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Abstract

Most natural history institutions in Europe have been scientific publishers since their foundation and have a long scholarly publishing tradition. Nowadays, they are confronted with rapid technological developments and face complex strategic and technical questions related to visibility, access, format, and the financial structure of their titles. These issues require a common vision and an international strategy to ensure that the community acts in a consistent and coordinated way. A consortium of institutions is thus launching the *European Journal of Taxonomy* to provide an alternative, public Open Access business model, where neither authors nor readers have to pay fees for subscriptions or publication. This paper focuses on the benefits for the institutions on taking greater control over their communication process.

Keywords

Taxonomy; European consortium; Natural history institutions; Open Access; Scientific publishing

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Resumé

La plupart des institutions d'Histoire naturelle en Europe sont éditrices scientifiques depuis leur fondation et ont une longue tradition de publications scientifiques. De nos jours, elles sont confrontées à des développements technologiques rapides et doivent faire face à des questions stratégiques et techniques complexes liées à la visibilité, l'accès, le format et la structure financière de leurs titres. Ces problématiques exigent une vision et une stratégie communes afin d'assurer à la communauté scientifique une action cohérente et coordonnée. Un consortium d'institutions lance ainsi le Journal européen de Taxonomie proposant un modèle économique public alternatif où ni les auteurs, ni les lecteurs ne doivent payer pour la lecture ou la parution des articles. Ce papier décrit les avantages pour les institutions d'une réappropriation de leur processus de communication.

Mots clés

taxonomie; consortium européen; institutions d'histoire naturelle; libre accès; publications scientifiques

Introduction

Natural History Institutions (NHIs), such as research institutions, herbariums, botanical gardens, and museums, have traditionally been created to contribute to the understanding of the natural world and to disseminate this knowledge. Their core mission can be divided into three main objectives: (1) to establish and maintain biological collections (carried out by herbaria, zoological archives, et cetera); (2) to conduct scientific research associated with the collections; and (3) to disseminate scientific knowledge within the scientific community and to the general public. This is one of the reasons NHIs have been scientific publishers since their creation, some of them since the end of the 18th century. Indeed, as scientific establishments and public services, NHIs have to make sure that publicly funded research is easily and sustainably accessible to everyone who needs it, independent of geographic location or scientific domain. NHI publishers are facing rapid technological changes and an increasing abundance of information that requires dissemination. They face complex strategic and technical issues related to the visibility, access, format, and financial structure of their titles. In taxonomy, as in any other scientific field, the growing dissatisfaction with the established scholarly communication system results from a variety of factors, including rapidly rising subscription prices, concerns about copyright, slowness of the publication process, and poor dissemination (Van de Sompel, Payette, Erickson, Lagoze, & Warner, 2004).

The real challenge for institutional journals is to keep up with the rapid developments in online services and standards, while fulfilling their mission of disseminating scientific results. These issues require a common vision for the institutions and an international strategy to ensure that the community acts in a consistent and coordinated way. In 2008, under the umbrella of the 6th Framework Programme, the European Distributed Institute of Taxonomy (EDIT) Research Network of Excellence established a group of publishing experts from NHIs to critically address the rapid changes that are affecting scholarly publications in their field. This network has given

birth to a new journal, the *European Journal of Taxonomy* (EJT). In this paper, we will describe the rationale behind the creation of EJT. This new e-journal is adopting modern electronic publishing practices so as to enable increased production and a wider circulation of the results of taxonomic research.

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Publishing in taxonomy

Taxonomy and systematics involve classifying organisms according to natural and evolutionary relationships. The current system used by all scientists dates back to the 18th century, when the Swedish botanist Carl Linnaeus established (in 1735) a way of naming, ranking, and classifying organisms. Since then, all animals and plants have been named following an ordered system. To avoid the confusion that would be caused by several people giving different names to the same organism at the same time, the taxonomic communities have long-established codes of practice, including the *International Code of Zoological Nomenclature* (ICZN) and the *International Code of Botanical Nomenclature* (ICBN). Nomenclature is the procedure of assigning names, while taxonomy is the science that studies natural and evolutionary species. The codes of nomenclature promote stability and universality in the scientific naming of animals and plants (ICZN, 1999; ICBN, 2006) and compliance with them is essential to the field, to ensure that only one official and accepted name is provided for a designated species. Furthermore, the codes help to rationalize the scientific descriptions published. Indeed, taxonomic papers are legal documents that determine the legitimacy of a name of a (new) species; however, taxonomic publications cover every creation, description, classification, modification, and use of a taxon.

