

also know that in the vast majority of cases these are not true mimetic resemblances, as occur in the animal kingdom, but adaptations to common conditions of the environment. Numerous instances might be quoted, but it may serve to mention the fleshy succulent stems of such Xerophytes as *Euphorbia* (Euphorbiaceæ), *Cactus* (Cactaceæ), and *Stapelia* (Asclepiadaceæ), and the much divided leaves of such hydrophilous plants as the Batrachian *Ranunculi* (Ranunculaceæ), *Myriophyllum* (Haloragidaceæ), and *Hottonia* (Primulaceæ).<sup>1</sup> Indeed, it is fully recognised that plants which are highly adapted may, if found fossil, become a fruitful source of error to the palæobotanist.<sup>2</sup>

If, therefore, the theory of homœomorphy is permissible as a working hypothesis applicable to fossil plants, then we have not only some explanation of the phenomenon "of similarity in general with dissimilarity in details,"<sup>3</sup> which is common among such remains, but an indication of the possible diverse origin of such types. At the same time, it is necessary to guard against an undue application of a criterion of small differences, and consequently a large increase to the number of genera and species already recorded. It is necessary to remember that such small differences may be really due to the manner of preservation. But where good characters do exist, however much they may be overshadowed by general resemblances, the adoption of the theory of homœomorphy, even though it may not in all cases be a safe guide, would usually point to separation rather than to identification.

## II.—ON A FOSSILIFEROUS BED IN THE SELBORNIAN OF CHARMOUTH.

By W. D. LANG, B.A., British Museum (Nat. Hist.).

THE Charmouth district, situated in the south-west corner of Dorsetshire, consists of valleys in the Lias clays, separated by hills which are capped by Upper Cretaceous rocks, resting unconformably upon the Lias. Black Ven is the name of the cliff face bisecting one of these hills, which, lying between Charmouth and Lyme Regis, divides the valleys of the Char and the Lyme stream. Of this cliff, the lower 350 feet consist of Lias clays and limestones. Above this the succession of beds is explained by the following section:—

	Feet.
4. Soil and subsoil, consisting chiefly of the weathered remains of the Chert beds in the zone of <i>Pecten asper</i> , as well as of higher Cretaceous beds ... ..	about 20
Zone of <i>Schloenbachia rostrata</i> (Sowerby). } 3. Yellowish-brown sand (Foxmould) ... ..	60-80
Zone of <i>Hoplites interruptus</i> (Bruguère). } 2. Yellow sand containing three layers of indurated nodules (Cowstones) ... ..	30-50
1. Black and dark green loams ... ..	20

<sup>1</sup> For a short account of these biological groups see Henslow, *Natural Science*, vol. xv (1899).

<sup>2</sup> Seward: "Fossil Plants," vol. i, chapter v.

<sup>3</sup> Buckman: *ibid.*, p. 232.

The fossil-bed here described was first found by the author in April, 1901, and fossils from it have been obtained on several subsequent occasions.

So far as can be determined the bed has not yet been described, though it may have been mentioned by Mr. A. J. Jukes-Browne in dealing with the Gault and Upper Greensand of England.<sup>1</sup> He speaks of "the highest visible bed" at Black Ven as being composed of "brownish sand with green grains and many broken shells of *Pecten* (*Neithea*) *quadricostata*, recalling sand seen at Foxton, near Chard." Further than this he does not describe it, and I am inclined to think that he refers to a bed at the top of the cliff, immediately under the Golf Links, about half a mile further westwards. Otherwise he could not have failed to mention the number of other fossils, notably *Exogyra*, with which the *Neithea* fragments are associated.

Mention is also made in the same place of "a nest of silicified but fragmentary fossils, . . . resembling very poor Blackdown specimens," found by the Rev. W. Downes in 1884.<sup>2</sup> But on referring to Mr. Downes' paper it seems that the fossils he found were at least a quarter of a mile further west; for he describes them as occurring "50 feet above the spot in the Gault where I obtained the other fossils, and in nearly a straight vertical line above it." Tracing this line from where Gault fossils are now exposed, we reach a locality where there is no section, although cliffs are present on either side of this spot, the junction of the old and present Lyme roads. As the present road had only been made four years previously to Mr. Downes' paper, it is probable that these cliffs were then much less overgrown, and possibly his fossil-bed is the same as that described below, appearing further westwards, which (if there) is now hidden by overgrowth and talus. Even so, it will be seen by the section following that the latter is considerably more than 50 feet above the black Gault loams.

