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ON THE USE OF SOME COMMON BOTANICAL TERMS.

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The revolution which has taken place in the science of botany during the last fifty years has given to many of the older terms an entirely new meaning. The following explanations are offered to indicate in a general way the proper use of some of the terms which are continually recurring in the class room and which stand for definite ideas and facts as at present recognized. They will be used by the writer until something better is proposed.

In the first place, it is of the greatest importance to clearly recognize the alternation of generations in all of the plants above the Thallophtes as well as in those Algae and Fungi where a true alternation exists. The alternation of generations lies at the bottom of the entire evolutionary history of plants and to ignore this fact is to start with confusion as a foundation. With beginners one need not go into details, but so far as one does go, so far he should tell the whole truth and leave no room for false impressions. It is best to speak of the two generations and the plant individuals only as gametophyte and sporophyte and to drop such terms as sporogonium, oophore, and oophyte when speaking of the individual or of the generation. The gametophyte is the sexual generation and the sporophyte is the non-sexual one. Sex terms should be used only for the sexual generation and all sex terms should be discarded when the sporophyte generation is under discussion. It is just as easy to say carpellate flower as female flower, or staminate tree as male tree. In speaking of the gametophyte, if the two sexes are united in one individual the

proper terms are hermaphrodite or bisexual, and unisexual when the sexes are separated. Monoecious and dioecious should not be used for sexual individuals; these terms are properly applied only to the sporophyte.

Reproduction may come under three general heads: 1. Vegetative propagation. 2. Reproduction by non-sexual spores. 3. Sexual reproduction in which spores are formed by the conjugation of two gametes or two coenocytes. Any specialized part or branch of the gametophyte which bears the sexual organs should be called a gametophore. The gametophores may be antheridiophores, archegoniophores, oogoniophores, etc. The organs which bear the male and female cells are the spermary and ovary, but these may have various special names, as oogonium, archegonium, antheridium, depending upon their structure. The sexual cells are gametes, and should be called spermatozoid and oosphere, or simply sperm and egg. Normally these two cells must unite to give rise to a spore. The union of the male and female gametes is known as fertilization. This term must never be used for pollination. Pollination is the transfer of a small male plant to an ovule or a stigma. Sexually formed spores are either zygosporos or oosporos—zygosporos when the uniting cells are not at all or very little differentiated from each other, oosporos when they are spermatozoid and oosphere. The product of coenocytic conjugations may be called coenocytic zygosporos, etc. The term sporophore may be used for any organ which bears sporangia, whether on the gametophyte or sporophyte. Then the sporophore may be a sporophyll, or otherwise. Sporophore is a general term for a spore-bearing organ or branch. The sporophore may be a conidiophore, a zoosporangiophore, etc., according to the nature of the spores produced.

A flower is a modified spore-bearing branch without sexual organs. In some cases complete sterilization may have resulted so that no spores are produced. Such a flower is one, nevertheless, which was a spore-bearing organ in the earlier stages of its phylogeny. It is sometimes difficult to distinguish between spores and brood-buds, but all specialized reproductive cells should be called spores. The term spike should not be used for a primitive flower or shortened branch of sporophylls. Such flowers may be called cones—as cone of *Equisetum*, *Lycopod*, *Pine*, etc. The spike is an inflorescence. The flower may be either monosporangiate or bisporangiate. If it is monosporangiate it may be monoecious or dioecious. These terms should be applied only to heterosporous sporophytes. Monosporangiate flowers are either microsporangiate or megasporangiate. In the case of Spermato-phytes they may be called staminate and carpellate. Such expressions as hermaphrodite flowers, and polygamous flowers

are altogether misleading. The typical flower is made up of four sets of floral organs, as follows :

Fertile parts . . .	{	1. Gynoecium—composed of carpels.
	{	2. Androecium—composed of stamens.
Sterile parts . . .	{	3. Corolla—composed of petals.
	{	4. Calyx—composed of sepals.

