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EVOLUTION OF THE GERM-PLASM[1]

By Professor C. E. McCLUNG

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A DEFINITION of terms seems to be the first requisite in a discussion of this subject. By "germ-plasm" we mean a distinctive substance, endowed with all the properties of life, but especially with that of reproduction, which here is, in some measure, unique. Equivalence is an inherent characteristic of organic reproduction, and it holds in respect to the germ-plasm itself; but, whereas commonly the influence of a part is continuously the same, that of the germ-plasm is cyclically different. It involves elements which mark the race and so it may be denominated "racial material." It is customary to distinguish between "germ-plasm" and "soma-plasm," both being nuclear, one concerned with racial processes, the other with those of the individual. This distinction is, however, purely arbitrary and may lead to misunderstandings. Such a distinction was suggested by the presumed functional differences between the macro- and micronuclei of certain Protozoa. But if the germ-plasm is defined specifically as "that substance, or organization, which distinguishes a chromosome complex" then it is essentially the same in both germ and somatic cells. Mere observations tell us that the chromosome complement of germ and somatic cells is one, both being derived by direct descent from that of the original zygote. Finally, and in a more abstract sense, the germ-plasm may be defined as "the temporal record of racial experience." However conceived, it has the properties of continuity, specificity and control of organic processes.

[1] Presented at the University of Pennsylvania Bicentennial Conference, September, 1940.

eliminate the difficulty. Thermometers properly made and used with the above circuit have a life far exceeding that of the relay. In fact, the writer has three thermometers which have made over 14,000,000 operations each, without failure, and continue to function perfectly. The original relays have been replaced. Much depends upon the proper design and construction of the thermometer.

The question often arises as to how accurately the temperature of a bath or oven may be controlled by an instrument of this type. Unfortunately, there is no simple answer. Too many factors must be considered, such as the time lag of the bath, its heat capacity and the manner of supplying energy. Suffice it to say, that for close control, lag of the bath should be as small as possible. Good thermal insulation is essential. Forced circulation is necessary; and finally, the energy should be supplied (or withdrawn) at as constant a rate as practical. "On" and "off" circuits are not desirable.

To illustrate, let it be assumed that a bath is to be held at 200° F. Assume that 200 watts is not sufficient to maintain this temperature, even when the environmental temperature is a maximum, and that 300 watts is more than enough to maintain the desired 200° F. temperature even when the external temperature is a minimum. The relay should control only the difference of 100 watts, 200 watts being supplied to the bath at all times.

A simple method of accomplishing this is to place a resistance of suitable size in series with the heating element, allowing 200 watts to pass to the bath at all times. The relay should be connected so that when the temperature of the bath is as high, or above the control temperature, the contact of the thermometer is closed and the resistance is in the circuit. When the bath is too cool and the contact through the thermometer is broken, the relay contacts short the resistance and energy supply to the bath is increased to the 300 watts. Such circuits are easily designed, particularly if a variable transformer such as the Variac, manufactured by the General Radio Company, is available.

The other factors mentioned are beyond the scope of this article.

BRADFORD NOYES

ROCHESTER, N. Y.

ANOTHER METHOD FOR RECORDING LOCALITIES FROM TOPOGRAPHICAL MAPS

THE method of indicating localities from topographical maps suggested by Clyde F. Reed[1] has certain disadvantages. Not only must one construct an elaborate grid in order to record the localities, but any one wishing to interpret the record must also construct a similar grid. Since topographical maps are now printed in two sizes, both the recorder and the interpreter must have two grids.

A much simpler method, and one which could be used on any map regardless of size or latitude, would be to use the lower left-hand corner of the map as origin, recording in centimeters the distances of the locality from the left-hand margin and the lower margin of the map. Decimals may be used if great accuracy is necessary. As an example, the summit of Taum Sauk Mountain, the highest point in Missouri, would be recorded as: "Edgehill (31.0, 12.4)." This method has the advantage of conforming with ordinary graphing methods.

If it is desired to cut the map in segments for convenience in the field it is only necessary to indicate on the margin of these segments the distances to the margin of the complete map and to add these to the measurements on the segment.

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[1] SCIENCE, 93: 68.

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CHARLES GURCHOT
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BOOKS RECEIVED

Carnegie Institution of Washington Year Book No. 39, 1939–1940. Pp. xxxi + 326. The Institution, Washington.

RIDER, JOHN F. *Vacuum Tube Voltmeters.* Pp. xi + 179. Illustrated. Author, New York. $1.50.

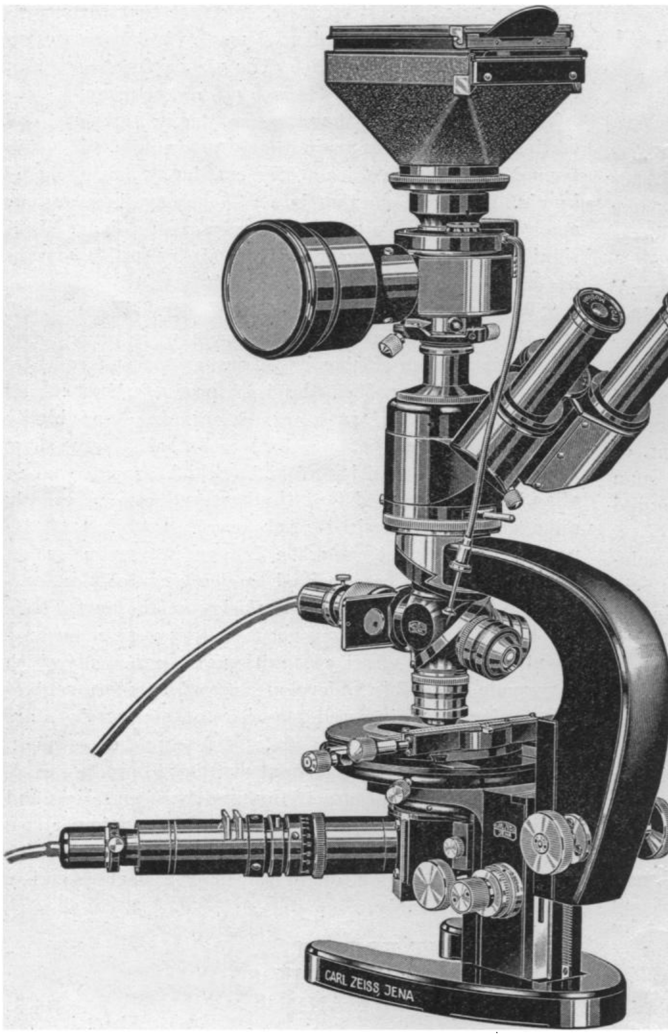
RUHEMANN, M. *The Separation of Gases.* Pp. xiii + 283. 148 figures. Oxford University Press. $5.75.

SLAUGHTER, FRANK G. *That None Should Die.* (A medical novel.) Pp. 423. Doubleday, Doran. $2.75.

SOHON, F. W. *The Stereographic Projection.* Pp. ix + 210. 53 figures, 1 plate. Chemical Publishing Co. $4.00.

Tôhoku Imperial University, Science Reports. First Series. (Mathematics, Physics and Chemistry.) Vol. XXIX, No. 3. Pp. 315–469. Illustrated. Maruzen, Tokyo.

VOSBURGH, WARREN C. *An Introduction to Quantitative Chemical Analysis.* Pp. viii + 356. 27 figures. Holt. $2.75.



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