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Itinerary for Trip A: 50th Meeting, New England Intercollegiate Geological Conference

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ITINERARY FOR TRIP A

50th Meeting - New England Intercollegiate Geological Conference

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STOP 1. (This stop is north of the northeast corner of the geologic map.) New London Turnpike, northwest of Marlborough.

The purpose of this stop is to examine the lithologic units and associated structural and metamorphic features that can be seen in crossing the overturned syncline that extends north-northeastward from Great Hill in Portland toward the state line. The field excursion will proceed from the Monson gneiss (?) on the east (normal) limb to the Glastonbury gneiss on the west (overturned) limb. On the east limb, the three members of the Bolton group display the following thicknesses (including tectonic repetition): Great Hill quartzite, 175'; Mine Brook calc-silicate, 600'; Camp Jenkins staurolite schist, 1,450'.

STOP 2. (Optional) (E-9). On north side of Carr Brook, just east of Highway 17 near Gildersleeve. Here one can see the distinctive, highly-aluminous kyanite-rich schist and gneiss that characterize the lower part of the Collins Hill formation. A short distance west, on the east side of Highway 17, is an exposure of Maromas microcline gneiss.

STOP 3. (C-11) Exposures of coarse conglomerate of the Triassic Portland formation on west side of Highway 17, about one-third of a mile north of U.S. Highway 6A east of Portland. The clasts in this outcrop are of interest for the light they shed on the nature of the provenance area and its relative location at the time of deposition. Of particular interest is the contrast in grade of metamorphism between the clasts of schist and their higher grade equivalents at Stop 1. In this outcrop, and in nearby exposures, it is possible to find large angular blocks and cobbles of Great Hill quartzite, Mine Brook carbonate rocks, and representative types from units below the Bolton group, including fine-grained garnet quartzites from the Collins Hill formation and anthophylite or cummingtonite rocks of the Middletown formation. Clasts that are believed to have been derived from the Bolton group are not found south of Duck Hill (just south of the Connecticut River). A few miles south of the river, clasts of a type of rock not found today in the Eastern Highlands appear rather abundantly. Boulders of gneissoid garnetiferous quartz porphyry are abundant. Their source, which must have been limited in its areal extent, has been eroded away. It seems logical to expect that feeder dikes will be found in the Eastern Highlands, but they have not, as yet, been discovered.

STOP 4. (N-13,14) South end of Great Hill, about 3 miles east of Portland. This is an area in which plunging structures allow one to prove that the quartzite on the east side of the schists of the Bolton group is the same as that on the west side, thereby proving that the formation is involved in a large fold. The truncation of the unconformity between the Collins Hill formation and older rocks by the basal quartzite of the Bolton group, and the downward convergence of dips in this quartzite in areas to the north, prove that this fold is a syncline. At this locality the Great Hill quartzite is 450' thick, and the Mine Brook calc-silicate, 400', but both units display isoclinal folds.

STOP 5. (P-28) Picnic ground north of Hurd Brook and Hubbard Brook syncline, in Hurd State Park, south of Middle Haddam. The rock at this locality is typical Maromas granitic gneiss. To the south, rocks in the lower part of the Collins Hill formation dip gently north in the core of the overturned, isoclinal Hubbard Brook syncline.

LUNCH STOP. (R-29) One-half mile beyond Stop 5, on the Hurd Park loop. For those who are interested, just beyond the picnic ground, at the summit of the road, one of the large diabase dikes that trend quasi-parallel to the Eastern Border Fault, is exposed. It is possible that this dike, and others like it, represent the feeders for the lava flows in the Triassic lowland. Their composition is similar to that of the lavas. Furthermore, the presence of clasts of vesicular basalt in the Triassic Portland formation suggests that lavas were present in the Eastern Highlands during its deposition. The orientation of tilted pipe vesicles in the lavas also indicates an eastern source.

STOP 6. (R-26) Exposures located northeast of the entrance to Hurd Park. Outcrops of the Middletown formation, with numerous sills and cross-cutting dikes of Maromas gneiss, are well exposed here. Although these discordant masses of Maromas gneiss are abundant in the Middletown formation at this locality, they are nowhere found in the Collins Hill formation in nearby areas. Furthermore, the line of cut-off of these discordant masses is parallel to the strata within the Collins Hill formation. Because of the presence, elsewhere, of coarse conglomerate at the base of the Collins Hill formation, and also because of the above-mentioned termination of dikes, it is believed that the Maromas gneiss and older meta-sedimentary and metavolcanic rocks lie unconformably beneath the Collins Hill formation.

