DOI: 10.22394/2070-8378-2018-20-1-84-89

Тенденции и перспективы российско-французского научного сотрудничества

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Аннотация: В статье представлены состояние и перспективы российско-французского научно-исследовательского сотрудничества на основе полуструктурированных интервью с российскими и французскими учеными. Были исследованы мотивы, происхождение и темпы развития научного сотрудничества между двумя странами. Изучены официальные схемы сотрудничества, а также временные деловые связи (в рамках стипендий, тренингов, неполная рабочая занятость в российских или французских организациях). Опрос охватывал широкий круг дисциплин, как в естественных, так и в общественных науках. Он показал, что большинство партнерских связей, которые функционируют в рамках официальных межправительственных схем, являются стабильными, и стороны готовы продолжать и даже расширять сотрудничество. В то же время существует ряд препятствий для успешного сотрудничества. Наиболее затрудняющими факторами являются отсутствие финансирования, проблемы материально-технического обеспечения и некоторые другие вопросы, связанные с особенностями организации и проведения научных исследований в России. Важным фактором устойчивого развития является участие студентов и постдоков в исследовательском сотрудничестве. Российские и французские студенты устанавливают долгосрочные связи, которые могут дать новые совместные проекты в будущем. Основными факторами, которые должны укреплять сотрудничество, являются необходимость обеспечения большего финансирования с обеих сторон, улучшение навыков иностранного языка и, возможно, переход к совместным исследованиям и разработкам на коммерческой почве.

Ключевые слова: научное сотрудничество, Россия, Франция, перспективы, препятствия, отношения

Благодарность: Поездка для проведения интервью во Франции была поддержана Посольством Франции в Москве.

Статья поступила в редакцию 26 февраля 2018 года.

TENDENCIES AND PROSPECTS OF RUSSIAN-FRENCH SCIENTIFIC COLLABORATION [1]

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Abstract: This article presents the state of the art and prospects for the Russian-French research collaboration, based on semi-structures interviews with Russian and French scientists. Motivations, origins, and a pace of development for scientific collaborations between the two countries were investigated. Official collaborative schemes as well as temporary partnerships (through fellowships, trainings, part-time work in Russian or French organizations) were studied. The survey covered wide range of disciplines, both in natural and social sciences. It has revealed that most of partnerships that are functioning within official intergovernmental schemes are stable and the parties are willing to continue and even expand collaboration. At the same time there are a number of barriers to successful cooperation. The most hampering factors are the lack of funding, some logistical problems, and other issues related to the specifics of organization and regulation of scientific research in Russia. An important part of sustainable development is participation of students and postdocs in research collaborations. Russian and French students establish long-term linkages that may yield new joint projects in the future. Main factors that should strengthen collaboration include necessity to provide more funding from both sides, to improve foreign language skills, and possibly move towards joint commercialization-related research and development.

Keywords: scientific cooperation, Russia, France, prospects, obstacles, attitudes.

Dezhina I.G. Tendencies and Prospects of Russian-French Scientific Collaboration. *Gosudarstvennaya sluzba*. 2018. № 1. P. 84–89. In Russian

1 The travel to conduct interviews in France was supported by the French Embassy in Moscow.

The number of studies devoted to the Russian-French cooperation in science and technology is relatively limited. Russian-French interactions are usually explored in a broader context of international cooperation, based on analysis of bibliometric data. Publications, which focus on bibliometric indicators [Aldieri, Kotsemir, & Vinci, 2017; Markova, Shmatko, & Katchanov, 2016], provide valuable information on the relative standings of the two countries. Other studies mention the example of France in the context of the Russian Academy of Sciences (RAS) reform. Usually the French CNRS (le Centre national de la recherche scientifique) is presented as an example of a similarly structured system that is successful. The CNRS is regarded as an effective collaborative scheme between the Academy institutes and universities and as a proof that having an independent system of fundamental research is important. Examples of such studies include Polterovich (2014) and Varshavskii' (2011). Another direction of research represents historical studies of Russian-French collaborations or scientific interactions in certain disciplines, for example, mathematics [Graham, & Kantor, 2006; Graham & Kantor, 2009], space biology and medicine [Grigor'e, & Kotovskaya, 2016] or sociology [Gofman, 2014]. Sometimes these relationships are analyzed through the prism of Russian emigration to France [Gofman, 2014], focused on certain professional Diaspora groups in France – for example, IT specialists [Smirnova, n.d.], or are put in a broader context of international scientific cooperation [Dezhina, 2010].

