

point. This property characterises the other occupants of the eighth column; to some extent in the iron group, and certainly in the palladium and platinum groups.

(5) The introduction of a new element with the atomic weight of 20 (not 21 or 22), will extend the range of certain recurring numbers which appear near the beginning of the series of atomic weights. In the existing arrangement of the atomic weights it will be observed that between oxygen 16 and fluorine 19 there are three units; between fluorine 19 and sodium 23 there are four; then the numbers run 1, 3, 1, 3, 1, 3½. Adding argon at 20 the series becomes symmetrical all the way from oxygen to chlorine, as will be seen in the diagram on the previous page.

If, on the other hand, we were to adopt 40 as the atomic weight of argon, we should meet with the following serious difficulties:—

(1) There is no room for it. To place another figure just before or just after calcium would disarrange the whole subsequent series.

(2) It would break the periodic law in regard to its melting point.

(3) It would break the law in regard to its atomic volume.

(4) The inactive argon would be associated with metals of the earths, the compounds of which are remarkably stable.

(5) It would bring the atomic weight of three elements, potassium 39, calcium and argon each about 39.9, within one unit. This never occurs elsewhere in Mendeléeff's table.

Against these considerations there is the forcible argument deduced from the ratio of the specific heats of argon. I will not attempt to weigh the respective merits of these lines of reasoning, especially in the absence of the details of the experiments on the velocity of sound, and until we have some knowledge of the compounds of argon. Trustworthy conclusions will not be possible till this fur her information is obtained. It is not a question of physics *versus* chemistry, for the true theory of its place among the elements must be able to coordinate all the facts upon which both the chemist and the physicist rely.

J. H. GLADSTONE.

London, February 8.

The Aurora of November 23, 1894.

PERMIT me to call attention to a significant fact disclosed by a scrutiny of the observations of the aurora of November 23, 1894, and having an important bearing in discussing the auroral dimensions, and which appears to have escaped notice (see NATURE, January 10). I refer to the *invisibility* of the objects at Dingwall, to the observers at Tynron, Dumfriesshire. Extracts from the synchronous accounts in NATURE, November 29, p. 107, and January 10, p. 246, will prove this statement.

Tynron, 7.30.—Luminous mist in the northern sky, strong enough to cast shadows on the shining surface of the wet ground. The mist moved from the horizon to the zenith, forming a detached luminous belt in patches, disappearing at 8.30, leaving only the light in the north.

Dingwall, 7.30.—Sky covered in all directions by a canopy of streamers. At the same time the arch disappeared, and occasional streamers up to eight o'clock. It is not possible that the arch seen at Dingwall could be the same as the one at Tynron, because the former had vanished when the latter commenced to form, whilst there is a total absence of streamers, and phenomenally brilliant mist not recognised at the other place. Until methods of observation and analysis can be introduced that will eliminate the errors of identification, the solution is likely to be indefinitely postponed.

W. H. WOOD.

Birmingham, February 3.

MAKING the necessary allowances for increased apparent luminosities of bright streaks, or of layers of light in the atmosphere, by the foreshortening effects of end-on, and of edge-presentations, the observations at Dingwall and in Dumfriesshire of the aurora of November 23 last, scarcely seem to recount very much which was not at the two places, at least partially, a fairly comparable and nearly contemporaneous description of the same phenomena. The first-formed light-band of the glow was very strong at Dingwall from the east to west, a little southward from the zenith, until 7.30 p.m., when with the usual drift of such displays to southwards, it became less prominent there than the approaching canopy of streamers

which supervened, drifting up from the north-eastern sky in rear of it. But it assumed at the same time increasing prominence in Dumfriesshire (150 miles south of Dingwall), where between 7.30 p.m. and 8 p.m., it passed overhead in the shape of detached patches of light, a form which the belt was also seen to assume and to break up into, in a slow extinction stage at Slough, in that interval. The display of streamers rising from a large tract of light-mist approaching Dingwall from the northward and increasing constantly in lustre at 7.30 p.m., did not extend far south of Dingwall before it faded out soon afterwards; and being (as it was seen at Slough) a dense local discharge of them, its corona of brightly-foreshortened beams overhead would naturally be a very impressive sight at Dingwall, although from a position 150 miles distant in Dumfriesshire, the broad-side aspect of the short outbreak, seen from afar, instead of from underneath, would only have the appearance of a sheaf of coloured light projected up from the usual flat streamer-base, neither very wide nor extraordinarily lofty, but of the massive berg-like form, which was its description at Slough, not unfrequently noticeable in rather strong auroras; and it may even have been quite easily hidden from view entirely at Tynron, although a clear horizon in the north near Slough allowed its observation there, by trees or by other obstructions in the landscape.

