

INTRODUCTION

PURPOSE

One of the chief problems associated with the Appalachian Geosyncline is the nature of its southeast margin. Throughout eastern United States, the rocks representing this portion of the geosyncline are buried beneath the sediments of the coastal plain and the continental shelf. Nova Scotia exhibits the easternmost outcrops of the older Paleozoic rocks in continental North America and, hence, is the best area in which to study the southeastern side of the geosyncline.

With the exception of the Silurian at Arisaig, the older Paleozoic of northern Nova Scotia had not been previously studied in detail. The present investigation was undertaken to extend knowledge of the Silurian into neighboring eastern Pictou County. In addition, the stratigraphic relations of the Silurian to the underlying and overlying rocks, unclear in the Arisaig area, were to be studied.

During the time that the present investigation was underway, Charles Hickox (1958, unpubl.) completed a study which included the older Paleozoic of the Annapolis Valley. During this time, Boucot, Gross, and Hickox began a detailed study of the Silurian and Devonian rocks at Lochaber Lake, in Antigonish County. In the same county, Boucot, Griffin, and Fletcher (1959) investigated the older Paleozoic rocks at Cormorant Cliff Cove and School Brook Cove, on Cape George. In addition, Boucot, Zeigler, and Hickox have begun a more detailed study of the Silurian at Arisaig. With the exception of the volcanics (Zeigler, 1958, unpubl.), this work is still incomplete.

These related investigations, together with the present study, provide a basis for determining the regional pattern of deposition in the Silurian and Devonian sedimentary rocks.

Faunal lists and maps are on file at the Nova Scotia Dept. of Mines, Halifax.

