

telescope had been made some time before the Gregorian, and its speculum had in consequence lost somewhat of its original polish. But notwithstanding this source of disadvantage on the side of the Cassegrainian, a corresponding superiority again appeared in its power of illumination.

The areas of aperture were in this instance as 79 to 110; but as the magnifying powers were not equal but in the ratio of 108 to 182, it was necessary to make further allowance, in proportion to the squares of these numbers; so that the illuminating powers were found to be nearly as 3 to 2.

From the mean of these experiments, and from consideration of all circumstances, the author conceives that the relative superiority of the Cassegrainian may be stated to be as 60 to 33, or 20 to 11.

With respect to the probable cause of the difference thus observed, Major Kater conjectures that it may possibly depend on the mutual interference of rays meeting in the same point, which it is possible may be in great measure dissipated when received by the small speculum in the Gregorian, after crossing in the principal focus; while on the contrary, in the Cassegrainian, the loss of light from this source is avoided, since the small speculum in that construction receives the rays before they arrive at the focus, and before they become sufficiently concentrated to interfere with each other's motion.

This conjecture, it is observed, derives additional support from a circumstance that has been observed with respect to refracting telescopes; namely, that in a comparison between the simple astronomical telescope and a Galilean of equal aperture and power, the satellites and belts of Jupiter may be seen much more distinctly in the latter, where the rays are received by a concave lens before their intersection in the principal focus of the object-glass.

*Additional Observations on the Effects of Magnesia in preventing an increased Formation of Uric Acid; with Remarks on the Influence of Acids upon the Composition of the Urine. By William Thomas Brande, Esq. F.R.S. Prof. Chem. R.I. Communicated by the Society for improving Animal Chemistry. Read June 3, 1813. [Phil. Trans. 1813, p. 213.]*

This communication consists of two parts: the first of which is a confirmation of the beneficial effects of magnesia in preventing the deposit of uric acid from the urine of persons subject to the formation of a redundancy of that ingredient; and the second part relates to the trial of acid remedies in disorders of an opposite nature, where the urine is found to deposit either the ammoniacal phosphate of magnesia or phosphate of lime.

The first section contains two cases; the first of a gentleman who was accidentally induced to employ magnesia for the purpose of relieving indigestion, occasioned by the use of alkaline remedies, and who thereby fortunately corrected a tendency to form red sand, for which those medicines had been taken ineffectually.

The second is an instance of the beneficial effects of magnesia in correcting the formation of uric acid, where alkalies had relieved but could not be continued. It also exhibits the prejudicial effects of both when too long persisted in, by causing a redundancy of an opposite nature in the urine, and a consequent deposit of earthy phosphates as white sand.

The object of the second section of this paper is to ascertain what acids may be employed with most advantage in those cases where the ammoniacal phosphate of magnesia prevails in the urine, either naturally or by an injudicious use of alkaline medicines. For though the use of acids was pointed out fifteen years since by the same chemist who originally analysed this species of calculus, Mr. Brande is not aware that in the course of that time any experiments have been made to illustrate the mode of action of different acids.

The first case related is that of a gentleman who had been cut for the stone ten years before, and was again attacked with symptoms of calculus. By the use of a brisk purge in the first instance, one calculus was passed, but he still suffered pain in his kidneys, that was aggravated by the use of soda water, which increased the proportion of triple phosphate in his urine. Ten drops of muriatic acid were then taken three times a day, which removed the white sand; but as this acid tended to increase the quantity of red sand, it was exchanged for carbonic acid, with decided relief to all the symptoms.

The second case was that of a boy, from whom four calculi had been extracted by the usual operation of lithotomy. These consisted principally of the triple phosphate of magnesia; and his urine continued after the operation to be loaded with a deposit of this substance, in the form of a white sand. The acid employed in this instance was citric acid, to the amount of twenty grains three times a day. As the effect of this remedy upon the disorder was found to be decisive, and the consequence of any omission was observable in less than twenty-four hours, it was persevered in for nearly three months, when the disposition to deposit the earthy phosphates was found to have ceased altogether, and the lad remained apparently free from disease.

Two other cases are also related: the first of which was relieved by citric acid taken twice every day, together with vinegar and other acid articles of diet; and the second by carbonic acid, taken as an effervescing draught, which prevented the formation of white sand, and removed an irritation of the bladder, occasioned by that deposit.

As the general results of these trials, the author infers,—

That where alkalies fail to correct the redundant secretion of red sand, magnesia is generally effectual.

That when either of these is improperly continued, they are liable to occasion the deposit of the earthy phosphates, in the form of white sand.

That the mineral acids prevent this deposition, but are apt to induce a return of red gravel, consisting of uric acid.

That vegetable acids, especially the citric and tartaric, are less

liable to produce this prejudicial effect, although they prevent the formation of white sand;—

And that carbonic acid appears particularly useful in cases where the irritability of the bladder forbids the use of other acid remedies.

*Additions to an Account of the Anatomy of the Squalus maximus, contained in a former Paper; with Observations on the Structure of the Bronchial Artery, By Sir Everard Home, Bart. F.R.S. Read June 24, 1813. [Phil. Trans. 1813, p. 227.]*

The author observes, that with respect to his former description of the external parts, he has no addition to make, excepting that, from the position of the fish at the time when it was drawn, a small fin was omitted between the anus and tail; which, however, is so far important, that some persons have on this ground imagined that the fish described was a different species of *Squalus*.

Of the internal parts, the stomach is now described, and a delineation given. The liver has six ducts; but these unite, before they enter the duodenum, in one common cavity, which corresponds to the dilatation of the common duct in those quadrupeds that have no gall-bladder.

A drawing is given of the heart and valves of the bronchial artery; and it is remarked, that the coats of this artery are muscular to some distance from the ventricle, the use of which is conceived by the author to be to aid in propelling the blood through the gills when impeded by the pressure of any great depth of water; for the same quantity of blood should pass through the gills at all depths, unless the water at greater depths contained a larger proportion of air; but this did not appear to be the case by direct experiment, in which the author was assisted by Mr. Brande.

In support of the opinion that muscularity of the coats of the bronchial artery is connected with the circumstance of living at great depths, the author remarks, that in the turbot and the wolf-fish, which live in shallow water, there is no muscular covering to the origin of the bronchial artery, but, on the contrary, its coats are so exceedingly elastic as to be easily dilated into a considerable reservoir.

In the *Lophius piscatorius*, the mechanism of the heart is such, that description alone could hardly convey an adequate idea of its form; and a drawing of its peculiarities is annexed.

In the tribe of Mollusca, other differences of muscularity occur from other causes. In the Terebines, where great muscular power is required for working the boring engine, the heart consists of two auricles and two ventricles, with valves of very great strength, to direct the current of the blood. But in the oyster, on the contrary, the heart has but one auricle and one ventricle; and in the muscle, the heart is scarcely divided into auricle and ventricle, but is a mere oval bag, through which the intestine passes, the peristaltic motion of which appears to the author to contribute as much to the motion of the blood as can be effected by the proper coats of the ventricle.