Within the cavity of the tympanum is a part peculiar to the whale. This is a membranous fold, or broad ligament, stretched across the cavity, having the form of a triangle, or rather the sector of a circle, the apex of which is attached to the short handle of the malleus, having one side detached, and passing across the centre of the membrana tympani, and its base attached to the concave surface of the hollow bone, at a small distance from the bony rim to which that membrane is connected.

The long handle of the malleus has no connexion with any other part; but the forms of this bone, of the incus, and stapes are much the same as in the human ear; there being no considerable difference excepting in the want of the os orbiculare.

The vestibulum, semicircular canals, cochlea, &c., differ in nothing material from the usual construction of these parts.

From this structure it appears to the author that the membrana tympani, which is subject in the whale to vast differences of pressure from without, is not well fitted, under all circumstances, to convey the nicer vibrations of sound to the ossicula auditûs, but that the membrane which projects across the cavity, being exposed to the same medium on both sides, will freely continue, and communicate the impressions it receives, unaffected by any differences of pressure.

Chemical Researches on the Blood, and some other Animal Fluids. *By* William Thomas Brande, *Esq. F.R S.* *Communicated to the Society for the Improvement of Animal Chemistry, and by them to the Royal Society.* Read November 21, 1811. [*Phil. Trans.* 1812, *p.* 90.]

The author, after referring to those authorities by which he had been misled into the supposition that the colour of the blood depended on the presence of iron, until he had tried how slight effect it produced by infusion of galls, proceeds to a series of experiments which he has made upon chyle and on lymph, for the purpose of comparing their composition with that of blood, the examination of which is divided into three sections, in which he treats separately of the serum, the coagulum, and the colouring matter.

The chyle employed in these analyses was collected by Mr. Brande while assisting Mr. Home and Mr. Brodie in their experiments on different animals; attention being always paid to the interval that had elapsed since the last meal; upon which circumstance its qualities were found to depend more than upon the animal from which it was taken. About four hours after a meal, the chyle is supposed to be in its most perfect state, and is then uniformly white, like milk. At longer periods it becomes more dilute, like milk and water, till at length, when an animal has fasted twenty-four hours, the fluid contained in the thoracic duct is reduced to the state of mere lymph.

The taste of chyle is rather salt, with a degree of sweetness, and, by the test of violets, appears very slightly alkaline. In about ten minutes after removal from the thoracic duct, it coagulates, and ulti-

The Royal Society is collaborating with JSTOR to digitize, preserve, and extend access to *Abstracts of the Papers Printed in the Philosophical Transactions of the Royal Society of London.* www.jstor.org

mately separates into two parts, as blood does, exhibiting a firm coagulum surrounded by a transparent colourless fluid. The former has more the properties of cheese obtained from milk, than of the fibrine of the blood; while the serous part also is like whey, and contains a species of sugar which at least very nearly resembles the sugar of milk.

The next subject which Mr. Brande undertakes to examine, is the lymph found in the thoracic duct of animals deprived of food for twenty-four hours before death. This is rendered slightly turbid by alcohol, but is not coagulated either by heat or by acids. It produces no change in vegetable blue colours till evaporated nearly to dryness. After incineration, it is found to contain a small portion of common salt, but no indications of iron.

The serum of blood has been so frequently examined, that Mr. Brande does not enter into any detailed analysis of it. He however relates some experiments made to satisfy himself, that when serum has been coagulated by heat, after the addition of an acid, or by voltaic electricity, the serosity that remains contains no gelatine. He examines also what quantity of iron might be present, by evaporating a pint of serum to dryness, and then incinerating the residuum. When the ash thus obtained had been dissolved in nitro-muriatic acid, a copious precipitation of phosphate of lime took place on the addition of ammonia, but only a slight trace of oxide of iron.

By similar examination of the crassamentum of blood, the quantity of iron contained in it was also found to be extremely small, and not perceptibly different, by previously washing the crassamentum, so as to free it from its red particles. And in conformity to this experiment, when a quantity of colouring matter had been allowed to subside from serum, through which it was diffused, and then examined separately by evaporation, incineration, and re-agents, as before, the traces of iron, even in the red part, were found to be as indistinct as in the rest of the blood.

In order to procure colouring matter for experiment, Mr. Brande generally employed venous blood, from which the fibrine was separated by stirring during its coagulation, and the red globules were then allowed to subside from the serum, through which they thus remain diffused.

The effect of water upon these globules is to dissolve their colouring matter, and leave them colourless. If the solution be heated to near 200°, the colouring matter is rendered insoluble, and falls to the bottom of a brown colour. It is also coagulated by alcohol or by sulphuric acid.

Muriatic acid, poured upon the colouring matter, renders a portion of it insoluble, but dissolves a part, forming a solution, which appears crimson by reflected light, but green by transmitted light.

The colour of this solution is turned brown-red by supersaturation with caustic potash, but rather improved by soda or by ammonia. A portion of the muriatic solution, being evaporated in a water-bath,

retained its red colour to the last; but when quite dry, it became of a dirty red colour.

Sulphuric acid, diluted with eight or ten parts of water, being poured upon the colouring matter, if no heat be applied, remains perfectly colourless; but, by the assistance of heat, it forms a lilac solution, which remains unaltered for a great length of time, though exposed to light; but if heat be applied, so as to evaporate part of the water, the colour is destroyed in proportion as the acid becomes more concentrated.

The effect of nitric acid is to destroy the colour in greater or less time, in proportion to the quantity employed.

Acetic acid dissolves the colouring matter, with appearances similar to those of the muriatic solution.

The solution in oxalic acid is of a brighter red than any other hitherto noticed. In tartaric acid the solution approached to scarlet.

The alkalies also, or their subcarbonates, dissolve the colouring matter; and the solutions may be evaporated nearly to dryness without losing their red colour.

The next object of Mr. Brande was to find such combinations of the colouring matter as would be insoluble, and might therefore afford a permanent dye. When combined with alumina it is red while moist, but becomes brown when dried. With oxide of tin it may also be combined, but becomes of a dull red by drying; neither does supertartrate of potash give permanent brilliancy to the colour. But when a piece of calico has been previously dipped into infusion of oak-bark, and afterwards steeped in an alkaline solution of the colouring matter, it acquires a redness nearly equal to that given by madder, and tolerably permanent. But the most effectual mordants appeared to be some of the solutions of quicksilver. Pieces of woollen cloth, calico, or linen, steeped first in a solution of corrosive sublimate, and afterwards in a solution of the colouring matter, acquired a permanent red tinge, which remained unaltered by washing with soap.

The author has, therefore, considerable hopes that this substance may be of some utility in the art of dyeing; and he remarks, that blood has, in fact, been already employed by the Armenian dyers, along with madder, to ensure the permanency of the colour.

Observations of a Comet, with Remarks on the Construction of its different Parts. By William Herschel, *LL.D. F.R.S.* Read December 19, 1811. [*Phil. Trans.* 1812, *p.* 115.]

The author first gives us, in detail, the succession of appearances that he has observed respecting this comet and its various parts, consisting of a planetary body, perceptible only by the best telescopes, in the luminous spherical head, which to the naked eye appears as a nucleus. The head is surrounded by an envelope that is hemispherical on the side towards the sun, but extends in an opposite direc-