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POLYEMBRYONY IN SPIRANTHES CERNUA.

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In the seed of *Spiranthes cernua*, I find that there is ordinarily more than one embryo. When this fact was first noticed, it was suspected that the occurrence might be local; inasmuch as, while the polyembryony is seen from a glance at the seeds or ovules at almost any stage, the case seems not heretofore to have been reported. Curtis (Bull. Torr. Bot. Club, vol. xx., p. 188) figured the seed, and he found but a single embryo. Material from a distance, however, kindly sent to me from Webster, Massachusetts, by Mr. L. J. Spalding, and from Toronto by Dr. Jeffrey, shows the same condition as the local material. Seed out of an herbarium specimen from Iowa is likewise polyembryonic.

Two spikes collected respectively in Melrose and in Beverly, Massachusetts, showed single embryos. One of these spikes was labelled "flowers yellowish." I have found a small plot of plants that have, also, a normal embryology. All these latter plants are vigorous specimens, and might perhaps be referred to the yellowish variety, if such a variety may be distinguished. Other plants characterized by long and dense spikes and yellow-tinged flowers have, however, displayed the polyembryonic trait.

The normal embryology — of which, with the abnormal, I hope soon to publish a fuller account — is interesting. The sexually derived embryo develops no suspensor at the micropylar end of the embryo-sac. It early establishes a connection with the opposite extremity, and from that quarter draws its nourishment. I may mention that I have readily found the pollen tubes applied to the embryo-sacs at the time of fertilization, and masses of empty tubes persisting in the

ovaries sectioned, even after the embryos are well along; this, in contrast to what I have noted in polyembryonic ovaries.

In the prevalent, abnormal development the inner integument of the ovules displays an extraordinary growth and tendency to form embryogenic masses even before the embryo-sac is mature. Indeed the sac seems ordinarily to be pushed aside by the adventive growths, and probably becomes functionless. I have rarely found traces of pollen tubes in the ovaries. In a test made to determine the ability of the plant to produce its polyembryonic seed under conditions absolutely excluding fertilization, I have, at the time of writing, got so far as to find adventive embryos of nearly the normal size. From present appearances I judge that the seed borne under test conditions will not differ from that ordinarily produced.[1]

The adventive embryos number from one to five or six. When several occur together, some are sure to be smaller than others. Even when solitary, an adventive embryo is readily distinguished from an egg-derived embryo in lacking the slight apical protuberance which serves the normal germ as suspensor — or at least as haustorium. In my observation, adventive and normal embryos do not occur in the same pod, or even upon the same plant.

The embryonal tissue is apt to grow so vigorously as to distort and frequently to rupture the seed. It is common to find large, rounded, embryo-like masses outside the micropyle, connected by a chain of richly protoplasmic cells to the nourishing region at the end of the seed.

The forms of the embryos vary from spherical to elongate; not rarely irregular and lobed examples occur. The lack of uniformity in size, shape, and position of the embryos in the seed is in consonance with the irregularity in all respects characterizing this mode of reproduction.

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[1] Since the above was written the pods of the plant under observation have come to maturity with an abundance of seed full of embryos of the usual size and formation.