Comments and Communications

On the Discovery of the Action of Colchicine on Mitosis in 1889

The description of the effects of colchicine on mitosis by A. P. Dustin (*Bull. Acad. roy. Med. Belg.*, 1934, **14**, 487) and F. Lits (*C. R. Soc. Biol.*, 1934, **115**, 1421) marked the beginning of a period of active investigation. During the next 15 years, publications dealing with this alkaloid averaged about 100 titles per year. The first study of the action of colchicine on mitosis, we now believe, is the one published by B. Pernice (*Sicilia Med.*, 1889, **1**, 265). Several papers since 1934 have credited W. E. Dixon and W. J. Malden (*A manual of pharmacology*. London: Arnold, 1906, and *Physiol.*, 1908, 37, 50) with the original observations on colchicine mitosis. They mentioned that after repeated injection in mammals, "plentiful mitotic figures can occasionally be observed" in smears of bone marrow. However, they did not give details or illustrations. On the other hand, the figures and text of Pernice make it clear that he observed in considerable detail the cytological action of this drug.

We have been interested in colchicine bibliography (*Lloydia*, 1947, **10**, 65) for the past ten years, and a work now in press (*Lloydia*) includes a reference to this work of Pernice. Through the service afforded by the U. S. Army Surgeon General's Index, and the cooperation of the Library of the U. S. War Department, Washington, D. C., we have been able to study this document. Greater details, as well as presentation of figures, will be published when suitable arrangements can be completed. However, at the moment, certain sentences are so appropriate that a few of Pernice's observations are included, with our comments.

In his paper, entitled: "On the karyokineses of the epithelial and endothelial cells in the mucosa of stomach and intestine, in experimental gastroenteritis following colchicum poisoning," Pernice studied with great care the gastrointestinal mitoses in two dogs given, respectively, 10 and 15 g tincture of bulbs of colchicum, and dying 24 and 48 hr later. In the stomach were to be found "an extraordinary great number of dividing cells." Furthermore, he stated that within the Lieberkühn glands of the intestine, "nearly all cells are engaged in indirect division." Endothelial mitoses can be seen "nearly in all vessels." Moreover, it is "rare to see the latest stages of division." Pernice considered that "the cellular elements may have been directly excited and stimulated by the tincture of colchicum." He noticed that some of the mitotic figures apparently underwent destruction and added: "Perhaps this is a necrosis of the cells, giving rise to some sort of pseudo-karyokinetic forms." He firmly stated, however, the relation of the observed images to true mitosis. The illustrations show gastric and Lieberkühn glands, one with "*quasi tutti gli elementi in cariocinesi*," and divided equatorial plates, but no true anaphases or telophases are represented.

Pernice deserves due credit for his discovery; thus the action of colchicine on mitosis has been known since 1889. While many physiological studies of the intestine in chochicinized animals were published in the interval from 1889 to 1934, the mitotic abnormalities were not described again until 45 years later. The year 1949 marks the 60th anniversary of the discovery of colchicine mitosis.

O. J. Eigsti, P. Dustin, Jr., and N. Gay-Winn
Northwestern University, Evanston, Illinois and *University of Brussels, Belgium*

A Nomination for the ISCC

My hearty approval of the article on Ridgway's color standards (*Science*, June 17).

You will find that I have been active in the past in an attempt to produce color standards which will be both permanent and reproducible. Inorganic ions and compounds were found to be permanent and could be accurately reproduced from known formulas; ferric chloride and cobalt chloride were the compounds employed. The nickel ion would probably have been the next, had I been able to continue the study.

The American Society for Testing Materials, neighbors of mine on Race Street, Philadelphia, have already done excellent studies on the color problem and know much of its intricacy. They might be the best available organization for the purpose mentioned in Dr. Middleton's letter (*Science*, June 17).

John Pim Carter
Academy of Natural Sciences, Philadelphia

Solar Rotation and Kepler's Laws

H. W. Babcock, of Pasadena, recently announced discovery of some significant correlations between the magnetic fields and the rotation of several astronomical bodies. P. M. S. Blackett, distinguished English physicist, found that Babcock's constant $Q/mr^2\omega$, or magnetic moment/angular momentum, is proportional to $G^{\frac{1}{2}}/c$, or square root of gravitation constant/velocity of light.

In calculating angular velocity, Prof. Blackett took the sun's equatorial time of rotation, about 25 days. But the sun does not rotate uniformly like a solid sphere and different values are found when the average time of rotation is used (i.e., mean of observed latitudes). This is a little more than 29 days, or about 2,510,000 seconds.

Substituting for m the equivalent term v^2r/G, angular momentum would be given by $v^2r^3\omega/G = 2.4 \times 10^{49}$ in c.g.s. units and $\frac{Q}{v^2r^3\omega/G}$ would be $8.9 \times 10^{33}/2.4 \times 10^{49} = 1/2.6 \times 10^{15}$. This would be proportional to $1/G(2\pi c)^2$ (i.e., approximately $1/2.4 \times 10^{15}$).