For example, according to the ICZN, a species name is only valid once it has been published with a description of the species. This publication credits the author of the description as the “author” of the new species. Therefore, both recent and historical publications are the primary sources in taxonomic studies. The taxonomy of any given group of organisms thus currently consists of the sum of the species’ descriptions and revisions published in the printed literature (Godfray & Knapp, 2004; Smith, Rycroft, Harman, Scott, & Roberts, 2009). The scientific literature dealing with biodiversity has been estimated at approximately 5.4 million volumes (around 800,000 monographs and 40,000 journal titles) since 1469 (Gwinn & Rinaldo, 2009). A key aspect of taxonomic publications over the past 250 years has been descriptions of species and their comparison to other species. The access to publications with descriptions of species is critical to the field. The difficulty in accessing published literature on biodiversity has always been one of the major obstacles to efficient and productive research. This is particularly true in the field of taxonomy, since the descriptions are scattered across thousands of journals, many of which are difficult to find and access.

The Internet and the digital world have radically changed the way taxonomy is addressed, not only because they increase the accessibility and visibility of scientific information, but also because they have changed the way taxonomic research is conducted. As Godfray and Knapp noted, new technological “innovations [are] likely to influence taxonomy in the next decade or so” (2004, p. 569) because the Web provides a much bigger

capacity to archive the information than what is feasible on a printed format and allows innovative use of techniques and tools that are impossible in print, such as interactive keys, 3-dimensional images, movies, and sound. Taxonomy is thus one of the sciences that would benefit from Internet browsing and cross-linking of resources. Moreover, taxonomic treatises can be long papers, often considered monographs; they have many illustrations and are aimed at a specialized audience (Godfray & Knapp, 2004; Scoble, 2004; Smith et al., 2009). The need to accommodate large papers restricts the number of papers that taxonomic journals can afford to publish each year, especially in print. This places a special financial constraint on the business model of print journals on taxonomy.

Major progress has been made in two main areas, namely, in the compilation of catalogues of species (such as the International Plant Names Index [IPNI], Catalogue of Life, World Register of Marine Species, The Plant List), and in the digitization of museum (including libraries) and herbarium collections (see the Global Plant Initiative Project and the Biodiversity Heritage Library) (Godfray & Knapp, 2004). However, as developed further, three particular challenges prevent journals, especially institutional or small journals, from moving online (Bénichou & Duin, 2009). These relate to archiving, rules of the codes of nomenclature, and journal exchange programs with other institutions. If the first two issues apply to all taxonomic journals, the latter is specific to NHI publishers.

Publishing within natural history institutions

In the past decade, electronic publishing has changed the scholarly publishing landscape for publishers as well as for readers. For publishers, e-publication offers a new medium, which has dramatically improved access to the scientific information they publish. This speeds up the publication process, so information becomes available to the public much faster and provides additional services to readers. Publishers of scholarly information and libraries will have to adapt their workflows and business models to these new technologies, with significant implications for their organisations (Dewatripont, Ginsburgh, Legros, Walckiers, Devroey, Dujardin, Vandooren, Dubois, Foncel, Ivaldi, & Heusse, 2006).

Many NHIs publish one or more research journals, often in house. Most of the time, journals are run by isolated members of staff. Very few institutions have a complete publishing team. In addition, publishing institutions are confronted with various technological revolutions in scientific publishing that pose complex and strategic questions. The lack of technical and editorial staff in the institutions who would be able to address these technical issues is problematic. This lack of expertise, skills, and knowledge prevents the institutions from being innovative in their mission to disseminate the scientific results. It is essential today to invest in a strong network of skilled professionals in scientific publishing that will be able to innovate and contribute to a set of common policies for the dissemination of publicly funded scientific information in natural history. As shown by Raym Crow, “this lack of in-house resources becomes especially critical as the transition to electronic dissemination accelerates” (2006, p. 8). In 2008, publishing staff and experts within NHIs began to meet under the umbrella of the EDIT network in order to address these issues.