A separate group of studies includes reports, which document activities of Russian and French scientists within inter-governmental collaborative schemes. For example, a special issue of "Vestnik RFBR" (Russian Foundation for Basic Research) [Vestnik RFFI, 2016] was devoted to the 20th anniversary of the RFBR-CNRS supported Russian-French scientific projects. The issue contains short articles in the form of "opinions" written by Russian scientists who participated in these collaborations. Another noticeable example is an analytical report covering wide variety of Russia-French collaborations both in education and research [Bartsits et al, 2017]. This report describes major challenges that the cooperation between the two countries is facing, presents in comparative perspective Russian and French educational and scientific systems, and outlines prospects for Russian-French cooperation based on expanding existing agreements and intergovernmental initiatives.

All of the above works, while providing useful information on a "big picture", do not reveal the nature of cooperation, mutual attitudes of collaborating researchers, and factors that influence their pace of development. This paper addresses the Russian and French scientific collaborators through "the mirror" of mutual perceptions and attitudes. It is aimed at understanding how international scientific cooperation works and evolves at the level of individual researchers, based on their personal stories, opinions, and perceptions.

Description of Respondents

The analysis of the mutual perceptions and attitudes of the Russian and French researchers was conducted using face-to-face interviews. The respondents have been asked questions on such issues as history and reasons for partnering with Russian / French colleagues, pace of development of these collaborations. They were expressing their views on the qualities of graduate students involved in joint research schemes, as well as on benefits and obstacles of the joint work. The idea was to cover a wide range of aspects rather than to pursue each of these in depth.

A total of 39 interviews (15 Russian and 24 French respondents) have been conducted. During the interviews, it became obvious that a sub-group of the French respondents which consisted of Russian-speaking researchers, who reside permanently in France, should be assessed separately. The members of this sub-group have worked in both Russian (or Soviet) and French science systems and their attitudes appeared to be differed from those of the native French researchers.

The respondents were selected on a snowball basis; however, the names of the initial group have been suggested by the French Embassy in Moscow and included those researchers that have been actively involved in collaborations under the framework of the French or Russian-French government programs. These first interviewees have been asked to provide names of other Russian or French colleagues who either participated in collaborative projects or had work experience in France / Russia.

Further selection of respondents was based on a set of criteria aimed to diversify science fields, types of research, and their duration as following:

areas of traditional strength of Russian science (physics, math), advanced areas (biomed), and region-sensitive areas (paleontology, archeology, history) have been covered;

the respondents have been chosen from both fundamental and applied fields; some respondents were also involved in commercial applications of research results;

different types of collaborations have been covered (joint research projects via EU / French instruments; various research / training / teaching schemes);

the respondents included the researchers with ongoing collaborations and those who were involved in this cooperation in the past.

The respondents specialize in different research fields – physics, mathematics, biology, biomedicine, Earth sciences, archeology, paleontology, philology, and history. They are predominantly middle-aged or older. All the interviews took place between September 2016 and May 2017. The majority of respondents agreed to talk on the condition of anonymity. Respondents were not controlled by age or duration of collaboration.

