A POPULAR CALIFORNIA FLORA, OR, MANUAL OF BOTANY FOR BEGINNERS. TO WHICH IS ADDED AN ANALYTICAL KEY TO WEST COAST BOTANY

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A popular California flora, or, manual of botany for beginners. To which is added an analytical key to West Coast botany by Volney Rattan

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VOLNEY RATTAN

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Trieste

A POPULAR

CALIFORNIA FLORA,

OR,

MANUAL OF BOTANY FOR BEGINNERS.

WITH

ILLUSTRATED INTRODUCTORY LESSONS, ESPECIALLY ADAPTED TO THE PACIFIC COAST.

TO WHICH IS ADDED AN

ANALYTICAL KEY TO WEST COAST BOTANY.

CONTAINING BRIEF DESCRIPTIONS OF OVER 1600 SPECIES OF PACIFIC COAST PLANTS.

By VOLNEY RATTAN,

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Eighth Revised Edition.

SAN FRANCISCO:
THE BANCROFT COMPANY,
1888.

PREFACE.

THE first edition of this book was prepared for the press during the evenings and Saturdays of the month of January, 1879. The hope that an abler hand would undertake the task deferred the beginning, and the needs of a class of over five hundred pupils hastened the completion of a work that would have been more slowly elaborated had the reputation of the author been the only consideration. The errors incident to such rapid work were as far as possible corrected the following year, in a second edition, which was prefaced as follows:

"I have endeavored to prepare an inexpensive manual which will enable beginners in botany to determine the names of all plants with conspicuous flowers that may be found growing wild in the Central Valley of California from Visalia to Marysville, and through the Coast Ranges from Monterey to Ukiah. Over six hundred species of plants are characterized by descriptions condensed, for the most part, from Vol. I of the 'California Botany,' and Sereno Watson's 'Revision of the North American Liliaceæ.' Valuable material has also been obtained from a 'Revision of the Eriogoneæ,' by Torrey & Gray, Gray's 'Synoptical Flora of North America,' and 'Gray's Manual of Botany.'

"Plants belonging to the Parsnip, Aster, Willow, Oak, and Pine Families, are not described, being mostly too difficult for beginners, or of little interest to them. The Introductory Lessons are designed to show the learner how to study the growth of plants, as well as to give such knowledge of their structure as will enable him to understand the descriptions in the Flora. The 'Glossary of Generic and Specific Names' will enable the student to make appropriate common names for most plants.

"To the authors whose works have furnished the materials for this book is due the credit for whatever of excellence it may possess; to the compiler, who may, in a few cases, have misrepresented these authors, attaches the blame for most of its defects.

"I am indebted for suggestions and criticisms to Prof. E. W. Hilgard, Dr. C. L. Anderson, Prof. W. H. Brewer and Dr. Asa Gray. To the latter I am especially grateful for his kind interest in my humble work."

One third of the second edition was new matter, and only about half of the book in its present form is printed from the stereotype plates of the first edition. The newer half of the work, although necessarily partaking somewhat of the nature of patchwork, is as good as I can make it. My drawings upon wood have been faithfully engraved, and, though claiming no artistic merit, will, I trust, prove helpful to the learner. With few exceptions—always noted in the text—the plants, or parts of plants, are represented of the natural size. Besides the more obvious improvements, an entirely new Analytical Key replaces the old one; and our most common oaks are described.

