some places patients are packed up in leaves of the birch tree. This produces profuse perspiration, and is said to be found useful in rheumatism and even in some dropsies.

I have already said, Why are mud baths not used in England? I may now add, Why are not pine baths? Why should we not have them at Bournemouth, Sunninghill, or Weybridge, and many other places in England? In Scotland, Dunkeld, Ballater, and Crieff are particularly suited for them. Wales and Ireland offer various suitable localities. And in some instances, as at Ballater, you might not only have mud baths, but baths saturated with chalybeate waters—not that I individually attach much importance to the latter addition; and where are birch leaves to be got better than on Dee-side for those who have a fancy for such a mode of packing?

AN IMPROVED PERIMETER. (FOR MEASURING THE FIELD OF VISION.)

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

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IN many of the diseases of the eye that superficially appear to be chiefly local in their character, and in numerous cases also in which defects of sight are manifestly due to the reaction of central nerve lesion, the power to measure the field of vision with accuracy and readiness is of the greatest importance to the practitioner. In some instances the extent and shape of the field will at once determine a diagnosis that must otherwise have remained doubtful for an uncertain period; and in many the same data will afford the only trustworthy evidence with regard to improvement or retrogression. On these grounds the practice of perimetry has long been cultivated by ophthalmologists, and has lately been recognised as essential by physicians engaged in the study and treatment of diseases of the nervous system.

The early attempts at measuring the field of vision were of a rude and primitive character. A small white cross was marked on the centre of a black board, which was hung against a wall. The patient was placed with the eye under examination level with this cross, and at a measured distance of from eight to twelve inches away from it. He was directed to look steadily at the centre of the cross, which was called the "fixing point," and the other eye was closed or covered. The operator, armed with a black wand having a white tip, and with a piece of chalk, stood behind or at the side of the patient, and drew the white tip of the wand slowly along the board, from its margin towards its centre, in successive directions, usually first in a vertical line, next in a horizontal, and then in two lines intermediate between the former ones. The patient was directed to speak as soon as the white tip came into view, and at this point a chalk dot was made on the board. The patient was directed to speak again as soon as the white tip, in its onward movement towards the fixing point, became *distinctly* visible, and here a second dot was made. When the examination was completed there were two chalk dots on each meridian of movement. A line uniting all the external dots would show the absolute boundaries of the field of visual perception, and a line uniting the internal dots would show the boundaries of the field of distinct vision.

The maps afforded by this process were of great value, especially in the earlier studies of glaucoma and of nerve atrophy; but the process was open to the objection that the eye of the patient, which was concealed from the view of the operator, was apt to wander from the fixing point towards the moving object, and thus to vitiate the whole result. To meet this difficulty, Professor Donders made a hole in the centre of the board, and placed it in a vertical frame adapted to stand upon a table. The patient was directed to look through the hole at the eye of a second person suitably placed upon the other side of the board; and this second person gave notice if the eye under observation wandered. It is manifest that a certain amount of care and accuracy would be required from the second ob-

server, and that the method, however occasionally useful, would render perimetry dependent upon the presence of at least a moderately skilled assistant. The flat board system, moreover, is open to the objection that the central fixing point is nearer the eye than any lateral portion of the surface.

To obviate these inconveniences several contrivances have from time to time been suggested; but that which has found most general acceptance is the perimeter of Professor Förster, of Breslau. It consists of a strong wooden platform, measuring fifteen inches by nineteen, supporting at one end a double chin-rest, and having at the other a stout, upright iron pillar. This pillar carries a semicircular iron band, two inches wide and of twelve inches radius, placed with its concavity towards the chin-rest, and turning freely at its middle point on a horizontal axis, so that it can be placed vertically, horizontally, or in any intermediate position. A movable slide carrying a white spot, travels freely to and fro over the concave face of the band, and is worked by an arrangement of cords and pulleys set in motion by a winch-handle. A rod proceeding from the base of the chin-rest carries a slender stem which is placed close to the band, which turns freely right or left, and on which slides a small ivory ball. The chin of the patient is placed on the chin-rest, on the proper side for the eye under examination, and (the other eye being closed) the ivory ball is used as a fixing-point, and is adjusted at such a distance on the nasal side of the eye examined as to make the middle of the band correspond with the blind spot. The same fixation being maintained, the band is placed in successive meridians, and the appearance and disappearance of the moving spot as it travels round the arc are recorded on a diagram prepared for the purpose. The operator stands behind the arc, opposite to the patient, and is thus able to watch the direction of the eye, and to see that it does not deviate from the fixing-point. The face of the arc is divided into degrees, and its axis carries a circle similarly divided, so that a map of great accuracy can in this way be obtained. The eccentric fixation-point has the advantage of rendering the optic disc, instead of the macula lutea, the centre of the map, which thus corresponds to the ordinary course of ophthalmoscopic examination.

