



BOTANICAL SCIENCES: AN HONORABLE FELLOW IN THE INTERNATIONAL
ASSEMBLY OF BOTANICAL JOURNALS

BOTANICAL SCIENCES: UN MIEMBRO HONORABLE EN EL CONJUNTO
INTERNACIONAL DE REVISTAS DE BOTÁNICA

JORGE A. MEAVE¹, KEN OYAMA², VICTORIA SOSA³, AND JOSÉ ARTURO DE-NOVA^{4*}

¹ Departamento de Ecología y Recursos Naturales, Facultad de Ciencias, Universidad Nacional Autónoma de México, Ciudad de México, Mexico

² Escuela Nacional de Estudios Superiores (ENES) Unidad Morelia, Universidad Nacional Autónoma de México, Morelia, Michoacán, Mexico

³ Biología Evolutiva, Instituto de Ecología, A. C., Xalapa, Veracruz, Mexico

⁴ Instituto de Investigación de Zonas Desérticas, Universidad Autónoma de San Luis Potosí, San Luis Potosí, Mexico

*Author for correspondence: arturo.denova@uaslp.mx

Abstract

As in every field of scientific research, the publication of new findings is a fundamental task of botanical investigations. Since its launching in 1944, *Botanical Sciences* (formerly *Boletín de la Sociedad Botánica de México*), the scientific periodical of the Botanical Society of Mexico, has played a major role in the dissemination of botanical knowledge, with a strong emphasis on Mexican plants and vegetation. In this essay, whose preparation was propelled by the publication of the 100th Volume of *Botanical Sciences* in 2022, we revisit this scientific periodical's trajectory for almost eight decades of activity, during which it has become an honorable member of an international assembly of journals devoted to publishing research in all botanical subdisciplines. On this ground, we reflect on its future, pondering the challenges it faces, the need to adjust to emerging circumstances, and the opportunities created by current national and international editorial practices. Additionally, we provide a brief overview of the contents of the contributions included in this Special Issue, with emphasis on the main conclusions drawn by their authors. We hope that these articles will become key references guiding future work in their respective botanical subdisciplines.

Keywords: editorial management, impact factor, journal publication financing, online publication, open access, scientific publication.

Resumen

Como en cualquier campo del quehacer científico, la publicación de nuevos hallazgos es una tarea fundamental de la investigación botánica. Desde su creación en 1944, *Botanical Sciences* (antes *Boletín de la Sociedad Botánica de México*), la revista científica de la Sociedad Botánica de México, ha jugado un papel importante en la difusión del conocimiento botánico, con un fuerte énfasis en las plantas y la vegetación mexicanas. En este ensayo, cuya preparación fue impulsada por la publicación en 2022 del Volumen 100 de *Botanical Sciences*, revisamos la trayectoria de esta revista científica desarrollada en casi ocho décadas de actividad, durante las cuales ha llegado a ser un miembro honorable de una comunidad internacional de revistas dedicadas a publicar investigaciones en todas las subdisciplinas botánicas. Con esta base, reflexionamos sobre su futuro, sopesando los desafíos que enfrenta, la necesidad de adaptarse a las circunstancias emergentes y las oportunidades que abren las prácticas editoriales nacionales e internacionales actuales. Además, ofrecemos una síntesis breve de los contenidos de las contribuciones incluidas en este Número Especial, con énfasis en las conclusiones principales a las que llegaron sus autores. Esperamos que estos artículos llegarán a ser referencias clave que guiarán el trabajo futuro en sus respectivas subdisciplinas de la botánica.

Palabras clave: acceso abierto, factor de impacto, financiamiento de la publicación de revistas, gestión editorial, publicación científica, publicación en línea.



The universal mandate to publish the findings of scientific studies guides the professional practice of individuals engaged in the delights and bitterness of scientific research (Lee 2014, Rawat & Meena 2014, Li 2016), including of course those devoted to the study of plants (Wilson 1978, Jernstedt 2014). However, the need to publish should not be viewed as an external imposition or a nuisance that researchers face against their will. On the contrary, it is difficult to think of an event capable of bringing so much satisfaction to scientists as having their articles accepted in a specialized journal (Snoek 2019). Similar causes of joyfulness are the news of an approved grant or the smooth progress of a complex experiment. The explanation for the positive feelings incited by the publication of a paper is simple: researchers long to have their findings known by their peers in the discipline, by scholars from other disciplines, and by society at large (Ravenscroft *et al.* 2017).

