water of towns, and successive memoirs, with almost identical titles, made their appearance either in the Society's *Transactions* or among the Reports of the British Association. The Royal Society's Catalogue shows that Smith was the author of about thirty papers on air and water. These he eventually collected and published, with considerable additions, in the form of a thick octavo volume, entitled "Air and Rain, the Beginnings of a Chemical Climatology," with a dedication to his friend and teacher Liebig. This book shows Smith at his best and at his worst. It is full of facts and quaint out-of-the-way references; on the other hand, it is diffuse, and, as a piece of literary work, badly put together—faults difficult to avoid in a compilation based upon, or largely composed of, papers already published. That Smith had considerable literary skill, and a sound critical faculty, may be seen in the short memoir on Graham prefixed to the collection of that philosopher's papers brought together and published, with a reverential care, by the late Dr. James Young of Kelly. Smith had years before saturated his mind with the notions of the Hellenic atomists, even before the time he wrote his monograph on Dalton, and in this short prefatory memoir of some twenty pages he crystallises out his thoughts on the development of the atomic systems of Kapila, Leucippus, Lucretius, Newton, and Dalton, and shows with admirable lucidity Graham's true relation to these great thinkers. Smith, however, would never have made a good teacher, despite his wish, in early life, to connect himself with some place of higher chemical instruction. When at his best he was not an ineffective speaker; but he was wanting in power of exposition, and his metaphysical tendencies and his quaint playful fancy were only too apt to disturb the even tenor of a sustained description, or closely reasoned argument. No man, however, was more popular among young men, for he had a genuine sympathy with youthful aspirations, and a kindly way of drawing out and encouraging what was good in them, and there are dozens of men still living who have to thank the gentle, quiet-spoken philosopher and friend for their first step in life. He had, too, his countrymen's tenacity of friendship: it took a very violent wrench indeed to disturb a confidence once placed.

From 1842 Smith was closely connected with Manchester. In that year he settled himself in the town as a consulting chemist. Shortly afterwards he became a member of the Literary and Philosophical Society of Manchester—a society made famous by its connection with Dalton and the Henrys—and much of his work appears in the *Memoirs* and *Proceedings* of that body. In 1855-56 he became one of its honorary secretaries, in 1859 a vice-president, and in 1864-65 president. In his "Centenary of Science in Manchester," published a short time ago, he has sketched, in characteristic manner, the growth of that institution, and has sought to trace its influence on the development of scientific life in Lancashire.

In 1863 Smith was appointed Inspector-General of Alkali Works for the Government, and the somewhat delicate task of initiating the working of Lord Derby's Act fell to him. He performed this duty with characteristic tact and with every desire to avoid undue interference with the legitimate business of the alkali maker. The successful working of that Act is largely due to the manner in which Smith and his subordinates set it in operation. On the passing of the Rivers' Pollution Act he was made Inspector for England, and afterwards for Scotland. He held both these appointments up to the time of his death.

Angus Smith had a passionate delight in the Highlands, and the smell of a peat fire was to him as incense. He had something, too, of the Highlander's love of mysticism in his composition, and throughout his life he found pleasure in Celtic literature; and it was with a mind well stored with legends that he produced "Loch Etive and the Sons of Uisnach," published anonymously in 1879.

Smith lived the "quiet life" of Pope's philosopher. His temper was singularly even and placid: he had his checks and crosses, of course, like other men, and he was occasionally pained to find himself misunderstood. But nothing ruffled his calm. His perfect transparency, his charming simplicity, and a certain quiet playfulness of manner gained for him the sobriquet of "Agnus" Smith. Indeed, his sense of fun could see the latent humour in any situation. Even on his death-bed it was with him. Somebody had said that they were not going to part with him yet. "You will be clever people," he rejoined, with the old twinkle in his eye, "if you keep me here three days longer."

Smith became a member of the Chemical Society in 1845, and a Fellow of the Royal Society in 1857, and in 1882 the University of Edinburgh conferred the honorary degree of LL.D. upon him.

