The greatest disturbance appeared at the third pendulum (S.W. to N.E.), with oscillations 6 cm. large; the maximum, with two well-defined periods, was from 8h. 23m. 52s. until 9h. 8m. 43s. a.m. Tremors followed until 11h. 30m. a.m.; the preliminary tremors of this pendulum, commencing 7h. 45m. 25s. a.m., showed three well-marked maxima. Other very small tremors preceded, the pendulum being troubled all the preceding night, perhaps by the winds.

On February 11, there was a small disturbance on the second and third pendulum 11h. 39m. 48s.; February 13, a very great one on all three pendulums from 2h. 31m. 54s. until 3h. 8m. a.m., with oscillations up to as much as 2·1 cm., and preceded on pendulum three by a preliminary motion, on February 12, from 11h. 2m. 2s. p.m. until 11h. 34m. 38s. p.m.

A very great perturbation was observed on February 19, on the third pendulum, from 10h. 11m. until 10h. 39m. p.m.; and on February 20, from 0h. 11m. 15s. until 1h. 20m. 10s. a.m. The first pendulum (E. to W.) had a very great motion from 0h. 11m. 16s. until 1h. 49m. a.m., February 20, followed by a long series of tremors. The second pendulum was not in activity.

Dr. Ehlert (Strassburg) has put the box with the three pendulums on a short, stout, isolated sandstone pillar, to avoid the earth-waves being concealed or wholly annihilated by the frictions and elastic motions taking place in a large pillar of masonry; and the pendulums, set up in such a manner, give very accurate records of vibrations, change of level, &c. They can be made extremely sensitive. The whole instrument may be purchased for 51*l.*, with recording apparatus and lamp (Strassburg, I. and A. Bosch); and I should like to recommend it, for the seismic survey of the world, for each station of this international survey. The distinct directions and movements of the three pendulums are showing (1) each motion of the earth-crust coming from whatever an azimuth; (2) the chief direction of the seismic wave; (3) the temporary figure of the wave; (4) their splitting-up in different trains of waves. They are disturbed also by vertical shocks.

G. GERLAND.

Strassburg, March 31.

Relationship between the Masses and Distances of the Four Outer Planets.

LET the mean distance of Jupiter be the unit of measurement for the four outer planets. The distances are then as follows.

Jupiter.	Saturn.	Uranus.	Neptune.
1	1·8338	3·6869	5·7765

Now take the following numbers as the masses—

Jupiter.	Saturn.	Uranus.	Neptune.
312	92·513	13·604	15·969

and multiply the masses into the distances. We then obtain

Jupiter.	Saturn.	Uranus.	Neptune.
312	169·65	50·157	92·245
J	S	U	N

Let the last series of numbers be J, S, U, N, respectively. Then

$$U S = N^2 \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$
$$U J = N S \quad . \quad . \quad . \quad . \quad . \quad (2)$$
$$U + N + S = J \quad . \quad . \quad . \quad . \quad . \quad (3)$$

In fact, the numbers are in geometrical progression, having a common ratio R = 1·8391. So that

$$U R = N \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (4)$$
$$U R^2 = S \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (5)$$
$$U R^3 = J \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (6)$$

The common ratio 1·8391 is nearly the mean distance of Saturn 1·8338, and is one of the solutions of a biquadratic equation

$$x^4 - 2x^3 + 1 = 0.$$

G. E. SUTCLIFFE.

The Hermitage, Coorla, Bombay, March 19.

X-Ray Photography.

IT may interest the readers of NATURE, that it is possible to take shadowgraphs (so-called) instantaneously without any special arrangement of induction coil or deviation in the form of Jackson tube.

The apparatus used consists of 10-inch Apps' induction coil, a Jackson focus tube supplied by Messrs. Newton (one of a set of twenty-five I have in my possession), and a set of small secondary batteries, about 30 ampère hour capacity, six cells in the set. The induction coil is of the ordinary type with ordinary commutator.

For the purpose of obtaining these results in such short exposures, a special choice of tube is necessary, working the tube for a considerable period before desired condition is arrived at, and that condition judged by experience, for no ampère measurement will give the information. The tube must be strongly heated by a spirit lamp, and when the desired condition (tube being of course connected with coil) is arrived at, the exposure must take place.

(1) By instantaneously turning current on and off.

(2) By interposing a ½-inch iron plate between tube and object to be shadowed, removing plate for the exposure.

Having carefully timed the exposures, I have been able to repeat the experiment with assured success. For some time past I knew that hands and arms of children could be taken in from twenty to thirty seconds, but have now succeeded in taking children's hands in half a second (showing all bones and cell tissue of bones), and adults' hands, bones of wrist, and even arms, with exposure of only one second, again showing cell tissue of bones.

It is interesting to note that everything connected with the production of these results was made in England.

WILLIAM WEBSTER.

Art Club, Blackheath, March 30.

A New Scientific Club.

MY attention has been drawn to a circular in favour of a new Club, in which my name appears as one having consented to become a member. I know nothing of the Club, nor have I in any way authorised the use of my name.

12 Arundel Gardens, W., April 9. W. RAMSAY.

DEEP-SEA FISHES OF THE NORTHERN ATLANTIC.

THE examination of the deep-sea fishes which have been collected by means of the dredge or trawl during the last twenty-five years, has now been almost completed; at least the results of this examination, as far as it has gone, are now before us, and form the most interesting and attractive portion of the ichthyological literature of our time. The harvest reaped by the various expeditions, surveys, and private enterprises, which have been fitted out to explore the mysteries of the sea, has far exceeded the most sanguine expectations, and it is satisfactory to find that the six or seven volumes devoted to ichthyology have been placed before the public in a style and with a wealth of illustration worthy of the interest attached to the subject. The first to appear was the volume descriptive of the deep-sea fishes collected during the Norwegian Expedition to the North Atlantic from 1876 to 1878, by R. Collett (Christiania, 1880, 4to, pp. 166, with five double plates); this was followed, in 1887 by the Report on the Deep-sea Fishes collected during the *Challenger* Expedition (1873–76), in which were incorporated the proceeds of the Faeröe Channel Exploration (1880 and 1882) (London, 1887, 4to, pp. lxv. + 335, with 73 plates); the collections made by the French expeditions of the *Travailleur* and *Talisman* (1880–83) were described by L. Vaillant (Paris, 1888, 4to, pp. 406, with 28 plates); in the Indian Ocean, H.M. Indian Marine Survey steamer *Investigator* has added largely to our knowledge of the bathybial fauna from year to year since 1885, the collections being described by A. Alcock in a series of papers which appeared in periodicals, and were supplemented afterwards by "Illustrations," of which three parts, with fifteen plates in quarto, have been issued under the authority of the Director of the Royal Indian Marine in Calcutta, 1892–95; finally, the collections made in the North Pacific by the U.S. Fish

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