daughter-granules are separated by the growth itself and by accident, and the division is determined by the dilaceration of the threads. The young granules increase in size, and acquire their normal figure. After the division, there may be found upon the granules a few protoplasmatic hyalin cilia, divided in groups. These cilia are the remainder of the divisional threads. All these cilia spring from points where dark spots are seen upon the surface of the living granules. The compressed granules of Hartwegia, of Fern-Prothallia, of Vallisneria, and Elodea offer most favourable opportunities for ascertaining the manner of division. This singular process is repeated again and again, so that the older granules are compressed, and a filament is formed, which elongates more and more rapidly as the granules increase in number. Sometimes the filament may be ramified. This continued multiplication by division has its limits; the protoplasmatic bearer (the matter of the granule, which carries the colouring substance) changes its appearance, and contains starch-granules, which soon become numerous. The whole process cannot, of course, be seen in the same granule, but in some, dividing granules may be observed in one stage, and in others in another. In such a manner (though the process is not so clear) divides the endochrome of the Bacillariaceæ, as I have studied it, in *Himantidium pectinale*. That is the manner of division certainly most common. The second mode of multiplication by division is more simple. The granules are divided by a constriction, and separate into single granules; the daughter-granules become detached after they have reached their full form and size. No cilia or threads, only a small number two to three (not six to eight) are formed by the division in the isthmus between the half-granules. This division is a reduced form of the former, that is, the direct division without cilia; the former is the indirect division with cilia. The direct division I have studied in all higher and lower green plants in all seasons of the year. The second form, the direct division, is seen especially in the cells of Vaucheria and Chara. These changes in the division of chlorophyll-granules of which we speak, can only be observed with a considerable magnifying power (2000–3000 lin. mag.), that is the cause why Mikosch agrees with the other authors mentioned in disclaiming the notion of threads of the true mode of division. I ascertained these changes in March of the year 1880, and described them in a short notice in the *Magyar Növénytani Lapok* (Hungarian Journal of Botany, edited by Prof. Dr. Kanitz Kolosvár (vol. iv. pp. 32-43).

II. Prof. Pringsheim,[1] after ascertaining the occurrence of hypochlorin in all higher chlorophyllous plants, and in many green algæ, speaks in his paper, with reference to the Bacillariaceæ, "Sie fehlt (the hypochlorin) dagegen bei den nicht chlorophyll grünen Gewächsen; also bei den Phycochromaceen, Diatomeen, Phæosporeen. . . . Wenigstens konnte ich sie bisher in den genannten Pflanzengruppen noch nicht sicher nachweisen und nur Spuren derselben ist es mir geglückt, in manchen Entwickelungsstadien einiger *Diatomeen aufzufinden.*" I have, with the use of diluted muriatic acid, proved the occurrence of hypochlorin in all the Bacillariaceæ and Cyanophyceæ (Phycochromaceæ) investigated. The experiment succeeded best with *Calothrix scopulorum*. The hypochlorin was seen in all these plants in the typical form of brown scales or brown drops.

SCHAARSCHMIDT GYULA
Botanical Institute of the Royal Hungarian University,
Kolosvár (Hungary), August 3

Mimicry in the "Plume Moths"

I HAVE not seen in any entomological work an attempt to explain the well-known peculiar character of the wings of the "Plume Moths" (*Pterophori*). They depart so thoroughly from the rest of the Lepidoptera in having the wings cleft into so-called feathery "plumes" (although retaining the microscopic scales characteristic of their order), that we may be certain so marked a type must have been evolved along definite lines and for specific reasons. One species (*Agdistes Bennetii*) may be regarded as the first stage in the differentiation of these insects; and from this species we have successive modifications in the number of "plumes" up to *Alucita polydactyla*, where the ordinary wings are split up into no fewer than twenty-four.

I have long thought this wing-peculiarity is due to *mimicry*, the objects mimicked being the down or *pappi* of thistles and other composite plants. The commonest of the "Plume Moths," perhaps, is the "Large White Plume" (*Pterophorus pentadactylus*), and all entomologists are acquainted with its peculiar *drifting* mode of flight, exactly resembling that in which a thistle plume is blown by the wind. The other day I followed what I took to be a drifting thistle-plume, for the sake of seeing what species it belonged to, and found it to be a specimen of this species of moth, so remarkably similar do the two objects appear when in motion. If the intention of the "plume-moths" is to mimic the *pappi* of winged-seeds, we can understand why these insects do not fold the wings to the body when at rest, but seem to display them to the utmost instead.

The fact that (according to Stainton), out of about twenty species of *Pterophori*, the larvæ of which have their food-plant given, no fewer than ten feed on composite plants, or plants bearing plumed seeds, indicate that the resemblance of the winged insects to pappi must also be protective to females when depositing their eggs on plants which produce down, as well as when they are flying. It would be interesting to compare the different kinds of thistle and other down with the appearance of the various species of "plume-moths" which thus appear to mimic them.

J. E. TAYLOR
Ipswich Museum, September 5

NOTE ON SOROCHE (MOUNTAIN SICKNESS) IN THE ANDES

THE effects of diminished atmospheric pressure on the human economy seem to vary so much with different individuals that a few facts of personal experience may be of some interest to those who have attended to the subject. During a somewhat prolonged acquaintance with mountain travelling, I had never felt any of the symptoms described as characteristic of mountain sickness. The only effect of rarified air that I had been able to verify was that an equal amount of mechanical effect produced at a great height necessitates a greater effort, so that climbing or other muscular effort causes, *cæteris paribus*, more sense of fatigue. Being in Peru in the month of April last, I was about to avail myself, with a friend, of the opportunity afforded by the reopening for traffic of the Oroya railway, and to spend a few days at Chicla, the present terminus of that remarkable work. The height of Chicla above the sea is 12,200 feet, and we were assured by several residents in Lima that we should infallibly suffer from the *soroche*, the local name for mountain sickness in Spanish America. Not having ever experienced the slightest inconvenience at heights considerably exceeding that limit in the Alps, I treated these warnings with some derision, and in truth they had passed from my mind on the evening when I arrived at Chicla. I may say at once that neither there nor anywhere else have I experienced any of the symptoms of mountain sickness by day, or while up and moving about after dark. On the evening of our arrival, after a frugal supper we retired to bed about eleven o'clock. Soon after falling asleep, I awoke with a severe headache, which continued throughout the night, allowing only a few short and broken snatches of sleep, but which passed away soon after I rose somewhat before sunrise. On comparing notes with my friend, I found that he also had suffered from headache during the night; but as he is somewhat subject to that affection, he had not attributed it to any special cause, whereas with me it is most unusual.

The following day was spent in botanising on the steep slopes upon either side of the valley at Chicla, and as I was quite free from any inconvenient sensation, I attributed the headache of the previous night to some accidental cause rather than to diminished pressure. On the second night, going to bed about the same hour, I again awoke with a headache more severe than that of the previous night, and was altogether unable to sleep for the rest of that night. Some two or three hours after midnight I was suddenly seized with retching of the stomach, but, perhaps because my light dinner was fully digested, no further effect followed.

We had arranged for the succeeding day to ride to the

[1] Ueber Lichtwirkung und chlorophyllfunction in der Pflanze Jahrb. f. wiss. Bot. xii., 1851. Heft iii. p. 296.