ever, the microscope and drawing board may be placed on the same level. The methods of lighting the microscope and chart may also be varied from those already described. Good lighting was obtained with three forty-watt lights; one for lighting the microscope and two for the color chart. When sunlight was employed, it seemed preferable to place the color chart in the bright sunlight, for a short time, and the microscope in a shadow.

In the second method, the apparatus commonly used for making photomicrographs was employed. Working in a darkroom, an image of the microscopic mount was focused on the ground glass of the camera in the usual way. The ground glass was then removed and placed about eight inches back from its natural position and the object refocused. The color standards with the comparing screen were then substituted for the ground glass. The color of the microscopic mount as projected could then be compared with the colors on the color chart by employing methods already described. However, the camera may be removed and an image of the microscopic mount projected on a horizontal surface by aid of a mirror commonly attached to the apparatus for this purpose.

The third method was devised as a laboratory aid in classifying fleshy fungi. Students experienced considerable difficulty in determining the colors of basidiospores, especially those of ochre, brown and rose colors. An eyepiece color comparator was constructed by flowing a negative varnish over a cover glass which could be placed in the tube of an eyepiece to a microscope. Before the varnish had hardened, four narrow parallel bars of transparent water colors were painted across the center. Deep yellow, geranium pink, mahogany brown of the Japanese transparent water colors were employed while India ink supplied the black. The color was more dense on one end of the bar thus giving a comparison of the diluted with the concentrated color. By placing this eyepiece color comparator in the eyepiece of the microscope, its colors and those of the microscopic object could be observed simultaneously and the relative colors of basidiospores determined. The colors on the eyepiece color comparator were standardized by the camera lucida as previously described. Thicker glass for the color comparator was obtained by choosing a microscopic slide of clear, thin white glass and a disc of the desired diameter was cut with shears under water. It seemed inadvisable to place the colors on a microscopic slide or its cover glass.

Finally, the methods described in this article may be successfully employed by one familiar with the use of a camera lucida. Furthermore, the proper lighting of the microscope, photographic apparatus and the color chart insures success when determining the color of microscopic objects by these methods.

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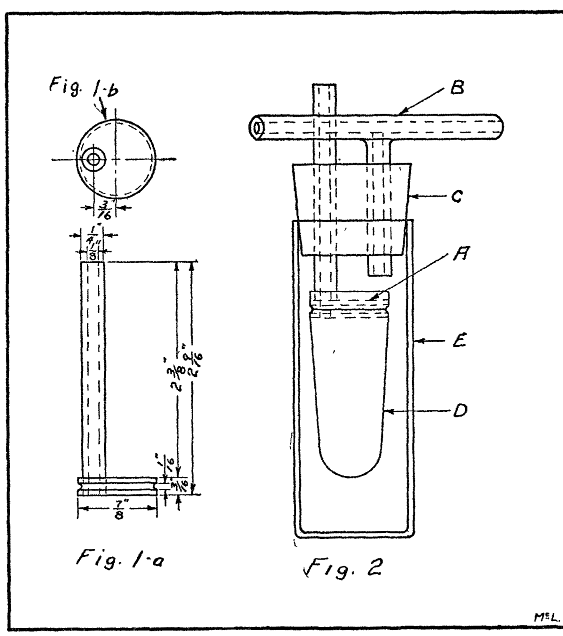
A MODIFIED ERLANGER SPHYGMOMANOMETER

About a year ago, when the writer attempted to assemble an Erlanger type recording sphygmomanometer, he was confronted by the impossibility of securing the special rubber bulb used in such apparatus. In casting about for a suitable one, many types of rubber bulbs and finger cots were tried without success until one day, after the cuff had been used for arm plethysmographic apparatus, the cast-off fingers of a rubber glove were tried. The finger of the glove was tied over a disc placed inside a capsule constructed as described (Figures 1 and 2) and served so satisfactorily that the writer thought others might find the apparatus useful.

The center of a 7/8-inch round brass rod was located and a 1/4-inch hole was centered and drilled 3/16 inch from the center of the rod. With a lathe a 3/32-inch groove was cut around the circumference of the rod and a 3/16-inch disc cut off. A piece of 1/4-inch brass tubing about 2½ inches long was soldered in the hole in the disc. The side and bottom views, respectively, of this disc are shown in figures 1a and 1b.



