GEOLOGICAL STUDIES OF THE NORTHWEST ADIRONDACKS REGION

FIELD TRIP GUIDE BOOK

43rd
ANNUAL MEETING
Potsdam, New York
May 7, 8, 9, 1971

THE NEW YORK STATE GEOLOGICAL ASSOCIATION

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Field Trip Guidebook

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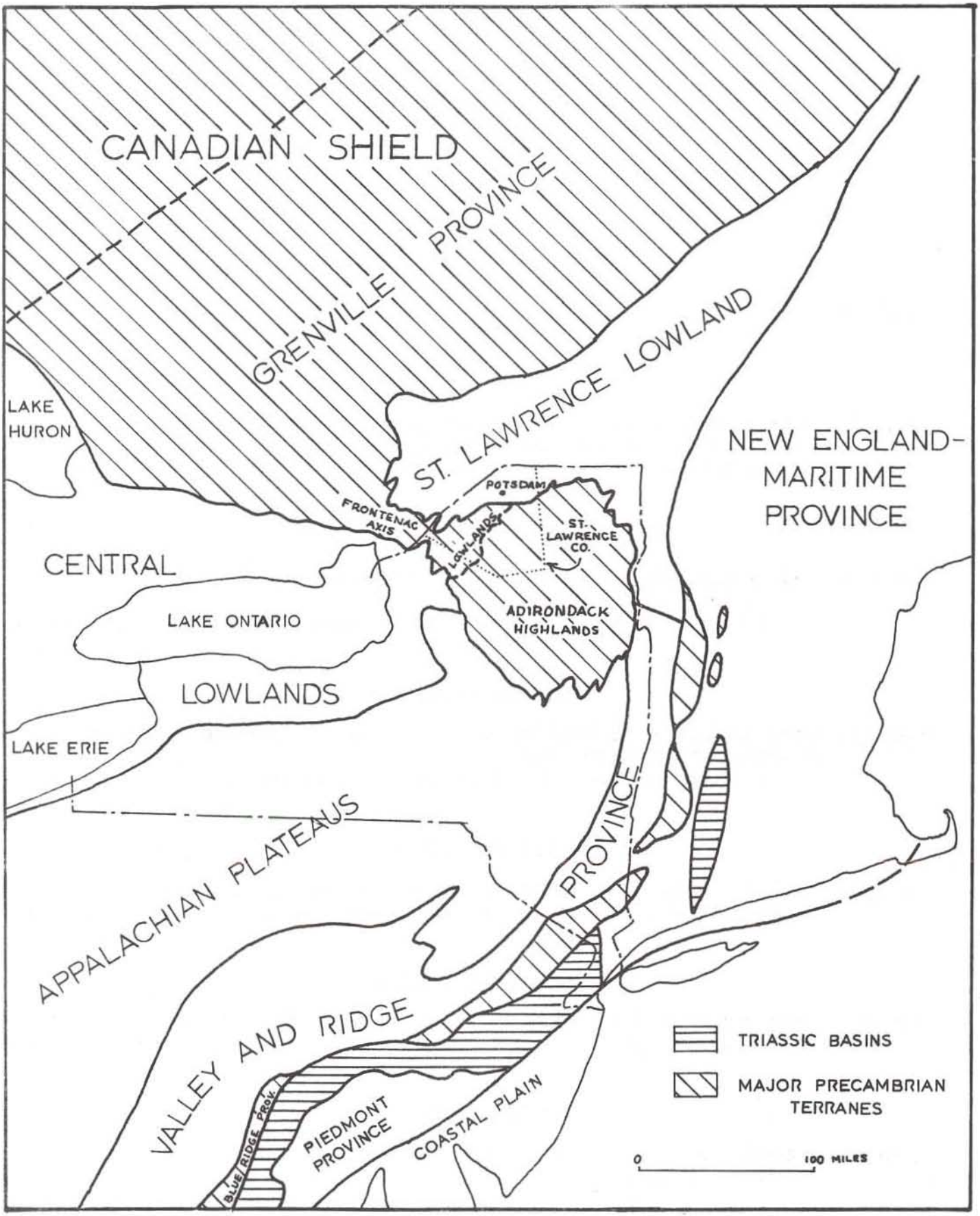
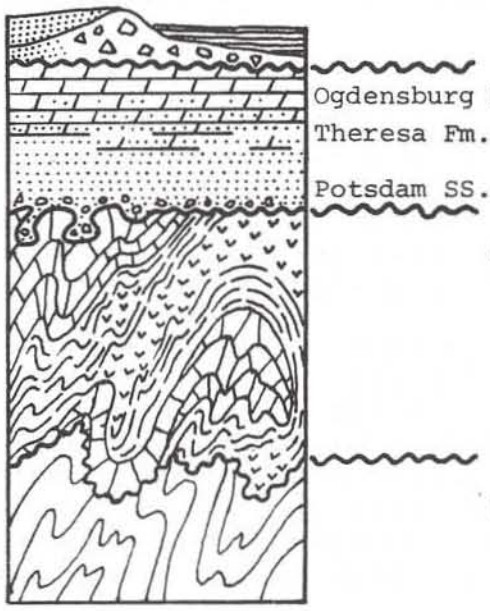


