experience of teachers with vision and imagination should be of great assistance.

L. F. PINKUS

McKINLEY HIGH SCHOOL,
ST. LOUIS, MISSOURI

AMERICAN BOTANY, 1886–1932, AS SHOWN IN THE BOTANICAL GAZETTE

A LIST of the principal articles published in the *Botanical Gazette* during the ten years 1886–1895 and a like list of articles for the decade 1923–1932 has just been compiled under my direction by Miss Lillian Bondurant, a graduate student. Titles have been classified in accordance with the scheme used by *Biological Abstracts,* but to save space in the tabular summary which I have made the subdivisions of physiology and systematic botany have been omitted. The average length of principal articles in the earlier period was about seven to nine pages and there were many short notes of less than a page, while the papers in more recent times are nearly twice as long. The pages of the ten volumes of the earlier period are 3,976, while the number in the last ten years is 8,866. Contributions in the recent period in every field, unless it be taxonomy, are of a far more technical nature than those in the early days of the *Gazette.*

TABLE I

NUMBER OF PRINCIPAL ARTICLES IN THE BOTANICAL GAZETTE FOR TWO TEN-YEAR PERIODS, CLASSIFIED BY SUBJECTS

Subjects	1886–1895	1923–1932
Botany, general with also methods and apparatus	26	5
Bacteriology and immunology	10	10
Cytology	14	46
Ecology, including "natural history"	53	38
Evolution	4	0
Genetics	1	25
Morphology and anatomy of vascular plants	45	100
Paleobotany	4	17
Physiology, in all its branches	33	176
Phytopathology	16	21
Systematic botany, including morphology of the lower plants	176	82
	382	520

The nature of articles in certain fields has changed greatly; the early papers tabulated under ecology were more properly "natural history" and would hardly be recognized as belonging to ecology; the lone article recorded as genetics belongs better as evolution. A great increase has occurred in plant physiology, and many of its present subdivisions were almost if not entirely untreated forty years ago—as light relations, chemical relations, mineral nutrients, enzymes.

The changes in the *Botanical Gazette* are, it is true, not an exact measure of change in botanical literature during the period. In recent years many special journals have come into being dealing with particular branches of botanical science. These furnish an outlet for articles which formerly would have been offered to the *Botanical Gazette.* Yet the magazine continues to receive now, as it accepted in the past, contributions in all fields of botany, and it represents rather well, now as heretofore, the activities of American investigators.

It is interesting to read over the list of early contributors, among whom may be noted George F. Atkinson, Charles R. Barnes, Charles E. Bessey, John M. Coulter, W. R. Dudley, W. G. Farlow, George L. Goodale, Asa Gray, Byron D. Halsted, Theodor Holm, Conway MacMillan, Roland Thaxter and Lester F. Ward. It would be possible to make another interesting list of contributors of the earlier period who are still active in botanical investigation, but such a list would need to be a long one, if inclusive, while any selection of names might lead to invidious comparisons.

The compiled lists are typewritten, and when bound will be placed in the University of Colorado library, where they may be consulted.

FRANCIS RAMALEY

UNIVERSITY OF COLORADO

THE FIRST AMERICAN LABORATORY OF PHYSIOLOGY

IN the issue of SCIENCE for September 22, 1933, there was printed an obituary notice on Albert Martin Bleile, signed "F. A. H." In the notice it was stated that in 1876 "there was but one laboratory of experimental physiology in the United States, that of the late Professor H. Newell Martin, which had recently been established at the Johns Hopkins University." May I call attention to the fact that when Dr. Henry P. Bowditch returned from Ludwig's laboratory in 1871 he established a laboratory of experimental physiology in the Harvard Medical School. The apparatus in the laboratory was brought over from Germany at his expense. During the years between 1871 and 1876 Bowditch himself published papers on the lymph spaces in the fasciae, on a new form of induction apparatus, and on the force of ciliary motion. He and the late Charles S. Minot completed and published a research on the influence of anesthetics on the vasomotor centers. The late Dr. J. Ott published two papers, one on the action of lobelina on the circulation, and another on the physiological action of thebain. Experiments on the effect of bile in promoting the absorption of fat and observations

on intestinal digestion appeared under the names of Charles H. Williams and G. M. Garland, respectively.

Although Dr. Bowditch's laboratory was called a laboratory of physiology, it is obvious that it was hospitable to work on problems of pharmacology as well, even during the first years, 1871–76.

