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Article

Ukrainian Scientific Emigration and Open Access

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Abstract: The sixth wave of Ukrainian scientific emigration, which began at the end of February 2022, and the formation of new structures in the Ukrainian scientific diaspora have stimulated research on the study and preservation of Ukrainian scientific heritage abroad. However, such research and measures to preserve this scientific heritage will not be effective if they are not based on the concept and technologies of Open Access. Therefore, the aim of our study is to show how such research should be conducted, using the example of the analysis of staff composition at the Ukrainian Free University and its publication activity in its first five years of operation, as well as what general measures are necessary to study and preserve the scientific heritage of all six waves of Ukrainian scientific emigration. The article deals with the following issues: periodisation of the waves of Ukrainian scientific emigration; identification of Ukrainian scientific and educational organisations of the first wave of Ukrainian scientific emigration; brief history of the Ukrainian Free University; publication activity of the professors of the Ukrainian Free University (1921–1925) with the selection of works published in Open Access; linguistic biographical Wikipedia articles for the professors of the Ukrainian Free University (1921–1925); distribution of publications by professors from Ukrainian Free University through digital libraries and repositories; analysis of book marks using a case study; standards for describing works in electronic collections of rare and old publications; approaches to the development of the programme "Open Access to the Scientific Knowledge and Cultural Heritage of Ukrainian Scientific Emigration". Overall, the results of study shows the importance of preserving the continuity of the traditions established by the first waves of Ukrainian scientific emigration, the new generation of Ukrainian scientific emigrants should maintain these traditions. In order to study and understand these traditions, it is necessary to study the activities of scientists of previous waves of Ukrainian scientific emigration, and in order to make the results of this study available to the wider scientific community, they should be digitised and made publicly available.

Keywords: Ukrainian scientific emigration; Ukrainian Free University; open access; publication activity; digital libraries; book marks

Introduction

There are six waves of Ukrainian scientific emigration. In terms of content, the first waves of this emigration have been fairly well studied. For example, the scientific activity of the institutions and participants of the first wave of Ukrainian scientific emigration, which was triggered by the events of the First World War, the October Revolution and the Civil War, is described in detail in the work of S. Narizhny (1942).

In order to study and preserve the scientific heritage of all waves of Ukrainian scientific emigration, it is necessary to conduct research on the representation in Open Access of information about their institutions and personalities, including their publication activity. Such work will make it possible to identify the part of that scientific heritage which is not represented in Open Access and to plan specific measures to digitise this part of the heritage and subsequently make it available in Open Access. By digitising and providing Open Access to the works of researchers of the first waves of Ukrainian scientific emigration, the scientific contributions of past scholars are preserved and made available to current and future researchers.

As an example of such work, we have conducted a systematic analysis of the statistics and demographics of the teaching staff of the Ukrainian Free University (UFU) and their publication activity in the context of Open Access during the first five years of the university's operation. For this purpose we used general works published by this university (Ukrainian Free University 1927, 1931; Universitas Libera Ucrainensis 2011), books by S. Narizhny (1942), R. Holiat (1964), and S.V. Vidnyansky (1994), other publications and internet sources. The tasks were to identify all teachers who worked in 1921-1925, the availability translations of their biographical articles on Wikipedia and publications on the Internet, including full-text articles in Open Access, as well as to develop the programme "Open Access to the scientific knowledge and cultural heritage of Ukrainian scientific emigration".

Recognising the contribution of the Ukrainian diaspora to world science even through just one university is crucial for understanding the global nature of scientific progress and the diverse contributions that various cultural and national groups have made. It encourages a more inclusive view of scientific history.

Methodology

The logic of this study is as follows. At the beginning, based on the analysis of literary sources, six waves of Ukrainian scientific emigration are identified, as well as all the main scientific and educational organisations of the first wave of this emigration. The years of their activity and their locations are determined. A brief excursion into the history of the UFU as the main centre of the Ukrainian scientific diaspora in Europe is also given. The publication activity of UFU professors and lecturers during the first five years of their work is then examined in detail, presenting the first 16 individuals who published at least six papers during this period.

