Roxbury Rodgers Bedrock Compilation Sheet 3 (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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ROXBURY QUADRANGLE, CONNECTICUT

Robert M. Gates

The Roxbury quadrangle is in planes, the rock crops out in platy, to 30 feet long. None were mappable unusually abundant. Outcrop areas belts of group A mica quartzite, west-central Connecticut, about 13 jagged hogbacks or overhanging at a scale of 1:24,000. of the dark-gray knobby feldspathic mica quartzite, and mica miles west of Waterbury and 4 cliffs. Numerous pencil-line folia- Fissile black graphitic schist mica quartzite and schist in the quartz schist with very subordinate miles east of New Milford. It includes the villages of Roxbury and striped appearance. The mapped area is near the west mica-quartz schist and feldspathic outcrops. edge of the Western Highlands of mica-quartz schist, the foliation is Steel gray to black granulitic ing northward from Roxbury and staurolite (hab and hb). These rocks Connecticut, which is a southern developed by streaky discontinuous schist with curly lenses of pink westward to the quadrangle boundextension of the Berkshire or Green interlayerings of quartz-rich and garnet and quartz occurs only in the ary is characterized by a hetero-moderately well foliated. They are Mountain Plateau. The plateau is subordinate mica-rich bands a frac- area east of Flagg Swamp Road, a geneous alternation of mica rather similar to the other units of bounded by the Connecticut River tion of an inch wide. Rocks tran- mile and a half east of Roxbury quartzites and schists and by irregu- group A types (hamf and hab) but on the east and the Housatonic River sitional between mica quartzite and Falls (hcmn on map). on the west. The southward-flowing mica-quartz schist and feldspathic Shepaug River bisects the quad- mica-quartz schist generally have rangle and provides the major drainwhite quartz, some containing small age of the area. Elevations range from 200 feet above sea level where amounts of feldspar, ranging from a fraction of an inch wide and several rangle to nearly 1,100 feet in Chest-inches long to large pods 5 to 20 feet nut Lands in the northwest corner wide and 10 to 60 feet long. Many is the ridge between the Shepaug and quarried for paint pigment. Housatonic Rivers. Except on a few In certain zones the rocks in outdrumloidal hills, outcrops are abun- crop are characterized by a distincdant. The general northwest trend tive lineation produced by a

of the ridges in this area reflects the crumpling of the foliation planes last movement of the glacier from about an axis. Hand samples and the northwest. Essentially all drumtalus blocks are irregularly rounded loidal hills are rock cored (Gates and in cross section and spindlelike in Bradley, 1952, p. 39). PALEOZOIC ROCKS The major rock units in the quad- mica, ranging from silvery gray in rangle are the Hartland formation, the muscovite-bearing rocks to dark the Mount Tom hornblende gneiss, gray in the biotite-rich rocks. and the Mine Hill granite gneiss. Greenish mottling is common where The Nonewaug granite barely chlorite is present. The feldsparextends into the northeast quarter bearing rocks generally are slightly of the quadrangle from the east. chalky on the weathered surface. The Hartland formation is usually considered a part of the metasedi mentary sequence that forms the east flank of the Green Mountain anticlinorium, and has been correlated with the Hoosac and Rowe abundance of one or more of the be due in part to deformation, the schists in Massachusetts (Rice and minerals garnet, staurolite, and observed distribution of rock types Gregory, 1906, p. 96; Gregory and but the correlation has not been these minerals indicates that the tion of foliation was used as the east of Roxbury. The second belt ing rocks are abundant. More readily The Mount Tom hornblende gneiss and aluminum and lower in potassium uous areas of similar rock type. forms a cluster of intrusive bodies than rocks of group A. Constituents, Each structural symbol on the lite, kyanite, plagioclase, and biotite east of Roxbury.

Hartland formation. The relative order of abundance (1) muscoviteges of the hornblende gneiss and quartz schist with porphyroblasts of garnet, staurolite, or both, (2) mica the granite gneiss are not known. HARTLAND FORMATION to Long Island Sound. It is narrow- Muscovite-quartz schist with part east of the Barkhamstead lite, or both, is a distinctive rock is widest (18 miles) in the latitude Garnet is generally more abundant of the Roxbury quadrangle, where it than staurolite and ranges in diamextends from Waterbury to New eter from 1/16 inch to 11/2 inches; Milford. In addition to the Roxbury staurolite, as a rule in smaller grains quadrangle recent detailed mapping than the garnet, occurs locally in

Hartland is uncertain. In the north biotite transverse to the foliation of the Berkshire Hills, which are quantity but generally present.

north to northeast and dips west slope of the 770-foot hill south of Apple Lane, and half a mile north DESCRIPTION OF ROCK TYPES of the south border of the quadrangle The rock types of the Hartland in east of Highway 199 near the this quadrangle are separated pri- Litchfield-New Haven County linemarily by mineralogic composition the garnet is coarse grained enough into three groups: Group A includes to have been quarried for abrasives. and carbonate rocks. These rocks

It occurs as thin layers in an otherthe belt of unit hamf along the occur principally as thin, subordinate beds interlavered in group A and B ouartzite and schist and commonly beds interlavered in group A and B ouartzite and schist and commonly control of the pelt of unit namt along the entire east border of the quadrangle entire east border of the quadrangle Excellent exposures of the southern Hematite beds interlayered in group A and B rocks throughout the quadrangle.
Only the granulite and schist

Waste normal sequences and commonly duartzite and schist and commonly contains 2 to 3 percent magnetite.

