

THE TRUE GRASSES

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The true grasses by Eduard Hackel

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EDUARD HACKEL

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GRASSES**

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TRUE GRASSES

BY
EDUARD HACKEL

TRANSLATED FROM
DIE NATÜRLICHEN PFLANZENFAMILIEN

BY
F. LAMSON-Scribner
AND
EFFIE A. SOUTHWORTH

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PREFACE TO THE TRANSLATION.

A WORK embracing the grass family as a whole, in all its aspects, enumerating the best known economic species and the uses which they serve, discussing their structure and morphology and their arrangement into tribes and genera with the characters of these pointed out in a manner enabling one to classify any grass which may come to his hand, is a desideratum in our literature and one which has long been felt by many. Such a work is the contribution made by Prof. Eduard Hackel, of St. Poelten, Austria, to that great German publication on the Natural Families of Plants (*Die natürlichen Pflanzenfamilien*) edited by Drs. Engler and Prantl. Prof. Hackel stands without a peer among agrostologists; his contribution, therefore, has an especial value and may be accepted as expressing the latest views of the highest authority.

The work here referred to contains so much of practical as well as of scientific importance and interest that its presentation in a form available to English readers seemed highly desirable. A further incentive to the preparation of an English translation was the fact that at this time particular interest in the investigation of grasses is being taken by the United States Government, and on all sides eager demands are being made for information relative to these plants. That this is so is not remarkable when we consider the unrivalled economic importance of grasses, furnishing as they do daily food to man and the animals upon which he is most dependent, as well as supplying a great variety of articles used in manufacture, the arts, and medicine. While the present work may not add to the interest in the subject already existing, it cannot fail to afford information much desired.

With a view to increasing the value of the work and rendering it more serviceable to private students and

general readers, an introduction wherein is illustrated the manner of using the keys of analysis in determining genera is given, and a full glossary and index are added. It is hoped also that the translation will thus be made more suitable for use as a text-book in our Agricultural Colleges, for which purpose the treatment of the structure, morphology, and physiology of grasses, given in detail and fully illustrated in Part I, renders the work especially well adapted.

Those familiar with the German will notice that in translation occasional liberties have been taken with the original by the omission of unimportant matter, insertion of head-lines, etc. Except in the account of the Bambuseæ, all matter enclosed in brackets has been added by myself. A number of notes and observations have been added by Prof. Hackel, to whom the manuscript was submitted for revision and approval before being sent to the printers.

Following the number of each genus there has been inserted, in parenthesis, its number in Bentham and Hooker's *Genera Plantarum*, facilitating reference to that work and at the same time showing the diversity between the systems of classification adopted.

With few exceptions the illustrations are from electrotypes of the original woodcuts obtained from the German publisher, Wilhelm Engelmann, of Leipzig. The figures illustrating the spikes of the cereals were redrawn from the imprints in the original and reduced nearly one half by photo-engraving. Figures 3*a* and 91*a* are additions, while figures 45*a*, 75*a*, and 78 were drawn especially for the translation and appear here for the first time.

Thanks are due Mr. Charles E. Smith, of Philadelphia, for his kind assistance with the proofs, and Dr. W. J. Beal, of Lansing, Michigan, and Mr. C. M. McClung, of Knoxville, Tennessee, for their interest in the progress of the work and material aid in its publication.

F. LAMSON-SCHIBNER.

INTRODUCTION.

No introduction appears to be necessary further than to give for the benefit of those unfamiliar with botanical keys, an illustration of their use. For this purpose let us suppose that we have in hand a specimen of Orchard-grass. After examining it carefully and noting the characters presented by the inflorescence, spikelets, glumes, etc., we turn to the key to the tribes on page 31, and read the characters under "A. Spikelets one- rarely two-flowered," etc. In our specimen the spikelets are 3-5-flowered, so we pass to "B," on the next page. The characters here—"spikelets 1- ∞ (many) flowered, . . . rachilla articulated above the empty glumes, . . . with distinct internodes between the flowers" (flowering glumes)—are those of our plant, and we continue by reading the characters following "a," all of which apply, and then go on reading the characters following "a." As those of our specimen are here included, the spikelets being upon distinct pedicels and disposed in a panicle, we proceed to the next section of the key; viz., "I. Spikelets one-flowered." As those in our specimen are 3-5-flowered, we pass on to "II. Spikelets 2- ∞ flowered." Our Orchard-grass falls under this section, and as it possesses characters (flowering glumes longer than the empty ones, and with a short straight awn from the point) which exclude it from the next division, "1," we try "2," which leads us to tribe XI, *Festucæ*, further described on page 135. Carefully comparing our plant with the more extended characters here given, we note their agreement (or disagreement, as would be the case if we had proceeded wrongly to this point).

