tissue, the albumen of egg, as I have often seen, is soon recognisable in the urine.

It has also been observed that a meal consisting largely of eggs, particularly after prolonged fasting, has been followed by the appearance of albumen in the urine. Here, apparently, it has happened that some albumen has reached the circulation without having undergone the usual conversion, and, as when experimentally injected, been thence discharged with the urine. Hence it may be concluded, not only that egg-albumen and blood-albumen differ strikingly from each other in a physiological point of view, but that egg-albumen, as such, is not fitted for entering into the circulation.

The conversion of albumen, therefore, into albuminose not only bears on the facility of absorption, but on the adaptability for subsequent application in the system. The change is required not only with a view to adaptability for absorption, but to subsequent fitness for utilisation in the system.

Caseine and gelatine I have found* behave in the same manner as albumen. When directly introduced into the circulation, they pass off from the system with the urine. The injection of three ounces of milk into a vein was followed, in an experiment which I some time back performed, by the appearance of caseine in the urine. The injection of one hundred grains of isinglass, dissolved in two and a half ounces of water, also so charged the urine with gelatine as to give rise to the formation of a firm, solid jelly on cooling.

Thrown off as they thus are from the system, albumen, caseine, and gelatine are evidently not adapted for direct introduction into the circulation. Fibrine, on account of its solidity, cannot be similarly experimented with. Digestion, however, in its case is an indispensable condition to its introduction into the circulation. In respect of all these principles, indeed, it may be said that metamorphosis in the digestive system is needed as a preliminary step to their utilisation in the system, or their subservience to the economy of life.

I have thus followed the nitrogenous alimentary principles to the stage of albuminose. The precise nature of the next step is not yet known. There can be little or no doubt as to the progress from albuminose to the albumen of the blood; but as to what next ensues we have no data to show. With the ultimate products which are formed we are familiar; but the steps of metamorphosis are as yet beyond our knowledge. The chain we have hitherto followed now wants one or more links which as yet have baffled experimentalists to bring into view. As regards the seat of metamorphosis we have also nothing of a precise nature to deal with, but we may nevertheless hazard the surmise that the liver is the viscus in which albuminose mainly if not entirely, like other nutritive matters absorbed from the alimentary canal, undergoes metamorphosis.

The various nitrogenous principles of the body must be ultimately produced from albuminose; but whether by direct transformation into them, or by passing through the stage of albumen, we have not the means of deciding. That albumen is susceptible of metamorphosis, however, into the other principles, we know from its forming in the egg the pabulum whence the various nitrogenous principles of the young bird are derived.

Instead of wandering further into the field of conjecture on the subject of metamorphosis, let us turn our attention to the purposes fulfilled by the nitrogenous principles as alimentary matter.

* Gulstonian Lectures (1862) on Assimilation and the Influence of Defects on the Urine (THE LANCET, vol. i., p. 874, 1863).

DR. ERMERINS.—Dr. Daremberg has published, in *L'Union Méd.*, a sketch of the labours of this learned professor, who died at Groningen (Holland), where he had held a distinguished position. The deceased was especially noted for his extensive investigations regarding ancient medical authors, and has left a series of important works and essays on Greek and Latin medical literature. The study of the ancients is so seldom earnestly pursued in our times that we gladly allude to the erudite Ermerins, who was highly appreciated by his countrymen, not only for his learning, but also for a blameless and very useful career.

ON AN

IMPROVED FORM OF DEMONSTRATING OPHTHALMOSCOPE.

BY ROBERT BRUDENELL CARTER, F.R.C.S.,

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THE elements which enter into the formation of the ophthalmoscope are so well known, their action is so well understood, and so many combinations of them have been devised by various persons, that it would be extremely hazardous to claim novelty for the arrangement which I am about to describe, and which differs from others only in points of detail, and not at all in principle. I have, however, ventured to call it an improved arrangement, because, whether as regards the simplicity of its construction and adjustment, or the magnitude, brilliancy, and clearness of the image which it affords, it is not equalled by any other with which I am acquainted.

The skilled ophthalmoscopic observer, when he wishes to scrutinise carefully the optic disc or other object in the fundus oculi, uses the direct method of examination. In this the mirror is brought close to the eye of the patient, and the fundus is seen magnified by its own crystalline lens. For many purposes this method is the best that can be adopted; for some purposes it is indispensable. But there are various difficulties in the way of its being generally employed; and the indirect method, or the examination of an aerial inverted image formed by placing a convex lens before the eye, must always be that which will find most favour with practitioners.

The chief disadvantage of the indirect method, as usually pursued, is that it affords only an inconsiderable degree of enlargement; while, at the same time, the highest degree of enlargement easily obtainable is only gained at a considerable sacrifice of illumination.

