Comments and Communications

Fluorescence of Solid Streptomycin Salts

It has been observed in our laboratories that streptomycin exerts a definite fluorescence in the solid state when exposed to ultraviolet radiations of wave lengths between 3,600 and 4,000 A. This fluorescence has been found to occur with commercial samples of streptomycin hydrochloride, streptomycin sulfate, streptomycin calcium chloride complex, and with a research sample of dihydrostreptomycin hydrochloride. The products of various manufacturers have been investigated, the phenomenon having been found to occur in all samples.

It is of extreme interest to note that a purified sample of streptomycin B (trihydrochloride) supplied by K. Folkers and R. L. Peck showed no fluorescence under similar conditions. This sample yielded an "assay" value of 600 μg/mg on basis of maltol assay but showed a microbial activity of only 135 μg/mg against *B. subtilis*.

The fluorescence of solid streptomycin salts is apparently quenched upon solution. Concentrated (1,000,000 μg/ml) aqueous solutions prepared from a highly purified sample of the calcium chloride complex showed negligible fluorescence. This is also true of saturated solutions in methanol. Unfortunately, no commercial apparatus is known to the undersigned for the quantitative measurement of fluorescence of solids. An instrument which we think will be adequately sensitive has been designed, and, upon its completion, measurements will be made to attempt to correlate fluorescence with microbial activity. Due to the fact that samples from diverse manufacturers and localities demonstrate this fluorescence and that it is readily noticed that high-purity samples fluoresce more strongly than low-purity material, we believe that this phenomenon is characteristic of the streptomycin moiety and is not due to the presence of trace impurities.

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Should There Be a *Living Metasequoia*?

E. D. Merrill's recent communication about a living *Metasequoia* (*Science*, February 6, p. 140) once more focuses attention upon the interrelationship of living and fossil plants and calls to mind a matter of taxonomic policy that might well receive attention in drafting appendix I of the International Botanical Rules. This appendix is to contain "regulations for determining types" and presumably may be drafted in time to submit to the Stockholm Congress, scheduled to meet in 1950.

Three genera are mentioned by Merrill that were recognized from fossils before their living representatives came to light. These are: (1) *Petrophiloides* Bowerbank (1840)—type specimen, a fossil fruit of this plant; living representative, *Platycarya* Sieb. and Zucc. (1843); (2) *Caryojuglans* Kirchheimer (1935)—type specimen, a fruit from German brown coal; living representative, *Rhamphocarya* Kuang (1941); and, of course, (3) *Metasequoia* Miki (*Jap. J. Bot.*, 1941, 11, 261), the modern species of which is probably not yet described. A fourth case, that of *Steinhauera* Presl in Sternberg (1838) versus *Sequoia* Endlicher (1847), is generally known, perhaps largely because of the publicity given it by H. Potonié in connection with his rather elaborate nomenclatural proposals prior to the Brussels Congress. The name *Sequoia* was subsequently conserved officially, but there still is no good evidence regarding the generic identity of the respective *types* of *Steinhauera* and of *Sequoia*. Nathorst (*Botaniska Notiser för År 1910*, pp. 54–56) has commented on this matter particularly and, while an argument was settled through conservation of the name *Sequoia*, there was no compelling need for an official ruling. *Steinhauera* still is an available name referring to a problematic fossil group of possibly coniferous(?) relationship. It is not now, and probably never can be, very useful because of the ambiguity of its nomenclatural type. Apparently no one has questioned the generic identity of fossil *Petrophiloides* and *Caryojuglans* with their modern representatives.

The generic similarity of the fossil and "living" *Metasequoia* is supported by both Chaney (*Ecol. Monogr.*, 1947, 17, 145) and Merrill (*Arnoldia*, 1948, 8, No. 1), but the description and illustration of the type fossil material on which the name *Metasequoia* is based are not yet available to the present writer and apparently were not widely distributed, having appeared during the recent war. The taxonomic decision as to whether remarkable new living material now being studied by Wan-Chun Cheng and H. H. Hu in China is congeneric with *Metasequoia* rests on its degree of similarity with Miki's fossil type. In comparison with any fossil type certain details must be omitted; whether these have been important or not will have to be determined largely by consideration of Miki's type species and the type specimen pertaining to it.

The writer is not concerned with the question of identity because, although some authors have believed an artificial nomenclatural boundary should be drawn between "fossil" plants and others dead not quite so long, there can be no real question that living forms in many, if not in most, instances have bona fide representation in the fossil record. To deny this is to deny the pertinence of botany to paleobotany. In any given instance the question of what constitutes adequate evidence to identify a fossil specimen with an extant group must rest with students specializing in systematic study of the plants concerned.

