"History of Creation." But, according to a recent reviewer* of the said work, this is what he says of the "true nature of Lichens":—"Every Lichen is really composed of *two distinct plants*: of a low form of *Fungus* (Ascomycetes), which lives as a *parasite* upon the former (?), and upon the nutritive substance prepared by it. The green cells, containing chlorophyll (Gonidia), which are found in every Lichen (?), belong to the *alga*. But the colourless threads (Hyphæ), which, densely interwoven, form the principal mass of the body of the Lichens, belong to the *parasitic fungus*." (Vol. ii. p. 95.) Now, says the reviewer in question, "This doctrine, so dogmatically put forth . . . . is adopted but by a few outside of the extremely Hypothetical school of German botanists; and by the best Cryptogamists of this country and of the Continent is considered a pure Delusion:" a verdict much nearer the truth, it must be confessed, than the assertion that Prof. Schwendener has "cleared up" the "true nature of Lichens." Among "the best cryptogamists of this country" who have expressed themselves as unconvinced by, or opposed to, the dogmata of Schwendener and his admirers, regarding the "true nature of Lichens," are Berkeley, Thwaites, and Cooke—than whom we have certainly no botanists better qualified or entitled to form or to offer opinions on such a subject. The views of Berkeley and Thwaites are referred to in NATURE (vol. x. p. 541) as having been expounded before the Royal Horticultural Society; while those of Cooke are set forth vigorously in his recent "International Scientific Series" volume on "Fungi." See also what the sagacious President of the Linnæan Society (Bentham) says on this subject—*ex cathedrâ*, and therefore summing up judicially—in his anniversary address for 1873 (Proceedings of the Society for May 1873, p. 28):—"There is one part of Sachs' book † (says he) which is an illustration of a very common readiness to take at once as proved any *paradox* or theory opposed to general belief, when a new discovery appears to afford some plausible argument in its favour. In the article *Lichens* . . . he adopts, as an established fact, Schwendener's view that Lichens are Fungi parasitical upon Algæ . . . a series of conclusions founded on a very small number of facts . . . They require much observation and study before the conclusions derived from them can be taught as an established Theory. And whatever be the result, the Group of Lichens is so distinct in its vegetative characters, and at the same time so extensive and varied a one, that it seems more methodical to treat it, as heretofore, as a *distinct class*,‡ than to absorb it in that of Fungi, notwithstanding the close affinity shown by its reproductive organs."

But other German botanists themselves, not inferior in status or experience to Prof. Schwendener, regard, as Bentham does, the Hypothesis that Lichens are the product of a union of Parasitic Ascomycetes with Algæ as far from being proved. For instance, Prof. De Bary, of Halle, and Dr. Stizenberger, of Constance, point this out in the *Botanische Zeitung* for 1870 (pp. 42 and 53). If, by artificial cultivation, such a Union could be made to produce a Lichen, the Theory might be held as proven. But this has not yet been effected, and I venture to think and say it never will be.

There are several difficulties in the natural history of Lichens with which the Schwendenerians have to deal, and which they have not yet, so far as I know, explained away. For instance, the case of Athalline Lichens that have neither Hyphæ nor Gonidia—neither fungoid nor algoid elements—assuming Hyphæ to be necessarily fungoid and Gonidia to be algoid; Lichens that are represented only by Apothecia, which are avowedly lichenoid: though they too may be claimed for the Algæ, inasmuch as Archer has a recent paper "On Apothecia occurring in some Scytonematous and Sorisophonaceous Algæ in addition to those previously known." §

In short, the mantle of Bayrhoffer appears to have fallen on Schwendener; and his Parasitic Theory is merely the most recent instance of German transcendentalism applied to the Lichens!

W. LAUDER LINDSAY

OUR ASTRONOMICAL COLUMN

THE BINARY STAR γ CORONÆ AUSTRALIS.—Professor Schiaparelli has measured this star during the past year with the 8-inch Merz-equatorial of the Observatory of Brera, Milan, where its meridian altitude is less than 8°; an interval of twelve years had elapsed since the last published measures by Powell. The first micrometrical measures were made in 1834 by Sir John Herschel, and from 1847 to 1858 Jacob had given much attention to observations of this star. From the forty-two years' observations thus available, Professor Schiaparelli has calculated an orbit which agrees unusually well with observation, and may be written as follows:—

Peri-astron passage, 1882·774; node, 49° 9′; node to peri-astron on orbit reckoned in the direction of motion, 255° 24′; inclination, 68° 38′; excentricity, 0·6989: semi-axis major, 2″·40; period of revolution, 55·582 years; mean annual motion, −6°·477.

At the calculated peri-astron passage in the autumn of 1882, the distance of the components which was 1″·45 last summer will have diminished, according to the above orbit, to 0″·3. Professor Schiaparelli states that observations are already difficult in his latitude, and will soon become impracticable; the star must therefore be left to the southern observatories, whence measures may be looked for during the interesting period in its revolution now at hand.

