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Note

Open Access in Botany

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ABSTRACT: Changes in communication processes in science as a result of the advent of electronic publishing and the internet are described. Open access to information is a key factor for the advance of science, but the existing copyright legislation and the monopolist position of commercial publishers influence the possible use of existing research results. The history of the Open Access movement and the "green" , "gold" and hybrid ways of achieving open access are briefly described. Important resurces for botany: e-journals, e-books, digitized collections and databases available in open access are recommended.

Key words: Open Access, botany, e-publications

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INTRODUCTION

Contemporary science is a huge global enterprise. The number of researchers engaged in it is close to the total number of researchers that ever lived and worked (Price 1963). Data are available in machine readable form as texts, images, multimedia, websites of institutions, publishers and journals, blogs, social networks, etc. Data analysis by machines creates the possibility to discover patterns that would not be possible for humans to discover. Linking of data gathered in different times and laboratories enables contemporary researchers to make new discoveries, using collected knowledge of previous generations. E-science, a term that is often used to describe contemporary science, stands for "enchanced science" (Sompel & Lagozze 2009)

Communication processes in science in the era of printed publications followed the chain author – publisher – library – user. This chain is stil present, but is changing dramatically because of electronic publishing and the Internet. Authors themselves can publish on the World Wide Web. Publishers of e-publications do not have to distribute them – it is enough to upload them on their server and provide protection that will let only the registered users read and download them. Libraries do not have to collect electronic publications - they provide access to publishers' servers and users do not have to go to library buildings - they just need to have access to the Internet and become registered library users to access commercial e-publications their library paid for.

All the possibilities for exploiting communications in science are still not being used, because of legal issues on the one side and because of resistance by publishers, institutions, research funders and scientists that belong to the "printed" world on the other side. Copyright legislation gives the author (or the person or institution that he transfers his rights to) the exclusive right to make copies of his work for a defined period of time, which is usualy 70 years after the death of the author. Copyright legislation is the same for the fields belonging to fine arts and entertainment, where authors live on fees for the use of copyrighted works, and for science, where authors live on salaries provided by institutions that employ them to do research. Researchers usually transfer their copyright to publishers. For them it is important to publish research results in high quality publications to gain scientific reputation that will secure them paid academic or research posts and new projects. Scientific journals are still the main communication channel in science and the main basis for

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evaluation of scientific research. The widely used tools for evaluation are bibliometric criteria, based on counting citations. Journal impact factor is the first and still most widely used bibliometric indicator for evaluation of journals and articles published in them, but there is a lot of controversy and discussions about its suitability. Even the creator of impact factor is talking about "Citation Sanity and Insanity -- the Obsession and Paranoia of Citations and Impact Factors." (Garfield 2005)

OPEN ACCESS PUBLISHING

Basically there are two kinds of publishers present now in the field of science. There are big commercial publishers, based in developed countries and with chief editors from those countries, who publish many journals from different fields, and small, non-commercial publishers, usually research institutions or professional associations, who publish a small number of journals (Guedon, 2001). The majority of scientific journals with big impact are published by a few commercial publishers (Elsevier, Springer, Wiley, Taylor and Francis ...), who have huge profits and raise their prices every year. The average price for scientific journals rose over 400% above inflation from 1986 to 2011 (ARL 2011). The annual profits for Elsevier, Springer and Wiley have been over 30% for years, higher than the profits of Apple or Google (McGill 2013). High prices of commercial journals are the reason why it is possible to say that instead of service for free flow of scientific results, those publishers became the brake for all those researchers whose institutions could not afford to pay subscriptions. The typical copyright statement, for example Springer's, states that: "*The copyright to this article is transferred to Springer ... effective if and when the article is accepted for publication. The author warrants that his/her contribution is original and that he/she has full power to make this grant... The copyright transfer covers the exclusive right and license to reproduce, publish, distribute and archive the article in all forms and media of expression now known or developed in the future, including reprints, translations, photographic reproductions, microform, electronic form (offline, online) or any other reproductions of similar nature.*"

The situation is pretty absurd: on research results achieved mostly with the support of public fundings - meaning that all tax-paying subjects paid their share - only the publishers get high profits. Researchers that are creating the scientific results and the public that financed them have to pay the publishers to get access. High prices are blocking the access to scientific information because many libraries, even in developed countries, cannot afford to buy all the journals that their users need. The movement for open access to scientific information appeared as a reaction to this situation.