When assembling (see figure 2), the finger of the glove D is slipped over the disc A and tightly tied by means of strong waxed linen thread. The brass tube B is forced through one of the holes in a number 7 rubber stopper C. One arm of the T-tube B is pressed through the other hole in the rubber stopper, and the stopper tightly inserted into a 34 x 90 millimeter homeopathic vial E. By means of a band of thin sheet brass 1½ inch wide the vial, in the inverted position, may be neatly mounted upon a 4 x 4 inch piece of oak board, which will also support the pressure gauge of the sphygmomanometer. The board in turn is supported by a ring stand.

In assembling the completed apparatus the tube leading to the glove finger is connected with the sphygmomanometer pressure system; one tube of the brass T is connected to a compound lever tambour and the other, when provided with a short length of rubber tubing and a pinch cock, serves to control the pressure in the recording system.

The rubber finger was obtained from a Paragold rubber glove, SR702, made by the Seamless Rubber Company, New Haven, Conn. The homeopathic vial is larger than is now regularly catalogued but may be obtained upon special order. Since it is used here as regular equipment, we put it to a variety of uses. It is possible that a smaller disc may be made and a 25 x 70 millimeter vial used.

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SPECIAL ARTICLES

ZEOLITE BEDS IN THE GREEN RIVER FORMATION[1]

AT several horizons in the upper half of the Green River formation of Utah and Colorado, an extensive series of Eocene lake beds that contain large deposits of oil shale, there are thin more or less persistent beds resembling sandstone that consist almost wholly of perfect or euhedral crystals of the zeolite mineral, analcite. These crystals differ greatly in size and reach a maximum diameter of nearly 2 millimeters. All are clouded with dust-like inclusions that make them dull gray and opaque. The character of the matrix as well as the proportion of matrix to zeolites differs from bed to bed. Both these factors are significant. In general those beds with relatively few zeolites have a distinctly tuffaceous matrix consisting of silica in the form of the mineral chalcedony in which are embedded many angular fragments and elongate splinters of feldspar and quartz together with laths of biotite and euhedral crystals of orthoclase, apatite and zircon. More rarely they contain good crystals of plagioclase and either hornblende or pyroxene. Clay minerals and carbonates which make up the associated beds are virtually absent. Other zeolite beds contain a very subordinate amount of chalcedonic matrix and if transitional beds between these and the distinctly tuffaceous type had not been found their relation to volcanic ash would have been utterly obscure. In addition to the analcite most of these beds contain a few small crystals of another zeolite mineral, apophyllite. Even some of the analcite crystals contain perfect though minute crystals of apophyllite.

In the summer of 1925 the writer found zeolite beds at one or more horizons at the following localities in Utah: about 700 feet above the base of the Green River formation in the canyon of White River, sec. 27, T. 9 S., R. 25 E., Uintah County and at approximately the same horizon in Hells Hole Canyon, sec. 22, T. 10 S., R. 25 E., also in Uintah County. One of these beds is lenticular and in places exceeds three feet in thickness. In Colorado similar beds were found at several places along White River in the western part of Rio Blanco County and in sec. 26, T. 3 S., R. 99 W., Garfield County.

Besides these crystal beds analcite occurs plentifully also disseminated in many oil shale beds of the Green River formation in Wyoming as well as in Utah and Colorado. Small apophyllite crystals too are scattered through these beds and, like the analcite, the greater number of them are euhedral. Some oil shale strata contain more than 16 per cent. by weight of analcite and others contain 1 or 2 per cent. of apophyllite. In the oil shale the zeolites are associated with numerous euhedral orthoclase crystals, angular quartz fragments and a little volcanic glass in addition to the calcium and magnesium carbonates and clay minerals that are principal constituents of most of the oil shale in this formation.

Field and microscopic study of these two types of zeolite-bearing rock indicates that both minerals formed in place on the lake bottom (or when only shallowly buried in ooze) as a result of interactions between various salts dissolved in the lake water and the dissolution products of volcanic ash that fell into the ancient Green River lakes. Presumably the volcanic material which makes up a really considerable part of the Green River formation came from Eocene volcanoes that were active in or near the San Juan Mountains in Colorado about 200 miles to the southeast.

This almost complete zeolitization of tuffs adds another interesting phase to the broader problem of the alteration of volcanic ash. Its relation to the origin of bentonite, however, is unknown for, so far as the writer is aware, the Green River formation

[1] Published by permission of the director of the U. S. Geological Survey.