Professors and lecturers at UFU were identified on the basis of the fundamental works published by this university (Ukrainian Free University, 1927, 1931; Universitas Libera Ucrainensis, 2011), books by S. Narizhny (1942), R. Holiat (1964) and S.V. Vidnyansky (1994), other publications and internet sources, and their publication activity was studied by testing their names using Google tools and searching for their publications in the Czech digital library "Kramerius", the Ukrainian digital libraries "Diasporiana" and "Chtivo", and other e-book repositories. From the number of publications found for each author, Open Access publications were selected.

The importance of the contribution of UFU professors and lecturers to science was studied not only on the basis of their publication activity, but also on the basis of the number of Wikipedia articles written about them in different languages. The first 13 people are presented, together with their scientific specialisation, for whom at least five biographical articles have been written in different languages. By comparing the publication activity of the authors with the Wikipedia information about them, it is possible to plan new and improved old Wikipedia articles about them.

We also made a distribution of OA publications across digital libraries and repositories, taking into account that one and the same publication could be represented by digitised copies placed in different electronic resources. When studying different digitised copies, which were mostly copies of books and pamphlets, we paid attention to book marks. They allow us to trace the migration of a book and its fate. In our case, there was only one book with rich book marks (Shcherbakivskyi 1925), which were studied in detail in this paper.

Then standards for describing works in electronic collections of rare and old publications, in which it is recommended to include book marks, were studied. Recommendations for the implementation of such standards for the Ukrainian public digital libraries "Diasporiana" and "Chtivo" are given.

Finally, considerations are given for the development of the programme "Open Access to the Scientific Knowledge and Cultural Heritage of Ukrainian Scientific Emigration", which is necessary for the preservation of the scientific and cultural heritage of scientists of previous waves of Ukrainian scientific emigration and for the promotion of the scientific contributions of researchers of the current wave of this emigration.

Findings

Periodisation of the Waves of Ukrainian Scientific Emigration

There is no clear periodisation of waves of Ukrainian scientific emigration, unlike waves of emigration in general (Petryk 2024). The first wave of Ukrainian emigration includes the labour emigration of ethnic Ukrainians in the period from the 1870s to the First World War. This was mainly the emigration of the rural population to North and South America and thus there was no significant scientific component.

Since Ukraine and Russia were one state after the 1917 revolution until the collapse of the USSR in 1991, the waves of Ukrainian and Russian scientific emigration can be considered coincidental.

As in the case of Russian scientific emigration, the first wave of Ukrainian scientific emigration should be attributed to the period between the two World Wars. The beginning of this wave coincided with the establishment of the short-lived Ukrainian People's Republic (1917-1920) and the Ukrainian Academy of Sciences (1918).

The beginning of the Second World War triggered the second wave, which lasted until the end of the 1950s.

The third wave can be placed within the framework of the mid-1960s to mid-1980s when, unlike in the previous waves of emigration, the departure from the USSR, including Ukraine, was legal. This wave of intellectual emigration is associated with the generation of the sixties.

At present, an attempt has been made to strictly periodise the waves of Ukrainian scientific emigration after the collapse of the USSR, which has allowed us to identify three stages (Karmadonova 2023), which we will call waves and continue our numbering.

The fourth wave, the "post-Soviet period" (1991-2012), was marked by the initial dissolution of the Soviet Union and economic shocks. In 1991 the country had 1,344 organisations engaged in research and development (R&D), employing 295,010 researchers. By 2012 these figures had fallen to 1,208 organisations and 82,032 researchers (State Statistics Service of Ukraine 2016).

This means that the number of researchers decreased by 3.6 times. It is difficult to say how many researchers went abroad, as Ukraine does not keep complete statistics on the emigration of researchers, but it can be assumed that most researchers changed their field of activity during the period under review.

