tion bills. Mr. W. C. Hodgkins, who has been prosecuting the work of the survey on the North Carolina coast, near Cape Lookout, has returned to Washington, and is stationed at the office for the present. New editions of the charts of the north-west coast of America will be out within ten days.

— The total amount subscribed to date to sustain the Pasteur institute in France is $113,719. The sultan has presented Pasteur with the grand order of Medjidie, and $2,000, and will send a commission to Paris to study his methods of rabies prevention.

— Sixteen of the wolf-bitten Russians who were treated by Pasteur have reached Smolensk on their way home, and, being in perfect health, have telegraphed their gratitude to their preserver.

— Professor Ormond Stone has just issued part ii. of the first volume of the publications of the new Leander McCormick observatory. Part i., an account of the observations of the transit of Venus in December, 1882, was published in 1883. Part ii. is a small quarto pamphlet of seventeen pages, a series of notes on the tail of the great comet of 1882, accompanied by six plates of sketches made by the observers, Messrs. Leavenworth and Jones. These drawings will furnish useful material to those engaged in the interesting study of the theory of comets' tails, — a subject in which considerable interest has been aroused by the researches of Dr. Bredichin, director of the Moscow observatory.

— The Library bureau of Boston has issued the first number of a quarterly journal, *Library notes*, under the editorship of Prof. Melvil Dewey, librarian of Columbia college. While the journal is of especial value to the professional librarian, we should judge from an examination of the June number, and from what is promised for succeeding numbers, that it will also prove of considerable value to individual literary and scientific men who are interested in lightening the purely mechanical portion of their labors by the numerous ingenious devices which are constantly being brought forward. For instance, almost every scientific specialist nowadays finds it necessary to keep for himself a bibliography of some particular branch of his subject: he will find described in the number before us the size and quality of catalogue or index cards, with all the neat and convenient accessories which years of experiment or experience have pointed out to be best adapted to such purposes. The 'labor-saving notes' promise to be particularly useful to the lay readers, the aim being to bring to light, by co-operation and an interchange of ideas, the best literary tools and methods.

— The Spanish government has recently decided to establish a 'Maritime station for experimental zoölogy and botany,' to be in charge of a director, one assistant, and two fellows, all salaried. It is to be opened to students from all parts of the world, the results of all investigations to be published by the department of public works. In addition to the salaries of the officers, two thousand dollars annually will be appropriated for its support. The site has not yet been fixed upon, and *Cronica cientifica* justly complains of the inadequate provisions made for its establishment and support. Spain is almost the last of the chief civilized nations to found a zoölogical station.

— Roetheln, or German measles, has been very prevalent in Savannah, Ga., during the past year. This disease is very rare in the United States, and there are many physicians of established practice who have never seen a case. It prevailed in New York City during 1873 and 1874. As a rule children are attacked, but it is not exclusively the young; an old lady of seventy-seven was affected with it in the Savannah epidemic. It resembles both measles and scarlet-fever, so much so that the diagnosis is sometimes very difficult. It is contagious, and usually very mild, requiring but little treatment. Although it is doubtless a germ-disease, the specific microbe upon which it depends has never been identified.

— The legislature of Vermont at its last session passed a law prohibiting the adulteration of maple-sugar or honey, and punishing the offender with a fine of from twenty-five dollars to fifty dollars.

— M. Lessenne claims that a certain sign of death is the permanent gaping of a wound made in the skin by puncturing it with a needle. If the person be living, blood will usually follow the withdrawal of the needle, but whether it does or not, the wound will close at once. The puncture made in the skin of a dead person will remain open, as if made in leather.

— The North Carolina state board of agriculture, on Thursday, July 22, opened the new buildings of the experiment farm, near Raleigh.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

Glaciers and glacialists.

IN a note on glaciers in the Alps in the number of *Science* for June 25, p. 570. are the following words: "The longest is the Aletsch glacier in Austria, measuring over nine miles."

The Aletsch glacier is far distant from Austria, descending from the Jungfrau into the Valais, not far from the glacier of the Rhone. Its length is over nineteen miles.

