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Considerations regarding the recent updates in botanical nomenclature

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Abstract: The use of scientific names of plants is essential in the communication of botanical knowledge. As is known, to scientifically name species we use binary nomenclature introduced by Carl von Linné, in 1753. But taxonomy is not a static science, on the contrary a very dynamic (and controversial) one. The sources of new names are 1) the discovery of new species and 2) the reshaping or revision of classifications through merging, splitting, reassignment, etc. Our work is an update of some scientific names of plant and a reclassification into botanical families, carried out following the investigation of international databases. For example, oriental thuja now has the valid name *Platyclusus orientalis* and *Thuja orientalis* has become its synonym, mahonia has the valid name *Berberis aquifolium* and *Mahonia aquifolium* has become its synonym, Japanese acacia has the valid name *Styphnolobium japonicum* and *Sophora japonica* has become its synonym, sedge has the valid name *Noccaea perfoliata* and *Thlaspi perfoliatum* has become its synonym, yellow chamomile has the valid name *Cota tinctoria* and *Anthemis tinctoria* has become its synonym. At the same time, some genera have been moved to other botanical families: *Acer* is now in Sapindaceae (from Aceraceae, which is no longer recognized), as well *Aesculus* in Sapindaceae (from Hippocastanaceae, also not recognized), *Tilia*, in Malvaceae (from Tiliaceae, also not recognized), *Taxodium* and *Sequoia*, in Cupressaceae (from Taxodiaceae, also not recognized), *Fumaria*, *Corydalis*, *Dicentra*, in Papaveraceae (from Fumariaceae, also not recognized), *Veronica*, *Digitalis*, *Linaria*, *Antirrhinum*, in Plantaginaceae (from Scrophulariaceae, which was reorganized). As can be seen, botanical nomenclature keeps changing, to be in line with advanced molecular biology research, through which the phylogeny of plant species is much better understood and reflects real evolutionary relationships, which morphology alone cannot encompass. Although they are difficult and can create confusion, these updates are essential in scientific activity for the accuracy of research, but also in the didactic process, for re-editing materials and bringing them into line with current discoveries.

• Introduction

Scientific plant names are given according to the recommendations of The International Code of Nomenclature for algae, fungi and plants - ICN. This code is coordinated by the International Association for Plant Taxonomy - IAPT and revised at each International Botanical Congress - IBC. One of the great challenges for taxonomy is certainly Sequence-Based Nomenclature - SBN. The transition from physical to molecular is desired, that is, the names of plant species will be validated by DNA sequences and digital data will be used, without the need for physical specimens. From a didactic perspective, the use of online databases becomes mandatory due to the need to use updated information, as floras and reference manuals are outdated. In addition, they are very well received by students.

• Material and method

We investigated International Code of Nomenclature for algae, fungi, and plants (Madrid Code) - ICN and the main recognized reference databases, such as: World Flora Online - WFO, Plants of the World Online - POWO, Euro+Med PlantBase, Global Biodiversity Information Facility - GBIF, International Plant Names Index - IPNI, Angiosperm Phylogeny Group (III, IV) - APG III, APG IV, FloraVeg.EU. APG IV is considered the latest official version for the classification of flowering plants and POWO is the current reference standard for global botanical nomenclature for vascular plants. Next, we updated the classical names of some common plant species with current valid names and we presented the reorganized botanical families and reclassified genera. These data are presented in tabular form and the taxa were organized alphabetically, for easy viewing. We note that the choice of taxa was subjective, based on our scientific and didactic interest.