It will be seen that γ Coronæ Australis has the shortest revolution of any southern binary, and is fourth on our list in respect of rapid motion.

THE SOLAR ECLIPSE OF 1876, MARCH 25.—It is quite possible that this eclipse, which is given as an annular one in the Ephemerides, may be total for an instant on the North Pacific Ocean in longitude 140° 16′ west of Greenwich, and latitude 35° 39′ north, or near this position it may prove one of those rare phenomena, characterised in our text-books as "total without continuance." The central line traverses the southern and largest island of the Sandwich group, where the eclipse will be annular for a few seconds. At a point in longitude 155° 56′ W., latitude 19° 28′ N., the eclipse commences at 9h. 30m. A.M. local mean time, at 130° from the sun's north point towards the west (direct), and the annulus is formed according to the *Nautical Almanac* elements at 10h. 49m. 10s., and continues ten seconds. This point is a little south of Kaavaroa, by the Admiralty Chart, and close to the spot where the monument to Capt. Cook was erected; the central eclipse leaves this island, Hawaii, near Manienie, also marked on the Admiralty Chart of this group. The eclipse will be central and annular also in Vancouver Island and British Columbia. The central line appears to enter Vancouver at Refuge Cove, Sydney Inlet, leaving it at Orange Point, Duncan Bay, whence its course is to George Point, British Columbia. In Vancouver Island the annulus may continue seven or eight seconds, being formed about 0h. 27m. P.M. local mean time. At New Westminster, British Columbia, calculation gives a large partial eclipse commencing at 11h. 22m. A.M., and ending at 2h. 3m. P.M. local times, magnitude 0·95; here the first impression of the moon upon the sun's disc is made at 127° from his north point towards the west. For further information on the track of the central line over these parts the large Admiralty Chart of Vancouver Island and vicinity should be consulted; the above names of points traversed by the central eclipse are taken from it.

On the central line this eclipse must prove one of very considerable and unusual interest.

BESSEL'S TREATISES.—The first volume of the collective edition of the more important astronomical and other memoirs by the illustrious Königsberg astronomer has been issued under the editorship of Dr. Rudolf Engelmann, of Leipsic. It is a handsomely printed volume in quarto, of nearly 400 pages, and doubtless will find its way into the library of every earnest student of the science.

Amongst the contents of this first volume may be mentioned Bessel's early work, undertaken at the instigation of Olbers, the reduction of Harriot's and Torporley's

* In the *Scotsman* (Edinburgh) for December 3, 1875.
† "Lehrbuch der Botanik," of which a well-known English translation has now been published.
‡ The italics are mine.
§ "Quart. Journal of Microscopical Science," January 1875.

observations of the comet of Halley at its appearance in 1607; his "Development of a general method for calculating the perturbations of comets" from his classical work on the great comet of 1807, published at Königsberg in 1810, and somewhat difficult to meet with now, in its original form; the well-known memoir on the physical condition of Halley's comet with the plates, taken from Vol. 13 of the *Astronomische Nachrichten;* the memoir presented to the Berlin Academy in 1824, entitled "Untersuchung der Theils der planetarischen Störungen, welcher aus der Bewegung der Sonne entsteht;" researches on the Saturnian system, the position of the plane of the rings and their dimensions, the figure and dimensions of the planet, the motions of the Huyghenian satellite and determination of the mass of Saturn therefrom, and the memoir on the theory of this system from Vol. 28 of the *Astronomische Nachrichten;* the Prize Essay "Untersuchung der Grösse und der Einflusses des Vörrucken der Nachtgleichen," to which was attached the motto, "Non frustra signorum obitus speculamur et ortus;" various papers on precession, aberration, &c., which appeared in the *Tabulæ Regiomentanæ*, and elsewhere, and the essay on the "Scheinbare figur eines unvollstandig erleuchteten Planeten scheibe."

The portrait of Bessel after Mandel is prefixed, with reminiscences of his early life, from the correspondence with Olbers, and additional notes by the editor.

The work is entitled "Abhandlungen von Friedrich Wilhelm Bessel herausgegeben von Rudolf Engelmann, —Erster Band, Leipzig, 1875."

THE FLOWERING OF SPRING PLANTS*

DURING the past twenty years the Scottish Meteorological Society has been collecting data relative to the budding, leafing, flowering, and defoliation of trees and plants, and to the migrations of birds in connection with the periodical return of the seasons, and it was proposed some time ago to discuss the material which has been accumulated. As preliminary, however, to this very difficult line of inquiry, it was resolved to discuss in the first place the observations which have been made by Mr. McNab on the flowering of spring plants in the open air in the Edinburgh Royal Botanic Garden during the past twenty-six years, and which have been published in the Transactions of the Botanical Society of Edinburgh. These observations have been made by the same observer on the same plants, growing in the same situations, during the whole of the twenty-six years.

