ing the flora to partake far more of that of the Pacific than of the Atlantic coast. It differs, however, notably from the Californian flora in the paucity of Papaveraceæ, Rhamneæ, Hydrophyllaceæ, Labiatæ, Cupuliferæ, Coniferæ, and Liliaceæ.

The distribution in the United States of America of the 480 indigenous European species,[1] which form an integral part of their flora, offers some very interesting matters for consideration. Of these there are indigenous to the

Rocky Mountain Flora	about	300
Eastern United States	„	370
Californian	„	225
Common to all	„	135

The following list of some of the Rocky Mountain species not found either in the Eastern Alps or Sierra Nevada of California is a very instructive one. No doubt some occur in the northern continuation of the Sierra Nevada, in Oregon, and Washington, &c.; such are therefore plants of the Pacific States, though not Californian:—

Ranunculus hyperboreus, nivalis, pygmæus, and affinis
Thalictrum alpinum
Papaver nudicaule
Draba stellata, incana
Viola biflora
Cerastium alpinum
Sagina nivalis
Elatine triandra
Astragalus hypoglottis
Potentilla nivea
Saxifraga Hirculus, flagellaris, cæspitosa, cernua, adscendens, punctata
Chrysosplenium alternifolium
Epilobium latifolium
Adoxa Moschatellina
Hieracium umbellatum
Campanula uniflora
Androsace Chamæjasme
Gentiana frigida, glacialis, prostrata
Swertia perennis
Lloydia serotina
Juncus triglumis, castaneus
Kobresia caricina
Carex microglochin, rupestris, obtusata, frigida, ampullacea, nardina, gynocrates, incurva, stenophylla, elongata, leporina
Alopecurus alpinus
Deyeuxia lapponica
Catabrosa aquatica

These it will be seen are for the most part Arctic plants, whose presence might be expected on any range of mountains of sufficient elevation in America; but they are absent both in the Sierra Nevada and the White Mountains of the Eastern States. On the other hand, it is not easy to account for the absence in the Rocky Mountains of an even greater number of European species which are found in the Eastern States or in California, or both, and of which some occur in most other meridians of the globe. Such are especially

Caltha palustris
Nuphar lutea
Cardamine bellidifolia and pratensis
Arabis petræa
Drosera (all the 3 European species)
Arenaria peploides
Montia fontana
Oxalis Acetosella
Oxytropis campestris
Rubus Chamæmorus
Circæa lutetiana and alpina
Lythrum Salicaria
Lobelia Dortmanna
Ericeæ (12 species, nearly all Arctic, and both European and Asiatic)
Menyanthes trifoliata
Trientalis europæa
Euphrasia officinalis
Prunella vulgaris
Armeria vulgaris
Myrica Gale
Salix herbacea
Betula alba
Taxus baccata
Rhynchospora alba and fusca
Carex (24 species, chiefly boreal)
Tofieldia palustris
Narthecium ossifragum
Luzula arcuata
Hierochloe alpina
Aira atropurpurea
Glyceria fluitans

[1] In Gray's "Vegetation of the Rocky Mountain Region," cited above, will be found an exhaustive table of comparison of all the Alpine plants of the Atlantic, Pacific, and Rocky Mountain regions as then known. Coulter's "Flora," however, introduces considerable modifications in its details.

Neither the climate of the Rocky Mountain region, its elevation, its geological structure or its physical features, appear to present obstacles to the migration into it of these common plants of the colder north temperate zone from Canada or from the Eastern United States. It is still more difficult to understand how those that occur in all three adjacent American regions should have become excluded from the fourth, which they may be said to bound.

It remains to add that Dr. Coulter's manual is well got up, and though claiming in the preface to be no more than a compilation, it is really a very useful work. The only important omission observed, and it is a very serious one, is that of the elevations at which the plants grow. It is a great advance on the fragmentary "Synopsis of the Colorado Flora" by Porter and Coulter, which was welcome in its day; and though there is no doubt that a good many more species will be found in a future edition, and that some of the data extracted above will be thereby interfered with, there is no reason to suppose that these will clash with the main facts, which so amply confirm all the conclusions that Asa Gray drew years ago from the comparatively imperfect data then at his disposal.

J. D. H.

MORLEY'S "ORGANIC CHEMISTRY"

Outlines of Organic Chemistry. By H. Forster Morley, M.A., D.Sc. (London: J. and A. Churchill, 1886.)

THE faults into which the writer of a text-book of organic chemistry for students is apt to be led are, as Dr. Morley points out in his preface, that of over-elaboration on the one hand, to which the material too readily lends itself, and that of unintelligent abridgment on the other. Dr. Morley adopts a satisfactory compromise by selecting for treatment a relatively small number of typical compounds, giving, however, "as much consideration to each compound as it would receive in a large treatise." Some departures from this rule are, as he candidly confesses, due to the necessity of taking into account "the requirements of students working for examinations."

Dr. Morley's arrangement of his subject is new—so far at least as it has not been anticipated in Prof. Remsen's "Organic Chemistry," which, however, did not appear until after the completion of the present work in manuscript. "I have endeavoured," he says, "to describe compounds in the order in which they may be synthetically produced, so that each compound should be a product of the one before and a producer of the one after." We must confess to having doubts as to how far, save in the interests of very young students, such an entire sacrifice of the symmetry of the ordinary classification as is involved in this arrangement is judicious.