Historical Interconnections as a Background for Cooperation

The role of historical interconnections was extensively discussed, especially by the Russian respondents. Many of

them pointed out that the two countries have long history of relationships, strengthened by several waves of Russian emigration to France. Then, the French and Russian research systems are similar because Centre national de la recherche scientifique was founded in 1939 as a "mirror" of Soviet Academy; the same is true for INSERM (Institut national de la santé et de la recherche médicale) as a parallel structure for the Soviet Academy of Medical Sciences. Till nowadays, many features of the two systems remain similar. Both CNRS and the institutes of RAS laboratories cooperate with universities, although, in Russia, these collaborations are informal and not regulated administratively. Likewise, both systems are largely government-regulated and, therefore, rigid, with researchers holding permanent positions.

Most respondents stated that French culture and mentality are close to Russian, especially if compared with those of Germans, British or Americans (the respondents have experience in collaborations with these countries). As one of the Diaspora respondents noticed, "*France is interested in cooperation with Russia because for them Moscow is the same as for us – Paris. Here is the saying, that 'those French is bad who does not have Russian grandmother'. Russia and France are fond of each other. The first wave of [Russian] immigration influenced French science and culture*".

At the same time some French and Russian respondents have admitted that nowadays in the scientific area the French adopted some elements of the American (broader – overall Western) behavior; e.g., they pay much more attention than Russians to self-promotion and popularization of their research results. Diaspora researchers paid special attention to this cultural feature, and considered that it is rather negative development of recent years.

Factors Determining the Start and Prospects of Collaboration

There is no common approach to start a collaboration. The relations of the Russian respondents with their French colleagues started due to:

Fellowships (temporary positions) at French labs and universities;

Meetings at conferences;

An initiative from the French side (interest to Russian publications or inventions);

Accidental meetings with French scientists working on similar problems during visits to France.

In some cases, personal acquaintances have resulted in joint projects under the CNRS-RFBR calls. In others – to "pendulum" migration when Russian scientists have worked for extended periods in French labs and exchanged graduate students. Several respondents had a one-time fellowship and then continued the relationships remotely.

French respondents appear to be more proactive in seeking partners for collaboration. They often stated that they were actively looking for Russian partners. This is especially true for scientific fields that are region-specific, like geography, anthropology, botany, and Earth sciences. It is also true for areas where Russians have good data and sample collections (e.g., viruses or soil).

Overall French respondents stated that they were looking for contacts with Russian researchers for a variety of reasons. These could be pure scientific interests (looking for specialists, data, or access to infrastructure) or some less obvious motives. For example, a French researcher wanted to help Russian science after the breakup of the Soviet Union:

'*After the breakup of the Soviet Union I understood that it will be very difficult for science and decided to help Russians… There are many distinguished and unique scientists in Russia and collaboration gives a possibility to establish contacts and develop friendly relationships*' (French biophysicist, #1).

Accidental meetings with Russians at the conferences also were starting points for further collaborations. Two respondents started to cooperate because of Russian-speaking colleagues who work in their divisions:

"*I started to collaborate with Russia due to colleagues of Russian origin. Now we develop collaborations between French biologists and Russian physicists*" (French physicist, #3)

All the respondents from Diaspora stated that they have never interrupted collaborations with Russian colleagues, and they are pursuing them in a variety of ways (formal and informal, in research and teaching).

"*I always continued to collaborate with Russia, and especially intensive it was in the 90-s when there were special grants for countries of the Former Soviet Union, like INTAS, for example*" (Diaspora physicist, #2)

Both parties are quite rational in their attitude to collaboration. They look for ideas, complimentary expertise, and good students.

«*Russian researchers have a good knowledge of nature and objects. French scientists know how to use science-intensive methods of analysis. In Russia, these methods are not used*» (Diaspora hydrogeologist, #4).

