UDK 050:669.1:6(497.4)
Review article/Pregledni članek

ISSN 1580-2949
MTAEC9, 42(4)151(2008)

MATERIALS AND TECHNOLOGY: HISTORICAL OVERVIEW

MATERIALI IN TEHNOLOGIJE: ZGODOVINSKI PREGLED

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Prejem rokopisa – received: 2008-01-10; sprejem za objavo – accepted for publication: 2008-07-14

This article describes the evolution of the scientific journal Materials and Technology (Materiali in tehnologije) from its predecessors, the Iron and Steel Journal (Železarski zbornik) and Metals Alloys Technologies (Kovine zlitine tehnologije). We present the statistical data for the journal relating to the years 2000–2006. The article looks at the electronic form of the journal and the influence of online publishing on the recognition and citing of Materials and Technology around the world. We show how the process of publishing the scientific journal takes into account ISO 9000. The article concludes with a description of how Materials and Technology will develop in the future.

Key words: scientific serial publication, Materials and Technology, historical overview, statistical data, electronic publishing, ISO 9000

Članek opisuje razvoj znanstvene serijske publikacije Materiali in tehnologije (Materials and Technology) od njenih predhodnikov, Železarski zbornik (Iron and Steel Journal) in Kovine zlitine tehnologije (Metals Alloys Technologies), do današnjih dni. Predstavljeni so statistični podatki za obdobje od leta 2000 do leta 2006. Opisan je razvoj elektronske oblike serijske publikacije in vpliv elektronskega izdajanja na mednarodno prepoznavnost in citiranje serijske publikacije Materiali in tehnologije. Predstavljen je potek izdajateljske dejavnosti serijske publikacije Materiali in tehnologije po ISO 9000. Članek se končuje z opisom, kako naj bi se serijska publikacija Materiali in tehnologije razvijala v prihodnje.

Ključne besede: znanstvena serijska publikacija, Materiali in tehnologije, zgodovinski pregled, statistični podatki, elektronsko založništvo, ISO 9000

1 ŽELEZARSKI ZBORNIK – IRON AND STEEL JOURNAL

The periodic publication the Iron and Steel Journal (Železarski Zbornik) (ISSN 0372-8633) started as a joint project of the Slovenian Ironworks company and the Metallurgical Institute Ljubljana, an independent institution and also the central R&D facility for the company. At that time, in decisions about the development of technology and products, theoretical knowledge was applied to an increasing extent in addition to experience, and at the management level it was considered useful to provide, for people working in R&D, the possibility to exchange ideas and R&D results. At almost the same time, the organisation of the first of annual conferences to provide a platform for oral presentations and discussions about R&D started. The journal was published from 1967 to 1991 as a quarterly, with only three numbers in the first volume. Published articles were classified according to the Universal Decimal Classification and later also using the ASM/SLA Classification. The abstracts were published in English and German, and from 1968 also in Russian. By 1975 the journal started to print authors' abstracts in Slovenian, German, English and Russian. Starting with Volume 2, the Annual Chronological Index was published in the last number of each volume or in the first issue of the next volume.

2 KOVINE ZLITINE TEHNOLOGIJE – METALS ALLOYS TECHNOLOGIES

In 1992 the Iron and Steel Journal (Železarski zbornik) changed its name to Metals Alloys Technologies (Kovine Zlitine Tehnologije) (ISSN 1318-0010). The name was changed to better cover the topics of the published articles, which had broadened from topics related to iron and steel to other metallic alloys as well as inorganic materials, polymers, and materials that are used in vacuum technology. A similar evolution took place in some western countries, e.g., in Great Britain the name of the journal Acta metallurgica was changed to Acta materialia, and in Germany the name Zeitschrift für Metallkunde was changed to Zeitshcrift für Materialkunde. Four issues per volume of Metals Alloys Technologies were published up to 1995, and six issues per volume were published from 1996 on. The manuscripts were submitted for publication from authors from Slovenia and abroad. The Annual Index, which included the chronological, authors' and subject index, was added to the last issue of the year. At the request of an industrial society, in 1997 a special number was published.

The role of the publisher was assumed by the Institute of Metals and Technology, and several institutions and industrial companies were brought in as associate publishers to provide a broader base. The

associate publishers were the companies ACRONI Jesenice, IMPOL Slovenska Bistrica, Slovenia steelworks, Metal Ravne, Talum Kidričevo, the National Institute of Chemistry, Institute "Jožef Stefan", the Faculty of Mechanical Engineering, and the Slovenian Society of Tribology. The Ministry for Science and Technology of the Republic of Slovenia (now the Ministry of Higher Education, Science and Technology of the Republic of Slovenia) funded some of the publishing expenses. The content was original scientific and professional contributions, review articles and expanded texts based on communications presented at the annual Conference on Materials and Technology.

