Tertiary Chalk in Barbados.

IN a previous communication (NATURE, February 14, p. 367) we called attention to the series of oceanic deposits in Barbados, of which the well-known Radiolarian earth (or Polycistina marl) forms a part. We stated that these deposits had a wide extension, and were of variable composition, some being much more calcareous than others; and further that they formed an independent series, resting unconformably on the older clays and sandstones which are supposed to be of early Tertiary age.

Since the date of our former note, we have examined many sections along the outcrop of the deposits, and find that the varieties which we had noticed fall into a natural succession, the calcareous earths lying principally at the base, though in the northern part of the island there is a development of similar beds at the summit. The total maximum thickness is about 200 feet, and the series contains many interesting varieties of rock. We hope to describe these at length, and to lay our results before the Geological Society, but as some time must elapse before this can be done, we write at once to place on record the fact that some of the beds have all the essential characteristics of typical (Cretaceous) chalk.

We have samples which consist of from 80 to 90 per cent. of calcium carbonate, which give the usual white streak of chalk, which contain Foraminifera in abundance, and have a minute structure which can hardly be distinguished from that of certain portions of the English chalk. A thin slice examined under a 1-inch objective shows many Foraminifera distributed through a matrix which under this power appears to be amorphous; the Foraminifera are chiefly Globigerinæ of the thick-shelled type similar to that figured in Carpenter's "The Microscope and its Revelations," sixth edition. Examined under a higher power the matrix can be resolved into definite particles, among which can be distinguished many forms identical with the so-called crystalloids of the chalk. Our friend Mr. W. Hill, to whom we sent a specimen of this Barbadian chalk, says it presents a very close analogy to our English chalk. Other samples combine the characters of chalk and Radiolarian earth having a calcareo-siliceous matrix containing a mixture of Radiolaria and Foraminifera.

We believe that the Barbadian deposits were formed on the floor of the Atlantic previous to the upheaval of the Caribbean Islands, and this conclusion is strengthened by the fact that similar Radiolarian earths occur in Trinidad and Hayti. We find too that the late Dr. Carpenter remarked that if the modern oceanic oozes were uplifted they would form deposits similar to the Barbados earths ("The Microscope and its Revelations," sixth edition, p. 602).

We wish to correct one paragraph in our former letter, in which we tacitly assumed that the Caribbean Islands were originally part of the American continent, and were therefore continental islands; we are now disposed to regard Barbados at any rate as an oceanic island, and believe that it has never been connected with South America since its upheaval as an island. Colonel Feilden has collected some evidence on this point which we hope he will shortly publish. We may state that the nearest island to Barbados (St. Vincent) is one hundred miles to the west, and that the intervening sea is more than 1000 fathoms deep.

But whether classed as an oceanic or a continental island, the rocks of Barbados are equally interesting to the physical geologist, since they give proof of a complete interchange of continental and oceanic conditions in Tertiary times; for the underlying sandstones and shales imply the close proximity of a continent during their formation, while the chalky series proves the subsequent conversion of this shallow sea into an oceanic area. Moreover, the existence of both sets of rocks now at the surface is entirely antagonistic to the prevalent theories respecting both continental and oceanic islands.

A. J. JUKES BROWNE.
April 22. J. B. HARRISON.

A New Mountain of the Bell.

I HAVE just returned from a journey of four weeks in the desert of Mount Sinai, made with the especial object of studying the *Jebel Nagous* in connection with the joint researches of Dr. Alexis A. Julien and myself on "musical sand." The "Mountain of the Bell" is situated on the Gulf of Suez, about four and a half hours from Tor by the roundabout camel route. It was first described by Seetzen in 1808, since which time it has been visited by Ehrenberg, Gray, Wellstedt, Rüppell, Ward, Newbold, and the late Prof. Palmer, as well as by large numbers of pilgrims. My observations confirm in the main their accounts of the acoustic phenomena heard, but my measurements differ widely from those of all the travellers save Prof. Palmer.