The principle of Professor Förster's instrument is perfectly sound; but its details are excessively faulty. It is very large, heavy, cumbrous, and costly; its strings are constantly becoming loose, or twisted, or otherwise out of gear; its chin-rest is too low, the instrument being on a table, for the comfort of the great majority of patients; and the superfluous half of its semicircular band is perpetually getting in the way. Like other people, I had borne these inconveniences with more or less grumbling, until Mr. Hawksley, of Blenheim-street, one day called upon me, wishing to examine the instrument on the part of a gentleman who desired to have one. I pointed out the faults to which I have referred, and made some suggestions for overcoming them; and the result has been the construction of the perimeter I am now about to describe.

It consists of a simple tripod, supporting a hollow stem (Fig. 1, A), in which a second stem (B) moves up and down, and can be fixed at any desired height by the screw (c). At the top of the stem (B) is a short horizontal axis (D), carrying the quadrant (E, E'), which turns in a complete circle, and moves with just stiffness enough to remain wherever it is placed. On the quadrant is a travelling slide (F), with a white spot; and a second independent axis is inserted in the axis of the quadrant at G, and carries a short tube, in which may be placed a stem to support the fixing point. The second or inner axis makes a complete revolution without affecting the position of the quadrant, and without being affected by it. At its attached extremity the quadrant terminates in a circular disc (E'), which is graduated into degrees at the back, and a fixed index allows the exact position of the quadrant to be read off. The quadrant is also graduated from ten degrees to ninety, on its concave face, so as to show the exact position of the slide. The fixing-point may be either an ivory knob at the end of a wire, or, what is for most purposes better, a small disc with a central perforation, as shown at H, through which the patient looks at an object on the other side of the room, and obtains fixation without exercise of the accommodation and consequent fatigue to the eye. The travelling slide (F) may be made

to carry a spot of any colour or size that is desired, and it is furnished with a ring at the back, by which it may be moved by means of a hook set in a handle, so that its position may not be indicated by that of the hand of the operator. For the purpose of taking exact measurements of the blind

FIG. 1.

spot, the quadrant is graduated at the back from eight degrees to twenty-five, in degrees and sixths of a degree; and a white spot is placed on the centre of the axis (G), to serve as a fixing-point for this particular purpose.

In order to use the instrument, the patient is comfortably seated in front of a table, with his chin supported by the rest of a demonstrating ophthalmoscope. The perimeter is then set at such a height as to have the centre of its axis on a level with his eyes, and is placed with this centre exactly in front of the eye to be examined (i. e., an inch and a quarter to the right or left of the median line, according to the eye), and exactly twelve inches distant from it. The patient closes the eye not under examination, and covers it with the hand, resting his elbow upon the table for the sake of greater steadiness.

In order to measure the blind spot, the smallest white object is fixed to the slide, and the quadrant raised until

FIG. 2.

it is nearly horizontal on the temporal side of the eye under examination. The patient is directed to fix the central point, and the slide is moved from outwards towards

the centre, until its white spot disappears, which it will usually do at about 17° . Continuing the same movement, it reappears, say at about 14° ; thus giving the horizontal width of the blind spot in that meridian. Placing the white spot half-way between the two points, at $15\frac{1}{2}^\circ$, the vertical measurement may be taken by raising and lowering the quadrant until the spot reappears in each direction, usually at the meridians of 90° and 58° . The horizontal and vertical measurements may thus be taken in as many meridians as we desire; and an exact outline of the part of the field corresponding to the blind spot may be traced upon a chart. I have designed the foregoing chart (Fig. 2) for this purpose, and have traced upon it the gap in the field of my own right eye for an illustration.

