Letter to the Editor

A Serogrouping Concept For Legume Comoviruses

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The naming and classification of plant viruses has long been a problem. In recent years, however, with increased understanding of structure, chemistry, serology, and vector relationships, it has been possible to recognize well-defined groups (7). Relationships within a group, however, are sometimes ill-defined. This is evident in the comoviruses; although distinctions between members of the group have been emphasized (14), often they are ignored. Also, isolates very closely related to previously described isolates have been named as distinct viruses (4,10).

We have suggested a serogrouping of the legume isolates we have encountered (Table 1 reproduced from Fulton and Scott [3]) as an aid in clarifying relationships. A comovirus isolated from a legume may, for example, fall into one of five serogroups. A serogroup, such as cowpea mosaic-Arkansas, can be recognized easily on a simple Ouchterlony double-diffusion agar plate by the type of precipitin band and the spurring between antigens. A comovirus reacts with its homologous antiserum, or antisera to other members of its serogroup, to produce a sharp, well-defined, curved band. Spurs are formed between members of the serogroup, but the spurs will be fine and sharply defined. Precipitin bands of comoviruses not in the serogroup of the virus to which the antiserum was produced will be somewhat straight and diffuse (Fig. 1).

Since comoviruses are highly antigenic, the best reactions are produced by antisera more dilute than 1:10. We prefer to use a dilution of 1:20 of a relatively high titre antiserum when testing isolates in crude sap. The procedure is quite simple since high titre antisera representative of the different serogroups are readily available and tests can be made with crude plant sap.

We do not assume the serogroups to be all-inclusive. Rather, they present groupings of currently available legume isolates. We suggest that an unknown isolate of a comovirus be reacted against antisera representative of the five serogroups as an indication of its relationship to other comoviruses.

Failure to recognize the differences, as well as similarities, within the comoviruses can lead to confusion. For example, type members of two of the serogroups have been designated cowpea mosaic: cowpea mosaic-Arkansas (CPMV-Ark), and cowpea mosaic-Sb (CPMV-Sb). Severe CPMV and yellow CPMV, respectively, are also designations applied to these two viruses (14). Cowpea mosaic-Sb is accepted as the type virus for the comoviruses (7). The distinction between CPMV-Ark and CPMV-Sb has been emphasized (1,14). These two should certainly be regarded as distinct viruses.

Isolates within a single serogroup usually do not warrant designation as a distinct virus. As indicated below, isolates of CPMV-Ark from the western hemisphere often form fine spurs with one another when reacted on agar plates but all are clearly in the CPMV-Ark serogroup. Also, it is not unusual, when one is checking large numbers of isolates of bean pod mottle virus from soybeans, to encounter an occasional one that will spur with the type isolate as has been recorded in the case of J-10 (12).

A paper appeared recently in Phytopathology (6) entitled "Host Reactions of Mechanically Transmissible Legume Viruses of the

TABLE 1. Serogroups of legume isolates of comoviruses[a]

Cowpea Mosaic Virus - Arkansas (CPMV-Ark) (13)
Costa Rica
El Salvador
Puerto Rico
Venezuela
Brazil
Colombia
Bean Rugose Mosaic Virus (BRMV)(5)
Virus Ampollado del frijol (4)
Quail Pea Mosaic Virus (QPMV) (11)
Bean curly dwarf mosaic virus (10)
Costa Rica (in beans, furnished by H. A. Hobbs)
Arkansas (in soybeans)
Bean Pod Mottle Virus (BPMV) (15)
J-10 (12)
Cowpea Mosaic Virus - Sb (CPMV-Sb) (1,2)
Cowpea yellow mosaic virus, Nigeria (furnished by A. O. Lana)

[a]Type member of each serogroup selected on the basis of priority of publication.

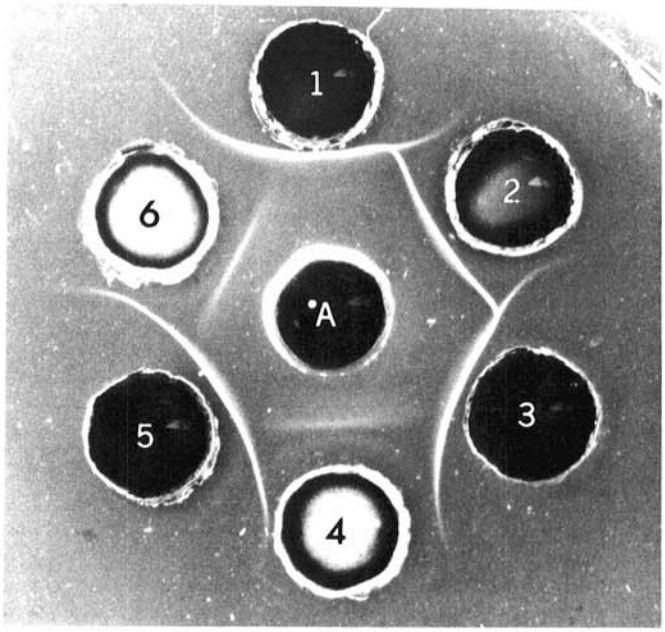

Fig. 1. Agar double-diffusion plate showing reactions to CPMV-Ark antiserum. Center well A contains CPMV-Ark antiserum diluted 1:20. Outerwells are filled with crude sap from cowpea plants infected with: well 1, CPMV-Ark; well 2, CPMV from Puerto Rico; well 3, CPMV from El Salvador; well 4, CPMV-Sb; well 5, CPMV from Venezuela; and well 6, CPMV-Sb.

Northern Temperate Zone". The cowpea mosaic virus selected for inclusion in the comparisons was CPMV-Sb apparently because the distinction between CPMV-Ark and CPMV-Sb was not considered important. Our studies indicate that CPMV-Sb does not occur naturally in the northern temperate zone and that it is not typical of cowpea mosaic encountered in the western hemisphere although it was reported originally from Surinam (1). We have recently checked isolates of cowpea mosaic from El Salvador (four collections furnished by A. Díaz), Puerto Rico (one collection furnished by N. G. Vakili), Costa Rica (eight collections furnished by R. Gámez and R. Moreno) and Venezuela (one collection furnished by J. R. Lastra). All of these are in the CPMV-Ark serogroup. Additionally, R. Gámez and R. Valverde (*personal communications*) have serologically checked many collections in Costa Rica and have confirmed that all are in the CPMV-Ark serogroup. O. R. Paguio at Recife, Brazil, and M. T. Lin at Brasilia, Brazil, have checked isolates of cowpea mosaic in their areas utilizing our antisera and indicate that all are in the CPMV-Ark serogroup. In Colombia, B. Pineda (*personal communications*) also has found that isolates from cowpea are in the CPMV-Ark serogroup. As far as we know, all naturally occurring isolates from the United States are also in the CPMV-Ark serogroup. One recent publication to the contrary (9) is in doubt since it was not based upon a naturally occurring infected plant and subsequent studies did not verify the natural occurrence of the virus (8). Isolates from Central and South America develop well-defined, curved bands when reacted with CPMV-Ark antiserum. Fine spurring is evident between these isolates and CPMV-Ark. Also, isolates with some geographical separation spur with each other as is the case with the isolates from El Salvador, Puerto Rico, Costa Rica and Venezuela. We thank R. Gámez, R. Moreno, J. R. Lastra, A. Díaz, J. P. Meiners, H. E. Waterworth, N. G. Vakili, H. A. Hobbs, and A. O. Lana for furnishing the viruses mentioned in the text and in Table 1.

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