

*Dichlorinated Marsh-gas.*

Monatomic salt . . . . .  $[(C H_2 Cl)' (C_2 H_5)_3 P]' Cl.$

Diatomic salt . . . . .  $[(C H_2)'' (C_2 H_5)_3 P]'' Cl_2.$

*Trichlorinated Marsh-gas.*

Monatomic salt . . . . .  $[(C H Cl_2)' (C_2 H_5)_3 P] Cl.$

Diatomic salt . . . . .  $[(C H Cl)'' (C_2 H_5)_3 P]'' Cl_{\frac{3}{2}}.$

Triatomic salt . . . . .  $[(C H)''' (C_2 H_5)_3 P]''' Cl_3.$

*Tetrachlorinated Marsh-gas.*

Monatomic salt . . . . .  $[(C Cl_3)' (C_2 H_5)_3 P] Cl.$

Diatomic salt . . . . .  $[(C Cl_2)'' (C_2 H_5)_3 P]'' Cl_2.$

Triatomic salt . . . . .  $[(C Cl)''' (C_2 H_5)_3 P]''' Cl_{\frac{3}{2}}.$

Tetratomic salt . . . . .  $[C^{iv} (C_2 H_5)_3 P]^{iv} Cl_4.$

June 20, 1861.

Major-General SABINE, R.A., Treasurer and Vice-President,  
in the Chair.

In accordance with the Statutes, notice of the ensuing Anniversary Meeting was given from the Chair.

Dr. Heinrich Debus, Mr. Campbell De Morgan, Dr. Thomas A. Hirst, Professor James Clerk Maxwell, Dr. Edmund Alexander Parkes, Professor William Pole, Mr. Philip Lutley Sclater, Professor Henry John Stephen Smith, and Dr. Thomas Thomson, were admitted into the Society.

The following communications were read :—

## I. "On the Lunar Semidiurnal Variation of the Barometer."

By JOHN ALLAN BROWN, Esq., F.R.S., Director of the Trevandrum Observatory. Received May 30, 1861.

The results obtained hitherto for the lunar diurnal variation of atmospheric pressure have been received with some doubt; the range of the variation has been found to be small, and the proximity to the sea of the stations for which the discussions have been made, has given some value to the idea that the variation is due simply to the tidal rise and fall of the sea, the base of the atmosphere. It has even been suggested that the barometer should be incapable of showing an atmospheric tide, because the gravity of the mercury is diminished by the lunar attraction, as well as that of the atmosphere; this suggestion, however, omits all consideration of the integrating means by which a tide is formed.

I have considered the question at two stations in the following manner. Simultaneous observations of two standard barometers of the same construction, with boiled tubes 0·65 inch internal diameter, were made hourly during fifteen months (April 1857 to June 1858) at two observatories; one at Trevandrum 200 feet above the sea-level and three miles distant from the sea, the other on the summit of the Agustier peak of the South Indian Ghats, 6200 feet above the sea, about 22 miles from Trevandrum, 25 miles from the sea on the west, and 40 to 60 miles from the sea on the south and east. The means of all the observations give the following results.

*At Trevandrum.*—The lunar diurnal variation of atmospheric pressure has two nearly equal maxima, occurring almost exactly at the moon's passages of the upper and lower meridian, the minima occurring six hours before and after these epochs.

*At Agustier (6200 feet).*—The law is nearly the same as to epochs, the maximum for the inferior passage occurring, however, about one hour later, and each minimum occurring about one hour nearer the upper passage.

The chief difference in the two results is that between the relative values of the maxima and minima. The oscillation occurring while the moon is below the horizon, or between the meridians of 6<sup>h</sup> and of 18<sup>h</sup>, has the same amount at Trevandrum (height 200 feet) and at Agustier (height 6200 feet); but the oscillation occurring while

the moon is above the horizon, has twice the amount at the lower station which it has at the upper station.

This curious result, which it is difficult to explain by any theory depending simply on the attraction of gravitation, whether acting on the sea or the atmosphere, agrees remarkably with the conclusions for the solar diurnal oscillation obtained from the discussion of hourly observations made simultaneously during a month at five different stations, four of these being on the Agustier mountains, rising gradually from 1200 to 6200 feet, the fifth station being at Trevandrum. From these observations (an abstract of which will be found noticed in the Report of the British Association for 1859, Trans. of Sect., p. 46), it appeared that the solar semidiurnal oscillation between 9 P.M. and 9 A.M. was nearly the same at all the stations; while the day oscillation, 9 A.M. to 9 P.M., diminished with the height, being at 6200 feet little more than half the amount of the oscillation at 200 feet.

These facts might be put into the following general form :—When the heavenly body (sun or moon) is *below the horizon*, the semidiurnal oscillation of the barometer within the tropics has the same value at all heights up to 6200 feet; but when the body is *above the horizon*, the oscillation at 6200 feet has only half the amount of the oscillation at the level of the sea.

II. “On the Law of Disturbance and the Range of the Diurnal Variation of Magnetic Declination near the Magnetic Equator, with reference to the Moon’s Hour-angle.” By JOHN ALLAN BROWN, Esq., F.R.S., Director of the Trevandrum Observatory. Received May 30, 1861.

The discovery by Dr. Lamont of a “decennial” period in the range of the solar diurnal variation of magnetic declination, naturally leads to the question whether a similar law may not exist for the lunar diurnal variation; the question is also of importance in connexion with the theory of the cause of these variations. The following results for the range of the lunar diurnal variation were obtained from the discussion whose conclusions were given in the Proceedings of the Royal Society, vol. x. p. 475.