

devices—perhaps even of inorganic materials—which would perform the essential functions of the conditioned reflex, we should be able to organize these units into systems which would show true trial-and-error learning with intelligent selection and the elimination of errors, as well as other behavior ordinarily classed as psychic. Thus emerges in a perfectly natural manner a direct implication of the mechanistic tendency of modern psychology. Learning and thought are here conceived as by no means necessarily a function of living protoplasm any more than is aerial locomotion.

In casting about for principles upon which to base the construction of a mechanism which would parallel the essential behavior of the conditioned reflex, the principle of endosmosis was at first considered. This was rejected both because its effects were too slow in taking place and because they were too slight in amount. An early model was constructed on the principle of potential changes. This gave some promise but was found to yield only two or three of the characteristic types of reaction required.

The mechanism which has given the best results is a combination of polarizable cells and mercury-toluene regulators, which are sensitive to temperature changes. Ordinary electric switches serve as "receptors"; a flashlight bulb is the responding "organ," analogous to the salivary gland of the experimental animal. By a manipulation of the switches in a manner strictly analogous to the presentation of stimuli in Pavlov's conditioned reflex experiments, phenomena, paralleling fairly accurately a considerable number of the properties of the conditioned reflex, are obtained. Thus far the following conditioned-reflex phenomena have been duplicated:

- (1) The simple substitution of a stimulus.
- (2) Complex redintegration.
- (3) Irradiation of excitation.
- (4) Weakening through lapse of time (forgetting).
- (5) External inhibition.
- (6) Experimental extinction.
- (7) Reinforcement.
- (8) Spontaneous recovery after experimental extinction.
- (9) Differentiation.
- (10) Differential extinction.
- (11) Conditioned inhibition.
- (12) The acquisition of conditioned reflexes only when the conditioned stimulus precedes the unconditioned stimulus.

It is hoped that further research will result in a model which will also show the phenomena of delayed reflexes, trace reflexes, responsiveness to temporal stimulus patterns and the various other complex behavior patterns characteristic of the conditioned

reflexes as observed in mammals. A complete technical description of the apparatus is being prepared for publication.

The germinal idea of the present project originated with the first author; the design and construction of the mechanism is due entirely to the second.

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CHANGES IN THE RATE OF RESPIRATION OF THE FRUITS OF THE CULTIVATED BLUEBERRY DURING RIPENING

IN connection with work on the diseases of blueberries in New Jersey during 1926, a study was made of the rate of carbon dioxide production at three stages of ripeness in ten varieties of blueberries, mostly cultivated varieties of *Vaccinium corymbosum* L. The tests extended over a period of more than a month, the different varieties maintaining the same relative position whether picked early or late.

The most striking feature brought out by these experiments is that the greatest production of carbon dioxide occurs during the period of color development, that is, from the first pink coloration to the red-ripe stage. After the stage of full red coloration, the rate of carbon dioxide production decreases rapidly as ripening proceeds to the blue stage at which the fruit is picked. These changes in the rate of carbon dioxide production were shown clearly by the selection of three stages of ripeness—green, full size, showing no pink color; pink to red-ripe, and blue-ripe. A change in the rate of carbon dioxide production such as that herein described represents a condition which has not been previously reported for any fruit, nor has it been found in any of the other small fruits so far studied by the writer.

The variety Rubel produced carbon dioxide more slowly than any of the other varieties studied, which may have some significance in view of the fact that Rubel has shown the best keeping quality of any of the varieties which were tested. It is planned to repeat these studies with a wider range of varieties, particularly those of the recently developed varieties which have shown unusual keeping quality.

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AN INTERNATIONAL LIST OF GENERA OF VASCULAR PLANTS

FOR some years botanic gardens have corresponded in regard to possible simplification of the mutual exchange of seeds, including greater uniformity of arrangement and nomenclature for seed lists. It appears that the great works, the "Index Kewensis"

and the "Natürliche Pflanzenfamilien," although admittedly out of date in many particulars, are still most widely used as general authorities. The number of genera of seed-bearing plants according to the former is about 8,300; according to the latter, about 9,700. Nearly 8,000 names are common to these two works, thus constituting a substantial beginning toward a very widely acceptable list of generic names, that is, such as have been used for more than fifty years.

