

# Innovative electronic publication in plant systematics: PhytoKeys and the changes to the “Botanical Code” accepted at the XVIII International Botanical Congress in Melbourne

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PhytoKeys was established less than a year ago in response to four main publication challenges of our time: (1) the appearance of electronic publications as amendments or even alternatives to paper publications; (2) Open Access (OA) as a new publishing model; (3) the linkage of electronic registers, indices, and aggregators, which summarize information on biological species through taxonomic names or their persistent identifiers; and (4) Web 2.0 technologies, which permit the semantic markup of, and semantic enhancements to, published biological texts. The appearance of the journal was concomitant with lively discussions on the validity of nomenclatural acts published electronically (Knapp and Wright 2010, Knapp et al. 2010, Penev et al. 2010, Chapman et al. 2010). At the XVIII International Botanical Congress in Melbourne in July 2011 (IBC 2011) these discussions culminated in the decision to amend the *International Code of Botanical Nomenclature* to allow electronic-only publishing of new taxa. Even before the end of the Congress and formal acceptance of the changes PhytoKeys was able to publish a report on the main outcomes of the Nomenclature Section on electronic publishing (Miller et al. 2011).

During the year preceding the IBC 2011, PhytoKeys invested significant effort and resources in preparing the journal's infrastructure to meet the new challenges of electronic-only publication. PhytoKeys was the first journal to mandate the inclusion of International Plant Name Index (IPNI) identifiers in all original descriptions of new species (protologues) and hence a workflow for *pre-publication registration of nomenclatural acts*. Although the Nomenclature Section in Melbourne declined a proposal for mandatory pre-publication registration for acts in plants and algae, it approved the mandatory registration of fungal names on and after 1 January 2013 (see McNeill and Turland 2011, Hawksworth 2011 and Norvell in press for details). Following its proclaimed policy to always be at the forefront of biodiversity publishing, Pensoft launched MycoKeys, a sister journal to PhytoKeys, which requires mandatory inclusion of the MycoBank registration numbers in the protologues of new species (Lumbsch et al. 2011, Hawksworth 2011).

PhytoKeys has also been at the vanguard of "atomized" content, i.e., to separately distribute the taxonomic information included in a paper to relevant on-line aggregators. Thanks to its advanced XML-based editorial workflow, the journal exports taxon treatments to the Encyclopedia of Life, the Plazi Treatment Repository, and Wiki (Species-ID) on the day of publication. PhytoKeys also provides an established infrastructure for data publishing in cooperation with the Global Biodiversity Information Facility (GBIF) and the Dryad Data Repository.

Another important aspect of electronic publishing of nomenclatural acts is the long-term archival preservation of e-publications. Unfortunately, the Nomenclature Section in Melbourne addressed this question only in Recommendation 29A (see Knapp et al. 2011 in the present volume). Nonetheless, PhytoKeys now has a solution in place for this problem through a successful application for archiving in PubMedCentral, perhaps the most important archive for biomedical literature in the world. Thanks to adoption of TaxPub ([www.sourceforge.net/projects/taxpub](http://www.sourceforge.net/projects/taxpub)), an extension of the Journal Archiving and Interchange Tag Suite (JATS) maintained by the U.S. National Center for Biotechnology Information (NCBI) of the U.S. National Library of Medicine (NLM), all papers published in PhytoKeys will be archived in PubMedCentral in three versions, as PDF (the version which constitutes effective publication under the new rules, see Knapp et al. 2011, this volume), HTML, and XML. In addition, all images associated with a paper are stored and indexed in duplicate, as separate files. An additional guarantee for the long-term preservation of publications containing the names of new taxa is the wide dissemination of the open access articles, including the separate deposition of taxon treatments in various aggregators, as mentioned above.

The current issue of PhytoKeys further consolidates the strong commitment of the journal to revolutionizing the landscape of taxonomic publishing. The paper by Knapp et al. (2011) lists those amendments to the *Melbourne Code* that address electronic publication and is being or will be co-published in sixteen different journals (see the publishing statement in Knapp et al. 2011). To expedite the widest possible dissemination of this important paper, PhytoKeys and MycoKeys undertook the translation of

the paper into Chinese, Portuguese, Russian, and Spanish and published the translated versions in today's issues of both journals.

We are extremely pleased to see that most of the policies and publishing practices outlined in the opening paper of PhytoKeys (Penev et al. 2010) have been adopted by the botanical and mycological communities whose deliberations in Melbourne will result in the (newly named) *International Code of Nomenclature for algae, fungi, and plants* (see McNeill and Turland 2011; McNeill et al. 2011). The journal is fully prepared to continue to adapt to the new era of taxonomic publishing. Editorial policies of individual journals will eventually determine how these new changes will affect publishing practice.

In practical terms, PhytoKeys will now adhere to the following editorial policies:

- Mandate the inclusion of the IPNI registration numbers in the original descriptions (protologues). Authors are not requested to provide registration numbers, as the whole process of registration is provided by the Editorial Office of the journal in collaboration with IPNI
- Publish each paper in four versions: (1) PDF for effective publication, reference and easy archiving; (2) full-colour, high-resolution print version identical to the effectively published PDF version; (3) HTML for easy reading, browsing and applying semantic enhancements to the text; and (4) XML to provide a machine-readable file for archiving and data mining
- Produce a print version, identical to the PDF, which will be deposited in six important botanical libraries of the world: Smithsonian Institution, Washington D.C.; Natural History Museum, London; Royal Botanic Gardens, Kew; Missouri Botanical Garden, St. Louis; Komarov Botanical Institute, St. Petersburg; Kunming Institute of Botany Heilongtan, Kunming, China.
- Shorten the publication time to a maximum of one to two weeks after the editorial acceptance of a manuscript
- Continuously develop and implement cutting-edge publishing technologies: XML-based editorial work flow and mark up process, data publication and various semantic Web 2.0 enhancements.

Finally, we would like to thank all of the authors, editors and readers of PhytoKeys for their support of the journal, as well as the translators of the paper of Knapp et al. (2011): Li-Bing Zhang (Chinese), Jefferson Prado, Regina Y. Hirai, and Cíntia Kameyama (Portuguese), Irina Belyaeva and Maria Vorontsova (Russian), and Carmen Ulloa Ulloa, Lourdes Rico Arce, and Renée H. Fortunato (Spanish). Special thanks are due to all teams that made possible the establishment of the innovative workflow of Pensoft's journals: Plazi, the Global Biodiversity Information Facility (GBIF), the Encyclopedia of Life (EOL), the Biodiversity Heritage Library (BHL), the National Library of Medicine of the U.S. (NLM), and the ViBRANT EU FP7 project. We also

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# Changes to publication requirements made at the XVIII International Botanical Congress in Melbourne – what does e-publication mean for you?

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## Abstract

Changes to the *International Code of Botanical Nomenclature* are decided on every 6 years at Nomenclature Sections associated with International Botanical Congresses (IBC). The XVIII IBC was held in Melbourne, Australia; the Nomenclature Section met on 18–22 July 2011 and its decisions were accepted by the Congress at its plenary session on 30 July. Several important changes were made to the *Code* as a result of this meeting that will affect publication of new names. Two of these changes will come into effect on 1 January 2012, some months before the *Melbourne Code* is published. Electronic material published online in Portable Document Format (PDF) with an International Standard Serial Number (ISSN) or an International Standard Book Number (ISBN) will constitute effective publication, and the requirement for a Latin description or diagnosis for names of new taxa will be changed to a requirement for a description or diagnosis in either Latin or English. In addition, effective from 1 January 2013, new names of organisms treated as fungi must, in order to be validly published, include in the protologue (everything associated with a name at its valid publication) the citation of an identifier issued by a recognized repository (such as MycoBank). Draft text of the new articles dealing with electronic publication is provided and best practice is outlined.

To encourage dissemination of the changes made to the International Code of Nomenclature for algae, fungi, and plants, this article will be published in *BMC Evolutionary Biology*, *Botanical Journal of the Linnean Society*, *Brittonia*, *Cladistics*, *MycKeys*, *Mycotaxon*, *New Phytologist*, *North American Fungi*, *Novon*, *Opuscula Philolichenum*, *PhytoKeys*, *Phytoneuron*, *Phytotaxa*, *Plant Diversity and Resources*, *Systematic Botany* and *Taxon*.

## Introduction

At the XVIII International Botanical Congress in Melbourne, Australia, in July 2011, two important changes were made to the *International Code of Botanical Nomenclature* (now the *International Code of Nomenclature for algae, fungi, and plants*) that will take effect from 1 January 2012. These changes will affect everyone who publishes names governed by this *Code*. As the *Melbourne Code* will not be published until approximately mid-2012, we felt it would be helpful to outline these changes, particularly those concerning effective publication in electronic media (in Articles 29, 30, and 31). For a concise report on all the changes to the *Code* accepted in Melbourne, see McNeill et al. (2011).

A draft wording of the revised Articles, Notes, and Recommendations on effective publication is provided to aid editors and publishers in establishing best practice for implementing this aspect of the *Code*. We also outline here what these changes do *not* mean, to guide those wishing to publish new names and typifications by electronic means. We urge readers to consult the report of the Special Committee on Electronic Publication accompanying the changes proposed before the Congress (Chapman et al. 2010), wherein the reasoning for the changes now accepted into the *Code* is set out.

## Draft wording of revised Articles 29, 30, and 31 and Recommendations 29A, 30A, and 31A

Here we reproduce the wording of all of the relevant Articles, Notes, and Recommendations (omitting the Examples), with the changes highlighted in **bold**. The wording here is provisional, pending the meeting of the Editorial Committee in December 2011 to finalize the printed version of the *Melbourne Code*.

### Article 29

29.1. Publication is effected, under this *Code*, by distribution of printed matter (through sale, exchange or gift) to the general public or at least to botanical institutions with libraries accessible to botanists generally. **Publication is also effected by electronic distribution of material in Portable Document Format (PDF; see also Art. 29.3 and Rec. 29A.1) in an online publication with an International Standard Serial Number (ISSN) or an International Standard Book Number (ISBN).** Publication is not effected by communication of new names at a public meeting, by the placing of names in collections or gardens open to the public, by the issue of microfilm made from manuscripts, typescripts or other unpublished material, or by distribution electronically **other than as described above.**

29.2. **For the purpose of this Article, “online” is defined as accessible electronically via the World Wide Web.**

**29.3. Should Portable Document Format (PDF) be succeeded, a successor international standard format communicated by the General Committee (see Div. III) is acceptable.**

**29.4. The content of a particular electronic publication must not be altered after it is first issued. Any such alterations are not themselves effectively published. Corrections or revisions must be issued separately to be effectively published.**

#### Recommendation 29A

[Existing Recommendation replaced by the following:]

**29A.1. Publication electronically in Portable Document Format (PDF) should comply with the PDF/A archival standard (ISO 19005).**

**29A.2. Authors should preferably publish in publications that are archived, satisfying the following criteria as far as is practical (see also Rec. 29A.1):**

**(a) The material should be placed in multiple trusted online digital repositories, e.g. an ISO-certified repository;**

**(b) Digital repositories should be in more than one area of the world and preferably on different continents;**

**(c) Deposition of printed copies in libraries in more than one area of the world and preferably on different continents is also advisable.**

#### Article 30

**30.1. Publication by distribution of electronic material does not constitute effective publication before 1 January 2012.**

**30.2. An electronic publication is not effectively published if there is evidence associated with or within the publication that it is merely a preliminary version that was, or is to be, replaced by a version that the publisher considers final, in which case only that final version is effectively published.**

**30.3. Publication by indelible autograph before 1 January 1953 is effective. Indelible autograph produced at a later date is not effectively published.**

**30.4. For the purpose of this Article, indelible autograph is handwritten material reproduced by some mechanical or graphic process (such as lithography, offset, or metallic etching).**

**30.5. Publication on or after 1 January 1953 in trade catalogues or non-scientific newspapers, and on or after 1 January 1973 in seed-exchange lists, does not constitute effective publication.**

**30.6. The distribution on or after 1 January 1953 of printed matter accompanying exsiccatae does not constitute effective publication.**

*Note 1.* If the printed matter is also distributed independently of the exsiccata, it is effectively published.

30.7. Publication on or after 1 January 1953 of an independent non-serial work stated to be a thesis submitted to a university or other institute of education for the purpose of obtaining a degree is not effectively published unless it includes an explicit statement (referring to the requirements of the *Code* for effective publication) or other internal evidence that it is regarded as an effective publication by its author or publisher.

*Note 2.* The presence of an International Standard Book Number (ISBN) or a statement of the name of the printer, publisher, or distributor in the original printed version is regarded as internal evidence that the work was intended to be effectively published.

## Recommendation 30A

**30A.1. Preliminary and final versions of the same electronic publication should be clearly indicated as such when they are first issued.**

30A.2. It is strongly recommended that authors avoid publishing new names and descriptions or diagnoses of new taxa (nomenclatural novelties) in ephemeral printed matter of any kind, in particular printed matter that is multiplied in restricted and uncertain numbers, in which the permanence of the text may be limited, for which effective publication in terms of number of copies is not obvious, or that is unlikely to reach the general public. Authors should also avoid publishing new names and descriptions or diagnoses in popular periodicals, in abstracting journals, or on correction slips.

30A.3. To aid availability through time and place, authors publishing nomenclatural novelties should give preference to periodicals that regularly publish taxonomic articles. **Otherwise, a copy of a publication (whether published as printed or electronic matter) should be sent to an indexing centre appropriate to the taxonomic group, and publications that exist only as printed matter** should be deposited in at least ten, but preferably more, botanical or other generally accessible libraries throughout the world.

30A.4. Authors and editors are encouraged to mention nomenclatural novelties in the summary or abstract, or list them in an index in the publication.

## Article 31

31.1. The date of effective publication is the date on which the printed **or electronic** matter became available as defined in Art. 29 and 30. In the absence of proof establishing some other date, the one appearing in the printed **or electronic** matter must be accepted as correct.



[Existing Note 1 replaced by the following:]

**31.2. When a publication is issued in parallel electronic and printed versions, these must be treated as effectively published on the same date unless the dates of the versions are different according to Art. 31.1.**

31.3. When separates from periodicals or other works placed on sale are issued in advance, the date on the separate is accepted as the date of effective publication unless there is evidence that it is erroneous.

### Recommendation 31A

31A.1. The date on which the publisher or publisher's agent delivers printed matter to one of the usual carriers for distribution to the public should be accepted as its date of effective publication.

### Best practice

Authors of new names, editors and publishers will all be interested in ensuring that the publications including new names are in accordance with the *Melbourne Code*, so that the names therein are effectively published. We suggest that those publishing in journals or monograph series and books that have online editions communicate with the editors so that best practice can be established across the community as quickly as possible. Many publishers have been carefully addressing the issues involved with the e-publication of novelties for some time (see Knapp and Wright 2010; guidelines in PLoS One [<http://www.plosone.org/static/policies.action#taxon>]) and considerable interest in making these new *Code* changes function effectively has been apparent.

Some practices that we feel will help with the initial stages of e-publication of novelties that are according to the *Melbourne Code* are:

- Having each article bear the date of publication prominently (as is done in many journals, for example *New Phytologist* or *Nature*).
- If an online early version is issued that is not the same as the final version (and thus not the place of effective publication), stamp each article with this fact prominently (for example *American Journal of Botany*).
- Prominent display of the ISSN or ISBN of the publication on each article will help indexers establish effective publication.
- Publication in journals (or monograph series) that participate in the CLOCKSS system (see Knapp and Wright 2010 for a description) or another international archive and preservation system will ensure long-term archiving.
- Authors of new names by electronic means should alert the appropriate indexing center as recommended in Rec. 30A.3 - this will help indexers who may otherwise not be aware of electronically published names.

## What these changes do not mean

Although the new Articles and Recommendations use the terms PDF and PDF/A, this does not mean that publications must be issued *only* in that format to be effectively published. For example, some online journals issue papers in Hypertext Markup Language (HTML) format together with a parallel PDF version. In such cases, the PDF version will be effectively published. The stipulation that the General Committee for Botanical Nomenclature will communicate the acceptability of a new international standard format, should PDF ever be succeeded, means authors of novelties and the community using the *Code* can remain informed as to advances in the field and that the *Code* will be protected from obsolescence.

Use of the following means of electronic publication will *not* result in effective publication of novelties under the *Melbourne Code*:

- Publication on websites or in ephemeral documents available over the Internet (there are strict criteria for granting of ISSNs [<http://www.issn.org>]).
- Publication in journals without a registered ISSN or e-ISSN.
- Publication in books without a registered ISBN or e-ISBN.

