For the Scientific American.

New Chemical Law.

No. 11.

If we proceed with another class of substances, differing in chemical properties to the four elements we have just classified, we may probably arrive at the following aggregated series, which possess a radical with the atomic weight of 8.

	Sp. Gr.	Boil. Pt.	
Sulphur 8X2=16.00	1.98	600°	solid.
Selenium 8X5=40.00	4.32	650°	solid.
Tellerium 8X8=64 00	6.14		solid.

No aggregated series can be produced which are more perfect in the similarity of their chemical properties than these. The specific gravities are on a regular increase and so are all the boiling points. The boiling point of Tellerium although not precisely known is greater than that of Selenium. The gradual increase of all its properties may also be distinctly seen. Thus the series commencing at sulphur, a non-metallic substance, gradually runs into the metallic and ends in the metal Tellurium. The same gradual increase of properties may be seen in their powers of conducting heat and electricity—thus sulphur is a non-conductor of electricity, selenium an imperfect, but tellurium is a perfect conductor. No substances are more similar in their chemical properties than these, to which every chemist will agree. We have taken the atomic weight of the radical at 8. The following shows the close agreement which is found to exist between the calculated and experimental atomic weights.

	By Calculation.	By Experiment.	
		Kane.	Turner.
Sulphur	8X2=16.00	16.12	~~16.10~~
Selenium	8X5=40.00	39.63	39.60
Tellurium	8X8=64.00	64.25	64.20

In the last example of aggregated series it was shown that each substance comprised in it united with an equal number of atoms of oxygen to form an acid, which was 5. In this example the substances unite with an equal number of atoms of oxygen to form an acid, according to the requirements of the law.—And the acids thus formed possess similar chemical properties. They also form compounds with other substances which also possess similar chemical properties.

Sulphuric Acid 2R+O3+HO. specific gravity 1.850. boiling point 620°. fluid.

Selenic Acid 5R+O3+HO. sp. grav. 2.625, fluid.

Telluric Acid 8R+O3+HO. solid.

The specific gravity of telluric acid should therefore be greater than that of selenic acid. The boiling points also increase, but the precise temperature at which the selenic and telluric acids boil has never been ascertained, as they both decompose at high temperatures, the one giving oxygen and selenium, while the other oxygen and tellurium. There is no need of speaking of their similar chemical properties, as they are well known to every chemist. From the fact that the sulphate of barytes is insoluble in water, it is probable that the same is the case with the seleniate and the tellurate of barytes. The sulphurous, selenious and tellurious acids afford an illustration of the gradual increase of density which the law requires. Thus sulphurous acid is a gas, whilst the two remaining substances are solid. The combinations which these substances form in uniting with hydrogen are also precisely similar, possess the same smell, and precipitate the metals from their solutions in the same manner. Thus if we knew the properties of the telluretts, we also know the properties of the sulphurets. By these statements and the properties of this law, it may be seen that the specific gravities of any sulphuret, seleniuret or telluret of any particular substance whatever, must either increase or decrease in a regular manner; the same may be said of any of the sulphates, seleniates or Tellurates of any particular substance whatever. In fact every similarly formed compound of sulphur, selenium or tellurium must possess specific gravities which either increase or decrease in a regular manner. The boiling points of every similarly constituted compound of sulphur, selenium or tellurium must also increase. The same may be said of any other property whatever. If this law therefore is untrue, it is very easy to discover some departure from the numerous conditions given, as it is evident that these conditions could not answer through all the aggregated series and their compounds which have been given and which can be produced. It may be seen that the aggregated series just given corresponds in its general similarity with the known series as aggregated from the radical C H. Why then not ascribe the same law to govern both, and so declare sulphur, silenium and tellurium to be compounds and produced by the aggregation of a radical, possessing an atomic weight of 8. S. N.

Bridgeport, Conn.

Disinfecting Property of Coffee.

The London Medical Gazette says that coffee is one of the most powerful means not only of rendering animal and vegetable effluvia innocuous, but of actually destroying them. A room in which meat in an advanced degree of decomposition had been kept for some time, was instantly deprived of all smell on an open coffee roaster being carried through it, containing a pound of coffee newly roasted. In another room, exposed to the effluvium occasioned by the clearing out of a dung pit, so that sulphuretted hydrogen and ammonia in great quantities could be chemically detected, the stench was completely removed within half a minute on the employment of three ounces of fresh-roasted coffee, whilst the other parts of the house were permanently cleared of the same smell by being simply traversed with the coffee-roaster, although the cleansing of the dung-pit continued for several hours after. Even the smell of musk or castoreum, which cannot be overpowered by any other substance, is completely dispelled by the fumes of coffee; and the same applies to the odors of assafœdita. It was remarked, however, that in general animal effluvia are more readily affected by it than vegetable. That here an acidal neutralization and not mere envelopment of matter, takes place, is shown from this, that the first fumes of the coffee are imperceptible, and continue so until a point of saturation, so to speak, is reached whereupon the obnoxious smell disappears and that of the coffee predominates. The reverse happens with other aromatic vapors; and even with acetic acid and chlorine. Here both co-exist until the one completely preponderates. The simplest form in which to use it against contagious matter is in powder. The well-dried raw bean is to be pounded in a mortar, and to be strewed over a moderately heated iron plate until the powder assumes a dark brown tint. Coffeic acid and the empyreumatic coffee oil, act more readily in a very minute quantity.

Saltness of Sea-Water.

In the Northern and Arctic Seas the specific gravity of the water has been found by Dr. Marcet, Mr. Scoresby, and Dr. Fife, 1026.7, and nearly the same at all depths. Under the equator, 1028. In the Mediterranean, 1028. 82, showing this sea to be considerably salter than that of the oceans which surround the globe. But the saltest, at least the heaviest, of all the waters on the earth, is the Dead Sea, which is impregnated not only with salt but also with sulphurous and bituminous ingredients. The specific gravity has been found to be 1211, showing an impregnation eight times greater than sea-water.

