Observations and Remarks on the Figure, the Climate, and the Atmosphere of Saturn, and its Ring. By William Herschel, *LL.D. F.R.S.* Read June 26, 1806. [*Phil. Trans.* 1806, *p.* 455.]

The observations made by Dr. Herschel last year, on the figure of Saturn, having drawn the attention of astronomers to the subject, a further investigation of it appeared to him to be necessary. Those, he says, who compare his former figures of the planet (in which the particular shape of the body was not meant to be represented,) with that annexed to his last paper, and wonder at the difference between them, have not attended to the measures he had given of the equatorial and polar diameters of it; these, as established in 1789, are the same as in his last figure, which differs only in having the flattening at the pole a little more extended on both sides; and as his attention, in 1789, was entirely taken up with an examination of the two principal diameters of the planet, it is not, he thinks, extraordinary that the singularity of its shape should then have been overlooked by him.

After some observations on the magnifying powers necessary to be used in observing the figure of Saturn, Dr. Herschel proceeds to relate the observations made by him, for that purpose, in the months of April, May, and the beginning of June, of the present year. He first, however, gives an observation made in the year 1788, from which it appears, that he had then observed the shape of Saturn not to be spheroidical (like that of Mars or Jupiter), but much flattened at the poles, and a little flattened at the equator.

The observations made this year by our author, agree with those made last year, in establishing, that the flattening at the poles of Saturn is more extensive than it is in Jupiter: also that the curvature in high latitudes is greater than in the last-mentioned planet; but, on the contrary, the curvature at the equator is rather less in Saturn than it is in Jupiter.

In the observation of May 16, of the present year, the greatest curvature in the disc of Saturn appeared to be at the latitude of about 40°.

Upon the whole, the figure of Saturn may, Dr. Herschel says, be called a spheroid, while that of Jupiter may be called an ellipsoid.

Our author now proceeds to notice some observations he has made on the periodical changes in the colour of the polar regions of Saturn. From those made in the years 1793, 1794, and 1796, when the south pole of the planet had been long exposed to the influence of the sun, it appeared that the regions about that pole had lost their former whiteness; and that the whiteness of the northern hemisphere was increased. Those made in the present year, when the north pole of Saturn is exposed to the sun, show that its regions have lost much of their brightness; while those about the south pole have regained their former colour, and are brighter, and whiter, than the equatorial parts.

Respecting the atmosphere of Saturn, Dr. Herschel observes, that

the brightness remaining on the north polar regions is not uniform, but is tinged with large dusky spaces, of a cloudy atmospheric appearance. From which, and the fore-mentioned changes of colour at the polar regions, added to the changes he has formerly observed in the belts, we have, he thinks, sufficient reason to infer the existence of a Saturnian atmosphere.

The Bakerian *Lecture, on some chemical Agencies of Electricity. By* Humphry Davy, *Esq. F.R.S. M.R.I.A.* Read November 20, 1806. [*Phil. Trans.* 1807, *p.* 1.]

The chemical effects produced by electricity have, Mr. Davy says, long been objects of attention; but the novelty of the phenomena, their want of analogy to known facts, and the apparent discordance of some of the results, involved the inquiry in obscurity.

It was very early observed, that acid and alkaline matter appeared in water acted upon by a current of electricity; but Mr. Davy soon found that the muriatic acid came from the animal or vegetable matters employed to connect the two portions of water; for when the same cotton was repeatedly used, it ceased to be evolved. The soda, in like manner, was found to proceed from the corrosion of the glass tube, as it did not appear in water electrified in an agate cup.

To be more certain of this effect, some distilled water was electrified in two agate cups, by the current from 150 four-inch plates, the communication between the cups being formed by moistened amianthus. In the first experiment soda was produced in the negative cup, but the quantity was much less than when glass tubes were used; and on repeating the experiment, its quantity decreased, so that in the fourth experiment the presence of soda was scarcely perceptible in the residual water. The water in the other tube was sour, and appeared to contain nitrous acid, with excess of nitrous gas. As similar effects were produced by electrifying water in small gold cones, Mr. Davy suspected that some minute portion of saline matter had been carried over during the distillation of the water; notwithstanding it did not affect nitrate of silver, or muriate of barytes. And on evaporating a quantity of it in a silver vessel by a heat not exceeding 140° Fahrenheit, a small residuum was actually left, which appeared to be a mixture of nitrate of soda with nitrate of lead. A portion of this residuum being added to water electrified in the usual manner, and which had attained the maximum of its effect upon turmeric paper, considerably increased those effects.

Water slowly distilled, being electrified either in gold cones or agate cups, did not evolve any fixed alkaline matter, though it exhibited signs of ammonia; but in tubes of wax, both soda and potash were evolved, and the acid matter in the positive cup was a mixture of sulphuric and muriatic acids. In a tube of resin the alkali was principally potash. In cups of Carrara marble, primitive marble from Donegal, argillaceous schist from Cornwall, serpentine from the Lizard, and grauwacke from North Wales, soda was uniformly evolved.