grained, light-gray to pink, streaked and foliated orphyritic granite gneiss; prob bly equivalent to Ten Rod Granite Gneiss. Textural layering show by variations in microcline phenocryst content which ranges from 0 to 30 percent and aplite and alaskite layers a few inches to a few feet thick

Hope Valley Alaskite Gneiss

composed of about equal amount:

of microcline, quartz, and sodic

plagioclase, 1 to 5 percent fine-

grained biotite, and minor amounts

allanite. Muscovite may form as

Scituate Granite Gneiss Gray to pinkish-gray, coarsehva, Light-gray to flesh-colored, fine grained, locally porphyritic to medium-grained alaskite gneis: strongly to moderately foliated and strongly lineated granite gneiss ineation and foliation produced by characteristic spearhead-shaped splotches of coarse-grained biotit of magnetite, apatite, zircon, and and, to a lesser extent, by stringers and rods of white to smoky-gray granular quartz. Composed of about equal amounts of microcline,

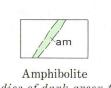
quartz, and sodic plagioclase, 5 to 15 percent biotite, and minor amounts of magnetite, zircon, apa tite, all anite, and chlorite after biotite: minor hornblende and sphene present locally. Outcrops of muscovite-bearing Scituate des ignated by letter M. Porphyritic variety contains subhedral crystal: and granular aggregates of microcline from 1 to 3 cm in length in addition to microcline in the monly contains more distinct foliation than coarse-grained sg

adjacent to the Plainfield Formation. Strong foliation shown b oriented biotite flakes and locally by stringers and rods of white to smoky-gray quartz. Microcline henocrysts, as much as 0.5 cm in length, form as much as 5 percent of the rock locally. Locally contains dark-gray to black, biotiterich layers adjacent to Plainfield Formation. Characterized by fin to medium-grain size, low biotite content, quartz stringers and rods. and magnetite octahedra which stud the light-gray weathered surhvb, Gray to flesh-colored, fine- to medium-grained alaskite gneiss

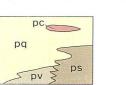
to 10 percent fine-grained biotite

Ponaganset Gneiss cg, Dark-gray, strongly foliated, conspicuously porphyroblastic

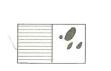
granodiorite to quartz monzonite gneiss composed of quartz microcline, plagioclase, biotite, hornblende, magnetite-ilmenit sphene, epidote, allanite, apatite, and zircon. Minor amounts of garnet and muscovite present in some hornblende-free samples. Characterized by subhedral porphyroblasts of white to ight-pink microcline as much as 2 cm in length which locally comprise as much as 20 percent of the rock and weather to a nubby surface. Microcline porphyroblasts commonly enclose traces of biotite foliation. Contains scattered layers of nonporphyroblastic dark-gray gneiss, a few feet thick, interlayered in variable proportions with the porphyroblastic variety cgf, Fine- to medium-grained light-gray facies similar to and gradational with cg, but lacks layers containing porphyroblasts



Elongate, isolated bodies of dark-green to black, medium- to coarse-grained, strongly foliated and locally streaked amphibolite; composed primarily of hornblende and plagioclase with variable and minor amounts of biotite, epidote, quartz, sphene, magnetite, apatite, and zircon. May contain paper-thin plagiclase-rich white streaks in hornblende matrix



Plainfield Formation pq, Light-tan to white, fine- to medium-grained, thinly laminated to thick-bedded (15 inches maximum) quartzite. Composed primarily of quartz with variable amounts of biotite, muscovite, magnetite, and zircon. Micaceous minerals commonl concentrated on bedding surfaces producing a slabby talus Weathers to hard, vitreous white or light-gray, smooth sur face, commonly stained by brown to yellow-brown iron oxide Stringers on Pine Hill composed primarily of intensely crenulated rusty-weathering, white quartz-muscovite schist and interlayered quartzite pc, Light- to dark-green, medium- to coarse-grained calc-silicate rock composed of quartz, microcline, actinolite, plagioclase diopside, pale-brown biotite, epidote, sphene, and zircon; calcite present in some samples. Interlayered with quartzite in beds ranging in thickness from less than 1 foot to about 5 feet ps, Dark-gray, fine- to coarse-grained, commonly porphyroblastic of white to light-tan quartzite from \( \frac{1}{2} \) to 1 foot thick. Biotite muscovite, quartz, plagioclase, garnet, tourmaline, and zircor make up most of the schist in the northwestern and northeastern parts of the quadrangle. Biotite, hornblende, quartz plagioclase, microcline, sphene, epidote, magnetite, apatite and zircon compose most of the schist in the southwestern pv , Dark-green to greenish-black, medium- to coarse-grained finely laminated to layered, foliated to schistose amphibolite composed of hornblende, plagioclase, sphene, epidote, actinolit replacing hornblende, biotite, magnetite, apatite, and zircon Compositional and textural layering shown by hornblende rich and plagioclase-epidote-rich layers a few inches thick



Epidote patches common. Includes light-gray to gray biotite-

quartz-feldspar gneiss, probably a metamorphosed tuff, in

northeast part of the quadrangle

Geology in Connecticut mapped by D. S. Harwood in

1967-68. Geology in Rhode Island mapped by

by N. L. Hatch, Jr., and E. Perry

Richard Goldsmith in 1962-63, assisted in 1963

Bedrock outcrops Areas of continuous outcrop shown solid. Ruled areas repre sent individual outcrops or groups of closely spaced outcrops separated by glacial drift