The misstatements, errors, and false quotations, with regard to glaciers and glacialists are somewhat astounding, difficult to explain, and more so to excuse; for the whole matter belongs to our century, almost to our own time. It would seem, that with the advantages of the long teaching of Louis Agassiz, and the constant flow of travellers toward the Alps, a little accuracy and exactness might be in common use, and by this time all the facts ought to be classic. But it is not so; and lately the amount of false notions has been lamentably increasing. I will signalize a few of the latest and most glaring.

"Glaciers have become so well known from the graphic descriptions of Carpenter, Forbes, Agassiz, Tyndall, and others," etc. This first sentence of 'Existing glaciers of the United States,' by Israel C. Russell (fifth annual report U. S. geological survey, p. 309, Washington, 1885), will mislead any one not very well acquainted with the history of glaciers and glacialists.

Carpenter is an English name well known in science. W. L. Carpenter and W. B. Carpenter are both naturalists of renown, and it would seem that one of these two Carpenters is referred to. But it is not so: the *savant* mentioned under this wrong name is simply Jean de Charpentier of Bex (Switzerland), the celebrated author of the glacial theory for the transportation of the erratic bowlders. It requires a certain effort of imagination to recognize him under the name given by Mr. Russell.

If his list is intended as a chronological series, it is altogether wrong and unjust. Forbes was not the first after de Charpentier to investigate glaciers. Agassiz called Forbes's attention to the glaciers, at Glasgow in 1840, and introduced him to his Aar's glacier observations, at the 'Hôtel des Neuchatelois' in 1841, one year after Agassiz's publication of his important 'Etudes sur les glaciers.'

Prof. J. S. Newberry, in his address before the Cornell university, at the unveiling of the tablet to the memory of Louis Agassiz, June 17, 1885, says, "In 1815, Charpentier, the director of the salt-works at Bex, and one of the most distinguished geologists of Switzerland, passing a night in the cottage of a mountaineer in the hamlet of Lourtier, was told by his host that he believed that the glaciers had formerly a much greater extent than at present, because, as he said, 'I find huge bowlders of alpine granite perched on the sides of the valleys, where they could only have been left by ice.' This remark excited the interest of Charpentier, and was practically the beginning of the investigations which have resulted in the theory of the ice period. In 1834, Charpentier brought before the Association of Swiss naturalists at Lucerne a report upon the evidences of the former extension of the Swiss glaciers, the result of his observations through many years. At that time a group of young, able, and enthusiastic scientists were gathered at Neuchatel, — Agassiz, Guyot, Schimper, Desor, Carl Vogt, Wild, and others. The new theory of Charpentier, that ice had once filled all the Swiss valleys, excited in them the greatest interest," etc.

De Charpentier, in his 'Essai sur les glaciers,' etc., took special pains to say in regard to the mountaineer Perraudin of the Bagnes valley, at the foot of the St. Bernard, that his hypothesis was so extraordinary, and even so extravagant, that he did not think that it was worth looking into and thinking of; and he adds, "J'avais presque oublié cette conversation [showing plainly that it was not practically the beginning of the investigations], lorsqu'au printemps de 1829, M. Venetz vint me dire aussi que ses observations le portaient à croire que, non seulement la vallée d'Entremonts, mais que tout le Valais avait été jadis occupé par un glacier, qui s'était étendu jusqu'au Jure et qui avait été la cause du transport des débris erratiques" (*Essai sur les glaciers*, pp. 242 and 243).

The order of priority of discoveries is, first, Venetz, who in a memoir written and read in 1821 before the Swiss naturalists, and published in 1833 under the title of 'Mémoire sur les variations de la température dans les Alpes' (*Denksch. allgem. Schweiz. ges. gesam. naturw.*, Zurich), showed the greatest extension of glaciers and their gigantic thickness; second, Jean de Charpentier, who in 1834 read before the same Helvetic society of naturalists at Lucerne his memoir, 'Notice sur la cause probable du transport des blocs erratiques de la Suisse' (*Annales des mines*, 3e série, vol. viii. p. 219, Sept. et Oct., 1835; also *Bibl. univ. de Genêve*, 2e série, vol. iv. p. 1, 1836; and translated into German by Julius Froebel, in *Mittheil. aus dem gebiete der theoret. erdkunde*, p. 482); and, third, Louis Agassiz, who first announced the existence of the 'glacial epoch,' or 'ice period,' in his 'Discours prononcé à l'ouverture des séances de la Société Helvètique des sciences naturelles, à Neuchatel, le 24 Juillet, 1837' (Actes de la Soc. Helv. des sc. natur., 22e session, Neuchatel, 1837; also *Bibl. univ. de Genêve*, vol. xii. p. 367, 1837).

