

### "Weather Forecasts"

I HAVE recently designed and patented "An improved floating vessel for automatically compressing air by the action of the waves of the sea, and also for the generation of electricity by the agency of this compressed air." This vessel is capable of being moored in 1000 fathoms, and can be connected with the shore by means of an insulated electric cable. Such a vessel moored in the mid-Atlantic in the usual track of the cyclones which approach these islands from the west, would be of immense advantage to the Meteorological Office in determining the velocity of advance and direction taken by these cyclonic centres. I purpose exhibiting a model and drawings of the vessel at the Winter Electric Exhibition, to be held at the Westminster Aquarium next month.

CHARLES W. HARDING

King's Lynn, November 14

### Age of Dogs

I AM acquainted with a black retriever dog aged thirty-one years, and should like to know whether this age is often attained by dogs.

R. CORDINER

Oxford, November 15

### Waterspouts on Land

WHEN on a fishing expedition this year, in the mountainous district of Minnigaff, in this country, my attention was drawn to the effects of two waterspouts, which had taken place, one in July last, and the other some six months previously. The effects of both are to be seen in the faces of two mountains a mile apart. One is on a hill-farm called Blac Klaggan, about 100 yards above a mountain-stream, where an excavation, by the force of the spout, had been made to the depth of ten or twelve feet, and about twenty yards wide. Stones—boulder-stones from 10 cwt. to 3 tons, were spread out, in the course of the torrent, down to the "burn," which runs below—one boulder, lying in the bed, being quite 3 tons weight. The other waterspout had struck on *White Laggan*, on a steep mountain side, facing the upper part of Loch Dee. It was higher up on the hill, and had cut to the depth of about 15 feet, and was 10 yards wide, scattering the earth and boulders before it, to a distance of 150 yards below, and spreading out the smaller stones and gravel over a flat moor, in varied tracks, more than 100 yards further. I have not heard of anyone who saw either waterspout, and both are supposed to have taken place at night. All the other parts of both mountains are covered with heather and grass, above, on each side, and below, except in the direct course cut by the torrent from each waterspout. No one remembers any previous case of the sort in the district. Perhaps some of your readers can give other instances of this kind, and some information that may prove interesting and useful.

JAMES HOSACK

Ellerslie, Kirkcudbright, N.B., November 13

### METEOROLOGY OF THE MALAY ARCHIPELAGO<sup>1</sup>

THE two systems of meteorological observations carried on under the direction of the late Dr. Bergsma present us, in these two serial publications, with what must be classed among the most remarkable contributions made in recent years to observational science, and they are all the more valuable on account of the new and exact information they give as to the different climates of the Malay Archipelago, about which so little was previously known.

The first and longest continued series of observations made at the observatory at Batavia take rank among the very best yet made. They embrace hourly observations for the fifteen years ending with 1880, of atmospheric pressure, temperature, humidity, rain, wind, cloud, &c., which have been published in *extenso*. During the first thirteen years the records consisted wholly of eye-observations, but from the beginning of 1879 the observations were made by photographically and other self-recording

<sup>1</sup> Observations made at the Magnetical and Meteorological Observatory at Batavia, 1866 to 1880. Regenwaarnemingen in Nederlandsch-Indië, 1879-80-81. Door Dr. P. A. Bergsma, Directeur van het Observatorium te Batavia.

instruments. In vol. v., in addition to the hourly observations for 1879 and 1880, there is given a discussion of the fifteen years' observations, which from the excellence of its design and execution, represents the meteorology of Batavia with a fulness and completeness at least equal to what has yet been done for any other place on the globe.

Among the more interesting results, those of the rainfall may be pointed to, particularly the tables showing the mean amounts for the different hours of the day. These reveal two daily maxima and two minima. The larger maximum occurs from 2 to 7 p.m., when 32 per cent. of the whole daily fall takes place, and the larger minimum from 6 to 11 a.m., when only 13 per cent. of the daily amount falls. The smaller maximum is from 10 p.m. to 2 a.m., when 17 per cent. falls, and the smaller minimum during the two hours from 8 to 10 p.m., when 7 per cent. falls.

The most remarkable, if not the most important of the results arrived at are perhaps those referring to the influence of the moon on the pressure and temperature of the atmosphere and the rainfall, which establish the fact of a distinct lunar atmospheric tide. Assuming the lunar day to commence with the time of the upper transit of the moon, the following are the phases above or below the mean expressed in millimetres:—

	mm.
1st max. +0.057 at lunar hour	1
„ min. -0.053 at „	7
2nd max. +0.064 at „	13
„ min. -0.060 at „	19

The lunar tide has been determined for each of the four quarters, and also at perigee and apogee, and the results show differences of great interest. As regards the rainfall, while the mean amount in 24 hours during the 17 years ending with 1880 was 5.19 mm., at the time of new moon there was a mean excess of 0.94 mm., and at full moon also an excess of 0.19 mm., but on the other hand, at the third octant there was a deficiency of 0.61 mm., and at the fifth octant also a deficiency amounting to 0.55 mm.

The result is that the atmospheric pressure at Batavia has a lunar daily tide quite as distinctly marked as the ordinary diurnal barometer tide, except that its amplitude is much less, the lunar daily tide being as compared with the mean solar daily tide nearly in the proportion of a millimetre to an English inch. The lunar tide has also the important difference in that its phases follow the moon's apparent course much more closely than the diurnal barometric fluctuations follow that of sun. The two maxima occur about the 1st and 13th, and the two minima about the 7th and 19th lunar hours, whereas these four daily phases of the diurnal barometric fluctuation occur with respect to the sun's apparent course from one to six hours later. The influence of the moon's phases on the rainfall is quite decided; for while the mean daily rainfall is 0.205 inches, it rises at full moon to 0.248 inch, from which time it gradually falls to 0.181 inch at the third octant, rises to 0.212 inch at the fourth octant, then falls to 0.184 inch at the fifth octant, and finally rises gradually to the maximum at the time of new moon. The important conclusion follows that the attractive influence of the moon, and consequently that of the sun, must be taken into account as factors concerned in bringing about oscillations of the barometer. In this connection it is interesting to note that in the higher latitudes in inland situations during winter, or at times and situations where the disturbing influences of temperature and humidity tend towards a minimum, the times of occurrence of the four phases of the daily oscillation of barometer approximate to those of the daily lunar atmospheric tide.

The second series of observations, giving the rainfall for the three years 1879, 1880, and 1881, form an extremely valuable contribution to our knowledge of the climates of