portant principles of morphology and physiology. The comparatively limited instruction in classification for which the first-year student has opportunity should not primarily aim to teach him phylogeny—the province of more advanced courses—but rather to familiarize him with the main features of the plant kingdom as it now exists, explaining briefly those great steps in evolutionary progress which have brought plants to where they are to-day. Has not an over-emphasis of phylogenetic detail been one of the reasons for the fact that botany to-day fills a much less conspicuous place in college curricula than its intrinsic importance warrants?

Secondly, an elementary text can not well present a given conclusion as fact until it has achieved essentially universal acceptance. Professor Campbell seems to imply that there is agreement as to the main facts of plant relationship; but certainly the conclusions which he cites and assumes to be established with regard to the interrelationships of the so-called embryophytes (Bryophytes, Pteridophytes and Spermatophytes) will by no means find unanimous consent to-day. Most botanists would probably agree that "comparative morphology . . . is the safest clue to relationships," but to base conclusions chiefly upon the structure of the reproductive parts alone, as does Professor Campbell, disregards a very important source of phylogenetic evidence and has often resulted in erroneous conceptions. Much attention, particularly during the past twenty years, has been devoted to another branch of comparative morphology, that which deals with the *vegetative* parts of the plant body, and the modern student of evolution draws his conclusions from *both* these important sources. This broader method of phylogenetic investigation has led to the conception of the plant kingdom as divided into two main groups, the non-vascular plants (Thallophytes and Bryophytes) and the vascular plants (Pteridophytes and Spermatophytes). Certainly between these two major divisions there are such profound differences in structure and function that it is hard to see how a student of evolutionary history can look upon the embryophytes as a very homogeneous group. Surely between mosses and ferns there are such fundamental divergences, if one is willing to consider all the facts, as to warrant the statement made by the writer, which Professor Campbell finds "astonishing," that "in passing from the Bryophytes to the Pteridophytes . . . we cross the widest gap which exists in the continuity of the plant kingdom." For years botanists have been unsuccessfully endeavoring to establish a bridge over this gap, and the author's reference, cited by Professor Campbell, to the most plausible connection (through the Anthocerotales) by no means implies that the gap is other than a very wide one indeed. It is hard to arrive at an estimate of opinion in such a matter as this, but the writer feels confident that a very considerable group of botanists will by no means regard as "an unscientific and outgrown system of classification" that which places liverworts closer to algae than to angiosperms, but will look with suspicion upon any system which is based largely upon the study of only one group of organs.

All these problems of phylogeny look more complex to-day than they did in the first flush of evolutionary enthusiasm, and we realize that their solution must involve a thorough study of anatomy, genetics, paleobotany and other branches of botanical science; and that it can not be based, as so often in the past, merely upon evidence derived from the reproductive structures alone. When facts from all sources have been sifted and botanists have agreed as to the fundamentals of plant classification, then it may be time to present phylogenetic conclusions to freshmen in more dogmatic form; but until that day arrives, there is much to be said in favor of a continued use in our elementary texts of that system which has so long met with favor at the hands of those who are entitled to speak with authority in matters of botanical pedagogy.

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CHESTNUT TREES SURVIVING BLIGHT

WHEN the chestnut blight (*Endothia parasitica*) became prevalent some years ago it seemed that *Castanea dentata* was doomed. Some suggested that a few resistant trees might remain. The writer has followed the course of the disease with great interest and in recent years his observations made him believe that there was a general lessening in the amount of branches killed per year, while the amount of new growth gradually overbalanced that killed.

Accurate data appeared rather difficult to secure; a measurement of new growth compared with that growth killed during the same year was an obvious index but one requiring considerable labor. Any element of choice should be excluded. From extensive field work in connection with an ecological problem it appeared that any normal area on a given soil type could be taken safely, and in such an area a twenty-meter quadrat was laid out near the middle of a woods. This woods was twenty-year-old second growth, of which the chestnut trees (10 in the quadrat) had been killed and sprouts produced from the base while 14 seedlings had come up and were now from 0.5 to 2.5 m in height. The new growth was measured and found to total 152.60 m. Assuming an average cross-sectional diameter of 0.0035 m for the twigs, the total volume of new twig-tissue produced was 0.001456m^3. Measuring the blighted wood in the same

way, it was found to total 0.000079m³. It is seen that the amount of new growth is 18 times that killed in the same year.