Most text-books of organic chemistry contain, prefixed to each class of compounds, preliminary chapters dealing with the general modes of preparation, the properties and the reactions of the entire class. This arrangement finds no favour in the author's eyes. "Not until he (the student) finds that a series of reactions can be grouped together under some general expression should he be allowed to mention a general law." The principle is doubtless, within its proper limits, sound; but we should

be sorry to lay down a hard-and-fast rule. The order of educational exposition is not necessarily identical with that of scientific discovery. Facts are more readily remembered if the principle connecting them is known beforehand. And if a teacher, by offering a few preliminary generalities, can peptonise a rather indigestible mental nutriment, why should he, on purely *doctrinaire* grounds, be forbidden to do so? Did Dr. Morley ever read a novel, and if so, did he never yield to the human temptation of anticipating the course of the narrative by looking at the end?

Dr. Morley has distributed the general reactions throughout the text, calling attention to them, however, by printing them in spaced type. The theoretical sections are as a rule brief, but to the point. An excellent account of the benzene theory is introduced; but we would point out that Hübner has given a simpler proof of the existence of the symmetrical *meta* pair of hydrogen atoms than that of Wroblewsky quoted by Dr. Morley: this proof is based upon reactions of the two nitro-salicylic acids.

The selection of facts is judicious, and, inasmuch as Dr. Morley's plan demanded that each compound should be treated of with considerable fulness, the student can hardly turn to any section of the book without learning all that is of real importance under that head.

Several inaccuracies have crept into the book, although they are not sufficiently numerous to interfere seriously with its usefulness. In his preface Dr. Morley acknowledges his indebtedness to Beilstein's treatise in his search for facts, and we fear that he has not always been sufficiently careful to ascertain how far Beilstein's statements are traversed by more recent experimental results.

Thus on p. 136 the author introduces glycerin ether —formerly dear to classification as the only example of the ether of a trihydric alcohol. But Tollens and Loë have shown that, whatever this compound may be, it is certainly not an ether of glycerin.

On p. 389 it is stated as a universal rule, that, in the conversion of diazo-compounds into substituted azo-compounds, "where nitrogen becomes attached to an atom of carbon in a benzene nucleus, the nitrogen takes up a para-position with regard to one of the groups already present." Mazzara, Witt, Liebermann, and Griess have shown that the nitrogen may also take up the ortho-position.

Following Beilstein the author has altered Wertheim's formula for conhydrine, $C_8H_{17}NO$, into $C_8H_{19}NO$. This has of course been done in order to bring Wertheim's statement, which Dr. Morley gives, that conhydrine may be broken up into water and coniine, into harmony with Hofmann's formula for coniine. But Hofmann has shown that Wertheim's conhydrine formula is correct, and that it is his experimental fact which is wrong: conhydrine does not yield coniine. In this connection it is strange that Dr. Morley makes no mention of Ladenburg's synthetic optically-inactive coniine (α-isopropylpiperidine).

Under piperidine (p. 434) Königs's assertion that pyridine can be reduced to this compound by treatment with tin and hydrochloric acid is given. Dr. Morley must have overlooked Ladenburg's criticism of this work.

In the indigo group we find isatin (p. 386) represented as a lactam instead of as a lactim, and the so-called nitroso-oxindol (in reality isotoxim) formulated as a true nitroso-compound, instead of as an isonitroso-compound. It is of course conceivable that in these two cases Dr. Morley does not share the views put forward in Baeyer's later work on the indigo-compounds.

In the foregoing instances the information is, as already stated, merely not up to date. But there are one or two statements in the book, the source of which we are quite unable to trace. Thus we are told (p. 339) that "anthraquinone forms a compound with bisulphite of soda." If there is one thing that distinguishes anthraquinone from the quinones of the other hydrocarbons with complex nuclei—from phenanthraquinone, chrysoquinone, &c.—it is the fact that it does *not* form a compound with bisulphite of soda.

Again, under the head of ultimate analysis of organic compounds, we read:—

"Many mixtures have been suggested from time to time as substitutes for oxide of copper; the latest is a mixture of potassic chromate and precipitated binoxide of manganese proposed by Dr. Perkin."

Dr. Perkin would indeed have much to answer for if he had proposed such a substitute for oxide of copper. The mixture was proposed as a substitute for *reduced* copper, to absorb the oxides of nitrogen formed during the combustion of nitrogenous organic compounds.

The equation for the action of trichloride of phosphorus on acetic acid (p. 47) is an instance of the strange vitality which symmetrically-constructed and plausible but quite erroneous chemical equations sometimes display. We do not blame Dr. Morley for introducing the equation: it is given in all organic text-books, ancient and modern, from the time of Gerhardt to the present day, and will probably continue to be employed, translated into the notation of the distant future, at a time when our present formulæ have become as unintelligible as cuneiform inscriptions. The correct equation may however be found, by the curious in such matters, in a paper by Dr. Thorpe, (*Chem. Soc. Trans.*, 1880, p. 186), who was at the trouble to work out the reaction quantitatively.

An excellent feature, unusual in an elementary work of this kind, is to be found in the copious references, designed to encourage in students the habit of reading original papers for themselves.

F. R. JAPP

THE SPRINGS OF CONDUCT

The Springs of Conduct; an Essay in Evolution. By C. Lloyd Morgan. (London: Kegan Paul, Trench, and Co., 1885.)

THIS is a thoughtful and extremely well-written little book on psychology and ethics, regarded from the standpoint of evolution. There is not much in it that is strikingly original; but the material is so well arranged, and the views so lucidly expressed, that the work constitutes a most interesting epitome of modern thought upon the subjects of which it treats. The author is a man well informed as to his facts, while his ability as an analyst may be remembered by the readers of this journal, in the pages of which it was well displayed a year or two ago in a criticism upon the work of the present writer. On that occasion Mr. Morgan took exception to the study of animal intelligence and mental evolution in animals, on the ground that it is impossible to obtain any verified