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