The EDIT network was a consortium of 29 leading European, North American, and Russian natural history institutions, funded by the European Commission from 2006

to 2011 (see <http://www.e-taxonomy.eu>). Sixty-five journals are published by 25 of the EDIT members. Three quarters of these journals publish taxonomic and systematic research. In 2011, only 78% of these 65 institutional journals were available online and 50% were Open Access (i.e., 28% were online but the reader paid by subscription), compared to 96% of all STM journals having been made available online by 2008 (Ware & Mabe, 2009).

The 65 listed journals published within EDIT can be classified into three groups:

1. Small journals with no or a low impact factor that fail to attract good papers and struggle to publish. They are faced today with a high risk of extinction.
2. High impact journals (with an impact factor around or above one, which is a good impact factor for descriptive taxonomy) that attract more papers than they can handle rapidly, which makes the publication timeline longer.
3. Commercially-outsourced journals that have lost their editorial control. Indeed, under the influence of the rush for an ever-increasing impact factor (IF), those journals have shifted their editorial scope from low-impact, descriptive taxonomy to phylogenetic and molecular research.

The publishing process within NHIs does not differ from scholarly publishers in other fields. Like other publishers, they deal with print technologies, copyediting, layout, print runs, proofreading, international standard numbers (such as ISSN [International Standard Serial Number], ISBN [International Standard Book Number], and DOI [Digital Object Identifier]), peer review processes, obtaining ISI impact factors, abstracting, the optimization of the dissemination processes, and intellectual property rights and fair use.

NHIs can bring together all the actors of the editorial chain, including scientists (as authors, referees, editors, readers) and all those on the technical side of the job (desk-editors, publication managers, librarians). Ian Rowlands and Dave Nicholas (2005) report that 76.7% of the authors are at some stage referees, 8% are also editors-in-chief, and 23.6% are part of an editorial board. Most natural history publishers are not-for-profit publishers, while many scholarly publishers are commercial businesses or aligned with commercial publishers. It is difficult to estimate how many of those journals are presently published by the NHIs themselves, and how many are outsourced to a commercial publisher or are published on behalf of the NHI by a commercial publisher. Based on data from Crow (2006), we extrapolate the ratio of journals published by commercial publishers to reach 62%, among which 17% are published on behalf of institutions. Among the 65 journals studied here, 18% are actually published by a commercial publisher on behalf of the NHI to which they belong.

All NHIs apply similar editorial processes, and their publishing departments, if in place, have strong relations with the international (natural history) libraries to sustain exchange programs. In general, the institutional journals are long-standing journals (30% of them are at least 60 years old and 16% are older than a hundred years), with low print runs (between 50 and 500 copies). Studies on the costs of scholarly publications (Houghton, Rasmussen, Sheehan, Oppenheim, Morris, Creaser, Greenwood, Summers, & Gourlay, 2009; Wellcome Trust, 2004) show that public funds are the major source of financial support of a publication (for example, salaries for authors, editors, and referees; see Table 1). Traditionally, public funds are spent on reader subscriptions or author-paid fees for Open Access (OA). These fees include profits for commercial publishers when the journal is outsourced to a for-profit publisher.

Table 1. Publishing activities and access status of scholarly information. Workflow sections financed with public funding.

	For-Profit model	For-Profit model OA	Not-For-Profit model	Not-For-Profit OA
Research by author	Yes	Yes	Yes	Yes
Review process	Yes	Yes	Yes	Yes
Editing	No	Yes *	Yes	Yes
Library subscriptions	Yes	No	No	No

* author pays (= institution, but not always)

NHIs, scientific societies, and small publishers produce many taxonomic publications. In the year 2000, around 15% of the marine species described per year were described in a journal run by an institution (Bouchet & Fontaine, 2008). If the journals published on behalf of an institution are also considered, this percentage rises to 27%. Thus, NHI journals are a significant contributor to taxonomic publication. Among 33 journals owned by the EDIT partners, 1,450 new species were described in 2010. Considering the consensus stating that 19,000 species are described a year (Anonymous, 2012), this represents nearly 8% of all the species described worldwide in 2010.

As scientific publications are the fruits of publicly funded research, we strongly believe that scholarly publications should be made accessible and free to all. Moreover, there is evidence that not-for-profit publishers price their products at one third of the price of those of for-profit publishers (Dewatripont et al., 2006). By publishing their own journal, institutions are able to set the conditions of access to the publicly funded research that they perform, while adopting modern publishing practises provided by the digital world.