The Recommendation approved to advise the deposition of a hard copy of any e-publication in a library suggests to botanists an action, but it does not set out standard practice or a protocol for librarians to follow. Librarians are themselves in a complex transition zone between publication modalities (Johnson and Luther 2007), and botanists may find librarians to be unwilling or unable to accommodate single hard copy papers as individual accessions should the volume be great.

## Two other important changes to the *Code* relating to the publication of names

The second change to the *Code* approved in Melbourne to take effect from 1 January 2012 is that the description or diagnosis required for valid publication of the name of a new taxon of all organisms falling under the *Code* may be in either English or Latin. This is the current provision for names of plant fossils, but all new non-fossil taxa have required a Latin description or diagnosis (fungi and plants from 1 January 1935; algae [including cyanobacteria, if treated under the *Code*] from 1 January 1958). This has no bearing on the form of scientific names, which continue to be Latin or treated as Latin. Individual journal requirements for Latin and/or English will, of course, be determined by the editors of those journals.

A third change to the *Code* approved in Melbourne relating to publication of names, but one not taking effect until 1 January 2013 (not 1 January 2012 as reported by Miller et al. 2011), is that all new names of organisms treated as fungi must, as an additional requirement for valid publication, include in the protologue (everything associated with a name at its valid publication) the citation of an identifier issued by a recognized repository (such as MycoBank [<http://www.mycobank.org/>]). This will be publicized separately.

The requirement for a unique identifier for new names of fungi on or after 1 January 2013 does *not* apply to plants or algae; there is no need for authors of new names in these groups to request Life Science Identifiers (LSIDs) - or other identifiers - from indexing centers.

## Acknowledgements

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To encourage dissemination of the changes made to the International Code of Nomenclature for algae, fungi, and plants, this article will be published in *BMC Evolutionary Biology*, *Botanical Journal of the Linnean Society*, *Brittonia*, *Cladistics*, *MycKeys*, *Mycotaxon*, *New Phytologist*, *North American Fungi*, *Novon*, *Opuscula Philolichenum*, *PhytoKeys*, *Phytoneuron*, *Phytotaxa*, *Plant Diversity and Resources*, *Systematic Botany* and *Taxon*.

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# Translation into Chinese of: "Changes to publication requirements made at the XVIII International Botanical Congress in Melbourne – what does e-publication mean for you?". Translated by Li-Bing Zhang

## 在墨尔本召开的第18届国际植物学大会做出的有关名称发表要求的变化 — 电子出版物对你意味着什么？

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### 摘要

《国际植物命名法规》的修订由每六年一次的国际植物学大会(IBC)命名分会来决定。第18届国际植物学大会在澳大利亚墨尔本举行；命名分会于2011年7月18日至22日召开，其决议获得7月30日的全体会议通过。“墨尔本法规”有几个重要的变化，将影响新名称的发表。这些变化中的两个将在“墨尔本法规”出版前的几个月，即于2012年1月1日起生效。通过以移动文档格式(Portable Document Format; pdf)在线发表的具有国际标准连续出版物号(ISSN)或国际标准图书编号(ISBN)的电出版物，将构成有效发表。新分类群名称的合格发表所必须的拉丁文描述或特征集要将更改为拉丁文或英文描述或特征集。此外，自2013年1月1日起，被处理为真菌的生物学的新名称必须在原始资料(某一名称合格发表时与之有关的所有资料)中引证一个由一家公认的存储库(例如MycoBank)签发的标识符，才构成合格发表。本文提供了有关电子出版物的新规则的草案文本，并概述了相应的最佳做法。

为便于新的《国际藻类、真菌和植物命名法规》中的变化得到广泛的了解，本文将发表在 *BMC Evolutionary Biology*, *Botanical Journal of the Linnean Society*, *Brittonia*, *Cladistics*, *MycKeys*, *Mycotaxon*, *New Phytologist*, *North American Fungi*, *Novon*, *Opuscula Philolichenum*, *PhytoKeys*, *Phytoneuron*, *Phytotaxa*, 《植物分类与资源学报》, *Systematic Botany* 和 *Taxon*。

## 序言

于2011年7月在澳大利亚墨尔本召开的第18届国际植物学大会通过的《国际植物命名法规》(现称为《国际藻类、真菌和植物命名法》)规)有两个重要的变化，并将于2012年1月1日生效。这些变化将影响到每一个发表相关名称的人。由于“墨尔本法规”大约要等到2012年中才能出版，我们认为将这些变化，特别是那些有关在电子媒体中有效发表的变化(规则29, 30, 31)，做一概述，将对我们的读者有所裨益。有关在墨尔本接受的所有变化的一个简明报告，可参阅 McNeill et al. (2011)。

本文提供了修订后的有关有效发表的规则、注释和辅则的草案，以帮助编辑和出版商建立为实施本法规的最佳做法。我们这里还概述了这些变化并不包含的意思，以指导那些希望通过电子方式发表新名称和指定模式的人们。我们促请读者阅读电子发表特别委员会的报告 Chapman et al. 2010 以及国际植物学大会之前的相关提案。有关法规修订的理由在那里有详细的陈述。

## 修订后的规则29, 30和31, 和辅则29A, 30A及31A的草案

在这里，我们复制了所有相关的规则、注释和辅则(省去例子)，黑体字指法规中新的变化。这里的措辞只是临时性的，印刷版的“墨尔本法规”的内容将由2011年12月召开的法规编辑委员会会议来决定。

### 规则29

29.1. 根据本法规，只有将印刷品向一般公众发行(通过出售、交换或赠送)，或至少分送给具有普通植物学家可使用的图书馆的植物学研究机构，这样的发表才是有效发表(effective publication)。通过以移动文档格式(**Portable Document Format**)(pdf; 也见规则29.3及辅则29A.1)在线发表的具有国际标准连续出版物号(**International Standard Serial Number; ISSN**)或国际标准图书编号(**International Standard Book Number; ISBN**)的电子发行，也是有效发表。在公共会议上对新名称的交流，或将名称置于对公众开放的标本馆或植物园，或发行由文稿(manuscript)、打字稿(type-scripts)或其他未发表的材料(unpublished material)制成的微缩胶片(microfilm)，或通过上述电子发表方式之外的电子发表，均为无效发表。

**29.2.** 就本规则的实际应用而言，“在线”指的是可通过万维网(World Wide Web)访问的。

**29.3.** 如果今后移动文档格式(pdf)被取代，可以接受由总委员会(见第三部分)通报的下一个国际标准格式。

**29.4.** 一个电子出版物首次发行以后，其内容便不能更改。任何更改都是无效发表。对其更正或修改必须独立地发表才构成有效发表。

## 辅则29A

[现有辅则被下面辅则取代]

**29A.1.** 以移动文档格式(pdf)的电子发表应遵照pdf/A存档标准(国际标准化组织(ISO)19005)。

**29A.2.** 在切实可行的情况下，作者在发表存档的出版物时，应该最好满足以下条件(也见辅则29A.1):

(a) 材料应存放在多个值得信赖的在线数字资源库，如国际标准化组织(ISO)认证的存储库;

(b) 数字资源库应放置在这个世界上多个地区，最好在不同的大洲;

(c) 印本应存放在世界上多个地区、最好在不同的大洲的图书馆。

## 规则30

**30.1.** 2012年1月1日前电子材料的分发并不构成有效的发表。

**30.2.** 如果存在跟电子出版物相关的证据或有电子出版物内部的证据显示，该电子出版物仅仅是一个初级的版本或将要被一个出版者所认为的最终版本所取代，该电子出版物便不构成有效发表。在这种情况下，只有最终版本才是有效发表。

**30.3.** 1953年1月1日之前的擦不掉的手写体(indelible autograph)出版物是有效发表。其后出现的擦不掉的手写体为无效发表。

**30.4.** 就本规则的具体应用而言，擦不掉的手写体是指通过机械或图像过程(例如平版印刷，胶印，或金属蚀刻)复制的手写材料。

**30.5.** 1953年1月1日或之后发行的商业目录(trade catalogue)或非学术性报纸，以及1973年1月1日或之后发行的种子交换目录(seed-exchange list)，均不构成有效发表。

**30.6.** 在1953年1月1日或之后随腊叶标本(exsiccatae)而被分发的印刷品不构成有效发表。

注释1. 如果该印刷品在随腊叶标本之外也有分发，则构成有效发表。

**30.7.** 在1953年1月1日或之后，指明为提交给大学或其它教育机构而为获得某种学位的、独立的、非系列的毕业论文的发表，是无效发表，除非论文中清楚地说明(指本法规中有效发表的必要条件)或其它的内部证据(internal evidence)显示其作者或出版者视它为有效发表。

注释2. 国际标准图书编号(International Standard Book Number; ISBN)的存在,或在原始印刷版中指出了有关印刷厂、出版者或发行者的名字,均被视为相关著作有意为有效发表的内部证据。

### 辅则30A

**30A.1.** 同一电子出版物的初级和最终版本在第一次发行时,应清楚地表明它们的版本。

**30A.2.** 本法规强烈地建议,作者应竭力避免在任何临时性的印刷品(ephemeral printed matter)中、特别是那些印数有限和不定的印刷品中发表新名称和新分类群的描述或特征集要(命名新材料nomenclatural novelties)。这样的印刷品内容的持久性可能会受到限制,其有效发表的拷贝数亦不明显,或者一般公众不太可能接触到。作者也应避免在通俗刊物(popular periodicals)、文摘杂志(abstracting journals)或勘误表(correction slip)上发表新名称和描述或特征集要。

**30A.3.** 为提高时间和地点方面的可用性,发表命名新材料的作者应尽量选择经常发表分类学文章的期刊。否则,应将其文章的拷贝(无论是印本发表或电子发表)寄给适当的与分类群相关的索引中心(indexing centre)。只有印本发表的文章应存于世界上至少10个或最好更多的植物学或其它一般的公共图书馆。

**30A.4.** 作者和编辑最好在摘要(abstract)或概要(summary)中提及所发表的命名新材料,或将其列在出版物的索引中。

### 规则31

**31.1.** 有效发表的日期是,根据规则29和30的规定,印刷品或电子件可被使用的日期。如果没有证据证明不同,印刷品或电子件上的日期必须被接受为正确的日期。

[现有的注释1被以下规则取代]

**31.2.** 当一个出版物同时发行在印刷版和电子版上,必须视印刷版和电子版的有效发表日期相同,除非根据规则31.1. 印刷版和电子版的有效发表日期不同。

**31.3.** 当期刊或其它出售品的抽印本被提前发行时,抽印本上的日期为有效发表日期,除非有证据显示该日期是错误的。

### 辅则31A

**31A.1.** 出版商或其代理将印刷品交付给平常的投递人向公众发行的日期,应被接受为该印刷品的有效发表日期。



## 最佳做法

新名称的作者、编辑和出版商都将确保含新名称的出版物符合“墨尔本法规”，以便其中的名称是有效发表。我们建议，含网络版的学术期刊或专著系列和书籍的作者与相关编辑沟通，使最佳做法可以在整个领域尽快建立起来。在有一段时间以来，许多出版商都精心讨论过有关新材料的电子发表问题(见 Knapp and Wright 2010, *PLoS One*指南[<http://www.plosone.org/static/policies.action#taxon>])。对法规的这些修改使其有效地发挥作用，已势在必行。

我们认为，有些做法将有助于符合“墨尔本法规”的电子发表新材料的开始阶段：

- 在每篇文章的醒目位置注明出版日期(象许多杂志所为，例如 *New Phytologist* 或 *Nature*)。
- 如果早期网络版不是最终版(因而不是有效发表的地方)，应在醒目位置注明这一事实(例如 *American Journal of Botany*)。
- 突出显示每篇文章所在的出版物的ISSN或ISBN，将有助于索引编写者确定有关名称是否为有效发表。
- 发表在参与CLOCKSS系统(描述见 Knapp and Wright 2010)或其他国际存档和保存系统的期刊(或专著系列)上的文章，将确保其长期归档。
- 通过电子方式发表新名称的作者，应采纳辅则30A.3的建议而提醒适当的索引中心。这将有助于索引编写者意识到其通过电子方式发表的名称。

## 这些变化不意味着什么

尽管新的规则和辅则使用PDF和PDF / A术语，这并不意味着，为了有效发表就只能发行这种格式。例如，一些在线期刊发行超文本标记语言(Hyper-text Markup Language; HTML)格式的论文，同时还有一个PDF的版本。在这种情况下，PDF版将是有效发表。如果将来PDF格式被取代，植物命名总委员会将通报一个新的国际标准格式的接受情况。这一规定意味着，新材料的作者和使用法规的人们会及时了解到该领域的进展情况，并保护法规不至于过时。

根据“墨尔本法规”，使用下列电子出版方式不构成新材料的有效发表：

- 网页上的发表或在因特网上出现的短暂文件(发放ISSN号有严格的标准 - 见[<http://www.issn.org>])。
- 没有ISSN号或e-ISSN号的期刊上的发表。
- 没有ISSN号或e-ISSN号的书籍中的发表。

获得植物学大会通过的辅则虽建议植物学家们将任何电子出版物的电脑打印件保存在图书馆里，但该辅则并没设定标准做法或需图书馆馆员遵从的规程。图书馆馆员本身处在出版模式之间的复杂的过渡区(Johnson and Luther 2007)。植物学家可能会发现，如果要保存的量很大，图书馆馆员不愿或无法收存个人单篇论文的电脑打印件。

## 法规中另外两个重要的有关名称发表的变化

在墨尔本获得通过的从2012年1月1日起生效的法规的第二个变化是，法规所管理的所有生物的新分类群名称的合格发表所需的描述或特征集要可以是英文或拉丁文。这是目前对发表植物化石名称的规定，但所有非化石分类群的新名称的发表，目前都需要拉丁文描述或特征集要(真菌和植物从1935年1月1日开始，藻类[包括根据该法规处理的蓝藻]从1958年1月1日开始)。这一变化跟学名的形式没有关系。学名将继续为拉丁词或被处理为拉丁词。当然，至于期刊要求描述或特征集要为英文和/或拉丁文，则由这些期刊的编辑决定。

直到2013年1月1日才生效(不是如Miller et al. 2011 所报道的2012年1月1日)的第三个在墨尔本获得通过的有关名称发表的法规的变化是，作为合格发表的附加要求，被处理为真菌的生物学的所有新名称必须在原始资料(某一名称合格发表时与之有关的所有资料)中引证一个由一家公认的存储库(例如 MycoBank [<http://www.mycobank.org/>])签发的标识码。这将另行公布。

2013年1月1日或之后的真菌新名称的独特标识码的规定并不适用于植物或藻类；这些类群的新名称的作者不需要从索引中心申请生命科学标识码(Life Science Identifiers; LSIDs)或其他标识码。

## 致谢

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为便于新的《国际藻类、真菌和植物命名法规》中的变化得到广泛的了解，本文将发表在*BMC Evolutionary Biology*, *Botanical Journal of the Linnean Society*, *Brittonia*, *Cladistics*, *MycKeys*, *Mycotaxon*, *New Phytologist*, *North American Fungi*, *Novon*, *Opuscula Philolichenum*, *PhytoKeys*, *Phytoneuron*, *Phytotaxa*, 《植物分类与资源学报》, *Systematic Botany*和*Taxon*。

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# Translation into Portuguese of: "Changes to publication requirements made at the XVIII International Botanical Congress in Melbourne – what does e-publication mean for you?". Translated by Jefferson Prado, Regina Y. Hirai, and Cíntia Kameyama

## Alterações nos requisitos de publicação feitas no XVIII Congresso Internacional de Botânica em Melbourne – o que significa publicação eletrônica para você?

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### Resumo

Alterações no *Código Internacional de Nomenclatura Botânica* são decididas a cada seis anos na Sessão de Nomenclatura, associada ao Congresso Internacional de Botânica (CIB). O XVIII CIB foi realizado em Melbourne, Austrália; a Sessão de Nomenclatura ocorreu de 18–22 de julho de 2011 e suas decisões foram aceitas pelo Congresso, em sua sessão plenária em 30 de julho. Como resultado desta reunião, foram decididas várias mudanças importantes no *Código* que afetarão a publicação de novos nomes. Duas dessas mudanças se tornarão efetivas em 1° de janeiro de 2012, alguns meses antes do *Código de Melbourne* ser publicado. Material eletrônico publicado online em Formato de Documento Portátil (PDF) com um Número Padrão Internacional de Séries (ISSN) ou com um Número Padrão Internacional de Livros

(ISBN) constituirão publicação efetiva e o requisito de uma descrição ou diagnose em latim para nomes de táxons novos será substituído por uma descrição ou diagnose em latim ou inglês. Além disso, nomes novos de organismos tratados como fungos devem, a partir de 1° de janeiro de 2013, a fim de ser validamente publicados, incluir no seu protótipo a citação de um número identificador de um indexador de nomes (p.e., MycoBank). O texto preliminar de novos artigos, tratando de publicação eletrônica, é apresentado e o melhor modo de fazer isto é discutido.