In order to measure the field, the perforated disc must be used for fixation, and must be set so that when the patient looks through the hole at a distant point the centre of the axis corresponds to the centre of the blind spot. For this purpose, in a normal eye, the centre of the perforation should be 10° above the horizontal meridian and $17\frac{1}{2}^\circ$ from the axis on the nasal side of the eye under examination. The patient is then instructed to look through the hole, the instrument being placed as before, and the eye not under examination closed. The operator moves the slide from without inwards along successive meridians until he has completed the circle, and marks the limits of perception and clear vision on a chart as he proceeds. The following diagram presents two continuous line circles, as data, the

FIG. 3.

outer having a radius of 70° , the inner a radius of 10° . The outer dotted line shows the limits of visual perception of my own right eye. The continuous line within the inner circle shows the limits within which I can read an unknown letter of Snellen's No. 8 test types; and the inner dotted line, which shows the entire field of vision of a patient with pigmentary retinitis, may serve to illustrate some of the clinical uses of the perimeter. The last two outlines are drawn from the fixing point as a centre.

In mapping the field one may of course proceed in any order; but there are some advantages in a regular method. I usually commence from zero, with the quadrant vertically downwards, and move it upwards towards the temporal side of the eye under examination. We may of course take a chart of the field by placing our marks on meridians corresponding to the positions of the quadrant (e. g., below the centre when the quadrant is downwards); or a chart of the percipient portion of the retina by placing the marks in contrary positions (e. g., above the centre when the quadrant is downwards). To render the charts universally intelligible the same plan should be adopted by all observers. Of the two named, the former is clearly the best: first, because it is the more simple; secondly, because the chart

so drawn will correspond with the more commonly employed inverted ophthalmoscopic image.

Since the woodcut has been taken I have had two small additions made to the instrument. The first is a little box beneath the tripod, which holds spots of various sizes and colours for the slide; and also a white knob on a stem, to be substituted for the perforated disc when it is desired to measure in the meridian of the fixing point, and hence to place the quadrant behind the perforation. The second is a screw on the axis D, by which the quadrant can be fixed or rendered easily movable at pleasure. By slackening the screw the quadrant can be turned to another meridian, without risk of displacing the general position of the instrument.

Wimpole-street, June, 1872.

A CASE OF PARAPLEGIA LASTING FIVE YEARS; ELECTRICAL ANÆSTHESIA.

QUESTION OF MALINGERING.

By W. MOXON, M.D.,

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A LAD aged eighteen was admitted into Guy's Hospital (Astley Cooper ward), under my care. He had been sent up from Northampton with the following history: He had fallen from a hay-loft nearly six years before admission, and in consequence of the fall was laid up with weakness of his lower extremities and of his back; he said that his water had been drawn off on account of his inability to pass it. The history which the lad gave was tolerably consistent. He said he had fallen from a height upon his back, and that paralysis of the bladder and lower extremities was the result of the fall, all of which was very likely.

Whenever a paralytic case comes under care one gets an advantage by inducing the person to put out all the effort he possibly can, urging and compelling him to do so. In this way one learns much of the nature of the case by the degree of willingness with which effort is put out, the freedom of the effort in the parts actually moved, as well as, of course, by the kind and degree of the imperfection in the usefulness of the paralysed part.

On making the boy get out of bed, he flopped on the floor, propping himself on his arms and resting on the side of his buttock, with his legs flexed at all the joints so as to be drawn up rather tightly. The legs were remarkably blue and cold, especially below the knees. The suspicious points about the lad's case were—first, the total paralysis he claimed to have; and, second, the defined line around his knees at and below which he declared the sensation to be lost. Under chloroform it was found that his legs, which he said had hurt him to straighten, would stretch to their length quite naturally; and when cautioned to be very careful, at the same time that he was forced to get upright—being held up in the air, in fact, by the arms,—his legs made very promising movements.