The practice of providing free access to electronic versions of their articles, archived on special servers, was established at first between computer scientists, followed by physicists. In 1994, professor of cognitive science at the University of Southampton, Stevan Harnad, formulated and presented "Subversive Proposal" at the The Network Services Conference in London (http://eprints.soton.ac.uk/id/eprint/253351). The proposal explained why it would be much better for everybody if authors would post in online archives preprints of the refereed version of their articles accepted for publishing in scientific journals. The first free scientific online archive, http://arxiv.org, was established in 1991 by professor Paul Ginsparg at the Los Alamos National Laboratories, as a preprint service for physicists. ArXiv now includes papers from physics, mathematics, computer science, nonlinear sciences, quantitative biology, quantitative finance, and statistics and has over 900,000 articles in free access. From 2010 it has been hosted by Cornell University Library. Archiving preprints has become the norm for physicists. The second open access digital archive for self-archived articles in the cognitive sciences and related disciplines, Cogprints, http://cogprints.org/, was established by professor Harnad in 1997 at the University of Southampton. Now there are about 3.5 thousand digital archives worldwide.

The term "Open Access" as the name of the movement was used for the first time in February 2002 in the text of the Budapest Open Access Initiative (http://www.budapestopenaccessinitiative.org/). The declaration formulated at the Budapest meeting and signed by thousands of researchers defines open access as follows: "*By 'open access' to this literature, we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited.*"

In 2003, the Max Planck Institute organized in Berlin a conference on open access to knowledge, and the result was the first international statement on open access, the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (http://openaccess.mpg.de/286432/Berlin-Declaration). By September 2013 more than 470 institutions had signed the declaration, including the University of Belgrade, University of Nis, University of Kragujevac and Serbian Academy of Sciences and Arts. The declaration states that users must be able to "*copy, use, distribute, transmit and display the work publicly and to*

make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship. "

There are two possible roads to achieve open access to scientific publications – "green" and "gold". Green open access refers to the practice of self-archiving, when authors themselves deposit articles in an institutional or subject repository. Gold open access refers to publishing in an open access regime, when the processing expenses are paid by the institution, author, or research funder and the access is free to everybody with access to the Internet. Many non-commercial academic journals levied page charges long before open access became a possibility. When open access journals do charge processing fees, it is the author's employer or research funder who typically pays the fee and many journals waive the fee for authors in less-developed countries.

Under pressure from the international scientific community, commercial publishers began to allow authors to upload preprints of their refereed works to their personal websites and to institutional or subject specific digital repositories. Springer`s copyright transfer statement (http://static.springer.com/sgw/documents/1384288/application/pdf/62482_CTS+Format_T1.pdf) states: "*An author may self-archive an author-created version of his/her article on his/her own website and or in his/her institutional repository. He/ she may also deposit this version on his/her funder's or funder's designated repository at the funder's request or as a result of a legal obligation, provided it is not made publicly available until 12 months after official publication. He/ she may not use the publisher's PDF version, which is posted on www.springerlink.com, for the purpose of selfarchiving or deposit. Furthermore, the author may only post his/her version provided acknowledgement is given to the original source of publication and a link is inserted to the published article on Springer's website. The link must be accompanied by the following text: "The final publication is available at www.springerlink.com*"."

Some subscription journals have found that OA after an embargo period, even a very short one like two months, actually increases submissions and subscriptions (Suber 2012). The next step was the appearance of hybrid journals – journals that are accessible in full text only to those who paid for access, but authors can pay an extra price to publishers to allow all users to read and download their article from the publisher's website. Discussions on what is the best way to achieve free access to scientific results for all are on-going, but the important fact is that many institutions support it. The "green" open access is a threat to the monopoly held by commercial publishers, but the "gold" open access gives them the possibility to keep their position and just switch the main source of financing - from academic libraries to the author's employer or research funder.

Mandatory publishing in an open access regime, either green or gold, is the only way to change the situation in communication processes in science and to provide researchers, students, professionals and all others interested in scientific results with relevant and up-to-date scientific results. The United States Federal Agencies, Higher Education Funding Council for England, EU Research and Innovation programme Horizon 2020, CERN, Max Planck Institute and many universities, including Harvard University, Massachusetts Institute of Technology, University College London, mandate that their employee or researchers using their funds have either to post their articles in institutional repositories or to publish in gold open access journals. The number of gold open access and hybrid journals is constantly growing. A study done for the European Commission in August 2013 showed that 50% of a random sample of all articles published in 2011 indexed by Scopus database were freely accessible online by the end of 2012.