Gynoecium and androecium should simply mean the house or place in which the male and female plants live and thus the mistake will be avoided of implying sexuality to the carpels and stamens. The term sterile should never be applied to a staminate flower. It is manifestly absurd to continue to call a staminate flower sterile when it produces a large number of microspores. A sterile flower is one which has lost the power of spore reproduction. The term pistil is very misleading and should not be used except for a gynoecium in which the carpels are completely united. It would be better to not use it at all. The parts of any cycle or whorl of the flower may be free or partly united or completely united and these conditions can be easily indicated without a special terminology. The older terms in regard to the symmetry of the flower should be completely dropped and the newer ones, which accord with mathematical conceptions, be used. According to Barnes, stigma, style, and ovulary are the usual parts of a carpel. Ovary should only be used for an egg-producing organ of the gametophyte. If the carpels are free the ovaries are simple ; but for convenience, if the ovaries of a number of carpels are united the entire structure may be called a compound ovulary with so many loculi or cavities. The term cell is to be used only in its cytological sense as the unit of plant structure. To speak of the cells of the ovulary or of the stamen when the loculi are meant is misleading.

The ovule is originally the megasporangium and produces one or more megaspores. The microsporangia are borne on the stamens and produce the microspores. The pollen grain and the embryo-sac are the male and female plants of the gametophyte generation of the seed plants, and develop from the microspore and megaspore, respectively. A distinction must be made between the microspore, which is a single cell, and the pollengrain, a several-celled male gametophyte ; also between the megaspore, a single cell, and embryo-sac, the female gametophyte. The pollentube is not the male gametophyte, but only a part of that individual. The entire structure, which develops from the microspore, is the male gametophyte. The pollengrains should not be called pollenspores, nor should the embryo-sac be called a megaspore. Endosperm should be restricted to the Angiosperms and stand for the tissue or cells which come from the definitive cell, and in such

cases as the Pine the tissue which surrounds the embryo can be called what it actually is, the female thallus or female gametophyte filled with food material.

The term root must be restricted to the sporophyte generation and root-hairs to hairs on real roots. The terms rhizoid and hold-fast may be used for similar organs of the gametophyte. The word leaf should be restricted entirely to the sporophyte. Any reduced leaf may be called a bract or scale-leaf. For expansions on the gametophyte the term scale may be used as moss scale, liverwort scale, scaly Liverworts, etc. Expanded thalli, as those in many of the red and brown Algae, and Liverworts and Mosses may be called fronds. There is no need of calling a fern leaf a frond. It is of the same nature as the leaf of a seed plant and should have the same terminology. The term stoma should be used only for true stomata on the sporophyte. Passages of somewhat similar function, but not similar structure on the gametophyte of some Liverworts may be called air passages for want of a better term. It would be well to drop the term prothallus in the Pteridophytes and call the gametophyte, what it really is, simply a thallus. The term germinate should be restricted to the division or budding of cells and spores; it should not be used for the breaking out of the embryo plant from the seed. This process should always be called sprouting. There is not even an analogy between this process and the germination of the spore.

The terms photosynthesis, digestion, respiration, and assimilation should be properly applied, especially assimilation, which should refer only to the conversion of dead food materials into living protoplasm. It would be very fortunate if the terms daughter cell, mother cell, and grandmother cell would always be applied to successive generations of cells produced by division. Thus in the formation of the spores on the sporophyte, the cells which are differentiated and usually separated from the general tissue are spore grandmother cells. These divide into two to form the two spore mother cells, which again divide, thus forming the four daughter cells which develop into the spores. These grandmother cells are usually called spore mother cells, but it is better to use the term sporocyte, and if there are two kinds of spores, the cells may be called microsporocytes and megasporocytes.

These are only a few of the most important terms that might be defined, but if these alone were always correctly applied, amateur students as well as those more advanced might obtain a clearer conception of the subject with much less outlay of misdirected effort.