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 moot point, *cf.* the remarks at the close of the article on the subject in the Encyclopedia Britannica.

Several observers have reported hearing such sounds during the very brilliant auroral display of May 14. I could not detect any such sounds on this occasion, doubtless owing to the proximity of a large city from which the volume of sound, even at 3 A.M., is quite noticeable.

I desire to place on record, however, certain earlier experiences under almost perfect conditions of isolation and quiet. While in charge of the Labrador station of the Lick Observatory-Crocker Eclipse Expeditions of 1905, much of the work of adjusting the instruments was necessarily done at night. The station was located at Cartwright (latitude +53° 42′), and auroral displays were frequent and bright during July and August. On several nights I heard faint swishing, crackling sounds which I could attribute only to the aurora. There were times when large faintly luminous patches or "curtains" passed rapidly over our camp; these *seemed* to be close and not more than a few hundred feet above the ground, though doubtless much higher. The faint hissing and crackling sounds were more in evidence as such luminous patches swept over us.

Heber D. Curtis
Allegheny Observatory,
August 10, 1921

LAWRENCE'S WARBLER

To the Editor of Science: It may be worth while to record the presence of the rare *Vermivora (Helminthophila) lawrencei* (Herrick) in Lexington, Virginia, on May 14. The warbler was observed sitting on a telephone wire less than ten yards from the porch of a house just on the outskirts of town, and its conspicuous black throat patch and white wing bars served to fully identify it, and differentiate it from *V. pinus* and *V. chrysoptera,* of which it is supposed to be a hybrid. Chapman speaks of it as much rarer than Brewster's warbler, *V. leucobronchialis,* the other supposed hybrid of these species, and says that less than a dozen specimens have been recorded.

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QUOTATIONS

CHEMISTRY IN WAR

Two distinguished chemists have recently made pronouncements, identical on the material side, divergent on the moral side, on the use of posion gas in war. It is a question on which civilization will have to come to a decision or to live under lasting and increasing menace. Sir T. Edward Thorpe, in his presidential address to the British Association, at Edinburgh, told his audience that the Germans, between April, 1915, and September, 1918, had used no fewer than eighteen different forms of poison—gases, liquids, and solids—in their military operations. Reprisals became inevitable, and for the greater part of three years the leading nations of the world were flinging the most deadly products at one another that chemical knowledge could suggest and technical skill contrive. Sir William Pope, an equally eminent English chemist, speaking at Montreal a few days before, said that by the Armistice the Allies had sufficient supplies of mustard gas to "have enveloped the Germans knee deep, and had discovered a new vapor against which respirators would be of no avail, so strong that it would stop a man if it were present in the atmosphere in the proportion of one part in five millions." The President of the British Association admitted that warfare had now definitely entered on a new phase. But in passionate words he deplored the prospect on the part of science and of humanity, and hoped that, through the League of Nations or by some other form of international agreement, it might be averted. Sir William Pope, on the other hand, claimed that from the humanitarian point of view gas was more merciful than high explosives, and stated his belief that chemical agencies would be the sole deciding factor in future wars.