

reason this combination is not desirable and only one salt is required, I give the bromide of ammonium as it is not so depressing as the bromide of potassium. In this statement I think I am in agreement with Dr. Beevor. In some cases I have found a combination of antipyrin with the bromide useful. The use of this drug for this purpose was brought to my notice by my colleague, Dr. A. de Watteville, some time ago and I prescribe it in doses of five grains three times daily for children and ten grains three times daily for adults. I have noticed that in many cases where the bromide alone has not produced much result so far as the lessening of the fits is concerned the addition of antipyrin has proved useful, and this result is no doubt due to its analgesic properties. In cases where the fits occur at night only I direct the patient to take just before going to bed or to be given a double dose of the bromide if the fits be infrequent and to take a large dose only at night if a great number of fits occur. It will often be useful to give a large dose of the bromide at night in the cases of clerks and workmen who are apt to forget to take the medicine during the day, whereas if it is given at night this forgetfulness is not so likely to occur. If the fits come on in the early morning a large dose should be given before the patient gets up and he should remain in bed for at least an hour after the dose is taken if possible. With regard to the reduction of chlorides in the diet to make the patient more sensitive to the use of bromides, although a less quantity of the bromide is necessary for daily administration, it appears to me that this plan has not sufficient evidence in its favour to warrant its use in the treatment of epilepsy, and in any case it cannot be continued for a long time in consequence of its interference with nutrition. As to the length of time during which the bromide should be administered, I am in favour of giving it for two years after the last fit in ordinary cases, and for three years in a few cases where circumstances render it necessary. During the time that the bromide is being taken by the patient it will be well to give iron tonics and cod-liver oil to maintain the nutrition. The bowels should be kept well open and occasionally high rectal saline douches should be given.

As to the treatment in colonies, which was only briefly touched upon, experience has shown that the result is most gratifying. In many cases the colonist has lived in a town and removal to the country has a good effect, because it is known that life in the open air is very necessary for epileptics. The general health is improved, the fits are diminished, and the colonists help to furnish a variety of food which is desirable in the treatment of the affection. Employment is particularly necessary, not only because it gives the colonist no time to brood over his malady, but because farm and garden pursuits bring him into the sunshine, fresh air, and other surroundings which inspire him with mental activity and hopefulness. As far as the colonial treatment of children is concerned, wherever it has been tried it has been followed with good results. A recent Act of Parliament, the Elementary Education (Defective and Epileptic Children) Act, has so far interfered with the treatment of epileptic children in colonies in England, but it is hoped that this Act will soon be modified and permit epileptic children to benefit by the treatment which is so necessary for them.

In the above remarks I have not attempted to give a full account of the treatment of epilepsy but only to make some observations which have occurred to me and which I could not state at the meeting after the papers of Dr. Russell and Sir Victor Horsley were read.

Wimpole-street, W.

ROYAL INSTITUTION.—The Friday evening discourse at the Royal Institution on Feb. 20th was delivered by Principal E. H. Griffiths of the University College of South Wales and Monmouthshire. The subject of the discourse was the Measurement of Energy, with special reference to the mechanical equivalent of heat. Joule's original determination was that 772 foot-pounds of work were equivalent to the heat required for raising the temperature of a pound of water by 1° F. Referred to the centigrade thermometer and to the units of the metric system this expression becomes $4 \cdot 186 \times 10^7$ ergs per gramme-degree. Later experiments have shown that this estimate is somewhat too low and that the number of ergs per gramme-degree centigrade is more correctly stated as $10^7 \times 4 \cdot 185$ or $4 \cdot 186$. Professor H. L. Callendar's apparatus for performing the experiment was exhibited in action.

THE THEORY OF RETINOSCOPY.

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As the theory of retinoscopy is very inadequately dealt with in the text-books the following, which is a complete account of its optical principles as worked out on Frost's artificial eye, may prove interesting to readers of THE LANCET.

Let L be the source of light and M a concave mirror, with its centre of curvature at C, and focus at F about 20 centimetres from M. There will be an image of L formed at I, a little above and to the right of F (see Fig. 1). Let i represent the image formed on the retina b ; then it follows that retinae in other positions, as a , c , d , e , will have diffusion-circles of light formed upon them.

If I be the far-point of the eye, then it is one of low myopia, I being distant about one metre, and the position of the retina will be that of b . In the other cases represented— a , high myopia; c , emmetropia; d , low hypermetropia; and e , high hypermetropia—diffusion-circles are formed proportional in size to the amount of ametropia.

