

school class for beginners. As it appears from his preface that this was the sole object of the author in writing the little book, he is entitled, we think, to consider that his object has been attained.

Bacillary Phthisis of the Lungs. By Germain Sée, translated by William H. Weddell. (London: Kegan Paul, Trench and Co., 1885.)

THIS is in many respects an unsatisfactory book. It is divided into seven parts. Of these the preliminaries and the first four parts comprise anatomical and histological notes, the biological study of micro-organisms generally, and the study of the bacillus tuberculosis especially, and all kinds of promiscuous notes on the causes of tuberculosis; but, owing to the dogmatic way in which these subjects are treated, the omission of details and the numerous mycological inaccuracies this portion of the book is very weak. The rest, treating of clinical, hygienic, and therapeutic subjects, is more within the author's proper domain, and will be found instructive to the medical practitioner.

Mineral Resources of the United States. By A. Williams. (Published by the U.S. Geological Survey, 1883.)

THIS book consists of a series of essays, of various degrees of importance, on the mining and metallurgic industries of the United States. The work has been mainly carried out by entrusting each subject, or a special branch of each subject, to a gentleman intimately acquainted with that branch. The thoroughness with which the subject is treated is shown by the fact that the natural history of so rare a substance as hiddenite is very fully discussed by the original discoverer, Mr. W. E. Hidden.

Naturally the most important and the most extensive essays are those on coal, iron, copper, and zinc. Silver, the position of which is at present one of the most difficult problems connected with the metals, was excluded by Act of Congress from the present investigation, and tables of the production of gold and silver in recent years are all the information given. Former publications of the U.S. Government have already made known the enormous wealth of the silver-mines, and have given fair means by which persons interested in mining may estimate the prospect of success in such undertakings.

Under iron, an account is given of the Bower-Barff process of protecting iron from rust by means of a thin film of magnetic oxide—a process which bids fair, if it stand the trial of some years' wear, to replace the process of galvanising.

To professional people who need accurate information as to the condition of the various industries, the book possesses great value. It is also full of interest to the scientific mineralogist who has mainly to depend on the opening of new mines for fresh discoveries in the mineral kingdom. One cannot help regretting, however, the space given to a history of the divining-rod, "natural magnets," and similar absurdities. The subject is as much out of place as an account of the astrological nonsense practised in the Middle Ages would be in a modern treatise on spherical astronomy.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

Pitcher Plants

PERHAPS you will allow me to set "W. C. M." right with regard to *Sarracenia variolaris* and pitcher plants generally

(p. 295). I am afraid the sources from whence he obtained his information were not very reliable, as will be seen from the following:—

There are six species of *Sarracenia* found in North America, all of them characterised by the same trumpet-shaped leaves growing in tufts, and in several of the species attaining a length of a yard. In addition to these there is the *Darlingtonia californica*, which has long twisted trumpet-shaped leaves, the top of which is curved over, forming a sort of hood, and having a rather small aperture on each side. These constitute the whole of the pitcher plants of North America. "W. C. M.," whilst professing to describe the "curious characteristics" of the *Sarracenia*, really describes the leaf and pitcher of *Nepenthes*, which, as almost everybody knows, are tropical plants, mostly natives of the Indian Archipelago, and well known in this country as ornamental stove plants. The pitchers vary much in size, some of the species producing them quite eighteen inches long and capable of holding a quart of water, whilst others have pitchers no larger than a thimble. "W. C. M." is quite wrong in saying that the lids of the pitchers of *Nepenthes*, or indeed of any pitcher-plant known, close again after they have once opened. When the pitcher is about full-grown, the lid pushes open, widely in some species, only slightly in others, and remains quite stationary till the pitcher dies. When the lid opens, the pitcher is found to be about one-quarter filled with a sweetish watery liquid. Under cultivation it is necessary to keep the pitchers filled with water, or they soon shrivel; and it is found that, however frequently the water is renewed, it soon acquires a slight sweetness; so that the secretion of "honey" going on in the pitcher must be somewhat copious. If the water which is in the pitcher when it first opens dries up, there is no further secretion of liquid—at least such is the case with cultivated plants. At Kew the oldest pitchers on the *Nepenthes* attract insects as long as they contain moisture. The *Sarracenia* have their pitchers formed by the folding and joining of the edges of the leaves, so as to make a long funnel which is wide at the mouth and narrowed to almost a point at the base. Over the mouth the flap-like lid is fixed and in some of the species stands erect so as to admit rain-water into the pitchers, whilst in others the lid curves over in such a manner as to hinder the rain from falling into them. In 1815 the then President of the Linnean Society, Dr. James McBride, read a communication on the fly-catching propensity of *Sarracenia*, from which the following is worth quoting, as it describes accurately what we have repeatedly observed in the collection of *Sarracenia* cultivated at Kew. He says, writing chiefly about *Sarracenia variolaris*: "If, in the months of May, June, or July, when the leaves of these plants perform their extraordinary functions in the greatest perfection, some of them should be removed to a house and fixed in an erect position, it will soon be perceived that flies are attracted by them. These insects immediately approach the fauces of the leaves, and, leaning over their edges, appear to sip with eagerness something from their internal surface. In this position they linger, but, at length allured, as it would seem by the pleasures of taste, they enter the tubes. The fly, which has thus changed its situation, will be seen to stand unsteadily, it totters for a few seconds, slips, and falls to the bottom of the tube, where it is either drowned or attempts in vain to ascend against the points of the hairs. The fly seldom takes wing in its fall and escapes. In a house much infested with flies this entrapment goes on so rapidly that a tube is filled within a few hours, and it becomes necessary to add water, the natural quantity being insufficient to drown the imprisoned insects. The leaves of other species might well be employed as fly-catchers; indeed I am credibly informed that they are in some neighbourhoods. The leaves of *Sarracenia flava*, although they are very capacious, and often grow to a height of three feet or more, are never found to contain so many insects as those of other species. The cause which attracts flies is evidently a sweet viscid substance resembling honey, secreted by, or exuding from, the internal surface of the tube. From the margin, where it commences, it does not extend lower than one-fourth of an inch. The falling of the insect as soon as it enters the tube is wholly attributable to the downward or inverted position of the hairs of the internal surface of the leaf. At the bottom of a tube, split open, the hairs are plainly discernible pointing downwards; as the eye ranges upwards they gradually become shorter and attenuated, till at, or just below, the surface covered by the bait, they are no longer perceptible to the naked eye nor to the most delicate touch. It is here that the fly cannot take a hold sufficiently strong to support itself,

