the rocks affected by great movement range from the Archæan to the Lower Coal-measures, the Upper Coal-measures and Permian rest relatively undisturbed on the denuded rocks of the range: thus the range is a member of the Hercynian system produced during Coal-measure time, and probably the two approximately rectangular directions of movement were practically contemporaneous and were produced during the limited interval between the deposition of the Lower and Upper Coal-measures. There is no evidence to prove that the Malvern and Abberley Hills formed part of a coast-line against which the Triassic beds were deposited; for the Upper Bunter Sandstone forms the base of the Trias throughout the district and rests unconformably on the Haffield Breccia, together with which it passed unconformably over the site of the West of England Chain. The present position of the Permian and Trias on the east of the hills is due to a post-Liassic fault of moderate downthrow, which tends to run parallel to the western front of the old range.

## CORRESPONDENCE.

### THE LIMESTONE KNOLLS OF CRAVEN.

Sir,—According to Mr. Marr the limestone knolls in Craven are due to the rock having been squeezed up, under intense lateral pressure, through the overlying shale. If this be the case, we should find the knolls most pronounced where the pressure has been greatest. Now the pressure, as proved by excessive folding, was greatest along what is now the Skibeden Valley, between Skipton and Wharfedale, but there are no knolls there. The knolls are confined to the region of Thorpe, where the rocks are not much folded and have therefore not suffered great pressure. As the knolls, then, do not occur where, according to the theory of Mr. Marr, they ought specially to be found, the theory cannot be true.

J. R. Dakyns.

Pen-y-Gwrych, Llanberis.
*November* 3, 1899.

### SUBMERGED PHYSICAL FEATURES OF THE MEDITERRANEAN BASIN.

Sir,—Since my return from the Continent I have been engaged in tracing out the physical features, by means of isobathic contours, of the western portion of the Mediterranean, and not without some interesting results. Considering the essential difference in the physical conditions of the Mediterranean and the Atlantic—that is, of an inland sea, with numerous large islands, and the vast sweep of an ocean almost unbroken through a thousand miles from the British Isles to the Straits of Gibraltar—we may well be prepared for differences in the submerged features of each; although it may be assumed that any changes of level which the eastern borders of the Atlantic can be shown to have undergone have been shared by the western portions, at least, of the Mediterranean. The great changes of level, amounting to thousands of feet vertical, which are indicated by the slopes of the continental platform and its intersection down to its very base of 1,000–1,500

fathoms by old river-valleys, must have extended far eastward as well as westward; and may be expected to have left their effects on the submerged Mediterranean border slopes. Such, indeed, is the case, as shown by the isobathic contours, but far less distinctly than in the case of the submerged borders of the Atlantic. In the first place, the great continental shelf of the Atlantic is in the case of the Mediterranean, narrow, and not well defined; and is represented generally by a broken slope, continuous with the bordering lands down to a depth of about 1,000–1,200 fathoms, when it gives place to the gradually shelving floor of the abyssal region, which descends to depths of over 1,500 fathoms. As a consequence of this, and as we might *a priori* expect, the submerged river-valleys are also less clearly defined than those off the coasts of France, Spain, and Portugal. Where, as in these cases, there exists a gently sloping terrace, extending for 100 to 200 miles out to sea, and traversed by deep channels with steep, sometimes precipitous, sides (as in the case of the Loire, the Adour, and the Tagus), it is easy to identify their courses by means of the soundings on the Admiralty charts; but where such channels only traverse for a short distance a steeply sloping surface, the conditions are entirely altered, and they are consequently less clearly recognizable. Notwithstanding this, however, the submerged channels of the Rhône and the Ebro can be clearly recognized by the inward bend of the contours opposite the mouths of these rivers, extending from about the 50 to the 1,000-fathom contours at the margin of the abyssal floor.

I may add, in conclusion, that I have succeeded in tracing Admiral Spratt's channel, between Adventure Bank and Cape Bon, by which the waters of the Levant Basin were connected with those of the Tyrrhenian Sea during the uplift of the entire area to the extent of 250 fathoms (1,500 feet), as explained by Admiral Spratt himself.[1]

EDWARD HULL.

## OBITUARY.

### DR. HENRY HICKS, F.R.S., F.G.S.

BORN IN 1837. DIED NOVEMBER 18, 1899.

THE mournful news has just reached us (November 21st) of the death of our genial friend and warm-hearted colleague, Dr. Henry Hicks. The son of the late Thomas Hicks, surgeon, of St. David's, Pembrokeshire, he was born in 1837, and was educated at the Collegiate and Chapter School in that city, and at Guy's Hospital, London. He became a member of the Royal College of Surgeons and a Licentiate of the Society of Apothecaries in 1862, and M.D. of the University of St. Andrew's in 1878, practising medicine at St. David's from 1862 to 1871. During that time he commenced his geological researches amongst the older rocks of that neighbourhood. His first paper was communicated to the Liverpool Geological Society in 1863. In the following year, in conjunction with the late Mr. J. W. Salter, Palæontologist to the Geological Survey,

[1] Q.J.G.S., vol. xxiii, p. 292.