Kyanite-bearing rocks, especially

Excellent exposures of the southern part of this area can be seen in the rocks of Botsford Hill. This eastern belt of rocks continues north-are somewhat better foliated than the rocks of Botsford Hill. This eastern belt of rocks continues north-are somewhat better foliated than the rocks of Botsford Hill. This eastern belt of rocks continues north-are somewhat better foliated than the rocks of Botsford Hill. This eastern belt of rocks continues north-are somewhat better foliated than the rocks of Botsford Hill. This eastern belt of rocks continues north-are somewhat better foliated than the rocks of Botsford Hill. This eastern belt of rocks continues north-are somewhat better foliated than the rocks of Botsford Hill. This eastern belt of rocks continues north-are somewhat better foliated than the rocks of Botsford Hill. This eastern belt of rocks continues north-are somewhat better foliated than the rocks of Botsford Hill. This eastern belt of rocks continues north-are somewhat better foliated than the rocks of Botsford Hill. This eastern belt of rocks continues north-are somewhat better foliated than the rocks of Botsford Hill. This eastern belt of rocks continues north-are somewhat better foliated than the rocks of Botsford Hill. This eastern belt of rocks continues north-are somewhat better foliated than the rocks of Botsford Hill. This eastern belt of rocks continues north-are somewhat better foliated than the rocks of Botsford Hill. This eastern belt of rocks continues north-are somewhat better foliated than the rocks of Botsford Hill. This east of the southern part of the southern part of this area can be seen in the rocks of Botsford Hill. bearing manganese garnet is shown those with prominent kyanite, are eastward across the southeast on the map in the southeast part of relatively rare but spectacular in corner of the New Preston quad-GROUP A

schist, which intergrade and are layers; in some places the kyanite Roxbury quadrangle. are quartz, biotite, muscovite, and and in size of crystals from 1/8 inch very subordinate 1- to 30-foot thick plagioclase where definitely identi
kyanite occurs with all the rock

or kyanite (group B type) and also

of this unit can be seen along the fied). Chlorite, magnetite, and shows the largest and most abundance of this unit can be seen along the includes several special rock types. tourmaline are common accessory above, the largest and most abuntourmaline are common accessory

The subordinate group B type layers and second hills % mile southeast of sphene, apatite, and zircon are sphene, apatite, and zircon apatite, and zirco present in trace amounts. Garnet, feldspar, biotite, and chlorite.

feldspar, biotite, and chlorite.

garnet, staurolite, or kyanite in the platy feldspathic mica quartzite staurolite, or kyanite are locally lesser extent upon mineralogic com-

GROUP C

not form foliation planes, the rocks weather as a massive, homogeneous, structureless rock with rounded structureless rock with rounded some of the lenses. Generally the structureless rock with rounded some of the lenses are nard, massive, and white; pink garnet and fascic porphyroblastic plagicalse. Epidote, which is not a common mineral in the Hartland formation, is fairly some of the lenses. Generally the some of the hornblende gneiss some of the northwest corner of the Roxbury the spindlelike rocks nearly coincide and thin beds and concretions of the hornblende gneiss some of the spindlende gneiss some of the hornblende gn surfaces. If, however, the mica granulites measure from 1 inch to abundant in the biotite-rich layers in Map unit ha.—The four isolated bodies occur close to unusually large zation and development of coarse large- and small-scale compositional Lane and east of Flagg Swamp are now well-crystallized mica Hill Book Co., 602 p.

forms well-developed foliation 15 inches thick and from a few inches this rock and tourmaline is also areas of the map unit ha are outcrop in the mica quartzite and schist and in unit hab are indicated by the aries are determined either by lack As mica quartzite grades into was found in only 10 scattered symbol K on the map. DISTRIBUTION OF ROCK TYPES

facilitate discussion of the distribution of the rock types given previously and for the information of The color of the rocks depends largely upon the amount and type of

sible basis for subdivision. In spite type satisfactorily for more than a mile or so. In fact, where outcrops Group B includes an assemblage are most abundant, it can be shown of rock types similar to group A that the different rock types are except in the relatively greater lenticular. As the discontinuity may kyanite, commonly as prominent or assemblages may suggest the Robinson, 1907; Agar, 1927, p. 16-17), porphyroblasts. The abundance of stratigraphic succession. The direction of the coarse garnet-staurolite-bearestablished by detailed mapping.

rocks are relatively higher in iron principal guide in joining discontin
(XS) contains a silvery muscovite accessible outcrops of this rock type in the Hartland formation in this generally in minor amounts but colored geologic map indicates an and is associated with the belt of Map unit hbi.—The map un the Hartland formation in this quadrangle and in quadrangles to quadrangles and in quadrangles to quadrangle quadrangle and in quadrangles to the north and northeast (Gates and the north and nort the north and northeast (Gates and Bradley, 1952, p. 21; Gates, 1951, p.

Accessory minerals are tourmaline, and evaluate the validity of the extends for a mile northeast into similar to those to the north and

GROUP B

quartzite and schist with garnet and

staurolite, (3) quartzo-feldspathic

semiconcordantly intrusive into the Rock types in group B include in GROUP A Map unit hamf.—The map unit roblast and attains a maximum hamf is present in two parts of the length of 6 inches but is usually half quadrangle—(1) south of the Mine an inch to an inch and a half long. in amount and except for unit homn Hill granite gneiss and (2) the The plagioclase porphyroblasts are not of mappable extent. In eastern border of the quadrangle— (calcic oligoclase) are chiefly 1/16 general, group C rocks occur as thin The Hartland formation forms a granulitic gneiss with garnet and which will be discussed separately.

eastern border of the quadrangle— which will be discussed separately.

calculate on good as a content of the quadrangle which will be discussed separately. continuous belt of irregular width staurolite, and (4) kyanite-bearing which will be discussed separately.

In the area south of the Mine Hill measure half an inch parallel to scattered throughout the quadrate half an inch parallel to rangle None show any stratigraphic granite gneiss the typical rock is a poorly foliated massive weathering biotite occurs in round to lens-distribution. ite with subordinate mica-quartz muscovite foliation. Kyanite is Reservoir, where it flanks the type in this quadrangle with few or schist. The foliation has not been type in this quadrangle with few or schist. The foliation has not been type in this quadrangle with few or schist. The foliation has not been type in this quadrangle with few or schist. Berkshire Hills on the east. The belt no gradations to other rock types.

in widest (18 miles) in the latitude of the latitude crumpled and destroyed. Subordinate rock. The outcrops of this distinctive rocks interlayered with the mica rock are not continuous along strike quartzite are mica-quartz schist, of foliation and do not indicate a quartzo-feldspathic granulite with single zone like the first belt (X) quadrangle to the north, and the

Hartland formation near the Mount
lite-bearing rocks, is indicated on Woodbury quadrangle to the east. Tom hornblende gneiss bodies. the map by the symbol K. The The stratigraphic position of the Porphyroblasts of plagioclase and kyanite rocks characteristically the Hartland forms the east flank are common. Chlorite is minor in and much feldspar. The kyanite