All the articles were published according to international ISO standards (ISO 8, ISO 18, ISO 214, ISO 215, ISO 690, ISO 690-2, ISO 832, ISO 999, ISO 2145, ISO 3297, ISO 5122, ISO 8459/1-5) and in line with the Instructions of the Slovenian Research Agency (SIST ISO 4, SISI ISO 8, SIST ISO 215, SIST ISO 214, SIST ISO 18, SIST ISO 690-2, SISI ISO 999, SIST ISO 2145, SIST ISO 5122). These instructions required ISSN, standard terminology, international measures and units, abstract, keywords, the beginning of the article on the odd page, and also the data on the author and the periodical publication had to be presented on the same page. Titles, abstracts and keywords were, for all articles, published in Slovenian and English. Since 1998 the date of receipt of the manuscript and the date of acceptance of the article for publication have also been published.

At the suggestion of the Ministry for Science and Technology of the Republic of Slovenia, in 1998 the editorship of the journal started to categorize and arrange the published articles according to the recommendations of the typology for guiding bibliographies and the entry of data in COBISS Slovenia (Cooperative Online Bibliographic Systems and Services). Between 1996 and 1999, 436 entries in COBISS for the articles were made for articles published in previous years.

In bibliometric analysis and a comparison of the Iron and Steel Journal (Železarski Zbornik) and Metals Alloys Technologies (Kovine Zlitine Tehnologije) 1996/97 several parameters were used for the comparison, for example:

- the number of authors of each article and the number of institutions from which the authors came,
- the breadth of the contents base,
- the shift from a professional publication to a scientific periodical publication.

The results of the analysis showed a significant improvement of the journal Metals Alloys Technologies (Kovine Zlitine Technologije) in terms of originality, quality and the presentation of topics, as well as the regularity of publishing. The improvement was due to three factors: better knowledge and experience of the domestic authors, the increasing share of authors from abroad, and the publishing of topics on a wide range of materials as well as phenomena and processes.[1]

3 MATERIALS AND TECHNOLOGY – MATERIALI IN TEHNOLOGIJE

In 2000 a new name, Materials and Technology (Materiali in tehnologije) (ISSN 1580-2949), was given to the journal and a new editorial board was selected, although the editors were not changed. The content was broadened to cover articles dealing with topics from a wide range of materials, such as metals and alloys, polymers, inorganic and vacuum materials, their testing and characterisation, development, manufacturing, processing and application for engineering structures. Also, articles on new developments in composites were published. The journal became the leading periodical publication in the field of materials in Slovenia. The topics published justified the change of the journal's name, and this change attracted authors from other scientific disciplines, especially solid-state physics. The future aims of the journal are to achieve a higher international recognition and an appropriate citation index. Only by a continuous improvement in quality, which is related to the striving for greater originality and quality of the published works and the attraction of new, younger authors, especially from foreign countries, will an appropriate indexing in the Science Citation Index be achieved. This will attract new authors, Slovenian and foreign, who are to a large extent currently submitting their papers for publication in foreign journals. Six issues were published per volume, and double issues have not been published in the past two years. The sixth and last issue in the volume also includes the Annual Index: chronological, authors and subject index.

During the 35th year of publication of the journal Materials and Technology – Materiali in Tehnologije in 2001, a bibliometric-bibliographic comparison of the journals Materials and Technology (2000) and Materials Science and Technology (2000) was done. It should be emphasized that Materials science and Technology is an international journal with the impact factor. The results have shown that there are no significant differences between the journals. The only noticeable difference is in the number of cited (and listed) sources. But when we are talking about the sources of references and about the age of the cited sources there are no significant differences. The finding that there are no significant differences between journals opens a lot of questions concerning international and local journals.[2]

The articles from periodical publication Materiali in tehnologije / Materials and Technology were till 2007/1 indexed in nine international secondary publications and databases:

- Metals Abstracts, Engineered Materials Abstracts, Business Alert Abstracts (Steels, Nonferrous, Polymers, Ceramics, Composites), Chemical Abstracts, Aluminium Industry Abstracts, Referativnyj žurnal Metallurgija, Metadex, Inside Conferences, and DOMA, and since 2007/1 also in:

- DOAJ (Directory of Open Access Journals), GOOGLE SCHOLAR and SCIRUS.

