

Europe, or sensibly depress the temperature of the east of North America.

Mr. Gardner makes the following hypothetical redistribution of land and water :—

“Supposing, as all evidence tends to prove,<sup>1</sup> that Northern Europe and America were connected by continuous land in Eocene time, would not the mere fact of shutting off the Arctic seas cause a general and perhaps sufficient rise of temperature?”

My answer to this is that such an arrangement of land and water in the North Atlantic would raise considerably the present minimum temperature of the east coast of North America, but would produce little or no effect in raising the already maximum temperature of West Europe, which already receives the full benefit of the Gulf Stream, and suffers none of the injuries of the Labrador current.

It seems to me not possible to raise the mean annual temperature of Bournemouth 15° F. or 20° F. without supposing an increased Gulf Stream; in other words, an increased sun-heat, which is contrary to the ideas of Lyell and his followers.

I must again ask Mr. Duncan to name the species of bamboo that flourishes so luxuriantly at Cooper's Hill under the disadvantageous conditions he has so well described.

If he decline to do so I have no other remedy than to go to the Indian Engineering College on my next visit to London, and inspect and report on the bamboo myself.

Trin. Coll. Dub., November 23

SAML. HAUGHTON

#### “Sulphuric Acid and Alkali”

MR. MACTEAR informs me that the statements contained in my review of Prof. Lunge's second volume, which appeared in your columns last week, require amendment, and I beg, in justice to Mr. Mactear, to make the following remarks :—

1. It appears that the direct object of Mr. Mactear's process is to reduce the amount of limestone to the least possible amount. Hence the words “in excess of that usually worked” are to be omitted in the sentence referring to this subject.

2. With regard to the statement that many thousands of pounds have been gained in a single works by the adoption of Mr. Mactear's process, that gentleman has placed in my hands the proof that this fact is correct.

There remains however no doubt that, in the Lancashire district at least, the liming process is not now so generally adopted as Dr. Lunge implies; but this may be explained by the fact that Mactear's process greatly reduces the quantity of caustic soda, and this does not suit the Lancashire plan of working.

H. E. ROSCOE

#### A General Theorem in Kinematics

PROF. MINCHIN has been anticipated in his discovery of the theorem on uniplanar motion given in NATURE, vol. xxiii. p. 62. It was published some six years ago by Prof. W. Schell of the Polytechnikum, Karlsruhe, in the *Zeitschrift für Mathematik und Physik*, xix. 3. The paper containing it is entitled “Ueber den Beschleunigungszustand des ebenen unveränderlichen, in der Ebene beweglichen Systems,” and commences at p. 185. The two parts of the theorem will be found in leaded type at pp. 190 and 192. The paper (which is an admirable specimen of clear writing) is purely kinematical, and treats only of motion *in plano*. The dynamical consequences pointed out by Prof. Minchin are accordingly not to be found in it; nor the analogous theorem for the general motion of a rigid body obtained by Prof. Wolstenholme. The following quaternion proof of the latter theorem may interest some of your readers.

The velocity  $\dot{\rho}$  of the particle at vector distance  $\rho$  from a fixed origin is—

$$\dot{\rho} = a + V\beta\rho,$$

$a$  being the velocity at the origin, and  $\beta$  the angular velocity.

The acceleration is therefore—

$$\ddot{\rho} = \dot{a} + V\beta\dot{\rho} + V\beta(a + V\beta\rho),$$

and will be zero for one definite value of  $\rho$ .

Taking the point of no acceleration for origin, the constant terms in the expression for the acceleration must vanish, and the expression will be reduced to—

$$\ddot{\rho} = V\beta\dot{\rho} + V\beta V\beta\rho,$$

which is identical with Prof. Wolstenholme's result.

Malone Road, Belfast, November 22

J. D. EVERETT

#### Phosphorescent Centipedes

ON September 28 last I was walking in my garden here at eight o'clock in the evening with a friend, when we were

<sup>1</sup> I entirely deny this, but will not now turn aside from my present purpose to discuss it.

simultaneously attracted by a bright light about twenty paces in front of us. The light was so bright that in the distance it looked like moonlight through the trees; and had the moon been shining we should probably not again have thought about the light until we came upon it. But it was a dark night, though warm and even sultry, and still. The light was so bright that, taking a letter out of my pocket, I could read it. It resembled an electric light, and proceeded from the bodies of two centipedes and their two trails. The centipedes were about four inches apart. The light illumined the entire body of the animal, and seemed to increase its diameter three times. It flashed along both sides of the creature in sections; there being about six sections from head to tail, between which the light played. The light behaved precisely like the electric light, moving as it were perpetually in two streams, one on each side, and yet lighting up the whole body. In the trail there was no movement, but light only. The trail extended 1½ foot from each centipede over the grass and the gravel-walk, and it had the appearance of illumined mucus.

Having observed these creatures for several minutes, I picked one of them up and lodged it in a box which had been procured from the house, for further observation. On touching the centipede the light in both animals, as well as in both trails, was instantly extinguished. Later in the evening we found another centipede, and this also emitted light in the same manner, both from body and trail as I have described. My gardener then informed me that he had observed these creatures during the previous three or four evenings, both in the garden and in the stableyard.

On the following day I took the centipede to Prof. Flower, who, with the assistance of the authorities of the British Museum, has identified the species as *Geophilus subterraneus*.

The published descriptions of the luminous properties of the British centipedes differ considerably from what I observed in this instance.

The best, so far as I know, is given in Shaw's “General Zoology,” vol. vi. After describing the animal, it proceeds thus: “It is possessed of a high degree of phosphoric splendour, which, however, seems to be only excited when the animal is pressed or suddenly disturbed, when it diffuses a beautiful smaragdine light, so powerful as not to be obliterated by the light of two candles on the same table.”

I may observe that I was never able to induce my centipede to shine whilst in captivity. It may also be worthy of note that the atmosphere was exceptionally dry and the barometer remarkably high at the time of the observation.

B. E. BRODHURST

Grange Court, Chigwell, November 22

#### The Yang-tse, the Yellow River, and the Pei-ho.

ALTHOUGH the conclusions at which Dr. Woeikof has arrived (NATURE, vol. xxiii. p. 9) with regard to my estimations of the discharge of water and sediment of the Yang-tse and Pei-ho may militate against their being accepted as generally typical of these two rivers, I would urge that another series of observations would be of more service in either correcting or in corroborating my estimations.

In the case of the Yang-tse it will have been seen that, according to the estimate of Capt. Blakiston at I-chang and of my own at Hankow—500,000 and 650,000 cubic feet of water per second respectively,—this river increases its discharge by 150,000 cubic feet in the 360 miles that intervene between these two places of observation. In this portion of its course the Yang-tse not only receives the waters of the Han, but is also the recipient of those of the Tung-ting Lake; and the increase it receives from these two important tributaries—an amount exceeding the water-discharge of the Nile<sup>1</sup>—is not such as would support the conclusion that my estimate for the Yang-tse at Hankow is under the usual average.

My observations on the Pei-ho, referring as they do to only a portion of the year, are more open to correction; and a series of observations throughout the entire twelve months are certainly to be preferred.

In conclusion I may state that, although my various estimations are open to criticism, my object will have been gained if, by inviting further inquiry into the hydrological features of the great river system of China, an accurate knowledge of them is obtained.

H. B. GUPPY

<sup>1</sup> 130,000 cubic feet per second.