Almost 80 years ago, a group of Mexican botanists, most of them amateurs rather than scholars associated with academic institutions, felt the urge to create a scientific periodical in which they and other fellow botanists could publish their work in this field (Lot & Butanda 1994). In some way, the reasons leading them to such critical decision are intriguing, because at that time the *Revista de la Sociedad Mexicana de Historia Natural*, a periodical dedicated to all areas of biology and the study of Mexican nature, was being published regularly since 1939 (Gio-Argáez *et al.* 2013), following the wake left by its short-lived but no less important predecessor, *La Naturaleza*, a periodical that circulated between 1870 and 1912. Apparently, the idea of launching a new journal was mainly motivated by the aspiration to pursue one of the four goals defined by the recently founded *Sociedad Botánica de México A.C.* (Botanical Society of Mexico): to publish research conducted by Mexican botanists or by foreign researchers working on Mexican plants and vegetation (Lot & Carvajal 1981). Consequently, in January 1944, the first issue of this journal, which initially bore the simple title of *Boletín* and included just two contributions, came to light (Meave *et al.* 2012). Undoubtedly, this foundational issue of the scientific journal of the Botanical Society of Mexico may look today more like an informal outlet meant to share interesting information among Society members than like a proper scientific journal. Nonetheless, and despite its modest origin, during the following nearly eight decades, and very likely stimulated by the increasing activity of a thriving guild of botanical researchers working in the country, this journal has undergone a series of transformations, some of them profound, giving way to our current journal, *Botanical Sciences*, as it is entitled today (Meave *et al.* 2021, Meave 2019).

The goals of this essay are three-fold. First, we present and discuss several pieces of evidence to assess the present status of *Botanical Sciences*. On this ground and drawing from our personal experiences as former editors-in-chief or editors of sections of the journal, we next reflect on its future, considering the challenges it faces, the need to make adjustments, and the opportunities created by current editorial practices in Mexico and worldwide. Additionally, we provide a concise overview of the contents of the contributions included in this Special Issue, with emphasis on the main conclusions drawn by their authors. We hope that these articles will become key references guiding future work in their respective botanical subdisciplines. In the end, our hope is that the readers of this contribution will become convinced, as we are, that *Botanical Sciences* is an honorable fellow in the international assembly of botanical journals, which makes it an attractive and valuable venue to publish research in a broad range of botanical subdisciplines, both for scholars from Mexico and abroad.

The international assembly of botanical journals

Currently, there are more than 300 international journals circulating in cyberspace that are related to plant sciences, plant biology, or botany, simply defined. Each and every one of these journals has its own story, has evolved following a distinctly different editorial policy, and has a unique research scope. This sizable array includes centennial journals published since the 19th century like *Flora* (launched in Germany in 1818) and the *Journal of the Torrey Botanical Society* (formerly *Bulletin of the Torrey Botanical Club*), the oldest botanical journal in the Americas (according to its web page, its publication began in 1870), to the most recent ones, such as *Nature Plants* (first published in 2015). *Botanical Sciences* is part of this group of international journals, many of which participate in the promotion and dissemination of knowledge related to Mexican plants.

The diversity of academic journals specializing in botany is astonishing. Based on a selected list of 308 prestigious periodicals that belong in the plant sciences category listed in the Scimago Journal & Country Rank (scimagojr.com), there are 75 journals specialized in general botany, *i.e.*, journals publishing papers in all or most fields of botany, including anatomy, biochemistry, bioinformatics, biophysics, biotechnology, cell biology, conservation, developmental biology, ecophysiology, ecology, environmental biology, ethnobotany, evolutionary biology, genetics, molecular biology, morphology, nature management, paleobotany, palynology, phylogenetics, physiology, plant interactions, restoration, structural biology, systematics, systems biology, taxonomy, and theoretical biology. Very old but also very recent journals stand out in this list: the *Botanical Journal of the Linnean Society* (published since 1856), the *International Journal of Plant Sciences* (1875), *Annals of Botany* (1877), and the *New Phytologist* (1902) are examples of legendary scientific journals, whereas *Nature Plants* (2015) and *AoB Plants* (2009) are amongst the most recent additions to this large group of periodicals. *Botanical Sciences* proudly occupies a place in this selected list.

The diversity of botanical journals is also related to the type and magnitude of the organizations responsible for their operation. For example, in the aforementioned list of 75 journals classified as general botany, one can distinguish those that are published and supported by botanical gardens and museums (*e.g.*, *Brittonia*, *Candollea*, *Iheringia*, *Kew Bulletin*, *Willdenowia*, *Wulfenia*), national herbaria (*e.g.*, *Telopea*), scientific societies (*e.g.*, *Acta Botanica Brasílica*, *Acta Societatis Botanicorum Poloniae*, *American Journal of Botany*, *Biologia Plantarum*, *Journal of Plant Biology*, *Journal of Plant Research*, *Plant Biosystems*, *Plant Journal*, *Systematic Botany*), nation-level academies of sciences (*e.g.*, *Journal of Integrative Plant Biology*), universities (*e.g.*, *Acta Botanica Croatica*, *Gayana Botanica*) and research centers (*e.g.*, *Acta Botanica Mexicana*). Similarly, there are differences regarding their geographical scopes (*e.g.*, *Blumea* focuses on tropical Sub-Saharan Africa and tropical Southeast Asia, with a strong emphasis on Malesia, and South America with emphasis on the Guianas; in turn, *Castanea* is devoted to studies in the Eastern United States). In addition, there are journals dedicated to specific groups of plants, such as *Maydica*, which focuses on studies on maize and allied species, *Lankesteriana*, which specializes in orchid species, or *Taxon*, which offers its pages to papers on systematics, phylogenetics, and taxonomy of plants, algae, and fungi.

