

coloured, bituminous and compact, with partings of dark brown or black argillaceous shale. This formation is particularly rich in organic remains, both of corals, shells and trilobites, and the area between the Ottawa and St. Lawrence, occupied by it, is estimated at over 600 square miles. The total thickness of this formation as developed in the lower Ottawa basin is not far from 650 to 700 feet.

The Utica and Hudson River (Lorraine) formations constitute the upper members of the Cambro-Silurian system. While having their greatest development in the St. Lawrence valley, they also appear at several points in the Ottawa basin. The rocks of the lower division, or the Utica, are usually black brittle bituminous shales with thin bands of yellow-weathering limestone. The formation is thus lithologically distinct from the underlying Trenton. The thickness as given in the typical section at the Montmorency Falls, below Quebec, is 318 feet, but this thickness must be greatly reduced for the deposits in the Ottawa basin where it will probably not reach one hundred feet. There is no defined break between the strata of the Utica and those of the Lorraine, the passage being apparently continuous, through the replacement of the dark bituminous beds by grayish shales and sandstones and by an almost entire disappearance of calcareous matter. The thickness of the upper division is placed at 719 feet in the St. Lawrence section, but as in the case of the Utica this must be also very largely reduced for the western area. The only known outlier of the Lorraine to the southeast of Ottawa is represented by a very thin series of beds, probably not more than thirty or forty feet in so far as yet observed.

The formations just described for the lower Ottawa area complete the Cambro-Silurian series; but as already intimated, in the townships of Osgoode and Russell, certain reddish shales and sandstones<sup>1</sup> occur which overlie the Lorraine, and presumably represent the Medina division of the Silurian. No fossils have yet been found in these newest outliers; and owing to the great mantle of drift with which they are surrounded, and for the most part concealed, their thickness cannot be ascertained.

In order to complete the series of Paleozoic formations which occur in the area now being discussed we may here refer to the peculiar outlier of Niagara rocks which occurs near the upper end of Lake Temiscaming. A description of these is given in the *Geology of Canada*, 1863, from which we learn that the formation lies unconformably upon the sandstones (quartzites) of the Huronian of that district. The lower part of the outlier is generally arenaceous, and very often a conglomerate, containing large boulders of the underlying rock. Mr. A. E. Barlow, who has recently studied these rocks, describes them as occurring on both sides of the lake as well as on Chief's Island and on several smaller islands near by. The base of the deposits is said to "consist of vast boulders and

<sup>1</sup> *Geology of Canada*, 1863, p. 219.