Optical Department.

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The editor of the optical department being off for a holiday, all queries, etc., will have to remain unanswered until next issue.

On the doctor's return and the abatement of hot weather, our readers may expect some further valuable contributions from his pen. In the meantime we would ask druggist-opticians and students to use our columns freely, either in asking questions or giving results of investigations in the way of helps to other opticians.—Editor.

The Sense of Sight.

By Lionel Laurance (London, (Eng.)

The visual acuity is reduced in the higher degrees of hypermetropia, because accompanying the ill developed globe, there is a certain degree of want of development in the retina and optic nerve, the fibres in the latter being less numerous. This is apart from the fact that in highly hypermetropic and astigmatic eyes, when glasses have not been worn, want of use has reduced the visual acuteness.

In myopia, unless the defect be of so high a degree as to have caused fungus changes, the visual acuity is usually very good. Also, extremely good visual acuity is met with in the lower degrees of hypermetropia, that is, in those cases where the defect is sufficiently low to be actively overcome by accommodation; then the eye is accustomed to sharp retinal images and the sense of sight is kept correspondingly acute.

Fatigue of the eye results if a retinal impression is long continued. Under ordinary circumstances, retinal fatigue is not noticed, the retina being refreshed by the gaze being constantly turned from one object to another, so that a fresh impression is made on that part of the retina previously occupied by some other image; also, some small degree of rest is obtained for the retina by frequent blinking; the pupil being covered for the moment by the lid, the light is excluded, and no retinal impression is received.

During sleep the retinal function is for some hours entirely inactive, the eye being in darkness. Slee is thus the great preserver and restorer of the retinal function, and this is shown by the weakened condition of the sight of those who, for some reason, have been deprived of the usual quantity of repose. The sight is rarely so good and keen at night, after many hours' use of the eyes, as it is early in the day, when they are fresher.

The eyes not being quite opaque, sleep is more refreshing when the room is in total darkness; the brighter the light the less true rest do the eyes obtain. Instinctively this is known, as, if a person wishes to sleep during the day time, he will draw the blind or cover his eyes or sleep face downwards.

A diminished retinal impression obtains when the retina is fatigued, and although, if this fatigue is general and equal, the altered relative brightness of different objects may not be particularly observed, it can be, under certain circumstances. Thus, if a person passes from bright sunlight into a dull light for a short time nothing is clearly distinguished, and the inability to see under such circumstances may be so great as to cause temporary total blindness, which is aided by the fact that the pupils are for the time being strongly contracted, their adjustment having been for the bright sunlight, and they not having relaxed to the extent required for the admission of the more feeble light.

It is by experiment that the diminished impressions, which result from saturation of the retina can be proved. If, for some half-minute or so, one looks at a sheet of white paper which is half covered by some black paper, one part of the retina is strongly impressed, while the other part is almost entirely at rest. When the eyes begin to get tired, if the black paper is removed, that portion of the white sheet previously covered bythe black produces an impression on that part of the retina which before was not stimulated, and, it being fresh, the impression produced is so much more vivid that the freshly exposed part of the paper appears dazzlingly white, while the other appears gray and dull.

Another experiment, which shows how the functional activity of the retina is temporarily diminished by continued use, is to put in front of one eye, a dark smoked glass for some minutes, when, on its removal, the difference in the intensity of the impressions received by that and by the other eye is quite marked.

The altered action of the retina under fatigue due to over stimulation, produces "after images." In the experiment previously mentioned the dark gray is the after image of the original bright white and the bright white is the after image of the original black. If a person looks at a white spot on a black background until the eyes are completely fatigued, and then turns his eyes to a sheet of gray paper, he will very shortly see a dark spot on a white background, this being the after image or the original white spot on a black background.

Saturation of the retina by a certain color produces an after image of its complementary color; if a red spot is looked at, the after image is blue-green; if the spot is blue-green the after image is red. The colors produced by after images are the purest and brightest that the eye is capable of seeing, and much more so than could be obtained from ordinary pigments.

The eye is not entirely free from defects, although these defects are very small as compared with the many wonderful properties which it possesses, and in ordinary vision they are not noticeable.

It is doubtful whether the cornea, crystalline lens and vitreous are absolutely transparent, especially the crystalline lens. In the crystalline, moreover, the indices of refraction of the various parts differ, and the differences may be such as not to unite the various rays diverging from a single luminous point to a single common focus.

The cornea may be of a shape not perfectly spherical, so that a difference obtains in the refractive power of the various parts of any single meridian. Besides which, it has generally a sharper radius of curvature in its vertical than it has in its horizontal meridian, or the curvature of the crystalline may vary, these variations of radius being of a degree not sufficiently great to constitute an appreciable astigmatism, but only such that the eye can be considered, while emmetropic, not quite perfect.

Chromatic abberration certainly exists in the eye, so that, in order that red and violet rays be brought to a focus at the retina at the same time, the violet rays would need to diverge from some near point, while the red rays diverge from infinity. Since, however, the red and violet rays possess but little luminosity as com-