When the mirror is tilted downwards (into the dotted position M_1), I goes to I_1 ; and i goes to i_1 —i.e., against the mirror. Also, all the aforesaid diffusion-circles go the same way—*against*.

If M be the position of the mirror (plane), then an image (virtual) of L is formed at I (as far behind M as L is in front) and an image (real) of I is formed at i on the retina b , diffusion-circles being formed on retinae in other positions, as a , c , d , e (see Fig. 2). When the mirror is rotated downwards to the position M_1 , then I goes to I_1 and i goes to i_1 —i.e., downwards—and the diffusion-circles go the same way. This is just the opposite of what takes place with a concave mirror (see Fig. 1). b is the retina of a low myopic eye, the far-point of which is at I.

Now, having seen how the retina in the observed eye receives its illumination and that this always moves *against* the concave mirror, let us omit from subsequent diagrams all the rays concerned in the formation of this illuminated area and consider only those which leave the retina, pass through the lens, and enter the eye of the observer, and we shall take the five cases mentioned and consider each separately.

(a) *High myopia*.—Here we have a diffusion-circle, $a b$, upon the retina, because it is further back than the focal plane of the refracting media of the eye, the rays having crossed at i (Fig. 1) and an image of this circle is formed in the air at $a \beta$, as shown in Fig. 3, the construction being to draw a ray through the nodal point undeviated and another parallel to the axis, and refracted at the principal plane through the anterior focal point F. Such rays cross at $a \beta$ and here is formed a real aerial image of $a b$. Since the observer is accommodated for the pupil and not for the image its edge appears ill-defined, as shown in the figure.

Suppose now, by a downward tilt of the mirror, $a b$ is made to go to $a_1 b_1$ (Fig. 4), then the emergent cone of rays, A F B and the image $a_1 \beta_1$, go downwards—i.e., sweep across the front of the mirror—and presently the more or less ill-defined edge of the cone sweeps across the sight-hole and, when it is just passing, the eye behind the hole sees the light disappear downwards, followed by the concave edge of the shadow, and the field of vision—i.e., the observed pupil—at different stages of the sweep is represented by the circles 1, 2, and 3 in Fig. 3. Owing to the largeness of the diffusion-circle, $a b$, the illumination is seen to be somewhat feeble and the shadow is not very wide.

(b) *Low myopia*.—Here the cone of rays is not so divergent, for as we approach emmetropia they become more and more nearly parallel, the section of the cone is smaller, the illumination is brighter, and the edge of it is more curved than before and the width of the shadow is greater.

(b) 1. *Particular case of low myopia* in which the far-point,

FIG. 1.

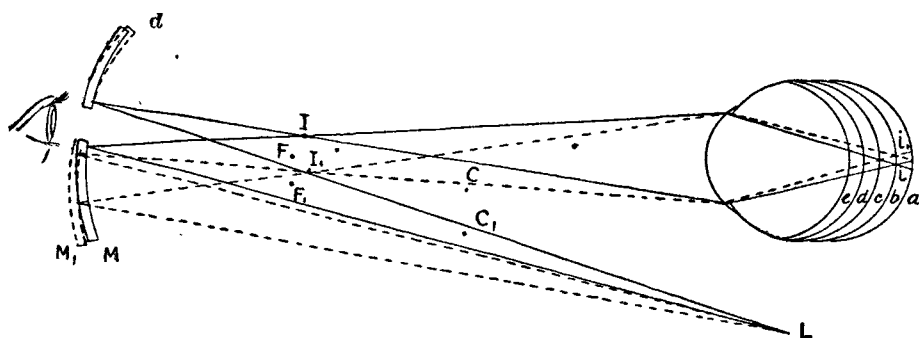


FIG. 2.

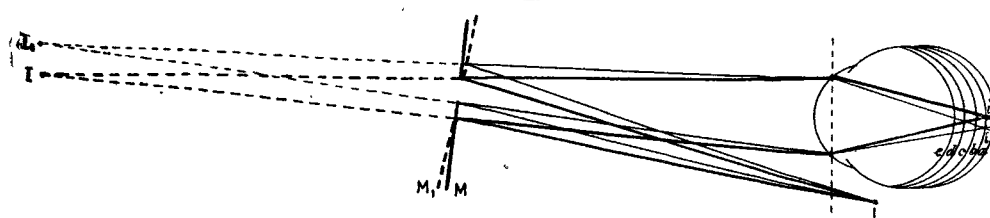


FIG. 3.

