

Letter to the Editor

Sir:

An explosion of court cases is in progress in North America based on a curious issue. Most legislation proscribing cannabis drugs defines the prohibited material as "*Cannabis sativa* L." The contention has been advanced that there are "legal" species of the genus *Cannabis*, not covered by this definition, and hence there are legal kinds of cannabis drugs. I am preparing an extensive analysis of the forensic debate, and am aware of others who have undertaken or completed this project in apparent ignorance of several critical aspects. At this time I believe it will be helpful if certain considerations become generally appreciated.

1. There are relatively few plant taxonomists (specialists in plant classification) in relation to the number of problems requiring study, and usually there are very few "experts" in given groups. At present, of living botanists in North America, only R. E. Schultes of Harvard University and I have carried out extensive taxonomic studies of the genus *Cannabis*.

2. The forensic debate in North America has involved repeated courtroom confrontation between Schultes on behalf of the defense, and A. Cronquist of the New York Botanical Garden and myself on behalf of the state. Schultes and Cronquist rank among the world's most eminent botanists. Several additional qualified taxonomists who have carried out limited studies of *Cannabis* up to the present have also participated occasionally in the debate. In every case in which Cronquist and I have testified, including all of those in which Schultes provided opposing testimony, a decision favorable to the prosecution was reached. In the only two notable cases in which a decision favorable to the defense was reached (*U.S. v. Collier*, Washington D.C.; *U.S. v. Lewallen*, Wisconsin), the defense was represented by a supporting expert, while the prosecution was not so represented.

3. In addition to "biological nomenclature," a distinctive pharmacological nomenclature ("official" or "officinal" nomenclature) was extensively used for *Cannabis* in the early part of this century. In this latter system, the term "*C. indica*" was used not to denote a species, but a plant product, specifically a drug preparation from *C. sativa*. This led to some confusion, but it remains clear that the import of the terms are equivalent for practical interpretation.

4. Biological classification is more complex than classification of inanimate objects. Biological taxonomists are acquainted with certain critical frailties of biological nomenclature, which are foreign to nontaxonomists. Those without professional qualifications as plant taxonomists are ill prepared to write on the scientific issues and are liable to produce at least somewhat ingenuous treatments of the subject. Those faced with evaluating the present forensic debate should appreciate that understanding of the problem is predicated on familiarity with an abstruse discipline which has never before received intensive forensic analysis. Some critical issues, such as the fundamental ambiguity in the term "species" (denoting either a "group" or a "category"), are incomprehensible without considerable background. Those wishing to become better acquainted with taxonomy should consult the most complete and widely respected exposition of the principles of plant taxonomy available today: *Principles of Angiosperm Taxonomy*, by P. H. Davis and V. H. Heywood (2nd. ed., 1965, Oliver & Boyd, London).

5. There are two distinctive phases to taxonomy, which are sometimes indicated by the terms "classification" and "nomenclature." Classification refers to the process of establishing and defining taxonomic groups in nature. Nomenclature is the allocation of names to the groups so established. Classification always precedes the giving of names

and names in the literature are of questionable significance until a satisfactory classification is achieved. Many plant species are burdened with an excess of names in the literature. Application of names is done in conformity with the canons of the "International Code of Botanical Nomenclature," a highly legalistic document based in considerable part on a complex system of adopting names in the literature, known as the type method. Much of nomenclature is of limited importance to the forensic debate, but without adequate taxonomic background, confusion regarding the significance of names in the literature is inevitable.

6. The forensic issue is logically resolvable in two ways (but see Paragraph 10, below): (a) as a scientific problem based on evidence bearing on how many species of *Cannabis* deserve recognition and (b) as a semantic problem based on evidence bearing on how comprehensively the name *C. sativa* is understood in society.

7. My scientific studies of *Cannabis* indicate that only one species deserves recognition. Scientific studies of Schultes have persuaded him that several species should be recognized. Our divergent viewpoints have stimulated some polarization of opinion among botanists.

8. Plant taxonomists require the satisfaction of a number of conditions before variants be afforded taxonomic recognition (for example, indication that supposed diagnostic characteristics are not merely the result of environmental modification and examination of comprehensive representative samples). Generally, taxonomists insist on certain criteria before species are recognized, a paramount criterion being the demonstration of discreteness of external appearance (that is, substantial absence of intermediates before variants are called species). Additionally, many kinds of unessential data may provide support for the recognition of variants as species (for example, demonstration of chemical or anatomical differences between variants), but this kind of accessory information cannot be used alone to recognize species. The debate has frequently been deflected by polemical arguments over the merits of nonessential, supporting data, the discussion of which is really peripheral to resolution of the issue. Lacking the background necessary for an evaluation of when the species rank is proper, nontaxonomists are easily convinced that the assignment of the species level is justified for a variant, when in fact it is appropriately ranked merely as a "subspecies" or "variety," or does not merit any taxonomic recognition.