T. E. THORPE

NORWEGIAN GEODETICAL OPERATIONS[1]

THE first part of this publication, published in 1882, was reviewed in NATURE, February 8, 1883. The second part, now before us, consists principally of a series of tables giving the results of the observations at the following tidal stations:—Stavanger from 1881 to 1882, Throndhjem from 1880 to 1881, Kabelvaag from 1881 to 1882, and Vardoe from 1880 to 1882. These tables are arranged precisely as in the first part; it is therefore unnecessary to refer to them more particularly.

A description, accompanied by a drawing, is given of the self-registering apparatus used. The float, placed in a tube, is connected by means of a fine wire to a wheel 50 cm. diameter, and the wire is kept taut by a counterweight acting on a second concentric wheel. On the axis of these wheels, and rigidly connected to it, is a pinion 2·5 cm. effective diameter, working on a horizontal rack, to which the scribing pencil is attached. Thus the rise and fall of the tide is measured to a scale of $\frac{2\cdot5}{50}$ or $\frac{1}{20}$. A cylinder, on which is fixed the diagram paper ruled with hour lines, is placed horizontally below the rack, and is driven by a clock connected to it directly by means of gearing, and assisted by a weight attached to a string passing over a pulley. This apparatus is the invention of Lieut.-Col. Haffner, and is made by a watchmaker (G. P. Stenberg) at Bergen.

It is mentioned that, owing to a defect in the self-registering apparatus used at Oscarsborg and at Drontheim, and described in the first part, the observations are not as satisfactory as might be wished. In the instruments used at these stations the motion of the driving clock was communicated to the diagrams by means of a string, and it has been found that the variations in the amount of humidity and of temperature sufficiently affected the length of the string to cause appreciable errors. It should be understood that the readings were taken by means of hour lines ruled on the diagram paper; any alteration in the length of the string clearly affects the accuracy of the position of these hour lines. This source of error has been removed, and new observations taken, which will be published in a succeeding part.

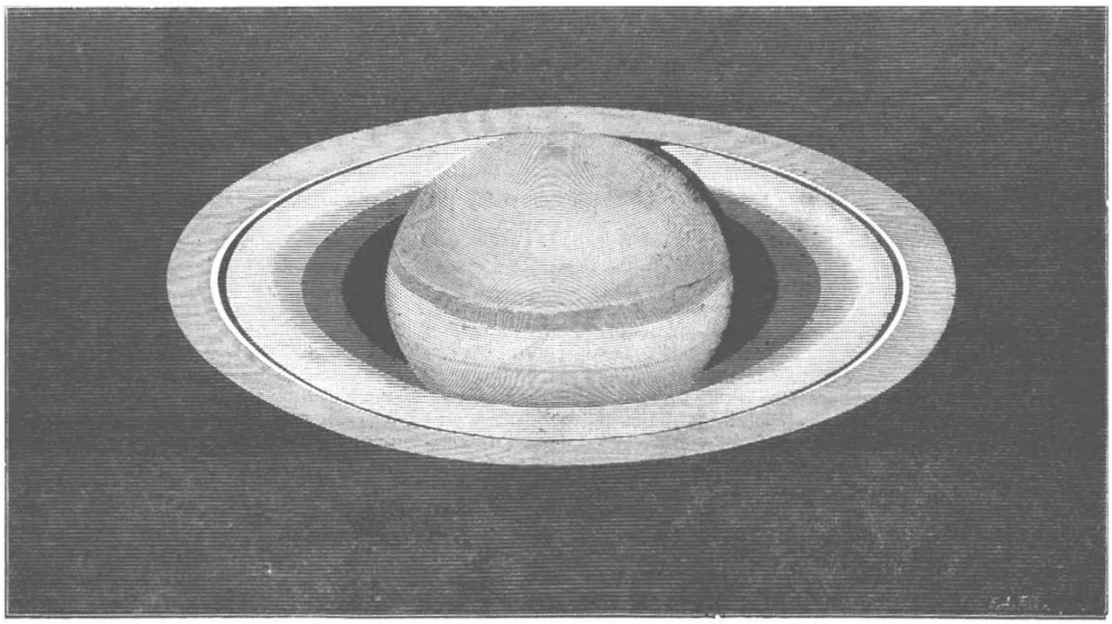
[1] Publication of the Norwegian Committee of the Association for the Measurement of Degrees in Europe, Part II. (Christiania, 1883.)

