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Scientific relations of Alexander P. Karpinsky (1847-1936) with France

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Abstract. The paper is devoted to some aspects of international cooperation in geosciences related with activities of the outstanding Russian geoscientist A. P. Karpinsky with a focus on his links with France. General questions concerning his role in the organization and development of geology in Russia are discussed. The position of Karpinsky as a member of an international geological society is underlined. An obvious recognition of the merits of Karpinsky in France was the awarding of his Cuvier Prize in 1921.

Key words: A. P. Karpinsky – history of geosciences – international scientific relations – France – Prix Cuvier.

Introduction

The Karpinsky family is the oldest and most famous mining and geological dynasty in Russia. Its ten generations gave Russia many famous names in the organization of mining, prospecting and exploration of minerals and geosciences since the beginning of the 18th century. The most famous representative of the dynasty is Alexander Petrovich Karpinsky (1847-1936). His name is associated with the organization and development of the main Russian scientific institutions and various fields of geological researches.

Karpinsky was a gifted geoscientist, teacher, one of the founders of the geological survey in Russia (Geological Committee of Russia), and the first elected President of the Russian Academy of Sciences¹ (1917-1936).

Called the "father of Russian geology" Karpinsky was well-known abroad. His career was associated with three Russian scientific institutions: the Mining Institute in Saint-Petersburg, the

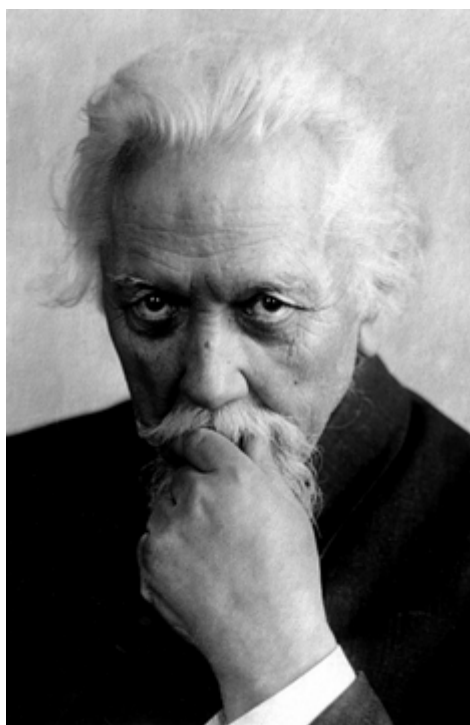


Fig. 1. Alexander Petrovich Karpinsky, 1920.
https://www.flickr.com/photos/hi_geo/sets/72157661829858712

¹ Academy of Science and Arts in Saint-Petersburg (1724), Imperial Academy of Science and Arts in Saint-Petersburg (1747), Imperial Academy of Science (1803), Imperial Academy of Science in Saint-Petersburg (1836), Russian Academy of Sciences (1917), Academy of Sciences of the USSR (1925), Russian Academy of Sciences (1991).

Geological Committee of Russia, and the Academy of Sciences.

After graduation from the Mining Institute in Saint-Petersburg in 1866 Karpinsky was closely related with his 'alma mater' as a teacher. For about 30 years (1867-1896) of teaching in the Mining Institute he has educated dozens of students who ensured the development of geosciences in Russia in the 20th century. The most part of prominent Russian geoscientists were his disciples.

Two Russian institutions were the places of the organizational activities of Karpinsky – the Geological Committee of Russia and the Academy of Sciences.

Karpinsky was one of 8 first staff members of the Russian geological survey – the Geological Committee of Russia founded in 1882. Elected its director in 1885 he kept this position until 1903.

In 1886, Karpinsky joined the Imperial Academy of Sciences in Saint-Petersburg as an adjunct. He became a full member in 1896 and was the first elected President of the Russian Academy of Sciences (May, 1917). Karpinsky headed the Academy of Sciences until the end of his life in 1936.

Karpinsky as a geoscientist

Karpinsky was the leader in all positions he had. Both scientific schools, and fields of geological researches have been started and developed under his leadership. Outstanding researches of Karpinsky in geological mapping, petrography, stratigraphy, paleontology, regional geology, tectonics, and mineral deposits are well known.

