Dear Editor:

RE: The Rediscovery of the Phytomer by Botanists

Botanists interested in the dynamics of plant populations have learned much from the applied plant sciences of agronomy, horticulture, and forestry, and they have been quick to acknowledge this (8, 9, 12, 18). Some of the best-founded generalizations of plant demography (9, 18) have relied heavily on the immense literature of these sciences, though perhaps less attention has been given to it by plant ecologists in recent years as the study of populations in natural vegetation has expanded. One topic, however, which has only recently received serious attention from plant population biologists is the dynamic or demographic basis of plant form (10, 11, 17, 19).

Fundamental to this development is the notion of the plant being composed of subunitary parts. It is therefore ironic that Brede (3) has recommended the abandonment of the concept of the grass phytomer by agricultural scientists, just as some of the classics of morphological research, such as Etter's monograph (5), are being rediscovered by botanists (2, 13, 17); Madison (13) writes that Etter used "the phytomer idea to advantage in studying Gramineae."

I would like to urge your readers to disregard Dr. Brede's advice and to pursue research on the phytomeric construction of plants, without regard to "widely used botany texts."

As Brede outlined, the idea of a basic structural unit in plants was widely discussed in the mid-19th century, by the leading botanists of the time (15, 17, 19). With changing fashions in botanical research, the concept faded out and was only revived occasionally in various, often idealistic guises by academic botanists (4, 17). The persistence of the concept to this day among agronomists is (to put it no higher) a tribute to their good sense: self-evidently the aerial parts of many plants are composed of repeated structural units, formed in a serial sequence by an apical meristem. These units have sometimes been called phytoms or phytomers (17), but I prefer to use the term metamer, which is widely used among zoologists (19). The accumulated sum of these metamers which are derived from a single apical meristem is referred to by contemporary botanists as a module. This term is a translation of the French l'article, the name for a concept only introduced to botanical morphology by Prévost in 1967 (14). The module as a unit of construction was used as the central organizing principle for interpreting plant architecture in the celebrated monograph of Hallé and Oldeman (6), from which most of the contemporary interest in the dynamics of plant construction springs (1, 2, 7, 16). It is still scarcely known to the writers of "widely used botany texts" I regret to say.

In spite of the somewhat idealistic applications of the idea of metamerism in plants by earlier botanists, the modern use of it by plant morphologists and demographers is based on good sense as they attempt to grapple with the principles of plant construction. As Tomlinson (16) has remarked: "There are numerous subunits of plant construction other than the primary categories of stem, leaf and root. All such subunits need to be recognized in an integrative approach . . . The extent to which subcategories of construction can be recognized because of shoot differentiation is too little recognized even in descriptive morphology." The concept of modular or metameric construction of shoot axes can be applied at all levels, from taxonomy with the precision with which botanists have traditionally employed studies on competition, productivity, plant-animal interactions, or the genetic basis of plant form (19).

Unquestionably, the metamer and the module are basic morphological units; they are especially distinct in grasses, where the module is usually referred to as a tiller. They are also evident in many other plants, except those that are thallose, such as fern gametophytes or some algae and hepatics. Since the concepts which these terms embody have been usefully employed by agricultural scientists (as Brede [3] illustrated for turfgrass science), it would be better to continue their use for the benefit of plant science as a whole than to discard them. As in the earlier emergence of plant demography as a scientific discipline, now the significance of research on the dynamics of plant construction by agronomists is only becoming better appreciated by botanists. Many seeds of theoretical plant demography and plant morphology have been well drilled in agronomy, horticulture, and forestry; let us encourage their growth and development.

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REFERENCES