We are pleased to inform that Materiali in Tehnologije has been selected for coverage in Thomson Reuters products and custom information services. Beginning with vol. 41 (1) 2007, this publication is indexed and abstracted in the following:

- **Science Citation Index Expanded (also known as SciSearch®)**
- **Materials Science Citation Index**
- **JournalCitations Reports / Science Edition**

In the future Materiali in Tehnologije may be evaluated and included in additional Thomson Reuters products and information services to meet the needs of the scientific and scholarly research community.

The process of publishing Materials and Technology is in accordance with ISO 9000 **(Diagram 1)**.

Table 1: Typology of articles (1967–2006)
Tabela 1: Tipologija člankov (1967–2006)

Typology of articles	Number	%
Review scientific articles	121	6.66
Original scientific articles	984	54.19
Professional articles	600	33.03
Technical news	86	4.74
Other	25	1.38
Together	1816	100.00

During the 40th year of publication, in 2007, a Special Issue of the journal Materials and Technology – Materiali in Tehnologije "The Bibliography of the articles 1967–2006" was published.

The post office issued a stamp "40 years of publishing of the periodical publication Materials and Technology" to mark the anniversary of the journal. The anniversary was also marked by the entering in COBISS (www.cobiss.si) all articles (1816) published in the journal and its predecessors in the years 1967 to 2007.

3.1 Statistical data on Materials and Technology – Materiali in Tehnologije: 2000–2006

Table 2: Number of issues, pages and articles
Tabela 2: Fizični obseg

Issue	Pages	Articles
2000 / 1–6	452	79
2001 / 1–6	500	72
2002 / 1–6	492	71
2003 / 1–6	420	67
2004 / 1–6 + special number	491	67
2005 / 1-6	334	30
2006 / 1-6	354	44
Total	3043	430

Table 3: Share of scientific versus professional articles
Tabela 3: Razmerje med objavljenimi znanstvenimi in strokovnimi članki

Year	Professional %	Scientific %
2000	38.00	62.00
2001	33.00	67.00
2002	21.00	79.00
2003	36.00	64.00
2004	28.35	71.65
2005	26.70	73.30
2006	13.65	86.35

Table 4: Language of publishing
Tabela 4: Jezik člankov

Year	Slovenian %	English %
2000	84.80	15.20
2001	72.20	27.80
2002	69.00	31.00
2003	58.00	42.00
2004	53.75	46.25
2005	31.70	68.30
2006	20.45	79.55

Table 5: Authors
Tabela 5: Analiza po avtorjih

Year	All authors	Articles	Authors / article
2000	222	79	3
2001	222	72	3
2002	216	71	3
2003	194	67	3
2004	243	67	4
2005	109	30	4
2006	147	44	3

Table 6: Nationality of authors
Tabela 6: Mednarodnost avtorjev

Year	Slovenia %	Foreign countries %
2000	85.10	14.90
2001	85.10	14.80
2002	80.10	19.90
2003	73.20	26.80
2004	62.15	37.85
2005	69.70	30.30
2006	52.40	47.60

Table 7: Subject area
Tabela 7: Vsebinski pregled člankov

Scientific field	2000	2001	2002	2003	2004	2005	2006
Metallic materials	51.90	68.10	71.85	67.15	71.70	70.00	68.20
Inorganic materials	31.60	11.10	12.65	7.45	11.95	23.30	9.10
Vacuum technology	8.90	12.50	7.00	10.45	7.45	0.00	4.55
Polymers	6.30	6.90	7.05	3.00	3.00	3.35	13.60
Building materials	0.00	0.00	0.00	7.45	5.95	3.35	4.55
Information science	1.26	0.00	1.40	0.00	0.00	0.00	0.00
Research policy	0.00	1.40	0.00	0.00	0.00	0.00	0.00
Research and development	0.00	0.00	0.00	1.50	0.00	0.00	0.00
Standardization	0.00	0.00	0.00	1.50	0.00	0.00	0.00
Methodology	0.00	0.00	0.00	1.50	0.00	0.00	0.00