If Mr. Wood can happily devise a practical means of perfectly recording the times and descriptions of *all* the rapidly changing features of an aurora, and the shifting variations of its misty light-glows, he could no doubt achieve results from observations which would be no less a benefit to astronomers and terrestrial magneticians, than an exact continuous registration of cloud phenomena would be of welcome interest to meteorologists and terrestrial electricians; but it needs no great familiarity with auroral exhibitions to be quite certainly assured that results of records even so elaborate as those might be, would never be found to confute, but only to confirm the generally accepted view of the really cosmical heights and dimensions of all truly auroral lights and corruscations; of all such lights, that is to say, as show in their spectra the yellowish auroral line, or some of the other well-recognised spectral indices of the aurora.

A. S. HERSCHEL.

The American Association.

AT the Brooklyn meeting of the American Association for the Advancement of Science last summer, it was decided to meet this year at San Francisco, provided reasonable rates of fare could be secured from the trans-continental routes, as it was supposed could be done. Prof. Joseph Le Conte for three consecutive years had crossed the continent, laden with earnest and cordial invitations from the Universities and Scientific Societies of California, and the Common Council of San Francisco, to hold the meeting for 1895 in that city. The short-sighted policy of the railroads, however, refused to grant any concessions; and it has at last been decided to meet at Springfield, Mass., August 29—September 4. The meetings of affiliated societies will begin on Monday, August 26—rather later than the usual time of meeting.

Springfield is a small city, located in the heart of New England. It is the seat of the principal arsenal of the United States; and, while not a University city itself, it is within two or three hours' ride of nearly, or quite, a score of institutions of learning of the highest grade, including the two oldest and most powerful Universities in America, Yale and Harvard. This will be the second meeting at Springfield, the first having been held in 1859.

The Association is incorporated by the State of Massachusetts, and its office and museum are at Salem in that State; but no meeting has been held in New England since that at Boston in 1880, the most brilliant in all the history of the Association. The return to New England after this longest absence, gives unusual interest to the approaching meeting.

WM. H. HALE.

Brooklyn, New York, February 2.

Earthquake in Norway.

ABOUT midnight on the 4th and 5th of this month, a fairly strong earthquake occurred in the southern part of Norway. The greatest disturbance was felt in the environs of the town of Aalesund, upon the west coast (about 60° 30' lat. N.). From there

the shocks extended to the region of the Trondhjems fjord, the Swedish border, and the Christiania fjord, and Bergen, but the extreme south-west part of the country seems to have been undisturbed. The earthquake is also reported from Fünen, in Denmark. The movement proceeded in about seven minutes from the west coast to Christiania (at Christianund 11h. 38m. Christiania time, 11h. 15m. Greenwich time). It is interesting to notice that the earthquake resembles one which occurred on March 9, 1866, and was felt across the North Sea at the lighthouse of Flugssarrock, on the Shetland Islands. As I am engaged in collecting data about the earthquake of this month, I should be glad to know whether it was observed in the British Isles.

Christiania, February 11.

HANS REUSCH.

"The Black-veined White Butterfly."

My experience of this species in England enables me to support Mr. W. Warde Fowler's opinion (*NATURE*, February 14, p. 367) as to the preference of the species for open ground. I met with it in abundance in the New Forest in 1866, 1868, 1869, and 1870. It rarely occurred in or near dense woods, but preferred the open heaths and wastes of the Forest, where thistles were plentiful. In 1867 I found the species swarming, about mid-summer, in hay fields on hill-sides in Monmouthshire. There were a few small orchards, but not much wood, in the neighbourhood. For a detailed account of the former distribution of *Aporia crataegi* in this country, I would refer Mr. Warde Fowler to my article on the subject in the *Entomologists' Monthly Magazine* for March 1887.

H. GOSS.

Surbiton Hill, March 16.

The Zodiacal Light.

At the present moment—7 p.m. February 16—the zodiacal light is more distinct than I ever remember to have seen it in England. The middle of the base is about 2° to the northward of the point where the sun set, and the axis is directed towards the Pleiades, and can be traced as far as the middle of Aries. The afternoon has been remarkably clear, and it is now a brilliant starlight evening.

J. P. MACLEAR.

Cranleigh, Surrey, February 16.