To Venetz is due the idea and proofs of gigantic glaciers, which transported the bowlders from the Alps of the Rhone valley to the Jura Mountains; to de Charpentier, the finding, accumulation, and the classification of material proofs (such as, the *moraines*, the *roches moutonnées, polies et striées;* the *cailloux striés* and *boue glaciaire*, etc.), which constitute the 'glacial doctrine;' finally, to Agassiz is due the 'ice period' and the prompt diffusion and acceptance of the theory of Venetz and de Charpentier.

Professor Newberry seems to think that in 1834, when Charpentier brought his theory forward at Lucerne, there "were gathered at Neuchatel, Agassiz, Guyot, Schimper, Desor, Carl Vogt, Wild, and others." It is a great mistake. Agassiz alone, of all those named, was then living at Neuchatel; Guyot did not come to live there until 1839; Schimper never lived there; Desor came at the end of 1837, Carl Vogt in 1839; and Wild was an inhabitant of Zürich.

Mrs. Agassiz, in her charmingly written history of her husband's life, says, "Agassiz was among those who received this hypothesis (the ancient extension of the alpine glaciers to the Jura) as improbable and untenable. Still, he was anxious to see the facts in place, and Charpentier was glad to be his guide" (*Louis Agassiz, his life and correspondence*, vol. i. p. 261, Cambridge). De Charpentier was a great deal more than his guide: he was his teacher; for Agassiz then knew almost nothing about glaciers, and certainly nothing about the glacial theory of Venetz and de Charpentier.

In the summer of 1836, Agassiz established himself at Sallaz, near 'des Dévens,' the residence of de Charpentier at Bex, to study under his direction.

De Charpentier studied with his friend Venetz the whole question, and created the glacial doctrine be-

tween 1829 and 1834. Being twenty years older than Agassiz, de Charpentier, then aged fifty-two, celebrated as one of the best observers in geology, conchology, and botany, was considered as the first naturalist then living in Switzerland. *Savants* from any part of the world, calling on him, received always a very amiable and generous hospitality. His beautiful and rich collections were open to all; and many who came there for only a passing call remained weeks and even months.

Agassiz had that magnetic power which attracted every one to him: de Charpentier was as well gifted, being the most charming and spiritual converser imaginable. Besides, de Charpentier was without ambition, a true 'scientific epicurean,' as he was called. Agassiz, with his power of quick perception, his excellent memory, his perspicacity and acuteness, his way of classifying, judging, and marshalling facts, quickly learned the whole mass of irresistible arguments collected patiently during seven years by de Charpentier and Venetz; and with that faculty of assimilation which he possessed in such a wonderful degree, and his insatiable appetite, he digested the whole doctrine of the glaciers. Then once in possession of that new and certainly very original and attractive tool, Agassiz, with his extraordinary imaginative power, saw that the phenomenon of the extension of old glaciers was not to be confined to the Rhone valley, but must be general, and was a special period in the history of the earth, during which cold prevailed all over the world. In a word, Agassiz, with his far-reaching thoughts, added an entirely unexpected and then generally very unwelcome step to the different periods which the earth has passed through,— the 'ice age.'