There is a growing consensus that results of publicly funded research should be made accessible to all (Costello, 2009). The Open Access movement has gained support in the research community and has given birth to collective declarations such as the Budapest and Berlin Declarations¹; however, there are still strong economic forces at work, and commercial for-profit publishers are reluctant to risk the guaranteed income of low-circulation, specialized, and expensive journals that are purchased by a few specialized libraries. Similarly, learned societies simply cannot abandon the income

from their subscriptions because the publication of their journals depends on these revenues (Godfray & Knapp, 2004). Yet, moving online will no doubt improve the visibility of these journals and thus increase their citation rates.

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The most important provider of bibliometric data on scientific publications is the Institute for Scientific Information (ISI), presently held by Thomson Reuters. Even though the ISI impact factor (IF) is criticized in scientific fields such as taxonomy, and although various alternative metrics for science are being developed (Thomaz & Martens, 2009; Duin & Besselaar, 2011), the impact factor is still a measure widely used by various universities and funding agencies to evaluate scientists according to the IF of the journal in which they publish. The citation life of a taxonomic paper lasts decades or even centuries, rather than years or months. Thus, taxonomic journals tend to have a low citation rate during the 2-year period used to calculate the IF. This is one of the biggest challenges for journals publishing descriptive taxonomy, and this is why journals are more and more reluctant to consider publishing descriptive taxonomic publications (Agnarsson & Kuntzer, 2007). This cycle is partly because many taxonomic publications are not included in the automated citation metrics that generate IF; if they were, past and present citation rates would increase. Thus, if journals outside the IF system are struggling to modernize, then joining an initiative like EJT could benefit both themselves and taxonomic citations overall.

For now, the result of the importance of journals' IF is that there are fewer communication channels for alpha- (descriptive) taxonomy, and those that do exist usually do not have wide circulation. In order to break out of this downward spiral, a consortium of NHIs has launched the *European Journal of Taxonomy*. In doing so, the consortium had to first overcome the particular obstacles related to publishing taxonomy, which are detailed in the following section.

Challenges faced by NHI publishers

Next to the advantages that come with the digitization of academic journals, there are also challenges for publishers, some of which are specific to the field of natural history research. First, most of the journals in the field are long-standing titles with a long shelf life because of the legal status of taxonomic names. Thus, the sustainability of online support and access to the journal archives must be guaranteed before going electronic. It is crucial for natural history research to ensure that the information will still be readable centuries from now.

A second challenge is the current use of nomenclature rules in zoology, botany, and microbiology, which differ in regard to the recognition of species' names in e-only publications. Nevertheless, the Nomenclature section of the International Botanical Congress, held in Melbourne in July 2011, decided that new names in botany may be published in electronic format only (i.e., without the distribution of printed matter), starting from January 1, 2012 (Cressey, 2011). In order to ensure perennial access, publishers are strongly recommended to provide the articles in a format compliant with archiving, such as PDF/A files. With regard to the ICZN (1999), electronic publications are allowed, provided that five copies are deposited in major libraries. Article 8.6 of the International Code of Zoological Nomenclature states that "for a work produced after 1999 by a method other than printing on paper to be accepted

as published within the meaning of the Code, it must contain a statement that copies (in the form in which it is published) have been deposited in at least 5 major publicly-accessible libraries which are identified by name in the work itself" (ICZN, 1999). We hope that zoologists will soon follow their botanist colleagues and accept e-only publication, provided perennial access is guaranteed, as valid for the description of new species and nomenclatural acts.

A third barrier, which would prevent institutional journals from shifting from paper to e-only journals, concerns library exchange programs. For many decades, libraries saved costs in subscribing to journals by exchanging journals with other institutions. These exchange programs could concern hundreds of titles and could thus be important for the libraries of the NHIs. Going e-only would mean that the institutional libraries would not be able to acquire publications for "free" as they used to, because institutions that go "e-only" cannot provide their exchange partners with an exchange copy, except if they are able to give free online access. The exchange programs have been a significant source of acquisitions for research libraries in NHIs almost since their origin. For instance, 35% of the books and journals of the scientific library of the Natural History Museum of London come from exchange programs with other institutions (Bénichou & Duin, 2009). Such exchanges are now in decline, however (see Figure 1), and a clear policy within European NHIs is needed to manage this decline in an elegant and cooperative way. Of course, if all journals went electronic, they could still be exchanged; but this would require coordination and planning. For example, it would be necessary to define what "exchange for free" means, because the exchange programs do have a cost to institutions; for example, in printing extra copies and especially in mailing them. Although the exchange programs are generally perceived as being cheaper than purchasing access, it is not a free service. Mailing hundreds of free copies around the globe indeed amounts to a significant budget.