Long dashed where approximately located; short dashed where inferred; dotted where concealed Thrust fault, approximately located Dashed where inferred. Sawteeth on upper plate \_\_\_\_\_\_\_

Normal fault, approximately located Dashed where inferred; dotted where concealed. U, upthrown side; D, downthrown side; arrows indicate relative movement

> Strike and dip of compositional layering in igneous rocks

Inclined Vertical Crenulated Strike and dip of foliation Orientation of the planar arrangement of minerals, includes schistosity in metamorphosed sedimentary rocks and folio of biotite igneous rocks

Strike and dip of bedding

Strike and dip of inclined parallel bedding and foliation Bearing and plunge of lineation

Alinement of mineral grains; FA, minor fold axis. May be combined with bedding and foliation symbols

Strike and dip of joints May be combined with bedding and foliation symbols

Area of minor molybdenite mineralization Abandoned Active Quarry or pit

METAMORPHISM The sedimentary and volcanic rocks of the Plainfield Formation in the Oneco quadrangle contain mineral assemblages indicative of the almandine-amphibolite facies of regional metamorphism. Hornblende, biotite, albite-oligoclase, epidote, and minor garnet are characteristic of the amphibolite layers, and diopside, microline, actinolite, biotite, and local traces of calcite are found in the calc-silicate rocks. The pelitic rocks contain biotite, muscovite, chlorite, and minor garnet in some areas in addition to quartz and plagioclase. Although no aluminum silicate mineral was found it seems reasonable to assume that in rocks of appropriate bull composition, sillimanite would be the stable polymorph because both Dixon (1965, 1968) and Feininger (1965) found sillimanite in the areas to the west and south, respectively However, staurolite occurs in the Plainfield in the northeast corner of the map, possibly indicating a somewhat lower grade of metamorphism here than to the west and south. The rocks of the Sterling Plutonic Group also show evidence of metamorphism. Garnet associated with hornblende, biotite, epidote, and chlorite is found in scattered outcrops of the Ponaganset Gneiss. In the Ponaganset, the large porphyroblasts of microcline appear to have grown around thin laminae of biotite or deformed the gneissic foliation shown by the biotite laminae. Furthermore, the large

porphyroblasts of microcline in the Ponaganset commonly contain large euhedral porphyroblasts of magnetite, suggesting that the magnetite and microcline formed by the breakdown of biotite. Whether the igneous gneisses and the Plainfield have undergone the same metamorphic history or whether the Plainfield was remetamorphosed during the thermal event that affected the igneous gneisses is not unequivocally known. There is no petrographic evidence to indicate that the Plainfield Formation underwent multiple met amorphism, and it is concluded that the Plainfield and the rocks of the Sterling Plutonic Group were metamorphosed to their present grade by a major thermal event that occurred either near the end of, or after, the major period of fold-

ECONOMIC RESOURCES

ing and faulting.

The Oneco quadrangle contains several granite quarries of moderate size near the villages of Oneco and Sterling and many smaller pits in the Scituate Granite Gneiss in the surrounding area. All but one of the workings have been abandoned. Dale (1923) gives detailed descriptions of the four largest quarries existing in 1908, and these appear to have changed little since that time. The Scituate Granite Gneiss in the Oneco quarry (Dale, 1923, p. 400), half a mile southwest of Oneco on the west side of Pine Hill Road, was used primarily for building, curbing, and paving stone and is presently worked on a much smaller scale for the same purposes Scattered flakes of molybdenite were found on one joint surface in the Hope Valley Alaskite Gneiss on the west end and south side of the large roadcut 600 feet west of the bridge over the Moosup River in Almyville. Many large and small pits have been opened to work the extensive sand and gravel deposits found in the major river and stream valleys (Harwood and Goldsmith, 1971). Sand

and gravel in a variety of stratified ice-contact deposits are

adequate for any foreseeable local need.

Quad. Map GQ-105. \_\_\_\_\_1963, Bedrock geology of the Coventry Center quadrangle, Rhode Island: U.S. Geol. Survey Bull. 1158-A,

Rice, W. N., and Gregory, H. E., 1906, Manual of the geology of Connecticut: Connecticut Geol. and Nat. History Survey Bull. 6, 273 p. Snyder, G. L., 1961, Bedrock geology of the Norwich quadrangle, Connecticut: U.S. Geol. Survey Geol. Quad. Map GQ-144. \_\_\_\_\_1964, Petrochemistry and bedrock geology of the Fitchville quadrangle, Connecticut: U.S. Geol. Survey Bull. 1161–I, 63 p. Zartman, R., Snyder, G. L., Stern, T. W., Marvin, R. F., and Bucknam, R. C., 1965, Implications of new radiometric ages in eastern Connecticut and Massachusetts: U.S. Geol. Survey Prof. Paper 525–D, p. D1–D10.

BEDROCK GEOLOGIC MAP OF THE ONECO QUADRANGLE, CONNECTICUT-RHODE ISLAND

David S. Harwood and Richard Goldsmith

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET

DATUM IS MEAN SEA LEVEL

1 KILOMETER

For sale by U.S. Geological Survey, price \$1.00