STOP 7. (S-30) Hill 366, east of White Mountain, just south of Hurd Park: delineation of the Hubbard Brook syncline using the Hurd Park member (diopside-hornblende rocks)of the Collins

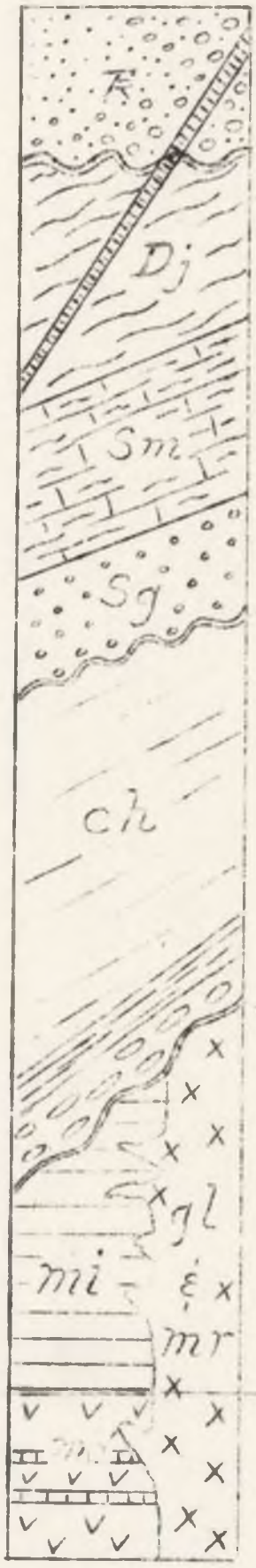
Hill formation as a marker horizon. Minor structural features such as folds, boudinage, mineral lineation, and fracture cleavage are well exposed. The rocks at this locality are in the sillimanite zone of metamorphism. Tracing the Hurd Park member of the Collins Hill formation across the Hubbard Brook syncline proves the stratigraphic equivalence of the sections mantling the Maromas gneiss and the Killingworth dome.

STOP 8. (S-32) This exposure is just west of Alexson Brook, on the road south of Hurd Park: typical exposures of the distinctive anthophylite-bearing and cummingtonite-bearing gneisses and amphibolites of the Middletown formation. Some of the anthophylite here is asbestiform, and is difficult to distinguish from sillimanite.

STOP 9. (F-26) This locality lies along the power line just south of the Hubbard Brook road, about one mile east of Highway 9 in the town of Middletown. The exposure includes the lower, highly-aluminous member of the Collins Hill formation and the underlying rocks of the Middletown formation. The Collins Hill formation is distinctive at this point for the coexistence of kyanite and small clots of fibrous sillimanite believed to have been derived from the alteration of the kyanite. The underlying Middletown formation displays large lensoid masses of epidote. These masses also occur in the Glastonbury gneiss near its contact with the Collins Hill formation, and it has been suggested that they may represent meta-caliche.

STOP 10. (Optional) (H-25) This locality is on the north side of Hubbard Brook road, about one-half mile east of Stop 9. The basal conglomeratic gneiss of the Collins Hill formation, characterized by numerous small quartz pebbles, is well exposed. Flattening of the pebbles within the plane of schistosity suggests considerable distention over the northward plunging nose of the Killingworth dome.

STRATIGRAPHIC SECTION OF MIDDLE HADDAM AREA



Intrusive diabasic rocks (Triassic)

Portland formation: Feldspathic conglomerate and arkose (Triassic)

MAJOR ANGULAR UNCONFORMITY
(also Metamorphic "Unconformity")

Camp Jenkins formation (Littleton): Gray non-rusty garnet-staurolite-binary schist; some platy quartz-sericite schist and quartzite particularly in lower portion (Lower Devonian).

