

the blood-pressure in the capillaries generally, it may be possible to infer, with some approximation to accuracy, the pressure in the capillaries of the eye. We know that the pressure in the anterior chamber, and therefore throughout the eye, is normally equal to about twelve inches of water. It necessarily follows that the pressure in the intra-ocular capillaries must be greater than this—the general intra-ocular pressure,—as otherwise the blood would be altogether expelled from the interior of the eye. We know also that even in complete glaucoma, when the intra-ocular pressure is vastly greater than the normal, the blood still circulates, though in diminished stream. We may reasonably take it therefore, that the intra-capillary pressure is very much, I might say many times, greater than the intra-ocular. It is generally believed that the waste fluids of the eye pass from the anterior chamber through the interspaces of the ligamentum pectinatum into the canal of Schlemm, and then into the venous system. This belief is founded on the fact that a suitable coloured fluid injected into an eye removed from the body, at a pressure of twelve inches of water, can be seen to find its way into the veins, though very slowly, and by no means as if there were direct channels between the anterior chamber and the veins. It is questionable whether during life this simple process of percolation obtains. In the dead eye there is no blood-pressure in the capillaries to counteract the pressure of the fluid injected into the anterior chamber, whereas in the living eye the blood-pressure in the capillaries is much greater than the lymph-pressure in the anterior chamber. Hence I think some other explanation must be sought.

Now, as in other parts of the body the propulsion of the lymph is effected chiefly by muscular pressure, aided by the lymphatic valves, which direct the current centripetally, it seems reasonable to suppose that some such action takes place in the eye; and if this be the case, then we see at once the object of the radial fibres. The circular, in the act of near accommodation, open up the meshes of the ligamentum pectinatum; and do not the radial fibres, in the act of accommodating for distance, reverse this action, close the meshes of the ligamentum pectinatum, and thus force the contained fluid into the canal of Schlemm, and so into the veins? For the openings from the lymph passages into the veins must be valvular, otherwise the blood would flood the eye, and the valves must open towards the veins. Hence some pressure, greater than the intravenous, must be brought to bear on the lymph spaces in the ligamentum pectinatum in order to force the contained fluid into the veins, and it seems impossible that this can be accomplished in any other way than by muscular action, and that by radial muscular action. If this, for the sake of argument, be conceded, I think I can account for and show the use of a condition which has doubtless puzzled many, as it has myself.

In estimating refraction, we take as a standard what we call an emmetropic eye—that is, one which receives parallel rays of light, and focusses them accurately on the retina without the intervention of accommodation. But does such an eye exist? We call such a typical eye a normal eye; but I doubt whether there be such an eye, save in a short period of transition between hypermetropia and myopia—that is, as a product of morbid action. I take it that a normal eye is slightly hypermetropic and slightly astigmatic; say, for instance, requiring from  $\cdot 25+$  to  $\cdot 5+$  for horizontal or nearly horizontal lines, and from  $\cdot 75+$  to  $1+$  for vertical or nearly vertical lines. Now, if this be the case, there must be, in seeing the largest or most distant objects, some accommodation; and inasmuch as the astigmatism of the cornea does not allow the accurate formation of an image with one uniform contraction of the circular fibres, since an amount of contraction sufficient to focus horizontal lines would be too little to focus vertical, and one to focus vertical lines too great to focus horizontal, it must follow that both muscles are constantly at work in every visual act. Judging by analogy, one would imagine that by rapid oscillations of the two muscles a series of pictures is formed on the retina, first of horizontal, then of vertical lines, in too quick succession for the brain to take cognizance of the interval. Or it may be that just as an inverted image on the retina is necessary for the appreciation by the brain of an object as erect, so such a succession of pictures may be necessary for the appreciation of correct outline.

This view of the functions of the ciliary muscle would shed a flood of light on the pathology of glaucoma, and, I would submit, it would add greatly to the probability of the theory of its production which I have advanced—

namely, that the disease is due to overaction of the ciliary muscle, which at last causes inflammatory engorgement and blockage of the ligamentum pectinatum. For in hypermetropia the circular fibres have so much to do in accommodation that their nutritive function must be very subsidiary indeed; and as we often find in hypermetropes such a degree of circular spasm as to require a strong concave glass for distance, it is difficult to believe that the nutritive duty can be satisfactorily performed under such a strain. It would seem that when the circular muscle is so cramped as to convert a hypermetropic into a myopic eye, the radial fibres never fully contract; therefore the valvular spaces are kept constantly open, and the fluid contained in them is, to say the least of it, insufficiently pumped out. Therefore it would appear that an eye is astigmatic designedly, in order that no accurate image shall be formed without the intervention of the muscular act of accommodation, which, if I am right, cannot be done without a change being made in the hydraulic apparatus of the eye.

### PERTUSSIS.

By WALLACE B. CROSKERY, L.K.Q.C.P.I., &c.