Since its of foundation (1882) the Geological Committee of Russia has started to compile the map of the European Russia to be a part of the International Geological Map of Europe (scale 1:1 500 000). Karpinsky headed this work as the Editor-in-Chief of the Russian map and was elected a representative from Russia in the Commission of the International Geological Map of Europe of the International Geological Congress (IGC).

He developed a general map legend and compiled map sheets in the Urals himself.

Ten years later the compilation of the Geological Map of the European Russia was finished (Karpinsky et al., 1893). Three sheets for the International Geological Map of Europe were prepared sometime later.

Progress in paleogeography in Russia in the second part of the 19th century has widened perspectives for tectonics. And Karpinsky has brilliantly demonstrated it. Using facial researches and compiling paleogeographic maps Karpinsky has reconstructed the tectonic development of the European Russia (Karpinsky, 1887).

Karpinsky is considered a pioneer in tectonics in Russia. His article "On the regularity in outline, distribution, and structure of continents" (Karpinsky, 1888) is recognized as a classic paper, which is why it was published in English with comments in *Episodes* (Romanovsky, Zoubarev, 2003). The article on the movements within the European Russia (Karpinsky, 1894) was published in French in *Annales de Géographie* two years later.

Karpinsky's publications in paleontology and stratigraphy were well known abroad and much discussed in Europe. He was one of the first who draw attention to the stratigraphic significance of the study of cephalopods. The phylogenetic series of the Upper Permian (Artinskian) ammonoids distinguished by him was a real discovery and caused most heated discussions among specialists.

Helicoprion and its close relatives were one of the favorite subjects of Karpinsky's studies. It is not needed here to report all the data, which had already published on the helicoprionids. One can be re-addressed to the large list of publications, focused on morphology and systematic position of this fish group (see these works for further references: Obruchev, 1953; Lebedev, 2009; Itano, Lucas, 2018). Many of the helicoprionid fossils are originated from the Lower Permian deposits, and the most representative collections of the helicoprionid remains in the Urals area came from the Artinskian deposits outcropped in the close vicinity of the City of Krasnoufimsk, Sverdlovsk region (Naugolnykh, 2016, 2018).