The fifth wave, the "post-revolutionary period" (2013-2021), occurred induring a period marked by profound political and social changes, including the Euromaidan revolution, the annexation of Crimea by Russia and the war in the eastern regions of the country. According to Ukrstat, the number of researchers was 115,806 in 2013 and 44,615 in 2023, i.e. 2.6 times less (State Statistics Service of Ukraine, 2024). It should be noted that the data for 2013 take into account scientific and educational personnel who did not participate in R&D, so they exceed the data of Ukrstat estimates for 1990-2015 (State Statistics Service of Ukraine 2016).

The sixth wave, dubbed "Full - Scale War", began in 2022 and is currently ongoing. The all-out war in Ukraine has had a profound impact on the migration trends of researchers.

Recent estimates put the number of emigrating Ukrainian researchers at 22,000, or about a quarter of all researchers in the country. (Gaind et al. 2022). This estimate is for mid-2022, and the fact that the total number of researchers (around 90,000) here does not correspond to previous Ukrstat data is due to the fact that these data do not take into account the number of researchers at universities who are not officially engaged in R&D.

Similar results were obtained by G. de Rassenfosse, T. Murovana, & W.H. Uhlbach (2023), who, based on a survey of about 2,500 Ukrainian scientists, showed that about 18.5% of the population of Ukrainian scientists had left the country by autumn 2022. As the authors note, these emigrating scientists were among the most active researchers in Ukraine. However, a significant proportion of these migrant scientists are on precarious contracts at their host institutions.

Scientific and Educational Centres of Ukrainian Scientific Emigration of the First Wave

Based on the works of S. Narizhny (1942), V. Ulianovskyi and S. Ulianovska (1993). K. Lisova (2015), V. Popyk (2021), V. Shelukhin (2024) using wikipedia information we identified almost all the main scientific and educational centres of the first wave of Ukrainian scientific emigration, their dates of existence and locations (Table 1).

Table 1. Ukrainian scientific and educational organisations of the first wave of Ukrainian scientific emigration.

Name of the organisation	Years of operation	Location
Ukrainian Free University	1921	Vienna, Austria
	1921–1945	Prague, Czechoslovakia
	1945-present	Munich, Germany
Ukrainian Academy of Economics	1922–1935	Podebrady, Czechoslovakia
Ukrainian Technical and Economic Institute of Extracurricular Education	1932–1945	Podebrady, Czechoslovakia
	1945–1949	Regensburg, Germany
	1949–1979	Munich, Germany
	50s - 2009	New York, USA
Ukrainian Higher Pedagogical Drahomanov Institute	1923–1933	Prague, Czechoslovakia
Ukrainian Historical and Philosophical Society (UIFT)	1923–1945	Prague, Czechoslovakia
Ukrainian Academic Committee	1924–1940	Prague, Czechoslovakia (Autonomous body of the UIFT)
Union of Ukrainian Doctors	1922–1935	Prague, Czechoslovakia
Ukrainian Law Society	1923–1933	Prague, Czechoslovakia
Ukrainian Society of Supporters Books	1927–1942	Prague, Czechoslovakia
Ukrainian Pedagogical Society	1930–1939	Prague, Czechoslovakia
Union of Engineers' Organisations Ukrainians in Emigration	1930–1939	Podebrady, Czechoslovakia
Ukrainian Scientific Association	1932–1939	Prague, Czechoslovakia
Ukrainian Studio of Plastic Art	1922–1947	Prague, Czechoslovakia
Ukrainian Sociological Institute of M. Shapoval	1924–1939	Prague, Czechoslovakia
Ukrainian Institute of Sociology M.Hrushevsky	1919	Geneva, Switzerland
	1920	Prague, Czechoslovakia
	1921–1924	Vienna, Austria
Ukrainian Archive	1923–1945	Prague, Czechoslovakia
Museum of the Liberation Struggle of Ukraine	1925–1945	Prague, Czechoslovakia
Ukrainian Scientific Institute	1926–1945	Berlin, Germany
Ukrainian Scientific Institute	1930–1939	Warsaw, Poland

Ukrainian Military History Society society	1920–1939	Warsaw, Poland
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In Table 1, there are 20 scientific and educational organisations, including University - 1, Academy - 1, Institute - 6, Scientific Society - 5, Scientific Union - 2, Scientific Committee and Association - 2, Museum and Archive - 2, Studio - 1. All these organisations, in addition to their core activities, carried out research and scientific publishing activities.