Fig. 1 (Editor's Preface). Location map for Northwest Adirondacks region relative to major physiographic and tectonic provinces. Field trips principally will be in Adirondack Lowlands, the St. Lawrence Lowland and the Frontenac Axis. (Adapted from Broughton et. al. 1962).

PREFACE

On behalf of the Department of Geological Sciences of the State University of New York, College at Potsdam, I extend a most cordial welcome to all participants in the 43rd annual meeting of the New York State Geological Association.

The area to be covered by the six field trips of this guidebook lies in the northwestern part of New York State approximately enclosed by the St. Lawrence River and a line from Alexandria Bay to Gouverneur to Edwards to South Colton to Massena. The area lies entirely within St. Lawrence County with the exception of a small portion of Jefferson County. Regional physiographic and tectonic location is shown in Figure 1 of this Preface. Field trips are principally in the Adirondack Lowlands, the St. Lawrence Lowland and the Frontenac Axis. Major observable rock assemblages of the area are shown in the form of a generalized stratigraphic column in Figure 2. The column may help to orient the visitor to the Northwest Adirondack region.



PLEISTOCENE

Modified drift of all kinds and glacial lakeshore deposits (beach sands, dunes, deltas)

Unconformity

PALEOZOIC

U. Cambrian to L. Ordovician, nearly flat-lying sedimentary rocks.

Unconformity

GRENVILLE

Highly deformed, high grade, largely metasedimentary marbles, gneisses, schists, quartzites, granites, etc.

Unconformity

PRE-GRENVILLE

Complex metamorphic rocks. Source of Grenville sediments.

Fig. 2 (Editor's Preface): Generalized stratigraphic column for the Northwest Adirondacks region. Adapted from Walton and DeWaard (1963), Bloomer and Elberty (1967), and MacClintock and Stewart (1965).

The Adirondack Mountains as a whole are a domical uplift of Precambrian basement rocks lithologically similar to the Grenville Province of the Canadian Shield and connected to the shield by the Frontenac Axis. Rocks of high grade metamorphism are lithologically and physiographically subdivided into a Highlands and Lowlands portion of the Adirondacks. The Highlands are

principally underlain by anorthosites, charnockitic, syenitic, granitic and mixed gneisses, and metasedimentary rocks. The Lowlands are chiefly underlain by tightly folded metasedimentary and metavolcanic rocks with a predominance of marbles and quartz-biotite-oligoclase gneisses. They are characterized by complex, largely plastic folding developed in two principle structural trends probably at different times. The rocks of the Lowlands have been reliably dated at 1100 m.y. which is the timing of the last major metamorphic event (Grenville Orogeny). Trip A will be concerned with this complex and interesting Precambrian terrane.

