tleman in Los Angeles, who chooses to be known as the "Mystic Helper," assisted by a friend, the "Mystic Scribe." The last message received (1911) from Professor Faraday reads:

> Through my cherished instrument I will continue my work bringing to mankind the greatest and most helpful thoughts gleaned from my long experience in this realm of truth.

The book is written in a kindly and tolerant spirit, accepting current theories of evolution, and going a long way farther. It closes with a rhapsody to evolution in which "the mighty soul of the Potent All guides all the worlds their endless rounds." A companion piece is the "Song of the Atom," which lets us down a bit from the "pure-ethered height" of the other poem:

> Come in line my brothers all
> Let us make the Earth a ball.

And a ball it remains to this day!

The volume is illustrated by photographs of nebulae and the like, taken by astronomers, by portraits of Faraday, Tyndall and Franklin, noted physicists, and by a number of spirit photographs not mentioned in the test. Some of these are conventional materializations, but others illustrate the creative work of electrons which in their varied operations appear in irregular forms pure white in color, and about as large as snowflakes. Students of heredity will be interested in the microphotographs showing the "formation of cell by induction of earth's magnetic currents," the process of mitosis being due to their influence. It is remarkable what electrons will accomplish when once released from bondage to "mortal electricians, like Edison, Marconi and many others."

The editor of this volume expresses the hope that Faraday "may be able to continue his efforts until intellectual spirituality animates every soul born into Cosmic Existence in or upon any planet that shall ever exist in Realms of Evolutionary Experience."

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LABORATORY APPARATUS AND METHODS

BLOOD CORPUSCLE MOVEMENT IN THE RETINA FOR CLASSROOM DEMONSTRATION OF CIRCULATORY CHANGES

No doubt many persons, when looking at a dull sky, have observed indistinct faint specks which appear, move in definite pathways across the field of vision and then disappear. Upon suddenly arising from a bending position, or after a sneeze, the specks may become quite bright and distinct. They are the moving blood-corpuscles in the retinal capillaries and their movement is quite different from that of small particles in the humors of the eye, often so troublesome to users of the microscope. Subjective observation of the retinal circulation has been frequently described, but the advantages of the following method for viewing this phenomenon, first recorded by Rood in 1860, are not generally recognized.

Upon looking at a bright sky through a dense blue-violet glass (such as Corning G 585–L), the movement of the corpuscles stands out almost as clearly as in the web of the frog's foot, but the corpuscles are not seen as objects of such definite form nor are capillary outlines visible. One observes bright specks, somewhat elongated, often curved like a vibrio. The whole field of view seems filled with a mass of writhing bacteria, sometimes accelerated in movement corresponding to the heart-beats.

Any brilliant white surface instead of the sky will serve as a background. One may look at the sun itself if additional filters are used, say G 585–L, G 586–A and G 584–J, when the corpuscles appear very bright. It is perhaps well not to gaze at the sun too long, for these filters are quite transparent to the near ultra-violet.

Changes in blood velocity connected with pressure changes are easily observed. Thus, if one suddenly bends over and looks at the sky through the blue-violet glass, the blood velocity is much accelerated; upon straightening up, the flow instantly slows down and then regains its usual rate. By taking a deep inspiration, holding the nose and exerting pressure on the thoracic cavity, the circulation may be seen to slow down and almost stop. The retinal circulation is an index of what is going on in the brain and illustrates the decreased blood-flow which precedes fainting, since fainting frequently follows any prolonged increase in intrathoracic pressure.

By lying on the back and having an assistant suddenly raise the legs, changes in blood-flow due to hydrostatic pressure of blood in the legs, with compensatory after-effects, may be demonstrated. By pressing on the eyeball with the finger, the circulation in the retina may be much slowed or stopped, and the bright specks disappear just before the whole field of view becomes black. On releasing the pressure, the circulation again starts at a rapid rate. Changes of blood-flow due to exercise and many other effects, which will occur to those interested in blood circulation, may be observed with great ease. The simplicity of the method commends it for classroom work, and the student usually takes great interest in viewing for himself blood velocity changes in his own body. The clinician may find the method useful where subjective answers may be relied upon.