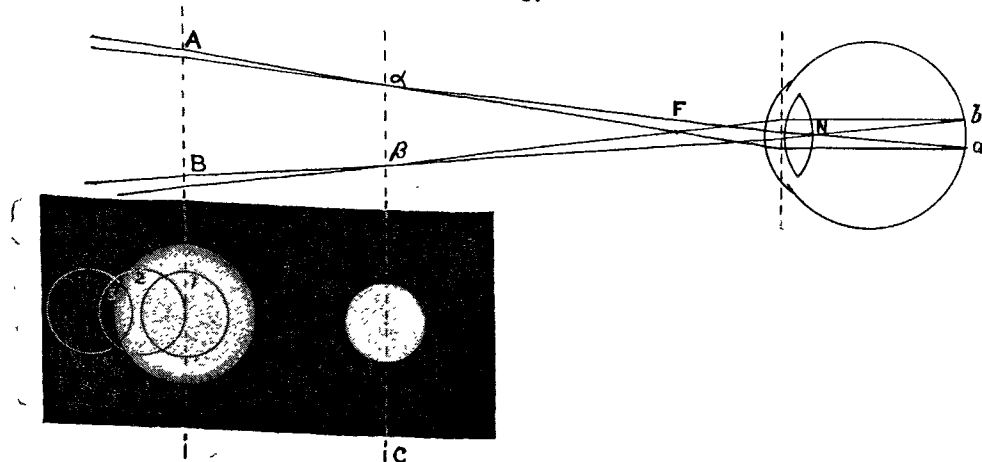


FIG. 4.

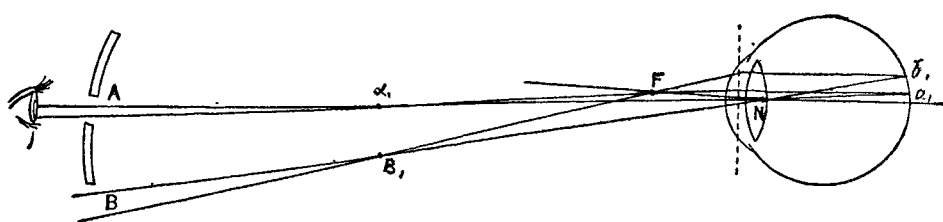


FIG. 5.

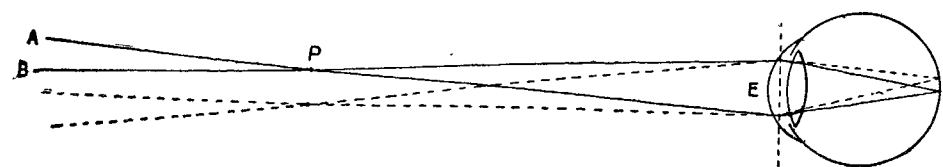
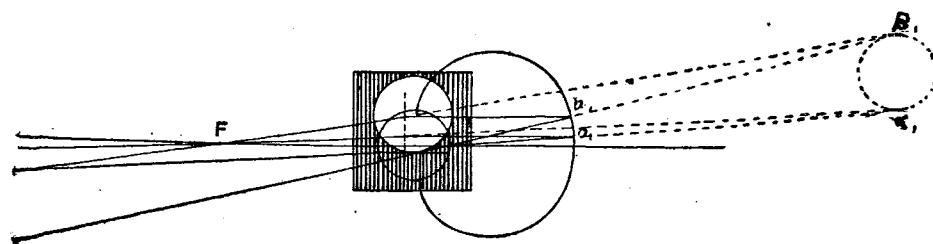


FIG. 6.



P, coincides with the focus of the mirror. On account of this coincidence there is formed on the retina of the observed eye an exact and well-defined image, i , of F (which in its turn is an image of L, Fig. 1). Hence the rays emerge from the image in the eye along the same path as they entered, P and i being conjugate foci.

The shape of the emergent beam is shown in Fig. 5, and it is seen that the cone is very narrow in section and may even all be included in the sight-hole of the mirror. The illumination is a maximum and a *very slight* movement of the mirror is enough to send the cone right off the sight-hole, as shown by the dotted lines, and so the edge of the shadow is difficult to observe (be it noted that a reflected ray moves at *twice* the angular rate of the mirror).

Now, since we have assumed the distance P E to be one metre, it is obvious that a -1 D. lens, placed in front of the eye would remove the far-point to infinity—in other words, render the rays parallel. Hence this is a case of myopia 1 D., and it may be regarded as the limiting case between movement *with* and movement *against*.

