beatifully-polished marble, which at present is entirely inaccessible. The country traversed was barren beyond description, and is pronounced by Colonel Powell as not susceptible of cultivation, even by irrigation.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

The Assimilation of Inorganic Substances in the Animal Economy.

MESSRS. EDITORS:—In criticising some remarks on phosphatic bread, which appeared in the SCIENTIFIC AMERICAN of September 11th, you ask for the writer's authority for the statement there made, that inorganic matter cannot be assimilated by the animal organism. After a more thorough examination for authority, we are willing to admit that the proposition in question might have been submitted with greater caution.

The "ordinary facts" to which you advert, relating to common salt in food and to preparations of iron administered by physicians to chlorotic patients, if facts, are by no means universally admitted by chemists and physiologists.

Dr. Bellows (late Professor of Chemistry, Physiology, and Hygiene) says of salt, "It is not in any sense nutriment as it does not furnish support to any organ or function, and does nothing toward sustaining life, as has often been proved in the case of the famished sailor who only increases his sufferings by taking salt water in very small quantities." He also says: "There is enough salt in common natural food to account for all the salt actually incorporated into the system."

Frederick William Headland, of the Royal College of Physicians, in London, in a standard work on the action of medicines, in attempting to prove that the iron from the shops does enter into the blood as a part of it says: "In some cases of chlorosis the blood was analyzed before giving iron, and after it had been given for a few weeks, and was found to contain more of red globules after taking the iron than before." But says Dr. Bellows, "scores of cases can be brought where under a different treatment the results were the same and even more striking, without a particle of iron, and my explanation is, that the effect of the iron was that of a mere stimulant promoting sanguification from food taken in the meantime containing iron." JOSEPH R. PARKS.

Muscatine, Iowa.

[Would it not be well for our correspondent to extend his reading to some other author than Dr. Bellows? This brilliant meteor of science has not yet flashed across our horizon; we do not find his name enrolled on any list of standard authorities in our possession. There is evidently some confusion in the minds of some of our correspondents on the constituents of animal and vegetable tissue, and as to what ought to be regarded as organic and inorganic substances. We will, when convenient endeavor to set them right on these points. —EDS.

Spectrum Lines of Aurora.

MESSRS. EDITORS:—During these times of auroral abundance our Canadian skies frequently present interesting scenes. Shortly after midnight on the morning of Sept. 3d, aurora borealis hung over us, waving like luminous canvas floating in the breeze, and forming a brilliant corona near the star Scheat, in Pegasus. The light seemed to flow in two currents, the uppermost remaining quiet, and the lower current changing with great rapidity.

On this occasion I submitted the aurora to careful spectrum analysis, and am happy to report an observation made with the spectroscope, which may help to settle the question of the nature of polar light. I succeeded in obtaining a distinct spectrum, consisting of one very bright line in the yellow and one faint line in the green. The bright line was close to the sodium line D, and coincident with an air line in the solar spectrum. The dim line in the green I could not identify as belonging to any known substance.

The conclusions resulting from the identification of the bright line in the spectrum of aurora are important, showing that polar light is principally incandescent oxygen gas.

The presence of this gas in excess, in regions traversed by aurora, may result from the decomposition of water. The electric currents effecting the separation and rendering the oxygen luminous. The re-union of oxygen and hydrogen form water again, which is visible as a turbid atmosphere, noticeable during auroral displays. But it may be asked, Why do not the lines of hydrogen appear in the spectrum of aurora? The answer is, because its temperature is not sufficiently high to render the gas incandescent. In a partial vacuum oxygen is luminous at a lower temperature than hydrogen, because of its density, which is sixteen times greater, and still increased by the continuous passage of electric currents.

Another question that may arise is this Why does the air line in the spectrum of aurora appear bright, while the same line in the solar spectrum is black? An explanation is found in the fact that there is no sufficient absorbing medium, between the aurora light or luminous oxygen, and the earth, while the solar line is seen after absorption by its passage through a deep luminous stratum of the earth's atmosphere.

Toronto, C. W. D. K. WINDER.

Cutters on Reaping Machines.

MESSRS. EDITORS:—Your correspondent in No. 11, current volume, is very much in error in some of his statements, in his criticism of one or two former communications on the subject of cutters for reaping machines: While I fully agree with him that the serrated sections are best, I see no reason for his great "surprise that any one should advocate smooth edges"; in as much as the fact that a great majority of machines have smooth cutters, will abundantly prove that your former correspondent is well sustained. In the second place, it is a great mistake to suppose that "the serrated sections are as hard as it is possible to make steel;" for in that case they would be nearly valueless, as they could neither be straightened nor sharpened; and a long experience with reaping machines in a rough country, has taught me that the bending and battering of these sections are of daily occurrence, and that they can be straightened and ground with impunity. JOHN MILTON.