Para encorajar a disseminação das mudanças feitas no *Código Internacional de Nomenclatura para algas, fungos e plantas*, este artigo será publicado na *BMC Evolutionary Biology*, *Botanical Journal of the Linnean Society*, *Brittonia*, *Cladistics*, *MycKeys*, *Mycotaxon*, *New Phytologist*, *North American Fungi*, *Novon*, *Opuscula Philolichenum*, *PhytoKeys*, *Phytoneuron*, *Phytotaxa*, *Plant Diversity and Resources*, *Systematic Botany* e *Taxon*.

## Introdução

No XVIII Congresso Internacional de Botânica em Melbourne, Austrália, em julho de 2011, duas alterações importantes foram decididas para o *Código Internacional de Nomenclatura Botânica* (agora, o *Código Internacional de Nomenclatura para algas, fungos e plantas*) e se tornarão efetivas a partir de 1° de janeiro de 2012. Essas mudanças afetarão todos aqueles que publicam nomes regidos por este *Código*. Como o *Código de Melbourne* não será publicado até aproximadamente a metade de 2012, nós achamos que seria útil esboçar essas mudanças, particularmente aquelas relacionadas à publicação efetiva em mídia eletrônica (nos Artigos 29, 30 e 31). Um relatório conciso de todas as alterações para o *Código* aceitas em Melbourne, pode ser visto em McNeill et al. (2011).

Um rascunho revisado da redação dos Artigos, Notas e Recomendações sobre publicação efetiva é apresentado para auxiliar os editores e editoras no estabelecimento de boas práticas para implementação deste aspecto do *Código*. Nós também esboçamos aqui o que essas mudanças *não* significam, para guiar aqueles que desejam publicar nomes novos e tipificações por meios eletrônicos. Nós recomendamos aos leitores consultar o relatório do Comitê Especial sobre Publicação Eletrônica que acompanha as mudanças propostas anteriormente ao Congresso (Chapman et al. 2010), onde estão as razões para estas alterações agora aceitas no *Código* e aqui expostas.

## Rascunho revisado da redação dos Artigos 29, 30 e 31 e Recomendações 29A, 30A e 31A

Nós reproduzimos aqui a redação de todos os Artigos, Notas e Recomendações relevantes (omitindo os Exemplos), com as mudanças destacadas em **negrito**. A redação aqui é provisória, dependendo da reunião do Comitê Editorial em dezembro de 2011 para finalizar a versão impressa do *Código de Melbourne*.

## Artigo 29

29.1. A publicação é efetiva, segundo este *Código*, somente pela distribuição de matéria impressa (por meio de venda, intercâmbio ou doação) ao público em geral ou, pelo menos, às instituições botânicas com bibliotecas acessíveis aos botânicos em geral. **A publicação também é efetiva pela distribuição eletrônica da matéria em Formato de Documento Portátil (PDF; veja também Art. 29.3 e Rec. 29A.1) em uma publicação online com um Número Padrão Internacional de Séries (ISSN) ou com um Número Padrão Internacional de Livros (ISBN).** Não é efetiva pela comunicação de nomes novos em reuniões públicas, pela colocação de nomes em coleções ou jardins abertos ao público, pela produção de microfilme feito a partir de manuscritos, textos datilografados ou outro material não publicado, ou pela distribuição eletrônica ou por qualquer meio eletrônico, **exceto como descrito acima.**

29.2. Para propósito deste Artigo, “online” é definido como acessível eletronicamente via “World Wide Web”.

29.3. Caso o Formato de Documento Portátil (PDF) seja sucedido por um formato padrão internacional, este formato sucessor informado pelo Comitê Geral (veja Div. III), é aceitável.

29.4. O conteúdo de uma publicação eletrônica em particular não deve ser alterado depois dele publicado pela primeira vez. Nenhuma dessas alterações é efetivamente publicada. Correções ou revisões devem ser publicadas separadamente para serem efetivamente publicadas.

## Recomendação 29A

[A Recomendação atual será substituída pelas seguintes]

29A.1. A publicação eletrônica em Formato de Documento Portátil (PDF) deveria estar de acordo com o padrão de arquivo PDF/A (ISO 19005).

29A.2. Autores deveriam preferencialmente publicar em publicações que são arquivadas, cumprindo os seguintes critérios tanto quanto possível na prática (veja também Rec. 29A.1):

(a) O material deveria ser colocado em múltiplos repositórios digitais online confiáveis, p.e., um repositório com certificado ISO;

(b) Repositórios digitais deveriam estar em mais de um local do mundo e preferencialmente em diferentes continentes;

(c) É também recomendável o depósito de cópias impressas em bibliotecas em mais de um local do mundo e preferencialmente em diferentes continentes.

## Article 30

**30.1. Publicação através da distribuição de matéria eletrônica não constitui publicação efetiva antes de 1° de janeiro de 2012.**

**30.2. Uma publicação eletrônica não é efetivamente publicada caso exista uma evidência associada com ou dentro dela de que ela seja meramente uma versão preliminar, que foi ou que será substituída por uma versão que o editor considera final, neste caso somente a versão final é efetivamente publicada.**

30.3. Publicação através de manuscrito indelével é efetiva antes de 1° de janeiro de 1953. Manuscrito indelével produzido em data posterior não é efetivamente publicado.

30.4. Para fins deste artigo, manuscrito indelével é o material manuscrito reproduzido por algum processo mecânico ou gráfico (tal como litografia, 'offset' ou gravação em chapa metálica).

30.5. Publicação em ou a partir de 1° de janeiro de 1953, em catálogos de intercâmbio ou em revistas não-científicas e em ou a partir de 1° de janeiro de 1973, em listas de intercâmbio de sementes, não constitui publicação efetiva.

30.6. A distribuição em ou a partir de 1° de janeiro de 1953, de material impressa que acompanhe exsicatas não constitui publicação efetiva.

*Nota 1.* Se a matéria impressa também for distribuída independente da exsicata, constitui publicação efetiva.

30.7. Publicação em ou a partir de 1° de janeiro de 1953, de um trabalho independente, não seriado, definido como uma tese submetida a uma Universidade ou outro instituto de educação com o propósito de obtenção de grau, não é efetivamente publicada, a menos que inclua uma declaração explícita (referente aos requisitos do *Código* para publicação efetiva) ou outra evidência interna de que seja entendida como uma publicação efetiva por seu autor ou editor.

*Nota 2.* A presença de um Número Padrão Internacional de Livros (ISBN) ou a colocação do nome da gráfica, da editora ou distribuidor na versão impressa original é entendido como evidência interna de que o trabalho foi definido como efetivamente publicado.

## Recommendation 30A

**30A.1. Versões preliminares e finais da mesma publicação eletrônica deveriam ser claramente indicadas tal como quando são publicadas pela primeira vez.**

30A.2. É fortemente recomendado que os autores evitem publicar nomes novos e descrições ou diagnoses de táxons novos (novidades nomenclaturais) em matéria impressa de qualquer tipo que seja efêmera, em matéria impressa particular que seja multiplicada em números restritos e incertos, nos quais a permanência do texto possa ser limitada, para os quais a publicação efetiva em termos de número



de cópias não seja óbvia ou que seja improvável que alcance o público em geral. Os autores deveriam também evitar nomes novos e descrições ou diagnoses em revistas populares, em revistas de resumos ('abstracting journals') ou em etiquetas de correção.

*30A.3.* Para ajudar na disponibilidade em termos de tempo e lugar, os autores ao publicar novidades nomenclaturais, deveriam dar preferência a revistas periódicas que regularmente publiquem artigos taxonômicos. **Por outro lado, uma cópia da publicação (se publicada como matéria eletrônica ou impressa) deveria ser enviada para um centro indexador apropriado do grupo taxonômico e publicações que existirem somente como matéria impressa** deveriam ser depositadas em, pelo menos dez, mas preferivelmente em mais bibliotecas botânicas ou outras geralmente acessíveis em todo o mundo.

*30A.4.* Autores e editores são encorajados a mencionar as novidades nomenclaturais no resumo ou no 'abstract' ou listá-las num índice na própria publicação.

## Article 31

*31.1.* A data de publicação efetiva é a data na qual a matéria impressa **ou eletrônica** tornou-se disponível conforme definido nos Art. 29 e 30. Na ausência de prova estabelecendo alguma outra data, a data que aparece na matéria impressa **ou eletrônica** deve ser aceita como correta.

[A Nota 1 atual será substituída pelo seguinte]

***31.2.* Quando uma publicação é lançada paralelamente em versões eletrônica e impressa, estas devem ser tratadas como efetivamente publicadas na mesma data a menos que as datas das versões sejam diferentes de acordo com o Art. 31.1.**

*31.3.* Quando separatas de periódicos ou outros trabalhos colocados à venda são distribuídos antes, a data na separata é aceita como a data da publicação efetiva, a menos que haja evidência de que esteja errada.

## Recomendação 31A

*31A.1.* A data na qual o editor ou o agente do publicador distribuiu a matéria impressa a um dos transportadores usuais para distribuição ao público deveria ser aceita como a data de publicação efetiva.

## Boas práticas

Autores de nomes novos, editores e editoras estarão todos interessados em assegurar que as publicações incluindo nomes novos estejam de acordo com o *Código de Mel-*

*bourne*, de tal modo que os nomes sejam efetivamente publicados. Nós sugerimos que aqueles que publicam, em periódicos ou monografias seriadas e livros que tenham edições online, se comuniquem com os editores de modo que as boas práticas possam ser estabelecidas na comunidade, o mais rápido possível. Já há algum tempo, muitos editores tem sido cuidadosamente orientados sobre as novidades relacionadas às publicações eletrônicas (veja Knapp and Wright 2010; guia para autores em PLoS One [<http://www.plosone.org/static/policies.action#taxon>] e eles tem, aparentemente, um considerável interesse em tornar essas novas mudanças do *Código* efetivas.

Nós acreditamos que algumas práticas que ajudarão nos estágios iniciais das publicações eletrônicas de novidades, que estão de acordo com o *Código de Melbourne*, são:

- Cada artigo ter a data de publicação bem evidente (como é feito em vários periódicos, p.e., *New Phytologist* ou *Nature*).
- Se uma versão anterior online é publicada e esta não for igual à versão final (e deste modo não é o local de publicação efetiva), estampar em cada artigo esta informação de forma bem evidente (p.e., *American Journal of Botany*).
- A exposição bem evidente do ISSN ou ISBN da publicação em cada artigo ajudará os indexadores estabelecer a publicação efetiva.
- A publicação em periódicos (ou monografias seriadas) que participam do sistema CLOCKSS (veja Knapp and Wright 2010 para uma descrição) ou de outro sistema internacional de arquivo e preservação garantirá o arquivamento a longo prazo.
- Autores de nomes novos por meio eletrônico deveriam alertar o centro indexador apropriado como recomendado na Rec. 30A.3 – isto ajudará os indexadores que poderiam não estar cientes dos nomes publicados eletronicamente.

## **O que essas mudanças não significam**

Embora os novos Artigos e Recomendações usem os termos PDF e PDF/A, isto não significa que as publicações devam ser lançadas *somente* neste formato para ser efetivamente publicadas. Por exemplo, alguns periódicos online publicam trabalhos em formato HTML (Linguagem de Marcação de Hipertexto) junto com uma versão paralela em PDF. Nestes casos, a versão PDF será a efetivamente publicada. A determinação de que o Comitê Geral para Nomenclatura Botânica informará a aceitação de um novo formato padrão internacional, que poderá suceder o PDF, significa que autores de novidades e a comunidade que usam o *Código* permanecerão informados sobre os avanços na área e que o *Código* estará protegido da obsolescência.

O uso dos seguintes meios de publicação eletrônica *não* resultará em publicação efetiva de novidades sob o *Código* de Melbourne:

- A publicação em sítios na Web ou em documentos efêmeros disponíveis na Internet (há critérios estritos para concessão de ISSNs [<http://www.issn.org>]).
- A publicação em periódicos sem um ISSN ou e-ISSN registrado.
- A publicação em livros sem um ISBN ou e-ISBN registrado.

A Recomendação aprovada para orientar o depósito de uma cópia impressa de qualquer publicação eletrônica em uma biblioteca sugere aos botânicos uma ação, mas isto não estabelece uma prática padrão ou um protocolo para os bibliotecários seguirem. Os bibliotecários encontram-se em uma zona de transição complexa entre modalidades de publicação (Johnson and Luther 2007) e os botânicos podem encontrá-los não dispostos ou capacitados para acomodar cópias impressas avulsas de trabalhos como entradas pontuais, se o volume for grande.

### **Outras duas mudanças importantes para o Código relacionadas à publicação de nomes**

A segunda mudança para o *Código*, aprovada em Melbourne, que entrará em vigor a partir de 1° de janeiro de 2012 é que a descrição ou diagnose, requerida para publicação válida de um nome de um novo táxon de todos os organismos, sob este *Código*, pode ser em inglês ou em latim. Esta é uma provisão corrente para nomes de plantas fósseis, porém todos os táxons novos não-fósseis requeriam uma diagnose ou descrição em latim (fungos e plantas desde 1° de janeiro de 1935; algas [incluindo cianobactérias, se tratadas sob este *Código*] desde 1° de janeiro de 1958). Isto não se refere à forma de nomes científicos, que continuam sendo em latim ou tratados em latim. Os requisitos de cada periódico para latim e/ou inglês, deverão, claro, ser determinados pelos editores desses periódicos.

A terceira mudança para o *Código* aprovada em Melbourne está relacionada à publicação de nomes, porém não terá efeito até 1° de janeiro de 2013 (não em 1° de janeiro de 2012 como relatado por Miller et al. 2011), é que todos os nomes novos de organismos tratados como fungos devem, como um requisito adicional para publicação válida, incluir no protólogo (tudo associado com o nome na sua publicação válida) a citação de um número identificador de um repositório reconhecido (p.e., MycoBank [<http://www.mycobank.org/>]). Isto será divulgado à parte.

O requisito para um único identificador para nomes novos de fungos em ou a partir de 1° de janeiro de 2013 *não* se aplica a plantas ou algas; não há necessidade que autores de nomes novos nesses grupos requeram "Life Science Identifiers" (LSIDs) – ou outros identificadores – de centros indexadores.

### **Agradecimentos**

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Para encorajar a disseminação das mudanças feitas no *Código Internacional de Nomenclatura para algas, fungos e plantas*, este artigo será publicado na *BMC Evolutionary*

*Biology, Botanical Journal of the Linnean Society, Brittonia, Cladistics, MycoKeys, Myco-taxon, New Phytologist, North American Fungi, Novon, Opuscula Philolichenum, PhytoKeys, Phytoneuron, Phytotaxa, Plant Diversity and Resources, Systematic Botany e Taxon.*

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# Translation into Russian of: “Changes to publication requirements made at the XVIII International Botanical Congress in Melbourne – what does e-publication mean for you?” Translated by Irina V. Belyaeva and Maria S. Vorontsova

## Изменения требований к обнародованию, принятые на XVIII Международном Ботаническом Конгрессе в Мельбурне – что означает электронное обнародование?

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### Резюме

Решения по изменениям *Международного Кодекса Ботанической Номенклатуры* принимаются каждые 6 лет на заседании Номенклатурной Секции Международного Ботанического Конгресса (МБК). XVIII МБК состоялся в Мельбурне, Австралия; Номенклатурная Секция заседала 18–22 июля 2011 г., и ее решения были утверждены Конгрессом на пленарном заседании 30 июля. В ходе этого заседания было сделано несколько важных изменений в *Кодексе*, которые затрагивают обнародо-

вание новых названий. Два из этих изменений вступят в действие с 1 января 2012 г., несколькими месяцами раньше, чем *Мельбурнский Кодекс* будет опубликован. Электронные материалы, опубликованные онлайн в формате PDF (Portable Document Format) с Международным Стандартным Серийным Номером ISSN (International Standard Serial Number) или с Международным Стандартным Книжным Номером ISBN (International Standard Book Number) будут считаться эффективно обнародованными, а требование наличия латинского описания или диагноза при обнародовании новых названий будет заменено требованием наличия описания на латинском или английском языке. В дополнение к этому, чтобы быть эффективно и действительно обнародованными, с 1 января 2013 г. новые названия организмов, считающихся грибами, должны цитировать в протологе (все, что связано с названием при его действительной публикации) идентификационный номер (идентификатор), присвоенный признанным банком данных (например, MycoBank). Приводятся предварительные тексты новых статей *Кодекса*, касающихся электронной публикации и предложены наилучшие пути их практического применения.

