FLEXIBLE FILAMENTOUS VIRUS STRUCTURES FROM FIBER DIFFRACTION

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Filamentous plant viruses make up almost half of plant virus genera, with hundreds of individual species recognized. Two of the largest families, the Potyviridae and the Flexiviridae, have some morphological similarities, but have major physical, chemical, and biological differences, and have generally been considered to be unrelated. We have obtained fiber diffraction data from a number of viruses from these two families, particularly from narcissus mosaic virus, a potexvirus from the family Flexiviridae, and soybean mosaic virus, a potyvirus from the family Potyviridae. Potexvirus data are from oriented sols; potyvirus data are from fibers dried under high humidity. The data include the first well-ordered data ever obtained for the potyviruses and the best-ordered data from the potexviruses. Analysis of these data allows us to determine the symmetry of the viruses accurately for the first time, suggests a much closer relationship between the two families than had hitherto been suspected, and in conjunction with cryo-electron microscopy, offers the promise of high resolution structure determination. Supported by grants from the NSF (MCB-0235653) and the USDA (2003-01178).