These organisations were founded between 1919 and 1932, 12 of them in the first five years (1919-1924). Fifteen organisations were founded in Czechoslovakia, 13 of them in Prague. The remaining five organisations were founded in Austria (Vienna), Germany (Berlin), Poland (Warsaw) and Switzerland (Geneva).

The Czechoslovakia's leading role in the establishment of Ukrainian scientific organisations is linked to the Russian aid action of Czechoslovak President Tomáš Masaryk (Gousseff, 2024).

Most of these organisations ceased to exist in the late 30s and mid-40s of the 20th century. This was due to the economic crisis of the 1930s, the collapse of Czechoslovak President Tomáš Masaryk's Russian Aid Action (1921-1936) following his resignation from the presidency in 1935 and subsequent death in 1937, the signing of the Munich Agreement in 1938 and the subsequent occupation of Czechoslovakia and Poland by German troops in 1939, and the occupation of Czechoslovakia by Soviet troops in 1945.

Among the scientific and educational organisations of the first wave of Ukrainian scientific emigration, the leading one was the Ukrainian Free University (UFU), which is the only one that has survived to the present day (Table 1). Three major monographs (Holiat 1964; Vidnyanskyi 1994; Universitas Libera Ucrainensis 2011) are devoted to the history of the establishment and development of this university. In this context, we will briefly characterise this university below.

A Brief History of the Ukrainian Free University

The UFU was founded in Vienna on 17 th January 1921 by Ukrainian professors who had taught at universities in the Austro-Hungarian and Russian empires. The UFU was transferred to Prague, Czechoslovakia, in the autumn of 1921, where the government granted the UFU full academic accreditation and financial support. The UFU gained wide recognition for its significant and productive teaching, research and publications during its time in Prague (Vidnyanskyi 1994).

The University's move from Vienna to Prague in the same year it was founded was due to the fact that, in that year, Austria ceased to be the centre of Ukrainian scientific emigration. After the Soviet troops entered Prague in the spring of 1945, the University was destroyed and looted, which led to its relocation to Munich in 1945. On 16th September 1950, a ministerial decree of the Free State of Bavaria granted the UFU the right to award degrees. This academic privilege was subsequently confirmed by various Bavarian university laws and ministerial decrees (Vidnyanskyi 1994).

Financial support from the German and Bavarian governments has contributed to worthy research, publication and teaching activities. The university has become a recognised Western European research centre specialising in the study of Ukraine and the Ukrainian diaspora. Over the years, the university has evolved from a "university in exile" to a full-fledged, albeit highly specialised, European Union graduate school that still retains its Ukrainian uniqueness (Universitas Libera Ucrainensis 2011).

Publications by UFU Professors (1921–1925)

Forty-five UFU professors 235 works during the first five years of the UFU's existence, of which 45.5% (107 publications) are now available through the Open Access. These open access publications, represented by 175 files, and the digital libraries in which they are deposited, are available on the Zenodo website (Moskovkin 2024).

Table 2 shows the top sixteen authors who have published at least six publications over a five-year period.

Table 2. Publications by Ukrainian Free University professors (1921-1925).