С тем, чтобы ускорить распространение информации об изменениях, сделанных в *Международном Кодексе Номенклатуры водорослей, грибов и растений*, эта статья будет напечатана в журналах: *BMC Evolutionary Biology*, *Botanical Journal of the Linnean Society*, *Brittonia*, *Cladistics*, *MycKeys*, *Mycotaxon*, *New Phytologist*, *North American Fungi*, *Novon*, *Opuscula Philolichenum*, *PhytoKeys*, *Phytoneuron*, *Phytotaxa*, *Plant Diversity and Resources*, *Systematic Botany* и *Taxon*.

## Введение

На XVIII Международном Ботаническом Конгрессе в Мельбурне, Австралии, в июле 2011 года, были сделаны два важных изменения в *Международном Кодексе Ботанической Номенклатуры* (теперь – *Международный Кодекс Номенклатуры водорослей, грибов и растений*), которые начнут действовать с 1 января 2012 г.. Эти изменения будут касаться всех, кто публикует названия соответственно этому *Кодексу*. Поскольку *Кодекс*, принятый в Мельбурне, не будет опубликован примерно до середины 2012 г., мы полагаем, что было бы полезно описать эти изменения, в частности те, которые касаются эффективной публикации с помощью электронных средств массовой информации (в статьях 29, 30 и 31). Краткий отчет обо всех изменениях, принятых в Мельбурне, см. в McNeill et al. (2011).

Предварительные тексты измененных Статей, Примечаний и Советов *Кодекса* об эффективном обнародовании приведены с тем, чтобы помочь редакторам и издателям разработать наилучшие пути применения *Кодекса* в этом аспекте. Мы также разъясняем здесь, *что* эти изменения *не* означают, чтобы помочь тем, кто хочет обнародовать новые названия и типификации в электронном виде. Мы настоятельно советуем читателям сверяться с отчетом Специального Комитета по Электронным Публикациям (Charman et al. 2010), где объясняются причины изменений, предложенных перед Конгрессом, и принятых теперь в *Кодексе*.

## **Предварительный текст измененных Статей 29, 30 и 31 и Советов 29А, 30А и 31А**

Здесь мы приводим текст всех относящихся к случаю Статей, Примечаний и Советов (пропуская Примеры) с изменениями, выделенными **жирным шрифтом**. Предложенный текст – предварительный, в ожидании заседания Редакционного Комитета в декабре 2011 г. и утверждения копии для печати *Мельбурнского Кодекса*.

### **Статья 29**

29.1. Эффективное обнародование осуществляется, согласно настоящему *Кодексу*, через распространение печатного материала (посредством продажи, обмена или дарения) среди широкой публики или, по крайней мере, в ботанические учреждения с доступными для ботаников библиотеками. **Эффективное обнародование осуществляется также посредством распространения материала в электронном виде в формате PDF (см. также Ст. 29.3 и Сов. 29А.1), опубликованном онлайн с Международным Стандартным Серийным Номером (ISSN) или с Международным Стандартным Книжным Номером (ISBN).** Эффективное обнародование не производится путем сообщения новых названий на публичных заседаниях, указанием названий в открытых для публики коллекциях или садах, путем выпуска микрофильмов, сделанных с рукописей, машинописных текстов или других неопубликованных материалов, а также распространением названий на электронных носителях **иным путем, чем описано выше.**

29.2. Для целей этой статьи, термин «онлайн» определен как электронно доступный через Международную Мировую Сеть - Интернет (World Wide Web).

29.3. В случае изменения формата PDF принимается последующий международный стандартный формат, сообщенный Генеральным Комитетом (см. Разд. III).

29.4. Содержание конкретной электронной публикации не должно исправляться после того, как она была впервые обнародована. Любые поправки не являются эффективно обнародованными. Для эффективного обнародования исправления или изменения должны быть опубликованы отдельно.

## Совет 29А

[Существующий Совет заменен следующим:]

**29А.1.** Электронная публикация в формате PDF должна быть совместима со стандартом для архивирования PDF/A (ISO 19005).

**29А.2.** Авторы должны отдавать предпочтение обнародованию в публикациях, которые архивируются соответственно следующим критериям настолько, насколько возможно (см. также Сов. 29А.1):

(a) Материал должен быть размещен в нескольких заслуживающих доверия электронных онлайн-банках данных, например, ISO-сертифицированный репозиторий;

(b) Цифровые банки информации должны быть размещены в более чем одном регионе и, предпочтительно, на разных континентах;

(c) Также рекомендуется рассылка печатных копий в библиотеки в более чем один регион мира и, предпочтительно, на разные континенты.

## Статья 30

**30.1.** Обнародование, осуществляемое посредством распространения электронных материалов до 1 января 2012 г., не является эффективным.

**30.2.** Обнародование не является эффективным, если существуют факты, связанные с публикацией или содержанием публикации, свидетельствующие тому, что эта публикация является только предварительной версией, которая была или будет заменена версией, которую издатель считает окончательной; в этом случае только окончательная версия является эффективно обнародованной.

**30.3.** Обнародование до 1 января 1953 г. посредством несмываемой автографии является эффективным. Несмываемая автография, произведенная позднее этой даты не является эффективно обнародованной.

**30.4.** Применительно к настоящей статье, несмываемой автографией является рукописный материал, воспроизведенный каким-либо механическим или графическим способом (таким как литография, офсет или гравирование на металле).

**30.5.** Начиная с 1 января 1953 г., обнародование в торговых каталогах или в ненаучных информационных изданиях, а с 1 января 1973 г. и в обменных списках семян, не является эффективным обнародованием.

**30.6.** Начиная с 1 января 1953 г., распространение печатного материала, сопровождающего эксикаты (*exsiccatae*), не является эффективным обнародованием.



*Примечание 1.* Если печатный материал распространяется также и отдельно от эксикат, это является эффективным обнародованием.

30.7. Начиная с 1 января 1953 г., публикация отдельной несериальной работы с указанием, что она является диссертацией, представленной университету или другому образовательному учреждению с целью получения ученой степени, не является эффективным обнародованием, если в самой работе не содержится ясного указания (со ссылкой на требования *Кодекса* к эффективному обнародованию) или другого внутреннего (содержащегося в самой работе – *Прим. пер.*) свидетельства, что эта публикация предназначена для эффективного обнародования ее автором или издателем.

*Примечание 2.* Наличие ISBN (International Standard Book Number) или указание названия типографии, издательства или распространителя в оригинальной печатной версии рассматривается как внутреннее свидетельство того, что работа была предназначена для эффективного обнародования.

## Совет 30А

**30А.1. Предварительная и окончательная версии той же самой электронной публикации должны быть ясно обозначены как таковые при их первом издании.**

30А.2. Авторам настоятельно рекомендуется избегать обнародования новых названий и описаний или диагнозов новых таксонов (номенклатурных новаций) в недолговечных печатных материалах любого рода, в частности, в таких, которые воспроизводятся в ограниченном и неопределенном количестве, в которых долговечность текста может быть ограниченной, для которых эффективное обнародование, исходя из количества экземпляров, не является очевидным, или в таких материалах, которые, скорее всего, не дойдут до широкой публики. Авторы должны также избегать обнародования новых названий и описаний или диагнозов в популярной периодике, реферативных журналах или в списках исправлений, прилагаемых к изданиям.

30А.3. Для того, чтобы обеспечить доступность во времени и пространстве, авторы, обнародующие номенклатурные новации, должны отдавать предпочтение периодическим изданиям, которые регулярно публикуют таксономические статьи. **В противном случае, копия публикации (опубликованной в печатном или электронном варианте) должна быть послана в центр индексации по соответствующей таксономической группе, а публикации, существующие только в печатном варианте,** должны быть помещены, по крайней мере, в десять, но предпочтительно большее число ботанических или других общедоступных библиотек во всем мире.

30А.4. Авторам и редакторам рекомендуется сообщать о номенклатурных новациях в резюме, реферате или перечислять их в указателе публикации.

## Статья 31

31.1. Датой эффективного обнародования является дата, в которую печатный или **электронный** материал стал доступным, как определено в Ст. 29 и 30. При отсутствии доказательств, устанавливающих какую-либо другую дату, правильной следует считать дату, указанную на печатной или **электронной** копии.

[Существующее Примечание 1 заменено следующим:]

**31.2. Если обнародование осуществлено параллельным выпуском электронной и печатной версий, это является эффективным обнародованием с одной и той же датой, если даты на копиях не разные, соответственно Ст. 31.1.**

31.3. Если отдельные оттиски из периодических изданий или других работ, поступающих в продажу, выпускаются раньше этих публикаций, то дата оттиска принимается как дата эффективного обнародования, если нет доказательств, что она ошибочна.

## Совет 31A

31A.1. За дату эффективного обнародования печатного произведения следует принимать ту дату, в которую издатель или его представитель выпускает это произведение в свет одним из обычных способов.

## Рекомендации

Авторы новых названий, редакторы и издатели будут заинтересованы в обеспечении того, чтобы публикации, включающие новые названия, соответствовали *Мельбурнскому Кодексу* и чтобы названия в них были эффективно обнародованы. Мы предлагаем авторам публикаций в журналах или серийных монографиях и книгах, издаваемых онлайн, обмениваться информацией с редакторами, чтобы, как можно быстрее, внедрить лучшие методы в научном сообществе. В течение некоторого времени многие издатели внимательно адресовали проблемы, связанные с электронной публикацией новаций (см. Knapp and Wright 2010; руководство в PLoS One [<http://www.plosone.org/static/policies.action#taxon>]), и значительный интерес к внедрению этих изменений в *Кодекс* был очевидным.

Некоторые рекомендации, которые, мы надеемся, смогут помочь на начальной стадии электронной публикации новаций соответственно *Мельбурнскому Кодексу* приведены ниже:

- Рекомендуется выделять в каждой статье даты публикации (как это сделано в большинстве журналов, например, *New Phytologist* или *Nature*).

- Если более ранний выпуск онлайн-версии не является таким же, как окончательная версия (и поэтому не является эффективно обнародованным), рекомендуется отметить этот факт штампом (пример - *American Journal of Botany*).
- Включение и выделение ISSN или ISBN публикации в каждой статье поможет регистрирующему персоналу установить, эффективна ли публикация.
- Публикации в журналах (или серийных монографиях), участвующих в системе CLOCKSS (см. описание Knapp and Wright 2010) или в других международных архивах и системах хранения данных, обеспечат долгосрочное хранение.
- Авторы электронно обнародуемых новых названий должны уведомлять соответствующие центры индексации, как рекомендовано в Сов.30.A.3 – это поможет регистрирующему персоналу, который, иначе, может не знать об электронно обнародованных названиях.

### **Что эти изменения не означают**

Не смотря на то, что новые Статьи и Рекомендации *Кодекса* используют термины PDF и PDF/A, это не означает, что публикации должны быть изданы *только* в этом формате с тем, чтобы быть эффективно опубликованными. Например, некоторые онлайн-журналы издаются параллельно в формате HTML (Hypertext Markup Language) вместе с PDF версией. В таких случаях PDF версия будет эффективно опубликована. Соглашение о том, что Генеральный Комитет по Ботанической Номенклатуре будет сообщать о новом приемлемом международном стандартном формате, в случае, если PDF будет заменен, означает, что авторы новаций и научная общественность, использующие *Кодекс*, будут информированы о новшествах в этой области, и *Кодекс* будет защищен от устаревания.

Новации, опубликованные ниже перечисленными способами *не* будут эффективно обнародованы согласно *Мельбурнскому Кодексу*:

- Публикации на веб-сайтах или в недолговечных документах, доступных в Интернет (существуют строгие критерии получения ISSN [<http://www.issn.org>]).
- Публикации в журналах без зарегистрированного ISSN или e-ISSN.
- Публикации в книгах без зарегистрированного ISBN или e-ISBN.

Совет о том, что печатную копию каждой электронной публикации следует помещать в библиотеку рекомендует ботаникам, как поступать, но не устанавливает стандарты или протокол действий для сотрудников библиотек. Библиотекари находятся в сложном переходном состоянии между разными методами публикации (Johnson and Luther 2007), и, в случае большого объема присылаемого материала, ботаники могут оказаться в ситуации, когда работники библиотек откажутся принять печатные оттиски отдельных статей.

## Два других важных изменения в Кодексе, относящихся к обнародованию названий

Второе изменение в *Кодексе*, утвержденное в Мельбурне и вступающее в действие с 1 января 2012 г. гласит, что описание или диагноз, требуемые для действительного обнародования названия нового таксона для всех организмов, попадающих под действие *Кодекса*, могут быть опубликованы на любом из двух языков, английском, либо латинском. В настоящее время это положение действует для ископаемых растений, но для всех неископаемых таксонов требуются латинские описание или диагноз (грибы и растения с 1 января 1958; водоросли [включая цианобактерии, попадающие под действие *Кодекса*] с 1 января 1958 г.). Это не относится к форме научных названий, которые остаются латинскими или принимаются как латинские. Требования отдельных журналов относительно латинского или английского языков, будет определяться, конечно же, редакторами этих журналов.

Третье изменение в *Кодексе*, утвержденное в Мельбурне и относящееся к обнародованию названий, но не вступающее в действие до 1 января 2013 г. (а не 1 января 2012 г. как ошибочно отмечено Миллером и др. (Miller et al. 2011)) гласит, что для всех новых названий организмов, понимаемых как грибы, в качестве дополнительного требования для действительного обнародования необходимо цитировать в протологе (все, что связано с названием и его действительным обнародованием) идентификационный номер, выданный международно признанным банком данных (таким, как MycoBank [<http://www.mycobank.org/>]). Об этом пойдет речь в отдельной публикации.

Требование наличия уникального идентификатора для новых названий грибов, начиная с 1 января 2013 г., не касается растений и водорослей; авторам новых названий для этих групп не нужно запрашивать LSIDs (Life Science Identifiers) или другие идентификаторы в центрах по индексации.

## Благодарности\*

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С тем, чтобы ускорить распространение информации об изменениях, сделанных в *Международном Кодексе Номенклатуры водорослей, грибов и растений*, эта статья будет напечатана в журналах: *BMC Evolutionary Biology*, *Botanical Journal of the*

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\* И. Беяева и М. Воронцова благодарят Bentham-Moxton Trust за финансовую поддержку их участия в XVIII МБК в Мельбурне.

*Linnean Society, Brittonia, Cladistics, MycoKeys, Mycotaxon, New Phytologist, North American Fungi, Novon, Opuscula Philolichenum, PhytoKeys, Phytoneuron, Phytotaxa, Plant Diversity and Resources, Systematic Botany* и *Taxon*.

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# Translation into Spanish of: “Changes to publication requirements made at the XVIII International Botanical Congress in Melbourne – what does e-publication mean for you?”. Translated by Carmen Ulloa Ulloa, Lourdes Rico Arce, and Renée H. Fortunato

## Cambios a los requisitos para publicar realizados en el XVIII Congreso Internacional de Botánica en Melbourne – ¿qué significado tiene la publicación electrónica para usted?

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### Resumen

Los cambios al *Código Internacional de Nomenclatura Botánica* se deciden cada seis años en las Secciones de Nomenclatura asociadas a los Congresos Internacionales de Botánica. El XVIII Congreso Internacional de Botánica se llevó a cabo en Melbourne, Australia; la Sección de Nomenclatura se efectuó desde el 18 al 22 de julio de 2011 y sus decisiones fueron aceptadas por el Congreso en la asamblea plenaria del 30 de julio. Como resultado de esta reunión se hicieron varios cambios importantes al *Código* que afectarán la publicación de nuevos nombres. Dos de estos cambios entrarán en vigencia a partir del 1 de enero de 2012, meses antes de la edición del *Código de Melbourne*. El material electrónico publicado en línea en Formato de

Documento Portátil (PDF) con un Número Internacional Normalizado de Publicaciones Seriadas (ISSN) o con un Número Internacional Normalizado de Libro (ISBN) constituirá una publicación efectiva; y el requisito para una descripción o diagnosis en latín para los nombres de nuevos taxones será cambiado a un requisito de una descripción o diagnosis en los idiomas latín o inglés. Asimismo, a partir del 1 de enero de 2013, los nuevos nombres de organismos tratados como hongos, para ser publicados en forma válida, deberán incluir en el protólogo (todo lo asociado con el nombre en su publicación válida) la cita de un identificador provisto por un repositorio reconocido (como MycoBank). Se presenta un texto borrador de los nuevos artículos que tratan con publicación electrónica y se provee las mejores prácticas descritas.

Para incentivar la difusión de los cambios realizados en el *Código Internacional de Nomenclatura para algas, hongos y plantas*, este artículo se publicará en: *BMC Evolutionary Biology*, *Botanical Journal of the Linnean Society*, *Brittonia*, *Cladistics*, *MycKeys*, *Mycotaxon*, *New Phytologist*, *North American Fungi*, *Novon*, *Opuscula Philolichenum*, *PhytoKeys*, *Phytoneuron*, *Phytotaxa*, *Plant Diversity and Resources*, *Systematic Botany* y *Taxon*.

