So then in practise it will be necessary to calculate from the formula only one of these probable errors for a given distribution, viz., the probable error of the skewness. Having determined this we need only to multiply it by 2, by 4 and by σ to obtain the values for the other three. RAYMOND PEARL.

BOTANICAL NOTES.

HALLIER'S NATURAL SYSTEM.

IN the July number of *The New Phytologist* Professor Dr. Hans Hallier discusses further his provisional scheme of the phylogenetic system of flowering plants. The general features of his system are: (1) the Angiospermae constitute a monophyletic group; (2) the Amentaceae are not an old type remaining in a lower state of development, but as 'the highest and most reduced types of one of the lines of Dicotyledons'; (3) they and all other lines of Dicotyledons have been developed by reduction of flower and fruit from the *Polycarpicae,* the latter group being derived immediately from *Bennettitaceae* or other extinct Cycadales; (4) in the same manner, the *Liliiflorae* and all other syncarpous Monocotyledons have been derived by union of the carpels, by reduction in the number of parts, by epigynous insertion of the perianth, and by other changes in the structure of flower and fruit from the polycarpous Monocotyledons (*Helobiae*), which latter group originated from the polycarpous Dicotyledons (*Polycarpicae* and *Ranales*); (5) the *Apetalae* and *Sympetalae* are unnatural groups.

In applying these general principles, Dr. Hallier has worked out the following arrangement of the Dicotyledons, which he distinctly says is provisional for all after the Piperales.

1. POLYCARPICAE (*Magnoliaceae, Canellaceae, Anonaceae, Myristaceae, Calycanthaceae, Monimiaceae, Lauraceae*).

2. RANALES (*Berberidaceae, Menispermaceae, Ranunculaceae, Nymphaeaceae, Ceratophyllaceae*).

3. RHOEDALES (*Papaveraceae, Capparidaceae, Resedaceae, Cruciferae*).

4. PIPERALES (*Lactoridaceae, Piperaceae, Chloranthaceae, Myrothamnaceae*).

5. MALVALES (*Sterculiaceae, Papayaceae, Euphorbiaceae, Bombacaceae, Malvaceae, Elaeocarpaceae, Tiliaceae, Rhamnaceae, Urticaceae, Dipterocarpaceae*).

6. EBENALES (*Sapotaceae, Convolvulaceae, Ebenaceae, Symplocaceae, Styracaceae*).

7. GERANIALES (*Zygophyllaceae, Cneoraceae, Oxalidaceae, Geraniaceae, Linaceae*).

8. MYRTIFLORAE (*Lecythidaceae, Caryocaraceae, Rhizophoraceae, Lythraceae, Myrtaceae, Melastomaceae, Combretaceae, Geissolomaceae, Penaeaceae, Oliniaceae, Thymelaeaceae, Elaeagnaceae*).

9. ROSALES (*Saxifragaceae, Rosaceae, Anacardiaceae, * * * * Meliaceae, Rutaceae, * Leguminosae, * * * * * * * Sapindaceae, * Celastraceae, * Aquifoliaceae, * * * * * Guttiferae, * * Dilleniaceae*).

10. ERICALES (*Clethraceae, Pirolaceae, * Ericaceae, * * * Diapensiaceae, * * Primulaceae*).

11. SARRACENIALES (*Sarraceniaceae, Droseraceae*).

12. SANTALALES (*Olacaceae, Ampelidaceae, * Santalaceae, Myzodendraceae, Gnetaceae, Loranthaceae*).

13. UMBELLIFLORAE (*Cornaceae, Araliaceae, Adoxaceae*).

14. AMENTIFLORAE (*Hamamelidaceae, Myricaceae, Salicaceae, Juglandaceae, Betulaceae* (incl. *Casuarineae*), *Fagaceae*).

15. PASSIFLORALES (*Flacourtiaceae, Violaceae, Cistaceae, * * Passifloraceae, * * * Onagraceae, * * * Gentianaceae, Aristolochiaceae, Rafflesiaceae, Loasaceae, Begoniaceae, Cucurbitaceae, Campanulaceae, * * * Compositae*).