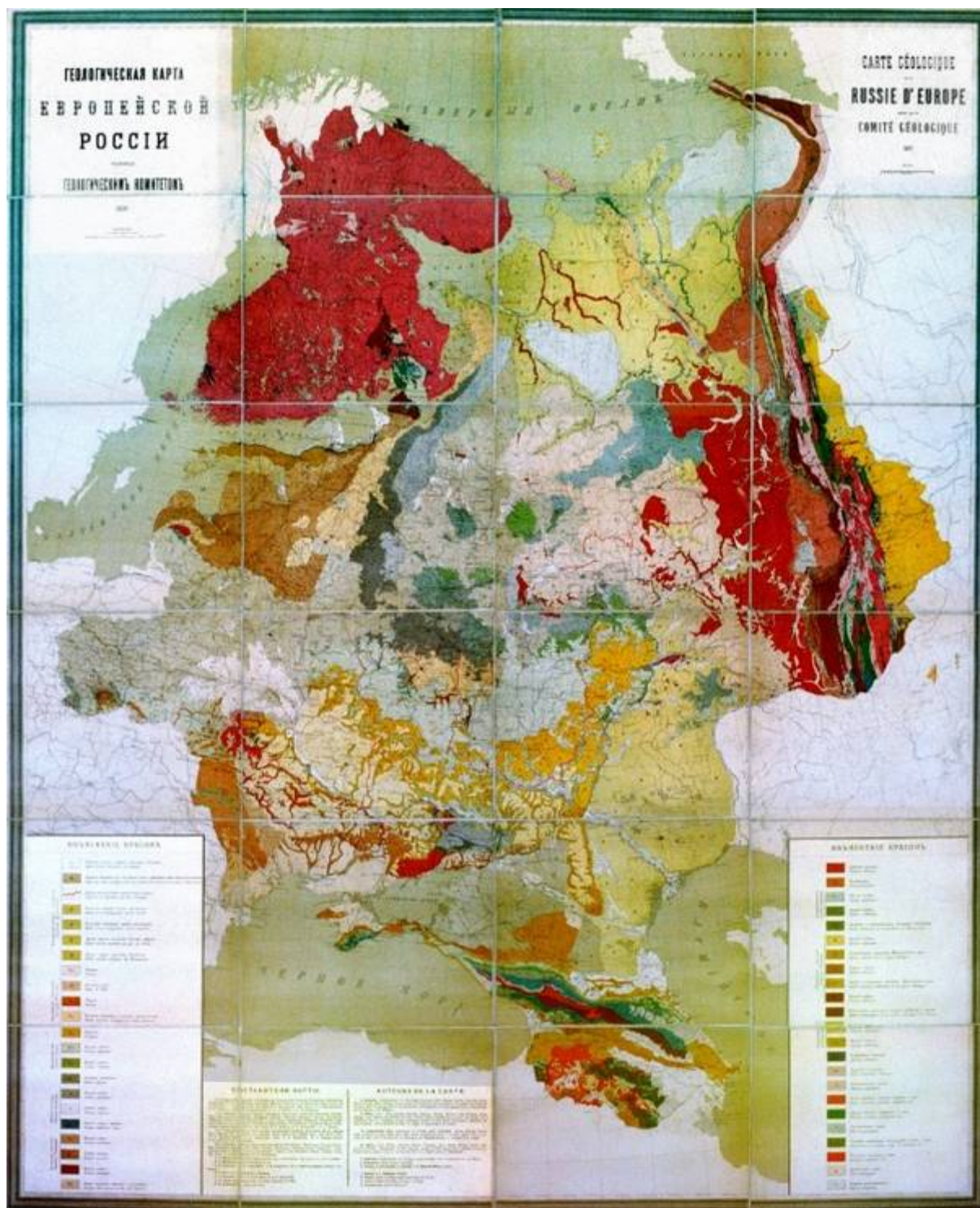


Fig. 2. Geological Map of European Russia, published by the Geological Committee in 1893. Scale 1:2,520,000 (60 versts per inch) (Karpinsky et al., 1893)

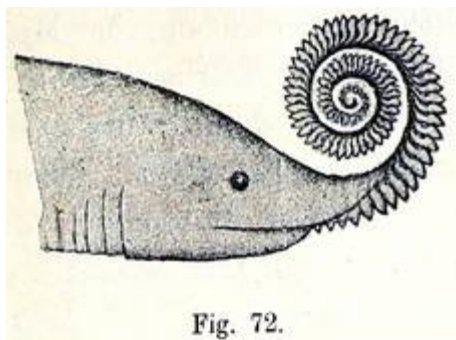


Fig. 3. The first reconstruction of the *Helicoprion* dental spiral position (Karpinsky, 1899)

In 1903, Karpinsky described one quite particular chondrichthyan tooth of durophagous morphology attributed to the genus *Campodus* de Koninck, 1844. The tooth was found together with a fragment of the teeth whorl of *Helicoprion* sp. and cephalopods *Popanoceras krasnopolskyi* Karpinsky, *Medlicottia artiensis* (Grünwald), etc. (Karpinsky, 1903).

The material collected up to the present moment from a number of localities disposed in the Urals area by several scientific teams, mostly representing local or regional museums, such as the Krasnoufimsk regional museum, allows adding some new facts worth being taken in account for a further discussion of the helicoprionid paleoecology and morphology. Now we can suggest that the Artinskian deposits in transection from the City of Krasnoufimsk on west and to the City of Arti on east represent more or less gradual changes in paleoenvironments from the algal-bryozoan reefs with inter-reefs sea basin to the near-coastal basin with fast adding of clastic material from the Paleo-Urals on east. Further studies of the Artinskian sections of the western Urals started more than one hundred years ago by Academician A.P. Karpinsky will be continued and will lead to a multidisciplinary reconstruction of the Early Permian landscape, biota, and paleoclimate of this region in future studies.

Karpinsky as a member of the international geological society

These scientific and organization activities made Karpinsky well known abroad. He was an active member of the international geological society. His activities in the work of International

Geological Congress have been noticeable for 55 years.

In 1881, the work of Karpinsky "Essai de l'unification systématique des procédés graphiques en géologie" prepared for the 2nd IGC Session in Bologna received one of the prizes (Karpinsky, 1882). He was a member or the head of Russian delegations at the next IGC Sessions: Zurich (1894), the President of the 7th IGC in Saint-Petersburg (1897), Paris (1900), et al. The last IGC Session for Karpinsky was the Congress in Madrid (1926) but he intended to take part in the 17th IGC Session in Moscow (1937). During the IGC Sessions and commissions meetings Karpinsky had opportunity to meet with foreign colleagues.

