

nized groups. Many Palæozoic forms are in a different case. The orifices seen on the surface are not, in many instances, the mouths of the cells, but those of what the authors call *vestibules* beneath which the true cell-mouth is concealed. For these types they propose to found a new suborder under the name of *CRYPTOSTOMATA*, and characterized by having the zœcæia subtubular, or, in section, slightly angular, and the orifice surrounded by a vestibule or otherwise concealed. The families referred to this group are the *Ceramoporidæ*, *Ptilodictyidæ*, and *Arcanoporidæ*.

8. "On the Cause of the Depression and Re-elevation of the land during the Glacial Period." By T. F. Jamieson, Esq., F.G.S.

The author commenced by noticing the theory advanced by Adhémar and Croll, according to which the submergence was due to the effect of a polar ice-cap causing a displacement of the earth's centre of gravity and thereby drawing the ocean towards the ice-covered pole, and proceeded to show that this theory is opposed to the geological evidence, according to which the amount of submergence has been unequal in adjacent areas and along the same parallels of latitude, showing that the movement has been in the land and not in the sea. The facts of submergence also prove that no such cap of ice could have existed at the time in the northern regions. Sundry other objections were also pointed out. The author then went on to state his own hypothesis, which is to the effect that the depression of the land was caused by the weight of ice laid upon it, and the re-elevation by the disappearance of the ice. The amount of depression would depend partly on the weight of ice and partly on the elasticity or yielding nature of the ground beneath it. He then proceeded to consider what was the weight of ice that probably existed, and referred to the elastic and flexible nature of the earth's crust, as evinced by earthquakes, etc.

He further considered the relation of time to pressure, and touched upon the probable rate of subsidence, which he supposes to have been very slow and gradual. The recovery of level, he thinks, would be very gradual, and probably, in most cases, not complete.

He next proceeded to show how his hypothesis is borne out by an appeal to geological evidence in various countries, taking England, Ireland, North America, and Greenland as examples. He further pointed out its application to the facts connected with the loess beds, fjord latitudes, and lake-basins, and concluded with some observations on the remarkable connexion between glaciation and submergence in all countries.

CORRESPONDENCE.

THE MOON'S ACTION ON THE EARTH.

SIR,—I dare say your readers will have been much interested lately by Professor Ball's new speculations regarding the moon's action on the earth, and especially in the creation of geological changes on its surface by it. His theory purposes to establish gigantic tides in the far-off history of the Earth, upheaved by a closer approximation of the moon, and creating thereby a tremendous

force of current to act as a powerful denuding agent. I am strongly inclined to think that some fallacy lurks beneath this ingenious theory in a geological point of view. In the first place, the moon's action creates no currents in the open sea, the open tide being merely a wave (or elevation) of translation. The water in the wave does not follow the moon at all, but as soon as the moon has passed that spot, falls down again. 2nd. The tidal flows and ebbs in inclosed channels and seas do not denude the bounding lands into valleys and gorges, but level it flat, into sand banks and mud banks. 3rd. The awful rise and fall of tides of 648 feet up and down should throw further doubt upon the theory, as such could only take place in the open ocean far away from land. It would be quite impossible in our narrow seas, where the water would not be deep enough for it. 4th. A wave of water cannot be conceived to travel over land like a gale or hurricane, as it would collapse at once when brought into shallows of its own depth from the open sea. 5th. As these waves of translation must have corresponding troughs of water to draw upon, where could they get them, except in the open oceans, certainly not in coast seas? 6th. Therefore the disruptive and denuding agency expected from such tides on the dry land of continents, I beg to suggest would be illusory, and impossible of achievement. The student of Geology will do better to adhere to the principles of Geology taught by Sir C. Lyell, than put faith in Professor Ball's theory of tidal deluges repeated every day and tearing up diurnally the surface of the globe.

FESTINALENTE.

THE BRIDLINGTON CRAG.

SIR,—As my paper on the Bridlington and Dimlington shell-beds was meant to be descriptive, I did not think it necessary to lay particular stress on the evidence which caused me to doubt Mr. S. V. Wood's assertion that "the Bridlington shells unquestionably lived where they occur," and I contented myself with showing that "the most perfect preservation" of the shells, on which it seemed to me that Mr. Wood had mainly relied, was not certain evidence; and I thought the general account given of the beds would have proved the rest. Since, however, Mr. Wood has drawn attention to the matter, it will perhaps be as well to group the facts which caused me to differ from him.

My reasons for thinking that the shelly patches in the Basement Boulder-clay are not in place, but have been transported, are briefly as follows:—1. Neither at Bridlington nor at Dimlington do they show any signs of extension or regularity; at both places they exhibit the same mixture of remnants; and the patches—composed of many kinds of sand, gravel, silt and clay, some with shells of one kind, some of another, many with none—all, so far as I have seen, occur at random in the clay, like boulders. 2. Most of the patches are made up of material which I do not think could have been obtained on this coast at that time. Coarse grains of greenish quartz form much of the sand, whilst the fine blue clays have, I think, been made up, in great part, of the waste of soft Neocomian beds. There