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STRUCTURAL GEOLOGY OF WOONSOCKET AND NORTH SCITUATE BASINS

By Henry T. Hall, Brown University

General Discussion

The Woonsocket and the North Scituate basins, about 6 miles west of the Narragansett Basin, are probably of Pennsylvanian age, although conclusive fossil evidence has not been found. Stratigraphically, both basins are formed of coarse Bellingham conglomerate. The pebbles are predominantly quartzite, but some are granite and some are schist. The matrix is arkosic in places and interbeds of sandstone are common. The rocks have been strongly folded so that the pebbles are greatly stretched; the matrix is schistose. Richmond (1952 GQ16) stated that in the Georgiaville quadrangle the intensity of metamorphism increases from the south to the north, in contrast to the southerly increase in metamorphic grade in the Narragansett Basin. Microscopic study of several samples does not confirm this, but rather shows an increase in metamorphic grade to the south.

The Bellingham conglomerate rests unconformably upon pre-Pennsylvanian igneous and metamorphic rocks. The conglomerate may have been continuous with the Pennsylvanian rocks of the Narragansett Basin at one time, in which case they were subsequently eroded from the structurally high areas between the basins.

The geologic structure of the Woonsocket and North Scituate basins is simple in its broad outline, but very complex in detail. Figure 1 is a geologic sketch map of the basins with some stereographic nets showing the macroscopic geometry of the folds. Figure H2 shows two alternative interpretations of the geologic section of the North Scituate basin. Richmond (1952), on the basis of the general easterly dip of bedding, interpreted the eastern border as a fault. Alternatively, the basins could be two large, overturned, infolded synclines.

Preliminary structural work on the Bellingham conglomerate demonstrates the existence of at least two phases of deformation and most probably a third. Figure H3 is a diagrammatic sketch of the small scale structures that indicate the following structural history. The first phase of folding warped bedding (S1) around NE plunging axes (B1), with the formation of an easterly dipping axial plane schistosity (S2), a mica lineation (L1), quartz rods (L2), and stretched pebbles (L3), all parallel to the fold axes. The second phase warped the axial plane schistosity of the B1 folds in an ENE direction with the formation of a new schistosity (S3) and a "crinkly" lineation (L4) which is due to the intersection of the two schistosities. Apparently a third phase folded the first schistosity and the pebbles; it also warped the "crinkly" lineation.

Itinerary

Assemble in First National Store parking lot, 9:00 AM, Sunday, October 6, 1963, Greenville. (Greenville is about 7 miles northwest of downtown Providence along Rt. 44).

- 0.0 First National Parking Lot. Log begins here. Proceed west along Rt. 44.
- 0.9 STOP 1 - West Greenville Intersection. Park at crossroads. Georgiaville quadrangle, GQ16. Outcrop of deformed, pre-Pennsylvanian Metadiorite (?) on south side of road - note aligned plagioclase crystals. Bellingham conglomerate on north side in woods. Tight, isoclinal folds of quartz veins and a fold of bedding with axial plane cleavage - note "crinkly" lineation. Return to Rt. 44 heading east.
- 1.8 Turn left onto Austin Ave.
- 4.0 Turn right onto Mapleville Rd. and turn right again onto Colwell Rd.
- 4.9 STOP 2 - Brown Outing Reservation GQ16. Pass through gate and park in parking lot. Walk around reservoir to creek mouth. Folds of bedding with strong stretching and alignment of pebbles. Chevron folds of vein quartz and a quartz rod structure. Note sedimentary features. Return to Colwell Rd. heading north. Good outcrops of congl. along road.
- 6.7 Turn left onto Rt. 5 - proceed 0.5 miles to junction of Rt. 104 and Rt. 5.
- 9.9 Keep to the right on Rt. 104.
- 12.8 Go under bridge and turn left onto Rt. 146, west.
- 14.6 STOP 3 - Route 146 new road out. Intense stretching of pebbles - average of many readings - 1.0-2.5-13.5. Contact with Blackstone Series at west end of outcrop. Note strong development of "crinkly" lineation, joints and the several small diabase dikes. Exit at west end of outcrop onto Pound Hill Rd. Continue for a few hundred yards and stop on Rd.
- 14.9 STOP 4 - Short Stop. Walk up private road to end of outcrop - localized folds of pebbles. Continue along Pound Hill Rd.
- 15.4 Turn left onto Rt. 146A proceed 0.6 miles to Mendon Rd. Turn right and continue onto Rhodes Ave.
- 17.6 STOP 5 - Rhodes Ave. The pebbles are stretched and fractured. Note attitude of cross-bedding and the relation between bedding and schistosity. On far side of field there are localized folds of the schistosity. Continue on Rhodes Ave. to River St., turn right and cross bridge, stop below Blackstone St.
- 18.1 STOP 6 - Blackstone St. Marble lenses and pegmatite are present which are unusual for Bellingham conglomerate. Note again the folded schistosity with the "crinkly" lineation. End of day's logged trip.