Hillsboro, Va.

The Scientific American Under a Corner Stone.

MESSRS. EDITORS:—Please send me a copy of the SCIENTIFIC AMERICAN for September 8, 1869. On the occasion of the laying of the corner stone of the Wesleyan church at this place, my copy of the above date arrived just in time for me to inclose it with the other papers and documents, which, in a hermetically sealed metallic box, were deposited in their (probably) long resting place beneath the corner stone.

I thought tnat possibly in the far future, the contents of that box might see the light once more, and that no paper on this continent could convey to future generations so correct an idea of the civilization and materal condition of the world in the latter half of the nineteenth century as a copy of the SCIENTIFIC AMERICAN.

I thought too, of the "good time" the printers, engravers, inventors, and scientists of that (future) age would have over the resurrection of a well-preserved copy of the SCIENTIFC AMERICAN of September 18, 1869.

Perhaps, long after your able efforts are ended, and your dust has mingled with mother earth, some future editor of the SCIENTIFIC AMERICAN will be permitted to see this embodiment of the invention, art, and science of the present day, and write a splendid leader on "Wonderful results of Invention: The Nineteenth Century and the Present Age," or some other theme which so pregnant a sheet would suggest.

Meantime be it mine to thank you for the pleasure and instruction which your journal always affords me.

JAMES STIMSON, M. D.

St. George, Brant Co., Ontario.

The Hartford Steam Boiler Inspection and Insurance Company.

This company make the following report for the month of August, 1869:

During the month 390 visits of inspection have been made, 584 boilers examined, 579 externally, and 156 internally, and 45 tested by hydrostatic pressure. The number of defects discovered, 403—of which 20 were especially dangerous. These defects were as follows: Furnaces out of shape, 17—1 dangerous; fractures in all, 196; burned plates, 25—1 dangerous; blistered plates, 38—1 dangerous; cases of incrustation and scale, 57—2 dangerous; cases of external corrosion, 26—5 dangerous; cases of internal corrosion, 1; cases of internal grooving, 1; water gages out of order, 8; blow out apparatus out of order, 6; safety valve overloaded, 15—6 dangerous; pressure gages out of order, 39—1 dangerous; boilers without gages, 5; cases of deficiency of water, 5; boilers without blow-out apparatus, 1—dangerous; boilers condemned as unfit for use, 2—both dangerous.

In commenting upon the above record, we can say but little that has not already been said. A marked improvement in one respect, however, will be noticed. And that is, that there are less dangerous defects than are usually noticed in our monthly reports, and as the business of the company increases, this improvement in the condition of boilers under its care will be more and more apparent, for when defects are discovered by the inspectors' periodical visits, they are pointed out and at once repaired. The expense is comparatively small, little time is required, and the boiler or boilers are thus kept in good condition.

When boilers are left for months or years without careful examination, they become badly corroded, incrusted, or burned, so that when they are overhauled for repairs, they are often found not worth repairing, or if repaired, at a cost nearly equaling the expense of new ones. It is an old adage that "a stitch in time saves nine," and this is as true in the case of steam boilers, as in the case of the good housewife who "sews tares while the husbandman sleeps."

Fractures, which are too numerous, are the result, either of faulty construction or poor management. Mr. Henry Hiller, chief engineer of the National Boiler Insurance Co., of Manchester, England, in his annual report, says of this difficulty. "The fractures at the seams and over the furnaces of externally fired boilers, some of which were of a most dangerous character, were due to various causes; viz., faulty arrangements of feed pipes, sedimentary water, or irregular working and firing. When the feed water contains much sediment, frequent cleaning of the interior of this class of boiler is especially necessary."

External corrosion is a serious evil, and one to which careful attention should be given. Boilers that are bricked in, are especially liable to this difficulty. A slight leak at the seams, goes on wearing away the plates until they are reduced to a very dangerous thinness. We have in our collection several specimens showing the insidious work of this evil. One specimen of plate is reduced to the thinness of paper, and the day before our inspector discovered it, 80-pounds pressure was used on the boiler. We copy from the report of Mr. Edward B. Marten, chief engineer of the Midland Boiler Inspection and Assurance Co., Stourbridge, England, with whose report we have recently been favored.

