perforate projection upon the inner surface of the tergum. (Mr. John Young's Collection.)

FIG. 7. *Spheroma gigas*, Kerguelen's Island.

„ 7a. Front view of head. 7b. Half of the same enlarged to show pore (*p*.)

„ 8. *Serolis paradoxa*, Sandy Point, Straits of Maghellan. Showing pore (*p*) near margin of thoracic somite.

III.—NOTICE OF NEW FISH-REMAINS FROM THE BLACKBAND IRONSTONE OF BOROUGH LEE, NEAR EDINBURGH.—No. IV.

By Dr. R. H. TRAQUAIR, F.R.S., F.G.S.

Gyracanthus nobilis, n.sp.

HITHERTO I have been in the habit of referring the *Gyracanthus* spines commonly occurring in the Borough Lee Ironstone to *G. formosus* or *tuberculatus* of Agassiz, being disposed to believe in the specific identity of those two forms, as has already been suggested by Messrs. Hancock and Atthey, and hinted at by Agassiz himself. In fact, the salient point of difference between the two is the greater extent of the tuberculation of the ridges in the latter, while in the former it is principally seen on the proximal parts of the ridges, which, as they converge towards the anterior middle line of the spine, become first simply undulated and then smooth. The original figured specimen of *G. tuberculatus* is from the Coal-measures of Sunderland; that of *G. formosus* is from the same formation at Dudley; but though Agassiz refers to it as occurring also at Burdiehouse, in Midlothian, and Burntisland in Fifeshire, it seems to me very doubtful if these Calciferous Sandstone specimens are really the same. And certainly the study of a large quantity of additional material from Borough Lee has convinced me that the species of *Gyracanthus* characteristic of this Ironstone of Carboniferous Limestone age is specifically different from both *formosus* and *tuberculatus*.

These spines are elongated and rather slender, showing very little lateral curvature, though every specimen and every fragment which I have examined shows that marked want of lateral symmetry which I have described in my last communication on the Borough Lee fossils. The posterior ridge is strongly denticulated, save in worn specimens. But the salient specific mark lies in the disposition and mode of tuberculation of the sculptured ridges. Commencing at the proximal end of the spine, these ridges are at first strongly and closely tuberculated along their whole extent, but near the closure of the posterior sulcus or hollow, this close tuberculation becomes limited to the anterior aspect,—each ridge as it arises, and advances upwards and forwards, showing first a comparatively distant tuberculation, then a smooth space (sometimes very minutely crenulated) on the side of the spine, and then becoming thick and coarsely tuberculated as it turns round to the front aspect. Where this feature of the ridges commences, they also become *excessively oblique* and very delicate, and in some specimens they occasionally also bifurcate along the sides of the spine, but in front where the tuberculation appears they become coarse, and *curve a little forwards* so as to become also less oblique. Towards its extremity the ridges become entirely smooth

on the sides of the spine, their slight curvature also ceases, and the tuberculation of the anterior aspect gives way to simple undulation. Finally, at the point, all ornamentation becomes completely worn off.

As I know of no other species of *Gyracanthus* with which the present can be confounded, I propose for it the specific name of *nobilis*. It must have attained a very large size—fragments occasionally indicate a length of two feet or more.

Gyracanthus Youngii, n.sp.

Spines attaining a length of probably two feet: usually displaying gentle curvatures both antero-posterior and lateral. Ridges of sculptured portion *so little oblique as to be nearly transverse*, though beyond the middle of the spine they become somewhat sigmoidal in their direction, turning towards the apex above, towards the base below. Only towards the apex have the ridges any marked obliquity in their middle portions, and they are closely tuberculated over their whole extent, excepting towards the apex, where occasionally the tuberculation becomes irregular. The groove on the posterior surface is less prominently marked, and the lip or ridge on the medial or concave side of the spine not so prominent as in other species: usually the floor of the groove is covered with tubercles at its commencement, where the sulcus closes. Medial edge on lip of posterior groove often denticulated, denticles sometimes also seen on the outer lip.