Despite the natural divergences between all these journals arising through their trajectories, it is also true that because all of them focus on a single biological group, namely plants, some degree of overlap, and therefore competition among them for manuscripts, is unavoidable. Considering their large number, it is remarkable that all these scientific journals have persisted to the present: they all are active and continue to publish the discoveries that botanists around the world make every day. How can we explain the persistence of so many botanical journals for over two centuries? The answer is quite evident, and it is elegantly formulated on the website of the prominent journal *Frontiers in Plant Science*:

“In an ever-changing world, plant science is of the utmost importance for securing humankind’s future well-being. Plants provide oxygen, food, feed, fibers, and building materials, and are a diverse source of industrial and pharmaceutical chemicals. In addition, they are centrally important to the health of ecosystems, and the management and maintenance of a sustainable biosphere necessitates their thorough understanding. A basic knowledge of plant biology processes underpins our ability to both utilize and improve plants for sustainable production of food, biofuel, and renewable biomaterials, as well as better understand their role in the environment.”

Briefly said, plants have been nothing more and nothing less than the basis of planetary sustainability and human well-being since their origin, and we still have a lot of things to learn about them.

Botanical Sciences at present

Botanical Sciences is publishing this year its 100th volume in its 78th year of existence. This outstanding achievement has been forged thanks to the conviction and full dedication of many members of the Botanical Society of Mexico, but above all, of all Mexican and foreign botanists and scientists interested in the Mexican flora and veg-

etation who have explored this great country and its extraordinary biodiversity. Although *Botanical Sciences* has attained international recognition as one of the salient botanical journals in the world, for many people it may not be obvious that this accomplishment has been possible despite the absolute lack of sustained financing from the government, a foundation, a publishing company, or an academic institution. Indeed, the main source of funding through the years has been the Society's membership, which means that *Botanical Sciences* owes not only its creation but also its growth and consolidation to the Botanical Society of Mexico. Hence, it is difficult to comprehend the origin, evolution, and persistence of the journal without understanding the history of the Society itself (Lot & Carvajal 1981, Rzedowski 1981, Lot & Butanda 1994, Rzedowski 2019).

Studies documenting the richness of Mexico's flora in topics such as plant taxonomy, ethnobotany, plant species usefulness, genetic resource management, ecosystem diversity, richness and structure, and their conservation are important topics in which *Botanical Sciences* has made substantial contributions to universal knowledge over almost eight decades. The scientific discovery not only comes in the form of new chemicals that mankind can use to fight diseases but also of new technological advances. The discovery of a new plant species is as important as the discovery of a black hole in remote stretches of the universe. If we fail to understand this basic principle, we run the risk of missing out on the possibility of getting thoroughly acquainted with the components of life itself. Life is an intricate network of living things that intertwine and coevolve. Always focusing on plant life, *Botanical Sciences* has reported these findings, not only on the very existence of new species but also on their interactions, their role in ecosystem functioning, and on their potential and actual uses.

Science is currently thriving in an era of information, big databases, and artificial intelligence (O'Leary 2013, Iafrate 2018, Oliveira 2019). The Mexican scientific community has the potential to produce vast amounts of information on its natural resources, and we are gradually moving into an era characterized by the transformation of information into knowledge (Seitz 2018). Each plant species bears a different genome, a set of thousands of genes that are the product of its evolution and that will determine its paths of life. At the same time, Mexico is the home to dozens of plants that people still actively use either for food or other purposes (García-Alvarado *et al.* 2001). Mexico is also one of the most important cultural references regarding plant domestication (Hernández X. 1993, Kwak *et al.* 2009, Zizumbo-Villarreal & Colunga-GarcíaMarín 2010). How many more plant species can be domesticated for human benefit? *Botanical Sciences* will surely be a very important forum for documenting these new findings.

X-ray screening *Botanical Sciences*: a matter of numbers

A quantitative depiction of *Botanical Sciences* may serve to gain insights into the role that the journal has played in the advancement of botanical research. Since its early years as *Boletín de la Sociedad Botánica de México*, the pages of *Botanical Sciences* have accommodated a total of 1,355 works, including 1,053 research articles, 136 botanical notes, 61 comments, 44 book reviews, 35 obituaries, and 26 editorial notes. The most popular topics of articles and botanical notes have been floristics and taxonomy (513 items), ecology (371), structural botany (114), ethnobotany (72), physiology (65), systematics (40), genetics (37), and phytochemistry (35). As for the discovery of a new plant species, a total of 125 new taxa for the sciences have been described, including seven genera, 115 species, one sub-species, and two varieties (Figure 1).

