

Open-access journals are now open for discoveries of new plants and animals

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Abstract In 2012 the regulatory bodies on botanical and zoological nomenclature have decided that papers describing new species and other taxa can now be published in electronic-only journals or books. This decision opens up open access journals for the publication of discoveries of new animals and plants on earth. Rules and regulations for electronic publishing of papers introducing new scientific names are explained.

Keywords Zoology, botany, nomenclature, science communication

The year 2012 brought pivotal developments for both botany and zoology. The International Botanical Congress¹ and the International Commission on Zoological Nomenclature² decided to allow electronic-only publication for nomenclatural purposes. Nomenclature is the scientific naming system for taxonomic units (taxa) in biology, such as species, genera, and families. Before this, descriptions of new taxa and other acts involving scientific names of animals and plants were required to be in a paper publication.^{3,4} From 2012 onwards, such information can be published in electronic-only outlets, provided they fulfill certain criteria. These criteria in zoology are:²

- wide accessibility;
- issued for the permanent scientific record (online posting for a limited time is not accepted);
- fixed content and layout (eg a protected PDF file, not an editable Word file);
- date of publication must be stated in the work itself (ie paper or book); a note on the journal's webpage is not sufficient;
- work (ie a paper or a book) must be registered in ZooBank, the Official Registry of Zoological Nomenclature,⁵ and contain evidence that such registration took place (eg exact date of registration or/and registration number); registration of new animal names is not mandatory, but encouraged;⁶
- registration entry must give the name and internet address of an organization other than the publisher that is intended to permanently archive the work in a matter that preserves content and layout, and is capable of doing so (needs not to be stated in the published work itself; such archives are currently Bioline International, CLOCKSS, Hathitrust, LOCKSS, National Digital Heritage Archive (New Zealand), Portico, and PubMedCentral);
- registration entry must contain ISBN or ISSN.

Botany has fewer and slightly different criteria:⁷

- electronic material in portable data format (PDF);
- in an online publication with ISSN or ISBN;

- accessible electronically via the World Wide Web;
- only final version (version of record) is considered effectively published and cannot be changed or revised;
- from 2013 onwards, names of new taxa of fungi need to be registered in a recognised repository (eg Mycobank,⁸ Index Fungorum⁹), and the identifier issued by the repository needs to be included in the protologue.

All these provisions, particularly archiving and registration, attempt to ensure permanent retrievability of electronic works, often considered a more volatile medium than paper copy. Papers containing nomenclatural acts are semi-legal documents that need to be accessible and archived indefinitely.¹⁰

Allowing electronic publication for biological nomenclature is a tremendous step forward

With the number of open-access journals exploding,^{11,12} sticking to the paper publication requirement (for archival reasons) created an increasing impediment for the discovery of new life forms on earth. The immediate and free availability of open-access papers¹¹ is particularly advantageous for biodiversity research (new descriptions of animals and plants, revisions of whole groups of organisms, etc.) because the regions with the highest biodiversity are countries with the lowest library budgets. In developing countries, few print journals are accessible, and interlibrary loans are often impossible or too costly. For journals requiring subscription, HINARI,¹³ AGORA,¹⁴ or HighWire Press¹⁵ provide free access to the electronic version in developing countries. For access to journals following the open access model, no support system is needed, as the content is freely available anyway.

Drawbacks of the open-access model

Taxonomy, the formal, descriptive part of biodiversity exploration, is largely executed and published without proper funding.^{16,17} Amateurs, ie researchers not paid for their taxonomic activities, traditionally play a major role in discovering and describing new species.¹⁸ Even open-access fees as low as €15 per page (€300 minimum) as with *ZooKeys* or \$20 per page with *Zootaxa* can be too high if funding is unavailable. Journals grant waivers, but this business model may fail if the majority of authors qualify for and request waivers.

Taxonomy research is scattered over thousands of journals. Despite the emergence and growth of *Zootaxa*, a taxonomic mega-journal,¹⁹ core taxonomic journals containing most papers of interest to taxonomists do not exist.²⁰ This is because taxonomists have to consult all nomenclaturally relevant information (nomenclatural acts) on the studied taxa, disregarding quality, language, or publication outlet for such information. In the field of particle physics, a consortium (not authors!) pays 12 core

journals an average of \$1200 per paper for opening access.²¹ A similar model is highly unlikely for taxonomy.

Nevertheless, the open access market is rapidly developing with immense creative energy, not always directed in ethically acceptable directions,²² but sometimes creating virtually revolutionary experiments. For example, *PeerJ* offers life-long peer-reviewed publishing for just \$99, one article per year, or an unlimited number of papers for \$299 (per author).²³ With that in mind, open-access publishing might become affordable for unfunded research.

A word of advice for editors of electronic journals

Although scientific naming of organisms is heavily regulated to provide stability and avoid chaos, publishing papers with descriptions of newly discovered species is exciting and straightforward in the majority of cases. However, any paper containing nomenclatural acts (eg new descriptions) is a document that cannot be revised or retracted after publication. Any change to the contents of a paper needs to be done in a new document. Changing the pagination in the version of record from advance online publication to the issue-integrated version does not count as change in content, neither does adding bibliographical details such as an issue number. Following the nomenclatural rules^{2,4,7} is critically important for avoiding any problem at a later stage. With electronic publishing permitted for nomenclatural purposes, some new rules need to be considered as outlined above. Editors and publishers should be aware that the date of publication, that needs to be stated in zoological papers or provided somewhere for botanical papers, is the date of publication of the version of record. The date of a preliminary online publication does not count, even if the final version is similar. Publishers should ensure that their products are properly archived. Editors must request the registration of new mycological names and zoological works if they contain nomenclatural acts. It would be helpful if they would also require the registration of zoological names in ZooBank,⁶ which is currently voluntary.

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