Seeking to follow the general suggestions received from other botanical institutions, the Brooklyn Botanic Garden is listing these 8,000 genera by families. Under each are added the names as to which there are nomenclatural or taxonomic differences. The usage or preference of a number of institutions as to families and the most frequently used genera are included. The whole will make a pamphlet of hardly forty pages: thus corrections can readily be made in the direction of the needed international list of genera.

It is expected that many disputed points as to nomenclature will be decided at the Cambridge congress in 1930. But taxonomic differences are many times more numerous than nomenclatural ones. How can taxonomic usage be made more nearly uniform?

We believe that scientific and practical requirements may be most nearly harmonized if a list of genera, with the strength of a recommendation, be added as an appendix to the International Rules of Nomenclature, somewhat as follows:

Article 20. Recommendation *Iter*. For botanic gardens, for horticultural purposes, for the international exchange

of seeds and for other practical uses, a complete list of families and genera of vascular plants is provided, as of 1931. Nomenclatural matters of this list are decided by the International Committee of Nomenclature. Taxonomic matters are decided by a group of institutions designated by the congress. Revised lists will appear at intervals until 1940, and thereafter every ten years. This list is not intended to interfere with the nomenclature of taxonomic research publications.

ALFRED GUNDERSEN

BROOKLYN BOTANIC GARDEN

GREGOR MENDEL

GREGOR MENDEL was born in Neu-Titschein, Czechoslovakia. Certain men of science in Czechoslovakia, particularly in his native province, are seeking to establish a monument to him. The total amount needed is \$3,000 and of this half has been raised. The committee hopes that geneticists in the United States and philanthropists who may be interested thus to participate in honoring Mendel would contribute about \$1,000 to the deficit. The treasurer of the fund is Franz H. Nitsch, official director of the Neu-Titschein Savings Bank. Funds may be sent to him directly or, if preferred, to the undersigned, who has been asked to collect funds in the United States.

It has seemed unnecessary to add anything concerning the great, well known and deeply appreciated part that Mendel has played in the advancement of biological science.

CHAS. B. DAVENPORT

THE STATION FOR EXPERIMENTAL
EVOLUTION OF THE CARNEGIE
INSTITUTION, COLD SPRING HAR-
BOR, L. I.

SCIENTIFIC APPARATUS AND LABORATORY METHODS

ANOTHER SYNTHETIC RESIN USEFUL IN MICROSCOPY

AN account was published in *SCIENCE*¹ in 1927 in which was given some of the properties of a synthetic resin which appeared to be useful in certain classes of microscopic mounting. This substance was derived from aniline and possessed a strong yellow color. The only suitable solvent known was aniline, and because of the comparatively high temperature required to evaporate the liquid in a reasonable time the resin appears to be unsuited to much work in biology, although these properties in no way detract from its usefulness in the mounting of fossil diatoms for which it was originally made and recommended. This resin was listed as A. F. S. in my protracted series of experiments on mounting media.

¹ Hanna, *SCIENCE*, 65, 1927, No. 1672, pp. 41-42; No. 1693, pp. 575-576.

It now seems fitting to announce another synthetic product having very different properties. This is a derivative of the simple hydrocarbon, naphthalene; it is soluble in xylol, benzol, toluol, and many other organic solvents, but not in water or alcohol. No color can be detected in slides mounted with this material, and in large bulk it has but a faint straw color—less than in the same quantity of Canada balsam. The resin has been noted as *hyrax*.

Test slides made with this resin have not changed in color or other characters in eighteen months' exposure, and nothing has appeared to indicate that they are not permanent. The material stands an exceedingly high temperature without decomposing or discoloring, and the ordinary oven treatment to which balsam mounts are subjected quickly removes the solvent because of the absence of difficultly volatile substances such as the turpenes in balsam.