The reason of this is, that the lamp is placed at the side of the patient's head, and that the convex lens, which should be held at rather more than its own focal length from the eye, forms, at its focal distance on the side of the spectator, an image which increases as the focal length increases, and so becomes larger as the magnifying power of the lens is less. Let the capital letters below represent the

O M I L E

relative position of things when the lens used is of two-inch focal length. E represents the eye of the patient, L the lens, I the image, and O M the eye of the observer, with the mirror in close proximity to it. In this case it is supposed that the distances L E and L I are each two inches, and the distance from I to O about fifteen inches, which is generally as little as will be found compatible with clear vision. The resulting image is well lighted, but small, and fine details cannot be seen with the degree of distinctness that is often required. If now we take a four-inch lens, we obtain an arrangement in which the distances L E and L I become each four inches; and hence O is removed four inches further from E, or to twenty-three inches instead of nineteen. The image is larger, but the illumination seriously diminished. In the first place, as the quantity of light radiating from any source to fall on a given area diminishes as the square of the distance, the absolute amount falling upon the mirror will be lessened by very nearly one-third, and hence less light will be thrown into, and returned from, the examined eye. This lesser quantity of light will in its turn have to form an image of about four times the superficial extent of that first considered, and the large image will therefore be so dimly lighted that it will often be impossible to make out its details with any certainty. Moreover, an object lens of even four inches focal length requires to be held so far from the patient that the observer cannot steady his hand by resting a finger upon the forehead or cheek; and anything beyond four inches soon requires a distance between the observer and the object lens that is beyond the comfortable, or even possible, range of the arm. Practically, a three-inch lens is the lowest power available for hand instruments.

Attempts have been made to overcome these difficulties

in various ways. Ulrich, Hasner, Liebreich, Follin, Galezowski, and others have mounted the mirror and the object-glass at the opposite extremities of a tube, blackened inside, so as to cut off external light, and thus to increase the apparent brightness of the image. In most of these instruments, and by many observers using the hand-mirror, a second convex lens has been placed behind the mirror, and used to magnify the image. I myself constantly employ a lens of 7" behind my hand mirror, in conjunction with an object-glass of 3".

The objection to all kinds of tube instruments is that they render impossible slight independent movements of the lens, by which it is easy to correct, or rather to compensate for, slight movements of the eye. Even a moderately steady, or what may be called a good patient, does not keep the eye perfectly still. Its slight lateral movements constantly displace the optic disc or other point of the image; and the skilled observer follows them, and keeps his object in view, by similar slight movements of his lens hand, movements of which he is scarcely conscious, and in the performance of which he is guided solely by sight. The inverted image appears to move in the same direction with the lens; and, therefore, if the optic disc strays away to the right of the observer, a little movement of the lens to the left will recall it to a central position in the field, and so on with other changes. Moreover, lateral movements of the lens are important aids to diagnosis in cases of depression or projection of any part of the fundus, as in excavation of the nerve-disc, or in the early stages of morbid growths; because the image of a part that is in a plane relatively anterior moves further with the lens than the image of a part relatively posterior to the former. As the lens is moved from side to side, the apex of a projection, or the margin of a cupped disc, appears to move also in front of the general level of the retina or of the floor of the excavation. In tube instruments, of course, the lens can only be moved laterally by moving the mirror also, and thus by changing the incidence of the light and otherwise disturbing the observation. Where any part of the apparatus touches the patient, the difficulty is much increased; for the instrument cannot be moved, as a whole, to follow the eye, and is liable to constant disturbance from slight movements of the head. The latter are of frequent occurrence during ophthalmoscopic observations; because patients, when told to look to the right or left, almost always turn the face, and not the eyes only, in the direction indicated to them.

The use of a magnifying lens behind the mirror soon reaches its limit, and is attended with the disadvantage of narrowing the field of view in a degree corresponding with the enlargement. If in this way we magnify the optic disc, we see nothing but the disc, and cannot at the same time obtain a general view of the fundus.

The first successful attempt to overcome these difficulties was made by Dr. Burke, of Paris, whose "reflecting ophthalmoscope" was perfected shortly before the commencement of the Franco-German war. Dr. Burke was good enough to bring me one of his instruments during a hasty visit to England; but at first I failed in using it satisfactorily. It was only when he came again to this country, after the peace, that I learned from him how to overcome my difficulties; and I then exhibited his ophthalmoscope to several medical assemblages. For size of image and brilliancy of illumination it stood quite alone; but it was attended by several minor inconveniences which limited its practical application.