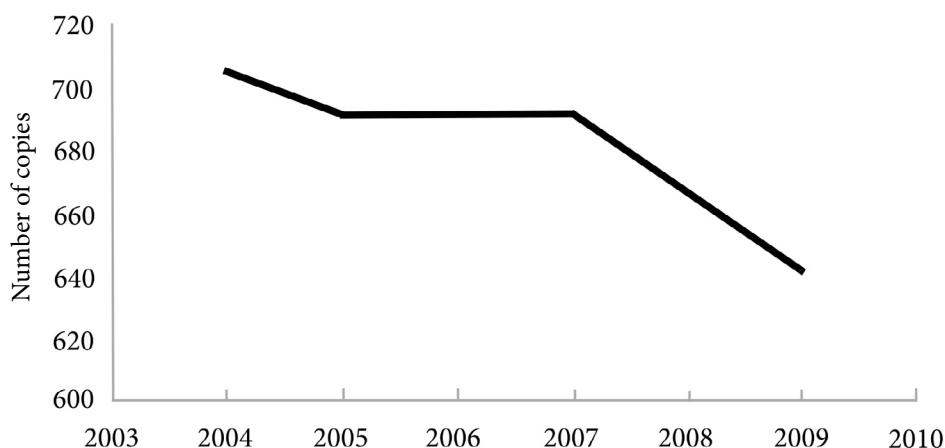


Figure 1. Recent changes in journal exchanges at the Natural History Museum (London) (Higley, 2009).

Nevertheless, ending the exchange programs would need to involve all libraries and academic presses of all institutions concerned. This, more than any other subject, would require a common vision and a collective (European) strategy, without which the acquisitions of libraries would be increasingly fragile, particularly in the context

of the budgets that are already stretched by the annual increase in subscription fees of commercial publishers. According to the report of the European Commission of 2006 (Dewatripont et al., 2006), the prices of the journals between 1975 and 1995 increased between 200 and 300% beyond inflation. Since the technological revolution of 1995, prices continued to increase, but less so than before. The same report indicates that the prices of journals, for a given discipline and in equal quality, published by commercial publishers, increased three times more than those published by not-for-profit publishers, such as NHIs.

The European Journal of Taxonomy

As an answer to the challenges described above, a consortium of NHIs has launched the *European Journal of Taxonomy* (EJT), providing an alternative, public, Open Access business model, where neither authors nor readers have to pay fees for subscriptions or publication. These costs are being borne by the supporting NHIs. The journal was launched in June 2011, and the first EJT article was published in September 2011.

During the last ten years or so, at least four other taxonomic e-journals have been initiated. Prominent amongst these are *Zootaxa*, (launched in 2001) and *Phytotaxa* (launched in August 2011), both published by Magnolia Press, and *Zookeys* (launched in 2008) and *Phytokeys* (launched in 2010) published by Pensoft. All are led by taxonomic researchers rather than big commercial publishers. The success of *Zootaxa* in particular, which now publishes almost ten times more new animal species descriptions per year than the next ranked journal (see <http://www.organismnames.com>), demonstrates the benefits of moving to e-publishing in taxonomy. These new e-journals bring many benefits to the taxonomic community, such as fast publication, no page limit, uploading, and linking the article to supportive data sets.

These journals have quickly attracted a high numbers of papers, demonstrating clearly that there is a clear need for modern online taxonomic journals. In 2006, *Zootaxa*'s Chief Editor and founder remarked that "although there are many journals that may publish taxonomic papers, they often fail to publish papers on descriptive taxonomy in a timely and cost-effective manner" (Zhang, 2006, p. 67). Five years later, the ever-increasing size of the mega-journal that *Zootaxa* has become confirms this statement. These e-journals have brought a number of benefits to the taxonomic community and will hopefully continue their performance. Nevertheless, we take the position that there is still a need for NHIs to continue acting as publishers of taxonomic information. The EJT fills a gap by combining the traditional business model of an embedded, institutional publisher, and at the same time embracing the advantages of modern web technology.