Rodgers, Gates, Cameron, and Ross ation planes being too crumpled to staurolite-, or garnet-rich rocks. two discontinuous outcrop belts in (1956), and the Waramaug formameasure. On a fresh surface the
Magnetite is generally present in
unit hb. Kyanite-bearing rocks, indition of Gates and Bradley (1952, p. rock is silvery white with rusty iron accessory amounts, but locally it is cated on the map by the symbol K, 6-7), respectively. In general, the staining around the staurolite and abundant enough to make the rock form a rough V near the Litchfieldfoliation of the Hartland strikes garnet crystals. In two places—the strongly magnetic. Tourmaline is New Haven County line and may be also locally abundant (1 to 2 percent) a single synclinally folded layer that but generally occurs only in trace could not be traced satisfactorily. An exception to the generalization is one of the largest areas of distincof massive to poorly foliated feld- tive lithology in the quadrangle. The spathic mica quartzite and schist in this area is found in a narrow belt this area is found in a narrow belt mica quartzite, feldspathic mica for the following ple, but the total feldspathic mica for the following ple, but the total feldspathic mica for the following ple, but the total feldspathic mica for the following ple, but the total feldspathic mica for the following ple, but the following ple for the followi rocks composed of muscovite, biotite,

The various mica quartzites and along both sides of the Shepaug quartzite, reluspating mica quartzite, reluspating mica quartzite, and subordinate mica quartzite, and subordinate mica quartzite, and subordinate mica quartzite, reluspating mica quartz, and feldspar without—or schists in group B are similar to

River. This belt contains well foliated quartz schist with well-developed, with subordinate—garnet, stauro- those in group A but carry porphyro- mica quartzite and schist and the uniform foliation planes which give Table 1 lite, or kyanite. Group B includes blasts of garnet and staurolite. They rock type is especially well shown the rock a slabby or bedded appearrocks composed of micas, quartz, and are interlayered commonly with in the falls of Shepaug River north in the falls of Shepaug River north ance. The mica quartzites in this mineral feldspar with prominent garnet, group A mica quartzite and schist in of Minars Bridge Road. Massive to area with the well developed folistaurolite, and kyanite. Thus, groups layers ranging from 6 inches to 20 poorly foliated rocks around Botsford ation planes in which mica is con-A and B differ mainly in the quantifeet thick. Commonly feldspar is
Hill change gradually southeastward
centrated contrast with the many
Quartz ties of iron- and aluminum-rich minpresent in minor quantities in the
to the narrow belt of well foliated
mica quartzites elsewhere in the
Sphene erals. Group A rock types are at the garnet-staurolite-bearing rocks, but rocks near Roxbury Falls. The quadrangle in which the micas occur Magnetit bedrock surface in about three- locally it is abundant. Magnetite boundaries between this area of hamf as disseminated, discrete flakes. The and group B in about one-eighth.

Quartzo-feldspathic granulitic

Quartzo-feldspathic granulitic

Accessor

the rocks to the east and west are

of the major differences between

mineral Group C includes various minor types. gneiss, with streaks or elongate inferred and gradational and based unit haf and units hamf and hab. in the Hartland formation such as augen of biotite, contains 10 to 40 on the increased amount of garnetseveral varieties of quartz-feldspar
percent staurolite and garnet. This staurolite-bearing mica-quartz schist toward Bridge southward toward Bridge water on the west side Chlorite quartz granulite, fissile black schist, nate but striking light-colored rock.

The mica quartzite and schist in of the foliation anticline, mica quartz

Biotite

local occurrences. Areas in which kyanite is particularly prominent are indicated on the more by the litchfield quadrangle. An excelkyanite is particularly prominent the Litchfield quadrangle. An excel-Group A includes several types of
(1) mica quartzite, (2) mica-quartz

are indicated on the map by the symbol K. The kyanite is associated with a family most seen in the hills north and south of seen in the hills north and south of this unit was schist, (3) feldspathic mica quartzite, with staurolite- or garnet-rich rocks schist, (3) feldspathic mica quartzite, with staurolite- or garnet-rich rocks schist, (3) feldspathic mica quartzite, and may occur in them or in adjacent schistose rocks. Painter Hill Road from the Roxbury considered by Gregory and Robinson and schistose rocks, hornblenden schistose rocks. and (4) feldspathic mica-quartz

and may occur in them, or in adjacent fire tower to the east border of the layers in some places the kvanite interlayered. The layers may be a cocurs in quartz pods or lenses. The layers than 1 parfew inches thick or more than 200 cent to 25 percent of the total rock feet thick. The essential minerals cent to 25 percent of the total rock that have subordinate rather than are feldspathic, but in general feld-

present in group A in quantities Group C includes several distinct relatively minor, small crystals. The grained staurolite-bearing quartz-

larly distributed garnet-, staurolite-, are separated from them because they or kyanite-bearing rocks. In spite of constitute mappable outcrop belts relatively uncomplicated structure and contain very subordinate garnet A major purpose of recent map- and a reasonable amount of outcrop or staurolite. ping of the Hartland formation has in this section, no stratigraphic In the unit ha west of East Flagg been to discover stratigraphic units sequence of rock types could be Swamp Road are small layers or in the wide belt of heterogeneous established. It was not possible lenses of limestone, sericite-hornrocks. It has not been possible to to trace the lithologies of units hafd, blende quartzite, and a rusty garnetestablish any stratigraphic sequence, ha, and hb into this section, as the cummingtonite-quartz schist in the but it is possible in this quadrangle irregular boundaries indicate. Drift mica quartzite and schist. The lenses of the mapped area. Chestnut Lands of these quartz pods were once to outline areas in which particular cover on Painter Hill prevented are located in the cliff faces west of rock types predominate. Mappable tracing the rocks of unit hb north- East Flagg Swamp Road a quarter units may be characterized by one ward in the Roxbury quadrangle, of a mile north of the quadrangle rock type or by an interlayering of but possible correlative rocks occur boundary. They are not of mappable more than one rock type. Thus, to in the southwest corner of the New extent. part of the mapped area, garnet, Map unit hb. - The map unit hb

the fault near Judds Bridge. The porphyroblasts.

schist with porphyroblasts of stauro- are east of the small pond south-Staurolite is the commonest porphy-

crystals 2 to 3 inches long. Stauroincludes the Litchfield quadrangle to the northeast, the New Preston quadrangle to the north, and the Woodbury quadrangle to the north, and the Woodbury quadrangle to the north, and the Woodbury quadrangle to the north, and the Hartland formation near the Mount staurolite-muscovite schist occur in the New Preston quadrangle. and similar hornblendic or amphib-The south-central part of this belt olitic rocks have been reported in of unit hab is an area of scattered the Hartland formation and adjoincrystals range from less than an outcrops of group-A-type mica ing formations throughout western considered part of the Precambrian

