mind far more valuable to science than the indiscriminate description of new species and genera, and a multitude of such facts would aid very materially in the solution of the origin of species, and the reasons for the gradual change from one type to another.

FRANK C. BAKER.

THE CHICAGO ACADEMY OF SCIENCES.

CURRENT PROBLEMS IN PLANT MORPHOLOGY (I.)

THE QUESTION OF PTERIDOPHYTE PHYLOGENY.

IF the question be asked: which among living genera of Pteridophytes most closely resembles the hypothetical archetype, three answers are at hand. Goebel, of Munich, adheres to the Prantlian theory that *Hymenophyllum* of the leptosporangiate ferns may be regarded as primitive. The peculiar strength of this position lies in the apparent homologies between the filamentous prothallia of this fern and moss-protonema such as that in particular of *Buxbaumia*. Bower, of Glasgow, has brought forward for consideration the curious club moss *Phylloglossum* and constructs, under his strobilar hypothesis, a phylogeny passing from Lycopodiaceæ through the eusporangiate ferns to the leptosporangiate, practically an inversion of the older view. Campbell, of Leland Stanford, has argued ably the claims of the eusporangiate fern *Ophioglossum*, deriving from its region the Marattiaceæ, Isoetaceæ, Lycopodiaceæ and leptosporangiate series of ferns.

The three views may really be reduced to two; Goebel maintains a leptosporangiate origin for the group; Bower and Campbell would establish an eusporangiate origin. Therefore one view is quite exactly the converse of the other. The peculiar strength of the new position lies in the remarkable sporophytic homologies which have been indicated between *Anthoceros* of the Hepaticæ and *Marattia* and *Lycopodium*.

At present the German school labors under a certain disadvantage, although the position of Dr. K. Goebel is in accord with the new ideas of mechanomorphosis developed in the rough long ago by Sachs and De Bary and lately carried forward by Sachs, and among zoölogists by Roux, Driesch and many others. The disadvantage consists in a necessary opposition to the well-established hypotheses of differentiation, an opposition in which an actual metamorphosis of embryonic rudiments (Anlagen) is maintained. Bower's theory of sterilization, than which nothing could seem more reasonable under the generally accepted interpretations of ontogenetic and paleontologic records, must be set aside, and, finally, little use can be made of the remarkable pteridophytic characters of the *Anthoceros* and *Notothylas* sporophytes; but one must turn away from this group and bring forward the more specialized mosses as archetypal plants.

Hugo Glück, in Flora 80: 303–387, 1895, under the title *Die Sporophyll Metamorphose*, gives a valuable census of anatomical resemblances between sporophylls and foliage leaves, and after an examination of sporangial protective apparatus, viz., hairs, pits, indusia, rolled-over margins, etc., of sporophyll petioles, and of various transitional forms, proposes as established the thesis that 'all sporophylls are metamorphosed foliage leaves.' This is almost exactly the converse of the Bower-Campbell position which maintains the derivation of non-sporangium-bearing leaves from a sporangial tract. The argument of Glück is by no means convincing, for his evidence, apparently, might be used with quite as much force on the other side.

Goebel, carrying the war into Africa, brings out a paper entitled '*On Metamorphosis in Plants*' in Science Progress 3: 114–126, 1895, which expresses his views tersely and clearly. The outcome of the debate is interesting, for it promises to resolve itself

into a struggle between the older evolutional and the newer developmental mechanical interpretations of morphology. It is difficult to see how the Bower sterilization theory can be overturned without carrying with it the whole scheme of Archegoniate phylogeny which plant morphology owes to the classic work of Hofmeister. Nothing can be more apparent under accepted beliefs than that from *Oedogonium* sporophytes upward there is a progressive change from an entirely sporogenous plant body to one in which the great part of the sporogenous tissue is replaced by sterilized areas. It is, however, possible that both differentiation and the 'true metamorphosis' of Goebel have gone on together in the phylogenetic series. The experimental method would doubtless throw more light on the whole matter than the speculative phosphorescence which, up to the present, has been the chief illumination.

Conway MacMillan.

SCIENTIFIC NOTES AND NEWS.

AUSTRALASIAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Seventh Session of the above Association will be held in Sydney, from the 3rd to the 10th January, 1897, under the Presidency of A. Liversidge, M. A., F. R. S., Professor of Chemistry, University of Sydney.

The Presidents and Secretaries of the Sections are as follows:

Astronomy, *Mathematics* and *Physics*.—R. L. J. Ellery, C. M. G., F. R. S., Government Astronomer, Vict., President; R. Threlfall, M. A., Professor of Physics, and J. Arthur Pollock, B. Sc., Demonstrator in Physics, Sydney University, Secretaries.

Chemistry.—T. C. Cloud, A. R. S. M., F. G. S., Manager Wallaroo Copper Works, South Australia, President; W. M. Hamlet, F. C. S., F. I. C., Government Analyst, N. S. W., Secretary.

Geology and *Mineralogy*.—Captain F. W. Hutton, M. A., F. R. S., F. G. S., Director of Canterbury Museum and Lecturer in Geology, Christ Church, New Zealand, President; T. W. E. David, B. A., F. G. S., Professor of Geology and Physical Geography, Sydney University, and E. F. Pittman, A. R. S. M., F. G. S., L. S., Government Geologist and Lecturer in Mining, Sydney University, Secretaries.

Biology.—T. J. Parker, B. Sc., F. R. S., Professor of Biology, Otago University, Dunedin, New Zealand, President; W. A. Haswell, M. A., D. Sc., F. L. S., Professor of Biology, Sydney University, and J. H. Maiden, F. C. S., F. L. S., Curator, Technological Museum, Sydney, and Superintendent of Technical Education, N. S. W., Secretaries.

Geography.—H. S. W. Crummer, Secretary of the Royal Geographical Society of Australasia, N. S. W. Branch, Secretary.

Ethnology and *Anthropology*.—A. W. Howitt, F. G. S., Secretary for Mines, Vict., President; John Fraser, B. A., LL. D., Sydney, Secretary.

Economic Science and *Agriculture*.—R. M. Johnston, F. L. S., Government Statistician, Tasmania, President; Walter Scott, M. A., Professor of Greek, Sydney University, and F. B. Guthrie, F. C. S., Consulting Chemist to the Department of Agriculture, N. S. W., Secretaries

Engineering and *Architecture*.—H. C. Stanley, M. I. C. E., Chief Engineer, Southern and Western Railway Lines, Queensland, President; J. W, Grimshaw, M. Inst. C. E., M. I. Mech. E., &c., Supervising Engineer, Harbors and Rivers Department, N. S. W., Secretary.

Sanitary Science and *Hygiene*.—Hon. Allan Campbell, M. L. C., L. R. C. O., South Australia, President; J. Ashburton Thompson, M. D., Chief Medical Inspector, Board of Health, N. S. W., Secretary.

Mental Science and *Education*.—John Shir-