The project was initiated by a task force of six people² from the EDIT network who have worked together over the past two years (from June 2009) to propose a joint journal that would solve some of the issues identified in shifting from paper to e-only publishing for institutional journals in taxonomy. The task force was given a mandate by the EDIT directors to investigate the need and feasibility of launching such a joint e-journal. In April 2010, the group proposed the creation of the *European Journal of Taxonomy*, as outlined in the EJT business plan (Bénichou, Dessein, Duin, Gérard, Higley, & Martens, 2010), which is summarized and further developed in this paper.

With the success stories of taxonomic e-journals in mind and with the EJT business plan at hand, the task force travelled to publishing workshops and symposia, presented the EJT in director's meetings, and organized one-by-one meetings with key players from NHIs to explain the benefits and urgency for the launch of the EJT.

Following the recommendation of the EJT business plan, five institutions signed a co-publishing agreement in autumn 2010, creating the *European Journal of Taxonomy* (EJT) as a co-published journal, owned by the five institutions; a sixth member joined in September 2011³. Three institutions decided to merge existing journal titles into the new journal. The main motivations for institutions to join the EJT were: increased efficient use of resources and expertise necessary to have their journal on the Web; increased visibility of their taxonomic publication services; the need for a new, web-based publication outlet for taxonomy; and an embracing of the idea that European collaboration should also be encouraged between publishing staff.

The journal builds on the following main principles:

1. Electronic and Open Access

Since it is their mission, NHIs will ensure, by way of a free Open Access (OA) journal, that publicly funded research is easily, freely, and sustainably accessible to everyone who needs it, independent of geographic or scientific domain. The EJT will satisfy the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities. On the website, the journal will offer an interactive upload facility for information sources and databases that form part of the wider community in biodiversity sciences, such as the Encyclopedia of Life (EoL), Biodiversity Heritage Library (BHL), Global Biodiversity Information Facility (GBIF), International Plant Names Index (IPNI), et cetera.

2. No financial costs to authors or readers

The EJT endorses the view that the ability to use and reuse data as freely as possibly is the key to innovation and the further advancement of science (i2010 Digital Libraries Initiative, 2009). The most suitable economic model for the EJT is therefore online Open Access without article-processing charges. This economic model will remove possible barriers to researchers in publishing their work and to other researchers citing and referring to previously published data.

3. Permanent Open Access archives

Coordinating institutional resources will contribute to excellence, prevent repetition, and increase efficiency, while providing a secure long-term platform at minimum cost. To ensure the long-term storage of the articles and thereby solve the problem of sustainability of support, the EJT follows the LOCKSS principles.⁴

Following these principles, the EJT is an international, fully electronic, fast-track, peer-reviewed, Open Access journal in descriptive taxonomy, covering subjects in zoology, entomology, botany, and palaeontology, run by an editorial and a production team on behalf of the institutions that own and fund the title. There are no size limits to articles, and the production cost is borne by the supporting NHIs.

The EJT's scope is global; authorship and geographical region of study are not exclusively European. Authors are invited to build their research on European natural history collections by consulting extant material, or by depositing (type) material related to a published paper in the collection of a European NHI. The EJT takes the position that the "scientific community expects that type specimens will be deposited in suitable collections (e.g. museums, herbaria) and most journal editors make such action a prerequisite for publication of a print paper" (Costello, 2009). The same policy applies to EJT, which anchors the title in a collection-based research environment.

The EJT's management structure is similar to a typical academic peer-reviewed journal, comprising a steering committee (i.e., representatives of the owners) and a management committee (i.e., the editorial team, combining desk-editors and editors). One of the biggest challenges in day-to-day management is precisely that of (virtually) bringing together the editorial and technical team scattered throughout several countries in Europe and to organize an efficient production process and editorial workflow. The organizational principle of the journal is to make use of copyeditors trained in taxonomic research and employed by the publishing NHIs. Four copyeditors are dedicated to the EJT, most of whom work part-time for the EJT and part-time on another task for their institution. Researchers will only be asked to invest time where their scientific expertise is needed; that is, as authors, on the editorial board, or as a peer reviewer. Frequently, in scholarly publishing today, a number of journals are run completely by scientific personnel who fulfil both the editor and desk-editor roles. The latter technical work, carried out by scientists, often stays invisible in a journal's business model but is expensive for the organizations involved. In accordance with the philosophy of the EJT business model, we envision being more cost-efficient by hiring less expensive but professional copyediting staff to do the work, thereby letting scientists focus on their research work.