The works of Karpinsky were published in the foreign press. Paleontological and stratigraphic conclusions were more discussed than the tectonic ones.

The discussion concerning the nature and interpretative morphology of the spiral teeth whorls of *Helicoprion bessonowi* Karpinsky, a discovery of which made the name of Karpinsky familiar not only to professional geologists, paleontologists and stratigraphers, but also to a wide public as well (brief discussion see above).



Fig. 4. Holotype of *Helicoprion bessonowi* Karpinsky gen. et sp. nov. Academician F.N. Chernyshev Central Geological Research Museum specimens 1670/1 (left) and 1865/1 (right) (Sokolov, 2021)

Among the partners who intensively discussed the problems of helicoprionid and edestid morphology and systematics there are such eminent scientists as O. Jaekel, E. Van der Broeck, A.P. Ivanov, A.S. Woodward, O.P. Hay, C.C. Branson, and many others (Obruchev, 1953).

References to Karpinsky's tectonic papers can be found in the works of Ed. Suess and M. Bertrand.

Scientific relations of Karpinsky with France

Through history Russia has been closely connected with France. A vivid manifestation of this fact in science is the participation of French scientists in the activities of the main scientific institution of Russia – the Academy of Sciences. Since its foundation in 1724 remarkable foreign scientists have been inviting to work in Russia. French scholars worked in Russia and were elected as foreign honorary members or correspondents. There are more than 20 French geoscientists in the list of foreign members, while the total amount is about 125 (Malakhova et al., 2012).

The scientific biography of Karpinsky allows you to trace some Russian-French scientific relations. He visited France several times and also welcomed French colleagues in Russia.

In 1892, Karpinsky visited Switzerland and France to participate in the Meeting on the publication of the Geological Map of Europe and to get acquainted with the Geological Society of France.

At the 6th IGC in Zurich (1894), the Vice-President from Russia Karpinsky has announced the Russian proposal for the next meeting in Saint-Petersburg. In 1897, members of the French delegation could appraise the efforts of Karpinsky as the President of the 7th IGC.

There were 89 delegates from France in the list of the 7th IGC participants, with 41 participating in person – Ch. Barrois (and his son), M. Bertrand, M. Boule, Ch. Depéret, Em. Fallot, A. Gaudry (with wife), P. Jannettaz, P.-Em. Levasseur, Em. Margerie, St. Meunier with his wife and daughter, A. Offret, and many others.

Ch. Barrois, M. Bertrand and A. Gaudry were elected as Bureau members. Ch. Depéret joined the Commission on the Unification of Geological Nomenclature and worked in close contact with Karpinsky and other Russian colleagues (Congrès géologique international..., 1899).

26 French delegates participated in geological excursions: 15 before the Session (the Urals and Finland), and 21 after the Session (the south of the country, from Moscow to the Caucasus and Crimea).

Karpinsky himself led the part of the Ural excursion (the Pre-Urals and the western slope of the Urals, from Urzhum to Yekaterinburg). There were 8 French participants in this group (M. Bertrand, P. Jannettaz, E. Margerie, A. Offret et al). M. Bertrand was very active during excursions and reported impressions and results of his Russian journey « Les excursions du septième Congrès géologique international en Russie » (Bertrand, 1897) at the meeting of the Geological Society of France. Ch. Barrois (Barrois, 1897), M. Boule (Boule, 1897) and A. Gaudry (Gaudry, 1898) did the same their (Kolbantsev, 2019). The spouses Meuniers published their impressions in the form of detailed sketches-reports "VII Session du Congrès Géologique International" (Meunier, St., 1897-1898) and "Voyage d'un Congrès en Russie" (Meunier St., M-me, 1898).

Later Karpinsky visited France several times. In 1899, he participated in the meeting of the International Petrographic Commission in Paris. A year later Karpinsky headed the Russian delegation at the 8th IGC in Paris (1900). He gave a welcoming speech at the Opening Meeting and introduced A. Gaudry, as President of the Session. Karpinsky was a member of the Bureau of the Congress. He made reports on the next topics: the Floating Marine Institute Project, the work on the Geological Map of Europe, the principles of classification and nomenclature of rocks, the teaching of geology in schools (Congrès géologique international..., 1901).