(b) 2. *Myopia of less than 1 D.*, in which the remote point lies further away than P, is not often met with in practice, as so little inconvenience is experienced that it is hardly worth correcting, being actually a real convenience for close work like reading, &c., and cannot be accurately gauged by the method of retinoscopy, as the movements of the shadow are difficult to observe, for the same reasons as before. Such cases must be settled at the test-types.

(c) *Emmetropia*.—In this case the diffusion-circle of illumination is very small (see Fig. 1) and is situated at the principal focus of the eye, so that the emergent beam consists of bundles of parallel rays coming from points of light in the circle. The section of this beam is nearly the same at every point and is of about the size of the patient's pupil. The illumination, as seen by the observer, is bright, but the shadow movement, which is "against," is not easy to detect for reasons already given.

(d) *Low hypermetropia*.—Rays from any point of light in the circle of illumination continue to be divergent after passing out of the eye and so never cross as in case a (myopia), but their directions, if produced backwards, do meet and form a virtual image of the point behind the eye. This is shown in Fig. 6 and is the reason why the shadow moves against instead of with.

$a\beta$ is a virtual image of a, b . As in all the other cases when the mirror is tilted down a, b goes up and, therefore, also, $a\beta$. In Fig. 6, a_1, b_1 is the new position of a, b , and a_1, β_1 of $a\beta$. This is movement against. The appearance seen is represented by the shaded projection, where the lower circle represents the pupil, and the upper the virtual image a_1, β_1 .

(e) *High hypermetropia*.—In this case the diffusion-circle of illumination is larger and the emergent rays are more divergent than in d . Hence, also, the virtual image $a\beta$ is larger and, therefore, not so bright and being larger the shadow is more crescentic.

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A NEW METHOD OF TREATING FRACTURES OF THE SHAFT OF THE FEMUR.

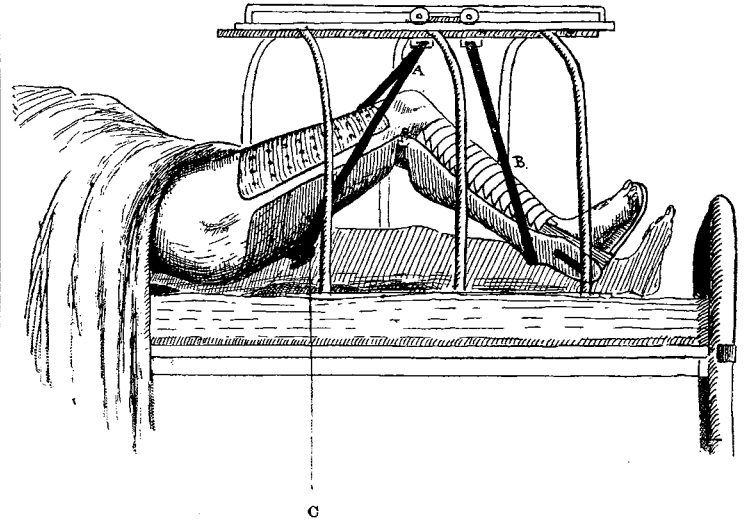
By J. P. LOCKHART MUMMERY, F.R.C.S. ENG.,
DEMONSTRATOR OF OPERATIVE SURGERY AT ST. GEORGE'S HOSPITAL.

FRACTURES of the shaft of the femur are among the most difficult to deal with satisfactorily that the surgeon is called upon to treat and the results of mal-union are often very serious to the patient. Any shortening in the thigh will of necessity bring the knee-joint on that side out of alignment with its fellow and so make a difference in the level of the two knee-joints. Thus patients with shortening above the knee walk more lamely than would be the case with a similar amount of shortening below it. There are several reasons which render these fractures particularly difficult to deal with. The bone in a well-developed subject is covered by a thick layer of muscles and is a long way from the skin surface; it is, therefore, difficult to ascertain the exact position of the fractured ends with any degree of certainty and to manipulate them into position when found. The muscles pulling on the fragments are probably the most powerful in the body (the glutei, hamstrings, quadriceps, &c.) and tend to make the fractured ends override each other, besides necessitating the use of powerful extension to overcome their pull. Also, the limb below the site of fracture is long and heavy, so that almost any movement of the patient's body is liable to result in movement taking place at the site of fracture in spite of the most carefully adjusted splints. It is now a well-recognised practice to endeavour to bring the bones into place by position rather than by force and to bring the distal fragment into line with the proximal one, the joints being so bent as to relax as far as possible the muscles tending to displace the fragments. (This was particularly pointed out by Sir William Bennett in an article in the *Practitioner* for August, 1901.)