Considering the whole period since its first appearance, the mean number of articles published per year in the journal is 17.22, but this figure has varied greatly, from only three items in 1944 to 64 in 2021, with a prominent peak of 74 writings in 2015 (Figure 2). Clearly, switching from publishing two to four issues per year had a strong impact on this number, which resulted in at least 40 works being published annually since 2013. With regard to the language used in these articles, although the journal has almost always welcomed contributions in both Spanish and English, the proportion of papers written in English has shown an increasing trend until peaking in 2017 (94.2 %), thus increasing potential access to these articles by a larger readership (Di Bitetti & Ferreras 2016), but it has declined in recent years (62.5 % in 2021) (Figure 2).

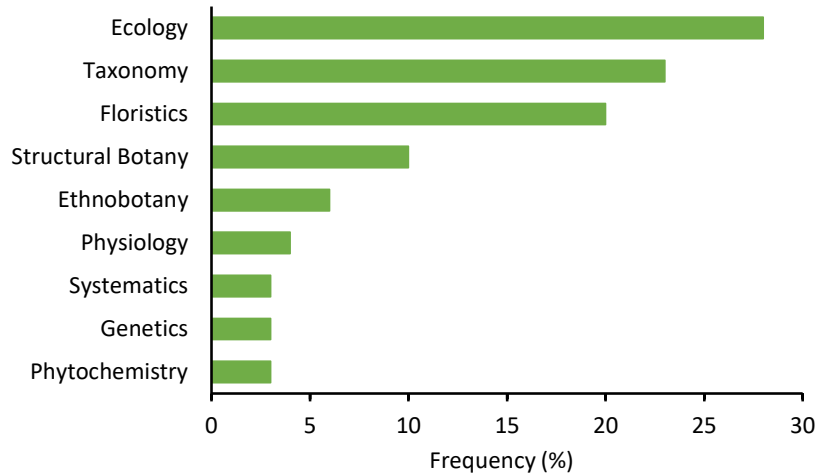


Figure 1. Frequency distribution of the topics covered in *Botanical Sciences* according to the number of papers corresponding to each one published throughout its trajectory.

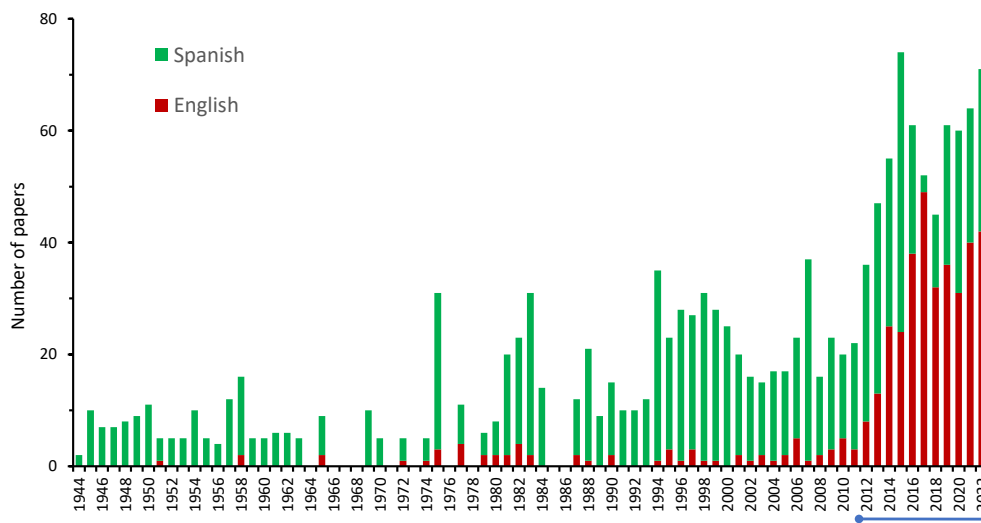


Figure 2. Total number of papers published each year in *Botanical Sciences* throughout its entire trajectory (*i.e.*, including papers published under the titles *Boletín* and *Boletín de la Sociedad Botánica de México*). The colors in the bars indicate papers published in Spanish (green) and English (red). The blue arrow indicates the period in which four issues have been published in each annual volume.