Muscovite schist is readily recoginch to 24 inches in length, are as quartzite and schist (with very Connecticut (Percival, 1842, map; core of the Green Mountain antinized in the field by its knobby
much as an inch in cross section, and
subordinate garnet, staurolite, or
Rice and Gregory, 1906, p. 112; clinorium, and must be Paleozoic in age. From the Berkshire Hills resistant garnet and staurolite mated 25 percent of the rock. The mated 25 percent of the better defined lithologies of the better defined litho southward the Hartland formation crystals. Foliation planes are garnet-staurolite rocks are normally units hb, ha, and hcmn. This area is Cameron, 1951, p. 11; Gates, 1951, is separated from known Precaminvariably crenulated, giving the granulitic and gneissic as compared bounded on the west by the narrow p. 10; Gates and Bradley, 1952, p. 21brian rocks to the west by a belt of rock a marked lineation. In some with the garnet-staurolite schists in belt of well-foliated mica quartzite with the garnet-staurolite schists in belt of well-foliated mica quartzite 25). These rocks have been referred marble or gneiss, or both, of unknown age—the Woodville marble of obvious structural element, the foliobvious structural element e

Map unit haf.—The map unit haf quadrangle (Gates and Bradley,

schist becomes more abundant and Sulfides quarter of a mile east of the west boundary of the quadrangle. The

few inches thick or more than 200 kyanite ranges from less than 1 perare quartz, biotite, muscovite, and to 24 inches in length. Although layers containing garnet, staurolite, exposures typical of the east limb forms of hornblende are found. The minerals, and epidote, hornblende,

dant crystals are in rocks containing
minerals, and epidote, hornblende,

Tange from mica schist to quartz
Judds Bridge. The east boundary of
hornblende. The quartz is fine- to less than 1 or 2 percent. The mica quartzite grades into mica-quartz to schist as the mica content increases, in order of decreasing abundance:

lithologic types less abundant than those in groups A and B. These are, in order of decreasing abundance:

lithologic types less abundant than locations of special rock types are indicated on the map (K, X, XS) and described below.

grained stauronte-bearing quartz-feldspar granulitic gneiss (X on map) mentioned in discussion of unit hab.

Map unit hafd.—The map unit and the rocks are called feldspathic (1) quartz-feldspar-garnet-horn- The map unit hab in the south- hafd is questionably correlated with grains. The aggregates are irregular if feldspar is recognized in the field blende granulite; (2) fissile black western part of the mapped area unit haf mainly from structural conin amounts estimated as greater schist; (3) black fine-grained includes an unusual, hard, dark-gray siderations and mineralogical simi- wedge-shaped crystals of sphene than 10 percent.

The field appearance of these rocks

The field appearance of these rocks

with pink garnet-quartz pods or

with pink garnet-quartz pods or

schist that contains kyanite, sodic

of unit hafd are mica quartzite,

The Mount Tom hornblende gneiss depends primarily on the develop- nodules; (4) carbonate rocks; and andesine, and epidote. The knobs feldspathic mica quartzite, and occurs in a variety of tabular, lensment of foliation planes and to a (5) rusty, iron-silicate and quartz range from small blebs a fraction of schist like unit haf, but structurally shaped or irregularly shaped bodies an inch in diameter to crude crystal- they differ. Instead of being slabby that range from a few inches across position and scale of interlayering. Granulites predominantly of quartz shaped masses 4 to 6 inches long. and uniformly foliated they are to masses half a mile by 4 miles. In In outcrop the texture ranges from but with any or all of the minerals, The crystal-shaped masses are raneither massive and poorly foliated or general these bodies are concordant massive to schistose depending in feldspar, garnet, and hornblende, domly oriented in the rock and have spindlelike. The spindlelike rocks but definite and inferred crosscutpart on the amount of mica and in occur as thin layers in the mica the shape of crude crystals of kyanite are those which have a prominent ting relationships have been mapped part on the distribution and orienta- quartzite and schist and as pods, or staurolite. Microscopic examina- lineation produced by convolutions (Gates and Bradley, 1952, p. 22-23). tion of the mica. In the mica quartz- lenses, or boudinage masses in the tion of several knobs showed them to of the foliation planes. The lineation Tentatively, they are considered ite and feldspathic mica quartzite, if garnet-staurolite-muscovite-quartz be masses of fine-grained kyanite, is shown by quartz rods and by consystem. Syntectonic intrusives. They have, the mica is disseminated and does schist. The rocks are hard, massive, trains of magnetite crystals, and volutions of mica folia. Structurally at least to a minor degree, hydro-

of outcrops or by adjacent rocks con-The area of map unit hab extend- taining much more garnet and

other geologists in the general region, staurolite, and kyanite are conspic- has outcrops of mica quartz schist the geologic map shows areas in uous and abundant in some layers, with coarse porphyroblasts of garnet each of which a particular rock type but generally it is possible to trace or staurolite or both with minor or assemblage predominates or a these layers for only short distances. plagioclase and with very subordinstructural feature-that is, pronounced foliation, poor foliation, or somewhat special rock types are schist. The most typical rock is a strong lineation-indicates a posindicated on the geologic map by rusty-weathering garnet-staurolitesymbols X and XS. The first of these muscovite-quartz schist with small of generally abundant outcrop, the (X) is a coarse-grained staurolite-biotite flakes transverse to foliation. writer was unable to trace any rock bearing quartz-feldspar granulitic A similar commonly associated rock gneiss which marks the boundary is a quartz-feldspar-granulitic gneiss between units haf and hab east of with garnet, staurolite, and biotite staurolite-bearing granulitic gneiss Abandoned garnet quarries are is interlayered with the normal located in the hills south of Apple varieties of mica quartzite and schist Lane south of Roxbury, and north and is exposed in a belt of discontin- of Garnett Road east of Roxbury uous outcrops extending from Judds Falls. In both localities outcrops of

est (6 miles wide) in the northern porphyroblasts of garnet, or stauro-dark-gray feldspathic mica quartzhcmn is primarily a black, finegrained, quartz-feldspar granulitic schist with pods or nodules of pink garnet and quartz. The rocks are made distinctive by toughness, blueblack manganese staining, and curly garnet and staurolite or granulitic mentioned. Areally they are asso-

to as hornblendite. The name Mount Tom hornblende gneiss is used in this report, as it applies primarily to the hornblende gneisses in the general area of the Litchfield, Nev Preston, and Roxbury quadrangles. The type locality is in the eastcentral part of the New Preston 1952, p. 21). The mineralogy of the Mount

