producing a refrigeration of the crust equal to that which would be effected in a certain longer time of the pre-glacial or post-glacial periods, then for a certain term of time—of length bearing some proportion to the difference between the two—succeeding the glacial epoch, the earth would, with its outer crust so much below the normal, lose little or no heat by radiation, so that during that subsequent period the thermo-dynamical effects due to cooling would be reduced to a minimum or cease altogether, and a period of nearly staple equilibrium, such as now prevails, obtain.

"This last great change in the long geological record is one of so exceptional a nature that, as I have observed elsewhere,* it deeply impresses me with the belief of great purpose and all-wise design, in staying that progressive refrigeration and contraction on which the movements of the crust of the earth depend and which has thus had imparted to it that rigidity and stability which now render it so fit and suitable for the habitation of civilised man; for, without that immobility, the slow and constantly recurring changes would, apart from the rarer and greater catastrophes, have rendered our rivers unnavigable, our harbours inaccessible, our edifices insecure, our springs ever-varying, and our climates ever-changing; and while some districts might have been gradually uplifted, other whole countries must have been gradually submerged; and against this inevitable destiny no human foresight could have prevailed."

SCIENTIFIC SERIALS

THE *Journal of Botany* for December 1874 and January and February 1875 contain quite the average of papers of general interest. Among the original papers may be mentioned in particular one on the critical species *Triticum pungens*, and another on *Rumex maximus*, by the Hon. J. Leicester Warren; descriptions of new species of Scilleæ and other Liliaceæ, by Mr. J. G. Baker; a list of the wild flora of Kew Gardens and pleasure-grounds, by G. Nicholson; *Anthoxanthum puelii*, by F. Townsend; and the continuation of the paper on the Botany of the Maltese Islands, by Mr. J. F. Duthie. A larger proportion of the space than usual is filled by reviews of botanical works, English and foreign. The plates include two of new species of *Ascobolus*, to illustrate a paper by Mr. James Renny; *Anthoxanthum puelii*, recently discovered in the south of England; and *Carex frigida* and *Salix Sadleri*, the two recent additions to the Scottish flora made by Mr. Sadler.

THE *Botanical Magazine* for February contains figures of the following plants:—*Epidendrum syringothyrsus*, a handsome species from Bolivia, with large racemes of purple-red flowers, tinged with lilac. *Lilium canadense*, var. *parvum*, a very handsome miniature lily, regarded by some as a distinct species. It has small orange-red flowers spotted with purple-brown. *Veronica pinguifolia*, a shrubby species from New Zealand, with very pale blue flowers. It is hardy at Kew. *Fourcroya Selloa*, an agave-like plant from Guatemala, whose large flower-scapes were allowed to protrude through the roof of the Succulent House at Kew last summer, and must have been noticed by many of our readers. *Senecio macroglossus*, the plant with ivy-like foliage alluded to in a recent number. Lastly, a new genus, *Erythrotis*, of Commelyneæ: an exceedingly pretty trailing plant from Malabar, having small leaves of a most brilliant crimson on the under surface, and small bright blue and red flowers. The species is called *Beddomei*, after Col. Beddome, its discoverer.