WHOOPIING-COUGH is an affection which the general practitioner meets very frequently in practice, and yet presents so many complications, relapses, and so forth, that, notwithstanding the many cases he sees of it, his skill and wits are frequently exercised both as to treatment and general management. It drags along over a period of weeks, and often months, and the many specifics suggested for its treatment are resorted to with more or less success. I wish more particularly to direct attention to those cases which become complicated with bronchitis or broncho-pneumonia. This I take to be the most frequent complication we meet with in children beyond the age of infancy; I allude more especially to those who are between the ages of three and eight years. When this complication has set in, the little patients have paroxysms of coughing every half, three-quarters, or every hour; the respiration ranges from 35 to 60 per minute; and the pulse from 120 to 140, or even higher; the temperature sometimes being elevated, sometimes not, and, if elevated, not generally running high. The child lies with eyes closed between the paroxysms, tired out and drowsy, partly from want of sleep and partly from imperfect aeration of blood. Expectoration is no longer simply glairy, but has become muco-purulent, or sometimes apparently completely purulent; of this a very considerable quantity is brought up, and very frequently the stomach is emptied of its contents at the same time. The child becomes very weak, thin, and wasted. Percussion frequently shows patchy dulness, more especially posteriorly, and general want of resonance; auscultation reveals muco-crepitant râles in the medium-sized tubes, which are loaded with muco-purulent secretion; and oxidation of the blood is very much interfered with. The urine is scanty, with a high specific gravity, ranging from 1026 to 1036, and acid. This condition may go on from two to six weeks, and we have our skill taxed to the utmost to bring the patient safely through.

Among my notes on whooping-cough are those of a child aged five years. As the case is typical of the complication I have described, I will make some extracts. The father of the child carefully noted down the hours at which each paroxysm occurred, and I find the average number of paroxysms for the first week after the onset of bronchitis—which set in about the fourth week of whooping-cough—to be  $30\frac{1}{2}$  in the twenty-four hours. In the night the paroxysms came on (as they generally do in severe cases) more frequently than in the day, the average from 10 P.M. to 10 A.M. being  $17\frac{1}{2}$ , and from 10 A.M. to 10 P.M.  $13\frac{1}{2}$ . During this week the average pulse was about 124 per minute and the respiration 40, the temperature ranging from  $99\cdot 5^{\circ}$  to  $100\cdot 5^{\circ}$ . During the second week of the bronchitis, or the fifth of whooping-cough, the average number of paroxysms in the twenty-four hours was  $23\frac{1}{2}$ ; the average pulse was 120; respiration 33; temperature  $99^{\circ}$ . During the third week of bronchitis the paroxysms averaged  $16\frac{1}{2}$  in the twenty-four hours. During the fourth week there were about seven in the twenty-four hours. In these last two weeks the average pulse was 110, the average respiration 30, and the temperature normal. During the next

week there was only a very occasional whoop, no hurried respiration, and no expectoration. Improvement in such cases is marked by the decline in the numbers of nightly paroxysms; this fall frequently takes place very abruptly, and it is not unusual, in a case where hourly paroxysms have been the rule at night, to hear that the child has slept four hours right off without a paroxysm. This sudden improvement occurs about the small hours of the morning, and is maintained, unless relapse takes place, and the interval is steadily increased to six, seven, or eight hours.

Whooping-cough has many specifics. Belladonna I have been disappointed in, but have never pushed it to very large doses, though I have pressed it to moderately large ones, as it is difficult in private practice to see the patient sufficiently often to watch that the physiological effect of the drug has not been exceeded. I have settled down for the most part into the treatment of uncomplicated cases with nitric acid and bromide of ammonium, combined with bark, and probably ipecacuanha or squills, with the external application of a stimulating liniment to the chest, back, and spine. In the condition I have described, exclusive specific treatment is for the most part disappointing. In its early stages, carbonate of ammonia, combined with a diminished dose of bromide, is of service with tolu and senega; the dose of the bromide should be a diminished one, as some authorities on the subject have pointed out, as, if given in the larger doses in this complication of the disease, the tendency to drowsiness is increased. Possibly with this treatment we may remove the bronchitis and return to the direct specific treatment. Frequently, however, notwithstanding the stimulating expectorant, the respiration becomes quicker; the secretion from the bronchial tubes, though dislodged in considerable quantity, seems to be secreted in increased amount, and accumulates in the tubes. I wish to direct attention to the treatment I have found most serviceable in such cases. I give two mixtures, each every six hours, the one within three hours of the other: the first containing oil of turpentine, spirit of ether, and tolu; the second containing a large dose of dilute nitric acid, a small dose of bromide of ammonium, with senega and bark. I find this treatment most efficacious; the turpentine dislodges the secretion and acts as a stimulant, the ether relieves the spasm and also stimulates, and the nitric acid comes into play as a specific. More reliance, I believe, is to be placed upon the nitric acid than the bromide for diminishing the number and duration of the paroxysms, but I have not found it useful when bronchitis is present, unless in a considerable dose. For a child of five years I give up to ten minims of the dilute acid for a dose. I have not found any untoward result from this or from the turpentine, which I give in about five-minim doses for a child of the same age. As auxiliary treatment, I keep the chest and back wrapped up in cotton-wool, and order to be rubbed in two or three times a day a combination of compound camphor and soap liniment. It is wonderful how a child's skin gets accustomed to its use, and a child of five years will tolerate an application containing one-third and sometimes one-half of the compound camphor liniment without flinching, or without vesication, or even much erythema resulting. Such foods should be given as are quickly assimilated, and should be administered as soon as a paroxysm is over. Stimulants are of immense service given with discretion in the presence of the drowsiness, as there is much exhaustion from the frequency of the paroxysms, the long duration of the disease, and frequently the starvation, so little food being allowed to remain in some cases in the stomach. When improvement has taken place cod-liver oil is of great service, also quinine and iron, either separately or combined, followed up by the usual change of air.

