They first treat the roots of seedling plants with an enzyme that breaks down the cellulose walls surrounding the root cells. Then the researchers expose the roots to rhizobia in the presence of polyethylene glycol, a compound that accelerates bacterial uptake by dissolving holes in the root cell membranes. The result: nodules that look very much like the nodules of legumes.

Cocking's method suffers from a disadvantage in that the seedlings require special handling. Since the plants are not genetically altered, the seedlings would have to be treated every year before planting. Although this is not necessarily a fatal handicap, translating the lab success into practice would certainly present a challenge to biologists and agricultural engineers. The work nonetheless demonstrates that rhizobia can nodulate nonlegumes, Cocking says.

Meanwhile, other researchers have been pursuing additional ways of obtaining nodulation of nonlegumes that would not require such unusual root treatments. For example, a group headed by Yuxiang Jing at the Institute of Botany in Beijing has developed a bacterial strain that will nodulate rice by exposing *Rhizobium sesbania*, which normally infects an Asian bush called *Sesbania cannabina*, to a mutagenic chemi-

The Name of the Rose, or Hunting for a Plant Database

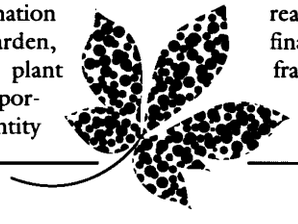
Plant taxonomists from around the world are gathering at the Royal Botanic Gardens at Kew, just outside London, this week to examine two entities. In doing so they face the classic taxonomist's question: are the entities similar enough to lump as one? Or should they remain split and distinct? But the entities aren't species or families of flora; they are competing proposals for putting all the world's higher plants into a computer data base.

Although a digitized botanical "library" might seem a luxury—or a computer programmer's toy—it actually is a much needed tool in many areas of research. Improved species of plants are the key to many of the world's problems with fuel, food, and medicines. The pharmacologists, genetic engineers, and agronomists pursuing such challenges need to find out quickly what is known about a given plant. But there is no one source they can turn to, and different databases often conflict—especially in the matter of names.

The competing answers to this botanical Babel would provide a single, authoritative database, but each takes a different route to that goal. The Species Plantarum Project (SPP), brainchild of Dick Brummitt, a plant taxonomist in the Herbarium at Kew, would summarize all botanical data on every known plant. Spearheaded by Kew, the Missouri Botanical Garden, and five other institutions, SPP would offer the works: a taxonomic synopsis of all ferns and flowering plants, with names and biological relationships verified according to the latest scholarship.

The Global Plant Species Information System (GPSIS), which was discussed in detail at a conference held last month in the Greek town of Delphi, is less ambitious. GPSIS would be content with a "quick and dirty" checklist of acceptable plant names. But even that isn't a simple matter. The 21-volume *Index Kewensis* (started a century ago by Charles Darwin) lists a million names for flowering plants. Since botanists agree that there are only 250,000 plant species, a list that eliminates overlapping names would enable database users to communicate without confusion—especially internationally. Hence the attractiveness of GPSIS.

Indeed, Frank Bisby, a senior lecturer in biology at Southampton University in England and an organizer of the recent GPSIS meeting, stresses that users don't worry about taxonomy. "Ninety percent of users couldn't care less what system we use, so long as we all use the same one." He says they simply want a list of names—without confusion. But Nancy Morin, head of botanical information management at Missouri Botanical Garden, thinks just the opposite: "If you're a plant breeder, or an ecologist, the name isn't important. What's important is the biological entity you're dealing with. You want good biological information."



Until recently, this kind of point-counterpoint has characterized conversations between the proponents of each system. But after attending the Delphi meeting organized by his opponents, Brummitt, father of the ambitious SPP, seems to be approaching a compromise position: he has come around to the view that a checklist does have value—if only as a first stage. Still, he warns that if a checklist is to be prepared in two or three years, as GPSIS intends, "it can only be uncritical" and fail to incorporate recent taxonomic results. As a taxonomist, that worries him. "Once you publish a list, people place credence in it," Brummitt told *Science*. "I'm not against a list, I just want people to be aware of the limitations."

While the people who would construct the database struggle with these niceties, it does seem users want a list—and quickly. Chris Leon, an ecologist who used to run the Threatened Plants database of the World Conservation Monitoring Centre in Cambridge, spoke for many users of botanical databases when she told *Science*: "I just want a consensus.... There is no right or wrong in botany. It doesn't bother the users at all. We just want a set of names that will be fixed for 10 or 15 years." The lack of a list, explains Leon, who is currently working on a database of poisonous plants for Kew, "is holding up international conservation and it must be holding up other disciplines such as forestry and pharmacology too." An agreed upon checklist, which could be revised every 10 or 15 years, would form the backbone every database needs. To it could be appended additional information, for example on economic uses, or phytochemistry, or geographic distribution.

This logic has persuaded Rusty Russell, a collections manager at the Smithsonian Institution and coorganizer of the Delphi meeting: "SPP is a taxonomist's view and GPSIS is a plant-name user's view—but they're coming together." Direct evidence of that comes from Grenville Lucas, Keeper of the Herbarium at Kew. Anticipating this week's meeting, he told *Science* that SPP "will draw up a checklist of approved names." Indeed, most observers say that an atmosphere of cooperation is likely to prevail at the Kew conference, which is a considerable change from the situation that prevailed only a month ago. Brummitt has even come to say that SPP and GPSIS are "essentially the same project."

In the great plant database debate it looks as though lumpers will prevail over splitters. But both groups have some serious real world questions to face: there is, at the moment, no financing, no management structure, and no institutional framework for any plant database. Participants in the Kew meeting say those topics will be high on the agenda.

■ JEREMY CHERFAS