The texture of the gneiss is related in large part to the grain size and prisms and a segregation of the hornblende and plagioclase into occurs predominantly as fine-grained to medium fine-grained slender ulose rocks as coarse-grained, poi kilitic, anhedral, roughly equant plagioclase (andesine) is fine grained, xenomorphic granular, and medium-grained, rounded, and genoccurs with the plagioclase and is porphyroblasts of staurolite and porphyroblasts of staurolite and layering, which is considered pri-It is considered to be a late hydrothermal alteration related to the

hornblende gneiss. be controlled by a synclinal flexure granite gneiss is here named to in the foliation of the Hartland. The replace Roxbury. It is named from podlike shape of these bodies is well shown in this area as outcrops are very abundant. The second occurrence is the tabular body, a quarter of a mile by a mile and three-quarters, just northwest of the Mine Hill granite gneiss. Several small outcrops of hornblende gneiss are present along the southwest border and in the northeast corner of the tion. It has had little apparent

The Mount Tom hornblende gneiss is readily recognized in the field by part, responsible for the foliation its greenish-black to black and dome and the attendant foliation white streaked or mottled appear- syncline between it and the Noneance. The outcrops may be rounded waug granite 5 miles eastward in and massive or tabular and slabby, depending on the rock structure. The structure ranges from nearly massive to gneissic, and even to schistose locally. In general, the small biotite flakes. Coarse muslarge body northwest of the Mine covite flakes characterize the prom-Hill granite gneiss is well foliated, and the small pods in the area north of Steep Rock are comparatively massive. In the more gneissic or vite, and biotite. Accessory minerals schistose varieties felted masses of are apatite, chlorite, and zircon. In hornblende prisms mark the foliation general, sodic plagioclase is more planes. The prisms are generally abundant than microcline, but the unoriented, but locally they produce ratio varies from layer to layer. In this quadrangle the small horn- aplite are absent. Some layers are blende gneiss bodies are poorly foli- coarser grained than others, but ated and the large one is well foli- none is considered pegmatitic.

New Preston quadrangle to the gneiss. are typically tabular gneisses.

the Mount Tom hornblende gneiss blasts of staurolite, plagioclase, and kyanite in nearby rocks of the Hartsome kyanite has the same erratic

Tom hornblende gneiss is very sim-

ne ter analy	xture is quit rsis (est.) of ole 1 below.	e complex.
ial	Range	Average
ls	(percent)	(percent)
nde	55-70	60-65
ase	20-35	25-30
	tr12	5-6
	0-8	2-3
te	tr5	2-3
	tr12	1-2
ory ils		
te-	0-3	tr.
	0-2	tr.
	0-0.5	tr.
	0-0.5	tr.
	0-tr.	
е	0-tr.	
	0-tr.	

abundant, conspicuous crystals or in the relatively minor small crystals. The characteristic features and the persistent band of coarse-

the Hartland formation near the the Hartland formation are consid- which is accentuated by metamor- outcrop of the coarse-grained garnet- ing schists or granulitic gneisses. contact with the hornblende gneiss. ered contact-metamorphic effects. phic differentiation. Foliation trans- staurolite-muscovite schist in that The chert-carbonate rocks are now MINE HILL GRANITE GNEISS in adjacent quadrangles, however. The lineation, measured on crenugranulities with minor feldspar, The Mine Hill granite lies in the No stratigraphic horizons could be lated and crumpled foliation planes, epidote, and garnet. typical outcrops on Mine Hill where it is a semiconcordant, probably land formation. It crops out in bold slablike, cliff-forming layers of

The two major occurrences of the west-central part of the quadrangle. traced with certainty through the plunges generally northwestward at The major variation in the meta-Mount Tom hornblende gneiss in It was named Roxbury granite Roxbury quadrangle, but the dis- an angle of 20°-50°. It is most morphism of the Hartland formathis quadrangle are in the north- gneiss on the Preliminary Geological tribution of different lithologic prominent along the axis of the tion is the size of the garnet, staurowestern corner. The first is the belt Map of Connecticut (Rogers, and types with respect to foliation and foliation syncline and locally proof irregularly shaped and distributed others, 1956), but Roxbury is pre- lineation suggests several possible duces spindlelike talus blocks and crystals of these metamorphic pods between West Church Hill empted by the Roxbury conglom- stratigraphic subdivisions of the strongly lineated outcrops. Linea- minerals occur either in the folia-Road and Steep Rock. It appears to erate of Massachusetts. Mine Hill Hartland. Figure 1 shows an tion is the predominant structural tion syncline, near hornblende gneiss hogbacks 5 to 20 feet thick. The outcrops are restricted to the core of a foliation dome in the otherwise isoclinally folded Hartland formametamorphic effect on the contigu-

ous rocks but is considered, in large the Woodbury quadrangle. The Mine Hill granite gneiss is a uniform fine- to medium-grained lustrous muscovite gneiss peppered with inent foliation planes. The essential minerals are microcline, sodic plagioclase (An10), quartz, musco-Crosscutting dikes of pegmatite and ated throughout, somewhat in Aplitic layers are fairly common contrast to the occurrence in the near the borders of the granite of the larger bodies are gneissic to covite folia, is xenomorphic gran-

schistose and the centers are more ular; the individual grains of quartz massive though foliated (Agar, and feldspar range in size from 1927, p. 32; Gates and Bradley, 1952, fine to coarse. Cataclastic effects p. 23). However, the small pods in are apparent in some thin sectionsthe Roxbury quadrangle are included strained and fractured quartz. in rocks of the Hartland formation angular fragments of feldspar in a to be crumpled in the foliation syn- lized or strained feldspars having a cline. The smaller bodies in the New mottled appearance. Replacement Preston quadrangle occur in wellfoliated rocks of the Hartland and dent in most sections. Microcline is characteristically fresh and clear, The apparent relationship between whereas the plagioclase commonly includes ragged flakes of muscovite and the unusually large porphyro- and quartz and is dusty with The relation of the granite gneiss land of appropriate composition is to the Hartland formation is most well illustrated in the area north of clearly shown on the north and