Zeitschrift der Oesterreichischen Gesellschaft für Meteorologie, Jan. 1.—On the curved tracks of cyclones issuing from the trade-wind region, by Dr. W. C. Wittner. Water resembles air in many of its movements, and is more easily observed; its eddies and currents especially may be studied with advantage in connection with cyclonic phenomena like the above-named. When a stream of water is met by another at right angles, a depression is formed at the point of interruption; particles bordering this depression sink into it in obedience to gravity, and particles at a greater distance move spirally inwards. Besides rotation there is a progressive motion of the whole eddy, in the direction of the resultant of the forces of the two streams. In turbulent streams eddies last a very short time; they are filled up almost as soon as formed. In quiet rivers, on the contrary, the whirl continues for a length of time sufficient for observation. In the development of hurricanes, difference of air-density corresponds to difference of level in water. Hurricanes, like eddies, are destroyed when the surrounding medium moves very irregularly, and we should therefore look to the neighbourhood of the tropics, where atmospheric conditions are remarkably regular, for a region favourable to their growth and progress. Near the northern boundary of the region of calms, the equatorial current begins at about S., and the polar meets it from about E., nearly at right angles, so that in this respect also the development of whirls, like those in water at the junction of rivers, is favoured. The resultant progression, towards N.W., becomes deflected as the storm advances, until, at a latitude where the eastward component of the equatorial may be supposed to vanish against the westward component of the polar wind, an excess seems to remain of the southerly over the northerly component, causing movement towards N. In still higher latitudes the more westerly equatorial and northerly polar drive the cyclone in an easterly direction. Occasionally, when the northerly component of the polar happens to be stronger than the southerly of the equatorial wind, as in the storm of Oct. 10, 1847, the system moves towards S.W. In the southern hemisphere, as in the northern, the direction of rotation indicates an irruption of the anti-trade into the trade-wind. The equatorial current, or anti-trade, appears to be the strongest both by its invasion of the trade-wind region and by the direction of advance of the consequent hurricane.—A communication from Captain Hoffmeyer, in the *Kleinere Mittheilungen*, contains valuable remarks on the relation between pressure and rainfall. In Denmark, most rain falls on the front of a minimum, and when a considerable depression is near. Like Mr. Ley, he believes that, at least in Europe, minima are formed simultaneously with heavy rains, but thinks that they are not caused by them, only magnified. He has come to the conclusion that minima must be looked upon not as results of mechanical rotation, but as functions of existing conditions and differences. They seem to him to seek and require continual nourishment. The principle of a descending current in maxima, and an ascending current in minima, broached by Mr. Buchan some years ago, he considers the only one with which we can overcome the difficulties presented by these phenomena. Air is interchanged mainly by vertical currents, resulting from thermal inequalities. Vapour also plays a large part in *ascending* currents. Low pressure at the earth's surface is not an indication but a cause of the *courant ascendant*. With these views, and by the comparison of weather charts, we can in general explain the main features of the atmospheric condition, though not indeed its ever-varying relations. Dr. Hann, in reply, maintains his opposition to the theory of Espy and Reye, that the *courant ascendant* is the sole or chief cause of a minimum in storms, and objects that the heaviest rains in the tropics do not in the least disturb the regular daily movement of the barometer, and to assume that the same cause in similar conditions could produce opposite effects would be illogical. Tropical rains have not been proved less extensive than those of higher latitudes, as some have supposed them to be. We have no clear evidence that condensation and rain diminish pressure. On the other hand, mechanics teach us that pressure must diminish towards the centre of a whirling mass of air. From these reasons, we should seek for an explanation in the laws of dynamics.

THE *Bulletin Mensuel de la Société d'Acclimatation de Paris* for October opens with a paper by M. S. Berthelot on "The Domestication of Animals," in which the writer expresses the opinion that the domestication of animals is due more to the art and skill of man than to their natural qualities; though the aptitude for domestication is unalterable in those animals which naturally possess it.—M. Bouillod contributes a paper on the cultivation of wild turkeys, recounting his experience in the matter, the object of which is not clear, seeing the domesticated turkey cannot be excelled in any respect.—Silkworm culture occupies its usual prominent position in the report.—The rapid growth of the *Eucalytpus globulus* is exemplified by M. Laberenne, who planted some seeds in Algeria on the 29th April, 1873, which twenty-six days later had already appeared above ground. In September, 1874, some of the plants had attained a height of 65 centimetres (26 in.).—M. Drouyn de Lhuys, in a speech on the Phylloxera, suggests that new plantations of vine from seeds should be formed, which he thinks would more easily repel the attacks of the pest.—Germany is making advances in the culture of the silkworm, which are detailed in a letter by M. A. Buvignier.