Just why the corpuscles appear as bright somewhat elongated specks is questionable. I first observed the phenomenon on looking at a carbon arc focused to a parallel beam, passing through a combination Corning ultra-violet filter (G 586–A and G 584–J). I thought the effect was due to fluorescence of the white corpuscles but am now certain that is not the explanation.

If a small field is selected for observation the bright points, whose elongation I attribute to persistence of vision, are found to be not sufficiently numerous for red corpuscles. They move over the *same pathway* at infrequent intervals and must be white corpuscles. Nevertheless, there is a definite relation between the absorption spectrum of haemoglobin and the light in which one can see the moving corpuscles most plainly. Abelsdorff and Nagel showed that the moving corpuscles appear in light which haemoglobin absorbs. Thus they are visible in blue-violet but invisible in red light. One should expect that with a blue glass the continuous stream of red corpuscles would throw a shadow of the capillaries on the retinal elements. Yet we see no evidence of capillary loops or plexus in shadow form. No doubt this is because the capillaries are so near the retinal elements that their shadow is fixed. In the classic method of demonstrating the shadows of the *large* blood vessels over the *surface* of the retina by looking through a pinhole at a white surface, the pinhole must be moved so as to continually cast a bloodvessel shadow over new retinal elements. When the pinhole is fixed no shadows are visible, although shadows are continually cast upon the rods and cones. This corresponds to the condition where a continuous stream of red corpuscles moves through capillaries in blue light. Although each red corpuscle moves, the corpuscles overlap and the shadow is continuous. But when a white corpuscle comes along which does not absorb blue light, as the reds do, we have a rift in the shadow figure which corresponds to movement of a shadow across the rods and cones, analogous to the movement of the pinhole in the demonstration of the *large* retinal blood-vessels. Thus we see the white corpuscles by contrast with the reds and see them best in light which casts the best shadow. Red light passes both the red and white corpuscles and no contrast appears.

It so happens that the brightest lines of the mercury vapor lamp (the yellow, the green and the blue violet) lie in the position of oxyhaemoglobin absorption bands. One can therefore see the moving corpuscles of the retina very well by looking at a white matt surface illuminated by a mercury lamp; or by appropriate filters one can isolate each line and observe the moving corpuscles in yellow, green or blue violet light.

I recommend the above simple experiments to any one interested in the circulation of the blood or in subjective phenomena. They deserve to be more widely known than appears to be the case.

The literature on this subject is as follows:

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MICROPROJECTION BY THE DAYLIGHT SCREEN

IN the teaching of histology, organology and neurology the chief difficulty lies, not in making the students see the details of an organ, but rather in orienting for them the plane of section and the relationship of the main parts. It is next to impossible to persuade the student that a low power objective is far more important in the study of most sections than a 4 mm objective, and as a result he fails to obtain a true conception of relationships. Then, too, in personal demonstration six times out of ten the average student does not see that which you try to show him under his microscope. Again, it is impossible to properly demonstrate three or four slides in five or six minutes, which is the average time a demonstrator has per student in order to handle 15 to 20 of them. These difficulties, I am sure, are encountered not only by anatomists but also by embryologists and botanists.

It has been my experience that a short time spent during each laboratory period in projecting the slides to be studied, with a 48 mm, 25 mm or 16 mm objective and pointing out the plane of section and the relationships of the main structures will create an interest and give a viewpoint conducive to effective laboratory study. The best results are obtained by a ten to fifteen minute demonstration to ten to fifteen students at a time. Personal demonstration for this number of students would require from one and one half hours and would permit greater misinterpretation.

For the projection method of demonstrating sections the day-light screen is of great value, since it permits demonstration at one end of the laboratory without interrupting the work of the rest of the