

CHAPTER XXIV

ANTS AS MODIFIERS OF PLANT-STRUCTURE

[THE paper which forms the greater part of this chapter was written during the first few years after Spruce's return to England, and at a time when he had probably not seen, and had certainly not carefully read, the *Origin of Species*, the teachings of which at a later period he fully appreciated. At this period he accepted—as did almost all naturalists, including Darwin himself—what is termed the heredity of acquired characters, such as the effects on the individual of use or disuse of organs, of abundant or scanty nutrition, of heat and cold, excessive moisture or aridity, and other like agencies. But in the paper here given he went a step beyond this, and expressed his conviction that growths produced by the punctures and gnawings of ants, combined perhaps with their strongly acid secretions, continued year after year for perhaps long ages, at length became hereditary and thus led to the curious cells and other cavities on the leaves and stems of certain plants, which are now apparently constant in each species and appear to be specially produced for the use of the ants which invariably frequent them.

This paper Spruce sent to Darwin, asking him to send it to the Linnean Society if he thought it

worthy of being read there. I will here give some passages from Darwin's reply, dated April 1, 1869.

“The facts which you state are extraordinary, and quite new to me. If you can prove that the effects produced by ants are really inherited, it would be a most remarkable fact, and would open up quite a new field of inquiry. You ask for my opinion; if you had asked a year or two ago I should have said that I could not believe that the visits of the ants could produce an inherited effect; but I have lately come to believe rather more in inherited mutilations. I have advanced in opposition to such a belief, galls not being inherited. After reading your paper I admit, Firstly, from the presence of sacs in plants of so many families, and their absence in certain species, that they must be due to some extraneous cause acting in tropical South America. Secondly, I admit that the cause must be the ants, either acting mechanically or, as may perhaps be suspected from the order to which they belong, from some secretion. Thirdly, I admit, from the generality of the sacs in certain species, and from your not having observed ants in certain cases (though may not the ants have paid previous visits?), that the sacs are probably inherited. But I cannot feel satisfied on this head. Have any of these plants produced their sacs in European hot-houses? Or have you observed the commencement of the sacs in young and unfolded leaves which could not *possibly* have been visited by the ants? If you have any such evidence, I would venture strongly to advise you to produce it. . . .

“I may add that you are not quite correct (towards the close of your paper) in supposing that I believe that insects directly modify the structure of flowers. I only believe that spontaneous variations adapted to the structure of certain insects flourish and are preserved.”

The paper was read on April 15, 1869, and then, as usual, was submitted to the Council to decide as to its publication. After full consideration, their decision was communicated to Spruce by the secretary as follows:—

“I am requested to communicate to you their opinion that the paper will require modification before they can recommend its publication. It is considered that the evidence adduced is insufficient to overcome the improbability of the sacs in the course of ages having become inherited, and that although there would be no objection to a statement that the author has been led to suspect that the structures in question are now inherited (which might lead to further investigations), it would be inadvisable for the Society to publish positive statements on the subject of inheritance without much fuller evidence. The Council wish me to say that if you do not object to alter the title of the paper, and to strike out some short passages, marked in pencil on the margin, they will be glad to undertake the publication of the paper, as they think it highly desirable that the facts recorded should be made known.”

The paper was returned to him to make the alterations required if he wished to do so, but nothing more was heard of it, and it has remained