Testing the exact line limiting his anæsthesia in the way we employed led to still more doubt. We marked the professed line with ink, then made him shut his eyes, and tried his sensibility to touch above and below it. With his eyes shut he could not keep to his line as he had done most accurately when he was looking at it. It was remarkable, though, how near he kept to it.

The most interesting results were obtained from the electrical excitation of the paralysed parts. The lad was a miserable coward, and got into insufferable terror at the approach of the electrical battery. We did not calm his fears, but gave substance to them by applying the interrupted current so strong that I could scarcely bear it myself, which I endeavoured to do for the sake of appearances. He fairly bellowed when the poles were applied to his arm, the stimulated muscles of which contracted very actively, but I was much surprised to find that when this strong current was applied to his legs below the knees, he gave not the slightest sign of feeling it, and said that he scarce felt it at all, while the muscles contracted so feebly that their reaction was often doubtful, and never more than very trifling. The same current applied in the same

way to the legs of a man in the next bed, a courageous fellow who willingly underwent the experiment, made him hiss inwards through his teeth, and no effort of will on his part could prevent the muscles from strongly contracting, though he made a very energetic face in the endeavour to resist contraction, whereas the boy's countenance was perfectly placid while the electricity was applied to his legs. The boy had been a fortnight in the hospital before I made this examination by electricity, and had already made considerable progress; first he had stood up holding on to the back of a chair, then pushed the chair before him, and at last lifted the heavy chair, supporting it instead of having it to support him. As all this mending had occurred in a fortnight, and especially as I could not but think that the power required to lift a heavy chair, in the awkward stooping posture the boy always assumed, was far greater than compatible with his claim to be paralysed, I had come to regard him as a shammer. These results of electrical examination, however, made me at the time doubt whether it could be all sham, and led me to expect that perhaps a check in the progress of the case might be anticipated. I therefore adopted a more active treatment than that hitherto used, which had consisted of camphor-water and driving behind the chair. The fresh means consisted in the use of silver, administered, not internally, but in the form of sixpences, and accompanied with promises of more. Under all these therapeutical means his progress was wonderful. He left go the chair-back and got about on a broom-handle, then learnt to carry the broom. Five weeks after Christmas he ran a very good race with another boy in the hospital-park and won the shilling. He is now apprenticed to a tailor in the city of London, and described by his friends as doing well.

This issue of the case I suppose will be taken to show the boy's condition throughout was no other than deliberate deception. I can't help holding that opinion. Under these circumstances the state described in regard of electricity becomes of great interest.

Can we suppose that the prolonged disuse of the limbs had so brought down the sensitiveness of his legs and weakened their muscles that the usual painful contraction was partly not set up and partly not felt. It is difficult to suppose this, seeing that the power of the will found its ways into his legs so soon and thoroughly as the story shows. Nevertheless, I cannot suggest any more likely explanation of the difficulty, and we must remember that although recovery was quick it was gradual. I should, however, have said that in the latter few weeks the electrical current was used to the boy's legs; but the recovery was by that time complete. I ordered the electricity only for its moral effect; yet some may be disposed to think that that helped the cure.

But as my belief is that the lad was malingering, I think the chief interest of his case lies in its showing that want of absence of reaction to the electrical current does not prove a paralysis to be real; while the whole history shows the power over such cases which one may exercise by firm and persevering pressure upon the patient's will, keeping up a sufficient friendliness in the meantime.

Finsbury-circus, June, 1872.

ON THE QUALITY OF ATMOSPHERIC AIR IN PUBLIC AND PRIVATE BUILDINGS IN LEICESTER.

By RICHARD WEAVER, C.E., F.C.S.

No. I.

REPEATED observation in many localities has established the fact that average normal air, in positions free from pollution by the works of man, contains 0.399 part of carbonic acid in every 1000 parts of atmospheric air. Hence this gas, being the chief product of combustion in both the animal economy and manufactures, may be conveniently taken as a measure of aerial contamination; and its determination in different places shows their relative purity of breathing air.