

Very remarkable is the seedling of *Jatropha multifida* L., of which the cotyledons are distinctly petioled and by a long hypocotyl raised above ground, but of which the cotyledonary blades remain enclosed by the seed. In certain species of *Clematis* (*C. recta*) the cotyledons are normally hypogeic, but at times become epigeic.

Hypogeic cotyledons may remain enclosed by the seed all the time, or they might become freed from this and appear then as a pair of small, fleshy, pale leaves. Herbs as well as trees exhibit this manner of germinating, and characteristic of all is that the function of the cotyledons is only to be the bearers of reserve food-substances. The relative development of the primary root is somewhat different; furthermore, the hypocotyl, and the petioles of the cotyledons.

An interesting type is represented by *Megarrhiza Californica* Torr. In this plant the primary root does not commence to grow until the cotyledonary petioles have buried themselves deep in the ground, and these petioles are not only very long, but they are, furthermore, united so as to form a long tube, clothed with hairs which perform the same function as root-hairs.

Another type is characteristic of certain aquatics, e.g. *Nuphar*, *Nymphaea* and *Victoria*, in which the primary root increases but very little in length during the first stages of germination, its function becoming performed by a wreath of very long root-hairs developing from the base of the root as soon as the seed germinates. In *Nelumbium*, on the other hand, the root stays rudimentary, and does not even produce the wreath of hairs, so very characteristic of the others.

Sometimes the hypocotyl is well differentiated as in *Sanguinaria Canadensis* L. (Fig. 29), and we have here an interesting type with a persisting primary root (at least for some years), and a hypocotyl which by growing in thickness becomes the first joint of the large, horizontally creeping rhizome; the fleshy cotyledons soon leave the seed, but without being raised above ground. Furthermore, in this type the first leaf succeeding the cotyledons develops already during the first year, and shows the outline of the blade broadly cordate, and entire, instead of being prominently lobed as the final leaves. In *Phryma Leptostachya* L. the cotyledons do not leave the seed, and the hypocotyl is very short; the primary root develops as a long, somewhat fleshy root, which persists for some years. *Phryma* lacks a proper rhizome in the stricter sense of the word, since the vegetative reproduction is simply secured by cotyledonary buds in the first year, and later on by buds, which develop in the axils of the basal, scale-like leaves of the aerial shoot; it is a