In principle, a Dr. Burke's instrument is not entirely original, but is a modification of what had been suggested by Klaunig. It consists of two concave mirrors, each four inches in diameter, placed facing each other, about a yard apart, and about six inches from the edge of a table. One of these mirrors has a central perforation, and a focal length of thirty-three centimetres. The other has no perforation, and a focal length of nineteen centimetres. A lamp is placed on the table, a little to one side of the line between the mirrors, and at the focal distance of the first or perforated one, which is then so turned as to reflect the lamplight upon the second mirror, from which direct rays are cut off by the interposition of a screen. The patient sits against the edge of the table, looking at the second mirror, and with his face just beyond its focal distance. This mirror is then turned so as to throw the light it receives from its

fellow into the eye to be examined, and it forms the ray: returned to it into a large and brilliant inverted image—large, on account of the long focal distance of the inverting mirror; brilliant, on account of the flood of light furnished by the illuminating mirror. This inverted image is seen through the perforation of the illuminating mirror. It is necessary to a good result that the two mirrors, the eye observed, and the lamp, should all be precisely on a level, otherwise the image will be obscured by glare, or direct reflections of the flame; and the inverting mirror must not be placed too obliquely, otherwise the pupillary aperture will be distorted. The precise distance between the inverting mirror and the patient requires to be very nicely adjusted; and the observer, who is seated with the patient's back turned to him, cannot make these adjustments himself without rising and going to the mirror and then going back to observe the effect. In the meantime, a very slight movement may take the eye out of view altogether, and practically the instrument is of little use unless the observer has the aid of a skilled assistant.

In using Burke's ophthalmoscope for purposes of demonstration, I was constantly annoyed by these defects; and, in considering how they might be obviated, I was struck by the fact that the chief peculiarity of the instrument was in the brilliancy of its illumination,—and that this, which was solely due to the relative positions of the lamp and the perforated mirror, might equally be obtained if the inverting mirror were removed and replaced by the convex lens of the ordinary ophthalmoscope. The result has surpassed my expectations, and has not only afforded an image fully equal to that of Dr. Burke's ophthalmoscope under the best conditions, but also an instrument requiring no assistant, and perfectly simple and easy of management.

The apparatus consists of three pieces—a mirror, a lens, and a chin-rest,—each of which is supported on a vertical tube, which slides up and down within an outer tube, and can be fixed by a screw-collar at any desired height. The outer tube is screwed into a circular foot of sufficient weight. The mirror is hung in a gimbal by horizontal screws, and can be turned on its vertical axis by rotating its stand. It is the illuminating mirror of Burke's instrument, four inches in diameter, thirteen inches in focal length, centrally perforated, and furnished at the back with a lens clip, to hold a concave lens if used by a short-sighted observer. The mirror is of silvered glass; and the old tin and mercury silvering affords most light. The amalgam only is removed at the centre, leaving quite a small opening for the passage of light; but the opening in the metal back is somewhat larger, to get its margins out of the way of oblique rays. The lens is biconvex, four inches in diameter, eight inches in focal length, and is fixed in a simple collar, as it requires no movement on a horizontal axis. It can be raised or depressed or turned on its vertical axis by means of the inner sliding-tube of its stand. To one side of the base of the latter is attached a stout horizontal brass rod, fifteen inches long, with a vertical wooden handle at its free extremity. The chin-rest is simply a plate of metal, concave from side to side, rather more than two inches long and one broad, rounded at the corners, and covered with cloth or velvet.

The arrangement of the apparatus is shown, both in ground-plan and in perspective, in the accompanying diagram and sketch, the former of which gives also the relative distances between the patient, the observer, and the several parts of the apparatus. It will be seen that the patient and the observer are placed exactly facing each other, on opposite sides of a table, which (as the distance from the mirror to the patient's cornea should be forty inches) cannot be less than four, nor conveniently more than five feet wide. The lamp is thirteen inches from the mirror, and eight inches to either side (preferably to the right of the observer) of the base line. The lens is thirty inches from the observer, and ten inches from the patient; and its horizontal handle stretches directly towards the former.