Publications in open access tend to be more used and more cited than publications that are not freely available on the Internet. Many young researchers belonging to the "born digital" generations do not want to bother visiting the libraries for articles that are not immediately available to them in full text. That fact is of special importance for open access journals from developing countries because it helps them to be evaluated according to their real impact on the global scientific community by being read and cited outside their local community (Popovic et al. 2012). Besides their quality, openness has helped the Serbian biology journals *Archives of Biological Sciences* and *Botanica Serbica* to become included in the main commercial databases used for good quality scientific evaluation - Web of Science and Scopus, and to be visible on Google and Google Scholar.

OPEN ACCESS BOTANY RESOURCES

Botanists are traditionally cooperative; they have always tended to share their results with colleagues all over the world, so the idea of open access to scientific information found supporters amongst them. According to the Directory of open access journals DOAJ (www.doaj.org), there are 91 journals with the subject BOTANY from 32 countries, of which 83 are published in English. From our region, one journal from Serbia and one from Croatia, two from Romania and three from Bulgaria are registered.

Information important for botanists is not only from journals, but also from books, herbariums, photo albums, manuscripts, maps, etc. Many institutions all over the world are engaged in digitization of their resources and establishing cooperation to create digital

libraries in an open access regime. Millions of digitized books are available for full-text search on Google Books, http://books.google.com/. Those books that are in the public domain (not under copyright protection) can be read and downloaded, and for books under copyright it is possible just to get information about the book and view of the pages where the searched term occurs.

A great collection of free e-books and digitized books and manuscripts is available as part of the Internet archive, https://archive.org/details/texts. The Internet Archive is a non-profit organization founded in 1996 in San Francisco "*with the idea to build an open access Internet library, offering permanent access for researchers, and the general public to historical collections that exist in digital format*". Now the Internet Archive includes texts, audio, moving images, and software as well as archived web pages. All the materials are available for use and download.

Databases in open access that have many registered articles and books important for botanists are Medline, available at the website of the The National Library for Medicine at http://www.ncbi.nlm.nih.gov/pubmed, and Agricola, available at the website of the National Agricultural Library at http://agricola.nal.usda.gov/. From 2008, published results of research funded by the National Institute of health and from 2013 funded by the US Department for Agriculture must be freely available to the public within one year of publication.

The easiest way to find data on open access mandates is to consult ROARMAP: Registry of Open Access Repositories Mandatory Archiving Policies at http://roarmap.eprints.org/. To find out about the policy of journals and their publishers concerning copyright and open access, the best service SHERPA/RoMEO - Publisher copyright policies & self-archiving based at the University of Nottingham at www.sherpa.ac.uk/romeo/.

ROAR is a searchable international Registry of Open Access Repositories indexing the creation, location and growth of open access institutional repositories and their contents. It is created and hosted by the University of Southampton at http://roar.eprints.org/ and provides data on and links to about 3,000 repositories around the world.

One of the most important resources for botanists is the Biodiversity Heritage Library, available at http://www.biodiversitylibrary.org/. "*The Biodiversity Heritage Library is a consortium of natural history and botanical libraries that cooperate to digitize and make accessible the legacy literature of biodiversity held in their collections and to make that literature available for open access and responsible use as a part of a global "biodiversity commons." The BHL consortium works with the international taxonomic community, rights holders, and other interested parties to ensure that this biodiversity heritage is made available to a global audience through open access principles. In partnership with the Internet Archive and through local digitization efforts, the BHL has digitized millions of pages of taxonomic literature, representing tens of thousands of titles and over 100,000 volumes.*" At the moment there are 73,161 titles, 132,292 volumes and 42,743,962 digitized pages available.

The other very important resource for global biodiversity is GBIF, available at http://www.gbif.org. "*The Global Biodiversity Information Facility (GBIF) is an international open data infrastructure, funded by governments. It allows anyone, anywhere to access data about all types of life on Earth, shared across national boundaries via the Internet. By encouraging and helping institutions to publish data according to common standards, GBIF enables research not possible before, and informs better decisions to conserve and sustainably use the biological resources of the planet.*". It provides access to more than 400,000,000 records that relate to evidence about more than one million species, "*collected over three centuries of natural history exploration and including current observations from citizen scientists, researchers and automated monitoring programmes*".