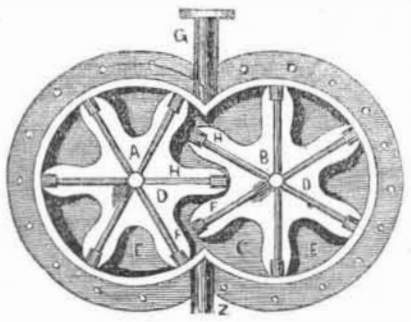
Fence for the Prairies.

A new kind of fence is coming into use in Northern Illinois. The fence consists of strips of sheet iron, one and a half inches wide, prepared in oil, so as to resist the action of the weather, and painted white. These strips are nailed to posts in the ground, two rods apart, with a perpendicular strip of board every other rod. The whole cost per rod is estimated at less than thirty cents; and it is superior to wire, as it does not sag, and being painted white, cattle will see it and not run against it.

History of the Rotary Engine.

Prepared expressly for the Scientific American.

Fig. 21.



MURDOCK'S ROTARY ENGINE.

This is a rotary engine invented and patented in 1799 by W. Murdock of Redruth, Wales. The invention consists in having two toothed wheels working into one another and fitted into a double case resembling two cylinders, with a segment cut off each.

A B, are the two axes upon which the wheels D D are fixed. The teeth are supposed to be packed at the parts in contact with the exterior cylinder. The teeth which are in contact are so fitted as to prevent any escape in that direction. Steam being introduced at the pipe Z, a rotative motion would be produced; but the construction would be so defective, and the friction so great, as totally to prevent its ever answering in practice. At the same time we ought to correct an erroneous opinion which many have formed respecting this machine, which is, that it would not move at all; it being thought that as the surface of the teeth H H, are as great as that of F F, that there would be as great a tendency to turn one way as another, and therefore no motion would be produced. But it will be seen that the teeth H H, though individually of equal superficies with F F, overlap each other. the surface presented to the action of the steam is only equal to one tooth, therefore the effect of the steam (without calculating friction) would be one half the real force.

This rotative engine of Mr. Murdock was never of any use whatever, although as a toy it is a very beautiful machine. The inventor was a very ingenious man and although not successful in this invention, yet he has claims to originality. We have presented no similar rotary to this before. Mr. Murdock made an improvement in the casting of James Watt's Steam Jacket. He cast it in one piece with the cylinder, with a space between the two, but connected at both ends.

The Constant Presence of Metals in the Blood.

M. Millon, through the (Paris) Comptes Rendus, remarks: The blood is received, for the sake of experiment, in a vessel containing about three volumes of water to one of blood, and introduced into a flask containing chlorine. The organic matter immediately coagulates, changes color and loses all traces of organization. By expressing the clot and washing, the whole inorganic matter is removed and is found in the clear and limpid solution. Not more than one per cent of organic matter is carried off in solution. The reaction with chlorine is complete in two or three minutes, the separation of the iron in this way is therefore a neat experiment.

The saline ingredients after ignition are examined as usual, and of this residue, 100 parts are found to contain—

Silica : : : : : 1 to 3	Copper : : : 1·5 to 2·5
Lead : : : : : : 1 to 5	Magnesia : 20· to 24·

This experiment shows that these metals, like iron, are found only in the globules of the blood. This method of analysis is suggested as suitable for the fluids of the animal economy: it is fully determined that the most repulsive matters furnish immediately a clear saline solution.

This is something new in organic chemistry, and must be received with some caution It may yet be discovered that the lead is no *lead*, and the copper, no copper.

Lithographic Limestone.

Papers from India, says the London Athenæum, notice the discovery in the Deccan, of a bed of lithographic limestone, of great extent and excellent quality.

Diseases and Cures of Grape Vines.

In some sections of country mildew is the greatest enemy to the vine. The mildew may be arrested by applying directly to the roots of the vine either leached or unleached ashes, or any thing else of an alkaline nature.

Rose Bugs are sometimes very destructive to vines, eating all the leaves and nearly destroying the entire crop of grapes. The best remedy is whale oil soap. Take four pounds of the soap and dissolve it in four gallons of water; strain it and add enough cold water to make one barrel of suds. If only a few vines are affected, the suds may be applied with a syringe, but if there is a large number of vines apply it with a garden engine.

We have seen the soap suds used with great effect. They should never be applied warm, but cold. Soapsuds applied to water the vine is most excellent—nothing better. It is both meat and drink to the ruby grape. But care should be taken never to apply them warm. We once saw a good vine destroyed by hot soapsuds. Sheet lead should never be used to fasten up vines, altho' we have seen it used for that purpose more than once. In moist weather, and especially through the influence of dew, the oxide of lead is liable to run down and enter the earth and then is taken up by the mouths of the vine, becoming a poisonous part and parcel of the fruit.

Beautiful Action of the Sun.

The illuminating influence of the sun is displayed in a remarkable degree by the plant *calcalia ficoides;* its leaves combine with the oxygen of the atmosphere during the night, and are as sour as sorrel in the morning; as the sun rises, they gradually lose their oxygen and are tasteless by noon; and by the continued action of the light, they lose more and more, till towards evening they become bitter.

Vast Irrigation.

There are works for this purpose in India, tanks and aqueducts of immense magnitude, miles in circumference and length, which excite the wonder of the passing traveller, and are, in the labor expended on them, little inferior to the Pyramids of Egypt themselves.—It has been imagined they were erected for hydraulic purposes.