lumbia have taken or are taking graduate work in geology, and that twenty-three of these have taken or are studying for the doctor's degree in geology. In order to ascertain the causes of this success, I asked a number of these men how they explained it, and their answers are summarized herewith:

(1) Environment is an important factor. British Columbia is still largely in a pioneer state, with great undeveloped mineral resources, and a consequent respect in the community for the geologist. It is a mountainous country, with a corresponding attraction for youth. As one man expressed it, "The rising generation grasps more readily at a prospecting pick than a brief case, and leans more towards a transit than a golf club; there is an appeal to romp over the rugged peaks of the Cordillera, rather than languish on the office stool." The attractions of business are not so prominent or so omnipresent there as they are in some parts of the United States.

(2) The geological faculty comprises a strong and inspiring group of men, who emphasize the high standing of the profession, the ability of the pioneer Canadian geologists and the necessity for a thorough training for those who would follow in their footsteps.

(3) An unusually good opportunity is afforded of doing summer work and getting field training; because of the exceptionally enlightened policy of the Canadian Geological Survey, whereby the most able students are selected for field assistants to geological parties, every effort is made to further their education and to afford field work suitable for doctorate theses, and publication of satisfactory theses is assured.

(4) There are good opportunities for positions with the Canadian Geological Survey, with universities or with mining companies, after completion of training.

I believe that there is more interest in geology in general in the Canadian universities than in those of the United States, due to the combination of these factors. The existence, popularity or stimulus of an "easy" course, as such, is not a vital factor but a mere incident drawing men into geology. To judge from the number of popular books on geology which are being written and the number of summer schools and summer tours in geology which are springing up on every side, the universities recognize the desirability of popularizing geology, and the geological faculties are aiming to supply the needs of the amateur in different ways.

But for the potential professional geologist, the opportunities for the long period of systematic training in field work, so necessary to his education, are meager, for the expense is beyond the means of most of such students. This is the serious problem. A revival of the state geological surveys and a definite recognized system for aiding men in getting their field training by such surveys and by the U. S. Geological Survey, would, I believe, attract more able men into the profession and produce better trained geologists.

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THE EARLIEST DYNAMO

H. W. Wiley, in your issue of May 25, quite correctly calls attention to the fact that the fiftieth anniversary of the dynamo should have been held some time ago and speaks of two French dynamos exhibited at the Centennial exposition in 1876. The earliest dynamo made in America, constructed before the importation of any machines from Europe, was exhibited and operated at the same exhibition. It is referred to in the biography of John E. Sweet (published by the American Society of Mechanical Engineers) as follows:

> At the exhibition the engine [a twenty-horse power engine designed by Sweet] drove an electric-generating machine, the first to be constructed in the United States, which supplied electrical energy to a single arc lamp, one of the very earliest of its kind. This exhibit attracted wondering attention; but those who saw it considered it as an interesting toy and probably had no conception of the future of electric lighting and power development. The electric generator or "Gramme machine" was built under the direction of Professor William A. Anthony, with the cooperation of Professor Sweet and Professor Moler and the students of Sibley College [of Cornell University], after the design of M. Gramme, of Paris, which was illustrated and described in London Engineering, August 4, 1871 . . . March 14 and April 25, 1873.

This dynamo delivered 20 amperes and 150 volts. It was used to operate two arc lights on the Cornell University campus. The arc light had previously been used in European lighthouses, but this was probably the first instance of outdoor electric lighting, certainly the first electric lighting in America. The machine was again exhibited at the Louisiana Purchase Exposition in 1904, where it was awarded a medal as the first dynamo in America. The machine is still in good condition.

Frederick Bedell

THE MEASUREMENT OF ULTRA-VIOLET RAYS

In the issue of Science for May 11, 1928, No. 1741, in the section "Science News" there is a report entitled "The Measurement of Ultra-Violet Rays." It is intimated that Dr. E. A. Pohle, of the University of Michigan, together with several coworkers, has designed a device for the measurement of ultra-violet rays, which consists of a cadmium photoelectric cell in connection with a radio amplification circuit. It would appear from this article that this measuring device is original with them.