More or less powerful extension, however, is almost always necessary in treating fractures of the femur, for it is not to be expected that weights of a few pounds will overcome the pull of such powerful muscles as those involved. The best way of obtaining efficient extension is undoubtedly by making the distal portion of the leg the fixed point and allowing the body-weight to act as the extending force; powerful extension can in this way be secured by very simple apparatus. Probably the best splints at present in use which attain these objects are "the double incline plane" and "the Hodgen's splint"; in both of these the weight of the upper part of the limb tending to slide off the splint acts as the extending force. (The "double incline plane," to be efficient, should have the thigh piece at least two inches too long for the thigh.) The Hodgen's splint is, however, somewhat tiresome to adjust and entails a good deal of rather complicated apparatus, while "the double incline plane" has the twofold objection that it is very troublesome to nurse patients with and there is no means of steadying the thigh laterally. The following method, which is in a sense a modification of both, is, I venture to think, simpler and more easily managed than either, while at the same time remaining quite as efficient.

The splint is applied as follows. An extension stirrup is applied with strapping from the ankle to the knee in the usual way and the stirrup is fixed round the foot-piece of a Macintyre's splint, the thigh-piece of which should be made long enough to reach well up to the fold of the buttock. On the under side of the thigh-piece and close to its upper margin a metal hook is fixed (see illustration). The best splint for the purpose is a Macintyre made so that the length of the thigh-piece can be adjusted by means of a thumb-screw and with a flat metal hook attached to the under side. An anterior splint for the thigh is then made of Gooch's splinting, or, better, of gutta-percha, padded with a double layer of lint, and fixed to the thigh with webbings passed round the Macintyre splint. The fracture having been set the splint is now adjusted with the knee bent nearly to a right angle and the limb is fixed with bandages or webbings, as the case may be. A leather strap, which should be about an inch in breadth, is now passed through the lugs on the carriage of a Salter's cradle, then round the thigh-piece of the splint and caught in the hook on the under side. The buckle is then brought to one side and the strap is tightened until the buttock and

the thigh on that side are lifted off the bed; when the strap is sufficiently tight it ought to be possible to pass the open hand beneath the buttock on the injured side. Another strap is then passed round the lower end of the splint and fixed to the cradle to support the leg; this strap must not be too tight or it will depress the upper end of the



C, Hook on splint round which strap a passes

splint. The upper strap will need tightening from time to time to make up for stretching, &c. All that is necessary in order to examine the site of fracture is to remove the anterior thigh splint.

By this method very powerful extension can be easily secured and with very little attention will remain efficient. The weight of the thigh and buttock tending to slide off the splint draws the upper fragment away from the lower; the latter is prevented from moving by the extension strapping and stirrup round the foot-piece and by the bent position of the limb.

The chief advantages of this method are: 1. The nursing is very easy, as there are no weights, &c., and the cradle is the only thing that rests on the bed. 2. There is less tendency to movement at the site of fracture than with most other methods, as if the patient moves his body or it should become necessary to move him for the purposes of nursing, the distal portion of the limb and the splint will tend to move with him rather than for the movement to take place at the site of fracture. 3. The splint is comfortable and the limb is in the natural resting position of semi-flexion. 4. The apparatus is simple and easily applied. Movement of the knee-joint can be carried out from time to time by screwing the splint straight with the key while the thigh is supported by an assistant; this can be done without undoing the splint at all. In these days, when the value of early movement and massage in the treatment of fractures is becoming recognised, it is getting more and more necessary to have some method of splinting which will enable one to get at the site of fracture, and to bend the joints without having to remove the splints, and I think that the above method will be found to be an improvement on the older ones. I have to thank Sir William Bennett for his kindness in allowing me to try this method on several cases under his care in St. George's Hospital.

Cavendish-place, W.

Clinical Notes:

MEDICAL, SURGICAL, OBSTETRICAL, AND THERAPEUTICAL.

EXPECTORATION OF A TOOTH THIRTEEN MONTHS AFTER INHALATION INTO THE LUNG.

By W. E. CARNEGIE DICKSON, B.Sc., M.B., CH.B. EDIN.

In the middle of December, 1901, the patient, a marine engineer, aged 28 years, had 12 stumps removed from the upper jaw on two consecutive days, gas being the anæsthetic employed. He now recalls the fact that after the second day's operation he experienced a slight feeling of uneasiness