WALTER B. CANNON
HARVARD MEDICAL SCHOOL

SCIENTIFIC APPARATUS AND LABORATORY METHODS

GRASSHOPPER EGGS AND THE PARAFFIN METHOD

PETRUNKEVITCH,[1] in a recent issue of SCIENCE, has published formulae for several new fixatives, containing—among other ingredients—phenol or one of its derivatives. Phenol, he claims, gives "a peculiar elastic texture to the tissues, unlike anything produced by commonly used fixing fluids." It occurred to the present authors that such a fixative might be utilized in making sections of grasshopper eggs, a material which, hitherto, has proved extremely refractory to a paraffin technique. Following the ordinary methods of fixation, embedding, etc., the yolk is found to be hard and gritty, and sectioning becomes an impossibility. Freshly laid grasshopper eggs were, accordingly, fixed in the cupric-phenol solution (No. 1), as directed by Petrunkevitch. When eggs so treated were embedded in paraffin no difficulty was found in securing smooth, clean sections, providing that the surface of the block was wiped with a bit of damp filter paper immediately before cutting each section.

In order to test the value of such a solution for cytological purposes a grasshopper testis and a young grasshopper embryo were fixed with it. The results, however, were extremely unsatisfactory. Cytoplasmic details were badly distorted and the chromosomes were almost unrecognizable.

The idea then suggested itself that it might still be possible to secure the benefits of the new cupric-phenol mixture by allowing it to act after a fixative already known to be of value in chromosome studies had been employed. To this end grasshopper eggs were fixed over night in Bouin's solution. After a thorough washing in 70 per cent. alcohol these were placed in the Petrunkevitch mixture and allowed to remain there for approximately 24 hours. Eggs treated in this way were found to section in an entirely satisfactory manner.

In order to discover whether the second fixative could have any possible effect on cytological details, bits of grasshopper testis were fixed in Bouin's solution, then, after this had been washed out, treated with Petrunkevitch's mixture for periods varying from 2 hours to 4 days, sectioned and stained with Heidenhain's iron-haematoxylin. No difference could be detected between the chromosomes in such material and that prepared in the ordinary way.

As the next step Petrunkevitch's "Stock solution B" (consisting of 100 cc of 80 per cent. alcohol, 4 gm of phenol and 6 cc of ether) was used alone and found to be quite as efficacious as the entire mixture. It was likewise found that matters could be still further simplified by omitting the ether.

The procedure recommended at present, then, is as follows: Grasshopper eggs of the desired age are fixed in Carnoy-Lebrun, as suggested by McNabb.[2] These are washed in iodized alcohol, cut in half and the micropyle halves stored in 70 to 80 per cent. alcohol until needed. (Eggs which had been kept in alcohol for three months were found to be still amenable to the phenol treatment.) Exposure for 24 hours to 4 per cent. phenol in 80 per cent. alcohol is followed by dehydration in 95 per cent. alcohol. The eggs are then cleared in carbol-xylol, infiltrated with paraffin and each one blocked with the cut end out. The paraffin is trimmed away from the face of the block until the yolk is just exposed and the whole is then soaked in water for 24 to 48 hours. This last eliminates the tedious and time-consuming process of moistening each section separately and permits the egg to be cut as rapidly and as easily as any ordinary material.

As an alternative method the eggs, after fixation and exposure to the phenol solution, are dehydrated in 95 per cent. alcohol, cleared in anilin oil, washed in chloroform and embedded in paraffin, after which they are placed in water as before.

Preparations of various stages in the maturation and early cleavage of the eggs of *Melanophus differentialis* and *Chortophaga viridifasciata* have already been successfully obtained with the technique outlined above. Finally, it might be well to mention that Feulgen's stain, since it does not color the yolk, has been found an important aid in the study of such material.

The essential features of this process which differentiate it from those commonly employed consist of (1) treatment with phenol and (2) soaking in water. Either of these steps alone has been found insufficient; but the two combined give a perfect ribbon. It is not unlikely that other cytologists or embryologists dealing with objects which are difficult or impossible to handle with routine methods may find here a solution to their problems.

ELEANOR H. SLIFER
ROBERT L. KING
UNIVERSITY OF IOWA

[1] A. Petrunkevitch, SCIENCE, 77: 117, 1933.

[2] J. W. McNabb, *Jour. Morph. and Physiol.*, 45: 47, 1928.