## Introducción

En julio de 2011, durante el XVIII Congreso Internacional de Botánica en Melbourne, Australia, se hicieron dos cambios importantes en el *Código Internacional de Nomenclatura Botánica* (ahora llamado el *Código Internacional de Nomenclatura para algas, hongos y plantas*) que entrarán en vigencia a partir del 1 de enero de 2012. Estos cambios afectarán a todos los autores que publican nombres regidos por este *Código*. Como el *Código de Melbourne* no será editado hasta aproximadamente mediados del 2012, se ha pensado que sería útil actualizar estos cambios, particularmente aquellos relacionados a la publicación efectiva por medios electrónicos (artículos 29, 30 y 31). Para un informe conciso de todos los cambios al *Código* aceptados en Melbourne, ver McNeill et al. (2011).

Un borrador revisado del texto de los Artículos, Notas y Recomendaciones sobre publicación efectiva se proporciona a los editores y comités editoriales como ayuda en el establecimiento de las mejores prácticas descritas para la aplicación del *Código*. También se describe lo que estos cambios *no* significan, a fin de orientar a aquellos que deseen publicar nuevos nombres y tipificaciones por medios electrónicos. Se solicita a los lectores consultar el informe del Comité Especial sobre Publicación Electrónica que acompaña los cambios propuestos previamente al XVIII Congreso (Chapman et al. 2010); en ellos se expone el razonamiento para los cambios ahora aceptados en el *Código*.

## **Borrador revisado del texto de los Artículos 29, 30 y 31 y Recomendaciones 29A, 30A, y 31A**

Se reproduce el texto de todos los Artículos, Notas y Recomendaciones pertinentes (omitiendo los ejemplos), con los cambios resaltados en **negritas**. El presente texto



es provisional, en espera de la reunión del Comité Editorial para finalizar la versión impresa del *Código de Melbourne* en diciembre del 2011.

## Artículo 29

29.1. De acuerdo con este *Código*, una publicación se hace efectiva por distribución de material impreso (por venta, intercambio o donación) al público o, al menos, a instituciones botánicas con bibliotecas accesibles generalmente a botánicos. **La publicación es también efectiva por la distribución electrónica de material en Formato de Documento Portátil (siglas en inglés PDF; véase también Art. 29.3 y Rec. 29A.1) en una publicación en línea con un Número Internacional Normalizado de Publicaciones Seriadas (siglas en inglés ISSN) o un Número Internacional Normalizado de Libro (siglas en inglés ISBN).** Una publicación no se hace efectiva en comunicaciones de nombres nuevos durante reuniones públicas, al colocar los nombres en colecciones o jardines abiertos al público, en la edición de microfilmes confeccionados a partir de manuscritos u originales mecanografiados o en otro material no publicado, o en otra distribución electrónica que no sea como la anteriormente descrita.

29.2. A efectos de este Artículo, "en línea" se define como accesible electrónicamente a través de la Red Informática Mundial o "World Wide Web".

29.3. En el caso de tener un reemplazo del Formato de Documento Portátil (PDF), el formato estándar internacional sucesor será comunicado por el Comité General (véase Div. III).

29.4. El contenido de una publicación electrónica en particular no deberá ser modificada después de ser emitido por primera vez. Tales alteraciones no son efectivamente publicadas. Las correcciones o revisiones deberán ser expedidas por separado para ser efectivamente publicadas.

## Recomendación 29A

[La Recomendación actual se reemplaza por lo siguiente:]

29A.1. La publicación electrónica en Formato de Documento Portátil (PDF) debe cumplir con el estándar de archivo PDF/A (ISO 19005).

29A.2. Los autores deberían preferiblemente publicar en publicaciones que se archiven, satisfaciendo en la medida de lo posible los siguientes criterios (véase también Rec. 29A.1):

(a) El material debe colocarse en varios repositorios de confianza digitales en línea, ej. un repositorio con certificación ISO;

(b) Los repositorios digitales deben ser en más de un área del mundo y preferiblemente en diferentes continentes;

**(c) También es recomendable depositar copias impresas en bibliotecas en más de un área del mundo y preferiblemente en diferentes continentes.**

## Artículo 30

**30.1. La distribución de una publicación por medio de material electrónico no constituye una publicación efectiva antes del 1 de enero de 2012.**

**30.2. Una publicación electrónica no se hace efectiva si hay pruebas asociadas con o dentro de la publicación que indiquen que es simplemente una versión preliminar que fue, o que será, reemplazada por una versión que el editor considere final, en cuyo caso sólo esa versión final es publicada en forma efectiva.**

30.3. La publicación con autografía indeleble es considerada efectiva, antes del 1 de enero de 1953. La autografía indeleble producida en una fecha posterior no se considera una publicación efectiva.

30.4. A efectos de este Artículo, la autografía indeleble es el material escrito a mano reproducido por algún proceso mecánico o gráfico (como litografía, offset o grabado metálico).

30.5. La publicación, desde o después del 1 de enero de 1953, en catálogos comerciales o periódicos no científicos, y desde o después el 1 de enero de 1973 en listas de intercambio de semillas, no constituye una publicación efectiva.

30.6. La distribución desde o después del 1 de enero de 1953 de material impreso acompañando ejemplares de herbario (exsiccatae) no constituye una publicación efectiva.

*Nota 1.* Si el material impreso es también distribuido independientemente de los ejemplares de herbario (exsiccatae), sí está efectivamente publicado.

30.7. La publicación desde o después del 1 de enero de 1953, de una obra que no forma parte de una serie y que dice ser una tesis presentada a una universidad u otro instituto de educación con el fin de obtener un título, no es efectivamente publicada a menos que incluya una declaración explícita (refiriéndose a los requisitos del *Código* para su publicación efectiva) u otra evidencia interna que sea considerada como una publicación efectiva por su autor o editor.

*Nota 2.* La presencia de un Número Internacional Normalizado de Libro (ISBN) o una declaración del nombre de la imprenta, editor o distribuidor en la versión impresa original es considerada como evidencia interna que el trabajo tenía la intención de ser publicado en forma efectiva.

## Recomendación 30A

**30A.1. Versiones preliminares y finales de la misma publicación electrónica deben indicarse claramente como tal cuando se emiten por primera vez.**

30A.2. Se recomienda enfáticamente que los autores eviten la publicación de nuevos nombres y descripciones o diagnosis de nuevos taxones (novedades nomenclaturales) en material impreso efímero de cualquier tipo, en particular material impreso que se publica en tiradas cortas e inciertas, donde la permanencia del texto puede ser limitada, para el que la publicación efectiva por lo que se refiere al número de copias no es evidente, o que es improbable que llegue al público en general. Los autores también deberían evitar la publicación de nuevos nombres y descripciones o diagnosis en revistas populares, en revistas o publicaciones de resúmenes, o en etiquetas de corrección.

30A.3. Para facilitar la disponibilidad a través de tiempo y lugar, los autores que publican novedades nomenclaturales deben dar preferencia a revistas periódicas que publican regularmente artículos taxonómicos. **De lo contrario, una copia de una publicación (ya sea impresa o electrónica) debe ser enviada a un centro de indexación apropiado para el grupo taxonómico, y las publicaciones que sólo existen como material impreso** deben ser depositadas en al menos diez, aunque preferiblemente más, bibliotecas botánicas u otras que estén generalmente accesibles en todo el mundo.

30A.4. Se recomienda a los autores y editores que mencionen las novedades nomenclaturales en el sumario o resumen, o que las inserten en un índice en la publicación.

## Artículo 31

31.1. La fecha de publicación efectiva es la fecha en que el material impreso o **electrónico** comenzó a estar disponible, tal como se define en los Arts. 29 y 30. En ausencia de prueba que establezca otra fecha, debe aceptarse como correcta la que aparece en el material impreso o **electrónico**.

[Nota 1 existente se sustituirá por lo siguiente:]

31.2. **Cuando una publicación se emite en versiones paralelas electrónica e impresa, estas deben tratarse como publicadas en forma efectiva en la misma fecha, a menos que las fechas de las versiones sean diferentes de acuerdo con el Art. 31.1.**

31.3. Cuando separatas de revistas periódicas, o de otras obras a la venta se distribuyen por adelantado, la fecha de las separatas se acepta como la fecha de publicación efectiva, a menos que haya evidencias de que sea errónea.

## Recomendación 31A

31A.1. La fecha en la cual el editor o su agente entrega el material impreso a uno de los correos usuales para su distribución al público debería aceptarse como la fecha de publicación efectiva.

## Mejores prácticas

Los autores de nuevos nombres, los editores y las editoriales estarán interesados en garantizar que las publicaciones que incluyen nuevos nombres estén en conformidad con el *Código de Melbourne*, para que los nombres en ellos incluidos sean efectivamente publicados. Se sugiere que aquellos que publiquen en revistas periódicas o series monográficas y libros que tienen ediciones en línea se comuniquen con los editores de manera que las normas prácticas se puedan establecer en toda la comunidad lo antes posible. Varios editores ya han estado abordando cuidadosamente los temas relacionados con la publicación electrónica de novedades (véase Knapp and Wright 2010; normas para autores en PLoS One [<http://www.plosone.org/static/policies.action#taxon>]) y ha sido evidente el considerable interés en hacer que los cambios al *Código* funcionen efectivamente.

Algunas prácticas que consideramos ayudarán en las etapas iniciales de la publicación electrónica de novedades de acuerdo con el *Código de Melbourne* son:

- Que en cada artículo figure destacada la fecha de publicación (como se hace en muchas revistas, por ejemplo, *New Phytologist* o *Nature*).
- Si se emite una versión en línea que no es la misma que la versión final (y por lo tanto no da lugar a una publicación efectiva) sellar cada artículo con este hecho en forma destacada (véase por ejemplo, *American Journal of Botany*).
- La visualización prominente del ISSN o ISBN de la publicación de cada artículo ayudará a los indizadores a establecer si el artículo está efectivamente publicado o si no lo está.
- La publicación en revistas (o series monográficas) que participan en el sistema CLOCKSS (véase Knapp and Wright 2010, para obtener una descripción) o de otro sistema internacional de archivo y sistema de conservación garantizará el archivo a largo plazo.
- Autores de nuevos nombres por medios electrónicos deben notificar al centro de indexación adecuado como se recomienda en la Rec 30A.3; esto ayudará a los indizadores, quienes de lo contrario, podrían no darse cuenta de los nombres publicados electrónicamente.

## Lo que estos cambios no significan

Aunque los nuevos Artículos y Recomendaciones utilicen los términos PDF y PDF/A, esto no significa que las publicaciones deben ser emitidas *sólo* en ese formato para ser efectivamente publicadas. Por ejemplo, algunas revistas en línea emiten documentos en formato de Lenguaje de Marcado de Hipertexto (siglas en inglés HTML) junto con una versión paralela de PDF. En tales casos, la versión PDF será la publicada de manera efectiva. La cláusula de que el Comité General de Nomenclatura Botánica comunicará la aceptación de un nuevo formato estándar internacional, en caso de que el PDF sea reemplazado, significa que los autores de novedades y la comunidad que usa el *Código*

puedan permanecer informados sobre avances en el área y que el *Código* sea protegido de quedar obsoleto.

De acuerdo al *Código de Melbourne* el uso de los siguientes medios de publicación electrónica no resultará en una publicación efectiva de novedades.

- Publicación en sitios Web o en documentos efímeros disponibles en Internet (hay criterios estrictos para la concesión de un ISSN [<http://www.issn.org>]).
- Publicación en revistas sin un ISSN o e-ISSN registrado.
- Publicación en libros sin un ISBN o e-ISBN registrado.

La Recomendación aprobada para aconsejar que se deposite una copia impresa de cualquier publicación electrónica en una biblioteca sugiere que los botánicos tomen una acción, pero no establece una práctica estándar o un protocolo a seguir por los bibliotecarios. Los bibliotecarios, están en una etapa de transición compleja entre las modalidades de publicación (Johnson and Luther 2007), por lo cual los botánicos pueden encontrar que los bibliotecarios no quieren o no puedan acomodar una sola copia de documentos impresos como ficheros individuales si el volumen es muy grande.

## Otros dos cambios importantes en el *Código* relativos a la publicación de nombres

El segundo cambio en el *Código* aprobado en Melbourne que entrará en vigencia a partir del 1 de enero de 2012 es que la descripción o la diagnosis requerida para la publicación válida de un nombre de un taxón nuevo, de cualquiera de los organismos comprendidos en el *Código*, puede ser en idioma inglés o latín. Esta es la disposición que actualmente aplica para los nombres de plantas fósiles, mientras que todos los taxones nuevos que no son fósiles han requerido una descripción o diagnosis en latín (hongos y plantas desde el 1 de enero de 1935; algas [incluyendo cianobacterias, también tratadas bajo el *Código*] desde el 1 de enero de 1958). Esto no tiene ninguna relación para los nombres científicos, que siguen siendo en latín o tratados como latín. Los requisitos individuales de las revistas periódicas de latín y/o inglés serán determinados, por supuesto, por los editores de las mismas.

Un tercer cambio al *Código* aprobado en Melbourne relativo a la publicación de los nombres, pero que no tomará efecto hasta el 1 de enero de 2013 (no a partir del 1 de enero de 2012 como fue registrado según Miller et al. 2011), es en el cual todos los nuevos nombres de organismos tratados como hongos tendrán, como un requisito adicional para que la publicación sea válida, que incluir en el protólogo (todo lo asociado con un nombre en su publicación válida) la cita de un identificador emitido por un repositorio reconocido (como MycoBank [<http://www.mycobank.org/>]). Este tema será publicitado por separado.

El requisito de un identificador único para nuevos nombres de hongos desde o después del 1 de enero de 2013 *no* se aplica a plantas o algas; no hay necesidad para autores de nuevos nombres en estos grupos solicitar LSIDs (siglas en inglés de *Life*

*Science Identifiers*, Identificadores de Ciencias de la Vida), u otros identificadores de centros de indexación.

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Para incentivar la difusión de los cambios realizados en el *Código Internacional de Nomenclatura para algas, hongos y plantas*, este artículo se publicará en: *BMC Evolutionary Biology*, *Botanical Journal of the Linnean Society*, *Brittonia*, *Cladistics*, *MycKeys*, *Mycotaxon*, *New Phytologist*, *North American Fungi*, *Novon*, *Opuscula Philolichenum*, *PhytoKeys*, *Phytoneuron*, *Phytotaxa*, *Plant Diversity and Resources*, *Systematic Botany* y *Taxon*.

Nota de traducción: texto en español del *Código* adaptado de Kiesling 2002.

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# *Spigelia genuflexa* (Loganiaceae), a new geocarpic species from the Atlantic forest of northeastern Bahia, Brazil

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## Abstract

A new species of *Spigelia* L. (Loganiaceae), *S. genuflexa* Popovkin & Struwe, **sp. n.**, from the Atlantic forest of northeastern Bahia, Brazil, is described, being the first reported geocarpic species in the family. During fruit maturation, the basal infructescences bend down towards the ground, depositing the fruit on the surface (and burying it in soft kinds of ground cover, e.g., moss), whereas the upper ones do so slightly but noticeably. The species is a short-lived annual apparently restricted to sandy-soil habitat of the Atlantic forest of northeastern Bahia, with variable and heterogeneous microenvironment and is known from only two restricted localities. A short review of amphi- and geocarpic species is provided. A discussion of comparative morphology within *Spigelia* with regards to dwarfism, indumentum, and annual habit is included. A phylogenetic parsimony and Bayesian analysis of ITS sequences from 15 *Spigelia* species plus 17 outgroups in Loganiaceae confirms its independent taxonomic status: on the basis of sequence similarity and phylogenetic topology it is phylogenetically distinct from all *Spigelia* species sequenced so far.

## Resumo

Uma nova espécie de *Spigelia* L. (Loganiaceae), *S. genuflexa* Popovkin & Struwe, **sp. n.**, da Mata Atlântica do litoral norte da Bahia, Brasil, é descrita, sendo o primeiro registro de espécie geocárpica na família. Durante a maturação do fruto, as inflorescências basais inclinam-se em direção ao solo, depositando os frutos sobre a superfície (ou mesmo enterrando os frutos sob a cobertura não compactada, e.g. musgos),

enquanto as superiores inclinam-se apenas ligeiramente, mas de forma bem perceptível. A espécie é anual, aparentemente restrita à habitat sobre solo arenoso da Mata Atlântica do litoral norte da Bahia, com microambiente variável e heterogêneo, e é conhecida por apenas duas localidades. Uma breve revisão de espécies amfi- ou geocárpicas é apresentada. Também é feita uma discussão comparativa da morfologia em *Spigelia*, principalmente com relação à nanismo, indumento e hábito anual. Uma análise filogenética de parcimônia baseada em sequências de ITS de 15 espécies de *Spigelia* e de outras 17 espécies em Loganiaceae como grupo externo confirma o status taxonômico independente da nova espécie: a similaridade da sequência e a topologia da árvore filogenética demonstram que ela é filogeneticamente distinta de todas as outras espécies de *Spigelia* sequenciadas até agora.