9. It is hazardous at present to evaluate the recent scientific literature on the subject because it has been produced by the protagonists closely involved in a forensic debate which has an appreciable irrational emotive component, inevitable because of the magnitude of the marijuana issue in contemporary society. I cannot refrain from commenting that some of the recent scientific evaluation of the taxonomy of *Cannabis* is extremely superficial.

10. The crux of the forensic debate is the semantic issue, and present opinion by a minority of botanists that more than one species of *Cannabis* deserves recognition is irrelevant. The majority of cases has been resolved on this basis.

11. Biological taxonomy involves a substantial semantic component and is as much an art as a science. Lack of understanding of this is the major difficulty confronted by nontaxonomists who attempt to comprehend the forensic debate. So-called "scientific names" (for example, "*Homo sapiens*") govern concepts which are not comparable to the thoroughly definable and objective concepts of the physical sciences (for example, "molecule" or "energy"). Although there is frequently universal agreement among taxonomists about the naming of plants, disagreement is also frequent.

12. Often a given name is used by taxonomists in a comprehensive sense ("*sensu lato*") and in a restrictive sense ("*sensu stricto*"). This situation is pervasive in plant taxonomy, and is related to differing taxonomic philosophies and traditions. There is no rigid formal process in botany which resolve the different uses of given names by different botanists

(although the code of botanical nomenclature does provide a rigid overall framework within which taxonomists must conform); rather, the tradition is one of relative tolerance to the subjective, arbitrary ways names are used by given individuals. Plant taxonomists are accustomed to interpreting names with careful consideration of the intent of the user.

13. The overwhelming tradition for the last century has been to use the name *C. sativa* comprehensively (*sensu lato*), that is, inclusive of all variants of *Cannabis*. Schultes strongly supported this comprehensive use of the name until at least 1970. Schultes conceded recently (*U.S. v. Kotara et al.*, Sacramento, Calif., Jan. 1975) that the majority of plant taxonomists still use the name *C. sativa* as inclusive of all variants of *Cannabis*.

14. During the enactment of federal legislation controlling cannabis drugs in the United States, Congressional hearings were held. The record of these hearings makes it clear that legislators intended to use the name *C. sativa* in a comprehensive sense.

15. Courts are not bound to interpret terms in the technical sense of particular disciplines. The textbook case of the U.S. Supreme Court ruling that for purposes of interpretation of a particular statute, a tomato is a vegetable, not a fruit, is exemplary. All competent botanists understand that a tomato is a fruit. Indeed, it might be pointed out that, technically, a tomato is a kind of fruit known as a "berry," although clearly the majority of society would not accept calling a tomato a berry.

16. Now that the Pandora's box of taxonomy has been opened to the legal profession, legislators should be circumspect in their use of biological names. The suggestion has been advanced that the forensic debate over how many species there are in *Cannabis* can be circumvented by replacing the specific name *C. sativa* with the generic name *Cannabis*, and some states are following this course. Although this is reasonable, for purposes of illustrating the kind of problem which can arise, consider the following. In 1772 the botanist Scopoli proposed that the hops plant be name *Cannabis lupulus*. Botanists agree that the hops plant and the marijuana plant are closely related. However, virtually all plant taxonomists consider the hops plant to be preferably assigned to a different genus, *Humulus*, and therefore appropriately named *Humulus lupulus*. Nevertheless, should the term "*Cannabis*" be adopted to indicate proscribed material, one might envision, perhaps, the temperance movement arguing that the hops plant is really a species of *Cannabis*, and accordingly the brewing industry is illegal and must be abolished! I hasten to assure those whose inebriant of choice is a brewery product that such a scenario is extremely unlikely. My purpose in presenting this example is to point out that at least some potential ambiguity is often an inevitable concomitant of biological nomenclature. I suggest that in future, where drug plants are concerned, emphasis be given to proscribing the drugs per se. In view of the *Cannabis* taxonomic debate, it is clear that careful thought will have to be given henceforth whenever biological names are utilized in legislation, to prevent the development of additional debates.

Ernest Small, Research Scientist
Cultivated Crop Section
Biosystematics Research Institute
Saunders Building, C.E.F.
Ottawa, Ontario
Canada K1A 0C6