Name	Number of publications		
	OA	non-OA	Total
1	2	3	4
Doroshenko, D.	6	19	25
Zalozetskyi, V.	1	17	18
Lototskyi, O.	3	11	14
Bidnov, V.	4	9	13
Antonovych, D.	8	4	12
Rudnytskyi, S.	10	2	12
Mitsiuk, O.	5	5	10
Lashchenko, R.	6	3	9
Lozynskyi, M.	7	2	9
Shcherbyna, F.	5	4	9
Loskyi, K.	6	2	8
Shelukhin, S.	2	5	7
Borodayevsky, S.	3	4	7
Mirchuk, I.	2	5	7
Dnistrianskyi, S.	5	1	6
Starosolsky, V.	6	0	6

The three authors with the most publication activity are Dmitro Doroshenko (1882 - 1951), Volodymyr Zalozetskyi (1884 - 1965), Oleksandr Lototskyi (1870 - 1939), but the three authors with the highest number of Open Access publications are different: Stepan Rudnytskyi (1877 - 1937), Dmitro Antonovich (1877 - 1945), Michael Lozinskyi (1880 - 1937).

This study shows which publications by UFU professors are not in the Open Access, and their digitisation and Open Access will make them available to current and future researchers, thus contributing to the continuity of the scientific traditions of the Ukrainian scientific diaspora. Note that the phenomenon of the relationship between diaspora and “cultural memory” was explored by Anh Hua (2005) in the section “Diaspora and Cultural Memory” of the book “Diaspora, Memory and Identity: Finding Home”. She stressed the importance of preserving the memory that links the past and the present.

Wikipedia Articles for Professors of the Ukrainian Free University (1921–1925)

In addition to publication activity, the number of biographical Wikipedia articles in different languages can also be used to measure the importance of a person. Table 3 lists UFU professors Wikipedia articles in at least five different languages.

Table 3. Professors of the Ukrainian Free University, 1921-1925, and the diversity of their language articles on Wikipedia.

Name and years of life	Field of knowledge	Number of language articles on Wikipedia
1	2	3
Gorbachevskyi, I. (1854 - 1942)	Chemistry	uk,ru,cz,de,en,fr,it,pt,pl,ar (10)

Smal-Stotskyi, S. (1859-1938)	Ukrainian Philology	uk,ru,cz,de,en,fr,pl,ro,ar, eo (10)
Antonovych, D (1877 - 1945)	Art History	uk,ru,cz,de,en,fr,ar (7)
Smal-Stotskyi, R. (1893–1969)	Comparative Slavic Linguistics	uk,ru,de,en,it,pl,ar (7)
Oleksandr Shulhyn (1889 - 1960)	World History	uk,ru,de,en,fr,pl,ar (7)
Oleksandr Lototskyi (1870 - 1939)	Church Law	uk,ru,de,en,pl,ar (6)
Fedir Shvets (1882 - 1940)	Geology	uk,ru,de,en,fr,pl (6)
Fedir Shcherbyna (1849 - 1936)	Statistics	uk,ru,de,pl,kk (5)
Viacheslav Lypynskyi (1882 - 1931)	History of Ukraine	uk,ru,be,de,en (5)
Dmytro Doroshenko (1882 - 1951)	History of Ukraine	uk,ru,de,en,fi (5)
Stepan Rudnytskyi (1877 - 1937)	Geography	uk,ru,de,az,ka (5)
Oleksandr Kolessa (1867 - 1945)	Ukrainian Philology	uk,ru,cz,de,pl (5)
Zenon Kuzela (1882-1952)	Ethnography	uk,ru,en,fi,ar (5)

Note: Language abbreviations are taken from ISO 639-1: uk - Ukrainian, ru - Russian, cz - Czech, de - German, en - English, fr - French, it - Italian, pt - Portuguese, pl - Polish, ar - Arabic, ro - Romanian, eo - Esperanto, fi - Finnish, kk - Kazakh, ka - Georgian, az - Azerbaijani.

This table indicates that publication output is not the only standard for notoriety, as those with the most publications are different professors to those with the most Wikipedia articles. The professors with biographical Wikipedia articles in the highest number of languages were Ivan Gorbachevskyi (1854 - 1942) and Stepan Smal-Stotskyi (1859 - 1938), each of whom had Wikipedia articles written about them in ten different languages.