Astronomische Nachrichten, No. 2,020.—Mr. S. Burnham contributes a note on certain double stars. Σ 410 and H 334

* Philosophical Transactions for 1864, p. 305.

are catalogued in identical positions, but he finds they are distinct stars, and the companion to Σ 410 is of 19 mag. of Herschel's scale. The companion of Σ 2749 shows an increase in distance and angle; the three stars are now almost in a line. The position of Σ 388 appears to have increased 100° since 1835.—J. Pebbutt gives position observations of Coggia's Comet, together with comparison stars. J. C. Watson sends a note on his discovery of Planet (139) at Pekin.—The elements and an ephemeris of Borrelli's Comet of December 1874 are given by J. Holetschek.

COMET 1874, VI.

T = Oct. 18.7391 Berlin time.
π = 298° 46′ 38″
Ω = 281° 38′ 18″
i = 99° 25′ 43″
log. q = 9.71576.

—Burnham notes the discovery of a close companion to β Leporis, dist. 2″, pos. 269°·1, 10th mag. This appears to have been missed by Herschel.—Prof. Bredichin gives differential measures of position of Juno and adjacent stars.—A number of position observations of the minor planets are given by Kowalczyk.—A lithograph of various appearances of Coggia's Comet, drawn by Vogel, accompanies this number.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, Feb. 11.—"Some particulars of the Transit of Venus across the Sun, December 9, 1874, observed on the Himalaya Mountains, Mussoorie, at Marz-Villa Station, lat. 30° 28′ N., long. 78° 3′ E. Height above sea, 6,500 feet."—Note No. I. By J. H. N. Hennessey, F.R.A.S. Communicated by Prof. Stokes, D.C.L., Sec. R.S.

The author observed the event with the equatoreal of the Royal Society, which Capt. J. Herschel, R.E., in his absence from India, had temporarily placed at his disposal. His especial object in view was to observe the transit from *a considerable height*, and this condition was easily secured through the circumstance that he was located only fourteen miles from Mussoorie, on the Himalaya Mountains. His numerical results will be communicated very shortly in a second note. The remarks here made are restricted chiefly to what he *saw* with the equatoreal.

The telescope of the equatoreal has a 5-inch object-glass, with about sixty inches focal length, and is driven by an excellent clock.

The author found from actual trial that the most suitable eyepiece for both ingress (sun's altitude 2° 24′ to 7° 29′) and egress (sun's altitude about 26°) was one of 125 power. He selected for ingress two glasses which, combined, gave a neutral or bluish field; and for egress he changed one of these for a deep-red glass, so that the field now presented a moderately deep red. The glasses were quite flat, and lay against one another in intimate contact, giving excellent definition. He enjoyed most exquisitely clear weather during his observations.

In describing the phenomena of the transit, the author has occasion to speak of Venus as she appeared *across* the sun's limb, when one portion of her own limb is seen against the sun, and the other remains against the sky. The former portion he calls Venus's sun-limb, or V_n, the latter Venus's sky-limb, or V_k. Again, he requires to mention a ring of light around V_k, which he indicates by L_k, the corresponding ring around V_n being understood by L_n. Another point is this: anyone who has watched, say the sun's limb, especially at a low altitude and with high power, must be aware of the turmoil or ebullition which there appears, very like as if the limb was being boiled. He denotes this kind of turmoil by "boiling."

The author did not detect Venus's limb until after it had made an indentation on the sun's limb. The latter boiled sensibly, but by no means violently. It appeared jagged, and as if with minute spikes projecting inwards, all of which were well defined in the bluish field. Watching V_n, he found it also boiling slightly, but in a manner somewhat different to the sun's limb. The appearance was that of boiling vapour coming round from the face of Venus, turned towards the sun and overlapping V_n; moreover, this boiling was not restricted to the edge of V_n, but extended 2″ or 3″ beyond, thus forming a kind of boiling annulus, in which there were minute sparkling specks dancing and shifting about, appearing and disappearing; the edge V_n was seen through the boiling.

