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# Geology of the Machias, Maine 7.5' quadrangle

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REPORT OF 1961 FIELD SEASON  
MACHIAS QUADRANGLE, MAINE

Field work commenced June 23 and was terminated September 15. During that period 62 days (10 weeks) were charged to the Maine Geological Survey of which 4 days were spent on the Maine Field trip to central Maine and 4 days of bad weather were used to compile notes and maps and catalog and pack fossils and rocks for shipment.

Mapping was carried out on 1/24000 scale topographic maps, compilation on the Machias 15-minute quadrangle. The Machias quadrangle has been completed except for Roque Island and its neighboring islands and Cross Island. In addition, several days were spent on reconnaissance in the Columbia Falls, Gardner Lake, and Eastport quadrangles, primarily for the collection of fossils. An interesting and mysterious result of reconnaissance in the Gardner Lake quadrangle was the discovery of a pre-Devonian round-pebble conglomerate that contained scattered pebbles of granite as well as volcanic rocks.

The sequence of latite, quartz latite, tuffs, and bedded marine sediments between the head of Machias Bay and Gardner Lake described in the 1960 report were traced across the Machias quadrangle into the Columbia Falls quadrangle. These rocks represent the Dennys and Edmunds formations of the Eastport quadrangle. Many of the tuffs and flows of the Dennys formation as described by Bastin and Williams for the Eastport quadrangle appear actually to be intrusive felsites and explosion breccias and are not necessarily older than the Edmunds or Pembroke formations.

The Pembroke formation of gray to maroon shales, tuffs, basalt flows and some limestones occupies most of the Machias quadrangle south of Machiasport. It is intruded by gabbro, diabase, felsite, and felsite breccias, and a small body of red hornblende granite. Rocks tentatively correlated with the Eastport formation on the basis of lithology and fossil (amateur) identification occur on Schoppe Point and Schoppee Island.

Pink biotite granite underlies the rounded hills in the northwest corner of the Machias quadrangle.

The structure of the quadrangle is basically a syncline, dips being southerly to about Bucks Harbor and northerly at Starboard Cove and Point of Maine. Dips along the east shore of Chandler Bay are easterly indicating closing of the syncline. This syncline has several minor anticlines and syncline within it and is cut by a number of north-northwest trending normal faults along which the south side appears to be downthrown. Numerous diabase and rhyolitic dike swarms cut all the rocks, except the biotite granite, and closely parallel the normal fault system.

Plans for next summer include checking some areas on the already mapped parts of the Machias quadrangle, mapping Cross Island and Roque and associated Islands, ~~and~~ mapping the southeastern part of the Gardner Lake quadrangle to tie in with the Eastport quadrangle and check out the granite bearing conglomerate, and remapping of the western part of the Eastport quadrangle to tie down better the origin and stratigraphy of the Dennys formation.

Permission has been obtained from Mr. Gardner to land on  
and walk over all of Roque Island.

Introduction

Field work was conducted on the Machias River during the summer of 1907. The purpose was to determine the eastern limit of the Cambrian in order to make a section perpendicular to the strike, to determine the configuration of the area, and sample the rocks.

Geological Position

The Machias River is a part of a complex series of crystalline schists, and is a typical example.

are intruded by numerous small igneous bodies, and are well exposed. The quadrangle is a part of a complex series of schists, and is a typical example.

GEOLOGY OF THE MACHIAS, MAINE, 7 1/2°

QUADRANGLE

plunges gently eastward. The rocks are typical of the regional metamorphism, and are well exposed.

Geological Position: the Preliminary Report by the Department of Geology suggests that the Machias River is a part of the same region.

Pleistocene glacial drift is found in the quadrangle.

Pleistocene marine shells are found in the quadrangle.

Geological Position

The rocks in the Machias River and the Machias River are the oldest in the area.

They are cut by a series of igneous bodies, and are well exposed. Donald Swift, Department of Geology, Johns Hopkins University.

They are cut by a series of igneous bodies, and are well exposed. The rocks are typical of the regional metamorphism, and are well exposed.

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### Foward

Field work was started on the Machias, 7 $\frac{1}{2}$ <sup>o</sup> quadrangle during the summer of 1960. The first summer was spent on the eastern margin of the quadrangle, in order to obtain a section perpendicular to the strike, establish the stratigraphy of the area, and sample its rock types.

### General Statement

The Machias 7 $\frac{1}{2}$ <sup>o</sup> quadrangle consists of a complex series of argillaceous sediments, and acid to basic extrusives. These are intruded by numerous acid and basic hyperabyssal and plutonic bodies. The quadrangle is on the north limb of a synclinorium which plunges gently east-north-east. The area has undergone mild regional metamorphism, and is within the greenschist facies. Comparison with the Silurian rocks of the nearby Eastport quadrangle suggest that the Machias rocks belong to the same system. Pleistocene glaciation has veneered the quadrangle with till. Pleistocene marine clays fill valleys up to the 60 foot contour.

### Structure and stratigraphy

The rocks between East Machias and the Machias river are the oldest in the area. They consist of massive, acid, lapilli tuffs and tuff breccias. Thin lenses of well-bedded sediments are interbedded with the tuff at several points. These dip both north and south, as a result of second order folding. The tuff has been invaded by a hyperabyssal complex of similar composition, composed of a series of <sup>STEELY DIPPING,</sup> lenticular bodies which trend conformable to the regional strike. The bodies are up to a half mile across, and

the complex has a maximum width of one and one half miles.

The most common rock type is a blue-gray, flow banded or massive felsite. Zones of flow breccias are abundant, and are often difficult to distinguish from the tuff country rock. Dikes of feldspar porphyry and intrusive breccia are also present.

A diverse series of clastic rocks outcrop from the edge of this complex at junction of the Machias and East Machias rivers south to Machiasport. The series includes acid tuff breccias, well-bedded basalt tuffs, andesitic tuffs, argillaceous limestone, and red and dark argillites. A unit of basalt flows rests unconformably on this sequence. The sequence dips 40° to 60° southeast. It has been invaded by numerous small gabbro and diabase bodies.

A dark feldspar porphyry outcrops from Machiasport to Machias bay. It resembles the Hyperabyssal complex of East Machias, and like it has regionally conformable flow banding and zones of flow breccia. However, there is some evidence to indicate that it may be a thick pile of flows. Further work will be necessary to determine its origin. West of Machias state park, the southern portion of this unit is intruded by a gabbro pluton three quarters of a mile wide.

The Lower portion of the quadrangle, From Sanborn cove to Bucks Harbor, has a different character. It consists of green to black siltstones and slates with numerous members of maroon slate.



These rocks exhibit ripple marking, cross bedding, and scour and fill structures, indicating deposition above wave base. Fossiliferous horizons are present. Several thin crystal tuff members provide traceable horizons. A gabbro pluton, one and one half miles in greatest diameter, has intruded these sediments in the vicinity of Bucks and Miller Mountain. The sequence is repeated by second order folding. The axis of a second order anticline extends from Birch Point to Narrows Mountain, and the axis of a second order syncline extends from the village of Kennebec to Sanborn cove.

Northwest trending Diabase dikes, Commonly 5 to 10 feet wide, occur throughout the quadrangle.