"In one or two cases frequent warnings as to damage going on from leaking fittings have been disregarded, until absolute danger has been reported, and when the boilers have been cleaned off and examined, those in charge have been dismayed at the extent of the corrosion in a short time. All leaking in the brick work around boilers should be entirely stopped if they are to last their proper time and work in safety." The over-loading of safety valves is still a prevalent evil, and one the steam users should be more particular in guarding against. The safety valve should be frequently raised, but this should be gently done. Never raise it suddenly, nor let it drop heavily upon its seat, for, by so doing the spindle may be bent, thus making its seating imperfect.

One of our inspectors reports 2 safety valves with corroded seats, and rusted fast. Now it is evident that an inoperative safety valve is worse than none, for while there is the appearance of safety, there is positive danger.

It will be noticed that 2 boilers have been condemned as unfit for use. The searching investigation which is given to boilers will discover weak points, if such there are, and we presume that many boilers in use would be at once condemned if they were thorough inspected by competent men.

We could extend these comments on all the defects and defective attachments of boilers, but space forbids. We shall take up other points in future.

OBITUARY.---THOMAS GRAHAM CHEMIST.

A cable dispatch from London reports the death in that city of Thomas Graham, the celebrated chemist and Master of the Mint. He was born in Glasgow, Scotland, on the 21st of December, 1805—his father being a merchant and manufacturer in that city. Mr. Graham was educated at Glasgow School, and subsequently at the University of Glasgow, where he graduated, taking the degree of M.A., in 1826. He then moved to Edinburgh, but at the end of two years, returned to his native place and established a laboratory for the practical study of chemistry. He also lectured at the Mechanics' Institute, and was elected Andersonian Professor at Glasgow. This office he held until 1837, when he resigned for the purpose of accepting the Professorship of Chemistry in the London University, to which he had been appointed. In 1855 Sir John Herschel retired from the Mastership of the Mint, and Mr. Graham was appointed to fill the vacancy, holding the position with credit until his death.

There has probably been no chemist in Great Britain of equal ability to Mr. Graham during the past quarter of a century. His study of the sciences was complete, and his discoveries and works have been of great scientific importance to the world. His most remarkable discoveries were the law of the diffusion of gases, the diffusion of liquids, and the new method of separation known as dialysis. For the first named discovery he received the Kieth prize of the Royal Society of Edinburgh in 1834, and for the last, the Copley medal of the Royal Society in 1862. Of his literary productions, the most important and best known is "Elements of Chemistry," which has been extensively circulated and read in Great Britain and Germany, and is also a familiar work to scientific students in the United States and other parts of the world. Mr. Graham was elected a Fellow of the Royal Society in 1836, a corresponding member of the Academy of Sciences of the Institute of France in 1848, and was created an honorary D.C.L. by Oxford University in 1855.

The readers of the SCIENTIFIC AMERICAN will remember the account given on page 244, of our last volume, of the discoveries made by Mr. Graham respecting the properties of hydrogen.

Gas for Lighthouses.

A series of letters and reports sent to the Commissioners of Lighthouses and the Board of Trade has resulted in a request being made to Professor Tyndall, by the latter body, that he would report upon the proposal to substitute gas for oil as an illuminating power for lighthouses, as illustrated in the lighthouses of Howth Baily and Wicklow Head. Various experiments were made at Howth Baily, and Professor Tyndall says that the superiority of the gas over the oil flame is rendered very conspicuous by these experiments. The 28-jet burner possesses 2½ times, the 48-jet burner 4½ times, the 68-jet burner 7¼ times, the 88-jet burner 9¾ times, and the 108-jet burner 13 times the illuminating power of the four-wick flame. The oil lamp with which the gas flame was compared was the most perfect one employed by the Commissioners of Irish Lights. Further experiments were also made, and it appeared that the whole of the gas-lighting apparatus was entirely under the control of the keeper, and that no damage was likely to arise from it. The 28-jet gas burner, when seen from a position some miles off, appeared to be very nearly upon an equality with the oil lamps, but when muffled to represent a fog it had a slight advantage. Of course with the brighter jet burners a great improvement was apparent, and before the 108-jet burner the oil lamp grew quite pale. By the adoption of a system of gas lighting a great saving in cost would be effected; but such a system would not be possible on rock lighthouses. Professor Tyndall recommends the encouragement of this system of illumination in Ireland.

TO KILL cockroaches take carbolic acid and powdered camphor in equal parts; put them in a bottle; they will become fluid. With a painter's brush of the size called a sash tool, put the mixture on the cracks or places where the "critters" hide; they will come out at once. It is wonderful to see the heroism with which they move to certain death. Nothing more sublime in history; the extirpation is certain and complete. While on this theme I would add that a mixture of carbolic acid with water—one-fourth acid three-fourths water —put on a dog, will kill fleas at once. I have seen it tried.

G. W. B.