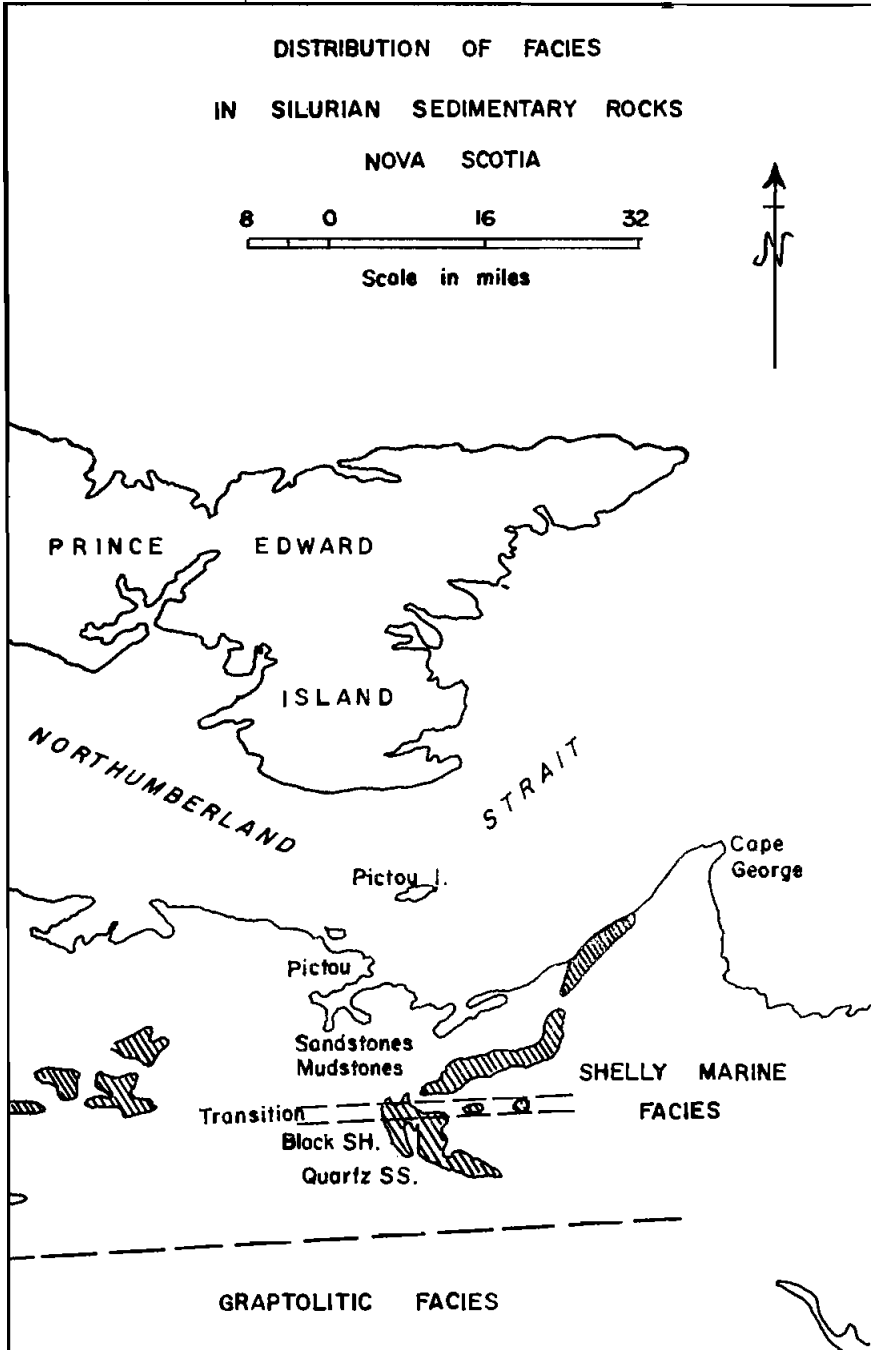


FIG. 1

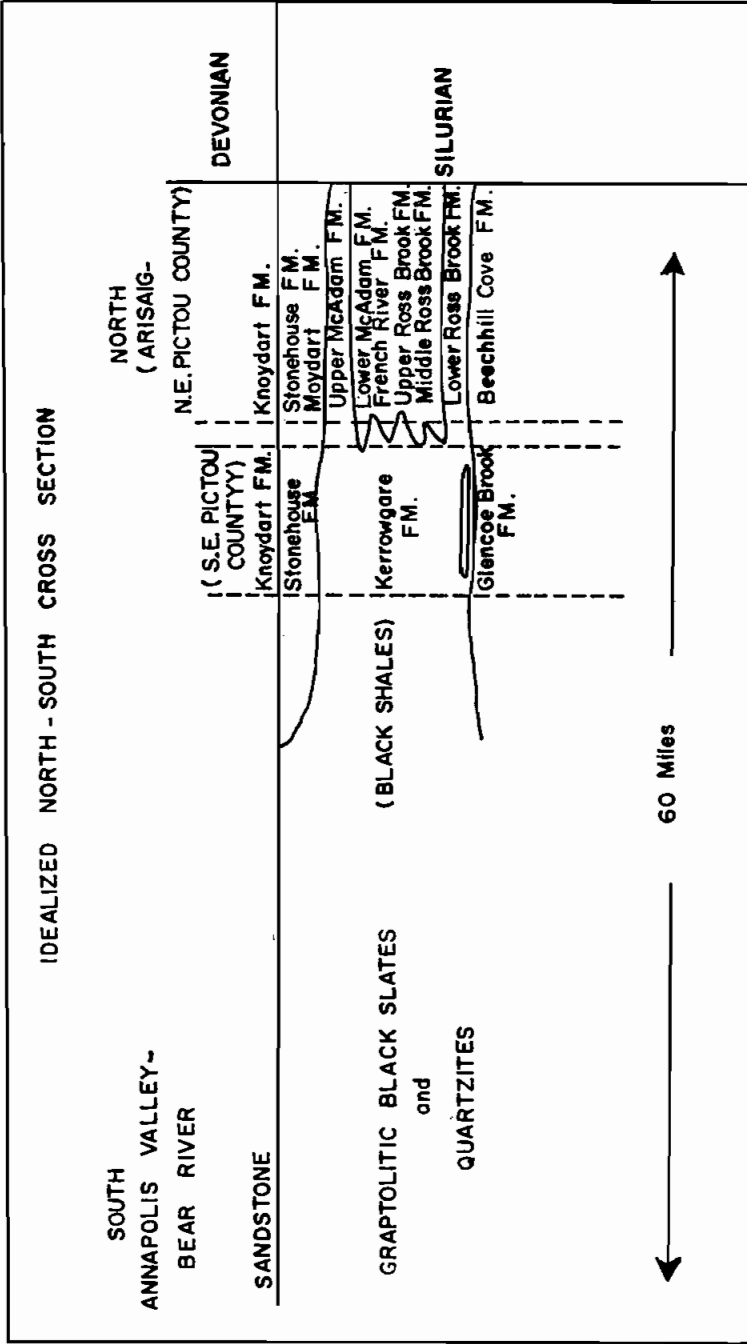


FIG. 4

PREVIOUS WORK

The earliest published geological work on the older Paleozoic of Pictou County was by Jackson and Alger (Jackson and Alger, 1829), which made mention of the iron ore on the East River of Pictou. This iron ore of the East River of Pictou was also described by R. Brown in Haliburton's *History of Nova Scotia*, in 1829. The rocks of this area were reported as Silurian in 1845 by Dawson, who also noted similarities to the Arisaig section (Dawson, 1845). A number of references are available, representing work done in this area in the nineteenth century. The only extensive investigation was the reconnaissance geology done by Fletcher during the last quarter of that century (Fletcher, 1886, 1892).

