tionships of convergent types commingled in a common environment and has no basis in critically conducted pure cultures. On the other hand, it is certainly to be expected that more instances of polymorphic life cycles, both obligatory and adaptive, will be discovered when the full histories of green unicells are unraveled. Furthermore, among the Dinoflagellata with certainty, and possibly among the desmids also, there is a high degree of self-regulating control of surface structures leading to a considerable range of form within the species. This is made evident from the fact that in both of these groups there are many species in which at the time of binary fission the daughter organisms each inherits one half of their exoskeleton or cell wall and forms the other half under the influence of the circumambient environment, which in some instances induces a strikingly different form of cell wall, involving structures utilized as specific characters. These may be of a mutative category, or more evidently of an adaptive or self-regulatory nature. It is also true that the theca or exoskeleton of the Dinoflagellata is subject to autotomy, local ecdysis, total exuviation, and local resorbtion and reconstruction to a considerable degree, after its formation, in adaptive response to changing environmental conditions. Such changes are not, however, of the same order of magnitude as those more profound ones occurring in the transformations in the life history of algæ, such as the *Palmella* stage of the Chlamydomonads.

On the whole, Professor West's contention as to specific stability seems to be well founded, provided adequate latitude for the metamorphoses of life history is retained and due allowance is made for adaptive and involution stages arising under environmental pressure. Both the pure culture method and wide observation of much material of the species under varying environments are needed to determine the normal range of form.

The rapid growth of biological literature in the past decades has tended to isolate botanists and zoologists, to the detriment of progress in both fields. Professor West's work is of great value in facilitating excursions of zoologists into one fundamental and suggestive field of botanical research.

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A German-English Dictionary for Chemists. By Austin M. Patterson, Ph.D., editor of chemical terms for "Webster's New International Dictionary" and formerly editor of "Chemical Abstracts." New York, John Wiley & Sons, Inc.; London, Chapman and Hall, Limited. 1917. Pp. xvi + 316. Price $2.00.

Dr. Patterson's dictionary fulfils a need which probably every English-speaking worker in chemistry has experienced, and fulfils it admirably. The large number of scientific and technical words and the abbreviations which puzzle the beginner in the reading of chemical German are all there and the older chemist long accustomed to the reading of German chemical literature will experience no less satisfaction in the use of this book, for it is sure to save him much time in determining the exact meaning of the words that even he is apt to find troublesome. The thoroughness with which the dictionary covers the broad field of chemistry as well as such related sciences as physics, mineralogy and pharmacy is very satisfying. Since its appearance in January it has been in constant use in the office of *Chemical Abstracts,* where translating work involving every phase of theoretical and applied chemistry is done and it has stood this test of completeness in such a way as to justify the confidence with which it is used. I say "justify" because, knowing the nature of Dr. Patterson's work on other things and having in mind his experience in handling chemical literature and in compiling the chemical vocabulary and other parts of the New International Dictionary, we expect much.

In his translations of German names of chemical compounds Dr. Patterson has used care to keep the nomenclature in accord with the best usage. The Introduction, which should be very helpful in several ways, includes interesting sections on inorganic and organic nomenclature. Many American chemists should read and heed the translating rules contained in these sections, for all too often German spellings, especially endings, are carried over into names used as English. At times this results in confusion. The new dictionary will tend to correct this bad practise, and it is hoped that it will help the cause of good chemical nomenclature in other ways.

Besides words from fields of science related to chemistry the dictionary contains a general vocabulary "to save the user the trouble of looking up the more common German words in a separate dictionary" and "because many general words have a technical, or at least a customary, chemical meaning," which "in a general work is often either absent or buried among other senses." The entries are all brief, few of them requiring more than a single line (two columns to the page). There are no long paragraphs of combinations, examples, etc., to wade through. The English equivalent usually sought by the scientist is given at once. These features add greatly to the convenience in use.

The use of small type (six point), which does not seem objectionable since one does not read a dictionary steadily, has made for compactness. The book will fit a large pocket. The work of the printer and binder (the cover is flexible) has been well done.

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SPECIAL ARTICLES

THE NATURE OF THE ULTIMATE MAGNETIC PARTICLE

It appears probable from various considerations that when a substance is magnetically saturated, the "molecular magnets" of which it is composed have their axes arranged parallel with the external magnetic field. On this assumption it is possible to investigate the validity of those theories, such as Bohr's which would explain the magnetic properties of an atom as due to electrons revolving about the atomic center in orbits all lying in the same plane.

It has been shown that the relative intensity of the different orders of an X-ray spectrum line depends upon the distance of the electrons from the middle planes of the atomic layers in the diffracting crystal.[1] Imagine X-rays to be reflected from the surface of a ferro-magnetic crystal composed of atoms of the type just described. When the crystal is unmagnetized the different atoms will have their electronic orbits distributed in all possible planes, so that on the average the electrons will be at an appreciable distance from the mid-planes of their atomic layers. If, however, the crystal is magnetically saturated perpendicular to the reflecting face of the crystal, the electronic orbits, being perpendicular to the magnetic axes of their atoms, will all lie parallel to the crystal face. The electrons will therefore now be *in* the mid-planes of the layers of atoms which are effective in producing the reflected beam. It can be shown that such a shift of the electrons must produce a very considerable increase in the intensity of the reflected beam of X-rays. On the other hand, if the crystal is magnetized parallel to the reflecting face, the turning of the orbits will carry the electrons farther, on the average, from the middle of their atomic layers, and a decrease in the intensity of reflection should result. Of course if the electrons are arranged isotropically in the atom, or if the atom is not rotated by a magnetic field, which would mean that it is the electron or the positive nucleus that is the ultimate magnetic particle, no such effect should be observed.

We have hunted in vain for such an effect on the intensity of the reflected beam of X-rays when the reflecting crystal is strongly magnetized. In our experiment a "null method" was employed. The ionization due to the beam of X-rays reflected from a crystal of magnetite was balanced against that due to a beam reflected from a crystal of rock-salt, so that a very small change in the relative intensity of either beam could be detected, while variations in the X-ray tube itself had little effect.

[1] A. H. Compton, *Phys. Rev.*, 9, 29 (1917).