

CORRESPONDENCE.

THE GEOLOGY OF BIARRITZ.

SIR,—In your pages of August last I described the reversal of Pyrenean geology at Lourdes and Biarritz effected by M. Carez in elaborate coloured sections of the *Bull. Soc. Geol.* for 1896, p. 379. By a typographical error, the map of the intermediate Pyrenees obtained from me by M. Carez in 1885 is referred to 1865. In spite of the studied condemnation of the reply of M. Carez to the geologist who had supplied his facts, I succeeded in re-establishing the Cretaceous age of the rocks represented as Middle Silurian and Cambrian, in which hundreds of Cretaceous Ammonites had been familiar to me for thirty years.

At Biarritz the supposed Lias, simultaneously figured in the same manner, has given birth to a unanimous selection of that locality as a type and proof of those Alpine paradoxes similarly created by MM. M. Bertrand, Carez, L. Bertrand, Bergeron, Seunes, and other officials of the French Survey. The question has been reduced to the decisive test of a boring of 104 metres deep, which boring has exactly proved the contrary of the views in question as figured by M. Bergeron in *Bull. Soc. Geol.* of 1900, p. 24. This boring has exactly confirmed my predictions of the same Bulletin, p. 614, as well as the detailed sections which I furnished to those interested at the Sorbonne. An elaborate attempt to explain away this decisive boring has been presented by M. L. Bertrand in *Bull. Soc. Geol.*, 1902, p. 83; and all his alleged facts have been refuted by M. Seunes in the *Compte Rendu* of the meeting of the same society on 6th April last.

The documents enumerated will enable any geologist to judge the method applied at Biarritz by the authors of the same paradox in the Alps, Montagne Noire, Provence, Corbieres, and such Pyrenean localities as Salies du Salat and Lasseube. Eight months of recent observation in the Alps, and repeated study of the other localities mentioned, have convinced me that Biarritz has been correctly selected by all the authors in question as a perfect sample of their work. The entire problem is precisely similar to that already settled at Lourdes.

In the hands of M. Seunes the problem attains the final stage of the process of proof invariably employed. This geologist is really familiar with the ground. In 1886 he was sent to me with a letter from the last two Professors of geology at the Sorbonne, begging me to supply him with my unpublished data, and promising that my published work should be the basis of his Thesis. Starting with all the new facts collected by my assistants and myself, he has completed his knowledge by yearly work. Consequently he has admitted, after 16 years, that every supposed fact cited as proving the presence of Trias at Biarritz is absolutely erroneous. Yet he affirms the correctness of the theory left standing on exploded fallacies alone. If he did not do so, his work would be treated as my own numerous papers, and as those in the *Bull. Soc. Geol.* of 1893 by the Staff

Officer who for ten years revised the topographical maps. That officer's practice in accurate mapping and my own practice in responsible engineering work compelled each of us to leave the Société Géologique when required to divorce theory from fact. Under Elie de Beaumont such divorce was inevitable, in the opinion of the new and exactly contrary school. Those trained to repeat either formula find the one as little embarrassing as the other. In all the localities already mentioned, I have found that admitted fallacies originated the paradoxes which survive. So at Biarritz the imagined Trias originates a fresh fallacy for each disproved. In the Alps, seven fresh paradoxes have already been imagined to justify the one found untenable by itself.

For more than thirty years I have been familiar with the presence of abundant gypsum, red marls, ophite, and granite in the Cretaceous to the south of Biarritz. The Trias theory rests entirely on their assumed absence. The intrusive granite has this year been exposed by extensive engineering works at St. Jean de Luz. In 1873 I took to Paris a conclusive series of specimens from the same point. Had I then presented them, I should have been boycotted from every society and periodical. I have found similar intrusions abundant in the analogous rocks of Italy, Switzerland, and Greece. But in the *Bull. Soc. Geol.* of 1902, p. 499, M. Carez again elaborately proves the absence of granite intrusions familiar to me along 200 metres just east of the bridge of Salies du Salat; and the source of M. Bertrand's speculations at Biarritz is the fact that he has described as exotic granite, at Lasseube, a common feature of the decomposing diabase of the Pyrenees. Palassou corrected the same blunder in 1819. The demand for local accuracy and experience was still active during my apprenticeship, and I owe to it whatever real information I possess. The present ideal is realized by the man who can describe an entire continent where he has never set foot. If any geologist without the taint of local knowledge, or the stigma of repeated success in quashing reckless assertion, would study the abundant literature of the Biarritz problem, he might do much to stem the torrent of garbled compilation that drowns all useful work in the most accessible of European chains. His observations might gain a hearing on the ground that their refutation should be easy. Mine are too well known to be unanswerable, and thereby only describable as polemics. That word, and the prompt substitution of one reckless fallacy for another, appears to console my opponents and satisfy their admirers.

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ST. JEAN DE LUZ, *May 5, 1903.*

P.S.—On the road to Iholdy, at two kilometres south-west of St. Palais, the granite-like ophite, long known at Lasseube, can be seen rising from beneath extensive Upper Cretaceous; and many similar cases forbid the assumption of superficial carting where the relations are obscure. The nature of the Biarritz problem can be understood from my map in *Comptes Rendus de l'Académie des Sciences* of June, 1894.