but falls. The inability of insects to crawl up against the points of the hairs I have often tested in the most satisfactory manner" (*Trans. Linnæan Society*, vol. xii.). I have again and again released blue-bottle flies after they have been trapped, and have never yet found them act in any way that would suggest an intoxicating property in the secretion which they had fed upon—this is contrary to the information of "W. C. M.," who says:—"After feeding upon the secretion for two or three minutes they [the insects] become quite stupid, unsteady on their feet, &c." To prevent the pitchers being injured by the large number of insects which are lured into them, we find it necessary at Kew to fill the mouths of the pitchers with cotton-wool; this prevents the insects from falling in. Before this precaution was taken many of our finest pitchers were lost, owing to the decay which was caused by the rotten mass of insects which had accumulated in the bottom of the pitchers. "W. C. M." will be surprised to hear that, in spite of this cutting off of the supply of insects to the pitchers, the plants were in no way affected as regarded growth or vigour, but that the length and general health of the pitchers were more satisfactory after the insects were not allowed to enter them, than before. The concluding sentence in his remarks is rather startling, as, so far as investigations conducted by physiologists have gone hitherto, the *Sarracenia* are not known to be carnivorous. Mr. W. H. Gilburt, of the Quekett Microscopical Club, says:—"The pitchers contain fluid, but nothing corresponding to a digestive fluid has been detected in them; so that, if the insects which perish in the pitcher are of any value to the plant and afford any nutriment, it must be simply by maceration, and the glands can be regarded as absorbent only." Of course it may be said that *Sarracenia* would not have been constructed with what appears to be a view specially to catching insects, if the insects were not to serve some useful purpose in the economy of the plant. Anyhow, at present it is only safe to say of *Sarracenia* that they allure and ultimately destroy insects, but we do not yet know that they obtain nourishment from them. Certainly under cultivation there is abundance of evidence to prove that these, and in fact all those plants which are considered to be distinctly carnivorous, grow and thrive at least as well when insect food is not allowed them as when it is.

Kew

W. WATSON

Colourless Chlorophyll

IN his elaborate "Contributions to the Chemistry of Chlorophyll" (*NATURE*, vol. xxxi. p. 117), Mr. E. Schunck rightly observes that the explanation given by Mr. Tschirch for the curious fact discovered by Mr. Church is not based on sufficient proof. Indeed it could hardly be admitted that the action of metallic zinc is a process of reduction, since a similar result may be arrived at when zinc oxide is used instead of the metal. (A fact that I stated in 1869).

But quite recently I have had the opportunity to convince myself that the reaction that takes place when a chlorophyll solution is treated by metallic zinc and an organic acid is of an utterly different nature. Through the agency of nascent hydrogen generated in the reaction, *chlorophyll* is actually reduced, the resulting substance being not of a green colour, but perfectly colourless, and presenting no traces of the characteristic chlorophyll spectrum or fluorescence. It is only on coming in contact with the air that it gradually acquires both its green colour and specific optical properties. It is highly instructive to watch the phenomenon in a test-tube placed before the slit of a spectroscope and observe the first appearance and subsequent growth of the dark bands, the colourless substance regaining in the mean while its original splendid emerald green.