Mine Brook formation (Fitch): Laminar calcareous biotite gneiss, diopside granulite, and schist showing deep pits on the weathered surface due to the solution of calcite marble masses. Rusty weathering aluminous schist in upper part. (Middle Silurian)

Great Hill formation (Clough): Conglomeratic quartzite in the lower portion overlain by well-banded granular quartzite and quartz sericite schist (late Lower Silurian)

ANGULAR UNCONFORMITY

Collins Hill formation: Rusty-weathering graphitic garnetiferous binary schist commonly containing sillimanite and/or kyanite. In its lowest portion this formation commonly contains a basal conglomerate gneiss associated with an overlying well-banded unit, consisting of: fine-grained quartzite, containing manganiferous garnet and cummingtonite; and laminar amphibolite, occasionally containing relatively large garnets. Interbedded calc-silicate bands and fine-grained biotite-muscovite gneiss are increasingly abundant to west. Horizons consist of persistent amphibolites and calc-silicate bands in lower part of formation (Middle Ordovician?).

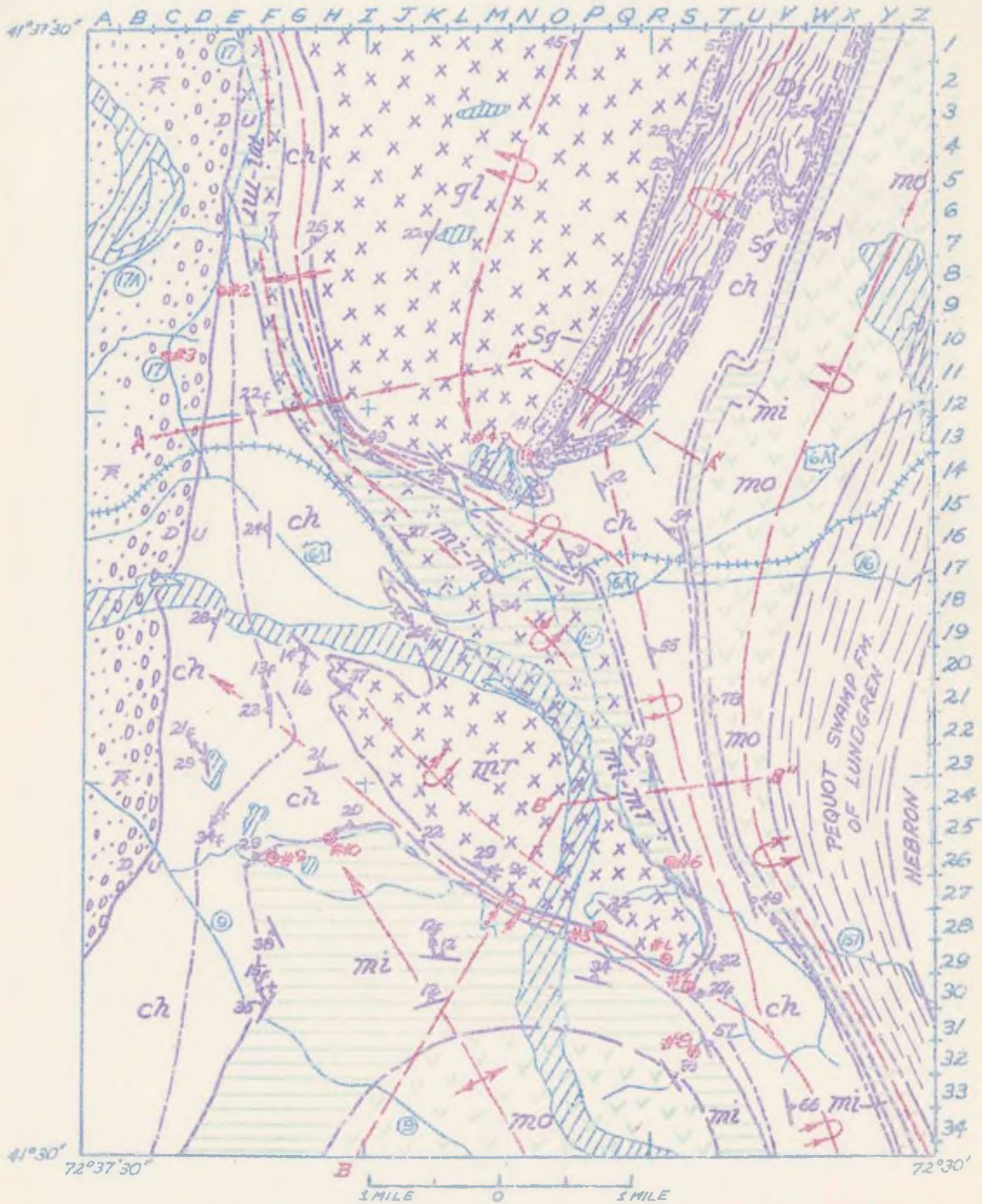
UNCONFORMITY

Glastonbury and Maromas gneisses: Biotite and hornblende granitoid gneiss of probable igneous origin showing intrusive relationships into the Middletown formation and a sedimentary contact with the overlying Collins Hill formation (Lower Ordovician?).