west sides where contacts are plenti-Steep Rock where a lustrous muscovite-quartz rock with large porphyroblasts of staurolite, plagioclase, and is parallel to that of the Hartland formation and forms a half-dome. One or two 5- to 10-foot granite occurrence as the hornblende gneiss gneiss sills occur in the Hartland pods. It is a rock unique in the formation 100 to 200 feet from the Roxbury quadrangle, but it extends main granite body all along the northeastward to the Washington west border. The conformable golf course in the New Preston relations and the sills are well quadrangle, where it is associated exposed in the areas northwest of with similar hornblende gneiss. The Mine Hill, three-quarters of a mile staurolite crystals locally exceed 5 northwest of Bridgewater, and inches in length and are typically between Second Hill and Roxbury larger than an inch. Also, plagioclase Road, a mile and three-quarters porphyroblasts half an inch across are present, although most are much smaller. In addition to the extremely large porphyroblasts, the rock is haracterized by an unusually large amount of plagioclase and magnetite-ilmenite for the Hartland formation. Augen-shaped biotite porphyroblasts are developed transverse to foliation. Hybrid rocks in this area are composed typically of

of the Hartland, mainly mica quartzites, also occur in the same body northwest of the Mine Hill the border suggests faulting along syncline.

Hartland was developed and con-granite core. NONEWAUG GRANITE tion of large and small bodies of the

The Nonewaug granite is a lenst he New Preston quadrangle (Gates

The spatial relations of the Mine bedrock geology of the Litchfield hornblende gneiss near Mount Tom shaped body 9 miles long and 3 miles and Bradley, 1952), and it is clearly Hill granite gneiss to the partial in the New Preston quadrangle and wide lying largely in the Woodbury evident in the vicinity of West foliation dome and adjacent syncline in the northwestern corner of the and Litchfield quadrangles (Gates, Church Hill Road near the north in the Hartland formation suggests Survey Misc. Ser., no. 3, 13 p.

tinuing to the end of the period of deformation. The spatial concentra-Roxbury quadrangle coincides with 1954, 1951) to the east. Only the border of the Roxbury quadrangle. a genetic relationship as the east Gates, R. M., 1954, The bedrock major flexures in the regional folia- western tip of the granite extends The axis of the foliation syncline side of the granite gneiss is the only geology of the Woodbury quadtion in the Hartland formation and into the Roxbury quadrangle. The trends S. 20° E., and the syncline place where foliation of the Hartland rangle, Connecticut: Connecticut is interpreted as indicating a struc- granite is a post tectonic intrusive extends nearly the full length of the dips eastward. The granite may Geol. Nat. History Survey, Quadtural control on the emplacement of in the Hartland formation clearly quadrangle. The specific location of have been emplaced early in the rangle Rept. no. 3, 23 p. atively late in the period of defor- ing it. The characteristic features not well defined. In the area between served as a competent mass or butof the granite are: (1) textural mation. The uniform mineralogic bodies makes their development from crystals, and (3) plumose muscovite. indicated on the map and figure 1 have been forcefully emplaced Misc. Ser., no. 5, 46 p. impure limestone improbable. The The layers in the granite may be a are several reversals of foliation during the waning stages of defor- Gregory, H. E., and Robinson, H. H. volcanic flows or tuffs or pretectonic fine grained to pegmatitic. The large with the stratigraphic syncline with the observed relations. basic sills unlikely parents for the graphic granite crystals commonly shown in figure 1. Southward from hornblende gneiss bodies. Local occur in a matrix of fine-grained Roxbury the syncline passes into crosscutting relations indicate the granite. The plumose muscovite is isoclinal folds with regional west
isoclinal folds with regional west
cut, New Haven, 495 p. intrusions continued at least until an intergrowth of quartz and musco-ward dip. The complementary land formation is assigned to the Rice, W. N., and Gregory, H. E., 1906, fractures developed across the vite and occurs like the graphic anticline is the foliation dome kyanite-staurolite subfacies of the Manual of the geology of Con-The textures were developed by referred to the Woodbury quad- and its southward continuation in Verhoogen, 1951, p. 452). Staurolite Bull., no. 6, 273 p. recrystallization and depend upon rangle report (Gates, 1954) for furthe small foliation dome at Botsford or kyanite is generally present in all Rodgers, John, Gates, R. M. time of emplacement, size of body ther information on the Nonewaug Hill; it also grades southward into rocks with more complex essential Cameron, E. N., and Ross, R. J., Jr. and location in relation to structural granite. deformation. In general, the bodies STRUCTURE of minor foliation synclines and biotite, and quartz. The original of Connecticut: Connecticut Geol. located in the foliation syncline in Foliation and lineation are the anticlines in the area between sedimentary rocks were probably Nat. History Survey.

verse to bedding has been observed area.

feldspar. Also chlorite is common in plagioclase in the adjacent parts of marily sedimentary in origin but account for the unusual width of garnet-, staurolite-, or kyanite-bear-

bodies, or near the Mine Hill granite

gneiss. The sequence of events

leading to the development of these

unusually large crystals includes

regional deformation and isoclina

folding accompanied by rising rock

temperature and the development of

micas, recrystallization of quartz.

and some growth of garnet. The

culminating phase of deformation,

which produced the foliation domes

with the gneiss by faulting. The

coarse kvanite crystals in the area

south of Berry Road may be evi-

dence for underlying granite.