Assuming that facts in natural history are useless if merely memorized from the book, and that the student must earn his knowledge by observing and experimenting, it is obviously best to encourage him at first by showing him how to try simple experiments whose results are easily interpreted. Seeds are the best material for such experiments, since the phenomena connected with their germination are not only easily observed, but deeply interesting. For this reason what may seem a disproportionate space in the Introductory Lessons is devoted to "The Beginnings of Plant Life." There are no lessons of greater educational value than those given to observing eyes by the growth of a plant from the first quickening of the dry embryo to the putting forth of flowers and the ripening of fruit. A sunny window in each school-room should be devoted to these beautiful object lessons of nature. It must not be forgotten, however, that since most young people are eager to learn the names of plants whose flowers they admire, it is best to devote most of the spring months to the study of Systematic Botany. The child's "What is it?" and the finger pointing to the plant in bloom, show plainly with what to begin the study of botany. Baron Frederick von Mueller says in his preface to an elementary work upon the botany of Victoria, Australia: "An experience of nearly forty years has convinced the author that the use of a grammar-like publication for initiating into a study of plants is alike wearisome to teacher and children, and that as a rule, subject to rare exceptions, the knowledge acquired from the ordinary first elementary works on botany is as quickly lost as gained. The only method of rendering such studies agreeable and lastingly fruitful consists in arousing an interest of the young scholars in the native plants of their locality, to afford them all possible facilities to recognize and discriminate all the various plants within reach, to lead them by observations thus started to comprehend the limits of specific forms, of generic and ordinal groups, and to conduct them afterwards to the more difficult study of special anatomy and physiology of plants."

Teachers and learners are here reminded of the importance of carefully writing out the details of experiments tried, as well as descriptions of what has been observed. In the words of Dr. Asa Gray: "The naturalist must not only observe that he may describe, but describe if he would observe."

It will be noticed—and the fact has formed the basis of a criticism—that the descriptions of genera and species in this Flora are very brief; as a rule only the contrasting characteristics being given, since more is calculated to confuse rather than help the beginner. Dr. Gray says: "In floras, as in more general works, abridged descriptions or diagnoses suffice—indeed, are preferable in all cases where the region is pretty well explored, and where materials can be thoroughly elaborated."

Although the Flora is designed especially for students in Central California, it will be found only a little less useful to those studying as far south as Los Angeles, or as far north as the Columbia. The Introductory Lessons are suited to the entire Pacific Coast.

SAN FRANCISCO, January, 1882. V. R.

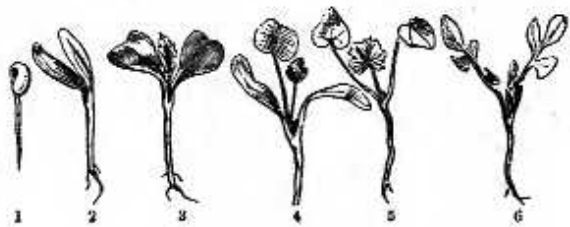
INTRODUCTORY LESSONS

IN

STRUCTURAL BOTANY.

SECTION 1.—THE BEGINNINGS OF PLANT LIFE.

1. If the first rain of the wet season is followed by warm, sunny weather, specks of green will soon appear among the dry stems of last year's weeds; and in fence corners or other eddy nooks where summer winds have drifted seeds and covered them with dust, you may find perfect mats of baby plants. With a shovel skim off a few square inches of this plant-bearing soil, and carefully examine it. Except a few green needles, which you recognize as spears of grass, most of these little plants seem to consist of white stems, which split at the top into pairs of green leaves. Looking sharply, you may find between each pair of leaves a



1. Seed of Bur-clover just before it appears above ground. 2. Same three days older. 3. Mustard. 4. Bur-clover showing the first and second plumule leaves; the former simple (apparently), the latter with three leaflets. 5. Mallows (Malva borealis), showing the long-petioled seed leaves (Cotyledons), and one plumule leaf unfolded. 6. Filaria (Erodium), with lobed or sub-compound seed leaves.

tiny bud; or, in the older plants, this may have grown other leaves, which curiously enough are not like the first two. (Figures 1 to 6). Searching through the shovelful of earth you will likely find plants in all stages of growth, from swollen and sprouting seeds to stems, which are just pushing their bowed leaf-heads into the sunlight. Here, then, is material from which you may learn how plants grow; a lesson, remember, which no text-book or schoolmaster can teach you. It will be easier, however, since most of these early wild plants come from very small seeds, to take

your first lessons from plants which have larger beginnings. You should first study—

2. **The Plant in the seed.** Get many kinds of large seeds, such as peas, beans, squash-seeds, buckeyes, castor beans, corn, etc. Put them in water that they may become soft enough to be readily separated into their parts. In a day or two starchy seeds, such as peas or beans, will be in good condition.

