ted, as in the bibliography of the cucurbits. The author has made a most useful book and it should stimulate botanists to get some of the old lines of work back into botany, rather than let it continue to be taught by men who have other lines of interest, than botany. The book is therefore a most welcome addition to our literature of practical botany.

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The Genera of Fishes, from Linnæus to Cuvier, 1758–1833, Seventy-five Years, with the accepted Type of Each. A contribution to the Stability of Scientific Nomenclature. By DAVID STARR JORDAN, assisted by BARTON WARREN EVERMANN. (Published by Stanford University, 1917.)

It is a reproach to zoologists that so much uncertainty exists about the proper names of animals. To an outsider it appears inexplicable that the numerous competent students of taxonomy do not put their house in order, and settle once for all the questions which they find so vexatious. The difficulty is that these matters demand exhaustive bibliographical research, and few have access to the necessary books, even if they could afford to take the time to digest them. Proposed changes, based on fragmentary research, are naturally regarded with doubt, since other investigations may show them to be needless. The only satisfactory solution must come through reviews of the whole of the pertinent literature of any group under discussion. Such a review, so far as it concerns the genera of fishes named from 1758 to 1833, is given by Dr. Jordan in a work just published by Stanford University. The various publications are enumerated in chronological order, and all the new generic names are cited, with indications of the type species. Explanatory notes, often of considerable length, are added. Thus the reader is put in possession of the facts, and is at liberty to form his own opinions. The list is doubtless substantially complete, although it is stated in the introduction that other names may yet be discovered in dictionaries and obscure publications.[1] At the end is a series of lists, showing the various necessary or possible changes in nomenclature. These lists are as follows:

(*A*) Changes resting in priority, involving 73 names, though in nine of these the generic name remains as currently accepted, only the authority being altered. It is greatly to be regretted that our common genus of darters, *Etheostoma* of all modern authors, must apparently be called *Catonotus*. The names adopted from A. F. Röse (1793) appear to me to be of doubtful validity, being mere transliterations of the Greek names of Aristotle. The work itself being in Latin, the Aristotelian names were given with Latin equivalents. The matter is of importance to entomologists as it involves the name *Phycis*, used at present for a genus of moths, the type of a subfamily.

(*B*) Changes resulting from the operations of opinions 20 and 37 of the International Commission, admitting the names of Gronow. Those of Klein are held to be equally valid or invalid. These authors do not use the Linnean binomial system, and Dr. Jordan questions the validity of the names. In spite of the opinions of the Commission, it appears evident that all these names should be rejected.

(*C*) Changes resulting from opinion 24 of the Commission, which if logically followed must also admit four names of Plumier. The Plumierian names were polynomial and we must agree with Dr. Jordan that they should be rejected. Although few, they involve some very objectionable changes.

(*D*) Hypothetical changes according to law of priority, but doubtfully eligible; apparently to be rejected under opinion 57 of the Commission.

[1] I hear from Dr. Jordan that he has found two omissions: *Congiopodus* Perry, 1811, the same as *Agriopus;* and *Rhomboides* Goldfuss, 1820, a substitute for *Rhombus* Cuvier, preoccupied.

(*E*) Changes as under *D*, but the names (of Catesby) perhaps to be regarded as Latin vernaculars.

(*F*) Changes in accord with the law of priority, but questionable on account of irregularities. These include various Arabic names of Forskal, used for divisions of genera.

(*G*) Changes due to so-called preoccupation by earlier, *nearly* identical words. These I think should be rejected as needless, following the opinion expressed in former years by Dr. Jordan and others.

(*H*) Questionable cases, similar to *G*.

Whatever we may think of all these cases, we must agree with Dr. Jordan that it is of prime importance to have them decided as soon as possible. The matter concerns all working zoologists, and these, now that they have the facts before them, should endeavor to form and express definite opinions.

The printing and appearance of the book are admirable, but it is unfortunate that the soft paper is unsuited for annotations in ink.

T. D. A. Cockerell

SPECIAL ARTICLES

THE "RAWNESS" OF SUBSOILS[1]

In his communication to Science for September 21, 1917, Dr. C. B. Lipman has raised the whole question of the relative "rawness," or unproductivity, of subsoils by putting forward the view, based upon his own observations of plant growth upon arid subsoils, that these are but little, if at all, less "raw" or unproductive than those of humid regions. In suggesting that soil investigators do not generally appreciate the facts which support such a view he states the case too mildly. Judging from their published statements they do not even suspect the existence of such facts, emphasizing as one of the most striking characteristics of the subsoils of arid regions the ability of these, when first thrown out of excavations or simply exposed by grading operations, to support a satisfactory growth of non-leguminous plants as well as of legumes. I am aware of no book or article, previous to that just referred to, in which a contrary view is expressed. This characteristic of arid subsoils, in contrast with those of humid regions, is emphasized in all text-books which refer to the matter at all, as illustrated by the following list of references:

1. "The Soil," by F. H. King, 1904, p. 29.
2. "Soils," by E. W. Hilgard, 1906, p. 163.
3. "The Principles of Soil Management," by T. L. Lyon and E. O. Fippen, 1909, p. 69.
4. "Bodenkunde," by E. Ramann, 1911, p. 527.
5. "Principles of Agricultural Chemistry," by G. S. Fraps, 1913.
6. "Soils, their Properties and Management," by T. L. Lyon, E. O. Fippin and H. O. Buckman, 1915, p. 82.
7. "Die Bodenkunkolloide," by P. Ehrenberg, 1915, p. 164.

The view that the characteristic subsoils of arid regions are lacking in rawness appears to be based almost entirely upon the observations of the late Dr. E. W. Hilgard, who, in 1892, first called attention to the matter, mentioning the following example:

> In the case of a cellar 7 to 10 feet deep, near Nevada City, California, the red soil-mass dug out was spread over part of a vegetable garden close by, and, as a venture, the annual vegetables—tomatoes, beans, watermelons, etc.—were sown just as usual. They not only did well, but better than the portions not covered, which had been cultivated for a number of years and were somewhat exhausted thereby.[2]

F. Wholtmann, of Halle, who in the early years of the present century made several visits to California, later expressed the same view, but it is not clear to what extent his conclusions were based upon his own observations, he having discussed the matter with Hilgard while in America. The common tendency to take Hilgard's conclusions on such matters as the final word is well illustrated by Ehrenberg, of Göttingen, who, in his very recent book included in the above list, mentions that

[1] Published with the approval of the Director as Paper No. 96, of the Journal Series of the Minnesota Agricultural Experiment Station.

[2] U. S. W. B. Bul. 3, p. 19.