*Elemente der Organographie, Systematik, und Biologie der Pflanzen.* Von Dr. Julius Wiesner. (Wien: Alfred Hölder, 1884.)

THIS is the second volume of a more extensive work entitled "Elemente der wissenschaftlichen Botanik," the first volume of which dealt with the anatomy and physiology of plants. The first part of this the second volume is occupied with organography: the author recognises five fundamental types of vegetative organs, viz. "phyllom, caulom, rhizicom, trichom, thallom," and thus ignores the conclusion of Sachs, that stem, leaf, and root are not coordinate categories, but that the root should rather be coordinated with the shoot, a structure composed jointly of stem and leaf. Further, he cites the sporangia of Ferns as examples of trichomes (p. 5), and thus does not adopt the view of Goebel, that the sporangium is an independent organ, and is not referable to the categories of vegetative organs. These two points are sufficient to show that the book is not abreast of current morphological opinion.

The second part is devoted to the systematic study of plants. The arrangement adopted is that of Eichler's "Syllabus," in which the classification of Angiosperms is different from that in current use in England. This section appears to consist chiefly of an enumeration of facts, and the student is left to draw his own comparisons between the plants described.

Then follows a part on "Biology," a very readable treatise on the life of the individual, reproduction, and the origin of species. As an appendix a short history of the development of botany is given, and in a few pages of notes, references are given to the most important works on various branches of the subject. It is surprising under the head of classification of Phanerogams (p. 424) to find no mention of the "Genera Plantarum" of Bentham and Hooker, the most important publication of the sort in recent years. The book is illustrated by numerous woodcuts, many of which are taken from older books, for example Schleiden's "Grundzüge." Looking at the book as a whole, there is nothing sufficiently new either in the material or in the treatment to recommend it above others already before the public.

## 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.*]

### On the Motion of Projectiles

I HAVE read with great interest Mr. Bashforth's article on a new method of estimating the steadiness of elongated shot when fired from large guns, and I have no doubt that we should have a much better knowledge of every new gun to be brought into service if we could try it, using the Bashforth chronograph, which is the most perfect for measuring the times occupied by a shot in passing over a succession of equal distances. That would give us at once the coefficient of resistance of the air to the projectiles used in that special gun, and then by very simple formulæ and tables the calculation of trajectories (which is one of the main points in artillery) would be a very easy task.

Instead, with the present system, viz. knowing only the muzzle velocity, we must rely for these calculations on the coefficients determined with only one sort of projectiles; and of course such coefficients must vary very much (more, perhaps, than is generally thought) with different projectiles, with different shapes of the head, and especially with the different methods of giving rotation.

Lately many improvements have been made in the form of the projectiles; many ogival-headed shots of two diameters have been introduced, and the use of breechloaders instead of muzzle loaders has allowed the use of better means of giving rotation.

Of course the present coefficients still hold good for comparatively short ranges, and for heavy projectiles, because then the loss of velocity is little on account of the small $\frac{d^2}{w}$. But when the $\frac{d^2}{w}$ is rather large, as in the case of small guns or rifles, then the coefficients $K_v$ are less reliable.

I have had great experience in calculating with the Bashforth method, and I have been able to calculate trajectories for heavy guns, which were not far out from the actual practice; I had still better results using Prof. Niven's method and table; but when I had to calculate trajectories for small guns, both these methods failed to give me reliable results.

For instance, in calculating the trajectories for the Nordenfeldt one-inch gun, I had with Bashforth's method for an angle of elevation of 9° a range of 2282 yards, and for 12° of elevation a range of 2539 yards: instead by actual practice the elevations required were found to be—

| | |
|---|---|
| For 2200 yards ... ... ... ... | 7° 12′ |
| ,, 2400 ,, ... ... ... ... | 8° 20′ |
| ,, 2600 ,, ... ... ... ... | 9° 36′ |

The bullets have an ogival head struck with a radius of one diameter and a half, therefore they are not different in shape from the shots used by Mr. Bashforth in his experiments. Besides I divided the trajectory into many small arcs, and I was very careful in applying the correction for the different density of the air, viz. using always the formula $\frac{d^2}{w}\left(1 \pm \frac{\Delta}{534{\cdot}22}\right)K_v$, instead of simply $\frac{d^2}{w}K_v$. I was even rather afraid of overdoing this correction, taking a lighter weight of the air than was necessary; and I was very much astonished when I saw that the trajectories calculated were much too short.

It seems to me also that the correction to be applied when the bullet rises to a great height, requires a little more consideration, and a thorough mathematical investigation.

I think that the problem of a body moving in a medium which becomes less and less resistant as the body advances through it is more complicated than we would think at first, and cannot be dealt with by only considering the density of the medium equal to the mean of the densities at the two terminal points.

E. RISTORI

### Christian Conrad Sprengel

THE interest in my note on Sprengel (NATURE, vol. xxix. p. 29) may excuse some additional facts. In the Life of Dr. E. L. Heim (by G. W. Kessler, Leipzig, 1835, 8vo) the following is reprinted from Heim's diary, vol. ii. p. 72:—

"I read Rector Sprengel's work with indescribable satisfaction. Since the time when I read Hedwig's system of the fructification of the mosses, fourteen years ago, I never had such a great and thorough pleasure as to-day. I cannot admire enough the power of observation, the untiring assiduity, the acuteness, and the correct and clear exposition of the facts which he had observed. His work is a masterpiece, an original, which gives him honour and of which Germany can be proud."

Dr. Heim, who afterwards became a distinguished physician in Berlin, Prussia, was an enthusiastic mycologist, who had made the acquaintance of Sir J. Banks and Solander, had studied carefully Dillenius's Herbarium in Oxford, had later visited Gærtner and Koelreuter. He speaks rather enthusiastically about this naturalist, who showed and explained to him his experiments. Dr. Heim gave also the first instructions in botany to Alexander von Humboldt.

Mr. Kessler, the editor of Heim's Life, says (vol. i. p. 286):—"Heim found in Rector Sprengel, to whom he gave the first instructions in botany, a remarkable student. Sprengel repaid largely all pains which Heim had spent on him by the fruit of his careful studies."

The editor wrote this in 1835, and the fact that he selected out of the diary the above-quoted note proves well how much Sprengel's work was appreciated and admired even by non-scientists.

In Kœnigsberg, Prussia, Prof. C. F. Burdach, in his yearly lectures on physiology, taught and appreciated highly Sprengel's discoveries. In his large "Physiology," published in 1826 with