Obviously, the more language versions a biographical article has, the more important the person is. Of course, the quality of the articles and the importance of the person should also be taken into account.

It should be noted that Wikipedia articles only existed for 38 out of 45 professors at the time this research occurred. Among the seven people for whom there were no such articles are the biologist Petro Andrievskyi (1880 - 1945), who worked as a professor at the UFU for 10 years, and the lawyers Dmytro Koropatnytskyi (1879 - 1940) and Lev Yekh (1872 - between 1938 and 1943).

There is also the issue of historicity and temporal contextual relevance to take into account here. These people predate Wikipedia - impact and importance are being measured by a modern standard - there is bias in that. Someone may have had a lot of impact and influence in their day but no longer be relevant now and not be on Wikipedia. This often holds true for certain types of practitioners / practice based scholars especially.

All of this will allow us to outline a plan for improving existing Wikipedia articles and creating new ones.

Distribution of Publications by Digital Libraries and Repositories

There are 107 Open Access publications associated with this key period in the UFU's history represented by 175 files. This number of files was found from Table 4 using the following line-by-line

calculations: $44 + 3 \times 17 + 2 \times 13 + 2 \times 11 + 2 + 4 + 3 + 3 + 3 + 2 + 2 + 2 + 2 + 1 + 1 + 1 + 1 = 175$. The most files of publications were found in the Ukrainian digital libraries "Diasporiana" (88), "Chtyvo" (44) and the Czech digital library "Kramerius" (32), while the first two libraries borrowed without declaration 43 files of publications from the Czech digital library "Kramerius" (Moskovkin 2024).

Thus, out of 175 publication files, 75 (43 + 32) are from the Kramerius Digital Library, which is 42.9%.

Table 4. Distribution of publications by digital libraries and repositories.

Digital libraries and repositories	Number of publications
Diasporiana	44
Kramerius, Diasporiana, Chtyvo	17
Kramerius, Diasporiana	13
Diasporiana, Chtyvo	11
Chtyvo	11
Kramerius	2
libarch.nmu.org.ua, Diasporiana, Internet Archive, Chtyvo	1
Diasporiana, Chtyvo, elib.nlu.org.ua	1
libarch.nmu.org.ua, Diasporiana, Chtyvo	1
libarch.nmu.org.ua, Diasporiana	1
libarch.nmu.org.ua, Chtyvo	1
Chtyvo, irbis – nbuv.gov.ua	1
elib.nlu.org.ua	1
libarch.nmu.org.ua	1
commons.wikimedia.org	1
Total	107

Out of 175 publication files, 48 were without book marks or with fragmentary marks that do not allow us to identify the place of storage of publications. In addition to the 75 publication files stamped by Slovanska knihovna, the national library in Prague, there were publication files stamped by the University of Toronto Library (5 publications), Lviv Scientific State Library (4 publications), National Parliamentary Library of Ukraine (4 publications), University of Illinois Library, Urbana-Champaign (3 publications), etc.

Analysis of Book Marks Using a Case Study

The analysis of book marks is very important, as it allows us to trace the fate of each individual book, to see with which events and people it has been associated. The collection of publications studied was relatively poor in such marks, in a number of cases they were simply destroyed, which is considered bad practice in the preservation of books in electronic form.

In our case, there was only one book with rich book markings (Shcherbakivskyi 1925). On the title page, we can see a gift inscription from the author to Prof. O. Shulhyn (1889 – 1960) and a square stamp of the Ukrainian Library of Symon Petliura in Paris (Bibliothèque Ukrainienne Symon Petlura).

On this library's website we read that the library was founded in 1926 and that "since 1927 the preparatory work was carried out by the library's Statutory Council, consisting of V. Prokopovych (chairman), I. Kosenko, I. Rudychiv, O. Udovychenko, O. Shulhyn", while the official opening of the library took place on 25 May 1929 ((Bibliothèque Ukrainienne Symon Petlura 2024).