In 1902, Karpinsky attended the 6th Congress of Hydrology, Climatology and Geology in Grenoble, where he was a member of the Bureau of the Geological Section.

Karpinsky participated in the International Congress on Mining, Metallurgy and Applied Geology in Liege (1930), and then in the festivities dedicated to the centennial of the Société Géologique de France (SGF) and the 50th anniversary of the Société Française de Minéralogie et de Cristallographie in Paris. « A.P. Karpinsky and his accompanying daughter E.A. Tolmacheva and paleontologist Academician A.A. Borissyak listened to the inspired speeches of A. Lacroix and P. Termier » (Romanovsky, 1981).

As a member of the Academy of Sciences Karpinsky has nominated and supported the election of French geoscientists as foreign correspondents. Ch. Barrois (1897), M. Bertrand (1899), A. Lacroix, E. Haug (1909), P. Termier (1924), Ch. Depéret (1927), L. Cayeux (1929) were among them (Malakhova et al., 2012).

Karpinsky remembered his French colleagues and published obituaries in Russian scientific periodicals: for example, to the memory of Gabriel

Auguste Daubrée (1814-1896) (Karpinsky, 1896), Marcel Bertrand (1847-1907) (Karpinsky, 1907), Jean Albert Gaudry (1827-1908) (Karpinsky, 1908).

His close scientific ties with French geoscientists are evidenced by extensive correspondence stored in the Archive of the Russian Academy of Sciences in Saint-Petersburg. There are next letters from French scholars – Table 1 (Karpinsky Alexander Petrovich, 1886-1936).

<i>Correspondents</i>	<i>Letters & Postcards</i>
Barrois, Charles Eugène (1851-1939)	13
Bertrand, Marcel Alexandre (1847-1907)	3
Cayeux, Lucien (1864-1944)	2
Depéret, Charles Jean Julien (1854-1929)	4
Daubrée, Gabriel Auguste (1814-1896)	14
Gaudry, Jean Albert (1827-1908)	15
de Grossouvre, Marie Félix Albert Durand (1849-1932)	2
Haug, Gustave Émile (1861-1927)	8
Lacroix, Alfred François Antoine (1863-1948)	11
de Margerie, Emmanuel Pierre Martin Jacquin (1862-1953)	12
Meunier, Étienne Stanislas (1843–1925)	17

Table 1: Some French correspondents of Alexander P. Karpinsky

Letters from France contain comments on scientific publications of Karpinsky and interest in receiving the results of his research in paleogeography, stratigraphy and mining resources exploration. Correspondents showed great interest in Karpinsky's initiatives reported on the 7th IGC Session, and especially in the Geological Map of Russia (Karpinsky, 1897).

The letter of A. Gaudry as of October 10, 1898 is very interesting. He supported the plan of the Floating Institute creation suggested by Karpinsky from the podium of the Congress (Congrès géologique international, 1899) and promised to contribute to its implementation from the French side. Gaudry also informed Karpinsky that the recommendation to introduce teaching of geology

and paleontology in gymnasium suggested at the 7th Congress was approved by the French Ministry.

And more from Gaudry's letter: « *J'ai reçu un jour-ci une lettre m'annonçant que sa Majesté l'Empereur de Russie me confère l'ordre de St Anne de première classe. Je suppose que je vous dois en partie cette distinction à laquelle je ne m'attendais nullement et je vous remercie de tout cœur de me donner en bien de plus avec votre grande nation, si aimé de tous les Français. Nous continuons à préparer le Congrès de 1900 à Paris, mais il nous sera impossible de vous égaler* » (Karpinsky, Alexander Petrovich. 1886-1936. Fund. 265. List 6. File 171, pp. 5-6)