The physiological importance of this fact will be obvious to all botanists interested in the subject; for my part I consider that the discovery of this colourless modification of chlorophyll brings additional proof in favour of an hypothesis that I proposed in 1875 concerning the chemical nature of chlorophyll—viz. that the green colour of this substance is due to the presence of iron in the state of a FeOFe_2O_3 compound. In fact, all the changes that this substance undergoes, its production, its destruction, the action of acids, of metallic zinc and zinc oxide, might be easily accounted for by admitting this simple and very plausible hypothesis.

But whatever may be the ultimate fate of this "provisional" hypothesis, the fact just stated will lose nothing of its importance. Its chief interest lies in the establishment of the existence of a colourless substance, acquiring by oxidation all the optical

properties of chlorophyll. It is evident that chlorophyll is generated in this case by a process similar to that which takes place in the living plant. (The existence of such a substance has been often announced, but continues to be a subject of doubt). At the same time we may see the reason why, admitting that chlorophyll undergoes a process of reduction when CO_2 is dissociated through the agency of light (this supposition is highly probable), this transformation may not be attended by a visible change of its colour, and other optical properties—the produce of reduction being colourless and having no dark lines in the spectrum. However, the change of colour that M. Sachs observed in a great number of leaves on exposing them to direct sunlight, and which is generally attributed to a migration of the chlorophyll grains, might, partly at least, be due to this process of reduction.

C. TIMIRIAZEFF

Moscow, July 15

July Meteors

BETWEEN July 8 and 14, 111 shooting stars were recorded here in 11¼ hours of observation. The paths of these, reproduced upon an 18-inch celestial globe, enabled me to fix the radiant points of 12 showers with considerable distinctness:—

No.	Epoch. July.	Radiant.	Notes.
1 ...	13-14 ...	11° + 48°	Meteors long, swift with streaks.
2 ...	8-13 ...	245° + 52°	Slow, yellow, max. July 8.
3 ...	13-14 ...	255° + 37°	Slow, faint, near π Herculis.
4 ...	9-13 ...	265° + 63°	Slow, faint, near ζ Draconis.
5 ...	9-14 ...	271° + 21°	Slow, faint. In Cerberus.
6 ...	9-13 ...	280° - 14°	Very slow, long paths.
7 ...	13-14 ...	285° + 42°	Very swift and short, near α Lyrae.
8 ...	9-13 ...	289° + 31°	Swift, faint, near γ Lyrae.
9 ...	8-13 ...	290° + 60°	Slow, bright, near ϵ Draconis.
10 ...	8-13 ...	303° + 24°	Swift. In Vulpecula.
11 ...	13-14 ...	314° + 47°	Very swift, short, bright, near α Cygni.
12 ...	9-14 ...	329° + 36°	Swift, reddish streaks. S. of Lacerta.

Nos. 1, 7, 8, 9, 11, and 12 were well observed by Zezioli in 1867-68, and form Nos. 93, 90, 88, 89, 99, and 98 of the catalogue of radiants derived by Schiaparelli from his observations.

Generally the meteors observed here during the past month were small, but three were estimated as bright as Jupiter. The first of these appeared on July 8 at 12h. 1m., shooting rapidly along a course of 27 degrees a little west of ζ , η , θ Draconis. It left a brilliant streak, enabling the path to be very accurately noted. This meteor belonged to the radiant at 11° + 48°, and soon afterwards, at 12h. 10m., another fine one was seen pursuing a greatly foreshortened path near δ Draconis and throwing off a dense train of yellowish sparks. Its motion and appearance prove it to have been a Draconid and a member of the display from 290° + 60°. On July 9, at 13h. 50m., I recorded a fine meteor shooting upwards, just east of Altair, from a centre at 304° - 15° near α and β Capricorni; but I have not included this position in the list, as I only saw one other shooting star with a conformable direction during the period included by my observations.

On July 31 a few fine and early members of the August Perseids were seen, and on August 1, between 9h. 45m. and 9h. 50m., I noted three others, two of which were unusually brilliant, and projected vivid streaks upon their long, graceful flights through the Milky Way west of Aquila. This conspicuous and early appearance of the Perseids would seem to predicate a bright maximum on the night of August 10.

Bristol, August 2

W. F. DENNING

The August Meteors

LAST night at 9.32 a brilliant meteor crossed Cassiopeia's Chair from W. to E. parallel to the horizon. Its trail was visible for twenty-six seconds after the bursting of the meteor. During a five mile walk, lighted by many meteors, the summer lightning incessantly flashed from the northern horizon, but its brightness was never comparable to that of this meteor. It resembled most a magnesium rocket in the Crystal Palace fireworks. But even this comparison is hardly adequate.

Chatham, August 12

H. B. JUPP

A Possible Windfall for Science

Is not the better course for immediate action that the departments in England and the United States should first combine?