From a quantitative perspective and in the context of scientific journal evaluation, a final issue worth looking at refers to the impact that the research published in *Botanical Sciences* has had over the years. While recognizing that there is no simple way to assess such impact, we resort to the number of citations, a generally accepted metric for this purpose. According to Clarivate database (clarivate.com), citable items published in the journal have received a total of 1,567 citations from 2009 to this date, 937 of them as *Boletín de la Sociedad Botánica de México* and 630 as *Botanical Sciences*. These numbers translate into an impact factor assessed by Clarivate’s Journal Citation Reports (clarivate.com) that has been approaching the value of 1.0 since 2018, without reaching it yet (Figure 3). Moreover, it is noteworthy that the statistics produced automatically on the *Botanical Sciences* webpage show that the Online First section is the most visited, underscoring the value that scholars put on immediacy in access to scientific literature.

Adapt or perish: Will *Botanical Sciences* need to reinvent itself?

Botanical Sciences has evolved over time in multiple ways. While in its early days the main focus was placed on floristic and taxonomic papers, today its pages gather an ample range of topics, including diverse aspects of ecology, physiology, ethnobotany, and anatomy. The expansion of its thematic coverage has allowed *Botanical Sciences* to gain a prominent position among the top botanical journals in Latin America. Nonetheless, this variety of topics is by no means exhaustive; for example, no papers dealing with molecular systematics, molecular ecology, and genomics have been published yet in the journal. Apparently, this pattern is shared with many other journals focusing on plants, except for prominent periodicals like the *American Journal of Botany* and the *Botanical Journal of the Linnean Society*, both of which boast high impact factors and attract numerous submissions on these topics. This pattern may be explained, at least in part, by the countries where the research was conducted, and most of the research published in *Botanical Sciences* has been based in Mexico. In this context, it is worth noting that a recent bibliometric analysis revealed that a handful of countries including the United States of America, Germany, China, and India are the leading nations in conducting research on plant molecular markers (Garrido-Cárdenas *et al.* 2018). Therefore, strategies for including molecular research conducted in Mexico and other countries seem to be necessary for *Botanical Sciences*. Currently, new approaches from next-generation sequencing are common practice in plant systematics, molecular ecology, and evolutionary research (Straub *et al.* 2012), and it is now possible to sequence even entire genomes (Li & Harkess 2018). Sequencing platforms will continue to improve the length and quality of outputs utilized. Thus, the challenge remains to incorporate papers on these topics in *Botanical Sciences*.

The time seems to have come for the production process of *Botanical Sciences* to become formally separated from the Society (*Sociedad Botánica de México A.C.*). This action would most likely result in the creation of a more robust journal with strong professional support in editing, publishing, and promotion while expanding its scope to other fields such as the molecular mechanisms involved in plant physiology, genomics, and phylogenomics. It will also be necessary to strengthen currently consolidated fields such as biodiversity, structural botany, and ecological restoration. In this transition, the Botanical Society of Mexico would keep its leadership in guiding the editorial policy of this periodical, but the effort and time of the academic editors and editorial board could be geared towards finding effective mechanisms to ensure this thematic diversification and upgrading. Similar steps have already been taken successfully by other societies in the same field, such as the Botanical Society of Japan, the *Società Botanica Italiana*, and the Korean Society of Plant Biologists, and there are even cases involving the concurrence of several societies to edit a single journal, as exemplified by *Plant Biology*, now published by the German Society for Plant Sciences and the Royal Botanical Society of the Netherlands, and *Plant Direct*, the product of the collaboration between the American Society of Plant Biologists and the Society for Experimental Biology. Because of actions of this kind, several periodicals like *Journal of Plant Research*, *Plant Biosystems*, *Journal of Plant Biology*, *Plant Biology*, and *Plant Direct* have increased the number of papers published in different fields with a considerable increase in their impact factors (between 2.434 and 3.081). A word of caution in this regard is that these changes took place at the end of the last century, which implies that the increase in their impact factors was not immediate; rather, the progress became apparent 20-25 years after the new editorial policy was established.

Other journals have succeeded in following their original editorial lines but with strong support either from a government-funded academy of sciences or their own scientific associations. This is the case, for instance, with the *Journal of Integrative Plant Biology* (impact factor 7.061) sponsored since 1952 by the Botanical Society of China with the Institute of Botany of the Chinese Academy of Sciences. Notably, most of the contributions are from Chinese scientists, which reflects the rapid growth of a scientific community of plant biologists in that country. The consolidation and strengthening of this journal's trajectory may also be explained by an efficient distribution and an aggressive promotion policy: it is hosted in 14,200 libraries around the world and is indexed in 66 recognized databases. In addition, the adoption of the open access model provides free access to its publications worldwide. Another important case, and in closer proximity to our geography, is the *American Journal of Botany* fostered by the Botanical Society of America; its strong consolidation seems related to the fact that this academic society has grown