It is clear from this that O. Shulhyn gave the book he had received from Shcherbakivskyi to the Symon Petliura Library.

Next we see a stamp with the inscription "Collection of Arkady Zhukovsky". We read about him in the work of S.I. Kot (2014): "Arkadii Zhukovskyi (12 January 1922, Chernivtsi - 2 October 2014, Paris) was a Ukrainian historian, public and political figure. Full member of the Shevchenko Scientific Society (1972). ...A leading Ukrainianist in France for many years... In 1989-1995, he was president of the Symon Petliura Library in Paris and Member of the Metropolitan Council of the UAOC in Europe".

In this respect, we can assume that the book in question was in the collection of Arkadii Zhukovskyi in the Symon Petliura Library.

On the title page of the book there is a stamp with the inscription "Бібліотека імені О. Ольжича. Бул. Грушевського 4" ("O. Olzhych Library. 4 Hrushevskoho St."), and it is known that this library was the first private Ukrainian library, founded in 1994 (Kucheruk 2003). Therefore, it can be assumed that Arkady Zhukovsky, after finishing his term as president of the Symon Petliura Library, transferred this book to the newly established Ukrainian library. From the article by M. Shlyakhtychenko (1978) on Oleh Olzhych (1907-1944) we learn that he attended lectures on archaeology by Professor V.M. Shcherbakivskyi at the Ukrainian Free University and the Faculty of Philosophy of Charles University (winter semester 1925).

This is what the book marks from a single book from a century ago, written by the famous archaeologist Volodymyr Shcherbakivskyi (1876-1957), who made a great contribution to the opening of the Ukrainian Free University in Munich, where he was the first rector, can tell us.

Standards for Describing Works in Electronic Collections of Rare and Old Publications

When describing works in electronic collections of rare and old publications, it is crucial to follow certain standards. First of all, the place of storage and the date of digitisation of the work must be indicated. This can be seen, for example, in the Internet Archive and Google Books.

In Project Gutenberg, they also provide information such as credits (where and by whom the book was made available), release date (date the book was posted on the project's website), copyright status (for example, public domain in the US), and number of downloads.

For book collections in the European Digital Library (Europeana), in addition to the standard characteristics of a book, we see contributors, providing institution, aggregator, rights, identifier, providing country, collection name, date first published on Europeana, and date last updated by the providing institution. For rare books, such as incunabula, the provenance is also provided.

For collections of old books, we propose to introduce a parameter to describe book marks (library stamps, owner and donor inscriptions, etc.), which we have studied on the example of the works of UFU teachers. This can be easily implemented for the digital libraries "Diasporiana" and "Chytvo", for which we offer a minimum set of book characteristics that are not present in the description of books in these libraries: place of storage, date of digitisation, description of book marks, copyright, number of downloads.

Towards the Development of the Programme "Open Access to the Scientific Knowledge and Cultural Heritage of Ukrainian Scientific Emigration"

Earlier, we showed that 45.5% of the publications of the UFU faculty in the first five years of its work (1921-1925) are in the public domain. We believe that a similarly low figure will be found for other centers of Ukrainian scientific emigration of the first wave. This suggests that it is necessary to intensify the work on digitising the relevant. For this purpose, a special Open Access programme should be developed and launched, covering all centres of Ukrainian scientific emigration, including all five waves.

Within the framework of this programme, in order to preserve and promote the scientific heritage of all waves of Ukrainian scientific emigration, we propose to develop a draft "Declaration

on Open Access to Scientific Knowledge and Cultural Heritage of Ukrainian Scientific Emigration" and an "Action Plan" for it.

The main goal of this Declaration should be to create a single Open Access Repository or a network of such repositories in the main centres of the Ukrainian scientific diaspora, as well as to convert scholarly journals related to Ukrainian studies to open access. This applies, for example, to the scholarly periodicals of the Slavic Institute (Prague), the UFU (Munich), etc.