### Keywords

Dwarfism, evolution, geocarpy, ITS, Loganiaceae, Neotropics, phylogeny, Spigeliaeae

### Introduction

*Spigelia* L. is a genus of approximately 60 species of Neotropical herbs to shrubs (Zappi 2005). It is distributed from temperate South America (about the latitude of Buenos Aires, Argentina) northward into the tropics of South America, to Central America, Mexico and the Caribbean, and into the warm-temperate southern United States. *Spigelia* species inhabit mid-elevation to lowland areas, with at least 60% of the species found in South America. Forty-three species are distributed in Brazil, including 15 in the state of Bahia, nine of which inhabit the Atlantic forest biome ("Mata Atlântica," Zappi et al. 2010) where the new species is found. There are also centers of diversity in the grassland regions of southern Paraguay and adjacent northeastern Argentina, as well as in the Mexican central highlands and wet lowland tropics of Mexico and Central America. Although most species are geographically restricted, several are widespread from North to South America, including *S. anthelmia* L., *S. humboldtiana* Cham. & Schltdl., and *S. hamellioides* Kunth, with *Spigelia anthelmia* also naturalized in Africa and Malaysia.

Morphologically, *Spigelia* species can be recognized by their opposite or whorled leaves, one-sided cymose inflorescences, often brightly colored pentamerous flowers with usually funnelform or tubular corollas, articulated styles, and strongly bilobed capsules with persistent style and fruit bases.

The new species was discovered by José Carlos Mendes Santos (a.k.a. Louro), the house help and fellow plant collector of the first author, when squatting near the latter's house. The tiny plant of no more than 3 cm in height would have been otherwise easily missed. A colony of half-dozen plants, within 5 square meters, was initially discovered. Two more colonies in the same restricted area were eventually uncovered. The habitat is an open-soil roadside, partially covered by leaf litter, at the border of a *tabuleiro* forest in the Atlantic forest biome of northeastern Bahia, Brazil. The species has been observed for a period of over two years, during weekly visits. This is an ephemeral rainy-season species, with plants almost completely disappearing in the dry season. While collecting at a patch of the well preserved *tabuleiro* forest some 10 km



east of the first find, additional, larger specimens (10–25 cm high) were discovered in forest border leaf litter by the same collectors (*Popovkin & Mendes 913*).

Relationships among the species of *Spigelia* are still poorly understood. Early phylogenetic results focusing on the north-temperate species showed that there are two distinct north-temperate lineages of *Spigelia* and that both of them have close relatives in the tropics (Gould 1997). *Spigelia* itself is an isolated lineage and forms a monotypic tribe in the Loganiaceae (Struwe et al. 1994; Frasier 1998). We obtained DNA sequence from the new species in order to confirm its membership in *Spigelia* and to see where it is positioned relative to other species in our working phylogenetic hypothesis for the genus.

## Taxonomic Treatment

### *Spigelia genuflexa* Popovkin & Struwe, sp. nov.

urn:lsid:ipni.org:names:77114017-1

[http://species-id.net/wiki/Spigelia\\_genuflexa](http://species-id.net/wiki/Spigelia_genuflexa)

Figs 1–2

Additional photos at Popovkin: [http://calphotos.berkeley.edu/cgi/img\\_query?where-taxon=Spigelia+sp.+nov.&where-lifeform=specimen\\_tag&rel-lifeform=ne&rel-taxon=begin+with&title\\_tag=Spigelia+sp.+nov.](http://calphotos.berkeley.edu/cgi/img_query?where-taxon=Spigelia+sp.+nov.&where-lifeform=specimen_tag&rel-lifeform=ne&rel-taxon=begin+with&title_tag=Spigelia+sp.+nov.); <http://bit.ly/io7bpT-2009-2011>

**Diagnosis.** Haec species *Spigelia flemmingiana* Cham. & Schltl. similis, sed plantis brevioribus (1.5–25.0 vs. 17–50 cm), foliis parvis (0.6–2 × 0.2–0.5 cm vs. 2–9 × 1.4–2 cm) ellipticis vel ovatis (vs. lanceolatis), corollis brevioribus (0.4–0.8 vs. ca. 1 cm), inflorescentiis paucifloribus, et infrutescentiis nutantibus in maturitatem (vs. semper erectis) differt.

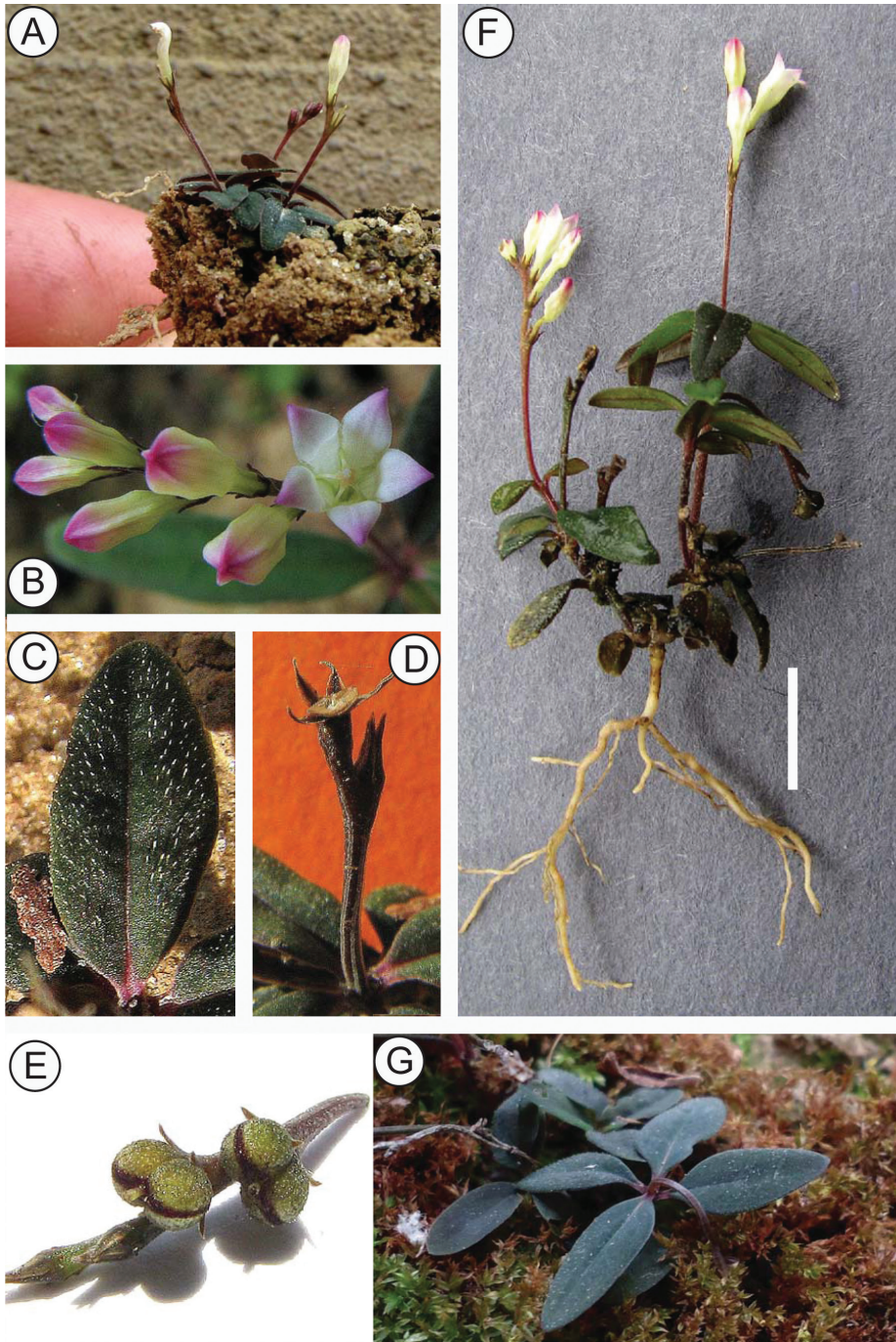
Similar to *Spigelia flemmingiana* Cham. & Schltl. but shorter (1.5–25 cm vs. 17–50 cm tall), with smaller leaves (0.6–2 × 0.2–0.5 cm vs. 2–9 × 1.4–2 cm) that are elliptic to ovate (vs. lanceolate), shorter corollas (0.4–0.8 cm vs. ca. 1 cm), fewer-flowered inflorescences (up to 7 flowers vs. up to 38 flowers), and infrutescences bending downward at maturity (vs. staying erect).

**Type. Brazil:** Bahia: Entre Rios, Fazenda Rio do Negro, Residual stands of the Atlantic Forest. Restinga-type forest of the Rio do Negro valley, ca. 15 km southeast of Entre Rios, Atlantic forest, 12° 01' S, 38° 02' W, 150 m, 31 July 2009, *A.V. Popovkin & J.C. Mendes 617* (holotype: HUEFS).

**Description.** Annual herb, 1.5–25 cm tall. Roots fibrous, not very extensive. Stem branched at base, with reddish tint, with 4–6 prominent ribs decurrent from the leaf bases; interpetiolar stipules triangular, with abundant papillae on outside. Leaves opposite as well as 4 together higher up on the main branch under the inflorescence, 6–20 mm long, 2–5 mm wide, elliptic to ovate; secondary veins 4–6 pairs, arcuate, inconspicuous below and above, midrib raised below; base acute, with decurrent lamina; margin flat or slightly revolute, entire; apex obtuse; upper side with many short,



**Figure 1.** *Spigelia genuflexa* **A–B** Habit, showing inflorescences and geocarpic infructescences, and close-up of apical part of leaf with appressed papillose hairs **C** Close-up of node and internode, showing small triangular interpetiolar stipules **D** Flowers before and at anthesis **E** Close-up of flower at anthesis; note diminutive bract **F** Opened corolla with epipetalous stamens **G** Stamens inserted into corolla and introrse anther **H** Gynoecium inside papillose calyx, with hairy style (brush-type); older gynoecium, after style has dried and fallen off to the right **I** Geocarpic infructescence branch with one whole capsule (mitra-shaped, with small style remnant in center), and capsular base of the fruit that has dehisced, above it **J** Seed. Drawing by Bobbi Angell, based on *A. V. Popovkin 602 and 602A*.



**Figure 2.** *Spigelia genuflexa* **A** Habit of mature plant **B** Flowers at anthesis and before opening. Note valvate and vertically folded petal lobes **C** Close-up of leaf with appressed papilloid hairs **D** Base of fruit after dehiscence ('carpoatlas') **E** Fruit before dehiscence **F** Whole plant with roots. Scale bar = 1 cm **G** Infructescence showing geocarpy. Photos by Alex Popovkin.

transparent papilloid hairs, 0.1–0.3 mm long; lower side glabrous; petiole 1–2 mm long. Inflorescence variable, solitary (occasionally multiple), typically a one-sided cyme (rarely a simple cyme/dichasium or a single flower), unbranched, (1-)4–7-flowered, up to 28 mm long, without bracts or with 1–2 tiny bracts subtending flowers; peduncle 7–15 mm. Flowers actinomorphic, perfect, 5- (rarely 6-) merous. Calyx divided almost to base, green, persistent in fruit; lobes triangular, acuminate, 0.8–1.4 mm long, c. 0.3 mm wide, with slightly papillose margins. Corolla sympetalous, tubular, slightly widening towards mouth, 4–8 mm long, 2.5–3.0 mm wide at mouth, white with pink lobes, aestivation valvate with individual corolla lobes plicate in bud, lobes unfolded when open, closing after a short (8-hour) anthesis, later withering and deciduous; lobes triangular, 1.0–1.5 mm long, ca. 1 mm wide, erect, acute, with smooth margin. Stamens epipetalous and adnate to corolla up to middle of the tube, of equal length, included in corolla; filaments flattened; anthers 0.7–0.8 mm long, shallowly sagittate at base, truncate at apex. Ovary bicarpellate, bilocular, ovoid, ca. 0.4 mm tall, with truncate apex; style 3–6 mm long (including stigma), simple, articulated at 0.5–1.00 mm above the ovary, mostly dehiscent in fruit (except the persistent base); stigma simple, papillose, 'brush-like' at the height of the anthers. Fruit a bilobed capsule, 1.5–2 mm tall, 2–3 mm wide; dehiscent septically, loculicidally and circumscissily, leaving behind on the rachis a persistent, boat-shaped base with pointed tips ('*carpoatlas*' in Fernández Casas' [2003] terminology); light brown, warty to papillose; with ca. 0.5 mm tall style remnant. Seeds brown, round, reticulate surface when dry, ca. 0.7–1 mm in diameter.

**Distribution.** This species is known from only two localities in northeastern Bahia (Brazil), about 30 km from the Atlantic coastline.

**Ecology.** The species has been found on sandy, leaf litter- or moss-covered soil areas along the border of a *tabuleiro* forest. The diminutive flowers appear to be able to self, based on observations of cultivated material, with one to two flowers opening at one time. The anthesis begins early in the morning and ends in the afternoon of the same day. The arrangement and morphology of stamens and pistil, with anthers located closely to the central pistil with hairy upper part (Figure 1), suggests that spatial closeness of flower parts may promote selfing, thus ensuring fruit set. Occasional tiny ant visitors have been observed entering the open flowers, though it is not entirely clear if they might be the pollinators.

**Dispersal.** The geocarpy, i.e. weak geocarpy (depositors, in Hylander's [1929] terminology), of this species was initially observed on plants transplanted to a pot kept on a windowsill, allowing for daily/hourly observations. Two growth forms have been observed: one with inflorescences forming after the first three pairs of leaves are formed (usually, with a long internode between the first pair of leaves and subsequent two pairs), with the plant height at that stage of about 1 cm, and the other with inflorescences forming after four or five pairs of leaves and the plant reaching the height from 10 to 25 cm. The lower-forming inflorescences at the start of the fruit set would bend down to the soil, depositing the ripe fruit on the ground, while the higher-forming inflorescences would bend down noticeably but, because of the main stem height, would

be unable to touch the soil surface. Inflorescences with the fruit not set (a rare phenomenon) stay upright. Later observations of plants growing on moss-covered ground showed that the capsules are actually buried in the soft substrate (Fig. 2G).

**Etymology.** The specific name refers to the sometimes repeated bending of its infructescence branches to the ground, figuratively evoking an image of the etiquette of genuflexion.

**Preliminary conservation status.** The species is known from only a handful of collections from two restricted populations in a non-protected area (private land), and should therefore be assessed as Data Deficient for EOO and AOO, following IUCN (2001)'s criteria.

**Phenology.** The species has been found flowering and fruiting from March to November during the local rainy season. It takes about 3–4 weeks from anthesis to fruit maturity. Living plants have not been observed from December to early March.

**Specimens examined. Brazil:** Bahia: Entre Rios: Fazenda Rio do Negro, Residual stands of the Atlantic Forest. Restinga-type forest of the Rio do Negro valley, ca. 15 km southeast of Entre Rios, Atlantic forest, 12° 01' S, 38° 02' W, 150 m (topotypes), 3 June 2009, *A.V. Popovkin 598* (HUEFS); *ibid.*, 10 June 2009, *A.V. Popovkin 602* (CHRB, NY); *ibid.*, 15 July 2009, *A.V. Popovkin 602A* (CHRB, NY); *ibid.*, 31 July 2009, *A.V. Popovkin 617* (HUEFS); *ibid.*, 27 May 2010, *A.V. Popovkin 703* (HUEFS); *ibid.*, 4 Sep 2010, *A.V. Popovkin 744* (HUEFS); *ibid.*, 18 January 2011, *A.V. Popovkin 825* (HUEFS); *ibid.*, 8 June 2011, *A.V. Popovkin & J.C. Mendes 885* (HUEFS). Bahia: Entre Rios: Imbé, Atlantic forest, 12° 05' S, 38° W, 135 m: 1 October 2010, *A.V. Popovkin & J.C. Mendes 758* (HUEFS); 1 June 2011, *A.V. Popovkin & J.C. Mendes 878* (HUEFS); 8 June 2011, *A.V. Popovkin & J.C. Mendes 885* (HUEFS); 17 August 2011, *A.V. Popovkin & J.C. Mendes 913* (HUEFS).

