A new collaborative research project: a global inventory of *Euphorbia*

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We are pleased to announce to the International Euphorbia Society that a collaborative research project entitled "EuphORBia: a global inventory of the spurges" has been funded by the United States National Science Foundation under the auspices of their Planetary Biodiversity Inventory (PBI) program. The project began in October 2006 and will run for five years, with the participation of an international team of collaborators led by Paul E. Berry (University of Michigan), Kenneth J. Wurdack (Smithsonian Institution), David Baum (University of Wisconsin), and Reed Beaman and Nico Cellinese (Yale University). Many other Euphorbia researchers in different countries have agreed to participate in the project as senior collaborators. We wish to make this a highly collaborative and open project, including training activities for undergraduate and graduate students and the participation of *Euphorbia* enthusiasts throughout the world.

Professor Paul E. Berry, University of Michigan Herbarium, head of the recently founded EuphORBia PBI project

The most recent taxonomic estimates indicate there are 57 genera of flowering plants that each contains more than 500 species. Together they comprise between 15 and 20 % of all flowering plant species. Nineteen of these giant genera have over 1000 species apiece, and only two exceed the threshold of 2000 species. These two megadiverse genera are *Astragalus* (Fabaceae), with upwards of 3000 species, and *Euphorbia*, with around 2000 known species (note the "known" species part, as we suspect there are still lots of undiscovered species waiting to be found). Many of the giant plant genera have been taxonomically neglected because of their unmanageable sizes, vast geographical ranges, low number of actively working plant taxonomists, and more importantly the lack of robust, molecular phylogenetic frameworks on which to base taxonomic classifications.

My laboratory group has been interested in the large genus problem for some time, and we began by studying a large and poorly known genus in the Euphorbiaceae, namely *Croton* (not to be confused with the horticultural genus *Codiaeum*, whose common name is croton). *Croton* has almost 1300 species distributed worldwide, mostly in warm tropical areas. Unlike *Euphorbia*, *Croton* has its center of diversity in the Neotropics, but it is also very diverse in areas of the Old World such as Madagascar. There is a web site for the Croton project at http://www.botany.wisc.edu/croton/, and we plan to significantly enhance the look and content of this web site in the future.

By virtue of its size alone, *Euphorbia* represents a bigger challenge to conducting taxonomic and phylo-

genetic studies than *Croton*, but we believe that this new endeavor will be facilitated by a much larger group of people interested in *Euphorbia* than we had with *Croton*. The most obvious reason for this difference is the high ornamental and aesthetic value of *Euphorbia* species among gardeners, horticulturists, and plant lovers in general. The *Euphorbia* PBI project will allow us to provide the resources to bring together, organize, and put into motion a qualified and motivated team of collaborators interested in substantially improving the current taxonomic knowledge of *Euphorbia*.

The specific goals of the *Euphorbia* PBI project are to: 1) conduct new field research in poorly explored areas or where *Euphorbia* is particularly diverse, 2) carry out in-depth herbarium and literature studies to resolve ongoing taxonomic problems in the genus, 3) publish descriptions of species new to science resulting from these studies, 4) develop a web-based virtual monograph of the roughly 2000 known species of *Euphorbia* (in the broad sense, including all former segregate genera), via the use of illustrated species pages and interactive keys, 5) produce a molecular-based phylogeny of the genus that should lead to a much more informative and predictive classification scheme, and 6) gain a better understanding of the evolutionary developmental of the cyathium, as this may have been a "key innovation" in the evolutionary success of this amazing group of plants.

We plan to implement modern bioinformatics tools to develop two collaborative online portals ("EuphORBia" and "Poinsettia"), with information freely available to the scientific community and the general public. The "EuphORBia portal" (so named to indicate the comprehensive and planetary scope of the project) will provide users with a single interface to resources including a) a digital library of *Euphorbia* descriptions, b) a species nomenclator (accepted names and their synonyms), c) species pages with photographs, illustrations, maps, and conservation status, d) a georeferenced specimen database, e) phylogenetic trees from molecular studies, f) species identification tools, and g) information about ongoing project activities such as expeditions and visits to living collections of *Euphorbia*. The "Poinsettia Portal" was conceived as the educational version of EuphORBia, with a focus on developing innovative biodiversity curriculum materials for middle schools. It will provide resources for the exploration of biodiversity and botany, using many examples of *Euphorbia* to address questions such as: what is a flower, what is a cyathium, a succulent, latex, a cactus vs. a spurge, a rare species, an invasive species?

The data that we generate should provide the baseline information for the proper recognition and conservation management of rare *Euphorbia* species worldwide. Our group would like to see the eventual production of print copy versions of the *Euphorbia* worldwide monograph, but that is beyond the scope of this project. With the cybertools that will be used in this project, however, it should be fairly straightforward to produce the text for print copy publication after the web version is fairly complete.

We are looking forward to having an active and fruitful collaboration with the International Euphorbia Society, including using Euphorbia World as a venue for publishing new species and other findings about the genus, and a mutual exchange of knowledge with its members on the taxonomy, cultivation, and natural history of *Euphorbia* species worldwide.

Much time, effort, and love has gone into assembling the living collections of *Euphorbia* that many of you maintain, and we hope that you will be willing to share your knowledge, photographs, or other materials to enrich our website, and to allow us to visit your collections when this will help us accomplish the goals of the project.

We have a dedicated email for the EuphORBia PBI project, namely euphorbia@umich.edu. Your messages will be read and answered either by Paul (project director) or Ricarda (postdoctoral fellow). We are currently developing online databases for the project and hope to have a web site operational by mid 2007 at www.euphorbiaceae.org.

Ricarda Riina during field work

We thank you all in advance for your interest and assistance and look forward to great progress in our understanding of the fascinating genus *Euphorbia*. Regards from your newest members of IES – Paul E. Berry and Ricarda Riina. ♦