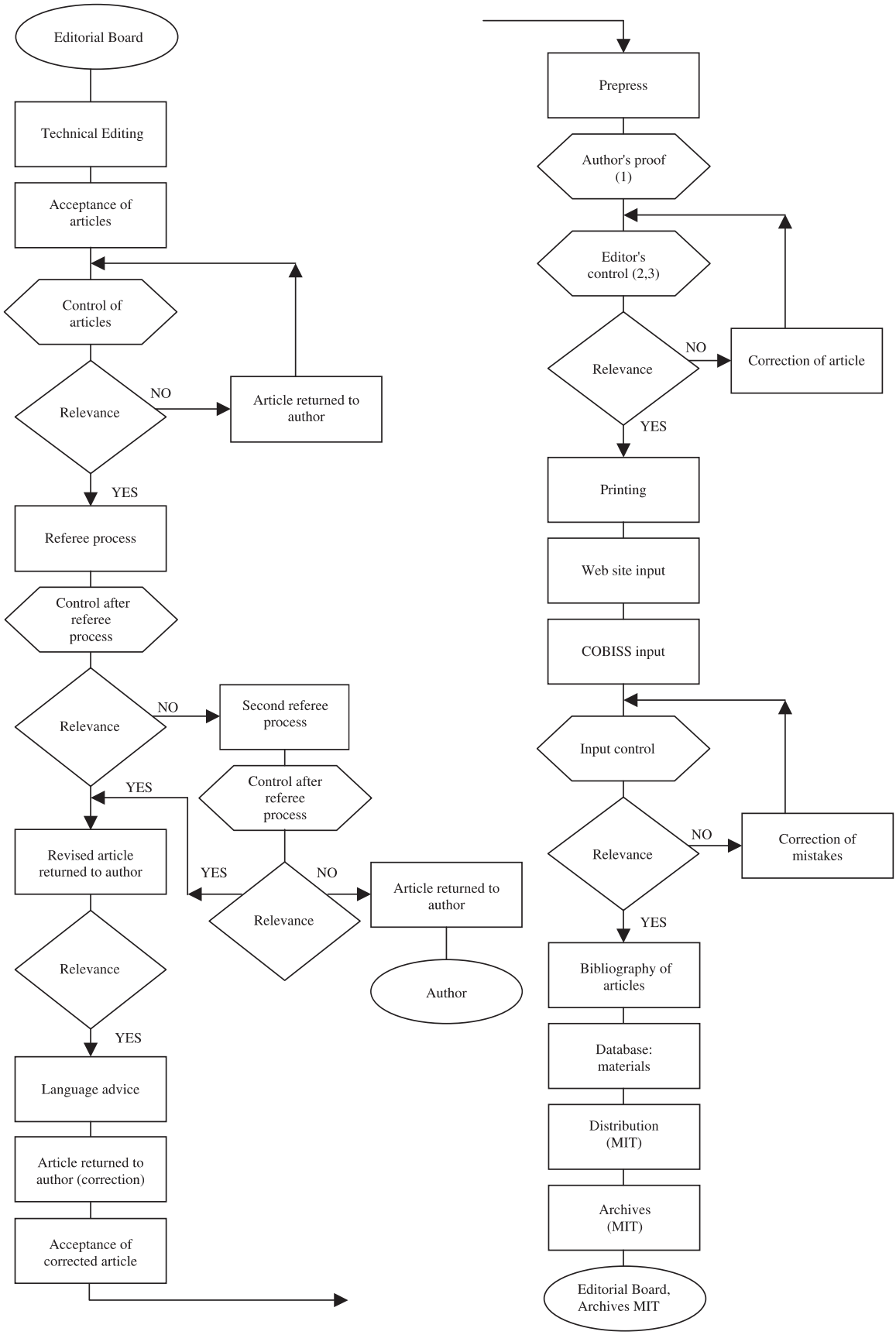

Diagram 1: The process of publishing Materials and Technology in accordance with ISO 9000
Diagram 1: Potek izdajateljske dejavnosti serijske publikacije Materiali in tehnologije po ISO 9000

Table 8: References quoted
Tabela 8: Citiranje literature

Number of articles with references quoted (%)							
Number of references	0	1–4	5–9	10–14	15–19	20–29	30 and more
Year							
2000	1.27	15.19	39.24	26.58	8.86	7.59	1.27
2001	0.00	13.88	40.28	23.61	6.95	12.50	2.78
2002	0.00	11.30	33.80	28.15	12.70	11.25	2.80
2003	1.50	14.90	41.80	26.90	3.00	5.95	5.95
2004	1.50	10.45	43.25	22.35	14.95	6.00	1.50
2005	0.00	3.35	50.00	16.65	13.35	6.65	10.00
2006	0.00	18.18	34.10	22.72	13.63	4.54	6.81

Table 9: Average citations per article
Tabela 9: Povprečno število citatov na članek

Year	Citations	Articles	Articles without citations	Citations / article
2000	797	79	1	10.10
2001	807	72	0	11.20
2002	848	71	0	11.95
2003	775	67	1	11.55
2004	734	67	0	10.95
2005	530	30	0	18.30
2006	576	44	0	13.10

Based on the statistical data, the following findings should be emphasized **(Tables 2–9)**:

