The Science of Optics.

By LIONEL LAURANCE.

Myopia.

The chances of a successful issue to an attempt to cure divergent strabismus by lengthening the reading distance depends on the visual acuity possessed by the deviating eye after correction by the Cc. lens. If the sight is equal to that of the other eye, the probabilities are good. They are also, if the sight be not very much more defective in the one eye than in the other, but the case must be watched and constantly retested every two or three months, as whether the visual lines will obtain and retain parallelism depends on the deviating eye receiving just the correction that will cause sufficient stimulus to the retina. The deviating eye should be exercised by itself at reading fine print as far away as possible every day for a few minutes so as to practise the retinal perceptive faculty.

If the eyes cannot converge to 16 in. with the aid of Cc. lenses only, they might be helped temporarily by weak prisms, bases inwards, combined with the Cc. spherical power. Divergent strabismus can be cured at a much later age than convergent strabismus, because, firstly, it starts later in life; secondly, the deviating eye being turned outwards receives some stimulus from light and so does not so soon become amblyopic as in convergent strabismus; and thirdly, because the internal rectus is anatomically of greater power than the external.

The use of Cc. glasses in M by inducing Ac. and removing the necessity for extreme Con. cure a tendency to squint, prevent a squint or cure a squint as the case may be.

If the squint be of long standing, the deviating eye becomes amblyopic and is useless for vision. More will be said on this subject under "Strabismus."

Many authorities, especially in France and Germany, are adverse to allowing the employment of Ac. in M on the ground that it tends to increase the defect, and they therefore select the distance glasses and then reduce them 3 D for reading at 13 in. for close work, while in M of less than 3 or 3.50 D they are not allowed to be used at all for close work.

In Germany it is not uncommon in high degrees of M to prescribe either no Cc. power or very little for close work, and allow reading to be done at a very near point with the aid of prisms bases in.

That ciliary exertion has any tendency to increase the M when it is employed in a normal manner without undue Con. is very doubtful, and the exertion of Ac. in M is rather to be recommended as it restores the natural harmonious action that should exist between it and Con. It makes the eyes as nearly normal as is possible because owing to its use being permitted the same glasses can be worn constantly. It saves the myope from passing his whole life, either not seeing distant objects properly, or else under the very uncomfortable necessity of constantly changing the two pair of lenses, he must be armed with, as he turns from viewing a distant object to see a near one or *vice-versa*; for the eyes cannot possibly read with the distance glasses if the accommodative power be lost and of course cannot see distant objects with glasses that are adapted for seeing only so far away as, say 13 inches. It is almost a cruelty to condemn a young person to such a fate for his whole life, if it can be possibly avoided.

Accommodative activity certainly leaves the eyes in a better condition for the advent of presbyopia. The accommodative power becomes lost in the course of time anyhow, but that is no reason why the optician should hasten its loss by not allowing it to be used during youth and middle age. On these grounds it is right in M of high and medium degree to give one pair of lenses only, to be worn constantly, these lenses to be such as are best adapted for close work as previously explained, and if they are also those, that make vision nearly normal for distance, they should serve until presbyopia sets in, but if they are not the same as give fair distant vision, their strength should be gradually increased, as the ciliary, though being actively employed, gains tone and power until the reading glasses are also those that give fair distant V.

The necessities of the client might demand lenses that give sharp distant V which lenses are not the same as are required for close work. These can be given for occasional use, but for constant wear, the glasses must be those that are adapted for reading except in cases of very low degrees of M (under 2.50 D), where generally, but not always, none are required for close work.

In M of low degree, it is proper to test the motor muscles and if there be any esophoria, it is better not to give glasses for close work, either at all or only of sufficient strength to remove the reading point to thirteen inches, as they induce Ac. and therefore more Con., and so throw a greater strain on the weak external recti.

If there be any exophoria, glasses should be given for close work, as near to the strength of the distance glasses as is possible, for they induce Ac., render Con. more easy and so relieve the weak internal recti. It might be laid down as a rule, that where Con. is difficult as in exophoria, the act of accommodating when Cc. glasses are worn, renders the convergence function more easy, and the eyes, generally, more comfortable. On the other hand where Con. is easy, as in esophoria the use of Cc. glasses by inducing Ac. tends to cause too much Con. and in order to prevent diplopia more strain is placed on the weak external recti, with the result that the eyes are less comfortable.

Of course esophoric M is the exception, as usually the internal recti are weak in this error of refraction. This rule will apply not only to M of low degree, but also to all cases to a certain extent.

When presbyopia first comes to a myope, there is no improvement in sight. The PP recedes but the PR remains the same, so that the range of his accommodation is shortened at the near end but is not lengthened at the far end. If accommodation had been previously somewhat exerted in distant vision causing thereby a very low degree of M, say $\frac{1}{4}$D, it may now disappear as Ac. is entirely relaxed.

BREAD CRUST.—The crust of bread has been supposed to be richer in nutritive constituents than the crumb, but Balland finds that it does not contain any more nitrogenous and mineral matter if brought to the same condition of dryness.

PRODUCTION OF PURE OXYGEN.—Pure oxygen can be readily prepared for medicinal use by adding a solution of hydrogen peroxid to a small quantity of solution of ammonio-sulfate of copper. Pure oxygen is evolved, and the latter solution remains almost unaffected and can be used continually.