

development is often hap-hazard, and the mental revolution required before Faraday's idea can be assimilated generally proves troublesome to the student.

The author's view, then, so far as we can gather, is that the subject should be developed from Faraday's standpoint. With this we are in complete sympathy. But the problem of writing a text-book from a new order of thought is no easy matter, and the first portion of the volume is distinctly disappointing. There are frequent relapses to the old method, the treatment is somewhat laboured, and the result, so far from being inspiring, is confusing and inconclusive.

In the latter part of the volume the author treats of electrical currents, and the fundamental laws are developed without the introduction of the magnetic properties. This is distinctly good, and, although not quite new, will commend itself favourably to those who take an interest in the philosophical and logical presentation of the subject.

We cannot help thinking that the author is somewhat misguided in pushing a hydrodynamical analogue to the extent he does. It is difficult to reconcile the suppositions that velocity corresponds to electrical force, and pressure to electrical potential. Chapter x. is devoted to "an extension of this hydrodynamical picture." We are of opinion that when an analogy becomes so troublesome that a chapter is required to expound its additional artificial properties, it has ceased to be of any assistance, and the sooner it is dropped the better.

*Die Keimpflanzen der Gesneriaceen.* By Dr. Karl Fritsch. Pp. iv+188. (Jena: G. Fischer, 1904.) Price 4.50 marks.

THE Gesneriaceæ are generally familiar to horticulturists and others, since the order includes several favourite greenhouse plants, to mention only *Ramondia*, *Saintpaulia*, *Achimenes*, *Streptocarpus*, and *Sinningia*, of which one species passes as *Gloxinia*. The morphological peculiarities of these and other less known genera are not so familiar, in fact, it has been the object of Dr. Fritsch to find their correct interpretation by the aid of cultivation and examination of such seedlings as he was able to obtain. Some of the principal morphological features are the tuber-bearing plants of which *Sinningia* is a type; vegetative scale-covered runners which propagate the plant, characteristic of *Achimenes* and *Kohleria* (*Isoloma*); and the unequal development of cotyledons which is well known to cultivators of *Streptocarpus Wendlandi*. The unequal development of the cotyledons is regarded by the writer as a special case of *anisophylly*, for which he proposes the term *anisocotily*; in this connection there is a discussion of the views put forward by Wiesner and Goebel on *anisophylly*, and it is shown that some modification is required in order to explain *anisocotily*. A further irregularity in the case of *Klugia Zeylanica* and some species of *Streptocarpus* is the displacement of the cotyledons from the opposite to an alternate position; this is attributed to the intercalary development of an internode between the cotyledons, to which the name of *mesocotyl* is given.

The scale-bearing runners have been variously described; they resemble bulbs in so far as the leaves are swollen into food reservoirs, but they differ therefrom because the stem is elongated and also contains reserve food material, and the swollen leaves may be closely packed, when the runner resembles a pine cone, or the leaves may be loosely arranged; on this account Dr. Fritsch prefers to call them *bulbshoots* (*Zwiebelsprosse*), and he would include under this designation the similar bodies which are found on species of *Epilobium*, *Oxalis*, *Saxifraga*, and *Dicentra*.

Dr. Fritsch confirms Lubbock's statement that the

tubers of *Corytholoma* (*Gesneria* of gardeners) and *Sinningia speciosa* (*Gloxinia*) are produced by the thickening of the hypocotyl, and adds that in the case of *Corytholoma cardinalis* the epicotyl also takes part in its formation. It is not possible to mention, much less to pass in review, the various morphological details, but enough has been said to show that the Gesneriaceæ, as an order, will repay careful study, and it should be added that this account of the seedlings is characterised by clearness and breadth of treatment, and the German is simple enough to suit the veriest tyro.

*Das Leben im Weltall.* By Dr. L. Zehnder. Pp. 125. (Leipzig: J. C. B. Mohr, 1904.) Price 2.50 marks.

MAN and animals and plants all live, each in its degree. Lower than these is matter itself. Does it live? Do crystals live in their mother-liquid? In general, is the universe itself a living thing? These are the questions which a professor of physics of Munich attempts to answer in this small volume. We learn that the variations of matter, and those variations of plants and animals which are taken as special evidence of their vitality, are linked together in an unbroken chain. On the other hand, an exception is made in respect to the ultimate structure of the atom itself. In fact, a well defined boundary is found to separate substances of which inorganic bodies consist from substances which are necessary for the formation of organic bodies.

We can by no means pretend to have followed all the arguments put forward, even when they have purely physical reference. Thus, the author concludes that the æther has an atomic structure merely on the ground that, having decided that it is a substance, there is neither sense in nor justification for attributing to it any properties except those which other substances possess. This dogmatic style of reasoning is characteristic of the whole argument; and it certainly does not conduce to confidence when matters are discussed with which we are not so familiar.

*First Stage Steam.* By J. W. Hayward, M.Sc. Pp. 230. (London: W. B. Clive, University Tutorial Press, Ltd., 1904.) Price 2s.

MR. HAYWARD is very happy in the treatment of his subject in his "First Stage Steam," written to meet the requirements of the examination of the Board of Education at South Kensington. After a short introductory chapter on mensuration and squared paper work, drawings of a simple horizontal steam engine are given, and the functions of the various parts are described in detail. This description occupies considerable space, and at appropriate intervals is made the occasion for the introduction of experiments and calculations bearing on the subject. The Lancashire boiler with its mountings is then well described, and this leads naturally to the consideration of combustion and the heat properties of steam. The reader is introduced to these by simple and striking experiments which he can make himself, and not until after this has been done is the student informed of the results of classical experiments on which heat calculations of the steam engine are based. The writer then, by the help of good illustrations, touches on the salient points connected with the design and working of modern locomotives, marine engines, internal combustion engines, and steam turbines. The reader is left with the impression that there is very much in the subject worthy of attentive study. A special feature of the book is the encouragement given to quantitative experimental work with simple apparatus which the student can make and use himself. The book is not free from slight defects, but is sure to give satisfaction wherever used.