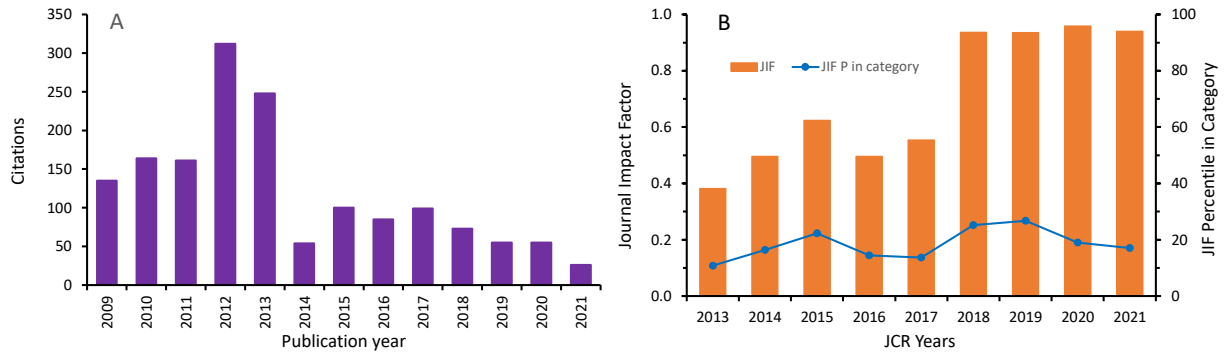


Figure 3. JCR citation and impact factor trends for *Botanical Sciences*. (A) The numbers of citations received to this date by the papers published in each year of the period 2009-2021 (note that this information is dynamic and thus will change as these papers are cited in the future). For the years 2009-2011 only papers published in *Boletín de la Sociedad Botánica de México* are tallied, for the period 2014-2021 only citations for papers published in *Botanical Sciences* are shown, whereas the years 2012-2013 include citations for both journal titles (in 2014 JCR stopped recording citations for papers published in the *Boletín de la Sociedad Botánica de México*). (B) Annual values of the Journal Impact Factor (bars) and the JIF percentile in the Plant Sciences category (lines) for *Botanical Sciences* for the period 2013-2021. SCIE, Science Citation Index Expanded. Source: Clarivate (last accessed on August 17, 2022, clarivate.com).

not only with researchers from the United States but also from other countries, which in turn may be stimulated by the broadness and quality of its journal's contents.

It is not –and it ought not to be– the aspiration of *Botanical Sciences* to compete, in the best sense of the term, with highly prestigious journals such as *New Phytologist* (impact factor: 10.151) or *Annals of Botany* (4.357), but we should not rule out following similar or analogous routes as those followed by *International Journal of Plant Sciences* (1.785) or other journals with similar trajectories and scope. All periodicals devoted to the field of general botany have grown in their content and impact in recent decades.

Botanical Sciences, like other scientific societies and their journals in Mexico, is immersed in a country where science has been traditionally underfunded (Corona *et al.* 2014, Guglielmi 2019). In general, there is little recognition to botanical research, particularly in the field of plant taxonomy (Villaseñor 2015). Globally, this is an endangered professional guild, despite the relevance of the study of biodiversity as a top global issue (Mayo *et al.* 2008, Thomson *et al.* 2018).

The transformation of *Botanical Sciences* will require discarding old dogmas and reconfiguring our way of thinking in accordance with a globalized world where the quality of science is what we care about, and we put it at the forefront. If we choose not to resort to global publishing companies, then we will have to create our own. However, few academic institutions dedicated to research and education in Mexico have the capacity to do so, and even they depend on the people who oversee their institutional publications. It is urgent to take firm steps to further contribute to the evolution of *Botanical Sciences* in better and more purposeful directions for the sake of the journal's continuity among the large –and ever-growing– suite of international journals in plant sciences.

Contributions to this commemorative special issue of *Botanical Sciences*

The Guest Editors, along with the journal's Editor-in-Chief, Dr. Teresa Terrazas, conceived this issue as a forum to publish profound albeit synthetic reflections on the state-of-the-art in different fields of botanical knowledge belonging to areas traditionally well represented in the pages of the journal. The intention was to offer the readership a set of contributions prepared by renowned scholars working in Mexico but having international recognition, in which they could share their visions and perspectives on the recent progress made in their respective fields of research. This should include diverse aspects such as central theoretical tenets, the potential and limitations of study methods, potential controversies, and ideally the delineation of future avenues of research.

Hence, the preparation of this special issue of *Botanical Sciences* started with an ample discussion to select candidates to be invited to prepare the contributions that would form the issue. We decided to invite renowned researchers that were leaders in their fields of study and who had achieved an advanced position in their careers but offer them the possibility to invite co-authors of their choice to support and facilitate their work. The decision about whom to invite was challenging, and the initial list included many more potential authors than articles that could be accommodated in the issue. The Guest Editors are fully aware of the research activities of many more distinguished botanists working in the country and sincerely hope that this issue will encourage them to make similar efforts in their respective fields that could be published in the future. In the end, we collated a series of 13 articles that represent fairly well, but by no means sufficiently, the breadth of topics traditionally published in *Botanical Sciences* throughout its history. More importantly, these pieces attest to the contribution of botanical research conducted in Mexico to the advancement of universal botanical knowledge.