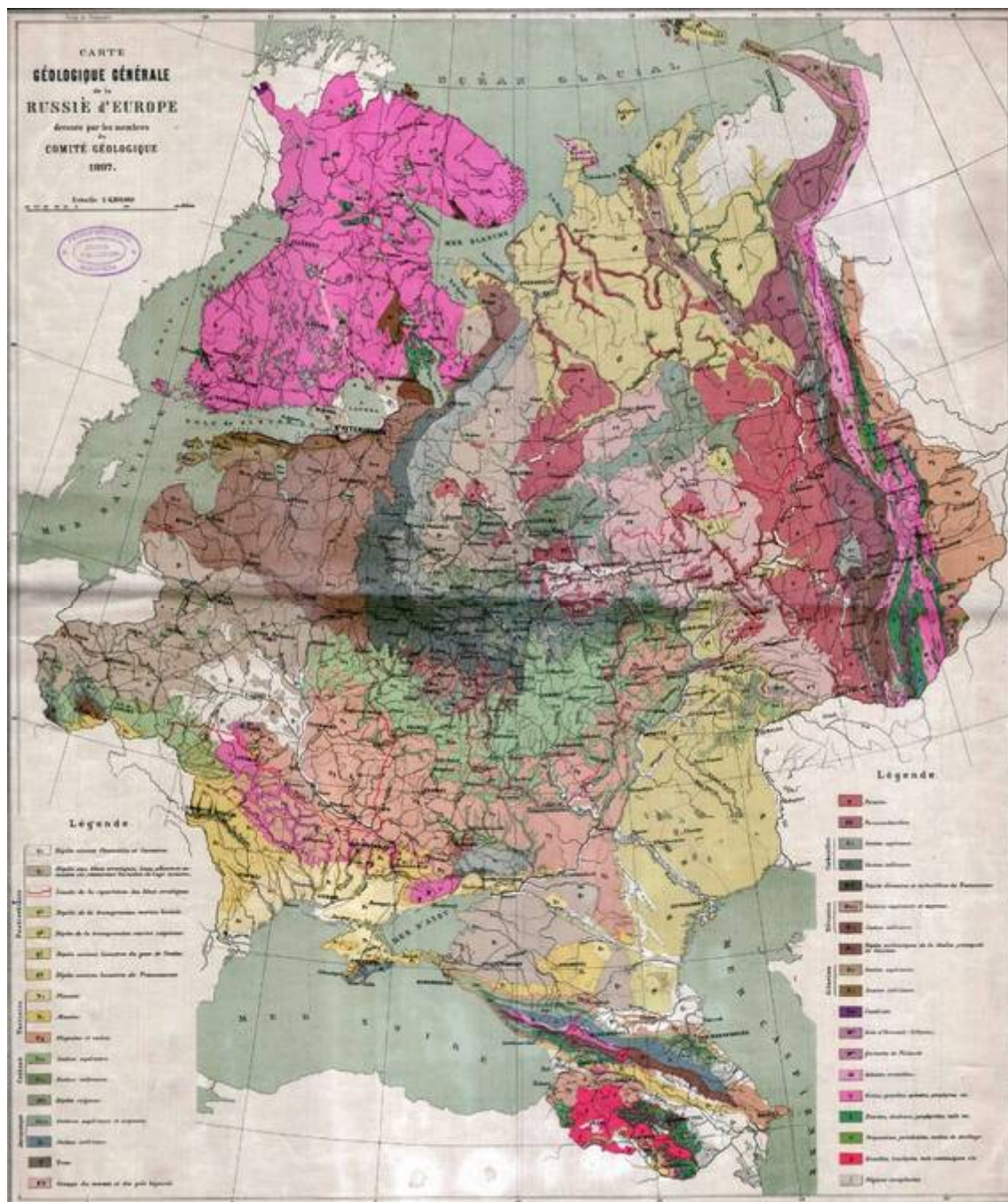


Fig. 5. A general geological map of European Russia, compiled by members of the Geological Committee in 1897. Scale 1:6,300,000 (150 versts per inch). The map was given to the participants of the VII IGC session in Saint Petersburg, 1897

5. The Prix Cuvier

A vivid recognition by the scientific community of France of the Russian geologist's merits was the awarding of the Prix Cuvier.

The award named by Jean Léopold Chrétien Frédéric Dagobert, baron de Cuvier (1769-1832) was established by the French Academy of Sciences in 1850. The French naturalist is known worldwide for his pioneer zoological and geological work. He was a member of the Academy of Sciences in Paris from 1795. The Prix Cuvier should be awarded to well-known scholars for works which « *will be recognized as the most outstanding among all researches on the animal kingdom or geology published after the death of this great naturalist* » (Prix Cuvier, 1850, p. 263).