OYSTERS AND TYPHOID.

THE statements that have recently appeared, both in the general and in the medical press, concerning the communication of typhoid fever through the agency of oysters when eaten raw, make it desirable to review some of the data on which the suspicion in question is based. For many years past it has been a matter of assumption, when typhoid fever has followed, within some ten to fifteen days, on the consumption of raw oysters, and when no obvious cause for the disease could be detected, that the oysters stood to the fever in the relation of cause; and this attitude received no inconsiderable impetus when, a few years ago, a member of our Royal family sickened of typhoid fever under circumstances that were suggestive of oysters as the vehicle of the disease. Then again, it must be admitted that it has been a matter of no very uncommon experience amongst medical men to have to treat typhoid fever in patients who, at an antecedent date corresponding with the incubation period of typhoid fever, had indulged in an oyster supper after leaving some place of entertainment. And the suspicion has been confirmed, in some cases, when it has been ascertained that another member of the same party, having nothing but the oyster supper, in common with the sufferer referred to, has also had typhoid fever about the same date, or had suffered from vomiting and other symptoms the day after the consumption of the oysters. The assumption in cases of this latter class has been, that the specific poison of typhoid fever was, with other matter that had become objectionable to the system, got rid of by the attack of sickness. A case generally illustrative of this class of occurrence was recently recorded in the *British Medical*

Journal. Four friends had an oyster supper on November 5. Two of them lived not far apart, but the others had nothing in common as regards residence or anything else. On November 23 three of them sickened, and they were, later on, all found to have typhoid fever. One of the patients, during convalescence, disclosed both his profession and his views by re-naming his malady "bivalvular disease."

Amongst leading medical men who have adopted the view that oysters are a source of typhoid fever, we may name Sir William Broadbent, who early this year announced that from time to time he had seen cases of typhoid fever "apparently attributable to oysters," but that during the course of last autumn the evidence as to the communication of the infection through this agency has been of such a character as to produce "conviction" in his mind.

This naturally leads us to ask how the oyster becomes the vehicle of such a disease; and the evidence already forthcoming on this point is such that we could only wonder if typhoid fever were not occasionally conveyed to those who eat this favourite mollusc in an uncooked form. Investigation of some of the river estuaries and other places where oysters are cultivated and prepared for market, would almost lead us to believe that conditions favourable to typhoid fever were deliberately chosen for the purpose. Indeed, it is notorious that a number of our British oyster-beds are in such relation to sewer outfalls, that the oysters must of necessity be bathed in a solution of sea-water and sewage at every tide. According to a commissioner appointed to inquire into this matter by the *British Medical Journal*, a well-known Essex oyster fishery has "a sewer discharging between oyster-beds on either side"; and at a "health-resort" (!) on the same coast, it is a common practice to moor the oyster-boxes to a pier or groyne, within a few feet of which the evidences of sewage are too palpable to be specified. In both the places referred to, the typhoid fever poison, which it is known finds access to drains, had had ample chance of fouling the sewers in question.

It has been alleged, on the evidence of certain recent bacteriological investigations as regards the contents of London sewers, that the organism producing typhoid fever cannot live and multiply in sewers. But the organism has been found in sewers; it also lives in sea-water; and the fact remains that sewage bathes our oysters during cultivation to an extent that is essentially disagreeable, and that ought not to take place; and, also, that typhoid fever follows the use of oysters so cultivated. It may also be alleged, as is done by certain oyster-growers, that sewage is fatal to the oyster itself. In answer to this, we can only say that such evidence as we have obtained, as to some of our oyster-beds, is absolutely opposed to this statement; and not only so, but we know of more than one instance where the oysters are deliberately brought from the beds to fatten in still nearer proximity to outfall sewers for a week or more preliminary to their sale. In brief, if sewage and noxious micro-organisms can be retained in the beard and other portions of the oyster, or in the "juice," which is so much relished, everything seems contrived to secure such retention of filth at some of our oyster fisheries.

Doubtless the same applies to many foreign oyster-beds. Indeed, the recent experience embodied in a report by Prof. W. N. Conn, as to an epidemic of typhoid fever amongst the students of a college at Middletown, Connecticut, not only supplies convincing evidence of this, but it affords the most connected and complete proof of "oyster-typhoid" as yet published. Quite an epidemic of typhoid fever occurred amongst the students of certain fraternities, and amongst a number of their friends who had joined them at their "initiation suppers," but who had subsequently returned to their distant