A very important open access source for botany is the International Plant Names Index, available at http://www.ipni.org/. "*IPNI is a database of the names and associated basic bibliographical details of seed plants, ferns and lycophytes. Its goal is to eliminate the need for repeated reference to primary sources for basic bibliographic information about plant names. The data are freely available and are gradually being standardized and checked. IPNI will be a dynamic resource, depending on direct contributions by all members of the botanical community. IPNI is the product of a collaboration between The Royal Botanic Gardens, Kew, The Harvard University Herbaria, and the Australian National Herbarium.*" It provides access to an online version of the International Code of Nomenclature for algae, fungi, and plants (Melbourne Code) adopted by the Eighteenth International Botanical Congress Melbourne, Australia, July 2011.

Important resources in open access can be found at the websites of world botanical gardens, like the New York Botanical Garden (http://www.nybg.org/), Royal Botanic Gardens, Kew, http://www.rgbkew.org.uk/, Harvard University Herbaria, http://www.huh.harvard.edu, Missouri Botanical Garden Library, www.botanicus.org, Swedish Museum of Natural History, http://www.nrm.se/inenglish.4.11e7cc61015db72f9800087.html. At the site of the Smithsonian National Museum of Natural History, Department for Botany, there is a collection of links to important institutions, publications, digital collections, databases, images etc. The list is available at http://botany.si.edu/references/botlinks/.

CONCLUSION

Many botanists worldwide are engaged in providing access to important botanical resources. More and more digitized collections of rare books, herbars, images, maps etc. are uploaded and made available every day. Botanists are publishing in open-access journals, cooperating in creating virtual libraries, communicating through social networks. We may conclude that open access to information is part of the botanists' culture, so we strongly believe that open access publishing will become a norm in botany.

REFERENCES

Association of Research Libraries. 2011. Monograph & Serial Costs in ARL Libraries, 1986-2011. In: ARL Statistics 2010-2011, Washington DC.

Garfield E. 2005. The Agony and the Ecstasy—The History and Meaning of the Journal Impact Factor. Chicago, 2005. Available at www.garfield.library.upenn.edu/papers/jifchicago2005.pdf. Abridged version of the above paper published in JAMA, 2006, **293**: 90-93.

Guédon J-C. 2001. In Oldenburg's Long Shadow: Librarians, Research Scientists, Publishers, and the Control of Scientific Publishing. ARL Publications, Washington DC.

McGill B. 2013. Follow the money – what really matters when choosing a journal. Dynamic Ecology, updated September 18. 2013. Available at http://dynamicecology.wordpress.com/2013/09/18/follow-the-money-what-really-matters- when-choosing-a-journal /

Popovic A, Antonic S, Filipi Matutinovic S. 2012. Rapid Changes of Serbian Scientific Journals: Their Quality, Visibility and Role in Science Locally and Globally. In: E-Science and Information Management. Communications in Computer and Information Science, 317, 61-70.

Price DJ de Sola 1963. Little Science, Big Science. Columbia University Press New York.

Sompel H, van de & Lagoze C. 2009. All aboard: Toward a machine-friendly scholarly communication system. In: Proceedings of The Fourth Paradigm, 193-199.

Suber P. 2012. Open Access, MIT Press, June 2012, p. 159, Cambridge, MA.

REZIME

Otvoren pristup u botanici

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U radu su date promene u procesima komunikacije kao posledica napredovanja elektronskog publikovanja i interneta. Otvoreni pristup je ključni uslov za napredovanje nauke, ali postojeća zakonska regulativa u odnosu na autorska prva i monopolska pozicija komercijalnih izdavača utiču na mogućnosti istraživačkih rezultata. Postojanje i razvoj otvorenog pristupa, „green", „gold" i hibridnog načina otvorenog pristupa je opisano u radu. Važni izvori za botaniku kao što su e-časopisi, e-knjige digitalizovane kolekcije i baze sa otvorenim pristupom su preporučljiv način publikovanja.

Ključne reči: otvoren pristup, botanika, e-publikacije