

*Lyelli* from the Lower Carboniferous Limestone of Nova Scotia, I have reluctantly been obliged to place *M. de Verneuil's* species among the synonyms of *P. Cora*, the latter name (as may be seen by the list of synonyms above given) claiming three years' priority. All the Nova-Scotian specimens I have been able to examine were small, not exceeding about 11 lines in length by some 12 or 13 in width. But it must be remembered that, as a general rule, the Nova-Scotian species and specimens, although adult, are small, and in this respect are exactly similar to those we find in Scotland. The surface is covered with numerous longitudinal, straight, or slightly flexuous, narrow, thread-like, rounded striæ, with sulci, or interspaces, of rather less width; smaller striæ are also here and there intercalated between the larger ones. The ribs are also regularly and closely crossed by small concentric lines.

*P. Cora* is a widely spread Carboniferous species, having been found in many parts of America, India, Europe, &c.

Sir C. Lyell found this shell at Windsor, Horton Bluff, Shubenacadie, Gay's River, Minudie, and Cape Breton, in Nova Scotia. Dr. Dawson states that it occurs almost everywhere—at Pugwash, on the eastern coast of Cumberland, at Lennox Passage, Mc'Kenzie's Mill at the eastern extremity of Wallace Harbour, &c.

#### EXPLANATION OF PLATE IX.

- Figs. 1, 2, 3. *Terebratula sacculus*, Martin.  
 „ 4, 5. *Athyris subtilita*, Hall.  
 „ 6. *Spiriferina cristata*, Schlotheim.  
 „ 7, 8. *Spirifera acuticostata*, De Koninck.  
 „ 9, 10. *Spirifera glabra*, Martin.  
 „ 11, 12. *Camarophoria*? *globulina*?, Phillips.  
 „ 13, 14. *Rhynchonella Dawsoniana*, n. sp.?  
 „ 15. *Rhynchonella* (undeterminable).  
 „ 16. *Rhynchonella Acadiensis*, n. sp.?  
 „ 17. *Rhynchonella* (undeterminable).  
 „ 18. *Strophomena analoga*, Phillips.  
 „ 19. *Streptorhynchus crenistria*, Phillips.  
 „ 20, 21. *Productus semireticulatus*, Martin.  
 „ 22, 23. *Productus Cora*, D'Orbigny.

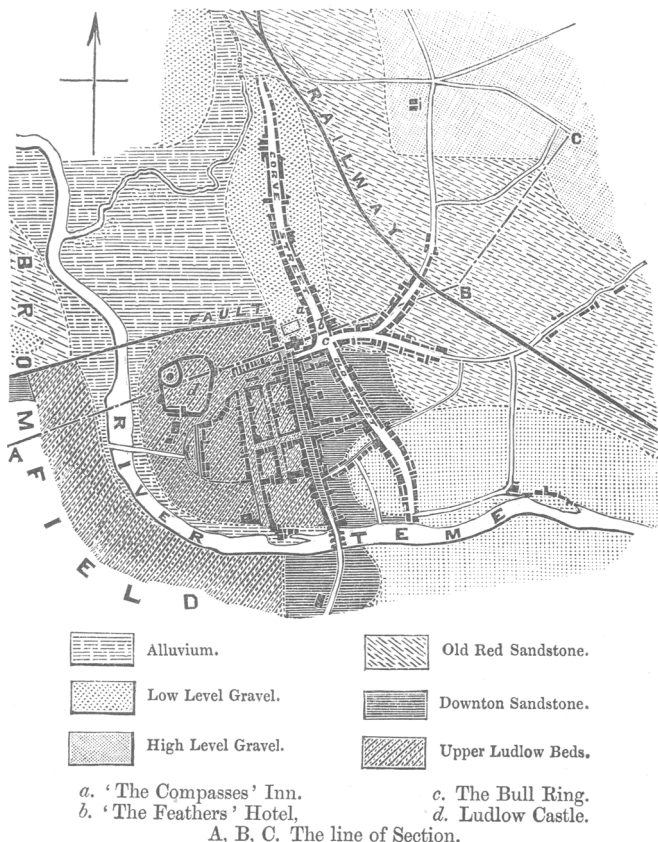
#### 2. On the GRAVELS and other SUPERFICIAL DEPOSITS of LUDLOW, HEREFORD, and SKIPTON. By T. CURLEY, Esq., C.E., F.G.S.

THE plans and geological sections which I have now the honour to lay before the Geological Society are those of three towns recently drained by me, namely, Ludlow, Hereford, and Skipton.