Although there are several features

of the Hartland formation bordering

the granite gneiss that may be

of the granite, none is necessarily

unique to the border area.

attributed to metamorphic effects

ECONOMIC GEOLOGY

The Mine Hill granite gneiss has

been quarried in the past for build-

ing stone and is still used for this

1,000 feet long was once mined for

iron and silver (Percival, 1842, p. 69).

feet northeast of Roxbury Station

on the east slope of Mine Hill. It

and synclines, was accompanied by the emplacement of the Mine Hil granite gneiss and the Mount Tom hornblende gneiss which locally caused some hydrothermal meta morphism and some hybridization of the Hartland. The rocks in the trough of the foliation syncline, a region of maximum deformation, underwent more intense or prolonged metamorphism within a single metamorphic grade resulting in the development of large porphyroblasts Chlorite is ubiquitous in minor amounts and its meaning is uncertain. In many places it accompanies the growth of garnet, staurolite, or kyanite and appears to be a stable mineral in this assemblage. It is generally penninite, clinochlore, or both, as determined in thin section and may result from the formation of garnet, staurolite, or kyanite from preexisting biotite. Locally, generally near hornblende gneiss bodies where it forms pseudomorphs after garnet, it is clearly regressive. Chlorite and muscovite pseudo Figure 1.—Interpretation of the geology of the Roxbury quadrangle morphs of staurolite are present at one locality between East Flagg Swamp Road and Bronson Mountain. Muscovite replaces kyanite or staurolite in several widely sepaated places. No special significance could be attached to this. It is difficult to distinguish the Hill granite gneiss on the Hartland formation from the regional metamorphism. The Hartland formation is feldspathic north of Mine Hill but no more so than locally elsewhere RESTORED CROSS SECTION ALONG LINE A-A' as in unit haf. Along the east side of the granite gneiss are several separated outcrops of coarse-grained kyanite-bearing rocks that are unusual in their relatively high content f chlorite. Their presence along this side of the gneiss body could be attributed to metamorphism by the Mine Hill granite gneiss or by naving previously metamorphose rocks brought into juxtaposition

north of Bridgewater. A dike of interpretation of possible divisions feature in the area south of Church granite similar to the Mine Hill in the Hartland and of the general- Street and Good Hill Road and granite gneiss cuts across the ized structure of the quadrangle, north of Squire Road; the foliation Hartland formation at a rather low Four lithologic subdivisions were here is too crumpled to determine angle at only one place—in the cliff made, using lithology, foliation, and its attitude. The plunge of the purpose to some extent. In the east of Judds Bridge Road, a mile lineation as criteria in combining the lineation is 30°-55° northwest, south granite gneiss a quartz-siderite vein south of Judds Bridge. units shown on the geologic map. of Lower Church Hill Road, decreas-The east boundary of the granite Division III is the most distinctive, es to 10°-15° in the central part of gneiss is not well exposed and may yet it could not be traced through the foliation syncline, and steepens well be faulted (as is shown on the the north central part of the quad- again in the southeast corner of the map). The foliation of the granite rangle. Further, the east limb of the quadrangle. plagioclases, approximately An23-28 gneiss tends to become nearly horisyncline formed by this division is in The foliation syncline is thought and An40. Rock types more typical zontal along the east edge, especially question (see unit hafd). Division II to have developed late in the period vertical. near Roxbury Station. The attitude comprises a belt in which the major of deformation that produced the of the foliation in the Hartland share of group B type rocks are foliation of the Hartland formation. formation east of the granite gneiss located. It follows, from the general This conclusion is based largely on seems to indicate that the gneiss parallelism of foliation and appar- negative and secondary lines of evi-A coarse-grained garnet-stauro- forms a symmetrical dome, but the ent bedding, that the proposed dence: (1) There is no evidence of a mantle the large hornblende gneiss ite and the Hartland formation at nearly coincident with the foliation tion and metamorphism, such as

RESTORED CROSS SECTION ALONG LINE B-B'

cataclastic textures, broken porphytains larger porphyroblasts and ment may have been vertical. One Mount Prospect complex of Cameron be related to the development of the Any theory of origin of the the Shepaug River and the other the northwest quarter of the syncline would constitute a zone of following features: (1) relatively the first sharp bend in Judds Bridge waug granite in the north half of of low relative pressure favorable to uniform mineralogic composition, Road. Small vertical faults prob- the Woodbury and the southeastern the dilatent emplacement of intrumation, (5) local crosscutting rela- land, but firm evidence of displace- southwestward across the southern seem to have had a thermal metations of hornblende gneiss and Hart- ment is lacking. The south boundary part of the Litchfield and New morphic effect on the Hartland 24 inches long. land, (6) range in textures in large of the Mine Hill granite gneiss is Preston quadrangles, and southward formation after deformation. (3) and small bodies, and (7) local con- obscured by drift, but from foliation through the Roxbury quadrangle. The metamorphism of the Hartland Agar, W. M., 1927, The geology of tact effects such as chloritization and lineation in the Hartland for- The foliation dips westward except formation in the foliation syncline is the Shepaug Aqueduct Tunnel, and the development of coarse- mation on Botsford Hill, a mile east locally in the Roxbury quadrangle more intense, though not of higher grained staurolite and plagioclase. of Bridgewater, it seems possible where the Mine Hill granite gneiss grade, than elsewhere in the quad-The uniform composition, spatial that the Hartland plunges beneath forms the core of a peanut-shell- rangle. The more intense metamor- Survey Bull. no. 40, 38 p. listribution, and range in size of the granite gneiss and that Botsford shaped foliation dome along the west phism in the trough of the foliation Balk, Robert, 1936, Structural and hornblende gneiss bodies can be Hill may be a dome with a concealed side of the area. syncline would be expected if the petrologic studies in Dutchess explained best by the intrusion of granite core. The small granite The foliation syncline dominates trough is a zone of maximum deforgabbroic magma into the Hartland gneiss area near the southern the structure of the Hartland mation as is indicated by the proor mation over a period of time boundary of the quadrangle may be between the dome of the Mine Hill nounced lineation. This relationship Cameron, E. N., 1951, The geology beginning after the foliation of the the outcrop of this hypothetical granite gneiss and the Nonewaug corroborates the theory that the of the Mt. Prospect complex:

