around the pore stretches less than the thinner parts of the cell wall.

This series of changes does not take place if the leaves are wilted. If wilting occurs after the guard cells are open the point of equilibrium is shifted so that the sugar changes to starch and the guard cells close. If the leaves remain turgid the guard cells remain open until darkness and close by a reversal of this series of changes. These changes can be made to go in either direction by experimentally changing the acidity of the guard cells.

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A BOTANICAL SPELLING MATCH

"CAN one imagine a botanical or an entomological spelling match?" "Could 'aster' or 'grasshopper' be drawn in recognizable detail by the contestants?" These are two of the questions asked by Dr. C. E. Waters in SCIENCE for November 24.

The writer can not answer for entomology but he can for systematic botany. Formulæ may be used to express the structure of flowers. For example, the flower formula of the Boraginaceæ can be written $Ca^{\textcircled{5}}\ \overset{S^5}{\underset{\textcircled{5}}{Co}}\ P^{\textcircled{4}}$, of the Liliaceæ $Ca^3\ Co^3\ S^6\ P^{\textcircled{3}}$. In this way formulæ may be written for families, genera and species. The flower formula expresses concisely the following features: number of parts in the flower, kinds of parts, arrangement of parts, something of the shape of the flower and the position of the flower in evolution. On hearing or reading such a formula the structure and shape, as well as the taxonomic position, of the flower are immediately brought to mind. Surely it would not be difficult to imagine a spelling match in a class in systematic botany!

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SCIENTIFIC BOOKS

A GUIDE BOOK OF THE GEOLOGICAL SURVEY

THE fifth volume of the series of guide books of the western United States which our national geological survey has been producing in the last seven years is as attractive as its predecessors.

It deals with that portion of Colorado and Utah which is served by the Denver and Rio Grande Western Railway, a region visited by more tourists than any other portion of the country west of the Mississippi. To them this book would be a boon if it could be brought to their notice. Being an official publication bound in a grey paper cover it is not apt to be as widely known as it would be were it published by an enterprising publishing house, bound in bright red cover, placed in all the book stores, and mentioned in many magazines and circulars. But it is worthy of wide publicity because of its excellence. Campbell has beaten Baedeker at his own game. The book is charmingly written, beautifully illustrated and furnished with excellent maps.

The main part of the text presents in clear manner the succession of events which have resulted in the present Colorado and Utah. It does not go back just a few months or years, but begins far enough back to include the whole history of the region from earliest archæan times till 1922 A. D.

The foot notes in fine print contain the side lights on the main circuit. They deal with economic statistics, histories of individuals, explanations, definitions and illustrations of the main theme and are hardly less interesting or important than the main theme.

The central topic—the present constitution, structure and topography of the country and the forces which have produced them—is presented in a clear manner as entertaining as the talk of a clever man at a club. University students in that part of the country will no doubt use the volume as a text book since it may be obtained of the United States superintendent of documents for one fourth the price necessarily charged for the average geology, and since it is so practical and interesting. The average geological text book has the disadvantage of jerking the mind from one part of the world to the other for illustrations. This book illustrates point after point right on the spot. In the regions treated the reader can see nearly every principle of the earth's history strikingly set forth.

To apply geology to a definite locality is an

excellent practice. It tends to take the science out of the realm of theory and place it in that of reality and give it "a local habitation and a name."

Fortunate is the man who in spite of other pressing duties, finds time to read this book through and in this manner adds to the pleasure of former or coming trips in this region.

If further editions are brought out it would be well to name the formations shown in pictures and sections. For example in Plate XXI is Lyons sandstone of the Pennsylvania System seen at the gateway of the Garden of the Gods. In Figure 10, p. 37, why should "N" indicate Morrison, "B" Fox Hill, "T" Pennsylvanian, etc.? Why use one series of signs to indicate another series? Why not write down directly the name of the formation indicated and so all through this and the majority of works on geology? This old custom of using one sign to represent another sign is the geologist's way of whipping the devil around the stump. The direct action plan will help to drive away ignorance in geological matters.

A sketch map of Corona and the Denver and Salt Lake Railroad might well replace one of the two illustrations of Castle Rock (p. 21 and 26).

The present writer may be excused in inquiring why the state museum was not mentioned on p. 6.

Suggestions such as the above are mere incidents. As a whole the book is delightful and valuable and people who discover it will be indeed fortunate.

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SUGGESTIONS FOR A WORLD-CODE OF PLANT NOMENCLATURE

THE trend of a recent discussion in *The Journal of Botany* (London, 1921, 153, 289; 1922, 111, 129, 199, 256, 313) suggests that the time is ripe for an attempt to secure world-wide agreement on plant-nomenclature. It has been shown that the divergence between the Type-basis Code and the International Rules leads to dual nomenclature in one out of every nine species of Phanerogams, apart from any differences in generic concept (op. cit. 1922, 129-131). Few will deny that such a state of affairs seriously handicaps the progress of systematic botany, since it necessarily results in much time, which might otherwise have been devoted to taxonomic work, being occupied with questions of nomenclature.

Is it not possible to combine the best features of both codes? An excellent summary of the chief differences between them has been given by Mr. A. S. Hitchcock (op. cit. 1922, 316). These concern (1) the type-concept; (2) the starting-point or points of nomenclature for certain groups of non-vascular plants; (3) nomina conservata; (4) publication of genera; (5) priority of position; (6) validity of homonyms; (7) duplicate binomials; (8) Latin diagnosis.

To deal with the less controversial points first: No. 7 is surely of little moment. Personally, after considering the arguments for and against, I am now in favor of accepting duplicate binomials, on the ground that the advantage of preserving the earliest specific name outweighs all other considerations. Duplicate binomials are less open to objection than many names which are treated as valid under the International Rules. No. 2 is a matter for the cryptogamists concerned: if they can arrive at an agreement, so much the better; but, if not, why should this stand in the way of agreement on other points? As to No. 8, many Internationalists now consider that Art. 36, which made a Latin diagnosis obligatory, should be revoked.

In regard to No. 4, publication of genera, the Rules treat a generic diagnosis (or reference to a former diagnosis of the group) as obligatory: otherwise it would be open to any name-monger to establish an unlimited number of new genera, without the slightest indication of their generic characters, by merely mentioning the names of species included in them. Surely no group should be recognized unless its diagnostic characters have been given. On the other hand, the Code requires that a generic name should be associable with a binomial specific name, this being essential under the type-system. Are not both requirements reasonable? For the complete definition of a genus, both its diagnostic characters and the species included in it should be stated.

There remain for consideration (1), the type-concept; (3) nomina conservata; (5)