*Ludlow.*—The Upper Ludlow rocks are, in my opinion, thrown up against the Old Red Sandstone by a fault running east and west, and taking the line of the Old Town ditch, below the Church and the Castle, as marked on the plan (p. 177). The relations of the intermediate “passage-beds,” which connect the Silurian and Old Red systems, and are so well developed in the immediate neighbourhood of the

town, have been rendered tolerably clear by the researches of the Ludlow geologists, and by the discoveries made during the progress of the drainage-works. Upon these "passage-beds" and the underlying Downton Sandstone the town is mainly situated. The overlying Old Red Sandstone is well seen in the line of the section in the railway-cutting. The Downton Sandstone, about 80 feet thick at Ludlow, has been generally included in the Silurian rocks: it is a yellow micaceous sandstone, very similar in composition to the Caradoc, from the denudation of which it has, most probably, been derived. But few organic remains occur in it at Ludlow, the principal being the Fishes—*Pteraspis* and *Cephalaspis*,—with the Crustaceans—*Eurypterus*, *Pterygotus*, and the small *Beyrichia*. Above this rock is a very hard, greenish, micaceous sandstone containing lime, much resembling an Old Red Cornstone in mineral composition. The Bull Ring is situated upon this rock, and no doubt owes its present relative altitude to the hardness of this sandstone and its capability of resisting denudation. Above it are several thin beds of sandstone, in which nothing organic has been found. Next occurs a greenish micaceous sandstone, containing *Cephalaspis*, *Langula*, &c. We then come to the "Olive Shales," which are thin argillaceous beds, easily broken, and containing layers and thick masses of fossils. Several species of *Pterygotus* and *Eurypterus*, and spines of *Onchus* have been found. A thin sandstone-band forms a capping to these olive shales, and underlies a bed of Old Red marl about 80 feet in thickness. On the top of this marl, N.E. of Ludlow, is situated the high-level gravel, in a bed about 30 feet in thickness. The rain-water, falling on this gravel-bed, percolates through it, and issues forth as a spring. Very nearly the whole of the sand and gravel here deposited is composed of Old Red Sandstone debris. The inclination of the sand-belts and their thinning-out towards the east, in this drift, indicate the direction of the current which brought this gravel to the lake in which it was deposited to have been from the westward. It is probable, therefore, that, prior to the deposition of this gravel, the Silurian rocks, which now form the entire area of the district west of Ludlow, were masked to some extent by Old Red Sandstone, since removed by denudation.

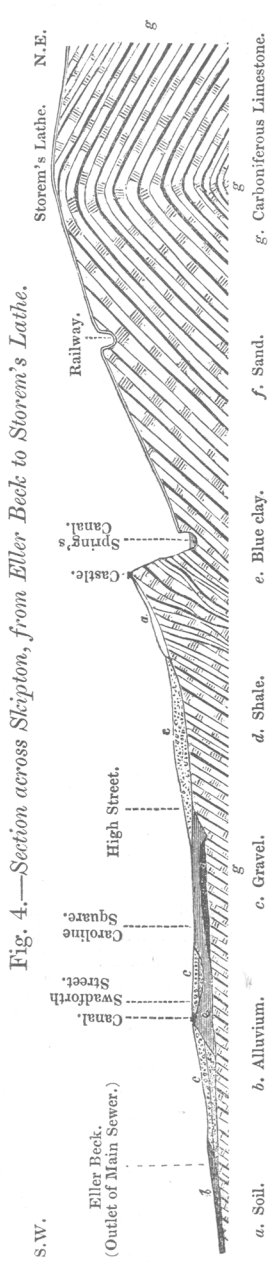
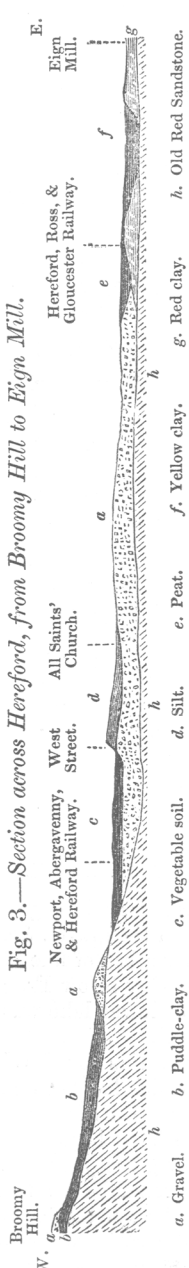
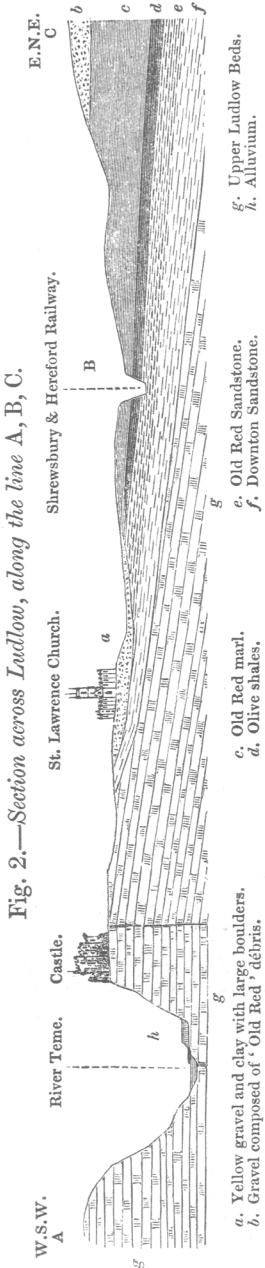
By subsequent denudation, and an alteration of currents, this "high-level lake" became drained, and a lower lake formed about 100 feet below it. Currents from the north deposited sand, gravel, and other drift in this lower basin, which now forms the site of Corve Street. This gravel-bed is composed chiefly of Cambrian and Silurian debris, water-worn fragments of the well-known Cambrian rocks of Church Stretton being abundant. A very small part of the present site of Ludlow would, during the deposition of this "low-level gravel," appear above water. The south edge of the lake appears to be opposite the Feathers Hotel, in Corve Street. A little lower down that street, opposite the Compasses Inn, large boulders of Old Red Sandstone were discovered, resting amongst sand, gravel, and fine clay. These boulders must have been carried to their present position by floating ice, which became stranded in