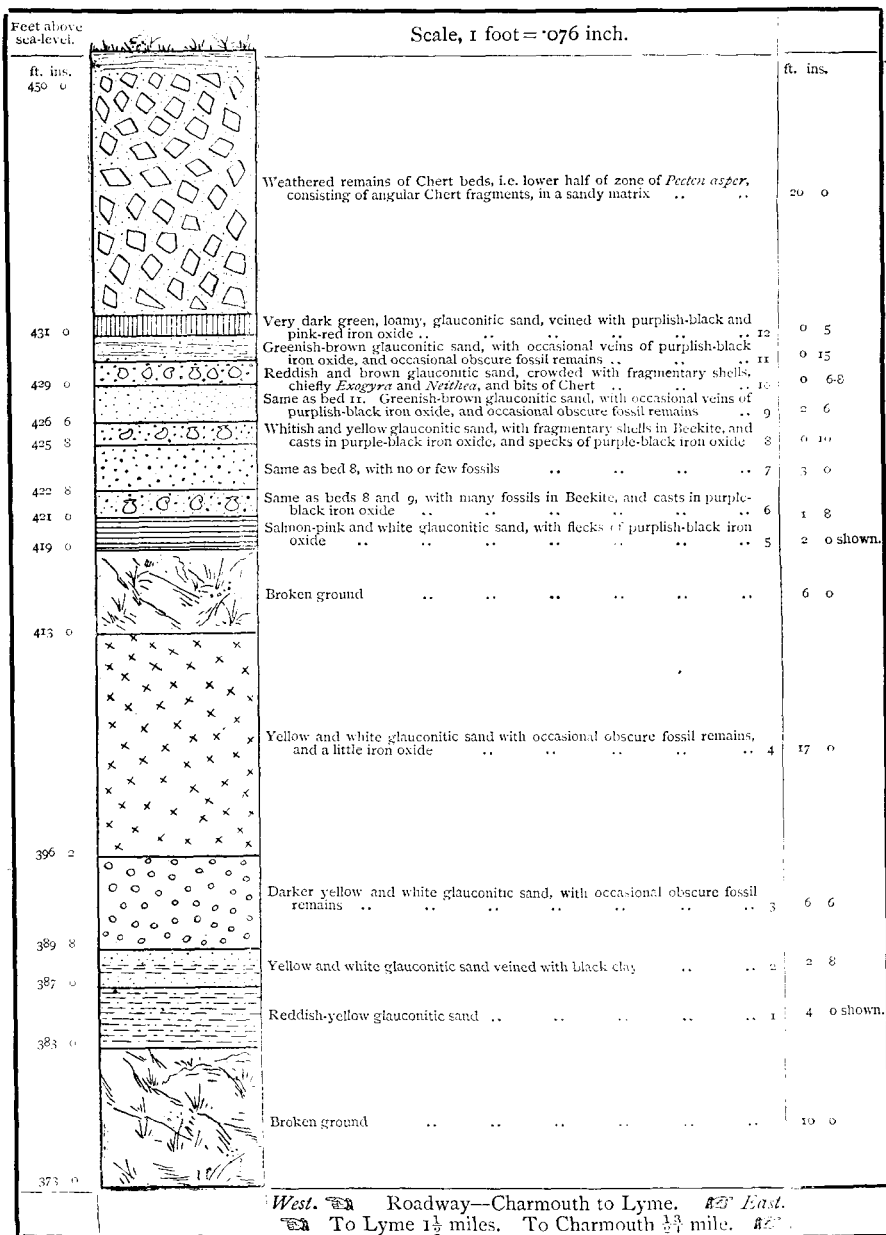
At a height of from 370 to 400 feet the road at present used between Charmouth and Lyme has been made for some distance along the face of the cliff, passing along the lower part of the zone of *Schloenbachia rostrata* (Sowerby), which consists of yellow sands locally called 'Foxmould.' This Foxmould forms a cliff of varying height overhanging the roadway, and at a spot situated some one and a half miles from Lyme Church, and about half a mile from Charmouth Church there is a small cliff on the seaward side of the road. This cutting is called by the villagers the 'Devil's Bellows,' on account of the great force with which a gale blows through it, facing as it does the south-west. The inland cliff is 75 feet in height, and the main fossil-bed occurs at a height of about 50 feet.

The following section, measured in September, 1902, gives a general idea of the beds of which the Foxmould consists. The small divisions, however, probably thin out rapidly in all directions, and so are of no use in correlating the beds from hill-top to hill-top.

<sup>1</sup> A. J. Jukes-Browne: "The Gault and Upper Greensand of England," 1900, p. 186.

<sup>2</sup> W. Downes, "The Cretaceous Beds at Black Ven, near Lyme Regis": Quart. Journ. Geol. Soc., vol. xli (1885), p. 23.

## SECTION AT THE CUTTING, CHARMOUTH.



It will be seen that there is a gap of 6 feet in the middle of the section where no sand is exposed, the cliff being here obscured and overgrown with grass, gorse, and broom.

Of the three beds in which fossils occur, the uppermost (No. 10) is by far the most productive, the lower two beds (Nos. 6 and 8) yielding chiefly *Exogyra*; moreover, these are not so well preserved as those in the highest bed.