Such distinguished scholars as Jean Louis Rodolphe Agassiz (1807-1873), Richard Owen (1804-1892), Roderick Impey Murchison (1792-1871), and Arthur Smith Woodward (1864-1944) were honored until 1921, when the first Russian name was listed. At that time A.P. Karpinsky was and still is the most known geoscientist in Russia.

In 1921, the Commission on the Cuvier Prize of the Academy of Sciences (Institut de France), composed of Ch. Barrois, H. Douvillé, F. Walerant, P.-M. Termier, L. de Launay, E. Perrier, A. Lacroix, Ch. Depéret. The decision of the Commission on the Prix Cuvier of the Academy of Sciences in Paris to award Karpinsky was reported at the Session by E. Haug.

The next Karpinsky's official regalia include nomination of the French Academy – Director of the Geological Committee of Russia, President of the 7th Session of the International Geological Congress (IGC) in Saint-Petersburg (1897), and President of the Academy of Sciences in Petrograd. The decision was based on scientific merits of Karpinsky. As his main accomplishment Commission noted: «Tertiary deposits of the Eastern Urals» (1883); «The general nature of the earth's crust movements within European Russia» (1894); many paleontological works of Karpinsky and, first of all, the study of genres *Helicoprion* and *Volborthella*, as well as description of *Trocholisques* (Prix Cuvier, 1921, p. 1244).

As indicated in the introduction letter, one of the main reasons for the Prix Cuvier awarding was the broad study of the spiral teeth whorls of the genus *Helicoprion* Karpinsky, established in 1899 and widely,

« *les recherches paléontologiques de M. Karpinski sur les Ammonoidés des couches d'Ar-tinsk sont depuis longtemps classiques. Elles illustrent d'une manière saisissante le parallélisme qui existe entre les stades du développement individuel et ceux auxquels sont arrivés les genres successifs d'une série phylétique. Elles font, en outre, connaître en détail de nombreux termes de passage entre les faunes carbonifères et les faunes triasiques.*

Les travaux ultérieurs de l'auteur ont trait au genre Helicoprion, curieux élasmobranche, dont les dents étaient disposées en spirales, au genre Volborthella, le plus ancien céphalopode connu, aux trocholisques, singulières algues calcaires des terrains primaires, représentées par leurs oogones, qui les classent au voisinage des characées. Ils témoignent tous de remarquables dons d'observation et d'un sens critique très affiné » (Prix Cuvier, 1921, p. 1244).

In 1922, the Russian scientific journal *Priroda* (*Nature*) congratulated academician A.P. Karpinsky with the remarkable award – the *Prix Cuvier* of the Academy of Sciences (Institute of France) in Paris with reprinted text of the nomination (Prix Cuvier for academician..., 1922).

Conclusions

Science in Russia has been much obliged to foreign scholars and institutions ever since the foundation of the Academy of Sciences in Russia. Geological theories and practice have much followed foreign ones.

The time of Karpinsky was a period of the progress of geosciences in Russia and the effective cooperation of Russian geoscientists on a par with foreign colleagues: change of ideas, discussions and personal contacts. And Karpinsky is the symbol of that time;