There is, however, a point to be made regarding the source of evidence for such critical determinations. Although in a number of instances plant structures are preserved in fossils with a perfection not exceeded in modern plants save for the details of cytology, this is not a general rule, nor can we by any stretch of imagination expect that in the distant future the exquisitely preserved fossil

examples will ever be numerous enough to give a very complete picture of all the fossil forms. Ingenuity in devising new paleobotanical techniques has enormously enlarged the potential botanical information obtainable from fossils; nevertheless, the best source of information about plants in general is from the species that can provide us with *vital* information, *i.e. the extant forms.* The functional characteristics of the fossil forms must be judged always in relation to what is known about modern representatives in the present flora. Modern plants serve as standards by means of which fossil plants are evaluated. Would it not be a wise policy to acknowledge this principle taxonomically?

Nomenclatural types are of critical importance in the application of names to plants. Identification involves assignment of a specimen to a place within a group of technical circumscription, and the oldest valid name-carrier (type) within the circle of circumscription determines the name of the group. For stability of nomenclature it is most essential that the characteristics of the name-carriers be unambiguous. In fact, the essential usefulness of a name in designating a particular group of plants often depends to a large extent on how definite a determination can be provided for its nomenclatural type (see Dayton. *Leafl. west. Bot.*, 1943, 3 (10), p. 217, re. *Steinhauera*). If, as in the instances cited by Prof. Merrill, the oldest name-carrier happens to be a fossil specimen, that name under the present Botanical Rules must be applied to the group. Although opinions differ as to what the particular requirements should be for designating a new nomenclatural type (any new group must include its type), there can be little question that implications of names attached to modern material are generally more *understandable* than those carried by fossils. The writer believes that, wherever possible, the modern type material should be given precedence, but to do this a new policy must be incorporated in the code of nomenclature.

To serve this purpose the writer suggests that the following sentence be inserted in the International Rules of Botanical Nomenclature, either as a part of Article 18 under Section 2 regarding "The Type Method," or as a part of Appendix I, "Regulations for Determining Types," yet to be proposed, or in whatever place it may seem more appropriate.

Names based on types composed of modern material always take nomenclatural precedence over names permanently attached to specimens of fossil or subfossil character.

The inclusion of such a statement would authorize a departure from priority in the few instances where fossils have received names ahead of congeneric descendants in the modern flora. In these instances it would insure that the valid name is typified by material deriving from the best source of evidence and information. If such a principle were incorporated in the Rules, it would obviate any future argument like that about *Steinhauera*; it would tend to insure the stability of names established with reference to modern material as types. Although discerning paleobotanical investigation is tending more and more to link closely related ancestral forms with those of the present flora, it is probably simpler (where evidence warrants it) to place such fossils according to names referring to modern material than it is *assuredly* to adjust modern names to fit nomenclatural types among fossils that happen to have priority.

Adoption of such a provision probably would validate automatically the names *Platycarya* and *Rhamphocarya* mentioned by Prof. Merrill—both typified by modern material. It would permit Prof. Cheng and Dr. Hu to propose a new and appropriate generic name for the modern *Metasequoia.* According to Merrill, the new group suggests *Glyptostrobus* and *Taxodium* in its vegetative characters, and its botanical alliance is scarcely with *Sequoia,* as one might infer from the name of the fossils with which it has been identified.

Appropriate or not, a name is a name; however, a full set of characteristics can be established for the modern plant in a way that is scarcely true of fossil forms. Among the Coniferales, in particular, characteristics of the frequently complex type of polyembryony are important. These could be established for the modern material, but who can determine the degree to which they apply to the fossil *Metasequoia*? There always will be matters of doubt concerning some of the features of fossils regardless of how definitely their relationships may be adjudicated. Inevitably, knowledge of modern forms is on a more certain basis and is accorded more prominence in botanical thought. If this state of affairs is given due recognition as suggested above, problems of nomenclature for both fossils and modern forms will, to some extent, be clarified.

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Brown, Mature-Fruit Color in Pepper (*Capsicum frutescens*)

In a collection of pepper material from Mexico turned over to me by the late J. N. Gilmore, one strain produced fruit which turned a deep chocolate brown at maturity instead of the normal red or yellow commonly found in this species. Later, an off-type plant with brown fruit was found in a field of the California Chili variety, and one plant with brown fruit, but otherwise typical of the variety, was found in a field of Mexican Chili. In conversations with several seedsmen I have been told that this character has been seen on a number of occasions by them in their collections. The only reference in the literature to this color of pepper fruit is made by S. M. Bukasov (*Bull. appl. Bot., Genet., Plant Breed.*, 1930, Suppl. 47, 526–529), who describes two forms which are quite widespread in Mexico and in Guatemala.

The chocolate-brown mature-fruit color in pepper is of especial interest because of the nature of the brown color and its rarity or absence in fruit generally. At the onset of ripening the color changes directly from green to brown and involves all of the wall tissue, which becomes a uniform chocolate brown throughout. A suggestion of this same phenomenon is sometimes seen in certain commercial