## Methods

**Morphological and molecular studies.** Photographs in the field and of cultivated material were made using a Panasonic DMC-ZS3 camera. Pressed and dried herbarium material of *Spigelia genuflexa* were observed, measured and photographed using a Stemi-2000 Zeiss dissecting microscope with a mounted digital Canon camera. Measurements were made using a caliper or using a graded and calibrated eye piece in a dissecting scope.

Several species concepts were utilized to identify and define this particular species, which is in line with previous species concepts used in this group (Gould 1999; Gould and Jansen 1999). Overall morphology provides a unique combination of characters supporting a new species based on the traditional morphological species concept. Additionally, the phylogenetic species concept also supports the status accorded here by the species' isolated evolutionary position and its autapomorphies in the phylogenetic analyses.

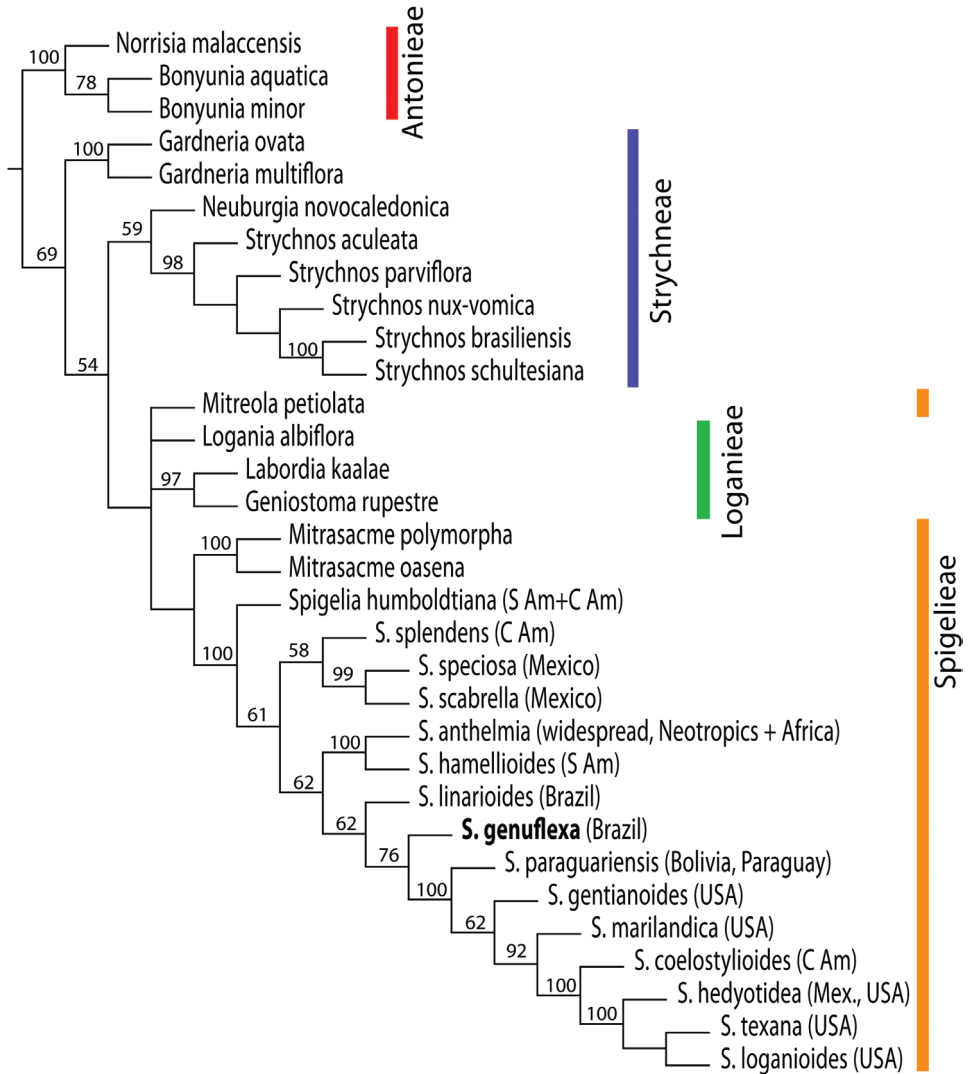
Sequences from the internal transcribed spacer (ITS) of nuclear ribosomal DNA were used to reconstruct a phylogenetic tree of 15 species of *Spigelia*, including the new species, and several outgroups. The complete methods for the phylogenetic analysis are presented in Appendix I.

## Results

Complete phylogenetic results are presented in Appendix I. Thus far, we have been able to include only one other Brazilian species in the phylogenetic analysis, therefore our results are to be viewed as preliminary but having a bearing on the status of the new species. ITS sequences confirm the position of *S. genuflexa* within the genus *Spigelia* relative to multiple outgroups in Loganiaceae. The strict consensus of two most parsimonious trees is shown in Figure 3. In this tree *S. genuflexa* is placed as sister to a clade containing five northern warm-temperate taxa and two tropical taxa. The only other strictly Brazilian species included in the analysis, *S. linarioides* DC., is positioned on the node just below *S. genuflexa*. Below the branch with *S. linarioides* is a clade formed by the two widespread species, *S. anthelmia* and *S. hamellioides*, and below this a clade of three Mexican species. *Spigelia humboldtiana*, a widespread species from central South America to southern Mexico, is most basal in *Spigelia*. Figure 4 shows the results of the Bayesian analysis, which differ from the parsimony results primarily in the positions of *S. linarioides* and *S. humboldtiana*: *Spigelia linarioides* from Brazil is on a basal branch outside of all other *Spigelia* species, and *S. humboldtiana* is sister to a Mexican species, *S. splendens* H. Wendl. ex Hook. In the Bayesian analysis the position of *S. genuflexa* remains unresolved, but phylogenetically distinct.

## Discussion

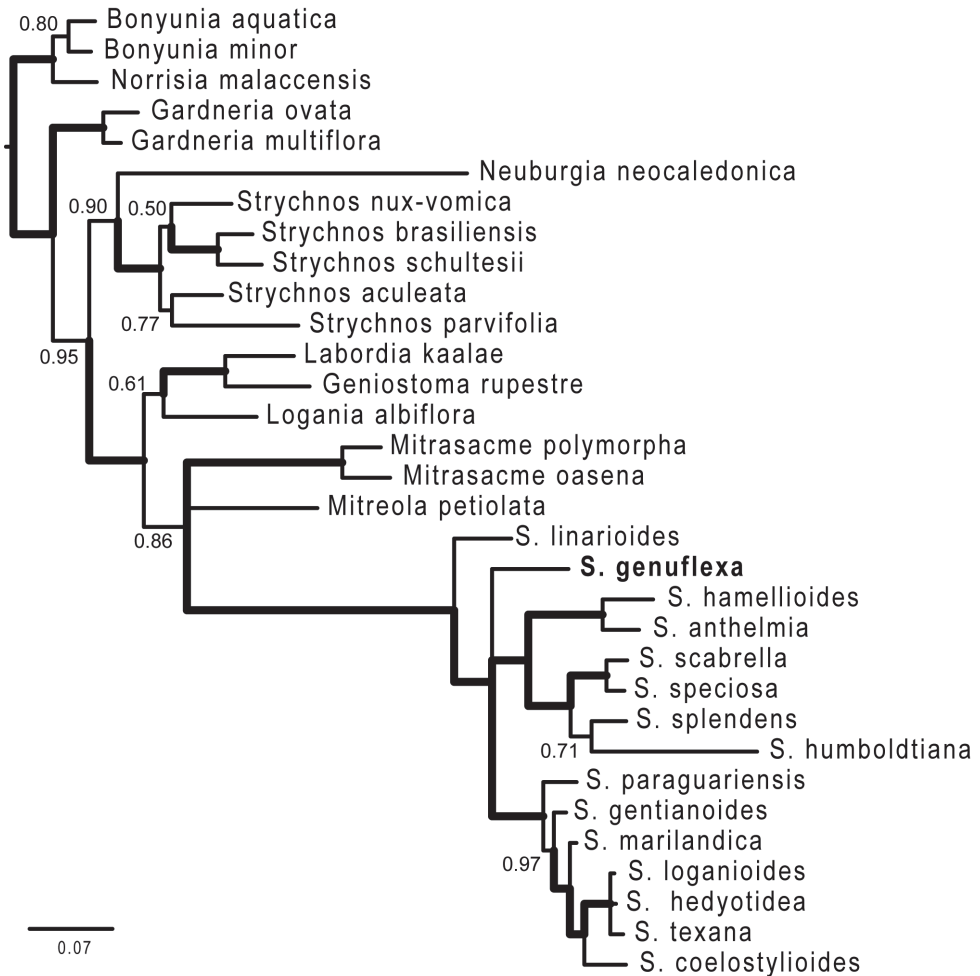
**Morphology.** Morphologically, *Spigelia genuflexa* displays a mosaic of traits similar to other species, as well as several unique characteristics, including geocarpy. Its leaves are densely covered with short, simple, slightly hooked papillae-like hairs, a trait that appears to be unique within the genus. Its small, white, funnellform flowers with included stamens (vs. long-tubular or campanulate, brightly colored flowers, with exerted stamens) make it similar to *Spigelia flemmingiana* (not included in the phylogeny), *S. anthelmia*, *S. hamellioides* (syn. *S. multispica* Steud.), and many others. Other traits shared with the latter three species are the annual lifespan, the warty (vs. smooth) capsule and the persistent fruit base with pointed tips (vs. rounded or emarginate tips). Like *S. anthelmia*, *S. genuflexa* has a persistent style segment on the capsule that is short and stout (vs. long and threadlike). Like *S. hamellioides*, *S. genuflexa* has pedunculate inflorescences (vs. sessile). *Spigelia genuflexa* is distinctly different from other species occurring in the Atlantic coastal forest biome of Bahia, including *S. anthelmia*, *S. blanchetiana* A.DC., *S. flemmingiana* Cham. & Schltldl., *S. glabrata* Mart., *S. laurina*



**Figure 3.** Strict consensus tree derived from molecular data (ITS and coded gaps) showing phylogenetic relationships of *Spigelia* and outgroups within Loganiaceae (tribal classification according to Leeuwenberg and Leenhouts, 1980). Numbers above branches indicate % jackknife support above 50%.

Cham. & Schltdl., *S. linarioides* (in the phylogeny), *S. schlechtendaliana* Mart., *S. spartioides* Cham., and *S. tetraptera* Taub. ex L.B. Sm.. Determining the definitive relationships of *S. genuflexa* within *Spigelia* will undoubtedly depend on the future inclusion of many additional species in a phylogenetic analysis.

**Phylogeny.** Very little phylogenetic work has been published in *Spigelia*, despite it being a relatively large genus with interesting Neotropical distribution and variable morphology linked to ecological traits, such as life span, pollination syndromes, and



**Figure 4.** 50% majority rule consensus tree from the Bayesian analyses. Numbers are clade posterior probability (pp) values; thickened branches indicate pp = 1.00. The genus name *Spigelia* is abbreviated to the first letter.

weediness (but see Gould 1997). This preliminary study is limited in its taxon selection, but it includes species from five of the seven described sections (Torrey and Gray 1839, Progel 1868, Bravo 1971) and all geographical regions except the Caribbean (including North America, Mexico, Central America and South America), and is a first approximation of relationships of some major clades.

The main goal with our phylogenetic analysis, however, was to place *S. genuflexa* in a taxonomic neighborhood within its genus and the Loganiaceae. It is clearly supported as included in *Spigelia*, and it is also clearly not very close to any other *Spigelia* species we have sequenced so far, based on sequence similarity or position in the cladograms. In fact, we cannot say with any certainty where its affinities lie since it is not definitively grouped with any other species. There is low jackknife support in the



parsimony analysis for its inclusion in a clade with *S. paraguariensis* Chodat and more northern species. It does not group with any member of section *Anthelmiae* Progel (*S. anthelmia*, *S. hamellioides* and *S. humboldtiana*), with which it shares morphological similarities, although this section is not monophyletic in any analyses. It also does not group with the only other Brazilian species, *S. linarioides*, which is understandable, considering their quite different vegetative morphologies.

Like section *Anthelmiae*, sections *Graciles* Progel, *Stenophyllae* Progel and *Speciosae* Progel are not monophyletic in any analyses. This is not surprising, given the superficial nature of Progel's (1868) classification, based on a small number of morphological characters. Vegetative characters used by Progel, which may be highly plastic, include vestiture, stem shape and leaf venation. Floral characters he used, which may be related to pollinator selection, include corolla shape and exertion of anthers and stigma. In the future, mapping morphological characters onto a better resolved molecular phylogeny might give some insight into character evolution in *Spigelia*. The one infrageneric classification that holds up in all analyses is the North American section *Coelostylis* (Torr. & A. Gray) Fern. Casas, the members of which (*S. texana* (Torr. & A. Gray) A. DC., *S. loganioides* (Torr. & A. Gray) A. DC., *S. hedyotideia* A. DC.) form a strongly supported clade. According to our trees, the more tropical *S. coelostylioides* K.R. Gould is closely related to this group, as hypothesized earlier (Gould 1999).

The sister group to *Spigelia* is shown to be other members of tribe Spigeliaceae sensu Leeuwenberg and Leenhouts (1980), with strong support in the Bayesian analysis (1.00 pp). *Mitrasacme* Labill. is sister to *Spigelia* in the parsimony tree, but with less than 50% jackknife support. *Mitrasacme* and *Mitreola* L. share a clade with *Spigelia* in the Bayesian analysis (0.86 pp), though which of the former is closer to *Spigelia* remains unresolved. In the parsimony tree, *Mitreola*'s position within Loganiaceae is also unresolved.

**Dwarfism in ephemeral annuals.** Dwarfism is also seen in two other *Spigelia* species, *S. pygmaea* D.N. Gibson and *S. polystachya* Klotzsch, both of which are annuals and are characteristically shorter than other *Spigelia* species. We have not yet been able to include either of these in the phylogenetic analysis. *Spigelia pygmaea* is known only from Chiapas, Mexico, and Guatemala, growing in generally dry habitats, including dry, deciduous forest, pine forest, and savanna. Like *S. genuflexa*, it has warty-papillose capsules. *Spigelia polystachya* grows in seasonally flooded fields and mud flats from southern lowland Mexico south to Bahia and Goiás, Brazil, and appears to flower year-round. Since the only collection of *S. genuflexa* of much taller size (to 25 cm) was made in the multi-layer leaf litter of the *tabuleiro* forest, the dwarfism of the initially collected plants could be strongly influenced by the differences in their respective micro-habitats, with the dwarfed plants found in a rather inhospitable bare sandy soil environment, with very little leaf litter. Such size plasticity is not uncommon in plants; however, even the larger specimens of *S. genuflexa* represent plants of a small stature.

**Geocarpy.** There are several adaptive advantages of geocarpy for plants growing in variable, heterogeneous, or ephemeral environments, such as the retention of offspring in advantageous microhabitats, protection of seeds from environmental extremes, fire,

and predators. The depositor-style geocarpy, in Hylander's terminology (Hylander 1929), is also occasionally found in some species of other plant families, e.g. Begoniaceae, Brassicaceae, Campanulaceae, Caryophyllaceae, Fabaceae, Hypoxidaceae, Myrsinaceae, Ranunculaceae, Rosaceae, Scrophulariaceae (Rawitscher 1937; Agnew and Hedberg 1968–69; Van der Pijl 1982; Cheplick 1987; Bruhl 1994; Barker 2005).

## Conclusion

*Spigelia genuflexa* is a new and unique species, with geocarpic fruits, the first known case of geocarpy in the Loganiaceae. It is not surprising it has not been detected earlier, given its diminutive stature and high biodiversity in the area. Northeastern Brazil contains the greatest number of known *Spigelia* species, most of which have been little studied. To better understand the taxonomic and distributional ranges of *Spigelia* species in Brazil, the threats to their survival, and their relationships and evolution, and last but not least, to get a better estimate of their actual number, a revision of Brazilian species is greatly needed.