The average costs per manuscript have been estimated at approximately €1122 per article for a good-to-high quality subscription journal, and €1258 per article for a good-to-high quality author-pays journal (Wellcome Trust, 2004). This includes the personnel costs for desk-editing and IT maintenance. Mark Ware and Michael Mabe (2009) estimate first-copy costs per article to be around €1146. The EJT uses an alternative economic model to produce articles for a similar price (*c.* €1129 per 25-page article) (Bénichou et al., 2010).

The electronic distribution and enhanced online access of the EJT articles require an IT specialist to maintain the website, the archives, and to put in place the linkages with other biodiversity databases. The amount of technical time invested in the EJT will have to be adjusted to the number of pages to be published, which in turn is dependent on the number and quality of the papers submitted.

Working daily with a team scattered throughout several countries in Europe is challenging. We had to define an editorial workflow and a way of working that allowed several people to work efficiently at the same time, with the same level of responsibility. In order to facilitate the way people work together, we have decided to use an online journal submission and tracking system. The open-source Open Journal System (OJS) has been chosen because it shares the Open Access model and the spirit of the EJT. At an EDIT workshop (Copenhagen, 2010), the use of OJS was proposed as a suitable platform for taxonomic journals by Zhi-Qiang Zhang, and Jörgen Eriksson demonstrated how OJS was being used for the publication of several Nordic journals (see http://www.ub.uit.no/wiki/noap/index.php/Nordic_Journals_using_OJS). It is also compliant with the scholarly publication world (peer review management, LOCKSS system, Creative Commons licence, Open Access facilities, et cetera.). The website of the journal is maintained by the IT staff from London.

Once the papers are accepted for publication, after having been edited and laid out, a linked PDF, a PDF/A version (in order to be compliant with the Botanical Code), an XML version and an HTML version will be available to download from the website. The idea is to structure the articles in an XML format so as to enable effective and efficient data exchange. The data (names of species, description, geo-location, et cetera) must be extractable by the different databases widely used in the field; namely, EoL, Consortium for the Barcode of Life (CBOL), Catalogue of Life, World Register of Marine Species (WoRMS), IPNI, and Zoobank, to name some. The EJT thus aims to offer the modern interactive web-based facilities of high-level, high impact journals. It provides links to all leading biodiversity-related databases in which new names of species and genera will automatically be included.

As outlined above, long-term archiving of taxonomic publications is essential for the field, and NHIs have been doing this for more than 200 years. Curating collections—of specimens, of libraries and of databases—is the core business of NHIs, and their public-funding business model ensures that they can be relied on to provide secure long-term curation. This is also true for electronic publications; NHIs have a government-secured position, which makes their long-term archiving more reliable than that of most commercial publishers that come and go, merge with each other, or disappear altogether from the market. The EJT will secure its published volumes using both PKP's (Public Knowledge Project's) Open Journal System (implemented on the servers of the NHM in London) and the Biodiversity Heritage Library (also in the NHM in London). Both sites have secure mirror sites in several other locations around the globe.

The copyright issues, often presented as one of the big concerns when moving online, are avoided, since the journal is Open Access and requires the authors to accept a Creative Commons licence that allows others to share the work, provided they acknowledge the work's authorship and initial publication in this journal. The EJT's registration has been based in France for copyright reasons. French law on copyright explicitly allows the use and reuse of data published for scientific or educational purposes, as long as the authors are credited for their work.

A benefit for one user group will often benefit another, since they are often the same people but operating in different capacities (author, reader, editor, reviewer, et cetera; see Table 2). We expect that all will benefit from the collaboration of publishing expertise from different EDIT institutions in one journal. The EJT has to contribute to setting standards in scholarly publishing that are favourable to the dissemination and access of taxonomic information.