- the number of articles decreased from 79 articles in 2000 to 44 articles in 2006. This is in part due to the decrease in the R&D activity after the independence of Slovenia and in part due to the devaluation of articles published in Slovenian journals,
- the number of scientific articles increased in relation to professional articles from 62 % in 2000 to 86 % in 2006, an indication of the improved average originality and scientific value of the presented topics,
- the number of articles published in English has increased very considerably, from 15.20 % in 2000 to 79.55 % in 2006, as a direct consequence of the official underrating of the use of Slovenian for publishing articles on topics related to technical aspects, technology and natural sciences,
- the share of international authors increased very substantially, from 14.90 % in 2000 to 47.60 % in 2006,
- the average number of references quoted per article published has increased slightly, from 10.10 in 2000 to 13.10 in 2006.

3.2 Access in electronic form

In electronic form the journals Metals Alloys Technology – Kovine Zlitine Tehnologije and Materials and Technology – Materiali in Tehnologije were initially accessible at the following URL: http://www.imt.si/materiali-tehnologije (ISSN 1580-3414).

The idea of the digitalisation of the journal Metals Alloys Technologies came in 1995. The decision was made for the journal to have a web site for the basic presentation of the journal. The web site was accessed at http://www.ctk.uni-lj.si/kovine/. In the next two years, 1997 and 1998, the newly developed HTML 3.2 and HTML 4 allowed new solutions, while Microsoft Office 97 made possible the very simple transformation of documents from the Office environment to hypertext. As a result, the idea of the electronic publishing of articles in full-text form was revived. The growth of electronic serials with access to the articles in full-text form allowed a comparison between different file types in which the full texts were accessible at web sites. The most interesting for the comparison were the journals on natural sciences and technology because of them having solutions for the graphical elements in the articles, i.e., graphs and figures, and for other difficult text parts, like mathematical derivations and chemical formulae. The web site of the journal was supplemented with a simple search tool for searching on the basis of indexes and hypertext assemblies of articles (data on authors, abstracts in Slovenian and English, key words in Slovenian and English).

With the change of the title Metals Alloys Technologies to Materials and Technology, the web site was given a new form and content. The new URL of the electronic version of the journal is http://www.imt.si/materiali-tehnologije. The web site presented a sort of web portal for the field of natural sciences and technology. The aim of the web site was to achieve the highest data accessibility for a wide circle of users. The web site also enables an interactive attitude between readers and the editorship. With the monitoring of new technologies in electronic publishing as well as with further education, more useful connections with electronic forums and with notifications for the users about the new ways of accessing the data from this field of science (monitoring of the development and accessibility of new databases and standards, notifications about conferences, the possibility for further education, and the monitoring of legislation) it is possible that the web site will be friendly and useful for researchers, students and other.[3]

The advantages of publishing the journal in electronic form are:

- ordering of articles from a simple database allows subject enquiries over the content of the articles,
- simplification of the contacts between the authors and the editorship,
- permanent and simple access to the full text of the articles regardless of the place and time,
- the electronic form can be accessed before the printing of the journal,
- wider impact and visibility in the international community,

- different search options (by indexes, abstracts, keywords),
- possibilities for connections between quoted and other related articles,
- quick accessibility of authors to notifications of the editorship: to instructions for submission of manuscripts and other notifications,
- access and downloading of the full text of the article,
- traceability of the article (history of the article at one point),
- the electronic form is cheaper than the printed form.

3.3 Materials and Technology – the future

- Materials and Technology – Materiali in Tehnologije is the leading periodical publication in the field of materials and composites in Slovenia, and strengthening this position should be the main goal for the Editorial Board in the future.
- The number of articles in English should increase further. However, the activity of maintaining Slovenian as a developed cultural language should not be neglected. For this reason, as the leading periodical publication, in the future articles in Slovenian should also be published. A compromise should be found between the majority of articles published in English, mostly original scientific works, and some of the articles published in Slovenian, probably mostly with authors from industry. The bilingual publishing of all articles depends on the extent of funding.
- The journal covers the fields where figures, microstructures and diagrams are very important, for this reason the editors should conserve the quality of printing at the current level or even improve it.
- The editors should attract more distinguished authors especially from English-speaking countries.
- The number of citations of the journal in prestigious periodical publications should be increased.
- The electronic form of the periodical publication of the journal must maintain its level of quality.
- The electronic version of the journal should exist as a web portal, where the user, in addition to the articles in full-text form, should find information about other services from the scientific fields covered (the catalogue of web connections, news, interesting information and data of interest for scientists).
- The journal should actively take part in the development of a potential information service for Slovenian professional and scientific periodical publication.

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