The fossils obtained from the bed (No. 10) are as follows. The numbers after the names indicate the number of specimens found :—

MOLLUSCA LAMELLIBRANCHIATA.

- Alectryonia frons* (Parkinson), 2.
- ? *Anomia* sp., 1.
- Avicula* sp., 1.
- Exogyra canaliculata* (Sowerby), 1.
- Exogyra conica* (Sowerby), abundant.
- Exogyra plicata* (Lamarek), 2.
- Ostræa* sp., 1.
- ? *Pecten* (*Syncyclonema*) *orbicularis*, Sowerby, 1.
- Pecten* (*Neithea*) *quadrucostata*, Sowerby, abundant.
- Septifer lineatus* (Sowerby), 1.

MOLLUSCA GASTEROPODA.

- Turbo* sp., 1.

ANNELIDA.

- Serpula ilium*, Sowerby, 2.
- Serpula filiformis*, Sowerby, 2.

ECHINODERMATA.

- One Urchin spine.

BRYOZOA.

- Cellulipora ornata*, D'Orbigny, var. *devonica*, Gregory, 1.
- Entalophora* sp., 1.
- Entalophora* (?), 1.
- Ceriopora* (?), 1.

The following is a list of the fossils found by Mr. Downes<sup>1</sup> :—

MOLLUSCA LAMELLIBRANCHIATA.

- Cardium proboscideum*, Sowerby, 3 small fragments.
- Cucullæa fibrosa*, Sowerby, 1.
- Cucullæa glabra*, Sowerby, 4.
- Cyprina emeata* (Sowerby), abundant.
- Cytherea caperata* (Sowerby), 4.
- Gervillia rostrata* (Sowerby), abundant.
- Exogyra*, 1.
- ? *Pecten orbicularis*, Sowerby, 1.
- Pecten quinquecostatus*, Sowerby, fragment.
- Trigonia scabricola*, Lycett, 2.

MOLLUSCA GASTEROPODA.

- ? *Phasianella* sp., 1.
- Turritella granulata*, Sowerby, 1.

ANNELIDA.

- Serpula* sp.

PORIFERA.

- ? *Siphonia*.

<sup>1</sup> Downes, *ibid.*, p. 25.

The *Pecten quadricostatus*, Sowerby, and the *Exogyra* are by far the commonest shells, the Pectens being mostly fragmentary; but I have found nearly perfect ones, which, however, have invariably fallen to pieces on being removed.

All the fossils are siliceous, many, especially the flat fragments of *Pecten*, showing the curious concentric structure peculiar to Beekite.

The obscure fossil remains in beds 3 and 4 are casts in sand, which at once fall to pieces on removal; but none of those found could be identified. Possibly they are the 'impressions' mentioned in the Survey Memoir.<sup>1</sup>

Half a mile further westwards, where the Foxmould cliff recedes some two hundred yards from the road, and immediately beneath the Golf Links, another fossil-bed occurs. This, like the last, lies within a foot of the capping of chert detritus, but is at a higher level, the cliff rising here to about 500 feet. This has yielded fragments of *P. quadricostatus*, Sowerby, and from it in September, 1902, I obtained some fine specimens of *Exogyra conica*, Sowerby.

My best thanks are due to Dr. F. L. Kitchin and Mr. E. T. Newton, F.R.S., of the Museum of Practical Geology, for their kindness in helping me to identify the specimens.

### III.—SOME DISPUTED POINTS IN THE CRYSTALLISATION OF THE CONSTITUENT MINERALS OF GRANITE.

By A. R. HUNT, M.A., F.G.S.

IN writing my little paper on vein-quartz I was particularly anxious not to introduce controversial matter, but to be strictly orthodox throughout. After the paper was published I was much perturbed to find that I had unwittingly come into collision with two incidental remarks in General McMahon's most interesting paper on the Satlej granite, which was the subject of his address to Section C at Belfast. My oversight arose owing to the said remarks being incidental, and no stress having been laid upon their paramount importance.

To explain, the modern theory of granite is a chemico-physical one, founded on the critical temperatures of carbonic acid and of water. According to the physical evidence, ordinary granites crystallised about the critical temperature of water; some minerals possibly above, and others below; or all above, or all below. The critical temperature of water I have taken as 342° C. (Rep. Brit. Assoc., 1877, p. 236). The chief witnesses are the various inclusions of gas, water, and other liquids, and the deposited crystals contained in the water inclusions.

In my paper I assumed it to be an accepted fact that deposited crystals were proof positive that the mineral containing them was crystallised below the critical temperature of water, and that groups of inclusions with proportional amounts of carbonic acid and water were evidence of a temperature above the critical temperature of water. I also assumed that above the critical temperature of water,

<sup>1</sup> Jukes-Browne: *ibid.*, p. 186.