The first thing to be done is to seat the patient comfortably, with his chin well on the rest, and this fixed at such a height as to render the general plane of the face vertical. The mirror is then set with its central opening on a level with the patient's eye, and the lens at the same height as the mirror; and these two, and the lamp and screen, are placed in the positions shown in the diagram. The mirror is turned on its vertical axis until the rays reflected from

it fall full on the lens, which should then throw a circular patch of brilliant light, about the size of a shilling, full upon the eye of the patient. If the patch be much larger than this, the lens is too distant; if it lose its circularity, and approach the shape of an inverted image of the flame, the lens is too near. Until perfect certainty of adjustment has been obtained, it is well to protect the eye by a screen until the right distance is attained. If the light

be of the proper size and shape, but not central on the eye, the lens must be raised or lowered, or moved laterally, until the proper position is obtained. The observer then takes his seat behind the mirror, and looks through the perforation at the image. By means of the horizontal handle, which comes well within his reach, he impresses upon the lens any to and fro or lateral movements he may desire, and is able to follow those of the patient's eye. The patient

In the above diagram,—E, represents the eye of the patient; L, the lens; I, the image; M, the mirror; F, the flame; S, the screen; and G, the slip of plate-glass to produce a second image at I'.

should be instructed, before the light is thrown on, to look a little across the median line with the eye examined, so as to bring the optic disc into the centre of the field of view.

The best light for the purpose is that afforded by the common German (or so-called Queen's) reading-lamp, not only on account of the ease with which it may be handled, and the burner set at any required height, but also on account of the perfect steadiness of the flame. The flame of even the best gas burners is apt to flicker; and this flickering, which is much intensified in the concentrated beam of the lens, produces disturbance by distorting the outline of the pupil, and by causing broken images of the iris to be projected into the field of view, and partially to conceal the image of the fundus.

The German lamp, moreover, conveniently carries a simple screen, to shield the patient from direct light, in the socket intended to support the ring which sustains the shade, this ring being of course removed. My screen is a piece of stout white cardboard, eleven inches broad and nine deep, blackened on the side that is turned away from the light. A strip half an inch wide is cut out of its lower half, to allow it to fall over the tube that carries oil from the reservoir; and a sort of central leg enters the socket

already mentioned. The whole arrangement is shown in the sketch, and the degree of inclination of the screen in the diagram. With any other lamp, a detached screen may be employed.

If the plane of the lens be placed, as shown in the diagram, at right angles to the line between patient and observer, the view will be more or less obscured by two reflected images of the mirror. To obviate this, the *inner* tube of the lens-holder must be turned a little on its axis, so as to render the lens oblique, by which the two images will be laterally displaced. The corresponding manoeuvre is perfectly familiar to all who use the hand instrument; but it is necessary to turn the *inner* tube only, so as not to alter the position of the horizontal handle.

The line G in the diagram indicates the position of a valuable accessory in using the instrument for demonstrating purposes. A slip of thin plate glass, placed thus obliquely in the track of the rays, will reflect some of them in the direction of I', and will form there a faint reduplication or "ghost" of the image, which will be sufficiently visible, in the shadow of the screen, to an observer properly placed, who may thus control the lens by being himself able to see dimly the appearances that are seen brilliantly by

anyone looking through the mirror opening. The slip of glass may be held in the hand, or placed in a clip supported by a horizontal arm projecting from the lens-holder. I believe it will be possible to intensify this ghost, and even to render it visible to many spectators at once; but this part of the question must be reserved for a future communication.

The ophthalmoscope is now coming into constantly increasing prominence as an instrument of diagnosis in many maladies wholly unconnected with the eye, or, at least, having only a secondary influence upon it; and a good instrument is nearly as valuable to the general physician as to the ophthalmic specialist. I bring this one before the profession with great confidence, feeling that, for the consulting-room at least, it will remove many of the difficulties that have hitherto impeded the general employment of ophthalmoscopic research. Its image, which is brilliantly illuminated, which embraces a large field, and which, with a normal eye, is magnified at least twelve diameters, leaves nothing to be desired, and its construction and management are so simple that I cannot conceive that anyone, even on a first attempt, would fail to obtain a satisfactory view of the fundus oculi. The use of atropine is often desirable, but is not essential except in the case of very contracted pupils. It is best to exclude daylight, or a second artificial light on the same table; but artificial light overhead may be entirely disregarded.

Messrs. Weiss and Son and Mr. Hawksley are both acquainted with all details of the instrument; and from both I have received valuable suggestions in the course of the experiments that have led to its construction.

Wimpole-street, Jan. 1872.

POISONING BY STRYCHNINE TREATED SUCCESSFULLY WITH TINCTURE OF OPIUM.

By THOMAS MOORE, F.R.C.S. EXAM.

A CASE of strychnine poisoning successfully treated by the exhibition of opium, related in THE LANCET of the 23rd of December, 1871, by Mr. Beatty, of Seaham Harbour, reminds me of a similar one which came under my care some years ago.

