

The Science of Optics.

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Myopia.

After having tested and fitted the one eye, the other is proceeded with in the same way, and when this is done the two eyes must be directed to the distant test type.

Binocular V is always stronger and clearer than the monocular, and in some cases of M of low degree a little Ac. may also be exerted when one eye is covered by the disc. Therefore, when both eyes are engaged in V, in front of the - lenses already in the frame a pair of weak + lenses must be placed, and if with them V still = $\frac{20}{60}$, even if not quite so clearly, the - lenses are to be reduced by the power of the strongest + lenses that does not make V less than $\frac{20}{60}$.

Frequently in myopic errors of rather high degree V cannot be made normal with any lenses, then by the test, it must be learnt how much it can be improved. Say it can be made $\frac{20}{70}$ —and no lens makes it better, the weakest lens with which this No. 40 line can be read is found by working backwards and trying successively weaker glasses in the same way as when selecting the weakest that makes V = $\frac{20}{60}$. Whatever line is the smallest that can be read with any lens is the best V obtainable.

Then the correction of M is the very weakest - sph. lenses with which V = $\frac{20}{60}$, or the best V obtainable when both eyes are engaged in the act of V. This correction is found by testing first each eye separately, and then both together, reducing the power, if possible, and as much as possible in the binocular test.

It is extremely easy to give lenses too strong in M. Holding in front of one's eyes a pair of Cc. glasses the No. 20 line can through them still be seen by exerting Ac. and it is this that the myope would do if the correcting lenses be stronger than necessary. The pernicious effects of over-correcting M to the slightest extent should be clearly understood by knowing the cause of M and the condition of the eyes when it exists.

If a +20 D lens (2 in. focal distance) be held 3 in. in front of a white screen, opposite to a bright light 20 ft. or more distant, on the screen there will be found only a very blurred and indistinct picture, as the rays focussed at 2 in. between the lens and the screen, and only form on the latter circles of diffusion. If now there be added a -7 D lens to the +20 D, the refractive power is reduced to 13 D, the focal distance of which is 3 in., and on the screen there will be formed a clear picture of the light. So with a myopic eye which has, say, 56 D refraction power, the focus of parallel rays is at .714 in., or .086 in. in front of the retina. If there be placed before such

an eye a -6 D lens the refractive power is reduced sufficiently to make parallel rays focus .086 in. further back, and so just at the retina. The refraction is made normal by adding -6 D to the 56 D of the myopic eye in question.

The cause of M is tension on the eyes during childhood and youth while the coats are yet soft and yielding. It never commences before the age of 5, generally between 10 and 15, and never after 20, so from 5 to 15 is the dangerous age for children's eyes, while if one has passed 16 there is slight chance of his becoming myopic. Unfortunately this dangerous age is exactly that in which great application of the eyes to close work is necessitated by school work.

M is first started in children by the bad habit of stooping, during which the weight of the humors are thrown forward and the coats yield, so that the eye is extended in its length by the sclerotic and choroid being stretched, and the cornea is bulged forward.

M is essentially progressive, and if once started is sure to increase more or less. A child who has acquired a certain amount of M is almost certainly one who is addicted to reading and study and will follow these pursuits under conditions of light and posture most favourable for increasing the defect. An object that is brought close to the eyes can be seen with much less illumination than if more distant, so in the twilight or a dim corner a myopic child will read with the book held up close to the eyes or the head bent down over it, the bad light and the slight myopia already existing making it easier in such positions, or perhaps with his head below the level of the shoulder, he will read by the light from an open grate.

The proximity of the reading to the eyes causes to be exerted an extreme amount of Con. In converging the strain of the internal rectus on the sclerotic, causes this coat to be stretched and elongated, and the globe is compressed between the stretched external and the contracted internal recti, etc., so that the M is increased by the close work and by the stooping. Again the more the M is increased, the more stooping and converging must there necessarily be, and the greater the extent of these the more still will the M increase, there being thus established a kind of pernicious circle of cause and effect.

A child who is wide between the eyes, is more liable to become myopic, as he has to make a greater convergence effort, in order to obtain binocular V at a near point.

The blood flows less freely from the head than to it when stooping, owing to the pressure on the arteries, thus causing

congestion of the blood vessels of the eyes, which distends them and so helps also to increase the M.

The stooping contracts the chest, and impedes the proper development of the child in health and growth, and this together with the defective sight cause myopic children to less fully enjoy outdoor games and sports, and drives them to seek amusement in reading and occupations for which their sight is better adapted, but which are more deleterious.

Ac. is also said to cause M, but that is doubtful, if it be exerted less than or equal to Con.

It may have this effect indirectly, as when the correction is too strong, by inducing excessive Con., and so throwing a strain on the external recti to prevent a convergent strabismus.

M is very liable to be acquired by children who have some defect of the eyes, such as corneal opacities, which, while not totally obscuring V, causes the necessity of small objects being brought very close in order to be seen.

It is also argued that Con. alone, is the primary cause of M, and that stooping alone has no such tendency, it being shown that watchmakers, engravers, etc., who stoop very much at their work, do not acquire M, because using one eye with a very strong magnifying glass, they employ neither Ac. or Con. It is true that people engaged in these occupations are rarely myopic, but this fact hardly proves the contention, but rather that, as they do not start to work at the bench so very young, the tendency to acquire M has passed, and it is rather a proof that M starts early in life, while the eyeballs are still very soft, or not at all.

Musk Paraffin Dry Soap.

	Per cent.
Hard tallow soap.....	40
Crystallized carbonate of soda.....	30
Silicate Soda.....	20

Dry the soap and reduce the powder, as likewise with the soda crystals; then mix all together, and to perfume same, melt the whole by heat and then put in the perfume.

To every 100 parts of the soap compound add:

	Parts.
Essence of bergamot.....	4
" lemon.....	1
" Portugal.....	$\frac{1}{2}$
" aniseed.....	$\frac{1}{2}$

Again allow the soap to dry, and then reduce the powder again.—*Oils, Colours, and Dye-stuffes.*

ASPIDINE.—A proximate principle derived from *Felix mas*. It is colorless, fuses at 124° C., and has the formula $C_{22}H_{27}NO_2$. It is insoluble in water but soluble in alcohol, benzol, ether, and the alkalies. It is toxic, but its therapeutic value and uses have not yet been determined.