Following this, no further work was reported until Hayes (1916) reported on a single outcrop and Bell (1940) examined a few outcrops of the older Paleozoic rocks bordering the Carboniferous Pictou basin that he was studying (Bell, 1940).

In addition, some of the more detailed work done at Arisaig in Antigonish County (Twenhofel, 1909, Williams, 1914, McLearn, 1924) is relevant to the problems in Pictou County. Finally, the Nova Scotia Department of Mines (Messervey, 1943, Weeks, 1948) published descriptions of the long-closed Bridgeville iron mines and the geology of the immediate area.

The earliest workers (Jackson and Alger, 1829, 1832, Gesner, 1836) reported only that slates and graywackes of considerable age were present. Gesner (1836, p 59) and Honeyman (1860) reported some of the common fossils, and considerable mention was made in the literature of the iron occurrences. Of the numerous references available¹ only Gesner (1836) and Gilpin (1879) gave information of geologic use.

No structural information was reported, other than occasional attitudes of beds. No stratigraphic subdivision was attempted, although Honeyman (1860) recognized that the outcrops along Rte. 4 correspond to some of the lowest beds at Arisaig (now middle Ross Brook formation). Dawson (1875 p 129) noted that slates overlie quartzites in the East River of Pictou area, and later (Dawson, 1881) wrote of two stratigraphically distinct horizons of iron ore, and listed fossils collected. Gilpin (1880) had also mentioned two horizons of iron ore.

¹Brown (1829), Dawson (1860, 1881), Gesner (1836), Gilpin (1880), Harrington (1874), Hartley (1869), Honeyman (1870, 1872, 1880), Jackson and Alger (1829), Poole (1872, 1874, 1875, 1876, 1877).

Fletcher (1886) provided a map of the distribution of rock systems with no further subdivisions in the older Paleozoic, with the exception of his "Lower Helderberg". This did correctly suggest that the youngest beds are mostly at the western end of the outcrop of the older Paleozoic, although incorrect as to age and detailed distribution. His work on the whole is reliable, although he never recognized the presence of the Devonian Knoydart formation in Pictou County. He also reported some of the good fossil localities. In view of the large area covered, it is not surprising that the map is faulty in some details of the distribution of rock types or units.

In the course of mapping the Pictou Basin, Bell (1940) examined a few outcrops of older Paleozoic rocks. Fossils collected from some of these outcrops were sent to F. H. McLearn. Their identification indicated the presence of rocks of the Beechhill Cove and Ross Brook formations.

Weeks (1948) suggested that the Bridgeville iron deposits represent an ancient laterite, formed on the surface of the Silurian sedimentary rocks prior to the deposition of the upper Windsor limestone.

GENERAL GEOLOGY

Rocks of two general ages are present in eastern Pictou County. Devonian, Silurian, and older non-fossiliferous rocks are found in the central part of this area. To the north, west, and south are rocks of Carboniferous age.

The older Paleozoic rocks are present in a sequence at least 15,000 feet thick. This sequence extends from the lower Devonian to the lower Silurian, plus a thick non-fossiliferous section below. No angular break is present in this sequence. With the exception of the non-marine Devonian sedimentary rocks, this succession is composed of volcanic and marine sedimentary rocks.

To the north, the two major stratigraphic divisions are separated by an extensive normal fault. To the southwest, the older Paleozoic rocks are overlain unconformably by the upper part of the Mississippian Windsor Group. To the west, this same unconformity has been the locus of relatively minor normal faulting.

To the south is present part of an east-west trending belt of quartzites and argillites. This belt extends from Guysborough County on the east, through Pictou County to Colchester County on the west. A few fossils found near the eastern end indicate that these rocks are of the same age as the Mississippian Horton Group, although of different lithology.

The contact between this belt and the older Paleozoic rocks is hidden beneath swampy ground in the upper reaches of the valley of the East River of Pictou and lies under rocks of the Windsor Group farther downstream in this valley.

The Carboniferous rocks to the southwest, west, and north are predominantly non-marine clastics, but include limestone and gypsum in the Mississippian Windsor Group and coal in the Pennsylvanian Stellarton Series.

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