INTRUSIVE CONTACT

Middletown formation: Amphibolites and heterogeneous biotite-oligoclase gneiss, commonly well-banded and characterized by the presence in many places of cummingtonite, hornblende, and anthophyllite (Cambro-Ordovician?)

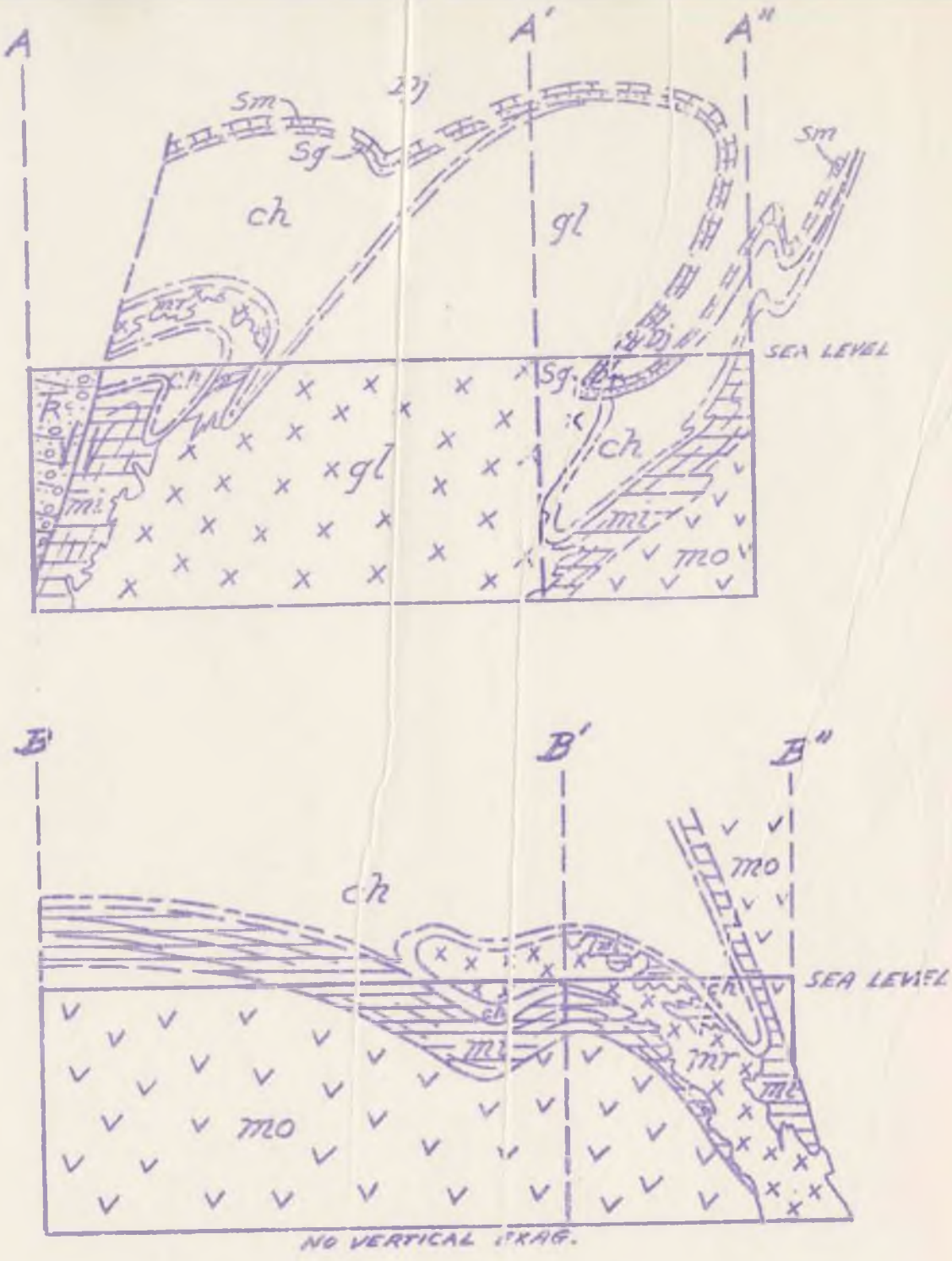
Monson or Haddam gneiss: Well-banded oligoclase-rich gneisses with subordinate amphibolite bands (probably of sedimentary origin). This unit is separated with difficulty from the overlying Middletown formation to which it appears to be related (age questionable; pre-Ordovician?)