Sedimentary rocks of the St. Lawrence Lowland to be examined on trip B belong to the upper Cambrian to lower Ordovician Potsdam, Theresa and Ogdensburg formations. These lie unconformably on the underlying Grenville complex and represent shoreline and near-shore deposits of a westward advancing (or eastward retreating) sea. The Adirondack Mountains formed a large peninsula during advance of the early Paleozoic sea and were connected to the mainland Canadian Shield by the narrow neck of the Frontenac Axis. The Precambrian gneissic surfaces of the Adirondack Lowlands were nearly peneplained at that time. Karsts were extensively developed in the marbles and the stage was set for a rather peculiar pattern of patchy sinkhole and valley preservation of sandstone when the region was subjected to later epeirogenic uplift and erosion. Nearly continuous sedimentary units are presently exposed near the St. Lawrence River, and numerous outliers, chiefly of Potsdam Sandstone, occur on the Grenville surface with the number and size of outliers decreasing southward away from the river.

The Adirondack Mountains also served as an impediment to glacial advances in Pleistocene time, and terminal glacial features are extensively developed in the Lowlands as are shoreline features related to the St. Lawrence Embayment, Lake Fort Ann and "Lake Iroquois". The Pleistocene geology of the St. Lawrence Lowland is well known through the work of MacClintock and Stewart(1965). Trip E. will view some textbook examples of drift and ice contact features associated with the Fort Covington (late Wisconsin)glaciation.

Students of mineralogy recognize the international reputation of St. Lawrence County for mineral and crystal collecting. A survey of Dana's Manual of Mineralogy, any edition, reveals frequent mention of the County as a prime collecting site, particularly for silicate minerals of high grade metamorphic origin. Most of the well-known sites are surficially mined out, but good specimens are still to be had. No comprehensive geologic study of this region would be complete without some reference to mineral occurrences, and trip F will show participants four world-famous localities with opportunity for collection and discussion of genesis.

Economic mineral deposits are also abundant in St. Lawrence County and the Adirondack region. Trip D is an important part of the comprehensive geologic study in that participants will visit two of the largest open pit operations in the region, the International Talc Company Mine at Balmat where tremolite (commercial talc) is the principle ore, and the Jones and Laughlin Company's Benson Mine near Star Lake where magnetite/hematite is mined.

Geologists are becoming increasingly aware of the man-oriented aspects of their science, and we thought it appropriate to incorporate a trip dealing primarily with the geologic engineering aspects of the enormous St. Lawrence Seaway project and the somewhat smaller Raquette River power dam project. Trip C is being led by two geologically oriented Civil Engineers from Clarkson College of Technology who have been closely associated with development of these projects.

A word about the guidebook. To aid in correlating trips, the same stop map appears as Figure 1 for each trip description. The major geologic maps, Figures 2 for trips A, B, and E are similarly coordinated and tie in with the stop map. Drawings rather than photographs are used to cut costs. A number of roadcut "maps" have been drawn directly from panoramic photographs (30 for the Rock Island roadcut).

This guidebook, with one exception, has been written by local geologists and engineers from the State University of New York College at Potsdam, St. Lawrence University and Clarkson College of Technology. The one exception is Dr. George Theokritoff of Rutgers University, who, however, was formerly at St. Lawrence University. Some of what is presented here represents original work by the authors, but much of it is drawn from the literature. In any case, it is the result of an enormous amount of cumulative effort, and, as Editor, I would like to express my sincere thanks to all contributors. For the most part, they have done their own editing, thus reducing the professional contributions of the Editor to a minimum.

We are also grateful for the assistance of the following individuals and departments: Dr. Thomas M. Barrington, President of the State College, for use of campus facilities; Dr. Robert E. Johnson, Director of Continuing Education, for organizational help; Mrs. Judy Moriarty, Mrs. Judy Fairbridge and Mrs. Lorraine Richards,for typing; the duplicating departments of the State and Clarkson Colleges, for printing; geology students at State, for collating and; the Learning Resources Center at State, for help in the cover layout.

My personal thanks go to Dr. Harold M. Bannerman for his generous contribution of field data in the area of the Rock Island roadcut.