The cadmium photoelectric cell has been used by Prof. Dorno-Davos since 1914 for the measurement of ultra-violet rays and he especially recommends it in medical practice, since its sensitivity towards different parts of the ultra-violet spectrum is parallel to that of the human skin. Dorno also was the first to suggest an ultra-violet unit based on this cell and to calibrate practical instruments.

The amplification of a small current of a photoelectric cell by a radio amplifier was made as early as 1919 by C. E. Pike, who published his arrangement in *Physical Review,* 13, 102. Many others, such as H. Rosenberg (*Die Naturwissenschaften,* 1921, Heft 19/20), Abraham and Bloch (Comptes Ren., 1919, 168, 1321), E. Meyer and R. Tank, have described such circuits. Practical instruments using such circuits to amplify the small current produced in ionization chambers employed in radiation therapy as well as that of photoelectric cells have been on the market for a number of years and are widely used by the medical profession in this country and abroad. Simple arrangements using the Dorno cadmium cell in connection with the electroscope have been especially designed for the medical profession and have been also on the market for quite some time. There have been a number of publications on the results obtained.

OTTO GLASSER

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A NUCLEAR AND DIFFERENTIAL TISSUE STAIN COMBINED

IN the teaching of histology I have always felt that the practical recognition of tissues under the microscope can not be too strongly stressed. With this thought before me I began experimenting with various stains and combinations of stains in an attempt to strike a method that would differentiate tissues and at the same time bring out the structure of the nuclei. After several years of such experimentation I believe that I now have struck a combination stain that will differentiate the nuclei as well as the tissues.

In writing up my staining method for SCIENCE I claim absolutely no credit for a new stain. The only newness in my staining method is the manner of combining and manipulating two old stains, namely, Delafield's hematoxylin and Mallory's connective tissue stain. The successive steps in my staining method follow:

(1) Stain sections in Delafield's hematoxylin for five minutes.

(2) Pass through distilled water to remove excess stain.

(3) Stain in 0.2 per cent. aqueous solution of Acid Fuchsin for one minute.

(4) Pass through distilled water to remove excess stain.

(5) Stain in the following solution for two to three hours:

Anilin blue (water soluble)	0.5 gm.
Orange G	2.0 gm.
Phosphomolybdic Acid (1 per cent. aqueous solution)	100.0 cc.

(6) Pass through distilled water to remove excess stain.

(7) Pass successively (rapidly) through the following grades of alcohol: 35 per cent., 70 per cent. and 95 per cent.

(8) Complete dehydration in absolute alcohol in one-half to one minute. (Water-free acetone may be used in place of the absolute alcohol, with but little or no shrinkage of the cells.)

(9) Clear in xylol.

(10) Mount with cover-glass.

With this stain nuclei will appear a rich red, epithelial cells pink, connective tissue blue, and muscle red. Red blood cells will stain yellowish in veins, reddish in arteries. Colloid and mucus stain blue. Sections stained by this method more than five years ago have not faded. The staining seems to follow any fixation well. The hematoxylin penetrates the nuclei; then the acid fuchsin changes the hematoxylin over to a red color and perhaps aids in intensifying this red. This is my explanation why I get better nuclear differentiation with this method than I do with Mallory's stain alone. As to this I ask others to check me up.

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WATERING POTTED SOIL KEPT UNDER MICROBIOLOGICALLY CONTROLLED CONDITIONS[1]

NUMEROUS forms of apparatus have been devised for growing plants under microbiologically controlled conditions. The issue of SCIENCE for March 30 last contained an apparatus used at Amherst. The pamphlet of Klein and Kisser[2] contains twenty diagrams.

[1] Approved as Scientific Paper No. 55 by the director of West Virginia Agricultural Experiment Station, Morgantown, W. Va.

[2] Klein, G., and J. Kisser, "Die Sterile Kultur der Höheren Pflanzen." Botanische Abhandlungen, Heft 2, 1924.