One of the factors abstracted from the equations, $r^3\omega$,

or cube of sun's radius multiplied by its angular velocity, is proportional to a Keplerian constant for the solar system, $2\pi rv^2$, or planetary orbit multiplied by the square of orbital velocity, e.g., in cm/s units:

$$2\pi rv^2 = (6.28 \times 6.95 \times 10^{10}) \cdot (4.38 \times 10^7)^2 = 8.37 \times 10^{26}$$
$$r^3\omega = (6.95 \times 10^{10})^3 \cdot (6.28/2{,}510{,}000) = 8.4 \times 10^{26}$$

This equivalence suggests that planetary motions are related to the sun's rotation and regulated by electromagnetic laws, as Kepler surmised.

CORNELIUS O'CONNOR

3276 Harrison Street,
San Francisco, California

Corneal Contact Lens Reference?

It has been widely quoted that Sir John Herschell was the first to suggest the possibility of making a corneal contact lens. Can any of your readers give us the exact reference in Sir John's writings regarding this idea?

KATHERINE FERGUSON CHALKLEY

Manuscript Editor
American Journal of Ophthalmology,
Lake Geneva, Wisconsin

Guarded Circuit Bridge

A precision guard circuit has been constructed to operate in conjunction with a Modified Schering Bridge so that three terminal guarded measurements can be made on solid and liquid dielectrics over the operating frequency range of the bridge; namely, 100 cycles/sec to 300,000 cycles/sec.

The detector system used with this equipment is made up of a matching amplifier with built-in selective frequency filters between the output of the bridge and main amplifier. The main amplifier has a flat frequency response of 40 db from 60 cycles/sec to 1,000,000 cycles/sec. The output of the main amplifier is fed to one set of plates of a standard oscilloscope. The other 'scope plates are fed directly from the bridge supply oscillator through a phase shifter.

Amplifiers are operated at full gain with the signal forming an ellipse on the 'scope screen. Controls are adjusted so that resistance balance opens and closes the ellipse and capacity balance tips the closed line right or left from horizontal.

Accurate balance is obtained over the complete frequency range of the bridge.

The guarded circuit bridge enables one to make dielectric constant and dielectric loss measurements under controlled humidity conditions and at different temperatures, which are impossible with a two-electrode system. Surface leakage on a dielectric cannot be separated from volume resistance using an unguarded bridge. Edge corrections for electrostatic fringing are also eliminated by means of the guarded test electrode.

STANLEY I. REYNOLDS

General Electric Research Laboratory,
Schenectady, New York

Report from Sweden

The more important scientific activities of the Scandinavian countries are known in this country by way of the Scandinavian journals and abstracts in our own American medical journals. Therefore, when I went to Stockholm to visit the larger hospitals and state and municipal laboratories, I did so with a good many preconceived ideas and the feeling of at least a surface familiarity with the work in progress. I found, however, a laboratory organization quite different from that in the U. S., owing to some extent, to the absence of large commercial pharmaceutical plants and also to the semi-socialization of medicine in this country.

In this account I shall not attempt to give a complete picture of all the important laboratory activities in progress. My visits were confined almost exclusively to Stockholm. However, I was assured that the organization here is prevalent throughout Sweden.

Swedish laboratory medicine is now centralized to a large extent. In recent years demands for decentralization have increased, and to some degree plans for this process have been made and will be carried out within the next decade or two. Stockholm (and all the larger communities in Sweden) maintains one central municipal bacteriological laboratory that works with and for all the city hospitals except the Medical Institute—Karolinska Hospital—which is to a large degree self-sufficient. Individual hospitals maintain small bacteriological laboratories to do a few routine tests, but send most clinical diagnostic work to the municipal laboratories. But all the hospitals maintain adequate chemical, hematological and pathological laboratories.

The Municipal Bacteriological Institute is rather inadequately housed in an old converted school house, but plans for new quarters have been drawn up by the directing head, Prof. Davide. Funds are available and it is hoped that in three or four years the new quarters will be ready for use. The plans call for a continuation of the present organization into four scientific departments: clinical bacteriology, i.e., cultures and antibiotic tests; serology, including Wassermann and Widal tests, antistreptolysin titers, and staphylococcal lysin titers; intestinal infection; and tuberculosis. To this will be added a fifth and very important section—a virus department in which Prof. Davide tentatively plans an emphasis on encephalitis investigations.

Opportunities for research in the present cramped quarters are of necessity restricted. In the new building, however, adequate space for research is planned for, so that each department head will have a small laboratory for private scientific investigations. Prof. Davide is continuing his extensive 15-year work on bacterial metabolic products with bactericidal action on *Mycobacterium* tuberculosis. His associate, Dr. Pakalin, is also continuing with his work on the effect of generalized infections on the clinical course of tuberculosis. Both men were most kind in showing me their work, as were their staff, and the staffs in all the institutions I visited. English is generally spoken, usually very fluently, and older doctors speak excellent German.