Angiosperm Phylogeny Group (APG) in jeopardy – Where have the flowers gone?

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The Angiosperm Phylogeny Group (APG) is a loose assemblage of systematic botanists aiming to establish a stable, modern classification system of flowering plants strongly based on molecular phylogenetics. The group published three seminal papers starting in 1998. An update to be entitled "APG IV" is in preparation and due shortly. A survey was conducted among systematic botanists in the forefront of this project, the results of which were recently published. The author of this Opinion Piece comments on the concept, evaluation, and results of this survey, and on the advice provided by the initiators, in particular regarding the order Boraginales. Expert opinion should be favored over a general majority vote on suggestive questions of an uncoordinated survey conducted by a single "authority". Science is based on knowledge and on scholarly expertise, and should not be made a matter of popular votes and majority preferences.

APG started out as a unique and positively perceived, participatory group activity of 29 equally responsible authors. This originally large number of authors could not be maintained, however: APG II had 7 main authors + 20 contributors, APG III had 8 main authors + 9 contributors (The Angiosperm Phylogeny Group, 1998, 2003, 2009). The authority of APG is broadly recognized and its work is now extensively cited – APweb (Stevens, 2001 onwards) has about 400 daily views and about 200,000 views per year! This is an unprecedented success story for botany and for science in general. The initiative has served as a model for other similar projects in organismic studies. Systematic botany had emerged from an era of systematic classifications usually by single authors (Engler, Cronquist, Takhtajan, Reveal) whose names signified authority, but whose systems were based on personal concepts of academic scholarship which often led to bitter opposition and heated debates within the community.

From the start, APG's premise has been to establish a system with less orders and families than previous classifications (APG III with 56 orders and 450 families). Simplicity and a clearer overview improve the overall perception and teaching of the diversity of flowering plants. With this effort, APG and collaborators have succeeded in presenting the natural hereditary relationships of angiosperms in a concise and easily comprehensible way (Cole and Hilger, 2014).

The broad consensus of the early years of APG is in jeopardy.

The corresponding author of APG II and III, supported by three colleagues from that same institution, have launched, evaluated, and now published the results of a survey in an attempt to reach a "democratic" majority vote on 26 suggestive, multiple choice-style questions (Christenhusz et al., 2015).

The publication of the results of the survey and the included "advice to APG IV" are alienating the specialists, rather than encouraging a trusted participatory continuation of support by expert scholars in the "spirit of APG".

A notable case of conflict arises from the treatment of **Boraginales**. With some 2750 species, this was the last major group whose phylogeny was unresolved at the time of publication of APG III – meanwhile the position of the group has been clarified (Refulio-Rodriguez and Olmstead, 2014; Weigend et al., 2014). On the basis of their long-year experience and recent molecular findings, experts on this group have decided to arrange the order into a set of logical, clearly definable families (currently seven). The order and its families have since been broadly published, acknowledged, and accepted, for instance, in a forthcoming volume of Families and Genera of Flowering Plants (Kubitzki et al., Vol. 14), by APweb (Stevens, 2001 onwards), and the Global Genome Initiative (GGI).

In said "survey", Christenhusz et al. set out to revert to a one-family Boraginales. The consequences are further destabilization, ongoing conflict among scientists, and confusion about the system in the lay community and public, who will rightfully ask why published expertise is not reflected in such prominent platforms as APG – an unprecedented and unnecessary confrontation.

The authors of the survey argue that accepting several more families could trigger an avalanche of splitting efforts and would establish "infective" precedent.

If expert consortia on Orchidaceae, Asteraceae, or Fabaceae (each with 20,000 or more species) were to suggest dismembering these giant families on scientific grounds (see e.g., The Legume Phylogeny Working Group, 2013), would a vote be held on pro or con? Who would be allowed to vote? Would the voters' names need to be disclosed and revealed to the public to assure transparency? And if 51% opposed the change, would the experts' suggestions be rejected?

The arguments and proposals of The Boraginales Working Group (2015) are being ignored on the basis of a survey of anonymous participants, the majority of which can hardly be experts in this particular field.

The "advice" that the authors give (to themselves, as declared chief authors of APG IV) only serves to alienate respectable and valuable colleagues. If APG IV were published now, on the basis of this survey, it would destroy its authority and the spirit of APG.

I encourage the authors to reconsider the "advice" given regarding Boraginales. In the light of unresolvable, diverging opinion one may want to choose a more diplomatic approach in acknowledging The Boraginales Working Group's recommendation and adding in APG IV a comment regarding the survey's authors' reluctance to follow the same scheme and their current preference of their 65.7% majority vote.

The "spirit" of APG lives from the consensus of experts and from their authority. Expert knowledge must be respected, rather than ignored or debased! Everybody will agree that expert advice should be weighted more heavily than public opinion.

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