SATURN

MESSRS. PAUL AND PROSPER HENRY contribute to *La Nature* some interesting information on the recent aspect of the planet Saturn. During the month of February and the beginning of March last

several nights were of exceptional purity so far as regards the definition of stars observed in the telescope. Messrs. Henry say :—

"We took advantage of the most favourable moments to observe with our refractor of 0·38 m. the aspect of the principal planets ; Saturn and his rings attracted our especial attention. The representations of this planet were often of remarkable precision, even when magnified more than a thousand times. It was possible to notice on several occasions curious inequalities in the equatorial band. Outside the known rings we established, around the principal separation (Cassini's division), the existence of a new ring, brilliant and perfectly defined, having a breadth of about $1\frac{1}{2}''$. It is surprising that this ring, which is quite visible, has not hitherto been perceived. But the fact which more particularly struck us in observing Saturn, and which has induced us to publish the accompanying sketch, is that, notwithstanding extremely favourable conditions of visibility, it was impossible to discover the least trace of the external *anse* (Encke's division). That division, indicated since Encke by all the observers who have published drawings of Saturn, and which we believe we had also seen with instruments of moderate power, may well be only the result of an optical illusion. This phenomenon would be produced, in our opinion, by the brilliant ring which we have discovered, and which irradiation causes to appear larger than it really is, while by an effect of contrast we believed we saw, like a black line of separation, what in reality is only a marked difference in the brightness of the rings. By examining at a distance of about three metres the sketch here given, this division may be very clearly noticed as it is usually represented. The experiment will succed even better if one takes the precaution of slightly closing the eyelids. In these conditions the aspect of the drawing is pretty much that which Saturn presents when observed with instruments of ordinary dimensions, or even with powerful telescopes when the definition is imperfect. We may then explain by an optical illusion these differences of aspect observed in the external ring, without its being necessary to attribute them to any modification which has taken place in this curious appendage of Saturn. This interesting planet is now too near the sun for useful observations to be practicable. We shall continue our researches by means of powerful telescopes at the next opposition."



Aspect of Saturn, March 4, 1884.

EARTH CURRENTS[1]

ONE of the most interesting subjects dealt with at the recent Electrical Congress in Paris was earth currents. The absence of published information in France on the behaviour of these erratic disturbers of telegraphic peace has led to an elaborate and careful study of the whole question by M. Blavier, the well-known and distinguished director of the High School of Telegraphy of the Post and Telegraph Administration in France. This has been printed, published, and circulated by the Minister of Posts and Telegraphs (M. Cochery) for the use of the members of the recent Congress.

These earth currents are always present in telegraph lines, varying in geographical and electrical direction and in strength, generally scarcely perceptible, but sometimes acquiring such intensity as to acquire the title of "storms." Their direction depends upon the direction of their earth terminals, and in no way on the route of the wires or on the fact of their being overground or underground. The longer the line the greater their strength. Their strength and direction vary with the hours of the day, and they show well-marked periods of maxima and minima. In fact there appears to be a tide in their affairs clearly following solar influence, and it has been believed by more than one observer that the influence of the moon is also perceptible. There is also an annual period of maximum and minimum, and this follows the well-marked eleven-year period of sunspots. We have just been passing through a period of maximum intensity. 1881 and 1882 were years of considerable activity. Their vagaries are exactly coincident

1 "Étude des Courants Telluriques," par E. E. Blavier. (Paris : Gauthier-Villars, 1884.)