four hundred dollars. The holder is expected to give twenty hours a week to the work of the laboratory, and to devote the remainder of the time to original investigation in histology or embryology under the supervision of the senior officers of the department. Applications should be addressed at once to Professor Charles S. Minot, Harvard Medical School, Boston.

DISCUSSION AND CORRESPONDENCE.

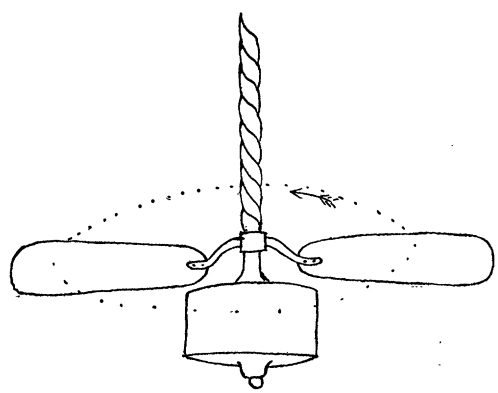
PRE-COLUMBIAN MUSIC AGAIN.

TO THE EDITOR OF SCIENCE: The question of pre-Columbian stringed instruments of music in America comes up again, this time from Carl Sapper, the distinguished geologist in Coban, Guatemala. He had learned of my former letter on the distribution of the musical bow and concedes with regard to the Loltun Hool, of the Mayas, that it was surely introduced from Africa, since the Kekchi call it marimbadie, or caramba. The same instrument is in use among the Xicaques, in Honduras, but they attach a guacal as a resonator. Dr. Sapper does not agree with me that the stringed musical instrument was entirely absent from the western hemisphere, for, says he, the Lacandones have a two-armed guitar, which he thinks not to have been borrowed. The Kekchi also, says Sapper, uses strings on the scraping instrument, called 'su.' This is entirely new to me. As to the double-necked guitar, Mr. E. H. Hawley says that they were common in Europe and may be seen in collections. These have the necks projecting from the same end and parallel or slightly diverging. The Fans have a variety in which the two necks start from opposite sides of the body. One example is made from the stem of a palm leaf 55 inches long. Four strings are cut from the outer skin, their ends being left attached. A little way from the middle a stick is set up perpendicular to the palm stem. On one margin of this are cut four notches or steps, about half an inch apart, to receive the strings. Braided bands of palm fibre encircle stem and strings, and by moving these the latter are tuned. Opposite the upright stick or bridge is tied an open gourd for resonator. I should be glad to receive descriptions of these Central American instruments or drawings. Most of all, would I like to examine specimens. If by the scraped instruments Dr. Sapper means some modification of the notched fiddle, then he has found a prize, but not necessarily a pre-Columbian one.

O. T. MASON.

A CURIOUS OPTICAL ILLUSION CONNECTED WITH AN ELECTRIC FAN.

A CURIOUS illusion connected with an ordinary two-winged pendant fan, such as are commonly employed in restaurants, barber shops, etc., attracted my attention some years ago, and lately, upon my return to the same place, was just as evident as formerly. Very much at a loss for an explanation, the phenomenon was described to one of our leading psychologists and educators, but no satisfactory explanation was obtained. Hence, it is supposed that possibly the phenomenon has not been noticed by others, and is described here for the benefit of those concerned and with the hope of drawing out similar observations by others.



The illusion consists in the fan appearing to rotate in the opposite direction from the real one. Sitting some thirty feet away and looking at the fan, which is moving at a moderate speed, it is plainly seen to be moving in the direction opposite to that of the hands of a watch. The plane of rotation appears to be horizontal. But as one continues looking the vanes suddenly seem to move in the opposite direction and the plane of rotation to change so as to incline towards the observer. The change is under the control of the will and may

be produced as readily as the illusions connected with a square within a square. A certain distance for a point of observation and also a certain speed of rotation appears to be necessary, for fans nearer the observer rotating more slowly do not produce the phenomenon which now seems to be due to the same principle of accommodation that makes a figure of a square within a square appear at one time as a hollow space and at another as a solid.

Two other illusions connected with the fan, but which may be well known to every one who has watched moving machinery, may be noted. In one the vanes, instead of rotating, seem to flap together; in the other the two iron arms appear to be continually withdrawing into and pushing out from the hanging rod.

F. C. Kenyon.

SCIENTIFIC LITERATURE.

Plant Life, Considered with Reference to Form and Function. By Charles Reid Barnes, Professor of Plant Physiology in the University of Chicago. New York, Henry Holt & Co. 1898. 12mo. Pp. x + 428.

In his preface the author says: "The absence of an elementary account of the form and functions of the plants of all groups has made itself felt," and "I am not aware that any book at present attempts to meet this need." These sentences, coupled with the author's reference to secondary schools, and to pupils of thirteen to eighteen years of age, indicate the purpose and place of the book.

In carrying out his plan he has divided the subject into four parts, viz.: (1) the vegetative body; (2) physiology; (3) reproduction, and (4) ecology. In the first part appear such chapter headings as 'the unit of structure,' 'single-celled plants and colonies,' 'linear and superficial aggregates,' 'the thallus of the higher algæ,' the fungus, body of hyphal elements,' 'liverworts and mosses,' 'fernworts and seed-plants.' A few years ago such an approach to what was then called 'morphology' would have horrified the old-time teachers of elementary botany, who were anxious to give the study as much 'practical' value as possible, and were wont to repeat pedagogical platitudes as to the necessity of 'proceeding from the known to the unknown.' Ignoring such objections, the author leads the pupil, chapter by chapter, from the relatively simple plant-body of the fission algæ to the highly complex structures, roots, stems and leaves, of the seed plants. The significance of the latter is thus made much clearer than by the old method of studying the anatomy of flowering plants first, and then following with something of the lower forms from which they sprang.

The treatment of the physiology of plants is satisfactory, as a matter of course, since the author has given especial attention to this department of botany. In the introduction some clear and useful definitions are given; then follows a suggestive chapter on the maintenance of bodily form, one on nutrition (particularly well done), one on growth and another on the movements of plants.

The chapters relating to reproduction must be very helpful in giving the beginner right notions as to how plants provide for a succession of individuals. Old-fashioned people will open their eyes when they find the 'flower' discussed in the chapter treating of vegetative (*i. e.*, asexual) reproduction, along with 'fission,' 'budding,' 'spores' and 'brood buds.' The 'flower' is brought in under the general topic 'spores,' after the discussion has led up to the differentiation of spores into megaspores and microspores. Of course, this is all right, as every botanist knows, but there will be some scrambling and tumbling on the part of many a high-school teacher as he attempts to lead his pupils through this, to him very new, territory, and we imagine that he will fare little better when he comes to the angiosperms in the chapter on sexual reproduction. In order fully to master this matter the teacher will, in most cases, be obliged to spend a term or two in some good botanical laboratory, where he can be helped over the difficult places.

The chapters on ecology are new to American books on botany, and while they are quite elementary they will be useful in the way of directing students and teachers into a comparatively new field of work.

The appendices are in some respects of more value than the body of the book, giving as they do: (1) directions for laboratory study; (2) direc-