Villaseñor and Meave (2022) analyzed the floristic information for Mexico housed in different sources that may provide a basis for the advancement of floristic knowledge in this country. Their review revealed that, despite a sizeable amount of information contained in those sources, it is very heterogeneous, which requires the design of novel ways to synthesize and organize it. In addition to reflecting on how this information may contribute to the completion of the Flora of Mexico, the authors also discuss the usefulness of floristic information to other fields of research. Clearly, floristic studies in Mexico stand as an active field of botanical research in Mexico.

The importance of studying plant life in the past to understand modern biodiversity is highlighted in the contribution of Cevallos-Ferriz *et al.* (2022). By focusing on plant fossils retrieved from the lithosphere in the Mexican territory, the authors examine the role of fossil evidence in understanding the origin and development of biological processes. They discuss examples of the enlightening interactions among fossils, anatomy, genetics, morphology, physiology, and numerical methods that allow generating solid botanical concepts. The authors conclude that future studies on Mexican fossil plants will lead to novel hypotheses that will be key to the discussion of the evolution of biological processes.

By using GenBank's metadata extracted through the informatic script Datataxa, Maya-Lastra *et al.* (2022) addressed eight questions related to phylogenetic studies for species occurring in Mexico. Although they report a surprisingly large number of species (over 12,500) having sequence records in GenBank, this information has important biases, as most of it concentrates on Magnoliophyta, Poales, and Poaceae. Their analysis revealed parsimony as the most common method and ITS as the most popular marker used in phylogenetic studies. This contribution underscores the importance of Mexico as a biological repository for understanding the evolution of plants globally while it also points to shortages in sequencing data needed to resolve some lineages in the phylogeny.

Departing from the recognition of the wealth of information contained in plant genomes, Eguiarte *et al.* (2022) provide the readers with a "roadmap" that encompasses 15 steps (not necessarily consecutive and several being optional) that will allow scholars to take advantage of modern molecular methods in evolutionary and taxonomic research. The starting point of their roadmap is a set of guidelines on how to obtain an adequate genome sequence for specific objectives, with the possibility of using different "omic" data (*e.g.*, proteome, metabolome, etc.). The roadmap then leads through proper ways to conduct population genomics, with an interesting stop at the concept of pangenome. Further steps cover an array of topics including the estimation of population genetics parameters and the analysis of geographic differentiation, inbreeding, and gene flow. The ideas and methods revisited by these authors are essential in studies of plant evolution, domestication, conservation, and adaptation to climate change.

The contribution of Flores *et al.* (2022) focuses on Mexican plants having crassulacean acid metabolism (CAM). These authors examine key physiological aspects (germination, photosynthesis, and water relations) of these plants and the degree to which these have been studied. Their analysis revealed a strong emphasis in physiological studies on four plant families (Cactaceae, Bromeliaceae, Asparagaceae and Orchidaceae), with most studies focusing on cacti germination. Interestingly, they also found that field and laboratory studies on photosynthesis and water relations have paid more attention to terrestrial cacti and epiphytic bromeliads, while seedling physiology of CAM species is understudied. Their analysis highlights the urgency to embark on new physiological research on CAM plants, as they may play an important role in future scenarios of climate change.

Martorell *et al.* (2022) center on the use of two kinds of structured projection models (discrete matrix projection models and continuous integral projection models) to study the dynamic properties of plant populations whose individuals are classified according to different criteria (*i.e.*, not all individuals are equal). The authors highlight the versatility of these models, which have already been used to examine the dynamics of numerous populations of a large variety of species. After examining key conceptual and methodological issues related to the use of these models, the authors emphasize the need for a careful selection of state variables, proper parameter estimation, and the identification of the most suitable model type to be used in the demographic analyses of plant populations.

For centuries, vegetation ecologists have pursued the goal of understanding the roles of the multiple abiotic and biotic factors affecting the vegetation of Earth. In their contribution, Ibarra-Manríquez *et al.* (2022) reflect on the difficulties and opportunities to accomplish this objective and review relevant advances in the main areas of vegetation ecology. After delving into theoretical and methodological challenges, including potential solutions and alternatives, the authors claim that vegetation ecology, currently turned into a scientific discipline on its own, will continue to play a key role in the construction of new knowledge necessary to strengthen the theoretical and technological tools required to address the urgent need to conserve the vegetation cover of the planet.

