thus the coleoptile becomes situated at some distance from the cotyledon, as if it represented the first leaf of the seedling. If this be really the case we would have two leaves (cotyledon and coleoptile) situated at the same side of the axis, above each other, and such arrangement of leaves would not be very probable. A like structure is exhibited by *Rhynchospora alba*, Vahl. (Fig. 12), but in this the primary root does not develop at all, being replaced by three secondary roots. The structure of the cotyledon, however, is the same as in *Cyperus;* inside the coleoptile is the first green leaf from the axil of which a long bud has developed, provided with a small, adorsed fore-leaf, thus representing the first ramification of the young plant.

In the *Cyperaceæ* we have thus the same structure of the absorbing portion of the cotyledon, while the coleoptile is much further developed than in the third and fourth type described above. The generally adopted explanation of the coleoptile is that it merely represents the sheath of the cotyledon, and in cases where a stem-like organ is developed, in *Fuirena*, for instance, this organ is defined as a node, but as a node that has become unusually stretched. It deserves notice, however, that a root sometimes develops from this "node," while roots evidently but very seldom develop from the nodes, but from above or below these. The greatest difficulty by considering the coleoptile as an independent leaf, the first of the seedling, depends of course upon its position, since it is placed on the same side of the axis as the cotyledon; to overcome this difficulty some authors have expressed the opinion that a leaf is lacking, and this leaf should then be the small, lobe-like organ "epiblast" so very characteristic of certain genera of *Gramineæ*; this organ is in these situated opposite the cotyledon, and below the coleoptile, thus the arrangement of these three organs would correspond very well with that of normal leaves. But, so far, the epiblast has not been detected in any member of the *Cyperaceæ*.

Now, in regard to the *Gramineæ*, the structure of the embryo is very complicated, and has been the subject of an extensive literature from the hands of a number of the most notable morphologists. But so different are the views expressed that the only point which seems settled beyond doubt is that the *Gramineæ* have at least one cotyledon; some authors think they have two.

Let us, however, examine a few of these embryos before we review the various explanations that have been offered. On the accompanying plate (Plate IV) I have figured some germinating grains of *Secale* and *Zea* (Figs. 13-17), and in these we notice the following organs: the primary root (R) with its sheath, the so-called coleorhiza, and frequently accompanied by one or