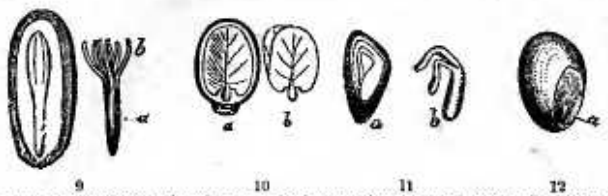
3. First take a bean and make drawings showing the outlines as seen sidewise and edgewise. Any marks that seem to be found on all beans must be put down in the drawing, but do not bother about the shading. These attempts to represent what you see will lead to the discovery of certain marks on the concave edge of the bean, the meaning of which you may sometime learn by studying the growth of the seed in the pod. After you have thus studied the outside of the seed, slit it along the back with a sharp knife and take out the kernel. It readily splits into halves which are held together near one end by a short stem. Upon breaking them apart the stem sticks to one half, and you discover growing from the inner end a pair of tiny embracing-leaves. Make another drawing and compare it with Fig. 7. Presently it will be clear to you that this entire kernel is a little plant. The plant in this dry apparently lifeless first stage of its existence is called—

7 8

7. One cotyledon of a bean with the radicle and large plumule. 8. Embryo of a peanut. *a*, inner side of one cotyledon with the radicle and plumule; *b*, outer side of the same.

4. **The Embryo, or Germ.** This, as you have seen, is made up of the stem, or *Radicle;* the thick parts called *Cotyledons*, and the two-leaved bud, or *Plumule*. The embryo of a pea is similar to that of a bean, but the plumule is more decidedly a bud. Fig. 8 represents the straight embryo of a peanut. The radicle is not bent around against the cotyledons as in the pea and bean, and the plumule shows two divided leaflets. The cotyledons of the squash are thin and the plumule is scarcely visible. Lupine, though its seeds resemble beans, has a long radicle and a minute plumule. The buckeye seems to have a long radicle, but since it splits nearly to its point, where you will find a large plumule, it is evident that the apparent radicle is mostly made up of the cotyledon stems (petioles).

5. Albuminous Seeds. Remove the shell-like coat of a castor bean, and carefully split it flatwise. What at first seems to be a large plumule proves to be free from the rest of the kernel, and with care you may be



9. Seed of Willow or Digger Pine cut so as to show the straight embryo in the center of the oily albumen. *a* and *b*, embryo taken out, the cotyledons (*b*) separated. 10. Seed of the Castor-bean. *a*, the broad thin embryo nearly dividing the albumen; *b*, the embryo removed and the leaf-like cotyledons separated. 11. Seed of Datura (Brugmansia), showing at *a* the bent embryo in the scanty albumen; *b*, the embryo taken out and the slender cotyledons separated. 12. A grain of coffee. *a*, the straight embryo.

able to get it out whole (Fig. 10.) It is a straight embryo with beautifully veined, leaf-like cotyledons, embedded in a white, oily substance, which makes up the mass of the kernel. This substance is called *Albumen*, a name which applies to anything inclosed with the embryo by the seed coats. Peas, beans, acorns, nuts, and most large seeds have no albumen. Carefully cut thin slices from a well soaked coffee grain until its embryo appears as represented in Fig. 12. The horny, folded albumen makes up most of the seed. A similar, but smaller embryo, may be found in the brain-shaped, fleshy albumen of the ivy seed. The embryo of the Tree-Datura, or Stramonium, is shown in Fig. 11. It has slender cotyledons, folded down against a thick radicle, the whole embedded in tough, fleshy albumen. Take the embryo of a Morning-Glory seed and pick the bits of transparent, jelly-like albumen out of the pockets in the crumpled cotyledons. An attempt to flatten out the cotyledons will probably result in something like *b*, Fig. 13, which may lead you to suppose that the cotyledons are separately crumpled, which is not the case. They stick closely together by their inner faces, as do the cotyledons of other seeds you have examined, and they are crumpled as one; but, being notched at the end, they readily split down the center. Buckwheat seeds will give you some trouble. Indeed, it will

13. Morning-Glory just appearing above the ground with the seed coat sticking to the cotyledons. *a*, the swollen seed; *b*, embryo, with the crumpled cotyledons split down the middle in the attempt to flatten them.