ture for identification. During recent excavations in Davidson County, Tenn., Mr. Meyer came upon a number of stone slab graves containing mortuary vessels. Some of these held specimens of charred maize in fairly good condition. From the size and shape of the grains it was possible to identify the variety as Many-Rowed Tropical Flint, a form about half way between true flint and popcorn. The same type of Indian corn occurs in the West Indies, and there appears to have been a very early communication between the West Indies and North America. Not only corn but beans, squashes, pumpkins, and tobacco are of tropical and subtropical origin. These staples, now so important throughout both hemispheres, found their way into North America and were cultivated beyond the Great Lakes in Canada long before the discovery of America. There is abundant evidence of communication between the West Indies and Florida, and up the Mississippi and its tributaries.

THE *Brazil Medico* announces that Dr. Cleef, professor of chemistry at Bello Horizonte, reports the discovery in Minas Geraes of a mineral substance hitherto unknown which possesses great radioactive properties.

UNIVERSITY AND EDUCATIONAL NEWS

YALE UNIVERSITY has begun the construction of the new Sterling Chemical Laboratory. It is hoped that this building will be ready for the use of the department of chemistry in October, 1922.

New members of the faculty at the University of North Carolina, at the beginning of the fall term include G. M. Braune, professor of civil engineering; H. B. Anderson, associate professor of pathology; H. F. Janda, associate professor of highway engineering; F. C. Vilbrandt, associate professor of industrial chemistry; H. W. Crane, associate professor of psychology, and E. L. Mackie, assistant professor of mathematics,

MISS EDITH NASON, Ph.D., Yale, 1921, has been appointed an instructor in organic chemistry at the University of Illinois.

MR. HENRY R. HENZE, who received his Ph.D. degree from Yale in June, 1921, has become adjunct professor of chemistry in the medical school of the University of Texas at Galveston.

DISCUSSION AND CORRESPONDENCE

A NEW DEFINITION OF PURE MATHEMATICS

DURING the present year there appeared a volume of the *Acta Mathematica,* volume 38, which was dedicated to the memory of H. Poincaré, the noted French mathematician who died in 1912. This volume opens with an account of his own works by Poincaré in which he deals briefly with his own contributions to the advancement of various subjects. This is followed by a report on the theory of groups and the works of E. Cartan, which Poincaré read before the council of the faculty of sciences of the University of Paris on the eve of the operation resulting in his death. The rest of the volume is devoted to letters and to various articles written by others but relating to Poincaré and his works.

In the present note we desire to direct attention to the second article mentioned above, which seems to be one of the last articles, if not the last article, written by Poincaré, and contains some remarkable statements in regard to the theory of groups. One of these is as follows: "The theory of groups is, so to say, entire mathematics, divested of its matter and reduced to a pure form." The interest in this statement should be increased by the fact that it may be regarded as a new definition of pure mathematics, the skyscraper among scientific structures. One of the best known other definitions is due to B. Peirce, who stated that "mathematics is the science which draws necessary conclusions." It should, however, not be inferred that the latter definition has been generally accepted as an entirely satisfactory one, nor do we want to create the impression that the former is likely to be universally adopted.

It may, however, be a matter of wide interest to see what Poincaré meant by the statement quoted above. Such an insight can probably be best gained by reading his own

preliminary remarks, which are, in part, as follows:

The preponderant rôle of the theory of groups in mathematics has been unsuspected for a long time. Eighty years ago even the name of group was unknown. It was Galois who first had a clear notion of it, but it is only since the works of Klein, and especially of Lie, that one has begun to see that there is almost no mathematical theory in which this notion does not occupy an important place. . . . It is necessary to give the same name to different things, but on condition that these things are different as to matter but not as to form. What is the cause of the mathematical phenomenon so often constant? And, on the other hand, of what consists the community of form which subsists under the diversity of matter? It is due to this that every mathematical theory is, in the last analysis, the study of properties of a group of operations, that is to say, of a system formed by certain fundamental operations and of all the combinations which can be made therefrom.

If, in another theory, one studies other operations which combine according to the same laws one will naturally see a set of theorems, having a one to one correspondence to those of the first theory, unfold themselves, and the two theories may be developed with a perfect parallelism; an artifice of language like those of which we just spoke, suffices to make this parallelism manifest and to give almost the impression of a complete identity. One says then that the two groups of operation are isomorphic, or that they have the same structure. If then one divests the mathematical theory of this which appertains to it only by accident, that is to say, its matter, there will remain only the essential, that is to say, the form; and this form, which constitutes, so to say, the solid skeleton of the theory, will be the structure of the group.

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GALL EVOLUTION: A NEW INTERPRETATION

PRACTICALLY all gall students to date have regarded cecidia as responses to specific stimuli relating specific differences causally to the plant bearing the gall.

Basing his ideas on Küster's logical classification of galls (structurally considered) into "kataplasmas" (galls of indefinite character; ex. oak knot gall, *Andricus punctatus* Bass.) and "prosoplasmas" (galls of definite character; ex. oak apple, *Amphibolips inanis* O. S.) together with Cook's recognition of the influence of the animal in gall formation, the writer has developed a new theory of gall evolution.

The new interpretation holds that phylogenetically prosoplasmas have been derived from kataplasmas. Further, kataplasmic evolution involves progressive inhibition of the normal differentiation of the plant part until homogeneity is reached. Not until kataplasmic evolution has been completed is it possible for prosoplasmic evolution to begin its course in which fundamentally new tissue orientations and forms are produced. Thus from the standpoint of the plant's differentiation we have first a regressive movement (kataplasmic) and then a progressive one (prosoplasmic) but from the standpoint of the animal the series should be regarded as progressive throughout.

A corollary of the above interpretation is the striking situation that an animal may not only inhibit the expression of a plant's characters but may introduce new ones, or in other words the evolution of the animal induced galls (zoocecidia) is primarily or fundamentally related to the animal. The initiating changes producing the different gall types probably occur in the germ plasm of the animal. This means that the evolution process carried out in the animal comes to expression in the plant, an interesting situation to say the least.

The evidence for the above theory drawn from the fields of comparative morphology and embryology appears to the writer to be overwhelming.

The writer has presented this thesis at greater length in the May, 1921, number of the *Botanical Gazette*.

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ON SOUNDS ACCOMPANYING AURORAL DISPLAYS

TO THE EDITOR OF SCIENCE: The existence of sounds in connection with manifestations of the aurora is regarded by many as still a