

30,000 for the year, with the total consumption of 14 tons of the liquid).

I am, Sir, yours faithfully,

A. D. WALLER.

Physiological Laboratory, University of London,
Oct. 21st, 1909.

EDRIDGE-GREEN'S THEORY OF VISION AND COLOUR VISION.

To the Editor of THE LANCET.

SIR,—The question of the meaning of the structure of the retina is the latest one in physiological optics—i.e., from the subjectival standpoint held by E. Hering, Mach, and myself. As Edridge-Green has found for the distribution of the visual purple, so I, Hering, Hess, Garten, and others, have found only gradual quantitative differences in the sight between the foveal and extrafoveal area. The phenomenon of Purkinje, the alteration of optical white equations by the state of light- and dark-adaptation, the colourless interval for spectral lights of increasing intensity, the different phases of the after-image,—all these subjective reactions exist, not only in the extrafoveal, but also (only gradually diminished) in the foveal region. The analogy between this behaviour and Edridge-Green's objective statement about the visual purple is a striking one.

As *principia*, I believe that it is absolutely necessary for the classification of colours to start with sensation analyses, from the statement of the simple effects by some definite but individually different lights, homogeneous or mixed. It is also necessary to note the changes produced in each case by varying states of light- and dark-adaptation. We must ascertain the position of pure green, pure yellow, pure blue in the spectrum, and of pure red in mixed light, and of the corresponding neutral points in the colour-blind. It is totally wrong to conclude from the constitution of physical stimuli (composition, wave-length) that the physiological effect or the psychological sensation are similarly constituted. Therefore all colour theories based on light mixture (colour mixture is a very bad expression), as the theory of Young-Maxwell-Helmholtz, A. Fick, J. v. Kries, are fallacious.

Hering holds that for the regular cases of colour blindness there is a defect of red-green or yellow-blue or red-yellow-green-blue perception. The antagonistic correlation between red and green and yellow and blue is founded in the nervous apparatus; the regular cases of colour blindness are therefore nervous anomalies. On the other side, I believe that alone or combined with a nervous anomaly there are many cases in which photo-chemical anomalies in the retina exist. I believe that the visual purple could be one of the photo-chemical stimulus-transformers for the nervous apparatus, especially the stimulus-transformer for the white sensation in the dark adapted eye. There may be a large number of such photo-chemical substances, at least six (for red, yellow, green, blue, and two for white sensation), the absorption spectra of which coincide partially, for p.e. the point of pure green varies according to the state of adaptation of the eye. As a pupil of Hering I may say that Hering has always objected to the association of his theory with the photo-chemical processes of the retina as it is only concerned with the central processes.

I am, Sir, yours faithfully,

A. VON TSCHERMAK,

Oct. 25th, 1909.

Professor of Physiology in the University of Vienna.

THE TREATMENT OF ADDER BITES.

To the Editor of THE LANCET.

SIR,—The recent correspondence on adder bites has prompted me to report a case which came under my care last year.

A boy, aged 11 years, was brought to me by his mother on July 15th, 1908, at 1.10 P.M., the history being that he had been bitten by a grass snake which he had caught the previous day, and which he had handled freely until 12.55 P.M. on the 15th, when it had bitten him. When I examined him, only one-quarter of an hour after he had been bitten, I found a small pin-prick wound on the dorsum of the right index finger from which a little serum was exuding. The skin around the wound was discoloured, and the whole finger and dorsum of the hand were very cedematous. There

was slight lymphangitis of the forearm, and the axillary glands formed a lump of the size of a pigeon's egg. The boy was evidently in great pain. He was pale; his pulse was 60 and of very low tension, and his temperature 98.2° F. He had vomited twice on the way to my house. I asked the mother to fetch the snake, which turned out to be a female viper, and in the meantime put on a tourniquet, and I made a deep incision an inch long through the site of the bite. The tourniquet was then slightly loosened and the patient sucked the wound for half an hour. As the boy had fainted twice and again vomited I gave him 1-100th grain strychnine hypodermically, dressed the wound with permanganate of potash crystals and wet boracic lint, and having removed the tourniquet I ordered that he should be taken home and put to bed. He was there wrapped in blankets and kept warm with hot-water bottles, brandy being administered in drachm doses every half hour until 5.30 P.M., when I visited him. He was then in much pain, the whole hand and arm greatly swollen, and the axillary glands so much enlarged that the arm could not be adducted to the side. The glands in the anterior triangle were also enlarged and tender. The pulse was 80 and very soft; his temperature was 99°. I stopped the brandy and gave another 1-100th grain strychnine, together with 1-12th grain morphia. At 7 P.M. the swelling had slightly decreased, but there was still much pain. His pulse was 48, low tension, and his temperature 100°. 20 cubic centimetres of Burroughs and Wellcome's polyvalent antivenom serum were injected into the flank.

At midnight the condition was as before, and as the patient complained greatly of pain in the arm and also at the seat of inoculation I gave him 10 grains of Dover's powder. On the following morning the boy was slightly more comfortable, the arm was less swollen but much discoloured, the glands had not decreased in size, and the whole of the right side of the thorax resembled a large black bruise. The pulse was 72, normal tension, and the temperature was 98.4°; the wound looked dirty and was discharging much clear serous fluid. I therefore ordered him to use a hand-bath thrice daily, consisting of one drachm of tincture of iodine to a pint of hot water. From this moment the swelling and glandular enlargement quickly subsided and the wound became healthy; the discolouration on the chest-wall persisted, however, for several days. It is difficult to say from a single case whether any benefit follows the use of antivenom serum, but I am inclined to agree with Dr. Sapwell that it certainly does no harm.

The points of interest in the case were: (1) the rapidity of the glandular swelling; (2) the collapse as evidenced by the low tension of the pulse, together with vomiting and fainting; (3) the extreme discolouration of the chest wall; and last, but not least, the adder's tractability during the first 24 hours of its captivity. This may, I think, be accounted for by the fact that she "struck" several times at the boy's boots while he was capturing her, and that she had thus more or less exhausted her stock of venom.

I am, Sir, yours faithfully,

MAURICE AMSLER, M.B., B.S. Lond.

Eton, Oct. 23rd, 1909.

MALARIA TREATED WITH INJECTIONS OF QUININE.

To the Editor of THE LANCET.

SIR,—In THE LANCET of Sept. 11th Dr. G. W. Young quotes three cases of malaria treated with injections of quinine, apparently being under the impression that this is a new form of treatment. I would point out that not only is this method fully described in Sir Patrick Manson's "Tropical Diseases," but also that several thousand injections are given during the year in India, as it is a favourite method of treating malignant cases, especially in the army.—I am, Sir, yours faithfully,

A. H. SAFFORD, Captain, R.A.M.C.

Fyzabad, India, Sept. 26th, 1909.

THE BENHAM TOP.

To the Editor of THE LANCET.

SIR,—In reply to Mr. C. E. Benham's letter in THE LANCET of Oct. 23rd, I may say that the fact which I have discovered is that the Purkinje phenomenon is found with small portions of the retina, and