• Results and discussions

No.	Valid name	Synonymous	Vernacular name (most common)
1.	<i>Argentina anserina</i> (L.) Rydb.	<i>Potentilla anserina</i> L.	Silverweed
2.	<i>Berberis aquifolium</i> Pursh	<i>Mahonia aquifolium</i> (Pursh) Nutt.	mahonia
3.	<i>Brugmansia arborea</i> (L.) Sweet	<i>Datura arborea</i> L.	angel's trumpet
4.	<i>Cardamine bulbifera</i> (L.) Crantz	<i>Dentaria bulbifera</i> L.	coralroot bittercress
5.	<i>Cota tinctoria</i> (L.) J. Gay	<i>Anthemis tinctoria</i> L.	yellow chamomile
25.	<i>Vincetoxicum hirundinaria</i> Medik.	<i>Cynanchum vincetoxicum</i> (L.) Pers.	white swallow-wort

No.	Unrecognized	Recently reclassified	Synonymous / with subfamily status	Known as
1.	Aceraceae	Sapindaceae	synonymous	maple family
2.	Adoxaceae	Viburnaceae	synonymous	elderberry family
3.	Agavaceae	Asparagaceae	Agavoideae	agave family
4.	Alliaceae	Amaryllidaceae	Allioideae	onion family
5.	Asclepiadaceae	Apocynaceae	Asclepiadoideae	beeswax family
16.	Valerianaceae	Caprifoliaceae	Valerianoideae	valerian family

No.	Genera name	Current classification	Old classification
1.	<i>Acer</i>	Sapindaceae	Aceraceae
2.	<i>Aesculus</i>	Sapindaceae	Hippocastanaceae
3.	<i>Agave</i>	Asparagaceae	Agavaceae
4.	<i>Albizia</i>	Fabaceae	Mimosaceae
5.	<i>Aloe</i>	Asphodeliaceae	Liliaceae
38.	<i>Yucca</i>	Asparagaceae	Agavaceae

Angiosperm Phylogeny Website
 COMPLETE SYNONYMY OF FAMILY NAMES OF EXTANT VASCULAR PLANTS
 A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z
 Back to Home
 In some cases clicking on a family synonym will send you directly to the subfamily in which the genus of the basionym is to be found.
 Abietaceae = Pinaceae = Pinales
 Abolbodaceae = Xyridaceae = Poales
 Abrophyllaceae = Rousseeaceae = Asterales
 Acaciaceae = Fabaceae = Fabaales
 Acalyphaceae = Euphorbiaceae = Malpighiales
 Acanthaceae = Lamiales
 Acanthochlamydeaceae = Velloziaceae = Pandanales
 Acarnaceae = Asteraceae = Asterales
 Aceraceae = Sapindaceae = Sapindales

Royal Botanic Gardens Kew | Plants of the World Online
 Viburnaceae
***Sambucus* L.**
 First published in Sp. Pl.: 269 (1753)
 This genus is accepted

Royal Botanic Gardens Kew | Plants of the World Online
 Melanthiaceae
***Veratrum* L.**
 First published in Sp. Pl.: 1044 (1753), nom. cons.
 This genus is accepted

Royal Botanic Gardens Kew | Plants of the World Online
 Papaveraceae > Lamprocapnos
***Lamprocapnos spectabilis* (L.) Fukuhara**
 First published in Pl. Syst. Evol. 206: 415 (1997)
 This species is accepted

Royal Botanic Gardens Kew | Plants of the World Online
***Dicentra spectabilis* (L.) Lem.**
 First published in Fl. Serres Jard. Eur. 3: t. 258 (1847)
 This name is a synonym of *Lamprocapnos spectabilis*



<https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:995841-1>

Conclusions

Taxonomic updates, now based on molecular phylogenetic studies, cannot be ignored by researchers and teachers. The use of valid species names and the ongoing revision of taxa are linked to the rigor of the scientific approach and represent a professional standard who supports the quality of research and teaching. In the field of education, the impact of digital technologies is evident, and teachers are faced with the necessity of integrating SBN (Sequence-Based Nomenclature) systems with morphological ones, in order to reconcile the need for scientific accuracy with the use of identification tools based on morphological characters. The exclusive use of tools such as iNaturalist and Pl@ntNet may give students the impression that species identification is an easy task and that classic paper-based identification keys are obsolete. On the other hand, the contributory aspect of science can prove extremely useful: the development of online tools by integrating detailed discriminatory criteria is a path already being pursued. A secondary consequence of classification reshuffling is the necessity to update collections (primarily herbaria) used in universities and other education and research institutions.