Some existing NHI journals were merged with the EJT as soon as it was launched, including the *Bulletin of the Royal Belgian Institute of Natural Sciences – Biology and Entomology*, the *Journal of Afrotropical Zoology* of the Royal Museum for Central Africa, and *Steenstrupia* of the Natural History Museum of Copenhagen. Other institutions may join in the future, which in turn may merge the publishing of additional journals. The EJT guarantees the naming of the discontinued titles and cross-linking to the website and online archives of the titles. The archives of the discontinued titles are managed and maintained by the Biodiversity Heritage Library (BHL). The other partners of the EJT (the museums of Paris and London and the National Botanical Garden of Belgium) added the EJT to their existing journal portfolios.

Table 2. Benefits for different user groups

Users
<ul style="list-style-type: none"> Access to results, including high-quality, independently peer-reviewed information, images, and data Ability to access content through other portals (e.g., EoL, GBIF, BHL, etc.) Use of only those parts of the available information that a user really needs
Authors (researchers)
<ul style="list-style-type: none"> Online submission without charges, which should encourage professional and non-professional taxonomists from all countries to submit their work for publication Fast-track publishing Increased visibility because of the Open Access model and linking with other web resources Simplified copyright through publishing under Creative Commons licence Greater citation rate due to greater accessibility and links with other online resources Reliable archiving
Publishers (institutions joining the consortium)
<ul style="list-style-type: none"> Increased visibility by being part of a state-of-the-art European project Maintain control over the dissemination conditions (scope, format, access and archiving) Living up to their public engagement missions Adjustment of the EJT's scope to ensure relevance to their institutions and the taxonomic field; the EJT will encourage the submission of papers based on the consortium's collections Strong political message within the European Research Area and good image of the consortium members, whilst providing an identifiable output from EDIT
The taxonomic field
<ul style="list-style-type: none"> Strong political signal to the wider scientific community about the importance of taxonomy Compliance with existing nomenclatural rules, and subsequently a contribution to the debate on the adaptation of the rules so as to allow "e-only" publication Strengthening the image of the field by making taxonomic information more visible, easily accessible, and reusable

Conclusion

Journals not only disseminate information, they also provide a mechanism of quality control and certification for the results published. Species names and descriptions are the primary metrics in quantifying biodiversity, including communicating information about food and agriculture, ecologically important species, pests, and pathogens, and species of popular and conservation interest. For taxonomy, the close link between publication and research is even more crucial, as publications are the legal document validating the naming of organisms. Moving online increases accessibility to taxonomic information and ensures the long-term preservation through electronic archiving; however, “such long-term preservation is a public-interest mission that may require public-sector commitment and funding, since one cannot expect or wish private actors to earn a sufficient return on this activity” (Dewatripont et al., 2006, p. 10). The EJT is an example of institutions adapting to modern technologies so as to better fulfil their public mission.

The creation of this new journal sends a strong political message to national and international funders of natural history research, showing the interest and capacity of NHIs in different countries to join forces and collectively claim a significant role in the organization of access to and dissemination of scientific information in their domain of research. By publishing their own joint journal, the institutions will be able to set conditions of access to the publicly funded research they perform.

The *European Journal of Taxonomy* builds a European cross-institutional cooperation through light governance, enhancing coordination, establishing a cross-institutional strategy at the European level, and promoting the adoption of common standards and ways of working, wherever possible. It also shows the ability of technical and scientific staff to learn to work together interactively.

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Notes

1. Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (2003); see <http://oa.mpg.de/berlin-prozess/berliner-erklarung>. As of April 2011, 302 foundations, universities, research institutions, libraries, and museums have signed the declaration. For the Budapest Open Initiative (2002), see <http://www.soros.org/openaccess/read.shtml>.
2. The current six first authors of this article.
3. Muséum national d'Histoire naturelle, Paris; National Botanic Garden of Belgium, Meise; Royal Museum for Central Africa, Tervuren; Natural History Museum, London; Royal Belgian Institute of Natural Sciences, Brussels; Natural History Museum of Denmark, Copenhagen.
4. Lots Of Copies Keep Stuff Safe. The journal's articles, in PDF and XML formats, will be deposited on the servers/data centres of the global Biodiversity Heritage Library partners. Initially, these will be in the UK and the USA. Subsequently, data centres will be added in China, Australia and South America.

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