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### Hyperlinked Genbank accession numbers:

<i>Bonyunia aquatica</i>	JF937926	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JF937926">http://www.ncbi.nlm.nih.gov/nuccore/JF937926</a>
<i>Bonyunia minor</i>	JF937927	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JF937927">http://www.ncbi.nlm.nih.gov/nuccore/JF937927</a>
<i>Gardneria multiflora</i>	JF937929	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JF937929">http://www.ncbi.nlm.nih.gov/nuccore/JF937929</a>
<i>Gardneria ovata</i>	JF937930	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JF937930">http://www.ncbi.nlm.nih.gov/nuccore/JF937930</a>
<i>Geniostoma rupestre</i>	DQ499095	<a href="http://www.ncbi.nlm.nih.gov/nuccore/DQ499095">http://www.ncbi.nlm.nih.gov/nuccore/DQ499095</a>
<i>Labordia kaalae</i>	JF937931	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JF937931">http://www.ncbi.nlm.nih.gov/nuccore/JF937931</a>
<i>Logania albiflora</i>	DQ358879	<a href="http://www.ncbi.nlm.nih.gov/nuccore/DQ358879">http://www.ncbi.nlm.nih.gov/nuccore/DQ358879</a>
<i>Mitrasacme oasena</i>	JF937932	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JF937932">http://www.ncbi.nlm.nih.gov/nuccore/JF937932</a>
<i>Mitrasacme polymorpha</i>	JF937933	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JF937933">http://www.ncbi.nlm.nih.gov/nuccore/JF937933</a>
<i>Mitreola petiolata</i>	AF054635	<a href="http://www.ncbi.nlm.nih.gov/nuccore/AF054635">http://www.ncbi.nlm.nih.gov/nuccore/AF054635</a>
<i>Neuburgia novocaledonica</i>	JF937935	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JF937935">http://www.ncbi.nlm.nih.gov/nuccore/JF937935</a>
<i>Norrisia malaccensis</i>	JF937936	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JF937936">http://www.ncbi.nlm.nih.gov/nuccore/JF937936</a>
<i>Spigelia anthelmia</i>	JF937937	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JF937937">http://www.ncbi.nlm.nih.gov/nuccore/JF937937</a>
<i>Spigelia coelostylioides</i>	AF177992	<a href="http://www.ncbi.nlm.nih.gov/nuccore/AF177992">http://www.ncbi.nlm.nih.gov/nuccore/AF177992</a>
<i>Spigelia gentianoides</i>	JN005877	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JN005877">http://www.ncbi.nlm.nih.gov/nuccore/JN005877</a>

<i>Spigelia genuflexa</i>	JN005878	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JN005878">http://www.ncbi.nlm.nih.gov/nuccore/JN005878</a>
<i>Spigelia hamellioides</i>	JN005879	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JN005879">http://www.ncbi.nlm.nih.gov/nuccore/JN005879</a>
<i>Spigelia hedyotidea</i>	AF178008	<a href="http://www.ncbi.nlm.nih.gov/nuccore/AF178008">http://www.ncbi.nlm.nih.gov/nuccore/AF178008</a>
<i>Spigelia humboldtiana</i>	JN005881	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JN005881">http://www.ncbi.nlm.nih.gov/nuccore/JN005881</a>
<i>Spigelia linarioides</i>	JN005880	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JN005880">http://www.ncbi.nlm.nih.gov/nuccore/JN005880</a>
<i>Spigelia loganioides</i>	AF178000	<a href="http://www.ncbi.nlm.nih.gov/nuccore/AF178000">http://www.ncbi.nlm.nih.gov/nuccore/AF178000</a>
<i>Spigelia marilandica</i>	AF177991	<a href="http://www.ncbi.nlm.nih.gov/nuccore/AF177991">http://www.ncbi.nlm.nih.gov/nuccore/AF177991</a>
<i>Spigelia paraguariensis</i>	JN005882	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JN005882">http://www.ncbi.nlm.nih.gov/nuccore/JN005882</a>
<i>Spigelia scabrella</i>	JN005885	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JN005885">http://www.ncbi.nlm.nih.gov/nuccore/JN005885</a>
<i>Spigelia speciosa</i>	JN005884	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JN005884">http://www.ncbi.nlm.nih.gov/nuccore/JN005884</a>
<i>Spigelia splendens</i>	JN005883	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JN005883">http://www.ncbi.nlm.nih.gov/nuccore/JN005883</a>
<i>Spigelia texana</i>	AF178006	<a href="http://www.ncbi.nlm.nih.gov/nuccore/AF178006">http://www.ncbi.nlm.nih.gov/nuccore/AF178006</a>
<i>Strychnos aculeata</i>	JF937940	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JF937940">http://www.ncbi.nlm.nih.gov/nuccore/JF937940</a>
<i>Strychnos brasiliensis</i>	JF937956	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JF937956">http://www.ncbi.nlm.nih.gov/nuccore/JF937956</a>
<i>Strychnos nux-vomica</i>	JF938015	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JF938015">http://www.ncbi.nlm.nih.gov/nuccore/JF938015</a>
<i>Strychnos parvifolia</i>	JF938021	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JF938021">http://www.ncbi.nlm.nih.gov/nuccore/JF938021</a>
<i>Strychnos schultesiana</i>	JF938036	<a href="http://www.ncbi.nlm.nih.gov/nuccore/JF938036">http://www.ncbi.nlm.nih.gov/nuccore/JF938036</a>

## Appendix I. Molecular phylogenetic methods and results

**Molecular studies.** Total genomic DNA extraction of *Spigelia genuflexa* was done by grinding one leaf from a NY herbarium specimen with sterile glass pestle in a mortar, and then processed using the DNAeasy Plant Mini Kit (Qiagen), according to the manufacturer's instructions.

The nuclear ITS rDNA region was amplified using the primers 5'-AACAA-GGTTTCCGTAGGTGA-3' (modified from Baldwin 1992) and 5'-GC-TACGTTCTTCATCGATGC-3' (White et al. 1990) to ITS1 and 5'-GCATCGAT-GAAGAACGTAGC-3' (White et al. 1990) and 5'-TATGCTTAAAYTCAGCGGGT (modified from Baldwin 1992) to ITS2. PCR amplifications were performed according to Frasier et al. (2008) and conducted on an Applied Biosystems GeneAmp System 9700, using the program: 97°C for 1 min, followed by 35 cycles of 95°C for 1 min, 53°C for 1 min, and 68°C for 2 min, ending with a final extension of 72°C for 4 min. For visualization, PCR products were run on 1% agarose gel. PCR products that resulted in single bands were cleaned using ExoSAP-IT® (USB cat.# 78201), following manufacturer's specifications, and then submitted to Genewiz Inc. for sequencing.

Additional ITS sequences from other *Spigelia* species were provided by co-author K. Mathews (Gould 1997; see methods therein for those sequences) and from Genbank. Sequences of other Loganiaceae species were obtained from C. Frasier (Frasier, 2008). For a list of included species, classification, Genbank numbers and vouchers, see Table 1.

The *Spigelia genuflexa* sequence was edited and assembled using Sequencher ver. 4.10 (GeneCodes). The sequences were aligned using MUSCLE ver. 3.7 (Edgar 2004, 2010), with subsequent modification of the alignment in SEQUENCHER v. 4.10 (Gene Codes) to optimize gap alignments. The aligned ITS matrix included 32 taxa

and 655 aligned nucleotides and 42% of the sites were phylogenetically informative (Appendix II). Indel characters (gaps) were coded using SEQSTATE ver. 1.4.1 (Müller 2005) using simple gap coding (Simmons and Ochoterena 2000), which lead to the addition of 114 binary gap characters (Appendix III).

**Phylogenetic analysis.** The phylogenetic data matrices were analyzed using maximum parsimony using NONA (Goloboff 2002), spawned via WINCLADA (Nixon 2002), and the following settings: unconstrained heuristic search, 1000 max trees, 500 replicates, 5 starting trees per replicate, multiple TBR + TBR. Jackknife analysis was also performed with NONA and WinClada, using 1000 replicates, 10 search reps per replicate, 5 starting trees per replicate, don't do max TBR, save consensus, and max-trees = 1000. Two matrices were analyzed: 1) ITS only, and 2) ITS with gaps coded. Trees were rooted with members of tribe Antonieae, including *Norrisia* and *Bonyunia* spp., based on phylogenetic results in Frasier (2008).

For the second, Bayesian, analyses we chose the best fitting nucleotide substitution model (excluding the binary indel partition), using the Akaike information criterion (AIC) in JMODELTEST ver. 0.1.1 (Posada 2008). We analyzed the data using Bayesian inference in MRBAYES 3.1.2 (Huelsenbeck and Ronquist 2001). Data were partitioned into nucleotide and indel partitions (Appendix IV). The indel characters were assigned the binary model (nst=1, coding=variable), as recommended in the MrBayes manual. For the nucleotide characters, JMODELTEST chose TIM3 + G + I, a special case of GTR with two transversion rates, which is not available in MRBAYES. Instead, we assigned the GTR + G + I model (nst=6, rates=invgamma). All free parameters were estimated from the data using the default settings in MRBAYES and were unlinked for the two partitions. Two simultaneous analyses were run, each with four chains (one cold and three heated), for 1 million generations, sampling every hundredth generation. Convergence was evaluated by examining the standard deviation of split frequencies among runs (accepted value of <0.01). The resulting branch posterior probabilities and consensus topology were summarized using the sumt command, excluding trees from the initial 250,000 generations as burn-in.

**Results.** The parsimony analysis of ITS yielded only four most parsimonious trees, with 993 steps, consistency index (ci) = 0.59, and retention index (ri) = 0.68. When coded gap characters were included, two most parsimonious trees were found, with a length of 1348 steps, ri = 0.57, and ci = 0.73 (strict consensus tree shown in Figure 3, with jackknife support above branches). *Spigelia* is supported as monophyletic in both analyses, with a jackknife value of 99% in the ITS-only analysis. Placed as sister to *Spigelia* is *Mitrasacme*, but with low support (50%, ITS only; below 50%, ITS plus gaps).

The strict consensus trees from these two analyses are largely congruent, with a few exceptions. The results from ITS only differ from matrix 2 (ITS with coded gaps) by: 1) positioning a species of *Mitreola* as sister to *Logania*, and this clade as sister clade to *Labordia* and *Geniostoma*; 2) collapsing the node below *Strychnos parvifolia* within *Strychnos*; and 3) rearranging relationships among *Spigelia* species in the clade, including *Spigelia paraguariensis*. These three differences are nodes that are relatively poorly supported by jackknife analysis (up to 62% support) based on ITS only data.

**Table 1.** Material for phylogenetic analysis using ITS sequences, with voucher information, Genbank accession number, and tribal classification according to Leeuwenberg and Leenhouts (1980). Herbarium abbreviations according to Index Herbariorum.

Species	Tribal classification	Infrageneric classification of <i>Spigelia</i> , if applicable	Genbank accession number	Voucher or publication
<i>Bonyunia aquatica</i>	Antonieae		JF937926	Berry et al. 5771 (NY)
<i>Bonyunia minor</i>	Antonieae		JF937927	Berry & Brako 5522 (NY)
<i>Gardneria multiflora</i>	Strychneae		JF937929	Ceming 9611186 (MO)
<i>Gardneria ovata</i>	Strychneae		JF937930	Klackenberg & Lundin 214 (NY)
<i>Geniostoma rupestre</i>	Loganieae		DQ499095	Wright et al. (2006)
<i>Labordia kaalae</i>	Loganieae		JF937931	Motley 1203 (BISH)
<i>Logania albiflora</i>	Loganieae		DQ358879	Hubbard 4198 (G)
<i>Mitrasacme oasena</i>	Spigeliaceae		JF937932	Forste et al. PIF24800 (NY)
<i>Mitrasacme polymorpha</i>	Spigeliaceae		JF937933	Anonymous 20495 (NY)
<i>Mitreola petiolata</i>	Spigeliaceae		AF054635	Gould 150 (TEX/LL)
<i>Neuburgia novocaledonica</i>	Strychneae		JF937935	Struwe 1301 (NY)
<i>Norrisia malaccensis</i>	Antonieae		JF937936	Stone 14107 (HUH)
<i>Spigelia anthelmia</i>	Spigeliaceae	<i>Anthelmiae</i>	JF937937	Worthington 21205 (NY)
<i>Spigelia coelostylioides</i>	Spigeliaceae		AF177992	Gould 139 (TEX/LL)
<i>Spigelia gentianoides</i>	Spigeliaceae		JN005877	Bok Tower Gardens Rare Plant Collection, Lake Wales Florida (living collection)
<i>Spigelia genuflexa</i>	Spigeliaceae		JN005878	Popovkin 602 (NY)
<i>Spigelia hamellioides</i>	Spigeliaceae	<i>Anthelmiae</i>	JN005879	Gould 7 (TEX/LL)
<i>Spigelia hedyotideae</i>	Spigeliaceae	<i>Coelostylis</i>	AF178008	Gould 103 (TEX/LL)
<i>Spigelia humboldtiana</i>	Spigeliaceae	<i>Anthelmiae</i>	JN005881	Gould 162 (TEX/LL)
<i>Spigelia linarioides</i>	Spigeliaceae	<i>Graciles</i>	JN005880	Taylor et al. 1508 (K)
<i>Spigelia loganioides</i>	Spigeliaceae	<i>Coelostylis</i>	AF178000	Goldman 433 (TEX/LL)
<i>Spigelia marilandica</i>	Spigeliaceae	<i>Graciles</i>	AF177991	Gould 163 (TEX/LL)
<i>Spigelia paraguariensis</i>	Spigeliaceae	<i>Stenophyllae</i>	JN005882	Zardini & Velasquez 27462 (G)
<i>Spigelia scabrella</i>	Spigeliaceae	<i>Stenophyllae</i>	JN005885	Williams 9565 (TEX/LL)
<i>Spigelia speciosa</i>	Spigeliaceae	<i>Speciosae</i>	JN005884	Gould 136 (TEX/LL)
<i>Spigelia splendens</i>	Spigeliaceae	<i>Speciosae</i>	JN005883	Panero 5758 (TEX/LL)
<i>Spigelia texana</i>	Spigeliaceae	<i>Coelostylis</i>	AF178006	Gould 135 (TEX/LL)
<i>Strychnos aculeata</i>	Strychneae		JF937940	Merello 1338 (MO)
<i>Strychnos brasiliensis</i>	Strychneae		JF937956	Medri et al. 446 (NY)
<i>Strychnos nux-vomica</i>	Strychneae		JF938015	Maxwell 90–622 (MO)
<i>Strychnos parvifolia</i>	Strychneae		JF938021	Rodal et al. 502 (MO)
<i>Strychnos schultesiana</i>	Strychneae		JF938036	Liesner & Gonzalez 9170 (MO)

The new species, *S. genuflexa*, is placed as sister (76% support) to a clade containing five northern warm-temperate taxa (*S. marilandica*, *S. gentianoides*, *S. texana*, *S. hedyotideae*, *S. loganioides*) in addition to two tropical taxa, *S. paraguariensis* (Paraguay) and *S. coelostylioides* (Chiapas, Mexico; Figure 3) in the parsimony results. The only other strictly Brazilian species included in the analysis, *S. linarioides*, is positioned on the node right below *S. genuflexa*. Below the branch with *S. linarioides* is a clade formed

by the two widespread species, *S. anthelmia* and *S. hamellioides*, and below this a clade of three Mexican species (*S. scabrella*, *S. speciosa*, *S. splendens*). The species placed on the most basally positioned branch within *Spigelia* is *S. humboldtiana*, a multi-stemmed, basally woody herb widespread from central South America to southern Mexico.

In the Bayesian analysis, *Mitreola* and *Mitrasacme* are in an unresolved sister clade to *Spigelia* (0.86 posterior probability [pp]), and *Spigelia* is monophyletic (1.00 pp; Figure 4). Within *Spigelia*, the Bayesian results differ from the parsimony results primarily in the positions of *S. linarioides* and *S. humboldtiana*: *Spigelia linarioides* from Brazil is on a basal branch outside of all other *Spigelia* species (1.00 pp), and *S. humboldtiana* is sister to a Mexican species, *S. splendens* (0.71 pp). *Spigelia genuflexa*'s position remains unresolved, but phylogenetically distinct, in the Bayesian analysis. We experimented with setting priors in the Bayesian inference by fixing the substitution rates and nucleotide frequencies to the values in the Q-matrices output by jModelTest (results not shown). This corresponded to the more parameter-rich TIM3 model. The resulting consensus tree placed *S. genuflexa* as sister to the *S. paraguariensis* + North American species clade (the same position as in the parsimony analyses), albeit with a low posterior probability (0.55). Other relationships within *Spigelia* did not change.

## Appendix II

DNA alignment of ITS from Loganiaceae taxa, especially *Spigelia*, shown in Fasta format. (doi: 10.3897/phytokeys.6.1654.app2)

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**Citation:** Popovkin AV, Mathews KG, Santos JCM, Molina MC, Struwe L (2011) *Spigelia genuflexa* (Loganiaceae), a new geocarpic species from the Atlantic forest of northeastern Bahia, Brazil. *PhytoKeys* 6: 47–65. doi: 10.3897/phytokeys.6.1654.app2

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## Appendix III

Alignment of ITS from Loganiaceae taxa, especially *Spigelia*, including coded gaps, Nexus format. (doi: 10.3897/phytokeys.6.1654.app3)



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## Appendix IV

Bayesian run-file of ITS plus coded gaps from Loganiaceae taxa, especially *Spigelia*, Nexus format. (doi: 10.3897/phytokeys.6.1654.app4)

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