All of the digital libraries and repositories we have identified provide open access to their content in the sense that it can be read, downloaded, copied, distributed, printed, etc. freely and without charge. This is in line with the definition and principles of Open Access set out in the Budapest Open Access Initiative. At the same time, these digital libraries and repositories, with the exception of the Internet Archive (Heritrix is the Internet Archive's open-source), do not use modern Open Access practices related to open-source software operating under the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) and implemented in Open Access repositories. As a result, keyword searches in Google Scholar or Google Books will not find the publications in these libraries and repositories, but only in their search engines.

Therefore, only when these libraries and repositories switch to open source software will it be possible to talk about full open access to the publications of Ukrainian scholars in emigration, the content stored in digital libraries and repositories needs reliable metadata to be discoverable by internet search engines such as Google Scholar.

When searching for content related to the works of Ukrainian scholars in emigration, most users are unlikely to search individual specialized digital libraries and repositories. Therefore, indexing and high-quality metadata should comply with open access standards and with OAI-PMH, which will allow a wider audience to find and use archived content.

Creative Commons licences play an important role in Open Access. But since they don't apply to old publications, we may be talking about copyright protection. It is obvious that the copyright on the works of the first wave of Ukrainian emigrants has already expired.

Now let us ask the question. Who can develop and launch a programme of "Open Access to the scientific knowledge and cultural heritage of Ukrainian scientific emigration"?

Of course, Ukrainian academic organizations and ministries responsible for science, education, culture, information policy and media should be addressing this issue in the first place. Unfortunately, the country has no state policy on Open Access, and only three Ukrainian organization's have signed the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities in the 21 years of its existence.

But as a result of the sixth wave of Ukrainian scientific emigration, which involved more than 20,000 Ukrainian scientists, we think there is a prospect of launching an Open Access programme, as the Office for the Support of Scientists at the Council of Young Scientists at the Ministry of Education and Science of Ukraine has launched the "Ukrainian Scientific Diaspora" initiative. This programme could in principle be supported by the UFU (Munich), which is the only official Ukrainian university abroad.

Conclusions

Thus, we show how to analyse the scientific heritage of the Ukrainian scientific diaspora and what measures are necessary to promote and preserve this heritage using Open Access tools. The analysis of the scientific heritage of the Ukrainian scientific diaspora is carried out using the example of the Ukrainian Free University in the first five years of its operation, and the measures for the promotion and preservation of the scientific heritage of all six waves of Ukrainian scientific emigration are proposed, which should be developed within the framework of the programme "Open Access to the Scientific Knowledge and Cultural Heritage of the Ukrainian Scientific Emigration".

The methods used to analyse the UFU's staff and their publications could serve as a model for other academic institutions and centres, and making historical research papers available through Open Access creates valuable educational resources.

Our study shows the importance of preserving the continuity of the traditions established by the first waves of Ukrainian scientific emigration, the new generation of Ukrainian scientific emigrants should maintain these traditions. In order to study and understand these traditions, it is necessary to study the activities of scientists of previous waves of Ukrainian scientific emigration, and in order to make the results of this study available to the wider scientific community, they should be digitised and made publicly available.

And now there are good conditions for preserving the continuity of the traditions of the Ukrainian scientific diaspora in the context of Open Access. Ukrainian emigrant scholars are in the Western academic environment, which is the most open to the ideas of Open Access, are well-positioned to be agents of these ideas in Ukraine, where there is no state policy supporting Open Access.

Naturally, if Ukrainian emigrant scientists publish in Open Access journals and post their articles in the OA repositories of the research institutes and universities where they work, then their publications will be visible to scientists remaining in Ukraine. It is important that these publications, especially those in the humanities, take into account the contribution of scholars from the first waves of Ukrainian scientific emigration.

In conclusion, analysing publications from the early 20th century in the context of Open Access can show how past research has influenced modern scientific developments. But this requires a separate study.

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