Being satisfied that our plant must belong to the

Festuceæ, we now try to determine its genus by the key which follows. The flowering glumes are not "divided into three-to-many awn-like lobes," so we pass from "A" to "B" on the next page, where it says "Flowering glumes entire or two-toothed," etc. As those of Orchard-grass are entire, we continue with the next division of the key, "a. Rachilla or flowering glumes with long hairs which envelop the latter." There are no such hairs in our specimen, so we pass at once to "b. Rachilla and flowering glume naked or hairy, hairs much shorter than the glumes." These characters apply to our plant, and as it has plumose stigmas projecting from the sides of the flowering glumes, we pass from " α " directly to " β ," the division having stigmas of this character.

In order to avoid repetition, we will simply quote from the succeeding divisions of the key that which it is necessary to read to complete the determination, placing in italics the characters *excluding* from any one of them the grass we are analyzing. All reference to the subdivisions under these last are of course omitted.

"I. Spikelets of *two* forms," etc.

"II. Spikelets all alike."

"1°. Flowering glumes *three-toothed*," etc.

"2°. Flowering glumes of some other structure."

"* Flowering glumes *one to three-nerved*," etc.

"** Flowering glumes 3-5- to many-nerved, with *two or more* of the upper glumes *empty*," etc.

"*** Flowering glumes five- to many-nerved; each containing a ♂ flower or the upper with only a ♂ flower, or empty." (Exceptions noted.)

"† Leaves *broad, lanceolate or ovate, with fine transverse veins between the longitudinal nerves*."

"†† Leaves linear or lanceolate, no distinct transverse veins."

"○ Keel of palea *winged*," etc.

"○○ Keel of palea not appendaged."

- “ Δ Empty glumes *three to six* at the base of each spikelet.”
- “ $\Delta\Delta$ Empty glumes two.”
- “X Plants strictly *diocious*,” etc.
- “XX Plants *hermaphrodite*,” etc.
- “ \square Flowering glumes *cordate* at the base.”
- “ $\square\square$ Flowering glumes not cordate at the base. . . . AA. etc.” (referring to the next series of divisions in the key).
- “AA. Spikelets closely imbricate, arranged in a *linear, dense false spike*.”
- “BB. Spikelets densely imbricate, *crowded in short spikes*,” etc.
- “CC. Spikelets in small fascicles which are united in a glomerate or interrupted panicle.”
- “aa. Panicles one-sided. . . . 252. *Daactylis*.”

Our analysis by the key has thus brought us to the genus *Dactylis*, No. 252, and on page 161 we find given further characters belonging to it. We learn here also that the genus contains but one species, *Dactylis glomerata* L. or Orchard-grass, its geographical distribution, that it is “a first-class fodder-grass, especially for heavy, wet soils,” that it is very productive, growing rapidly after cutting, and endures shade. There is also a figure, illustrating the inflorescence and a single spikelet, on page 102.

Orchard-grass was selected to illustrate the use of the keys not only because it is widely distributed, either naturally or in cultivation for hay, and therefore readily obtainable, but also because its analysis required such an extended use of the key. There are very many genera requiring much less reading in their analysis and possible of determination far more quickly. The manner of procedure is practically the same in every case. While the keys are in the majority of cases a certain guide in determining the genus, the statement made on

page 33 must be kept in mind when using them; for in the tribes as well as in the larger genera the characters given are of necessity subject to many exceptions.

Under each genus will be found its distinguishing characters not already mentioned in the keys, the number of species it embraces and their geographical distribution, also the names and uses of those species of marked economic value. The somewhat extended account given of the Cereals and Bamboos, due to their special importance, contains much of general interest.