Every one knows with what rapidity the mere suggestion — some may call it the inspiration of genius — made by Agassiz, in his celebrated 'Discours d'ouverture' before the meeting of the Swiss naturalists at Neuchatel in 1837, became an accepted truth. Discovery after discovery came in rapid succession, — first in the Vosges in 1838; then in Scotland, England, Ireland, the Pyrenees, the Jura, Scandinavia, Finland, Russia, the Ural Mountains, Auvergne, Britanny, the Sierra Nevada of Spain, the Atlas in Morocco, Corsica, the Balkans, Lebanon and Syria, the Caucasus, the Himalaya, Altai, the Thian-Shan, the Kuen-Lun, the Kamtchatka, Japan, Alaska, British Columbia, Washington Territory, Oregon, California, the Rocky Mountains, all the eastern part of Canada and the United States as far as New Jersey and Kentucky, Central America, Colombia, Ecuador, Peru, Chili, the Straits of Magellan, New Zealand, and even very strong suspicions of the existence of ancient glaciers in Brazil, in Guinea (Gold Coast), and in Australia. What splendid record! and almost all during the lifetime of Agassiz; himself having the honor to establish the existence of ancient glaciers in Scotland and England, in the eastern part of the United States, in the Straits of Magellan, in Chili, and probably in Brazil.

But that is not all. Admitting that Agassiz has a little too quickly digested and assimilated the glacial theory of de Charpentier and Venetz, we can say now with no less truth that his powerful intervention has greatly advanced the time of the acceptance of that theory, by thirty years at least, and that besides his great discovery of the glacial epoch or ice age, which is unquestionably his own, Agassiz has done more to make known the glaciers than any one else; although he was not a physicist, and his explanations were faulty and inaccurate on many points.

These explanations and appreciations are rendered necessary by criticisms and strictures on the part taken by Agassiz, and even entire omission of his name; his successor at Harvard college having denied *in toto*, in a publication founded by Agassiz, — 'The memoirs of the Museum of comparative zoölogy,'[1] — his great discovery of the 'ice age,' but having, more than that, ignored him altogether as the discoverer of the existence of ancient glaciers in the British Dominions, in New England and New York, in Brazil, in the Straits of Magellan, and in Chili.

On the other hand, some have gone too far in their eulogies. The part taken by Agassiz is grand and beautiful enough, without diminishing the great discoveries of Venetz and de Charpentier, both of whom were his teachers: for Agassiz was not alone in his visits at the house of 'des Dévens' in 1836; and all the explanations given by de Charpentier, and the excursions to the erratic bowlders, moraines, and glaciers, were made in company with several Swiss *savants*, — Venetz, Lardy, Mousson, Thomas, and Dr. H. Lebert. This last celebrated anatomist and naturalist has given his charming impression and souvenirs in his too short but excellent biography of Jean de Charpentier, read at Bex (Actes de la Soc. Helv. des sc. natur., Aug., 1877).

To be sure, Agassiz manifested his gratitude for the teaching of de Charpentier and Venetz in his 'Etudes sur les glaciers' (1840), dedicated on the first page, "A M. Venetz, ingénieur des ponts et chaussées au canton de Vaud, et à M. J. de Charpentier, directeur des mines de Bex." De Charpentier thanked him in his name and also in the name of Venetz, in the 'preface' of his 'Essai sur les glaciers' (October, 1840), a few days after Agassiz's work reached him at Bex. Notwithstanding this exchange of courtesies, an estrangement followed, due mainly to the interference of Agassiz's personal friends and collaborators; and after 1840 the friendship, or at least the relations, between de Charpentier and Agassiz, ceased entirely.

One more of the erroneous notices on glaciers and glacialists is in *Science* of April 30, 1886. At p. 385 we read, "Professor Dana's memoir gave an account of Guyot's early life which will be new to many of his American friends, and particularly called attention to the fact that Guyot had made a scientific examination of the Alpine glaciers two years before they were studied by Agassiz, and anticipated a number of his most important conclusions. In a paper read then before the Helvetic society, but never printed until 1883, Guyot pointed out that the upper portion of the glacier moves faster than the lower, that the middle moves faster than the sides," etc. It is difficult to imagine a more erroneous and unjust statement.

At Princeton Guyot was long isolated from intercourse with Swiss naturalists; and at the close of his life, while suffering under the malady which proved fatal in 1884, he put forth claims of doubtful value. These are the facts.

