

lamp and the first lens, the focus of the two will be nearer or less than 3 inches distant, depending upon the converging power of the added lens. If we substitute a concave lens for the added convex one, the bright focal point has removed beyond 3 inches, its distance beyond being variable at will, according to the greater or less concavity of the added lens. Let the curtain on which we receive the bright spot be fixed at any specified distance behind our first lens. If fixed at 3 inches, the focus comes upon it without a second lens being added. If, however, it be placed at a distance greater than 3 inches, we can still focus on it by either moving the lamp nearer the lens or leaving the lamp stationary and inserting a concave lens between the lamp and convex lens, the power of the concave lens to vary with the varying distance of the curtain beyond 3 inches. If the curtain be at less than 3 inches behind the lens, we can in like manner focus on it by inserting another *convex* lens before our first and stationary lens. Throughout the experiment we assume the reader to be familiar with the following elementary optical facts :—

(1). A convex lens makes rays converge.

(2). A concave lens makes rays diverge.

(3). When a convex and concave are combined, the emitted rays may converge or diverge according to which predominates in power.

Now what we have been verifying by our experiment is going on in the eye all the time. The curtain of the eye is the retina, a thin membrane, concave forwards, an expansion of the optic nerve, which receives the images and transmits them to the brain. The lamp is any luminous or illuminated object at which we look. Our 3-inch lens is the crystalline lens of the anatomist. The bright spot on the curtain is the image of the object on the retina.

The superadded glass between the object and the lens is the glass of a pair of spectacles. The walls of our darkened room are the coats of the eye which exclude light. In the eye there are besides two wonderful mechanisms not found in our experiment, first, the iris, a movable curtain, placed in front of the lens, with a hole in it, the pupil, of size varying chiefly according to the varying necessities for greater or less light; second, a small set of muscles, called the apparatus of accommodation, which causes the lens to become more or less convex, according to varying necessities of distance in vision. If accommodation were unlimited there would be no necessity for a glass. This accommodation is often much too limited in power, and it becomes the duty of the oculist to give such advice as shall supplement what accommodation there may be.

What is Myopia or Shortsightedness? It is a *disease* (rather than defect) of the eye, manifested by distant objects being seen with distinctness less than normal, and by the eye-ball being preternaturally long, (like a prolate spheroid, egg-shaped). This indicates only the chief manifestation and chief anatomical change. The consequence of this elongation is that the retina is too far back to receive images which are formed in front of it. Objects brought nearer than common to the eye, to the end of the nose in extreme cases, are seen with normal distinctness. This is because when the object is near, the rays are given off and enter the eye diverging, and are brought to focus farther back than parallel or rays from a distance, and so form a distinct image on the retina. The focal distance of the crystalline lens and its adjunct refracting humors is a little less than an inch. In shortsightedness the diameter of the eye from front to rear may be an inch or even more in its higher degrees. If a concave glass of suffi-