

trustworthy information. For some seventeen years I have kept a complete list of all salt exports from the Mersey ports, and this list, I think, is the only complete one published, though the Salt Chamber of Commerce here professes to have a list, which it does not issue for public use. Indeed, I regret to say that it is almost impossible to get any assistance or information from this body.

The French Government issues at times a list of salt manufactured or raised from mines. The last I received, viz. 1879, gave, as the production for that year, 283,000 tons of sea salt and 293,000 tons of rock salt.

I shall be glad to give any information I possess to Mr. Merrill, and should be glad if any of your readers could give any information or assistance that would enable me to make as complete as possible the Salt Museum we are here forming.

Northwich, Cheshire.

THOMAS WARD.

#### Prof. Rosenbusch's Work on Petrology.

PROF. BONNEY'S letter (NATURE, vol. xxxvii. p. 556) makes me venture once more to ask permission for space for a few remarks. One of the objects I had in view in writing to you at first is partly attained by the appearance of Prof. Bonney's "friendly protest"; and his remark that but for my letter he should have refrained "for a season" leads me to hope that in due course this object may be still further realized.

Prof. Bonney sees great objections to Rosenbusch's system of classification, and demurs to some of his groups altogether, both as to those admitted and those omitted. Naturally, then, he desires that this system shall not, by students of petrology, be too readily accepted nor too blindly followed. I do not think there is much danger of this, nor do I think that the "viaduct" was too much complimented either by Dr. Hatch or myself, the defective foundation of the piers in question being quite sufficiently alluded to for the time being.

The position, however, seems to be this. The number of earnest students of petrology is larger now than formerly, and is on the increase. They feel that no satisfactory system of classification had yet been offered to them, and indeed are rather bewildered by the fact that opinions as to what is the best system have been almost as many in number as the teachers who could by any means claim to be authorities entitled to instruct in this matter. Also, it is now a long time since any detailed system of classification, covering the whole ground, has been attempted.

Now we have such an attempt offered to us by Rosenbusch, and there is no doubt that to many it will be very welcome and will be largely used, in spite of the defects undoubtedly seen in it.

Prof. Bonney objects to the viaduct because of the weakness of some of its piers, and still more strongly objects to it, I think, because he considers that when a student has crossed it he will arrive at a point from which he will obtain a view of the surrounding country which will not be a good or correct view, and which will in some respects confuse the knowledge of that country already obtained and still to be sought for.

Would not this be just exactly the best time for some authority of great experience to come forward and point out to us younger workers wherein the viaduct is defective, and wherein we shall see wrongly from the ground on the further side of it; and to tell us his opinions as to a better viaduct, so placed as to lead us to a better point of outlook?

May we hope that Prof. Bonney will himself give us such a detailed criticism of the subject? It would be received with great attention and gratitude by many who, like myself, are looking for "light and leading" in this branch of study.

A. B.

#### History of the Contraction Theory of Mountain Formation.

In his "Physical Geology," second edition, p. 674, Prof. Green says: "The notion that the earth's contraction has been the cause of the displacement of the rocks and the elevations of the surface seems to have occurred first to Descartes (éd. française, 1668, p. 322)."

It does not seem to be generally known that, a few years later, the same idea occurred to Newton. In a letter to Dr. Thomas Burnet he refers to that writer's "Sacred Theory of the Earth," the Latin edition of which was published in 1681, and considers the creation of the earth in connection with the Mosaic account. After suggesting illustrations of the "generation of

hills," Newton concludes thus: "I forbear to describe other causes of mountains, as the breaking out of vapours from below before the earth was well hardened,—the settling and shrinking of the whole globe after the upper regions or surface began to be hard;" though he adds, "I have not set down anything I have well considered, or will undertake to defend."

The letter, which is written in reply to one of Burnet's, dated January 13, 1680-81, is given in full in Brewster's "Memoirs of Sir Isaac Newton," vol. ii. Appendix 4. The manuscript from which it is printed is a copy of the letter, without date or signature; but, according to Brewster, "the whole is distinctly written in Sir Isaac's hand."

CHARLES DAVISON.

Birmingham, April 23.

#### Lightning and Milk.

EMIN PASHA (NATURE, vol. xxxvii. p. 583) mentions the African superstition "that fire kindled by a flash of lightning cannot be extinguished until a small quantity of milk has been poured over it." This idea is embodied in a Russian proverb, and has also existed in parts of Germany (Boyes, *Lacon*, p. 157). Emin Pasha adds that, in tempering swords made from meteoric iron (*vulgo*, thunderbolts), the blacksmith uses not water, but milk. Are other instances of this custom known? Has any explanation been offered? Indian folk-lore furnishes two ideas which may illustrate it: one, that the fall of a meteor is a bad omen (*Indian Notes and Queries*, July 1887, 674); the other, that evil spirits are very fond of fresh milk (*ib.*, December 1886, 198). Meteorites and lightning are connected in the minds of ignorant people, particularly, as Emin Pasha tells us, in the present instance. The milk, therefore, whether applied by smith or fire-man, may be rather intended as a propitiation than used for its intrinsic power of tempering steel or extinguishing flame.

F. A. BATHER.

20 Camden Hill Road, Kensington, W., April 29.

#### The Duplex Pendulum Seismograph.

AS the accuracy of the duplex pendulum seismograph has been impugned by a writer in NATURE, vol. xxxvii. p. 571, who at the same time adopts the instrument (with modifications which are, in my opinion, the reverse of improvements) I forward to you comparison diagrams. They show side by side the record given by the seismograph itself, and the real motion of the base of the instrument when that was artificially shaken in a manner that closely imitated an earthquake. The real motion was recorded by means of a multiplying lever hinged by a universal joint in a bracket fixed to a separate support. In both records the motion is magnified about six times. The agreement of the two demonstrates the accuracy of the instrument as an earthquake recorder, alike for large and for small motions. These are examples of tests which I have been in the habit of applying to seismographs since 1880 (see Proc. R. S., vol. xxxi. p. 440). In the present case the test was made with one of the duplex pendulum seismographs made and sold by the Cambridge Scientific Instrument Company, and described by me in NATURE, vol. xxxiv. p. 343.

J. A. EWING.

University College, Dundee, April 20.

#### Self-Induction.

I HAVE to apologize for erroneously attributing to Dr. Lodge a suggestion with reference to the self-induction of wires for high-tension electric discharges. I do not, however, consider, as Prof. Lodge appears to do, that for such discharges it is "on the face of it absurd" to suppose that the self-induction of iron wires is less than that of copper wires of the same dimensions. Prof. Ewing has suggested that for very small values of the magnetizing force,  $H$ , iron may possibly behave as a diamagnetic body, and the corresponding values of the magnetic susceptibility,  $k$ , may be negative. The values of the magnetic induction,  $B$ , which are given by the equation—

$$B = (1 + 4\pi k)H,$$

will be less than  $H$ , because  $k$  is negative. The rate of increase of  $B$  with  $H$  will be less than unity for iron if this supposition is true, and will be equal to unity for copper, for which we may suppose that the value of  $k$  is negligible. The coefficient of self-induction, which will be proportional to the rate of increase of  $B$  with regard to  $H$  for wires of the same dimensions will accordingly be less for the iron than for the copper.

City and Guilds Institute, May 2.

W. E. SUMPNER.