In 1838, Guyot, stimulated by Agassiz's constant conversation on the glaciers, passed five weeks among the glaciers of the Bernese Oberland and the Upper Valais. It was two years after Agassiz's study of the glaciers under de Charpentier, and one year after his

[1] *The climatic changes of later geological times.* By J. D. WHITNEY. Cambridge, 1880-82. 4°.

discourse at Neuchatel, — a sufficient answer to the claims "that Guyot made a scientific examination of the Alpine glaciers two years before they were studied by Agassiz."

On the 5th of September, Agassiz and Guyot were present at the Réunion extraordinaire de la Société géologique de France à Porrentruy ; and at the meeting of the 6th of September we read the following remarks : —

"M. Agassiz présente à la société ses *observations sur les glaciers*, d'où il déduit d'importantes conséquences géogéniques relativement aux *blocs* erratiques. . . . M. Guyot ajoute aux observations de M. Agassiz de nouvelles considérations" (*Bull. soc. geol*, vol. ix. p. 407).

That is all. Guyot did not read a manuscript, but offered only a few verbal observations. He was not then a member of the society; and his remarks passed off unnoticed, although geologists were present, well prepared to discuss any point relating to glaciers, — Agassiz, Jean de Charpentier, Bernard Studer, Thurmann, Max Braun, Lardy, Buckland, d'Omalius, Nicolet, and finally Renoir and Leblanc, who announced at that meeting their discoveries of old glaciers in the Vosges.

On the contrary, Agassiz's communication attracted much attention, and was the subject of many discussions and commentaries. Agassiz, strengthened and animated by the presence of de Charpentier, surpassed himself in his clear and trenchant exposition of the 'glacial theory.' The impression left on all those who were present at the Porrentruy meeting was such, that years after, several of them told me that Agassiz was absolutely irresistible, and won the admiration even of his strongest opponent there, Bernard Studer.

Neither Agassiz nor Guyot gave their notes to be printed ; and it was almost one year later that Agassiz's memoir, 'Sur les glaciers,' was deposited at the 'secrétariat' of the Geological society at Paris. It was published at the end of volume ix. p. 413, as late as the spring of 1840. The same memoir appeared first in the *Bibliothèque univ. de Genêve* (tome xx. p. 382) in December, 1839 ; and it was reprinted in 1844, at the head of 'Excursions et séjours dans les glaciers,' etc., by E. Desor.

Many years after the death of Agassiz, and one year after the death of Desor, Professor Guyot claimed that he wrote Agassiz's memoir, and added that he was unable to finish the writing of his own memoir by an '*indisposition qui dura jusque tard dans l'été* (1839).' Guyot returned to Neuchatel, however, in good health, in the fall of 1839 ; and, if his memoir remained *inédit*, it was because he did not think his maiden notice was of sufficient value for publication ; for both the *Bulletin of the geological society* and the *Bibliothèque universelle* were open to him, and ready to accept his remarks.

James D. Forbes having claimed the discovery 'of ribboned structure' of the ice of glaciers, Agassiz took from Guyot's notes his remarks, "sur la structure lamellaire de la glace du glacier près du sommet du Gries," and published them in a pamphlet dated 11 April, 1842, Neuchatel. At the same time Agassiz begged Guyot to put his manuscript in the 'archives' of the Société des sciences naturelles de Neuchatel. This was done, and from that date the record of the existence of Guyot's notes is indisputable. Unhappily they were not published ; and Guyot took them back in 1848, and carried them to America, whence, in April, 1883, he sent them again to Neuchatel, where they were finally printed in the *Bulletin Soc. sc. naturelles* (tome xiii. p. 156), the 26th of April, 1883.

It is impossible not to feel an uncertainty as to the primordial communication of Professor Guyot at Porrentruy, when we think of the delays in its publication, the travelling about, and the incompleteness of the notes. This feeling is increased by a remark of his widow, who says that Guyot did not send back to Neuchatel all the original manuscript, a part having been left in her hands (*The American journal of science*, May, 1886, p. 366).

But accepting the Neuchatel memoir of 1883 as correct, its scientific value is very small, and hardly justifies its publication. All that was truly of value was put in Agassiz's reply to Forbes ; and even that is of small importance, considering that Rendu noticed more in detail the same phenomenon of veined structure of the ice, in his 'Théorie des glaciers de la Savoie,' published during the summer of 1840 ; and that Hugi, as far back as 1830, signalized the same phenomenon.

