

been divided in two lesser groups, called the Upper and the Lower, or more recently into the Upper, Middle and Lower Silurian. Their united thickness in Wales has been estimated at about seven thousand feet. On this continent they attain much greater thickness. They constitute with one known exception the most ancient of all fossiliferous groups of rocks. During the period of the deposition of the Lower Silurian rocks the sea would appear to have presented an aspect of tranquillity, for we generally find their strata to preserve great horizontality, and to exhibit many of the characteristics of quiet and undisturbed progression. Some of the layers are beautifully ripple marked, as you may see from this specimen which was procured from the cliff near the New Garrison. Many of the vegetables they entomb seem to have been fossilized in the spot where they grew, and the casts of shells in the soft horizontal shales, which are found abundantly in this neighbourhood, exhibit minute markings when examined microscopically, in an admirable state of preservation.

The Lower Silurian rocks consist of several formations of considerable thickness which lie one over the other, and are the representatives of extensive periods which elapsed during their deposition. They are grouped because they contain in common certain species of fossils, but their order of superposition exhibits their relative ages, and their enormous thickness affords us a vague idea of the immensity of the duration of the period of which they are the record. In Western Canada the formations which are analogous to those of the Lower Silurian group in Britain, contain the subjoined subdivisions:—

PRIMARY GRANITE.

1. Trenton Limestone.
2. Utica Slate.
2. Loraine Shales, (Caradoc Sandstone.)

In the State of New York, and in some parts of Eastern Canada, and the eastern part of Western Canada, rocks older than the Trenton Limestone are to be found. It may be useful to mention the names of these rocks in order to establish the position of the Loraine Shales. The series would then be as follows:—

PRIMARY GRANITE.

1. Potsdam Sandstone.
2. Calciferous Sandstone.
3. Chazy Limestone.
4. Birdseye “
5. Black River “
6. Trenton “
7. Utica Slates.
8. Loraine Shales or Hudson River group.

From the foregoing table we are to understand that the Potsdam Sandstone is the earliest, and consequently the lowest fossiliferous strata found in this country,—or as Mr. Hall states* “as having been produced at the dawning of the vital principle upon our planet; nothing which bears the semblance of having been organic is yet known in strata of anterior origin.”

After the deposition of the Potsdam sandstone the Calciferous sandstone occurred, then the Chazy, Birds-eye, Black River and Trenton limestones were slowly accumulated one above the other, each entombing an infinite multitude of the denizens of the seas in which they were deposited. After these came the Utica Slates, and then the 1,000 feet thick Loraine Shales were slowly, and probably peacefully piled up over a vast extent of the earth's surface.

The Hudson River group or Loraine Shales is the rock to which we must refer the strata which are exhibited at the Garrison Common. Mr. Murray, the Assistant Provincial Geologist, observes in the admirable Geological Reports, that the Loraine

Shales “compose the substrata of the whole country on the shore of Lake Ontario, between the River Rouge, in the Township of Pickering, on the East, and the River Credit, in Toronto Township, on the West, and sections of them may be seen in almost all the streams that intervene between the one point and the other.”

“The estimate I (Mr. Murray) have made of their thickness brings it to 1,110 feet. How near this may approach the truth is difficult to say, but the result of such evidence as I have had it in my power to collect being still in favour of supposing the dip to be at about the rate of thirty feet to the mile, it is probable that the figures given constitute a tolerable approximation.”

That the Loraine shales belong to the Lower Silurian group of Sir Roderick Murchison we have the subjoined authority of Mr. Hall.

“Commencing at the lowest rock known to contain fossils, we find the most important change in the typical forms to occur at the termination of the Hudson River group, (Loraine Shales) which is marked by a coarse sandstone or conglomerate, beyond which scarcely a single species has prolonged its existence. This point must be considered as representing that Horizon which in Great Britain is the termination of the Lower Silurian deposits. We never find, however, in the succeeding groups, a mingling of the fossils of the Lower and Higher rocks, which is regarded as taking place in England and Wales, where the strata are much disturbed. (Hall, Palaeontology of New York.)

The Lower Silurian period and its relative distance in time from the present epoch, may be represented by the following table of the thickness of deposits which have accumulated since its termination; that is, since the time of the layers of sandstone and shale which we see at the Garrison Common beach:—

Rocks of the Modern or Cainozoic period.	} feet	{ 1800 } Containing a small number of fossils identical with existing species.
Rocks of the Middle or Mesozoic period.	} feet	
Rocks of the Ancient or Palaeozoic period.	} feet	
		{ 5100 } Containing fossils belonging altogether to extinct species.
		{ 21,000 } Containing fossils belonging not only to extinct species but also often to extinct genera and families.

Above the Loraine Shales we find an aggregate of fossiliferous strata having a thickness exceeding 26,000 feet, or five miles, not represented at Toronto, but which are nevertheless illustrative of that immense period which has endured since the formation which underlies the Drift upon which Toronto is built, was slowly and perhaps tranquilly accumulated.

The relation of the Drift and Loraine Shales may be familiarly shown by dividing a line into thirty equal parts, and numbering them 1, 2, 3, 4, 5, &c., the position of the drift would be approximately represented by the 1st division, the Loraine Shales by the 26th division, and the true Coal Measures by the 15th division. From the 27th division to the thirtieth, we should have the rocks which were formed before the Loraine Shales and the probable dawn of life upon the surface of the Globe. It is an important question in this country to ascertain the relation which exists in time between the true coal measures and the Loraine Shales; this may be roughly and generally represented by a series of formations; having a thickness of 12000 feet, which we may suppose to be placed between the uppermost layer of the Shales and the lowest stratum of true coal. And further, if we assume that the vast Devonian group has no representative in

* Palaeontology of New York.