Intentions to further collaboration were expressed by both Russian and French respondents. The Diaspora scientists stated that they maintain sustainable contacts. In Russia, only those who work under formal international research cooperation tools supported by the Russian and French respective agencies plan to continue joint activities. Others reported the end of cooperation for one major reason: loss of interest in their research topic from the French side. According to interviews, Russian respondents were not interested in moving towards another topic or in broadening the area of their expertise. This result somewhat correlates with another survey [Shmatko, & Volkova, 2017] showing that Russian scientists of higher qualifications do not consider international cooperation as important factor for successful professional activity: only 5.8% of scientists working in research institutes and 3.8% employed in universities value international cooperation as an important factor for professional growth. These are amazingly low numbers that demonstrate a continuing autarchy of the Russian science.

One of the perspective directions of collaboration, aside of fundamental scientific research, is inter-university

collaboration in applied research and development. Both countries try to pursue universities to become more entrepreneurial. So far university systems in Russia and France lack the entrepreneurial spirit; in joining their efforts, for example in teaching entrepreneurship, they may be more successful in startup creation and similar activities:

"It is difficult to cooperate in the area of commercialization because French universities are not strong in entrepreneurship. But there is a trend to it which is good because it will be easier for students to find a job. They will have more competences. For Russia the same is applicable and therefore we could be developing together and in parallel" (French anthropologist, #9).

Core Competences of Russian and French Graduate Students

Students play an important role in international cooperation. They learn fast and then apply new knowledge in their home countries. Also students are the future of intercountry scientific relations; they ensure the continuity of collaborations. Russian and French students establish long-term linkages that may yield new joint projects in the future. Therefore, an important question is whether the students who participate in international collaborations are well trained and have good soft skills.

The opinions of respondents turned to be very different. Some Russian respondents think that French students are weaker than their Russian counterparts. Others stated that students from both countries are alike. The differences in training were mentioned: French get deeper education and Russians – broader. As far as personal qualities are concerned, Russian students were called as having "more initiative", and "independent-thinkers".

A view of the Diaspora respondents was similar to that of their Russian colleagues. They praised mostly Russian students, who are regarded as a benchmark.

"*There are good French students, from Ecloes, not worse than Russian ones. Ecoles – this is the level of best Russian universities in their better times*" (Diaspora physicists, #5)

"*I mostly have graduate students from Ecole. They have equal level to Russian students from the best universities – Mechanical-mathematical department of the Moscow State University, Higher School of Economics, and Independent University*». (Diaspora math, #1)

French respondents tried to perceive it in a comparative, alienated way. Some of them consider that students are more or less alike, but Russian students have certain peculiarities, for example, they are shy, do not ask many questions, may work long hours and lack some skills that are a norm for French students:

"*Russian students know a lot but they are unable to write a well-structured article, while French are usually obsessed with good structure. Russian texts are more descriptive; problematics is unclearly stated. Sometimes it is opposite – very abstract writing without any empirical evidence*" (French historian, #5)

Overall, both parties talked about students with warmth and sympathy.

Barriers to Cooperation

The survey has revealed that there are general and country-specific obstacles to cooperation between Russia and France. Common problems include lack of funding for collaboration, difficulties related to customs clearance (for transferring samples and other research materials), and visa issues. Country-specific problems are connected to how Russian science is organized and functioning. Lack of proficiency in the English language also turned to be a Russia-specific problem.

Insufficient funding has been mentioned most often. Other common issues, such as exchange of samples, customs clearance, and assignment of intellectual property rights, are disciplinary-specific. The second-important barrier, though only for the French side, was the state of the Russian science, including bureaucracy, ageing of scientists, poor knowledge of foreign language, and rather recent addition to this list – pressure to publish, wish of the Russian side to publish as many articles as possible. Insufficient transparency is also a problem in a broader sense:

«*Some are cautious in traveling to Russia because of instability and lack of transparency in political regime. Diaspora researchers are least afraid at this point*» (French biophysicist, #1)

Ageing was mentioned in the context of governance of scientific institutes in Russia. Older-age scientists who hold leading positions at Russian research organizations and universities were considered to be a hamper:

«*In Russia, there are many aged science administrators, just look at the age of academicians*» (Diaspora physicist, #2)

"*There is misunderstanding of the concept of "collaboration" in Russia, especially among aged researchers. It is not a charity, it is equal exchange. You collaborate because your partner is better than you or is equal to you or even worse than you but due to partial transfer of joint work to him you are saving time. In Russia sometimes think that collaboration means that country-partner will give Russia money or any other goods*" (French archeologist, #8)

This citation highlights a sometimes passive position of Russian scientists. If one is considering cooperation as a form of charity, then "waiting" is more natural than being proactive.