The name Jebel Nagous is given by the Bedouins to a mountain nearly three miles long and about 1200 feet high, composed of white sandstone bearing quartz, pebbles, and veins. On the western and northern sides are several large banks of blown sand, inclined at high angles. The sand on one of these slopes, at the north-west end of the mountain, has the property of yielding a deep resonance when it slides down the incline either from the force of the wind, or by the action of man. This bank of sand I distinguish from the others by calling it the *Bell Slope*. It is triangular in shape, and measures 260 feet across the base, 5 to 8 feet across the top, and is 391 feet high. It has the high inclination of 31° quite uniformly. It is bounded by vertical cliffs of sandstone, and is broken towards the base by projecting rocks of the same material. The sand is yellowish in colour, very fine, and possesses at this inclination a curious mobility which causes it to flow when disturbed, like treacle or soft pitch, the depression formed being filled in from above and advancing upward at the same time. The sand has none of the characteristics of sonorous sand found on beaches. When pulled downwards by the hands or pushed by the feet a strong vibration is felt, and a low note is plainly heard resembling the deep bass of an organ-pipe. The loudness and continuity of the note are related to the mass of sand moved, but I think that those who compare it to distant thunder exaggerate. The bordering rocky walls give a marked echo, which may have the effect of magnifying and prolonging the sounds, but which, as I afterwards demonstrated, is not essential. There are no cavities for the sand to fall into, as erroneously reported. The peak of Jebel Nagous rises above the Bell Slope to the height of 955 feet above the sea-level, as determined by a sensitive aneroid.

After studying the locality and phenomenon for several days, I formed the opinion that it could not be unique as hitherto supposed, and accordingly I tested every steep slope of blown sand met with on the caravan route northward to Suez. On April 6 I examined a steep sandbank on a hillock only 45 feet high, and was rewarded by the discovery of a second Nagous. This new Nagous is in the Wadi Werdan, only five minutes off the regular caravan route, and one and a half days, by camels, from Suez. The hillock is called by the Bedouins *Ramadan*, and forms the eastern end of a range of low hills about one quarter of a mile long; being the only hills in the Wadi, the locality can easily be found by travellers. The hills consist of conglomerate and sandstone, and to the west of gypsum; they slope up gradually from the north and end in bold cliffs on the south side. Sand blown by the north wind is carried over the cliffs, and rests on the steep face at two inclinations, 31° above, and 21°, or less, below. By applying the usual tests with the hands to the fine-grained sand, I found that wherever it lies at the requisite angle to produce mobility (31°), it yielded the bass note, though not so loud as on the Bell Slope of Jebel Nagous. In one instance, my friend and fellow traveller, Mr. Henry A. Sim, of the Madras Civil Service, who kindly aided me in my investigations, heard the sound while standing 100 feet distant. The Nagous sand occurs at intervals throughout the 500 yards of low cliffs; the main bank at the east end being 150 feet wide and 60 feet high measured on the incline. I stirred up the mobile sand pretty thoroughly on this slope, and the next day it failed to give the sounds, not having recovered its properties. The intervening night was very cold (53°). I feel confident that this phenomenon is not very rare in the desert, though the spontaneous production of sounds by sliding of the sand without man's agency, as at Jebel Nagous, may be. Whether the *Rig-i-Rawan*, north of Cabul, is caused by similar conditions remains to be determined, but I fear that the peculiar relations existing between England and Russia will prevent my visiting Northern Afghanistan. The Bedouins who accompanied us were greatly astounded at my discovery of a new Nagous, and I fear that their faith in a monastery hidden in the heart of Jabel Nagous has received a severe shock. It is interesting to note that the Nagous or modern gong is in daily use in the Monastery of St. Catherine, Mount Sinai.

I made photographs of Jebel Nagous and vicinity, as well as of the new Nagous, and collected specimens of the rocks, sand, &c. This communication must be regarded as a preliminary notice, full details being reserved for the work on "Musical Sand" in preparation by Dr. Julien and myself.