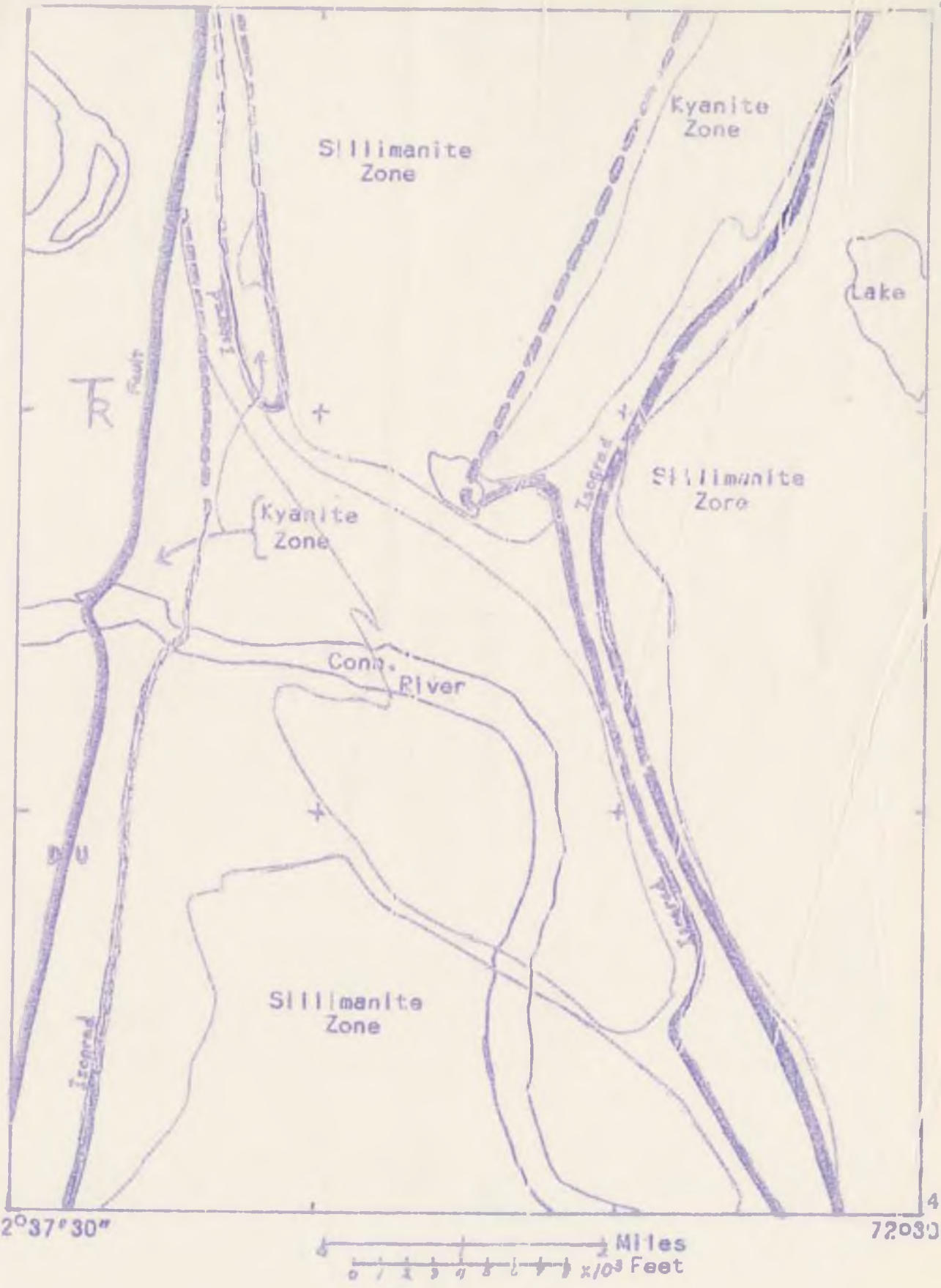
GEOLOGIC MAP OF THE MIDDLE HADDAM QUADRANGLE

By John L Rosenfeld & Gordon P Eaton

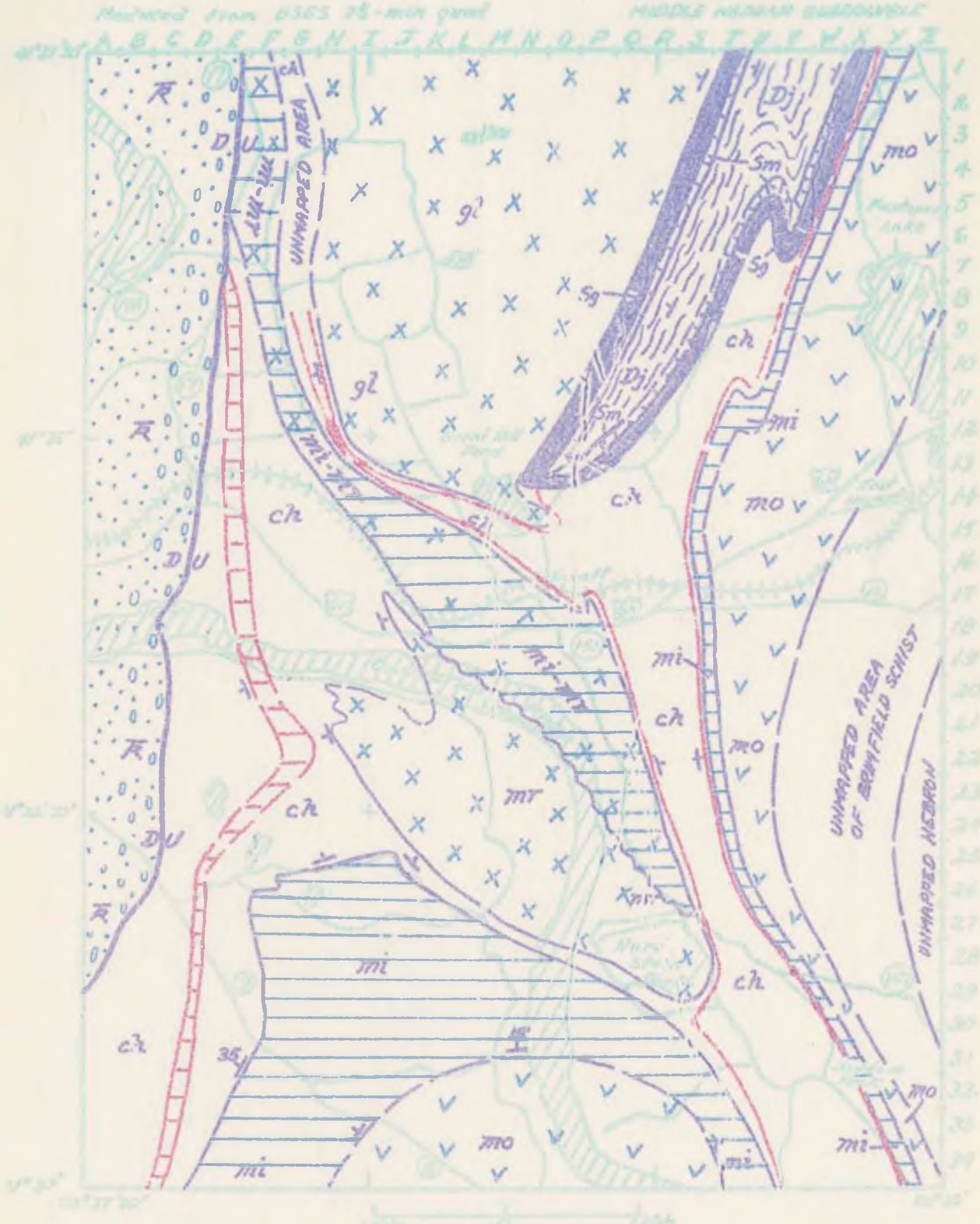
1958



STRUCTURE SECTIONS OF THE MIDDLE HADDAM AREA



Metamorphism
Middle Haddam Area



GEOLOGIC MAP OF THE MIDDLE HADDAM QUAD