16. CENTROSPERMAE (*Crassulaceae, Cactaceae, * * * * Portulacaceae, * Phytolacaceae, Tamaricaceae, Caryophyllaceae, Polygonaceae, * * Amarantaceae, Chenopodiaceae, Batidaceae*).

17. CAPRIFOLIALES (*Caprifoliaceae, Valerianaceae, Dipsaceae*).

18. TUBIFLORAE (*Apocynaceae, Loganiaceae, Rubiaceae, Bignoniaceae, Oleaceae, * * Acanthaceae, Verbenaceae, Labiatae, Scrophulariaceae, * Solanaceae, Polemoniaceae, Boraginaceae, Hydrophyllaceae*).

The arrangement of the Monocotyledons is merely begun, the families of the Helobiae alone being given (*Butomaceae, Alismaceae, Hydrocharitaceae, Potamogetonaceae, Aponogetonaceae, Juncaginaceae, Triurdiaceae*).

We can agree with the author in regard to the general plan of his system, of which he says: "I freely confess that it gives only an approximate idea of lines of descent and of the natural relations of the flowering plants: it is only one step in the further progress of phylogenetic botany. But I am sure that this step is not a wrong and useless one, and that it will lead to a broader knowledge of the flowering plants."

THE AMERICAN FOREST CONGRESS.

EARLY in the present year (January 2 to 6) the American Forest Congress was in session in Washington, D. C. Its purpose was 'to establish a broader understanding of the forest in its relation to the great industries depending upon it: to advance the conservative use of forest resources for both the present and future need of these industries: to stimulate and unite all efforts to perpetuate the forest as a permanent resource of the nation.' The papers read in this congress have been collected by Mr. H. M. Suter and published in a volume of 475 pages. These have been arranged systematically under the following heads. (1) 'Forestry as a National Question'; (2) 'Importance of the Public Forest Lands to Irrigation'; (3) 'The Lumber Industry and the Forests'; (4) 'Importance of the Public Forest Lands to Grazing'; (5) 'Railroads in Relation to the Forest'; (6) 'Importance of Public Forest Lands to Mining'; (7) 'National and State Forest Policy.' The book possesses much value, not only to foresters, but to botanists as well.

MORE PLANT CELL STUDIES.

THE series of articles by Bradley M. Davis entitled 'Studies on the Plant Cell,' which began in the May number (1904) of the *American Naturalist,* has been brought to a close in the October number (1905), and we have now the whole work before us. In looking over its pages, we are more and more impressed with its value and importance to students of plant cytology, since it presents a summary of the results of recent work not attainable elsewhere. It is to be hoped that the author may be able to push to early completion the preparation of a book on cytology planned to follow pretty closely the outlines given in these studies. In the meantime, many botanists will be glad to know that reprints of these papers are obtainable of the author, at the University of Chicago.

The closing section, which covers about forty-five pages, is devoted to the 'Comparative Morphology and Physiology of the Plant Cell.' About a dozen pages are given to the simplest types of cells, as they occur in the blue green algae, the bacteria and the yeasts, and a clear summary is made of the views of the investigators of these low plants. The author is able, from the incomplete and somewhat conflicting testimony, to find some justification of the belief in the presence of nuclear structures, even in the smallest bacteria. Interesting comparisons are made of the structure of simpler plant cells with those of higher types, in which many gaps in our knowledge are pointed out, one of which is the connection of the Schizophyta with the lower green algae. The structure of the trophoplasm, the reproduction of plastids, the individuality of the chromosomes, the functions of the vacuoles, the nature and occurrence of centrosomes, the balance of nuclear and cytoplasmic activities, are among the topics discussed in the closing pages of this interesting section, which, like the preceding sections, is followed by an extensive bibliography.

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THE AMERICAN CHEMICAL SOCIETY.

THE sessions of the thirty-third general meeting of the American Chemical Society and those of Section C of the American Association for the Advancement of Science will be held in the lecture rooms of Tulane University, New Orleans, from December 29 to January 2.

The preliminary program is as follows: