DO LATIN AMERICAN SCIENTIFIC JOURNALS FOLLOW DUAL-USE REVIEW POLICIES?

Edith Gladys Valles and Adriana Silvina Bernacchi

During the past decade, a number of journals have implemented dual-use policies in order to analyze whether the papers submitted for publication could raise concern because of the potential for misuse of their content. In this context, an analysis was performed on Latin American scientific journals to examine whether they apply formal written dual-use review policies and whether they inform their authors and reviewers about potentially sensitive issues in this area, as other international journals do. Peer-reviewed life sciences journals indexed in Latindex from Brazil, Mexico, Argentina, and Chile were analyzed. The Guide for Authors and the Instructions to Referees of 216 journals included in the Latindex catalogue (which means that they meet the best quality standards of the Latindex system) were screened for biosecurity-related information using the keywords *biosecurity*, *biological weapons*, and *dual-use research of concern*. Results showed that the screened publications had a total lack of dual-use review policies, even though some of them pointed out ethical behaviors to be followed related to authorship, plagiarism, simultaneous submission, research results misappropriation, ethical principles for medical research involving human subjects, guiding principles for the care and use of animals in research, research standard violations, and reviewer bias, among others.

THE PROCESS OF SCIENTIFIC PUBLICATION, through which new findings are reviewed for quality and then presented to the rest of the scientific community and the public, is a vital part of scientific development. New discoveries reported in research papers have helped to improve the human condition in many ways, by protecting public health, multiplying agricultural yields, fostering technological development and economic growth, and enhancing global stability and security.¹

Over the past several years, and especially following the terrorist events of September 11, 2001, and the subsequent attacks using the US Postal Service, there have been increasing calls to consider the possibility that research activities and published articles could be subverted for malevolent purposes because of their dual-use characteristics.

Several papers that could be considered as publications of concern because of the risk they may pose to society if the results were to be used for malevolent purposes have been published in prominent biomedical research journals. Examples include a description of a method for enhancing the virulence of a mousepox virus, which could be applied to human viruses;² a demonstration of how to reconstruct a human polio virus using mail-order supplies;³ research on how to enhance the virulence of a benign human smallpox virus (*Variola vaccinia*) used to vaccinate people against a more deadly form of the virus (*Variola major*);⁴ a mathematical model estimating how much botulinum toxin would be needed to infect the US milk supply and how many people would be killed;⁵ the complete genetic sequence of the 1918 pandemic influenza virus;⁶ the publications that

Edith Galdys Valles, DVM, PhD, and Adriana Silvina Bernacchi, PhD, are Technical Advisors, Scientific and Technical Research Institute for Defense, Buenos Aires, Argentina.

showed how to make the highly pathogenic avian influenza H5N1 virus transmissible by aerosol among ferrets;^{7,8} and the redaction of a paper about *Clostridium botulinum* toxin that is not neutralized by existing antitoxins.⁹

In 2003, a group of editors and security experts convened by the US National Academy of Sciences met to discuss the role of journals and editors. Concerns were raised about the potential abuse of published information with regard to safety and security issues raised by papers submitted for publication. The result of this meeting was a joint Statement on Scientific Publication and Security signed by a group of journal editors and authors, which was published in the journals *Science*, *Proceedings of the National Academy of Sciences*, and *Nature*.¹ This statement emphasized the importance of spreading science, but at the same time, it took into account that some information could be misused and would generate a potential risk if it were published.

As a consequence, journal editors discussed the importance of an international consensus on how to identify dual-use research issues. Some believed that the “Fink Report”¹⁰ definitions were a good starting point and a tool for establishing the basis for what was later developed by the National Science Advisory Board for Biosecurity (NSABB) as criteria for identifying “dual-use research of concern.”¹¹

In subsequent years, new policy statements on dual-use research (DUR) and dual-use research of concern (DURC) were developed by various groups, including the American Society for Microbiology, which “affirms the long-standing position of the Society that microbiologists will work for the proper and beneficent application of science and will call to the attention of the public or the appropriate authorities misuses of microbiology or of information derived from microbiology.”¹² Another example is the statement from the National Research Council Canada, which states in its Publishing Policy: Editorial and Ethical Responsibilities that “any paper or monograph submitted for publication that raises concern because of the potential misuse of methods, technologies or agents reported for nefarious purposes may be subject to editorial review to determine the risks and benefits to the scientific community and the public at large, that may result from the publication. The Editor will take a final decision concerning publication.”¹³ The World Association of Medical Editors (WAME) affirms that “editors should take into account whether studies are ethical and whether their publication might cause harm to readers or to the public interest.”¹⁴

As mentioned above, some journals have implemented dual-use review policies, but there is still a long road ahead. An article by van Aken and Hunger showed the results of a survey of 28 major life science journals, including English-language publishers (the vast majority) and Russian and Chinese journals.¹⁵ This study noted, “Few of the English-language publishers and none of the Russian and Chinese

publishers surveyed implement formal biosecurity policies or inform their authors and reviewers about potentially sensitive issues in this area.”^{15(p61)}

As it is unclear to what extent Latin American scientific journals apply formal dual-use review policies, we analyzed life science journals of this region, and results are presented below.

METHODS

In order to determine which Latin American countries had the most scientific output, a search was performed using SJR SCImago Journal & Country Rank for life science journals. The first 4 countries were Brazil, Mexico, Argentina, and Chile (Table 1).

Life sciences journals with peer review indexed in Latindex from these 4 countries were considered in conducting this analysis. The areas taken into account included agronomic sciences, biology, biochemistry, biotechnology, medical science and epidemiology, pharmacology, physiology, genetics, infectology, immunology, and microbiology. These 216 journals, which are included in the Latindex catalogue (this means that they meet the best quality standards of the Latindex system), are listed in Appendix 1. The Guide for Authors and Instructions to Referees from all these journals were screened for biosecurity-related information using the keywords *biosecurity*, *biological weapons*, and *dual-use research of concern* in Spanish, English, and Portuguese.

In order to show in detail the 5 most representative life science journals published in each of these 4 countries, we used SJR-SCImago Journal & Country Rank, the Latindex catalogue, and the JCR impact factor obtained in the Scientific Electronic Library Online (SciELO). The journals were selected based on their importance to the scientific community as reflected by their impact factor (Table 2). As can be observed in this table, the impact factors are not as

Table 1. Brazil, Mexico, Argentina, and Chile Indicators for 2012

Country	Total Documents ^a	H Index ^b
Brazil	55,803	305
Mexico	16,250	232
Argentina	11,041	222
Chile	8,111	194

Documents and H-index indicators of Brazil, Mexico, Argentina, and Chile, where the ranking parameters considered categorizing the searched journal performance were: *Region*: Latin America, *Subject Area*: all, *Year*: 2012.

^aTotal documents: output of the selected period. All types of documents are considered, including citable and noncitable documents.

^bH Index expresses the journal's number of articles (*h*) that have received at least *n* citations. It quantifies both journal scientific productivity and scientific impact, and it is also applicable to scientists, countries, etc.

Source: SCImago. (2007) SJR-SCImago Journal & Country Rank. <http://www.scimagojr.com>.

high as those of journals published in Europe or the United States, but they are the 5 highest-ranking journals that publish original research results in Latin American countries.

Scientific International Collaboration

Scientific international collaboration is a very important issue to analyze in the context of scientific publications; Figure 1 shows the percentages of documents that were produced by Brazil, Mexico, Argentina, and Chile in partnership with 1 or more countries. As can be seen, a high percentage of scientific work performed is done in collaboration with scientists who may work in countries that are more regulated than are Latin American countries.

FINDINGS

None of the 216 Latin American journals that were screened for biosecurity-related information has any written policy related to this topic. The journals did not consider any dual-use policy in their guidelines for publishing scientific papers, even though some of them addressed ethical concerns—for example, some follow the Vancouver rules for authorship,¹⁶ which are the foremost international ethical standards for scientific publications. Others include ethical standards for human and animal experimentation but contain no reference to dual-use concern issues.

The Brazilian journal *Memórias do Instituto Oswaldo Cruz*, regarding ethical policies, refers to the Singapore statement, which, in its section 14 related to societal considerations, says, “Researchers and research institutions should recognize that they have an ethical obligation to weigh societal benefits against risks inherent in their work.”¹⁷ This could be considered the closest to a dual-use policy without an explicit mention of it.

Increasing Awareness of Dual-Use Issues

The findings observed in Latin American journals reflect what is usually found in editorial boards of scientific journals in other regions of the world. These results might reveal, among other factors, a relatively low awareness of the potential risks of dual-use research among publishers and reviewers of scientific Latin American journals.

Resnik and colleagues reported the results of a survey conducted on high-impact life science journals to evaluate the application of dual-use policies by their editors.¹⁸ The results showed that, in addition to lack of awareness, there were other explanations given by editors for not applying dual-use policies in their journals. The reasons given included that editors might be aware of these issues but they did not consider them to be relevant, or that they had not taken the time to develop these policies, or that editors

thought that these kinds of policies were an inappropriate restriction on freedom of inquiry and the dissemination of knowledge.

The various reasons, including lack of awareness, that life science journal editors do not apply dual-use policies in their journals might reflect a need for an effective and feasible mechanism to oversee scientific information that has potential public health benefits but poses a significant risk for misuse if broadly disseminated.¹⁹

Education and International Collaboration

Part of the reason for a lack of awareness among life scientists and, in consequence, among scientific journal editors might be the fact that biosecurity and dual-use issues are rarely covered by university courses. To overcome this situation, we need a harmonized approach, with a broad reach to all of the scientific community, and in particular to publishers and reviewers, to explain what DUR and DURC mean, what the threats are, and what should be their roles as responsible communicators to the scientific community and to society.

In addition, the international community should be involved in finding mechanisms to minimize the risk of misuse of science, while paying particular attention to international scientific collaboration. According to the Proceedings from Bridging Science and Security for Biological Research: International Science and Security,²⁰ and using co-authorships as a measure of international partnerships, the percentage of scientific articles co-authored by international partners has doubled since 1997. International partnership was also observed among Latin American scientists, who often collaborate with colleagues from more developed countries, generating the need to face challenges of jurisdiction and governance, culture, scientific infrastructure, and export control policies, which are unfamiliar to many Latin American scientists.

Involvement in Shaping Policies

Government, international organizations, and nongovernment organizations need to be involved in shaping policies. The development of programs of outreach, education, and training in dual-use research, as well as information about policies governing publication, communication, and dissemination of dual-use research of concern, involve the scientific community in ensuring that their research activities are carried out in compliance with fundamental ethical principles. All these actions might constitute a way forward to effectively implement a culture of responsibility among scientists in Latin American countries, ensuring the promotion and observance of best practices in academia, industry, and government.

This outreach could be conducted in several ways. For example, at the national level, this process could be

Table 2. Information on Selected Journals

<i>JSSN</i>	<i>Title</i>	<i>Publisher</i>	<i>SJR</i>	<i>H Index</i>	<i>Total Documents (2012)</i>	<i>Impact Factor (p) 2012</i>	<i>Latindex Standards Met</i>	<i>Country</i>	<i>Ethical Issues Addressed</i>
0074-0276 (p) 1678-8060 (e)	Memórias do Instituto Oswaldo Cruz (Memories of the Oswaldo Cruz Institute)	Oswaldo Cruz Foundation	0.619	51	205	0.3211 (p) 2012	25 (p) 29 (e)	Brazil	Yes WMA, SSRI
1413-7054 (p) 1981-1829 (e)	Ciência e Agrotecnologia (Science and Agrotechnology)	Federal University of Lavras, MG	0.526	11	68	0.3892 (p) 2012	30 (p) 34 (e)	Brazil	No
1679-9275 (p) 1807-8621 (e)	Acta Scientiarum-Agronomy	State University of Maringá	0.624	9	100	0.2800 (e) 2012	NA (p) 36 (e)	Brazil	Yes IBC
0100-204X (p) 1678-3921 (e)	Pesquisa Agropecuária Brasileira (Agricultural Brazilian Research)	Embrapa Technological Information	0.613	29	228	0.5106 (p) 2012	29 (p) 34 (e)	Brazil	No
1678-9946 (p) 0036-4665 (e)	Revista do Instituto de Medicina Tropical de São Paulo (Journal of the Institute of Tropical Medicine of São Paulo)	Institute of Tropical Medicine	0.463	28	73	0.3471 (e) 2012	26 (p) 32 (e)	Brazil	Yes ICMJE WHO
1870-3453 (p)	Revista Mexicana de Biodiversidad (Mexican Journal of Biodiversity)	Institute of Biology National University of Mexico	0.241	8	138	0.2167 (p) 2012	33 (p) 35 (e)	Mexico	No

(continued)

Table 2. (Continued)

<i>ISSN</i>	<i>Title</i>	<i>Publisher</i>	<i>SJR</i>	<i>H Index</i>	<i>Total Documents (2012)</i>	<i>Impact Factor</i>	<i>Latindex Standards Met</i>	<i>Country</i>	<i>Ethical Issues Addressed</i>
0187-7380 (p)	Revista Fitotecnica Mexicana (Mexican Journal of Phytotechnology)	Mexican Society of Phylogenetics	0.171	4	63	0.1531 (p) 2012	32 (p) 32 (e)	Mexico	No
0336-2128 (p)	Boletín de la Sociedad Botánica de México (Mexican Bulletin of the Society of Botany)	Botanical Society of Mexico A.C.	0.166	4	0	0.1250 (p) 2011	31 (p)	Mexico	No
1405-0994 (p)	Enfermedades Infecciosas y Microbiología (Microbiology and Infectious Diseases)	Mexican Scientific Communications S.A.	0.104	3	26	NA	29 (p)	Mexico	No
1870-0195 (p) 1870-0195 (e)	Revista Mexicana de Ciencias Farmacéuticas (Mexican Journal of Pharmaceutical Sciences)	Mexican Pharmaceutical Association	0.114	4	29	NA	30 (p) 31 (e)	Mexico	No
0325-7541 (p) 1851-7617 (e)	Revista Argentina de Microbiología (Argentinian Journal of Microbiology)	Argentinean Society of Microbiology	0.202	13	56	0.1915 (p) 2012	31 (p) 34 (e)	Argentina	Yes ICMJE WHO IBC
0370-4661 (p)	Revista de la Facultad de Ciencias Agrarias (Journal of the Faculty of Agricultural Sciences)	National University of Cuyo, Argentina	0.200	3	41	NA	31 (p)	Argentina	No

(continued)

Table 2. (Continued)

<i>ISSN</i>	<i>Title</i>	<i>Publisher</i>	<i>SJR</i>	<i>H Index</i>	<i>Total Documents (2012)</i>	<i>Impact Factor</i>	<i>Latindex Standards Met</i>	<i>Country</i>	<i>Ethical Issues Addressed</i>
0326-2383 (p)	Latin American Journal of Pharmacy Formerly Acta bioquímica clínica latinoamericana	College of Pharmacists of Buenos Aires Province, Argentina	0.169	14	243	0.0233 (p) 2012	32 (p)	Argentina	No
0025-7680 (p) 1669-9106 (e)	Medicina (Buenos Aires) Medicine (Buenos Aires)	Institute of Medical Research	0.181	22	87	0.1812 (p) 2012	32 (p) 35 (e)	Argentina	Yes ICMJE
0031-9457 (p) 1851-5657 (e)	Phyton	Foundation Romulo Raggio	0.204	8	38	0.0196 (p) 2010	27 (p) 36 (e)	Argentina	No
0717-3458 (e)	Electronic Journal of Biotechnology	Pontifical Catholic University of Valparaíso and CONICYT	0.315	27	70	0.0795 (e) 2012	28 (e)	Chile	Yes IBC
0716-9760 (p) 0717-6287 (e)	Biological Research	Society of Biology of Chile	0.297	32	50	0.1386 (p) 2012	36 (p) 32 (e)	Chile	Yes WMA IBC APS
0304-5609 (p) 0718-1620 (e)	Ciencia e Investigación Agraria (Science and Agricultural Research)	Pontifical Catholic University of Chile	0.205	6	54	0.1379 (e) 2012	33 (p) 36 (e)	Chile	No

(continued)

Table 2. (Continued)

ISSN	Title	Publisher	SJR	H Index	Total Documents (2012)	Impact Factor	Latindex Standards Met	Country	Ethical Issues Addressed
0301-732X (p) 0717-6201 (e)	Archivos de Medicina Veterinaria (Archives of Veterinary Medicine)	Austral University of Chile	0.271	12	46	0.1951 (p) 2012	33 (p) 36 (e)	Chile	Yes IBC
0717-7917 (e)	Boletín Latinoamericano y Caribe de Plantas Medicinales y Aromáticas (Latin American and Caribbean Bulletin of Medicinal and Aromatic Plants)	University of Santiago, Chile	0.249	6	57	NA	35 (e)	Chile	No

ISSN = International Standard Serial Number for print journal (p) or electronic journal (e).

SJR = SCImago Journal Rank indicator (selected year 2012).

H Index = number of journal articles (*h*) that have received at least *n* citations over the whole period.

Total Documents (2012) = the total number of articles published by each journal during 2012.

Impact Factor from the Journal Citation Report (JCR), obtained from the Scientific Electronic Library Online (SciELO), for print (p) or electronic (e) journal. Impact factors are calculated based on a 2-year period (eg, 2012 impact factor is based on citations in 2010 and 2011).

Latindex: online information system for scientific journals from Latin America, the Caribbean, Spain, and Portugal. The Latindex catalogue includes titles that had passed an evaluation based on 33 international criteria of editorial quality for print journals (p) and 36 for electronic journals (e), previously checked and agreed by the Latindex system.

Editorial Issues Addressed: Some journals refer to general guidelines that include ethical standards but contain no reference to biosecurity issues:

ICMJE = International Committee of Medical Journals Editors; Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals.

WHO = World Health Organization, International Standards for Clinical Trial Registries.

WMA = World Medical Association Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects.

SSRI = Singapore Statement on Research Integrity.

IBC = Institutional biosafety or ethics committees.

APS = American Physiological Society, Guiding Principles for the Care and Use of Vertebrate Animals in Research and Training.

Figure 1. Percentage of documents written in collaboration between 2 or more countries (Source: SCImage Research Group. <http://www.scimagojr.com> [accessed March 3, 2014])

organized by life science societies and associations, which are important sources of guidance for scientists on the ethical standards to be applied to their disciplines. In some Latin American countries, government agencies can also help to organize the outreach process to reach not only scientists and academics, but also politicians, media, and science writers.

Although awareness and education represent a basic pillar in this process, some guidelines and oversight would be needed to achieve specific results. International organizations, such as the World Health Organization,²¹ could establish global guidelines for disseminating DUR and DURC research, so that editors can agree on ways to make author instructions more uniform, including agreeing on a consistent definition of DURC, with a checklist for reviewers to streamline the process. One way to achieve this goal could be through regional activities focused on the potential risk posed by DUR and DURC in Latin American scientific publications.

Moreover, in the Biological and Toxin Weapons Convention (BTWC), which was the first multilateral disarmament treaty banning an entire category of weapons, the term *biosecurity* arose for the first time in 2003 and has continued to evolve since then.²² It is worth mentioning that, because of the international community's concern about biosecurity policies, during the Seventh Review Conference, held in 2011, it was decided that this subject would become one of the 3 standing agenda items to be addressed annually during the 2012-2015 intercessional program.²³ Topics already discussed include, among others,

measures for strengthening national biological risk management; voluntary codes of conduct and other measures to encourage responsible conduct by scientists, academia, and industry; and education and awareness-raising about risks and benefits of life sciences and biotechnology.²⁴ In this way the BTWC has created a neutral platform, accessible to 170 states, which allows a multilateral dialogue about such issues as biosecurity and DURC policies and facilitates discussion among scientists and policymakers from different areas of the world, representing diverse environments, and with particular perceptions of biorisks.

Other nongovernment organizations, such as the International Federation of Biosafety Associations (IFBA), could play an active part in proposing guidelines with international scientific participation in order to discuss dual-use journal policies in the global community.

It is important to consider the role of national biosafety and biosecurity associations in the region, such as the Biosafety and Biosecurity Subcommittee, which belongs to the Argentinean Microbiology Association (AAM); the Biosafety Mexican Association (AMEXBIO); and the Brazilian Biosafety Association (ANBio). These associations have an important supporting role to play in educating on topics such as biorisk management, dual-use research, and codes of conduct through common outreach activities in their respective countries. These actions could include interactive online courses; the creation of regional networks among scientists that enable a more proactive role in this type of policy discussion; raising the awareness of journal editors, reviewers, and publishers regarding implementation

of dual-use policies and procedures; and the development of regional biosecurity guidelines that are informed by the sharing of common cultures and lifestyles. All these initiatives should enhance the ethical responsibility of communicating scientific information and diminish the risk that could endanger public health, agriculture, plants, animals, the environment, or materiel.

CONCLUSIONS

While we consider that this study reveals worrying results, we are not surprised by them. The findings suggest that we need to work harder in our scientific communities to increase awareness related to the new risks and threats.

Identification and consideration of DURC throughout the research process should be done before the submission of manuscripts for publication. If this is not done because identifying DURC is a task with which many scientists have no experience, then the editors of scientific journals will be the last step in the review process before the dissemination of information.¹⁹ Identifying DURC is subjective, and it is sometimes difficult for even the most knowledgeable scientists and editors.²⁵

International engagement is critical for reducing the risk of misusing biological research, given that science is globally distributed and has an effect on and relevance for members of every society. Although treaties, conventions, and dialogue between national governments and among international agencies are valuable, any meaningful progress will require strong relationships built on existing interactions of mutual trust and respect between individual scientists worldwide.²⁶

It is important to consider that even though freedom and openness are traditionally recognized as the central values governing the regulation of life science publication, there exists global risk that threatens the world. This is an area in which scientific journal editors, including Latin American ones, could contribute to mitigating and being effective safeguards against the misuse of legitimate research.

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Address correspondence to:
Dr. Adriana Bernacchi
International Agreements Department
Scientific and Technical Research Institute for Defense
J. B. La Salle 4397
Villa Martelli
Buenos Aires B1603 ALO
Argentina
E-mail: abernacchi@gmail.com

Appendix 1. List of the 216 Journals Screened for Mention of Biosecurity Issues in Guidelines for Authors and Reviewers

Note: For each journal, the instructions for authors and for reviewers that were available on the website were screened for biosecurity issues using key words *biosecurity*, *biological weapons*, and *dual use research of concern*. For every journal, relevant documents aimed at instructing authors were identified, but we cannot rule out the possibility that additional documents may have been overlooked, despite the utmost scrutiny and the use of search engines.

A Revista Eletrônica de Farmacia (Brazil)	Archives of Medical Research (Mexico)
A Unoesc & Ciência. ACBS (Brazil)	Archivos de Alergia e Inmunología Clínica (Argentina)
Acta Bioquímica Clínica Latinoamericana (Argentina)	Archivos de biología y medicina experimentales (Brazil)
Acta botânica brasileira (Brazil)	Archivos de medicina veterinaria (Chile)
Acta botânica mexicana (Mexico)	Archivos de salud de Sinaloa (Mexico)
Acta científica. Biologia e saúde (Brazil)	Arquivo Brasileiro de medicina veterinária e zootecnia (Brazil)
Acta Gastroenterológica Latinoamericana (Argentina)	Arquivos de biologia e tecnologia (Brazil)
Acta Scientiae (Brazil)	Arquivos de Ciências Veterinárias e Zoologia da Universidade (Brazil)
Acta Scientiae Medica (Brazil)	Arquivos do Instituto Biológico (Brazil)
Acta Scientiarum. Agronomy (Brazil)	Avances en ciencias veterinarias (Chile)
Acta veterinaria Brasileira (Brazil)	Avances en investigación agropecuaria (Mexico)
Agriscientia (Argentina)	BAG. Journal of Basic and Applied Genetics (Argentina)
Agro@mbiente (Brazil)	BIOCELL (Argentina)
Agro-ciencia (Chile)	Biociencia (Chile)
Agrociencia (Mexico)	Biociências (Maceió/Porto Alegre) (Brazil)
Agronomia (Brazil)	Biocyt (Mexico)
Agro Sur (Chile)	Bioéthikos (Brazil)
Alergia Pediátrica (Mexico)	Bio Farma: Revista Técnico Científica de Farmácia, Bioquímica e Análises Clínicas e Toxicológicas (Brazil)
Anais da Academia Brasileira de Ciências (Brazil)	Biological Research (Chile)
Anais da Academia Pernambucana de Ciência Agronômica (Brazil)	Bioquímica (Mexico)
Analecta veterinaria (Argentina)	Bioquímica y patología clínica (Argentina)
Anales de la Escuela Nacional de Ciencias Biológicas (Mexico)	
ARBS. Annual Review of Biomedical Sciences (Brazil)	

Appendix 1. (*Continued*)

- Bioscience Journal (Brazil)
 Biotecnia (Hermosillo, Son.) (Mexico)
 Biotecnia (Mexico)
 Boletim de Medicina Veterinária (Brazil)
 Boletín Micológico (Brazil)
 Boletín Sociedad Argentina de Botánica (Argentina)
 Bragantia (Brazil)
 Brazilian Archives of Biology and Technology (Brazil)
 Brazilian Journal of Biology (Brazil)
 Brazilian Journal of Genetics (Brazil); Gene Conserve (Brazil)
 Brazilian Journal of Infectious Diseases (BJID) (Brazil)
 Brazilian Journal of Medical and Biological Research (Brazil)
 Brazilian Journal of Microbiology (Brazil)
 Brazilian Journal of Plant Physiology (Brazil)
 Brazilian Journal of Veterinary Research and Animal Science (Brazil)
 Chilean Journal of Agricultural Research (Chile)
 Ciencia (Mexico, D.F.) (Mexico)
 Ciência Animal Brasileira (Brazil)
 Ciência e agrotecnologia (Brazil)
 Ciência e Cultura (Campinas) (Brazil)
 Ciência, Cuidado e Saúde (Brazil)
 Ciência & Educação (Brazil)
 Ciencia e investigación agraria (Chile)
 Ciência e Natura (Brazil)
 Ciência florestal (Brazil)
 Ciencia forestal en Mexico (Mexico)
 Ciência rural (Brazil)
 Ciências & Cognição (Brazil)
 Clínica Veterinária (Brazil)
 Comunicata Scientiae (Brazil)
 Crop Breeding and Applied Biotechnology (Brazil)
 Cuadernos del CEAGRO (Argentina)
 Darwiniana (Argentina)
 DOMINGUEZIA (Argentina)
 El Boletín Latinoamericano y del Caribe de Plantas Medicinales y Aromáticas (México)
 El Hornero (Argentina)
 Electronic Journal of Biotechnology (Chile)
 Enfermedades infecciosas y microbiología (Mexico)
 Engenharia Agrícola (Brazil)
 Engenharia na Agricultura (Brazil)
 Epidemiologia e Serviços de Saúde (Brazil)
 Evidência : Biotecnologia e Alimentos (Brazil)
 FABICIB (Revista de la Facultad de Bioquímica y Ciencias Biológicas) (Argentina)
 FAVE. Sección Ciencias Agrarias (Argentina)
 FAVE. Sección Ciencias Veterinarias (Argentina)
 Floresta (Brazil)
 Genetics and Molecular Biology (Brazil)
 Genetics and Molecular Research (Brazil)
 Genetics and Molecular Research (GMR) (Brazil)
 Horticultura Brasileira (Brazil)
 Horticultura mexicana (Mexico)
 Idesia (Chile)
 Jornal Brasileiro de Patologia e Medicina Laboratorial (Brazil)
 Jornal Brasileiro de Pneumologia (Brazil)
 Journal of Biotechnology and Biodiversity (Brazil)
 LABORAT-acta (Mexico)
 Latin American Journal of Pharmacy (Argentina)
 Medicina (Buenos Aires) (Argentina)
 Medicina Interna de México (Mexico)
 Medicina Universitaria (Mexico)
 Medicina y Sociedad (Argentina)
 Memórias do Instituto Oswaldo Cruz (Brazil)
 Micología Aplicada Internacional (Mexico)
 Miscelánea. Fundación Miguel Lillo (Argentina)
 Nacameh (Mexico)
 Nacional de Cuyo (Argentina)
 Perspectivas Médicas (Brazil)
 Pesquisa Agropecuária Brasileira (Brazil)
 Pesquisa Agropecuária Tropical (Brazil)
 Pesquisa Veterinária Brasileira (Brazil)
 Planta Danina (Brazil)
 Quebracho (Argentina)
 RCA. Revista científica agropecuaria (Argentina)
 REB. Revista de educación bioquímica (Mexico)
 RECIIS : Revista Eletrônica de Comunicação, Informação & Inovação em Saúde (Brazil)
 Recursos rurais (Brazil)
 Respyn. Revista salud pública y nutrición (Mexico)
 Revista Acadêmica: Ciências Agrárias e Ambientais (Brazil)
 Revista Americana de Medicina Respiratoria (Argentina)
 Revista AMMVEPE (Mexico)
 Revista Argentina de educación médica (RAEM) (Argentina)
 Revista Argentina de Microbiología (Argentina)
 Revista biomédica (Mexico)
 Revista Brasileira de Biociências (Brazil)
 Revista Brasileira de Botânica (Brazil)
 Revista Brasileira de Ciências Agrárias (Brazil)
 Revista Brasileira de Ciências Farmacêuticas/Brazilian Journal of Pharmaceutical Sciences (Brazil)
 Revista Brasileira de Educação Médica (Brazil)
 Revista Brasileira de Epidemiologia (Brazil)
 Revista Brasileira de Farmacognosia (Brazil)
 Revista Brasileira de Fisiologia Vegetal (Brazil)
 Revista Brasileira de Fruticultura (Brazil)
 Revista Brasileira de Saúde e Produção Animal (Brazil)
 Revista Caatinga (Brazil)
 Revista Ceres (Brazil)
 Revista Chapingo. Serie ciencias forestales y del ambiente (Mexico)
 Revista Chapingo. Serie horticultura (Mexico); Revista Ciência Agronômica (Brazil)
 Revista Chilena de Enfermedades Respiratorias (Chile)
 Revista Chilena de Infectología (Chile)
 Revista Ciencia y Salud (Chile)
 Revista científica de medicina veterinária. Pequenos animais e animais de estimação (Brazil)
 Revista da Associação Médica Brasileira (Brazil)
 Revista da Biologia (Brazil)
 Revista da Faculdade de de Zootecnia, Veterinária e Agronomia FZVA (Brazil)
 Revista de Biologia e Saúde da UNISEP (Brazil)
 Revista de ciencias agrarias y tecnología de los alimentos (Argentina)
 Revista de Ciências da Vida (Brazil)
 Revista de Ciencia y Tecnología (ReCyT) (Argentina)