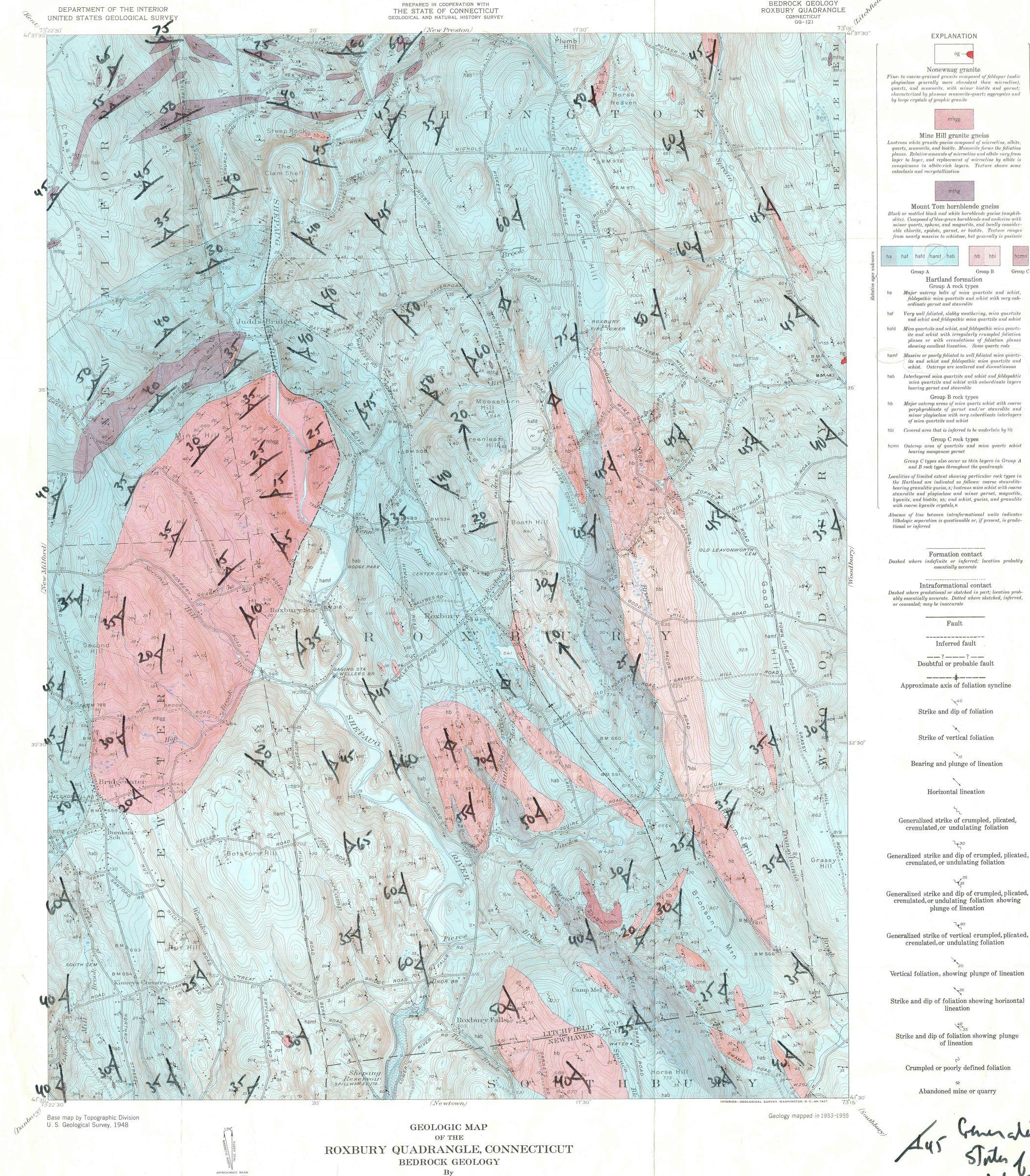
isoclinal folds. There are indications mineral assemblages than muscovite, 1956, Preliminary geological map

granite (see map and figure 1). syncline developed late in the defor-Traces of a foliation syncline can mation and merely prolonged the Survey Bull., no. 76, 44 p. be detected in the southern part of metamorphism in that belt. the Roxbury Fire Tower and Jack's tress during the late stages of

trends northwestward and appears mation have been quarried for paint pigment. The largest ones, however, in the area 2,000 feet west of Roxlite-mica-quartz schist appears to discordance of foliation of the gran- stratigraphic syncline (fig. 1) is separate, second period of deforma- bury Station and south of Quarry Road. They strike N. 15°-25° E. and granite gneiss. This porphyritic it. South of Judds Bridge the con- The Hartland formation in the roblasts, or a second foliation. (2) Garnet has been quarried for schist is similar to others in the tact of the granite gneiss and the quadrangles to the north, northeast, The Mount Tom hornblende gneiss abrasive material in the area south-Roxbury quadrangle not associated Hartland is displaced 1,000 feet and east forms a sinuous belt trend-bodies near the north end of the east of Roxbury Falls and in the area with hornblende gneiss, but it con-horizontally by a fault; the move-ing northeastward between the syncline are intrusive and appear to east of River Road and south of Apple Lane. Tailings from the shows indications of hydrothermal contact can be seen 1,500 feet south (1951) in the northeast quarter of syncline. The view taken here is that of Judds Bridge on the west side of the New Preston quadrangle and the trough of the developing foliation used for road gravel. Kvanite has not been mined comhornblende gneiss must explain the 2,500 feet south on the east side at Litchfield quadrangle and the None- maximum flexure and hence a zone mercially, but several places have mile north of Judds Bridge. The (2) spatial distribution, (3) great ably associated with the displace- part of Litchfield quadrangle. sives. Many of the hornblende most spectacular occurrence, howrange in size of bodies, (4) general ment can be seen at the second Foliation of the Hartland formation gneiss bodies are well foliated, indiconcordant relations of the horn- point mentioned. The fault probably trends southward along the east cating that they were emplaced near the south border of the quadblende gneiss to the Hartland for- extends northward into the Hart- side of the Litchfield quadrangle, before deformation ceased; yet they rangle. Here the kyanite occurs in REFERENCES

Connecticut Geol. Nat. History Gates, R. M., 1951, A report on the quadrangle with geological map Connecticut Geol. Nat. History composition of the hornblende gneiss layering, (2) large graphic granite Brook and the synclinal axis deformation or the granite could necticut Geol. Nat. History Survey spatial distribution and range in size and texture makes basic fraction of an inch to several feet thick. The textures range from very ation syncline does not quite coincide second possibility is more consistent of Connecticut: Connecticut Geol. Survey Bull, no. 7. Percival. J. G., 1842. Report on the geology of the State of Connectifoliation of the Hartland formation. granite crystals. The reader is around the Mine Hill granite gneiss amphibolite facies (Turner and necticut: Connecticut Geol. Survey

necticut State Geol. Nat. History



Robert M. Gates

Scale 1:24 000

Contour interval 10 feet Datum is mean sea level 1959

EXPLANATION

Nonewaug granite

Group B

Group C rock types

Formation contact

essentially accurate

Inferred fault

--?--?--

Horizontal lineation

plunge of lineation

of lineation