Another problem hampering fruitful cooperation is the lack of English language knowledge in Russia. It is noticeable that no one from the native French speakers said that Russians must know French.

"*It is difficult to find partners because sometimes contact persons in Russia cannot write in English. We had a case when we were unable to overcome language barrier*" (French anthropologist, #9)

The language problem is seen differently from the Diaspora side: they mention that the requirement to learn French (applicable to graduate students and postdocs) hampers cooperation with young Russian scientists. To their view, this is a French problem, not the Russian one.

Finally, a rather recent obstacle is the pressure to publish. Those French respondents that were collaborating

with Russian partners for years, especially noticed this change:

"*Now all Russians want to be co-authors of publications. Instead of 2-3 coauthors we have 15-16, and most of them are from Russia*" (French archeologist, #8)

«*In Russia, they want to have many publications, and they are expecting that we will publish together. I publish 2-4 articles per year, and in Russia the requirement is 4-6 publications, and it is not possible*." (French mechanical engineer, #10)

Despite a variety of problems, when the respondents have been asked about measures that could enhance collaborations, they were talking mostly about the necessity to increase funding. At the same time, the respondents have different views about the preferable forms and purposes of financial support. Among the areas, the lack of support have been mentioned for joint research projects, organization of international conferences, support of graduate students participating in joint international projects, and fellowships.

Conclusions and Policy Implications

The findings demonstrate that the parties are willing to collaborate and see a great value in joint initiatives. Even those researchers who do not participate in joint projects or other forms of interaction any more, still contributed from their previous experience of working with/in France or Russia, as they did in cooperation with other countries. What is more important, in many cases, even when scientific cooperation came to an end, friendly relationships have continued. Personal friendships may have a larger impact on strengthening the links between the two countries than formal research partnerships.

Many respondents pointed out that the French and Russian research systems are similar because CNRS was founded in 1939 as a "mirror" of the Soviet Academy; the same is true for INSERM as a parallel structure for the Academy of Medical Sciences. Both systems are very much government-regulated, and researchers in the scientific institutes hold permanent positions. This similarity simplifies mutual understanding.

Then, the Diaspora researchers can be considered as a driving force for cooperation. All of them have continuing collaborations and links with Russia in various forms. Those Diaspora researchers who have Russian passports are especially mobile and can be more flexible than their native French colleagues about short-term visits if negotiations or consultations are necessary. Moreover, some French scientists were involved in cooperation with Russian researchers exclusively due to the Russian-speaking researchers working in their labs (institutes, universities).

Overall, directly and indirectly, the respondents acknowledged strong bonds between the two nations, and a mutual cultural influence (including the impact of post-revolutionary Russian emigration on France). Cultural interconnections help to sustain research linkages. In this respect, France is a special country for Russia, though, on average, the country of origin does not play a key role in the selection of scientific partners. Nevertheless, given several choices, the Russian scientists preferred France (for example, for short-term fellowships, temporary research positions).

The knowledge of the other side's language or at least the knowledge of English is important for strengthening international cooperation. The value of knowing French has been emphasized especially by the Russian respondents. They respect the French's "love" to their language. The survey shows that language continues to be an issue, and the parties predominantly use English for communication. So far, the knowledge of even the English language continues to be a problem for the Russian side. A solution could be in offering intensive language courses to scientists who have won a grant or received a fellowship in France. Germany offers such courses, which proved effective (for example, for Alexander von Humboldt fellows).