Based on a literature review on the conservation of the Mexican flora for the 2000-2021 period, Dávila *et al.* (2022) examined the progress made by research on this topic and the activities undertaken to protect the Mexican flora. The information retrieved by them was classified into six categories: (a) regions and ecoregions; (b) communities or ecosystems; (c) taxonomic groups; (d) species and populations; (e) botanical gardens; and (f) seed banks, for all of which they distinguished *in situ* from *ex situ* conservation approaches. Their analysis confirmed that the number of publications on this topic is still insufficient to overcome the information gaps that hinder the design of plant conservation strategies. Finally, they underscore the need to strengthen the connections among researchers of different disciplines in order to make a significant advancement in this field.

Restoration is the topic of Moreno-Casasola's (2022) contribution. It goes without saying that in the face of the current environmental crisis, this field of research has gained prominence. In her paper, the author shares ideas with the readers on a handful of topics that are becoming central in restoration, such as landscape restoration and novel ecosystems. Yet, the emphasis on the need for the involvement of local communities for a restoration project to be successful is noteworthy. The message is clear: without the participation of society at large the success and sustainability of restoration projects cannot be guaranteed. In this context, the recognition of traditional ecological knowledge as a key input in restoration projects is well taken. The author closes her paper with guidelines for restoration efforts that integrate social and ecological processes.

In his contribution, Espinosa-García (2022) addresses the question of whether phytochemical diversity acts as a resistance mechanism in agroecosystems and, very importantly from an applied perspective, if ecosystem patterns and processes involving phytochemical diversity can be adapted to sustainable agroecosystem management. The review confirms high levels of α -, β -, and γ -phytochemical diversity in ecosystems and landscapes, which manifests itself as dynamic and heterogeneous mosaics of secondary metabolites with large variation at various levels (individuals, populations, and species). Because phytochemical diversity results from complex evolutionary processes operating in natural systems, the author concludes that copying them to industrial agroecosystems is hardly viable. However, despite the idiosyncratic nature of the outcomes, phytochemical diversity, phytochemical differentiation among crops, design of biopesticides, and chemical plant defenses could be helpful in agroecosystem management.

The topic of Chávez-Vergara *et al.*'s (2022) contribution is ecosystem science, which has progressed substantially since the turn of the century by integrating methods and concepts developed in different disciplines from molecular ecology to global science. The authors frame in this emerging field their review of new concepts and methods on water, energy, and nutrient dynamics research, by focusing on three key issues: (a) the need to integrate functional processes at different spatio-temporal scales to gain insights into ecosystem dynamics, (b) the concept of resource use efficiency as a key metric for ecosystem function, and (c) the role of species on ecosystem function from a genetic diversity framework. These new concepts and tools will improve ecosystem resilience research, linking it to evolutionary theory and global ecology research.

Acknowledging the importance of understanding the hydraulic pathways in plants as indicators of plant mortality risk, Méndez-Alonzo et al. (2022) review the adaptive basis of hydraulic traits and their relevance for overall plant function; also, they discuss potential applications of plant hydraulics to natural resource management in the Mexican context. Their analysis reveals major geographical and ecological biases in the research conducted in Mexico, with most studies concentrating on tropical deciduous forests, crop plants, and tree species. The increasing trend in the number of publications derived from Mexican studies in this field gives hope that this situation will improve in the future, but this will largely depend on nationwide collaborative efforts to quantify traits related to the hydraulic function in plants.

Vibrans & Casas (2022) review the development of ethnobotany with two emphases: the current millennium and Mexico. Within this framework, they reflect on the growth of ethnobotany as a scientific discipline, paying attention to inflection points and the relative development of the main areas of the discipline, and emphasizing the importance of language in communication among ethnobotanists. The authors provide evidence showing that ethnobotany's development has followed Kuhn's model of cyclical advancement of science, in which a closing stage of the cycle focuses on theory construction is very relevant. From there, the authors move on to discussing advances in three key areas of the discipline: medicinal plants, agriculture, and wild-growing resources. Although there is no question that ethnobotany is moving quickly towards an analytical stage, the authors recognize the value of careful descriptive studies to strengthen the empirical basis of the field. In the end, as the authors state, ethnobotany functions as knowledge transmission and biocultural memory.

Coda

Bringing *Botanical Sciences* to the path of becoming a highly prestigious global scientific journal with universal presence and uncontested influence, as is the case of the top journals in the field of plant sciences, is not only unattainable but also not necessarily desirable. Despite the great progress that *Botanical Sciences* has made over the last eight decades, it must be acknowledged that the current situation for science in general and for scientific journals, in particular, presents tremendous challenges but also invaluable opportunities for their future development (Oyama 2019). This brings us to the fundamental question that we need to address immediately in order to guide our future in the proper direction: what should be the goals of *Botanical Sciences* for the decades to come? More than ever before, this is a perfect time to devote a great deal of thinking and all our intelligence to search for the best answer.

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