Appendix 1. (*Continued*)

Revista de Ciências Médicas e Biológicas (Brazil)	Revista mexicana de ciencias farmacéuticas (Mexico)
Revista de Educación en Biología (Argentina)	Revista mexicana de fitopatología (Mexico)
Revista de enfermedades infecciosas en pediatría (Mexico)	Revista mexicana de ingeniería biomédica (Mexico)
Revista de la Asociación Médica de Bahía Blanca (Argentina)	Revista Mexicana de Micología (Mexico)
Revista de la Facultad de Agronomía (Buenos Aires) (Argentina)	Revista Pilquen. Sección Agronomía (Argentina)
Revista de la Facultad de Agronomía (La Plata) (Argentina)	Revista Saúde (Brazil)
Revista de la Facultad de Ciencias Agrarias. Universidad	Revista Saúde, Ética & Justiça (Brazil)
Revista de la Facultad de Medicina de la UNAM (Mexico)	Revista Scientia Agraria Paranaenses (Brazil)
Revista de la Sociedade Brasileira de Medicina Tropical (Brazil)	Revista Scientia Rural (Brazil)
Revista de medicina veterinaria (Argentina)	Revista Taurus (Argentina)
Revista de Microbiología (Brazil)	Revista veterinaria (Argentina)
Revista de Salud Pública (Argentina)	RIA. Revista de investigaciones agropecuarias (Argentina)
Revista de Sanidad Militar (México)	SaBios : revista de saúde e biología (Brazil)
Revista de Saúde Pública (Brazil)	Salud(i)cienza (Argentina)
Revista del CIZAS (Argentina)	Salud Colectiva (Argentina)
Revista del Instituto Nacional de Enfermedades Respiratorias (Mexico)	Saúde & Ambiente em Revista (Brazil)
Revista do Hospital das Clínicas (Faculdade de Medicina da Universidade de São Paulo) (Brazil)	Salusvita (Brazil)
Revista do Instituto de Medicina Tropical de São Paulo (Brazil)	Saúde em revista (Brazil)
Revista Eletrônica de Agronomia (Brazil)	Saúde e Pesquisa (Brazil)
Revista especializada en ciencias químico-biológicas (Mexico)	Scientia agrícola (Brazil)
Revista fitotecnia mexicana (Mexico)	Scientia Medica (Brazil)
Revista Gastroenterología Latinoamericana (Chile)	Simiente (Chile)
Revista HCPA (Brazil)	Técnica pecuaria en Mexico (Mexico)
Revista interdisciplinaria de estudios agrarios (Argentina)	Tempus – Actas de Saúde Coletiva (Brazil)
Revista latinoamericana de microbiología (Mexico)	Universitas Ciências da Saúde (Brazil)
Revista Médica de Chile (Chile)	Unoesco & Ciencia (Brazil)
Revista médica del Hospital General de México (Mexico)	Varia Scientia Agrárias (Brazil)
Revista Médica de Rosario (Argentina); Revista de Patología Clínica (Mexico)	Vertientes (Mexico)
Revista mexicana de ciencias agrícolas (Mexico)	Veterinária em foco (Brazil)
	Veterinária Mexico (Mexico)
	Veterinária Notícias (Brazil)
	Vittalle (Brazil)