The average day of flowering of thirty-two spring flowers has been determined, of which the following are examples:—*Galanthus nivalis*, Jan. 25; *Eranthis hyemalis*, Jan. 30; *Hepatica triloba*, Jan. 31; *Corylus Avellava*, Feb. 2; *Rhododendron atrovirens*, Feb. 3; *Crocus susianus*, Feb. 4; *Leucojum vernum*, Feb. 10; *Daphne Mezereum*, Feb. 22; *Narcissus pumilus*, March 10; *Orobus vernus*, March 11; *Muscari botryoides*, March 18; *Ribes sanguineum*, March 22; *Narcissus pseudo-Narcissus*, March 31; and *Fritillaria imperialis*, April 1.

The lateness or earliness of the different springs, as determined from the times of flowering of the thirty-two plants in each year, is considerable. The latest spring was 1855, which was thirty days later than the average, and the earliest 1874, which was twenty-three days earlier, thus giving a difference of fifty-three days between the latest and earliest springs during the past twenty-six years. As regards particular flowers, the deviations are much greater. The largest deviations from the average dates of flowering occur before the time of the equinox, when deviations of from five to seven weeks either way are of repeated occurrence; but after the equinox the deviations are markedly less, seldom reaching three weeks.

The springs of 1855, 1856, 1857, 1865, and 1870 were late throughout; and on the other hand, the springs of 1851, 1862, 1863, 1868, 1869, 1872, and 1874 were early throughout. Great variations have occurred in other springs, such as 1864, which, being preceded by a very mild December, many spring plants came into flower in the end of 1863. But in January the temperature was 2°·0 under the average, and in February, 5°·2, and vegetation was consequently arrested. March was also under the average, and the weather did not improve till April 3, the mean temperature of this month being 1°·7 above the average. The disturbing influence of this abnormal weather on the dates of flowering was in some cases very great. Thus, *Sisyrinchium grandiflorum* flowers on the average eleven days earlier than *Daphne Mezereum*, but in 1864 *Daphne Mezereum* did not come into flower till eighty-six days after *Sisyrinchium grandiflorum* had flowered. It is the occurrence of these disturbances which renders a long series of years necessary in order to arrive at a sufficiently close approximation to the true mean dates of flowering.

As regards Edinburgh, Jan. 11 may be considered as the turning point in the winter temperature, since previous to this date the temperature is, on the whole, falling, and after this date it continues steadily to rise.* Further, after this date the rainfall becomes less, clear weather is of more frequent occurrence, and the increase in the temperature is very largely due to an increase of sunshine. The extremely slow rate at which, up to the end of February, the mean temperature rises, and the small differences among the temperatures up to this date, and the large number of plants—fourteen in all out of thirty-two—which come successively into flower during the interval, suggest that it is not so much absolute temperature that calls for consideration as the accumulated amounts of the preceding daily temperatures, *in the extent to which these rise above freezing*. The accumulated temperatures, thus calculated, are, for *Galanthus nivalis*, 72°·7, and *G. plicatus*, 146°·4; for *Crocus susianus*, 125°·2, and *C. vernus*, 179°·1; for *Rhododendron atrovireus*, 120°·3, and *R. Nobleanum*, 249°·3; and for *Narcissus pumilus*, 347°·0, and *N. pseudo-Narcissus*, 540°·1. Similar data prepared for other places, in this and other countries, would be very instructive in showing how far the order of dates of flowering in Edinburgh is observed in other places, and what is the relation of the dates of flowering at each place to the accumulated temperatures at that place, and what modifications are brought about by purely climatic differences, particularly as these occasion different results as respects the heating and actinic rays of the sun.

The thirty-two plants, whose dates of flowering have been determined, include three varieties of one species, viz., the *blue*, *white*, and *red* varieties of *Scilla bifolia*. Of these three varieties the *blue* flowers first, viz., on March 7; next comes the *white* variety, on March 17; and lastly, the *red* variety, on March 21, the *red* being thus a fortnight later than the *blue* variety.

An interesting question may in this connection be raised with reference to the relation which the colours of flowers have to the dates of flowering. With this view, our British wild plants have been grouped according to the different colours of their flowers and the months in which the flowers usually first expand, the data being taken from Dr. Hooker's "Students' Flora of the British Islands." In classifying the plants, *red* includes pink, crimson, and scarlet; and *green*, all greenish-white, yellowish-green, and greenish-purple flowers. *Grasses*, *carices*, and other groups, characterised by inconspicuous floral envelopes, are excluded. The list examined includes 909 species, of which there are 257 with

* Abstract of a paper read before the Edinburgh Botanical Society on the 13th inst. The paper itself is in type for the Journal of the Scottish Meteorological Society.

* See Prof. Forbes's paper on the climate of Edinburgh, in Trans. Roy. Soc., Edin., vol. xxii. pp. 348-349.