Accompanying his notes by a letter to M. Louis Coulon, president of the Neuchatel society, Professor Guyot claims that he has discovered not only '*la structure lamellaire de la glace des glaciers*,' but also the different modes of progression of the glaciers, the inclination of the beds at the end of glaciers, and the disposition of 'crevasses *en éventail*.'

These facts were known before, and were discussed almost daily in the house of de Charpentier, as is proved in the book of de Charpentier on the glaciers. Besides, Grüner, Hugi, Rendu, Bischof, and others have previously signalized the same facts.

Finally, Prof. Guyot, at the end of his letter to M. Coulon, makes statements entirely at variance with fact in regard to '*la distribution des blocs erratiques*.' For instance, he says, "The erratic map of the old glacier of the Rhone, published by de Charpentier (1840), stops it at Nyon, when by my latter observations I extended it far beyond Geneva to the Mont de Sion." Now, de Charpentier's map '*du terrain erratique de la vallée du Rhône*,' accompanying his celebrated book, does not stop the glacier of the Rhone at Nyon, but close to the city of Geneva, twenty miles farther south. As to bowlders of the Rhone valley as far as Mont de Sion, they have been described there by J. A. Deluc anterior to 1840 ; and R. Blanchet, in his 'Carte du glacier du Rhône' (Lausanne, 1844), extends the Rhone glacier as far as la Perte du Rhône, with a large moraine on the Mont de Sion.

From 1840 to 1847, Guyot, with great industry and perseverance, made a hypsometrical survey of the positions of the bowlders in seven of the erratic basins round the central Alps. Unhappily he only partially published his researches, in the *Bulletin des sc. nat. de Neuchatel*, without the map showing the distribution of those bowlders ; reserving it, as he says, for an ulterior publication, in collaboration with Agassiz and Desor, which was never completed. If Guyot's map had been published then, it would have been an important contribution to the Alpine erratic phenomena. However, a great part of it — more than two-thirds at least — was anticipated by the issue in 1845, at Winterthur, of an anonymous map of the old glaciers of the central Alps, showing the extent of the ancient glaciers of the Arve, Rhone, Aar, Reuss, Linth, and Rhine, with their lateral and

frontal moraines. That map is entitled 'Verbreitungsweise der Alpen-fündlinge,' and its author is the modest and very able geologist, A. Escher von der Linth.

Since 1850, Gastaldi for Piemont, Chantre and Falsan for France, and A. Favre for Switzerland, have given maps of the ancient extension of the Alpine glaciers, which render Guyot's manuscript map obsolete and valueless, except as an historical document.

To finish this already too long review of glaciers and glacialists, I will add, that, after the three original memoirs of Venetz, de Charpentier, and Agassiz, of 1833, 1834, and 1837, the other important works and landmarks in the discoverics and exposition of the glacial question are, by order of data, 1°, 'Théorie des glaciers de la Savoie,' by the Chanoine Rendu (September, 1840); of this most important and excellent work, Tyndall said to me at the Geneva meeting of the Swiss naturalists in 1865, "If Rendu had been trained and educated as a physicist, he would have left nothing for others to do;" 2°, 'Etudes sur les glaciers,' by Louis Agassiz (October, 1840); 3°, 'Essai sur les glaciers,' by Jean de Charpentier (Oct. 31, 1840; issued in December, 1840, with the date on the titlepage of 1841); 4°, 'Travels through the Alps of Savoy,' by James D. Forbes (1843; second edition, 1845); 5°, 'Nouvelles études et expériences sur les glaciers actuels,' by Louis Agassiz (November, 1847); 6°, 'The glaciers of the Alps,' by John Tyndall (1860).

Venetz was personally known to but few *savants*. I will add that he was a Valaisan engineer of great skill. He had the charge of rectifying and embanking the Rhone in the cantons of Valais and Vaud, from Sion and Martigny to the lake of Geneva, — works which he executed most successfully. Accustomed to observe all that relates to the freshets of mountain torrents and glaciers, a spectator of the great 'débacle de Bagnes' in 1818, he and his friend de Charpentier put a stop to the constant ravages of the Getroz glacier and the Dranse River, an affluent of the Rhone.