Both undergraduate and graduate students are a future of science and international cooperation. In Russia, alarming moods about a worsening quality of higher education are common. The survey has demonstrated that Russian students are assessed positively by both the Russian and French respondents. In addition to a broad knowledge of certain areas of research, Russian students were praised for several personal qualities, including the ability to work long hours, persistence, and independent thinking. French students that participate in international collaborations are also strong. They have been characterized as well-educated, curious, efficient, and able to structure their scientific work. Judging from the opinions on students, it is possible to conclude that there are preconditions for continuing the French-Russian cooperation.

The survey reveals variety of ways to start collaboration, among which encounters at international conferences play an important role. Unfortunately, Russia currently hosts fewer conferences than before, especially in humanities. In defining possible collaborative schemes, support of international events should be carefully considered, for example by such Russian funding organizations as the Russian Foundation for Basic Research and the Russian Science Foundation.

Overall, according to the survey, the French respondents seem to be more proactive in seeking partners for collaboration. "I was looking for…" was more characteristic for the French respondent while typical Russian responses would be "they found me; they invited me". In the beginning of 90-s, during the most severe crisis in Russian science, many countries and international organizations started to provide assistance. The transformation from "assistance" to "collaboration" was long and mentally difficult. At present, the concept of an equal partnership is common in the Russian-French collaborative schemes (e.g., parity in volumes of funding) but the mental perception of foreign partners as providers of "aid" is still widespread and could have influenced the views of some Russian respondents.

Concurrently, the reasons for collaborations proved to be pragmatic for both sides. Aside from exchange of ideas, dividing responsibilities, labor costs, and training students, the parties were interested in specific geographic areas,

collections, databases, access to unique equipment, learning methods and techniques of research. This finding is line with previous studies of outcomes from international programs conducted in Russia. For example, the evaluation of Russian-American cooperative grants program that was conducted in the end of 90-s – beginning of 2000-s, showed similar results [Dezhina, 2005].

The respondents listed a variety of problems that hamper cooperation but none of them are exclusive for Russian-French case. Lack of funding has been cited most often; such issues as difficulties in obtaining visas, transfer of samples, exchange of experimental data and materials are area-specific.

A growing obstacle is the organization of research work in Russia, requirements towards reporting, and heavy focus on bibliometric output. These are the consequences of the current Russian science policy which cannot be changed at the level of individual universities or research institutes. The most characteristic example of a new obstacle is the pressure to publish. Russian scientists need publications in journals indexed in Scopus and Web of Science. It is important for the assessment of both individual researchers and whole research institutes, for reporting purposes of grant-awarding organizations, and as a way to get monetary bonuses. The backside of this requirement is that it leads to chasing quantity at the expense of quality. French partners feel this pressure because a Russian side would like to have more joint articles with a larger number of Russian co-authors. Publishing in co-authorship with foreign researchers gives access to better (higher impact) journals and thus improves the bibliometric indicators. This trend – to publish more with foreign co-authors – has already been identified by the Russian Ministry of Education in Science in their assessment of bibliometric performance of the leading Russian universities [Ivanter, 2017]. In France, the situation is different and the "publish or perish" slogan is not as abused as it is in Russia. While designing new joint initiatives it would be important to define output requirements for the Russian researchers more coherent with the French practice.

Overall respondents consider that collaboration in science impacts both countries in a broad sense, and that science is a sphere that connects countries at all times. And thus, it is appropriate to conclude by repeating the words of a Russian respondent, referring to a French scientist: "*Exactly scientists should be "advocates of culture", as Jean-Pierre Sauvage once said. They travel a lot and see other cultures and traditions… Only scientists are independent*".