Neither pear-drop nor ligament was seen either at ingress or egress.

Col. Walker, who was at Dehra Doon, in the valley below, some ten miles south of Mr. Hennessey's position, writing to the author, states that he "saw the pear-drop and the ligament very distinctly."

After describing his own observations, the author concludes as follows:—

1. In view of the light-ring L_k, and of the peculiar boiling annulus around V_n, which may be called L_n, I have no doubt that L_n was, in fact, a continuation of the light-ring L_k, *which latter, beyond all question, was plainly visible;* and under these circumstances it may be urged that Venus is surrounded by an atmosphere which at the time was made *visible* to the extent of 2″ to under 4″ in breadth.

2. As a matter of fact, the pear-drop or other ligament was visible at a height of 2,200 feet, but at 6,500 feet the ligament was invisible. The influence generally of height of station, from this evidence, appears undeniable; but the phenomenon still remains to be accounted for definitely. If, however, an effective atmosphere of x breadth around Venus be conceded, this atmosphere may be supposed to stop a certain amount of direct light from the sun, producing a slight shade around Venus corresponding to the breadth x. This shade would, I conceive, be quite invisible when its outer edge is backed by the sun's bright light; but could we contract the sun to a diameter equal to that of Venus *plus* twice x, and make Venus and the sun concentric, it appears likely that we should see a shaded annulus right round Venus between her limb and that of the sun. Further, that the annulus would appear darker at low than at higher altitudes, and would become invisible when the observer was raised above a sufficiency of the earth's atmosphere. Should these suggestions prove tenable, the ligament seen would break when the outer edge of the shade, corresponding to x, transited across the sun's limb.

3. Solar light shining through Venus's atmosphere, if any, produces no alteration in the lines of the solar spectrum, so far as the dispersion of a single simple prism can show. Also, Venus's face, turned towards us, reflects no light during transit, subject to the same instrumental test.

"Appendix to Note, dated November 1873, on White Lines in the Solar Spectrum," by J. H. N. Hennessey, F.R.A.S. Communicated by Prof. Stokes, Sec.R.S.

After detection of the white lines 1650 and 1658 (Kirchhoff's scale) at Mussoorie in November 1873, I discovered two other such lines before leaving that station of observation, viz. 2009 and 2068 (about). On 28th November, 1873, I packed up the spectroscope, taking particular care that the prisms should not shift from the position they then occupied.

On 28th November, 1873, I set up the spectroscope in the Dome Observatory at Dehra, in the valley below, the prisms retaining their former position, and my recollection of the white lines seen at Mussoorie being still quite vivid. I now found that 1650 and 1658 were distinctly seen; but they were no longer nearly of the pure white colour they presented at the higher station, while what may be termed the gloss about their whiteness, which induced me to describe them as resembling "threads of white silk held in the light," had quite disappeared; indeed they were now so decidedly greenish as not to invite attention. White line 2068 I now could hardly see, and 2009 was invisible, notwithstanding that I was quite familiar with the positions they occupied, and had made careful notes on the subject.

After this I released the prisms and turned them about variously, without producing any alteration in the white lines as they were now seen.

The height of the spectroscope above sea-level was—

At Mussoorie	...	...	...	...	7100 feet.
,, Dehra	...	...	...	...	2200 ,,

Anthropological Institute, Feb. 9.—Col. A. Lane Fox, F.S.A., president, in the chair.—The President exhibited a series of stone implements from the Alderley mines of Cheshire, and Dr. J. Simms exhibited five Lapp skulls.—A paper by the Rev. Wentworth Webster was read on the Basque and the Kelt, an examination of a paper by Mr. Boyd Dawkins, F.R.S., on the northern range of the Basques, in the *Fortnightly Review* of