I first observed a fragment of this spine from Bo'ness, in the Collection of Mr. Mowbray Cadell; subsequently I have seen it from Borough Lee, Cowdenbeith in Fife, Possil in Lanarkshire (Collection of Mr. J. Young), Dalry in Ayrshire (Collection of Mr. R. Craig). All these specimens are from ironstone of Carboniferous Limestone age. In proposing a name for this undoubted new spine, I beg to call it after my friend Mr. John Young, of the Hunterian Museum, Glasgow, who has done so much for the elucidation of the palæontology of the West of Scotland.

Ctenodus obliquus, var. *quinquecostatus*.

In the first of the present series of communications, I mentioned a fragmentary specimen of a tooth of *Ctenodus*, which so far as could be seen had some resemblance to *C. obliquus*, Hancock and Atthey. Since that time I have got together a considerable number of more perfect examples, which seem to show that the tooth is at least to a certain extent new.

Palatal teeth of this species are more frequently found than mandibular ones, and are usually attached to a palatopterygoid bone of the usual form. The tooth itself is narrow, elliptical in shape, its breadth being rather less than half the length. The inner margin is bluntly angulated, arched, sometimes simply arched; from the angle (or a point corresponding to it), which is placed behind the middle, radiate *five* stout ridges, of which the inner and anterior is the longest, the others rapidly diminishing in succession from within outwards, and before backwards: the number five is very constant,

though in one instance I find the posterior ridge bifurcating so as to form six at the outer margin. The free margins of those ridges are prominent and pretty regularly and gently convex, though rather more so towards the outer aspect, and are divided into a variable number of denticulations, which, when the enamel covering is gone, as is often the case, are blunt and rounded; otherwise these denticles are compressed, triangular, trenchant, pointed, and brilliant. The furrows between the ridges are smooth. The mandibular tooth resembles the palatal one in the number and character of the ridges, but is somewhat narrower as well as somewhat more convex in general aspect.

This is a small species, though not so minute as *C. angustulus*; the largest palatopterygoid with tooth which I have seen measuring $1\frac{1}{4}$ inch from the anterior extremity of the tooth to the posterior-external angle of the bone. In shape it most resembles *Ct. obliquus* of Hancock and Atthey, from which it differs, first in its small size, secondly in the constant or nearly constant presence of five ridges, whereas in *Ct. obliquus* there are six to eight. Considering, however, the great tendency to variation in teeth of the genera *Ctenodus* and *Ceratodus*, I hardly think it safe to devote *quinquecostatus* to the rank of a species at present.¹

IV.—THE PLEISTOCENE GEOLOGY OF THE FIRTH OF TAY AND THE "ELEVATION AND SUBSIDENCE" QUESTION.

By JAMES DURHAM, F.G.S.

WITHIN the last few months a good deal has been written upon the question of upheavals and depressions in the crust of the earth both in the *GEOLOGICAL MAGAZINE* and in "Nature." By far the majority of these writers have maintained with some show of reason that depressions are the result of the deposition of material of some sort on a part of the earth where it was not previously, in consequence of which the newly loaded part sinks down, just as a weight placed upon an air cushion causes the part on which the weight rests to be depressed. This novel view has been supported by pointing to the fact that numerous instances are met with in which vast thicknesses of rocks have been superimposed one upon another, while throughout their whole depth traces of shallow or comparatively shallow water are found, it being inferred that the sedimentary deposit being the cause of the depression, the bottom sinks exactly in proportion to the amount of the deposit. The Carboniferous system has been advanced as a conspicuous instance of this state of matters; the same holds true of the lower Old Red Sandstone, which appears to have been deposited in lakes.

It has been further shown that Greenland, which is at present covered with ice, is being depressed, and the depression is supposed to be directly caused by the great weight of snow and ice which buries its mountains and fills its valleys.

¹ For previous communications on this subject see *GEOL. MAG.* 1881, pp. 34, 491, and 334, and 1882, p. 540.