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Fig.-1 Geologic sketch map of the N. Scituate and Woonsocket basins.

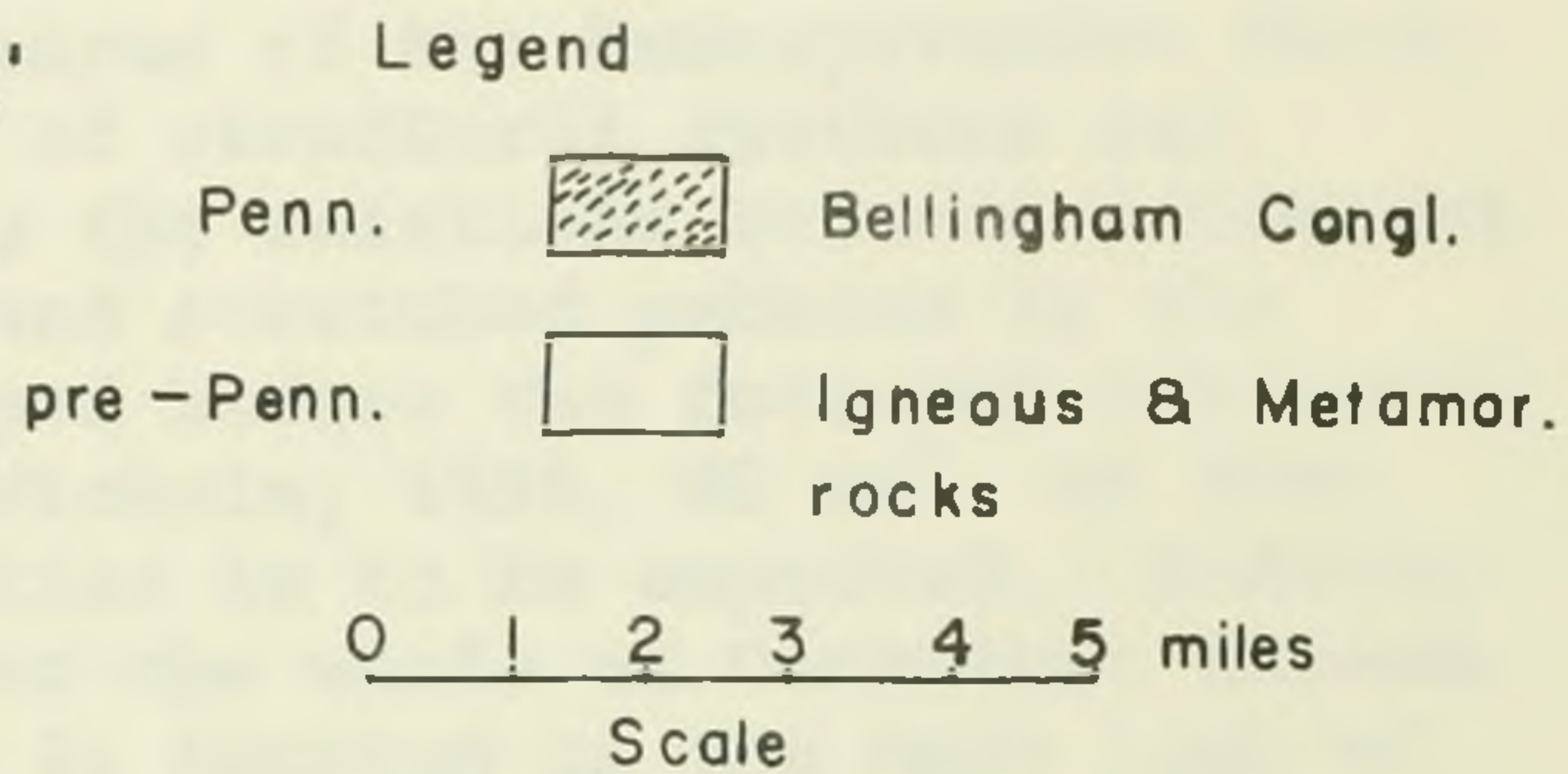
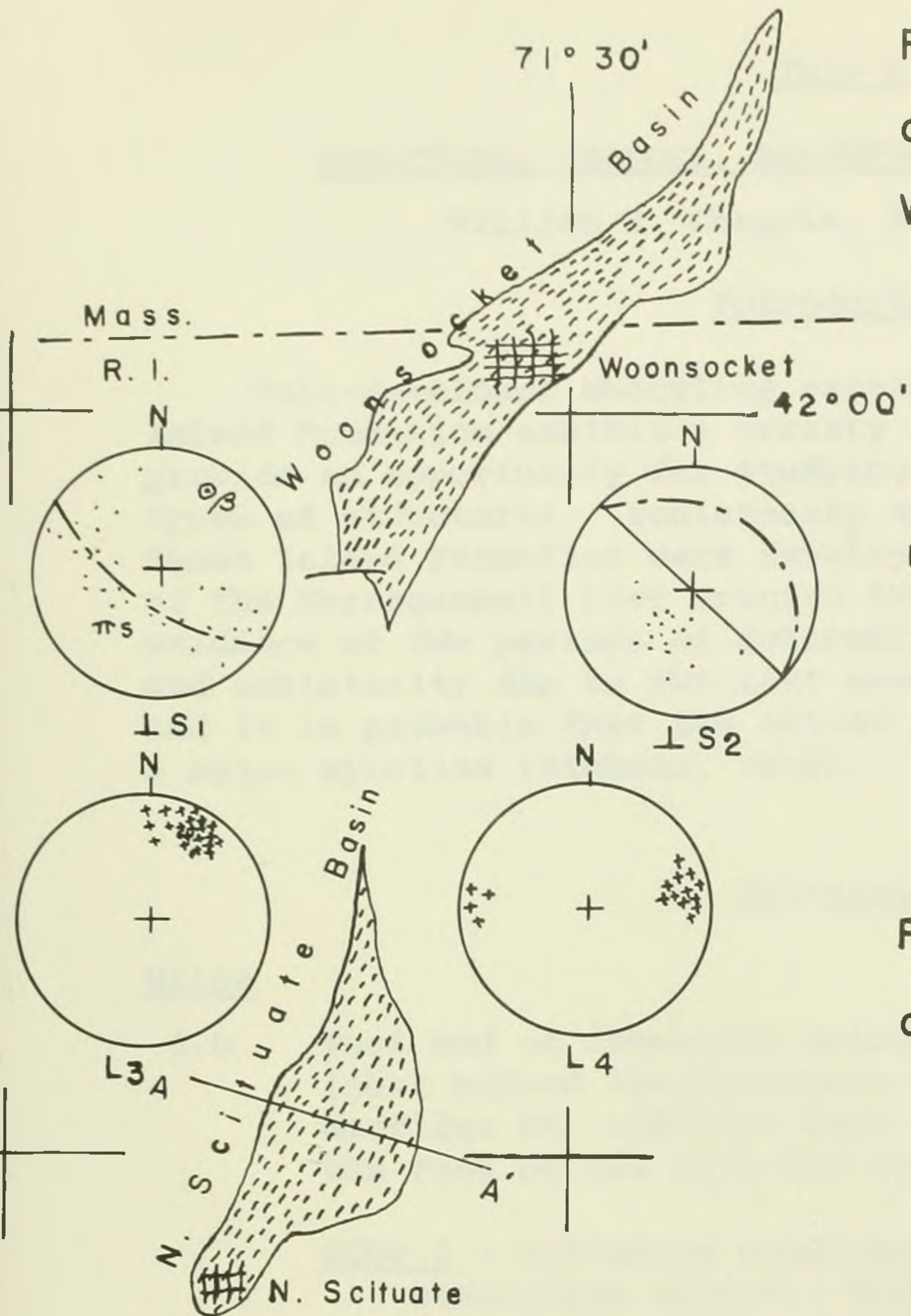