Venetz's modesty was extreme, and verging on great timidity, due perhaps, in part, to the infirmity so common in the Valais, and from which he was a sufferer. Not educated as a scientific man, but only as a road engineer, he did not possess the scientific method of marshalling and classifying facts and observations. But Venetz found in his friend de Charpentier the best man to systematize and construct a new science. In that respect de Charpentier, by his knowledge and education, was the equal and rival of his friends Alex. de Humboldt, Leopold de Buch, and Elie de Beaumont; and the association of Venetz with him was most happy and successful. Both without ambition, lovers of nature and truth, they created together what may be called now one of the most interesting branches of geology and physical geography.

JULES MARCOU.

Cambridge, Mass., July 7.

Barometer exposure.

It is gratifying to find that my brief letter calling in question the influence of wind on the indications of indoor barometers has elicited very satisfactory responses from Messrs. Gilbert and Clayton (*Science*, vol. vii. pp. 571, 572; and vol. viii. p. 14). There is one point, however, on which evidence is still wanting to fortify Mr. Clayton's induction.

As clearly indicated by Mr. Gilbert, it is evident, that, according to the conditions of exposure, the influence of the wind must tend sometimes to increase, and at other times to diminish, the pressure within the building in which the barometer is placed. Now, all of Mr. Clayton's experiments seem to indicate a lowering of the barometer-readings within the building. Perhaps he may be able to verify the deductions of theory by so arranging the conditions of exposure as to secure the opposite effect, and thus obtain a complete verification of his induction. If these opposite effects can be verified by experiment, while establishing the influence of wind as a true cause of barometric fluctuations, they would render it extremely difficult to apply a correction correlated with the velocity of the wind, except under well-defined conditions of exposure.

While seeking for possible causes of fluctuations of the barometric column in relation to wind-velocity, it may be well to recall the idea first broached by Hawksbee near the beginning of the last century, and more distinctly urged by Sir John Leslie, that the barometer is depressed by wind in consequence of the centrifugal force due to the horizontal current of air (Daniell's 'Elements of meteorology,' vol. i. pp. 4–9, London, 1845); for although Professor Daniell's criticism of Professor Leslie's theory is quite just, in so far as it relates to the idea that the effect would be 'accumulated by a long series of deflections,' yet the main fact, that the tendency to rectilinear motion would give rise to a centrifugal effect, remains a *vera causa* tending to depress the mercurial column.

A simple calculation shows, however, that the radius of curvature is so large, or the deflection from a tangent is so small, that a horizontal wind of 60 miles per hour, or 88 feet per second (assuming the whole thickness of the atmosphere to be involved), would lower the mercury in the barometric column only about 0.00875 of a millimetre, or 0.00034 of an inch, — an amount so small as to be far within the limits of observational error, and therefore quite inadequate as an explanation of the phenomenon.

JOHN LECONTE.

Berkeley, Cal., July 13.

Bright lines in the spectrum of β Lyrae.

A short study of the spectrum of β Lyrae presents the following bright lines as existing in her atmosphere. A portion are probably also found in the solar atmosphere. Referred to by their numbers in Young's catalogue, they are, 2, 3, 5, 22, 36, 41, 49, (58–59), 69, 74, 86, 100, (105–106), 115, (138–139), (140–141), 181, 189, 193, 198, 208, 248, (260–261), 267, (272–273?). Another portion find no place, or are infrequent, in the solar atmosphere, and, referred to by their approximate wave-lengths, are 59549, 58398, 57967, 57544, 56305, 55829, 54811, 51355, 51013, 50858, 50582, 49582, 47939, 47660, 47437, 46879, 45203, 43123.

Each of these appear in at least 40 per cent of the observations; none appear in more than 70 per cent. A number more are suspected, but are not clearly separated.

At present there would seem to be a connection between the variability of the star and the lines present in the spectrum; but on this point the observations are not final.

O. T. S.

New Haven, July 17.