

IV. "On the Occlusion of Hydrogen Gas by Meteoric Iron." By
THOMAS GRAHAM, F.R.S. Received May 16, 1867.

Some light may possibly be thrown upon the history of such metals found in nature as are of a soft colloid description, particularly native iron, platinum, and gold, by an investigation of the gases which they hold occluded, such gases being borrowed from the atmosphere in which the metallic mass last found itself in a state of ignition. The meteoric iron of Lenarto appeared to be well adapted for a trial. This well-known iron is free from any stony admixture, and is remarkably pure and malleable. It was found by Wehrle to be of specific gravity 7.79, and to consist of—

Iron	90.883
Nickel	8.450
Cobalt	0.665
Copper	0.002

From a larger mass a strip of the Lenarto iron 50 millimetres by 13 and 10 millimetres, was cut by a clean chisel. It weighed 45.2 grammes, and had the bulk of 5.78 cubic centimetres. The strip was well washed by hot solution of potassa, and then repeatedly by hot distilled water, and dried. Such treatment of iron, it had been previously found, conduces in no way to the evolution of hydrogen gas when the metal is subsequently heated. The Lenarto iron was enclosed in a new porcelain tube, and the latter being attached to a Sprengel aspirator, a good vacuum was obtained in the cold. The tube being placed in a trough combustion furnace, was heated to redness by ignited charcoal. Gas came off rather freely, namely—

In 35 minutes	5.28	cub. centims.
In 100 minutes	9.52	"
In 20 minutes	1.63	"
In 2 hours 35 minutes	16.53	"

The first portion of gas collected had a slight odour, but much less than that of the natural gases occluded by ordinary malleable iron. The gas burned like hydrogen. It did not contain a trace of carbonic acid, nor any hydrocarbon vapour absorbable by fuming sulphuric acid. The second portion of gas collected, consisting of 9.52 cub. centims., gave by analysis—

Hydrogen	8.26	cub. centims.	85.68
Carbonic oxide	0.43	"	4.46
Nitrogen.....	0.95	"	98.6
	9.64	"		100.00

The Lenarto iron appears, therefore, to yield 2.85 times its volume of gas, of which 86 per cent. nearly is hydrogen. The proportion of carbonic oxide is so low as $4\frac{1}{2}$ per cent.

The gas occluded by iron, from a carbonaceous fire, is very different, the prevailing gas then being carbonic oxide. For comparison a quantity of clean horseshoe nails was submitted to a similar distillation. The gas collected from 23·5 grammes of metal (3·01 cub. centims.) was—

In 150 minutes	5·40 cub. centims.
In 120 minutes	2·58 „
In 4 hours 30 minutes.....	7·98 „

The metal has given 2·66 times its volume of gas. The first portion collected appeared to contain of hydrogen 35 per cent., of carbonic oxide 50·3, of carbonic acid 7·7, and of nitrogen 7 per cent. The latter portion collected gave more carbonic oxide (58 per cent.) with less hydrogen (21 per cent.), no carbonic acid, the remainder nitrogen. The predominance of carbonic oxide in its occluded gases appears to attest the telluric origin of iron.

Hydrogen has been recognized in the spectrum-analysis of the light of the fixed stars, by Messrs. Huggins and Miller. The same gas constitutes, according to the wide researches of Father Secchi, the principal element of a numerous class of stars, of which α Lyræ is the type. The iron of Lenarto has no doubt come from such an atmosphere, in which hydrogen greatly prevailed. This meteorite may be looked upon as holding imprisoned within it, and bearing to us hydrogen of the stars.

It has been found difficult, on trial, to impregnate malleable iron with more than an equal volume of hydrogen, under the pressure of our atmosphere. Now the meteoric iron gave up about three times that amount, without being fully exhausted. The inference is that the meteorite has been extruded from a dense atmosphere of hydrogen gas, for which we must look beyond the light cometary matter floating about within the limits of the solar system.

V. “Further Observations on the Structure and Affinities of *Eozoon Canadense*.” In a Letter to the President. By WILLIAM B. CARPENTER, M.D., F.R.S., F.L.S., F.G.S. Received May 9, 1867.

University of London, May 9th, 1867.

When, on the 14th of December 1864, I addressed you on the subject of the remarkable discovery which had been recently made in Canada, and submitted by Sir William Logan to myself for verification, of a fossil belonging to the Foraminiferal type, occurring in large masses in the Serpentine-limestones intercalated among Gneissic and other rocks in the Lower Laurentian formation, and therefore long anterior in Geological time to the earliest traces of life previously observed, no doubts had been expressed as to the *organic* nature of this body, which had received the designation *Eozoon Canadense*.

The announcement was soon afterwards made, that the Serpentine Marble of Connemara, employed as an ornamental marble by builders