Fig. 1.—*Geological Sketch-map of Ludlow.*

water, eight or ten feet deep, near the edge of the shelving lake. The current which carried down the gravel, &c., passed over the present site of the River Teme; for a bed of fine blue clay lies at the bottom of Old Street, and yellow clay below Frog Lane. The dam which kept back the water of this lower lake was probably opposite to the tanks at the Old Paper Mill.

The average thickness of this low-level gravel is about 25 feet, a thickness of 21 feet of which has been exposed by shafts and tunnelling for the main sewer. During the existence of this water, the site of Ludlow appears to have been covered, save a narrow strip, about 130 yards wide, along the present direction of Castle Street. The water of this lake would be 70 feet deep at the bottom of Corve Street, and 90 feet deep at the bottom of Old Street.

In process of time, the rocks which formed its southern dam having been worn through, the whole of this lake-water seems to



have gradually drained away, the rain-water of the catchment-basin scooping out the beds of the Rivers Teme and Corve,—the courses of which, however, had then dissimilar directions, as is shown by the high terraces behind Burway, leading to Broomfield. Similar changes are now going on, slowly and imperceptibly, though probably not more so than the former ones.

*Hereford.*—The city of Hereford is 158 feet above the sea-level, and stands upon a gravel-deposit 900 acres in extent. The materials of this bed appear to have been transported from a great distance, being well rounded and water-worn. In addition to pebbles of Old Red Sandstone and Cornstone, it contains Silurian pebbles from the upper part of the Valley of the Wye, and fragments of trap-rocks from Builth. This gravel is seen to be the lowest of three terraces of drift, and has an average thickness of 30 feet. At a level of 30 feet above it we meet with a second deposit, a belt of gravel perfectly level, and evidently forming the edge of an old lake. Forty-two feet above this, a gravel-bed of small extent exists as a capping to Broomy Hill.

I am inclined to consider that the denudation of the Old Red Sandstone over the area of the Hereford valley was comparatively rapid; the present River Wye, which flows through it, discharging, in ordinary dry weather, 1650 million gallons daily. These three gravel-zones are very similar in their appearance and mineral constituents. The quantity in the lowest, or City-of-Hereford bed is 25 million cubic yards—sufficient to gravel a walk, 10 feet wide, round the globe.

*Skipton.*—The plan and sections of the town of Skipton exhibit a somewhat similar condition of things. The lower portion of the town is situated on a lacustrine deposit, lying in a basin of Mountain-limestone, containing gravel composed of the debris of this rock and the adjacent Millstone-grit.

Under this gravel there occurred, on the south side of the canal, and in the excavations for the main sewer, a black deposit of silt of the consistency of tar, which caused great trouble to the contractor; for straw had to be introduced behind close boarding to keep out this treacherous material, which appeared to be composed of pulverized coal-shale, derived from stratified layers in the neighbourhood. In the sewer-cutting, opposite Christ Church, a thick bed of dark marl was cut through, full of the shells of *Physa fontinalis*. In the cutting of the sewer north of the canal, opposite Victoria Mills, the skull, tibia, and other bones of a species of *Bos* were met with in fine sand, below 8 feet of peat and gravel-drift. Large boulders, about 3½ tons in weight, were found in the gravel opposite the Devonshire Hotel.

The section along the line of the main sewer has been extended to include the contorted stratification of the Carboniferous Limestone on which the Castle stands, and the anticlinal axis of Storem's Lathie.