admixture of small quantities of white and coloured light and to certain physiological influences which had not been taken into consideration, and which prevented him from arriving at a correct interpretation of the colours.

If a prism, even of the finest polish, be examined with a strong light against a dark background, numerous small particles and irregularities of the surface, which irregularly disperse the light, will be seen. The reflections from the sides of the prisms, lenses, and sides of the box have also to be taken into consideration. The amount of this irregularly dispersed light is small, but is a very important factor taken in conjunction with other facts. It is necessary, therefore, in order to get rid of the greater part of this irregularly dispersed light, to allow the light included in a monochromatic region to pass through a second aperture, such as that in my spectrometer. When this is done, I have found it impossible by any method which I have adopted to distinguish between the various waves included in the monochromatic region. I have magnified the image of this region with eyepieces of different power, making a corresponding increase in the light to make up for the loss of luminosity caused by the magnification. I have also obstructed the central portion of the monochromatic region with a screen, and the remaining portions have still appeared monochromatic. The most conclusive experiment, however, is the examination of the monochromatic region with an achromatic double image prism, the intensity of the source of light being increased as before. By this method two rectangular monochromatic fields are seen, and can be arranged so that they are side by side and just touch.

The portion belonging to the red side of the spectrum of one can be made to touch the portion belonging to the violet side of the spectrum of the other. This position is therefore most favourable for the detection of any difference, and yet I cannot detect any, neither can any other observer to whom I have shown the experiment. The experiment can be observed objectively in the following manner: An arc light being used for the illuminating source, a pure spectrum is obtained; a portion of this spectrum, forming a monochromatic region, is allowed to pass through an adjustable slit. Two images of this monochromatic region can be thrown with the aid of a double image prism upon a screen and made of any required size. The varying size of the monochromatic regions with different persons can by this means be demonstrated to a large number.

Another point which I found with Lord Rayleigh's apparatus is the difficulty of obtaining both fields of similar intensity. The slightest movement of the eye also causes an alteration in the number and kind of rays which enter the eye. When two fields are of unequal intensity the physiological effect of contrast is evoked, which causes an erroneous judgement of the colours under observation. In fact, weak orange light may, by contrast with bright red light, appear green. In making experiments on the discrimination of colour, the rays of light from the two regions to be compared should strike the eye at as nearly as possible the same angle; the fixation point of the eye should be in the centre between the two regions, so that one region may not be more influenced by the pigment of the yellow spot, or the blood in the retina, than the other; and equal amounts of light from each region should enter the eye.

The importance of the irregularly dispersed light in association with contrast in dealing with questions of colour has been overlooked by many physicists, as several instruments have been constructed for the investigation of colour and colour vision, which are defective on this ground. It was this irregularly dispersed light, as shown by Helmholtz,¹ which caused the apparent change in the colours of the spectrum observed by Brewster, and which led him to suppose—erroneously—that there were three kinds of solar light.

In conclusion, when special means are taken to have as pure a spectrum as possible, I can find no method which will enable me to distinguish as separate colours the wavelengths in a monochromatic region. I therefore regard the appearance of the monochromatic region as a fundamental physiological fact, as I stated over twenty years ago.

REFERENCES.

¹ *Proc. Roy. Soc.*, B. 1910, vol. lxxii, p. 458. ² *Colour Blindness and Colour Perception*, International Scientific Series. ³ December, 1910. ⁴ *Poggendorff's Annalen*, 1852, No. 8.

MENORRHAGIA IN VIRGINS: A MEDICINAL TREATMENT.

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IN the EPITOME for March 4th reference is made to a paper by Sireday and Lemaire on menorrhagia in young virgins. In this many factors are mentioned, but one of great importance is omitted.

The proximate cause of the menstrual flow is vascular distension of the uterine mucosa, in which there are at least three physiological factors: (1) The force of the heart; (2) the dilatation of the uterine arteries; and (3) the absence of arterial dilatation elsewhere—or, in other words, the maintenance in other areas of the average amount of vaso-constriction or vascular tone. The last factor, though, of course, fully recognised in physiology, is apt to be overlooked, or, at least, not allowed for, in practice. Hence vaso-constrictors rather than vaso-dilators are nearly always employed in seeking to arrest haemorrhage.

We may assume that the force of the heart remains unchanged during menstruation; at least, there is no reason to assume otherwise. It has also been shown in some cases of normal menstruation that the general blood pressure is unchanged.¹ It follows that in such there is a slight increase in the average vaso-constriction in the undilated areas (a slight general increase of vascular tone), though such increase would doubtless be far too small to admit of instrumental measurement.

Now, suppose an exaggeration of this normal slight increase of general vaso-constriction. Two results would follow: (1) An increase in the general blood pressure; and (2) a marked increase in the vascular distension of the internal genitalia. The former could be demonstrated by the manometer; the latter would cause symptoms. The increase of vascular distension in the ovaries and uterine adnexa would be indicated clinically by an increase in the ovarian and pelvic pain, which in some slight degree may be regarded as symptomatic of normal menstruation; the increase of vascular distension in the uterus would be indicated clinically by menorrhagia.

That marked menstrual exaggerations of general vaso-constriction are common is rendered probable by the well-known tendency to excessive vasomotor irritability which obtains in young females, and by the fact that hysterical girls who complain of pain, etc., during menstruation have a steady rise of 20 mm. during the flow.²

The conception that excessive menstrual losses may depend upon exaggerated vascular tone broadens the etiological basis of menorrhagia. While not forgetting the undoubted influence of local lesions and general diseases, we have to include amongst probable causes all the factors of exaggerated and impulsive (inadequately inhibited) vasomotor action—a series of factors too long to be here considered. Meanwhile we may work on proximate factors. From the fact that exaggerated general vaso-constriction increases the menstrual loss, it follows that a reduction thereof will diminish the loss; whereupon we at once think of the nitrites.

The effect on menstruation of an inhalation of amyl nitrite, the most rapidly acting of the class, is in strict accordance with, probably exceeds, anticipation. Synchronously with the flushing of the face, the clinical index of inhibition of the general vascular tone, the flow ceases; nor does this return until the next period, unless the inhalation has been administered during the first day or two of the process. In several cases a single administration of 3 minims on three or four successive menstrual periods has been sufficient to effect permanent relief from the tendency to excessive losses. In others the effect has been temporary only. In these latter it has been necessary, and usually sufficient, to give during the menstrual period a regular course of nitroglycerine, according to the practice recently advocated by Gowers in his article on Vagal and Vasovagal Attacks, in the *Lancet* of June 8th, 1907.

It is superfluous to add that the success of the nitrites in menorrhagia should never lead to the neglect of local conditions. But these, of course, are quite frequently not examinable.

REFERENCES.

¹ *Clinical Study of Blood Pressure*, Janeway, 1907, p. 127. ² *Ibid.*, p. 257.