Not only are saplings showing recovery of growth but older trees as well. Near the writer's home is a fine grove of chestnut trees of 30 to 40 years age; the tops were killed, but the trees are producing new crowns, in some cases recovering half their former height, and are now well set with fruit.

This condition seems common in southeastern Pennsylvania, the trees flourishing more on Chester and Manor soils than on the more sterile Dekalb. It may also be rather a widespread condition, for in passing through the mountains from Harrisburg, Pa., to Buffalo, N. Y., many trees were seen similar to those described. In the Niagara Peninsula of Ontario, especially near St. Catharines, recovery seemed evident.

The improved condition may not be due wholly to greater resistive powers but to a lessened supply of spores, for it is evident that the total production of *Endothia* spores is vastly lessened. The trees have also shown their ability to heal serious cankers, although ultimate recovery is not a necessary consequence.

Those trees, however, which seem most likely to survive and produce seed are in danger of extinction, since the public has been educated to believe that cutting of all chestnut trees from a woodlot is a virtue. Instead living ones should now be preserved. It might prove advisable to locate the best groves and to protect them from cutting and from fire.

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THE SCIENTIST AND AN INTERNATIONAL LANGUAGE

ON reading the article of Dr. R. G. Kent on "The Scientist and an International Language" (SCIENCE, No. 1538, June 20) I am particularly glad to hear from a scientist of an English-speaking nation, of the need of an international language for scientists. I fully agree with Dr. Kent in discarding any existing national language as such. I want to call attention to a great handicap on the part of scientists belonging to a nation whose language is not widely intelligible. For instance, in the *Annotations Zoologicae Japonenses* and the *Folia Anatomica,* both published by Japanese biologists, all articles written in Japanese are excluded, and the editors of the Swedish journal *Acta Zoologica* will not accept papers written in Swedish. It is true that for some scientists writing in other languages this may not be felt as a serious handicap. But it remains true that some have the advantage of publishing papers in the mother language, while others have the disadvantage of endeavoring to write in a foreign language.

Dr. Kent proposes the use of Latin as an international auxiliary language among scientists. This was proposed by Zamenhof in his boyhood half a century ago. He soon discarded it, however, because of the extreme difficulty of learning that complicated language, and after years of painstaking effort he finally succeeded in inventing a language, which is now well known by the name of Esperanto.

It is not necessary to explain how easy it is to learn Esperanto, and how freely one can express one's opinion and can describe what he has in mind, even in scientific terms. Every Esperantist will tell you of it. For this reason it would not be desirable to adopt Latin as the spoken language in an international congress. Even if "we give Latin a preferred place in our study of foreign languages" I wonder how many of us would succeed, after a few years' course, in speaking Latin! Esperanto has already experienced a brilliant success in this respect. I believe that it is Esperanto that fulfills our desire of having a neutral auxiliary language in scientific circles.

I may be allowed to add, further, that in Japan some original papers have already appeared in this language in the fields of anatomy, pathology and veterinary science, and that there is a project among a few biologists of publishing an Esperanto bulletin of zoology. This, together with the fact that there exist international as well as local Esperantists' associations in the medical sciences and that several journals are published by them, is sufficient to show the practicability of this language in scientific publications.

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BALL LIGHTNING

IN SCIENCE for August 8, Mr. W. J. Humphreys, of the U. S. Weather Bureau, requests information as to ball lightning.

Several years ago my home was struck by lightning. A ball of fire seemingly about nine inches in diameter was thrown into the center of my bedroom and exploded with a terrific noise, just as if a bomb had been exploded. Brilliant particles seemed to have been hurled into every direction, but I felt no effect other than that of sound and sight.

The electric wires throughout the house were affected, and there is an inch hole through the plastered wall on the ground floor where an electric spark seems to have found its path between the radiator in the room and the metal support to the water spout on the outside of the building.

I took the matter up with Dr. T. C. Mendenhall, with whom I was associated on the board of trustees of Ohio State University, and on expressing a doubt