On May 20th, 1862, when at the house of my father, Edward Moore, F.R.C.S., at Halesowen, Worcestershire, I was asked to see a strong and active young man, in good circumstances, who, some months previously, had been for a short time an inmate of a lunatic asylum. On my arrival at his place of residence, I was informed that he had, after a quarrel with a relative, taken some "rat poison," with the expressed intention of destroying his life. I found him, about ten minutes after taking the poison, apparently none the worse for it; but I administered an emetic of sulphate of zinc and mustard, which acted freely, and I made him drink warm milk-and-water to encourage the vomiting. I did not use a stomach-pump because I did not know where my father's was kept, and I thought it better not to lose time in looking for it, but to get the stomach empty at once with an emetic. About twenty minutes after taking the powder he was seized with a most violent tetanic convulsion, which lasted for about a minute, with well-marked opisthotonos. The "risus sardonicus" was scarcely noticeable; but the intercostal muscles were so rigid, and his face was so blue and swollen, that it seemed as if suffocation must ensue. He appeared to suffer intense agony, and uttered most heartrending cries.

My friend Mr. Bloxam, M.R.C.S., who had been sent for by the patient's friends, came in just at this time, and happened to know that the powder contained strychnine. The convulsion having subsided, we administered a drachm of tincture of opium; but another paroxysm came on in about two minutes. After there had been four convulsions of the same length and violence, with the same interval between them, we gave a second drachm of the tincture. The paroxysms now became somewhat less violent, although they were still frequent. At the end of half an hour from the first convulsion we gave half a drachm, and repeated

that dose every quarter of an hour three times. In an hour and a half the convulsions, which we had had the satisfaction of seeing become gradually less violent, ceased. They still remained, however, considerable and frequent twitchings of the muscles, especially those of the limbs; these did not come on at regular intervals, as did the convulsions, but at uncertain periods and frequently.

My father and his assistant (Mr. Hays) came in at this time, and, as our patient appeared to be sleepy, we carried him to bed, where he soon sank into a profound slumber. The latter gentleman stopped with him all night, and reported that, although he slept calmly, the twitchings continued with decreasing severity for twelve hours. He then awoke complaining merely of headache and stiffness of the muscles, and in three days was quite well. He has remained in perfect mental and bodily health up to this time.

We ascertained from the druggist who sold the poison that it contained upwards of a grain of strychnine. The quantity of tincture of opium we gave was half an ounce.

If the convulsions had merely subsided at the end of an hour and a half, it might have been concluded that the opium had nothing to do with their disappearance, or that the poisonous effects of the strychnine had simply worn themselves out; but as that subsidence appeared to be *pari passu* with the advance of drowsiness, I cannot but think that in this case the narcotic effected a cure.

The patient took a quantity of strychnine sufficient to destroy life, and the symptoms of strychnine-poisoning were well marked and very severe. A smaller quantity of laudanum than was exhibited to him has proved fatal; but in this instance its narcotic power seemed to be partly expended in counteracting the effects of its antagonist, as, after the cessation of the convulsions, it produced merely a deep and quiet sleep, instead of the coma which might have resulted under ordinary circumstances.

Petersfield, Jan. 1st, 1872.

CASES OF EXCISION OF THE KNEE-JOINT AND REMOVAL OF THE OS CALCIS.

By JOHN N. TERRY,

SURGEON TO THE BRADFORD INFIRMARY.

In order that excision of the knee-joint may prove successful, it becomes imperative that the cases should be carefully selected. It is not applicable, for obvious reasons, where the bones entering into the articulation are very extensively diseased; for though I admit a better chance of preserving life would be secured by excision than by amputation, yet the limb would be faulty—as a means of progression, it would be short and almost useless. I do not lay stress upon the integuments being extremely disorganised, nor think that such a state militates with any force against excision, for immediately after the removal of dead bone the soft parts set up a healthy action and recover themselves rapidly.

Excision of the Knee-joint.—D. D—, aged twenty-six years, was admitted into the Bradford Infirmary on the 15th October, 1864, with serious and long-standing disease of the left knee-joint. When quite a child disease of the knee set in, and he continued to be laid up at intervals on account of it. About twelve months previous to his admission into the hospital the symptoms became more aggravated; and when admitted, the joint was much swollen, and the structures around thickened and partially disorganised. Below the knee there was great wasting of the limb; it was considerably bent at the knee, and the slightest attempt at altering its angle caused severe pain.

On the 30th October the patient was put under chloroform, and resection of the joint performed, the horseshoe-shaped incision being adopted. About an inch and a half of the end of the femur, and a quarter of an inch of the head of the tibia, were sawn off. The section was made from behind forwards, and the cut surfaces were found quite healthy. A large quantity of softened gelatinous material was cut away by the scissors, and the patella removed, though not diseased. No vessels required ligaturing. The flaps were brought together by several wire sutures, and