I am indebted to Dr. Hickman, of Dorset-square, N.W., for much valuable information as to the treatment of this most rebellious ailment.

Eckington, Derbyshire.

**SURGEONS WANTED FOR THE WAR.**—The Servian Minister has received from Belgrade an official telegram to the following effect:—"The Servian Government would thankfully receive the medical services of English surgeons and doctors. All desiring to offer their services to the Red Cross are requested to address their offer to the Chief Commissioner of the Red Cross, Colonel Dr. Sava, Petrovich, Belgrade."

## A CASE IN WHICH FOUR TAPEWORMS COEXISTED IN ONE PERSON.

By THEOBALD A. PALM, M.A., M.D.,  
LATE MEDICAL MISSIONARY IN JAPAN.

As supplementary to the list of cases by Dr. Cobbold in THE LANCET of Sept. 26th illustrating the value of male shield fern in the treatment of tænia, the following case may be of interest, partly because it is an unusual occurrence to find several tapeworms coexisting, and also because it illustrates the importance in treatment of not only looking for the head of the parasite, but also of examining the whole of the parasite evacuated.

A German gentleman resident in Niigata, Japan, had suffered from tapeworm for more than twelve years, and had undergone a variety of treatment without avail, having, as he informed me, at one time eaten a large plateful of boiled pomegranate-root. I prescribed for him eighty minims of the ethereal extract of male fern, to be taken on awaking in the morning after fasting from noon of the previous day. It was taken in milk, in three portions, at short intervals, and the recumbent position was maintained till nausea had passed away. I had explained to him the importance of finding the head, and described what it was like. Later in the day he brought me in triumph two heads in a small phial and a large quantity of tapeworm. Upon arranging this around a large tray in lengths, I found that there was more than could be accounted for by two tapeworms, there being an array of the narrow segments near the head, beside those belonging to the two heads already evacuated. He was somewhat incredulous when I informed him that he had another left in him. After some weeks, however, he paid me a further visit, as he was again passing proglottides. The male fern was administered as before, bringing away one head and a considerable length of the worm. Upon examining this, and carefully putting it together on a tray, I again found that there were two lengths of the narrow upper portion of the parasite, which evidently belonged to separate worms. My patient delayed treatment until there was indisputable evidence that he was not cured, and then a third dose of the same remedy brought away the fourth and last head. I may add that his health did not appear in any way to suffer from the presence of the four tapeworms. His appetite was somewhat improved by the presence of the four guests whom he entertained, but this was a symptom of which he did not complain. He sought relief from the annoying consciousness of being the victim of a repulsive parasite.

Thorncombe, Chard.

## A Mirror OF HOSPITAL PRACTICE, BRITISH AND FOREIGN.

Nulla autem est alia pro certo noscendi via, nisi quamplurimas et morborum et dissectionum historias, tum aliorum tum proprias collectas habere, et inter se comparare.—MORGAGNI *De Sed. et Caus. Morb.*, lib. iv. Proœmium.

### ROYAL HOSPITAL FOR WOMEN AND CHILDREN.

LARGE UTERINE MYO-FIBROMA; PROFUSE METRORRHAGIA; ATTEMPTED REMOVAL OF OVARIES; REMOVAL OF UTERUS WITH TUMOUR; SECONDARY HÆMORRHAGE FROM PEDICLE; DEATH FROM CARDIAC THROMBOSIS.

(Under the care of Dr. WILLIAM DUNCAN.)

THE following case will be read with interest, not so much from its unusual character as from the accident which occurred in the breaking of the wire of the serrenœud—an accident which has fortunately been of very rare occurrence, but which involves very serious consequences to the patient. Some remarks on the case are appended by Dr. Duncan, to which we would refer our readers.

Mrs. P—, aged thirty-two, was admitted into the hospital on March 19th, 1885. Has been married thirteen years;