Bradford B. Van Diver
Editor

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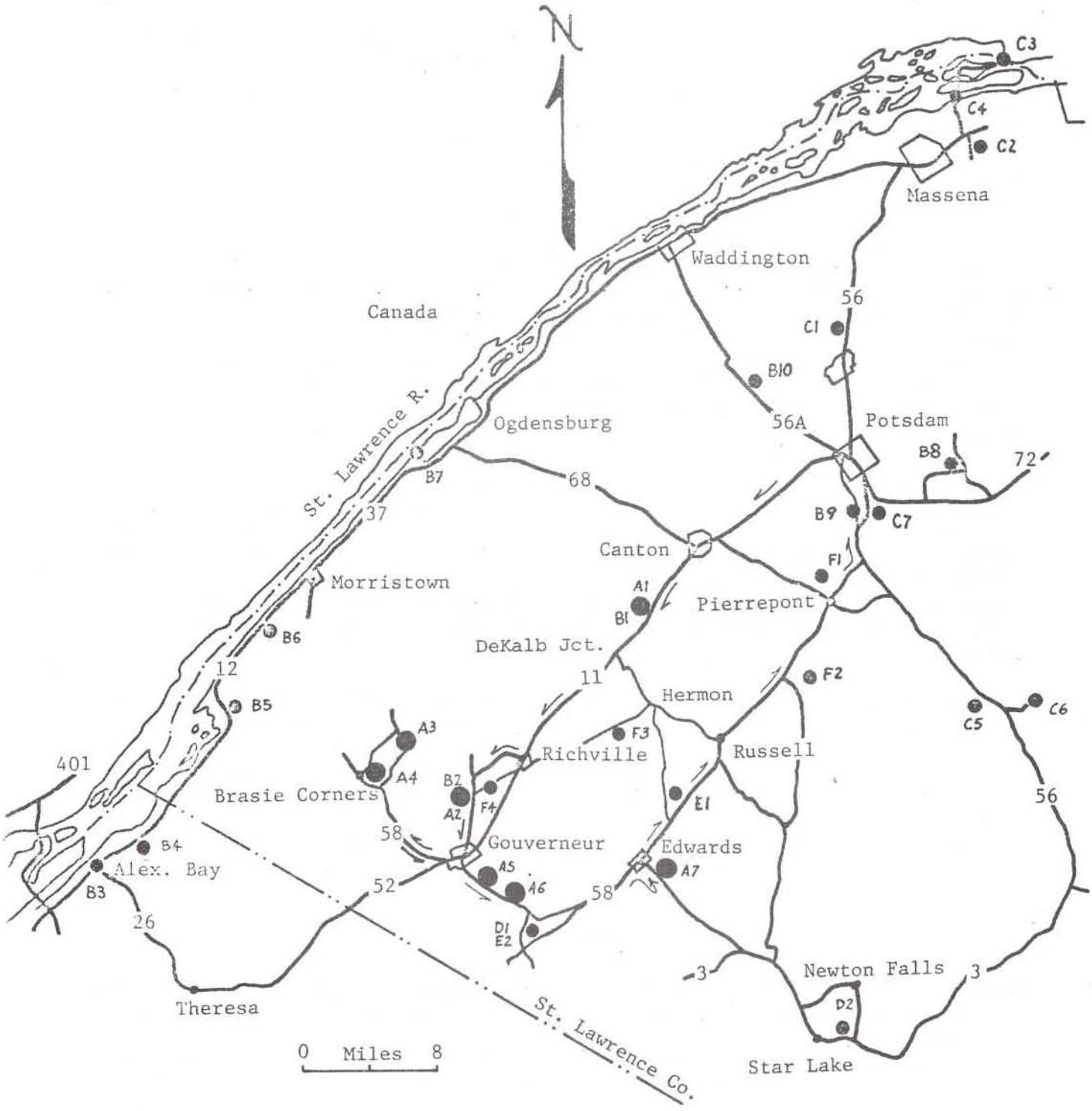

Figure 1. STOP MAP FOR TRIP A

Large dots indicate stops for this trip
and arrows show route.
Stops for other trips in guidebook
are indicated by smaller dots.