References

Aldieri, L., Kotsemir, M., & Vinci, C.P. (2017). The impact of research collaboration on academic performance: An empirical analysis for some European countries. *Socio-Economic Planning Sciences.* Advance online publication. doi: 10.1016/j.seps.2017.05.003

Bartsits, I. (Ed.) (2017). Россия и Франция в мировом образовательном пространстве. Rossiia i Frantsiia v mirovom obrazovatel'nom prostranstve [Russian and France in the World Educational Space]. Moscow: Delo. 400 p.

Dezhina, I. (2005). Вклад международных организаций и фондов в реформирование науки в России. Vklad mezhdunarodnykh organizatsii i fondov v reformirovanie nauki v Rossii [Impact of international organizations and foundations on reforms in Russian science]. Moscow: Institute for the Economy in Transition. Nauchnye Trudy N 91P. 183 p.

Dezhina, I. (2010). Международное научное сотрудничество России - Mezhdunarodnoe nauchnoe sotrudnichestvo Rossii [International scientific cooperation of Russia]. *World Economy and International Relations*, 2, 28–37.

Gofman, A.B. (2014). Социология во Франции и в России. К истокам идейных взаимосвязей - Sotsiologiia vo Frantsii i v Rossii. K istokam ideinykh vzaimosviazei [Sociology in France and Russia: to the origins of ideological interconnections]. *Sotsiologicheskie issledovaniia*, 11, 3–12.

Graham, L., & Kantor, J.-M. (2006). Два подхода к оценке математики как феномена культуры: Франция и Россия, 1890–1930 гг.. Dva podkhoda k otsenke matematiki kak fenomena kul'tury: Frantsiia i Rossiia, 1890–1930 gg. [Two approaches to mathematics evaluation as phenomenon of culture: France and Russia, 1890–1930 years]. *Voprosy istorii estestvoznaniia i tekhniki*, 3, 56-78.

Graham, L., Kantor, J.-M. (2009). *Naming Infinity. A True Story of Religious Mysticism and Mathematical Creativity.* Cambridge, MA: The Belknap Press of Harvard University Press. 239 p.

Grigor'e, A. I., & Kotovskaya, A.R. (2016). Russian–French Scientific Collaboration in Space Biology and Medicine. *Vestnik Rossiiskoi Akademii Nauk*, 86(7), 603–610.

Ivanter, A. (2017, June 30). Без ГОЭЛРО и бомбы. Bez GOELRO i bomby [Without GOELRO and a bomb]. *Expert,* Retrieved from http://expert.ru/expert/2017/21/bez-goelro-i-bombyi/

Markova, Y. V., Shmatko, N. A., & Katchanov, Y. L. (2016). Synchronous international scientific mobility in the space of affiliations: evidence from Russia. *SpringerPlus*, *5* (1). doi: 10.1186/s40064-016–2127-3

Polterovich, V.M. (2014). Реформа РАН: экспертный анализ - Reforma RAN: ekspertnyi analiz [Academy Reform: Expert Evaluation]. *Obshestvennye nauki i sovremen*nost', 1, 5–28.

Shmatko, N., & Volkova, G. (2017). Service or Devotion? Motivation patterns of Russian Researchers. *Foresight and STS Governance*, 11 (2), 54-66.

Smirnova, E. Стиль жизни. Stil' zhizni [Style of life]. Retrieved from http://rcs.eu.spb.ru/longreads/style/

Varshavskii', A. (2011). Проблемы науки и ее результативность - Problemy nauki i ee rezul'tativnost' [Problems of science and its results]. *Voprosy ekonomiki*, 1, 151–157.

Vestnik RFFI (2016). *20*-лет сотрудничества Российского фонда фундаментальных исследований *(*РФФИ*)* и Национального Центра научных исследований Франции *(*НЦНИ*)* - 20-let sotrudnichestva Rossiiskogo fonda fundamental'nykh issledovanii (RFFI) i Natsional'nogo Tsentra nauchnykh issledovanii Frantsii (NTsNI) [20 Years of cooperation of the Russian foundation for fundamental research (RFFI) and the French National center of scientific research (CNRS)]. Moscow. – 50 p.