one sixth part of the prussic acid, which is decomposed by the quantity of oxygen in the oxide present as a constituent of that salt, and hence five more equal quantities are requisite to effect the complete decomposition of the whole. In all cases it is observable that the quantity of azote produced is exactly equal in volume to the quantity of prussic acid gas decomposed, and the quantity of carbonic acid exactly the double of the same measure. Together with these is produced a quantity of water, containing twice as much oxygen as is contained in the carbonic acid.

The author takes pains to describe, with much precision, the precautions which he found it expedient to employ for effecting the entire decomposition of the prussic acid, the mode of preparing the red oxide, of grinding the materials, of charging the tube that he employs as a retort, of applying the heat to the several parts in succession, and of receiving and examining the products.

The results of this analysis of prussic acid, show that

100 grains consist of 34·8 carbon.
40·7 azote.
24·5 hydrogen.

In a Table which follows, the author exhibits, at one view, the results of his analysis of prussic acid, and of ten different compounds into which it enters; and at the same time a comparative statement of those proportions which may be supposed more near approximations to the truth, from theoretic considerations of the number of atoms contained in each of the salts under examination.

On the Nature and Combinations of a newly discovered vegetable Acid; with Observations on the Malic Acid, and Suggestions on the State in which Acids may have previously existed in Vegetables. *By* M. Donovan, *Esq.* *Communicated by* William Hyde Wollaston, *M.D. Sec. R.S.* Read June 1, 1815. [*Phil. Trans.* 1815, *p.* 231.]

The acid here noticed by the author being obtained in greatest quantity from the fruit of the *Sorbus aucuparia*, is denominated by him sorbic acid, in order to distinguish it from other known vegetable acids. To prepare it, he presses the ripe fruit, previously bruised, in a linen bag, and thereby obtains nearly half its weight of juice. With this juice he mixes a solution of acetate of lead, and obtains a precipitate of sorbate of lead, which requires to be frequently washed with cold water. The purified powder is then boiled in a large quantity of water, which dissolves a part as a super-sorbate, leaving undissolved a sub-sorbate. The liquor being filtered and suffered to cool, deposits brilliant crystals of purified sorbate of lead.

To the crystals thus obtained he adds a quantity of dilute sulphuric acid, sufficient to separate nearly the whole of the lead; and having then separated the remainder by a current of sulphuretted hydrogen gas, he obtains the acid in a state of purity.

The acid to which this bears the nearest resemblance, is the malic; and indeed these two acids appear to the author to have been con-

founded even by Scheele, for apples contain a portion of sorbic as well as of malic acid; but that these acids are different, Mr. Donovan proves by decomposing malate of lead by sorbic acid. For if water be boiled on malate of lead, no crystals are to be obtained on cooling the liquor; but when the malate is boiled in sorbic acid, the malate is decomposed; and the liquor, when cooled, deposits the peculiarly brilliant crystals of sorbate of lead.

In order to be well assured of the difference between these acids, Mr. Donovan compared his acid with as many as seven different specimens of malic acid obtained from different sources, and was confirmed in the opinion that they are essentially different, by comparison of various neutral salts obtained from each; those containing sorbic acid being in general to be procured in permanent crystals, while those from malic acid yield merely deliquescent residua when reduced to dryness.

The author remarks, that the purest malic acid is that prepared from the *Sempervivum tectorum*, which, according to the observation of Vauquelin, appears to be free from every other acid; while the juice of apples, unless they be taken very young, appears constantly to contain a portion of sorbic acid.

This paper concludes with conjectures respecting the progressive changes of vegetable products, and possible conversion of bitter principle into malic acid, sorbic acid, and oxalic acid; but the author is fully sensible that little reliance can be placed on such speculations.

On the Structure of the Organs of Respiration in Animals which appear to hold an intermediate Place between those of the Class Pisces and the Class Vermes, and in two Genera of the last-mentioned Class. *By Sir* Everard Home, *Bart. V.P.R.S.* Read June 1, 1815. [*Phil. Trans.* 1815, *p.* 256.]

The genera of animals here enumerated by the author, are the Lamprey, Myxine, an animal between the Lamprey and the Myxine, the *Aphrodita aculeata*, and the Leech.

In the Lamprey, the organs of respiration consist of separate oval bags, that have seven openings on each side of the neck, for receiving and emitting the water which they breathe by means of a cartilaginous thorax surrounding the bags. In the Lampern, which is of the same genus, the structure is very similar, but the cartilages of its thorax are weaker.

In an animal brought from the South Sea by Sir Joseph Banks, there are also the same number of external openings, and the same number of bags; but there is no cartilaginous thorax, and hence the author is induced to consider the animal intermediate between the Lamprey and Myxine, which it resembles in having teeth, and in having a mesentery to its intestines.

In the Myxine, there are only two orifices on the under surface of the neck; but these branch internally to six separate bags on each side.