Fig.-3 Diagrammatic sketch of small scale structures.

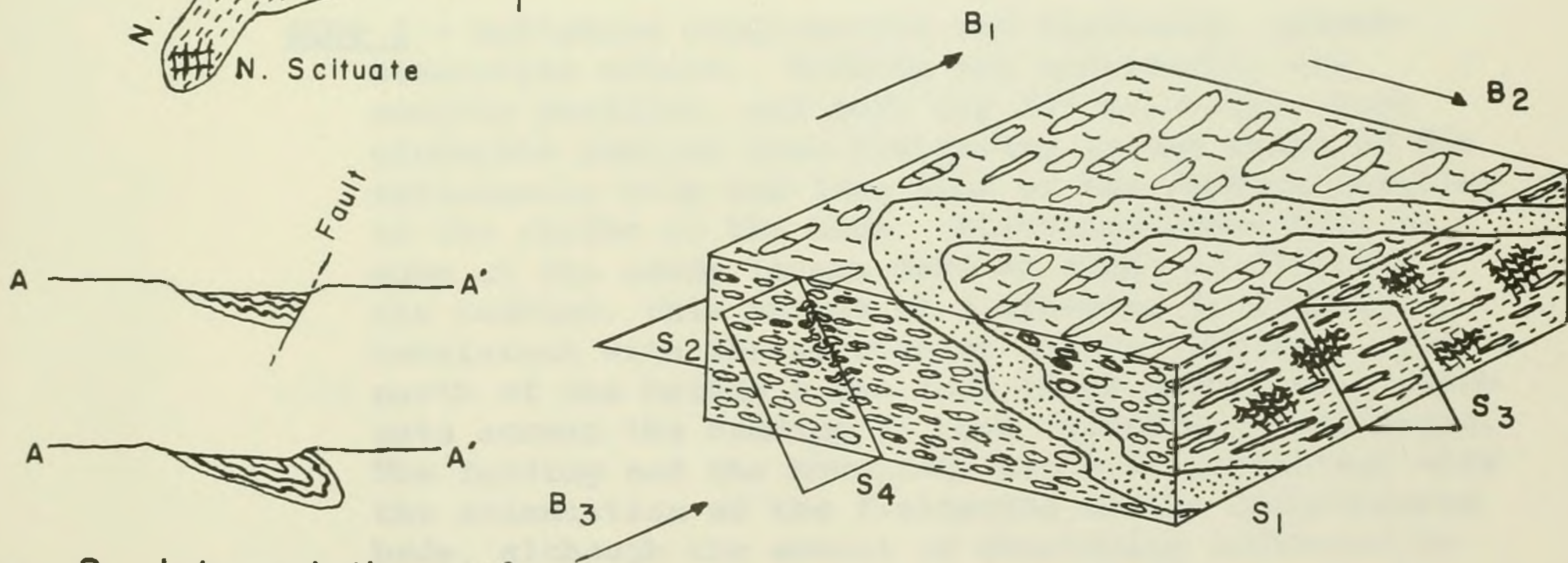


Fig.-2 Interpretations of geologic section.

FIGURES H-1, 2, 3

Geologic structures of North Scituate and Woonsocket basins.