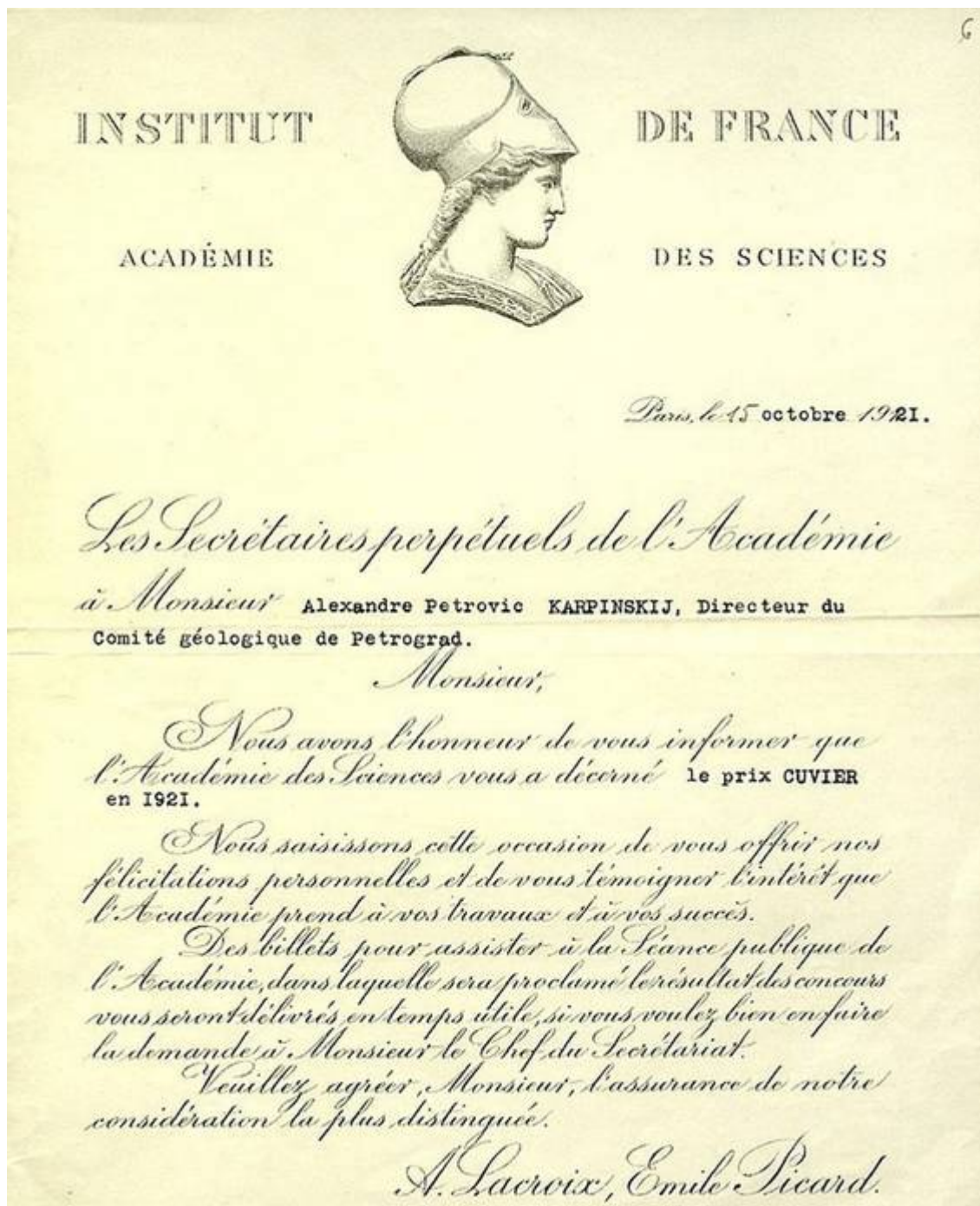


Fig. 6. Diploma of the French Academy of Sciences: Prix Cuvier for A.P. Karpinsky. The Archive of the Russian Academy of Sciences. Saint Petersburg Branch. Fund 265. Inventory 2. File 15. List 6. <http://ranar.spb.ru/rus/vystavki/id/340/>

He led science in Russia and the USSR during the October revolt (1917), the Civil War (1918-1922), the postwar devastation and famine (1917-1922), and during the build-up of fear and the beginning of the Stalinist terror (1931-1936). The Academy's efficiency during this period was his merit in many respects.

New data on the paleontological characteristics of the Artinskian deposits of the stratotype area, as well as new stratigraphical observations allowed adding new considerations on Early Permian paleoecology and even paleo-landscape/paleoenvironmental reconstructions of this region, for further developing of Karpinsky's ideas.

Karpinsky's scientific relations with French colleagues were long-lived and very fruitful for international cooperation in geosciences. The correspondence of Karpinsky testifies to the active exchange of scientific information. The letters from France imbued with deep respect for the Russian geologist. And the Prix Cuvier is a proof of that.

The World War I (1914-1918) destroyed many scientific relations. Russia, Germany and some other countries were under sanctions. So, the act of Karpinsky awarding was so remarkable at that time, and confirms the conclusion of Vladimir I. Vernadsky that science has neither nationalities, nor borders (Vernadsky, 1930).

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