

Plotkin, S. Ya.

**The Main Developmental Trends of the
Historical Studies on Science and
Technology in the Soviet Union**

Organon 6, 297-312

1969

Artykuł umieszczony jest w kolekcji cyfrowej Bazhum, gromadzącej zawartość polskich czasopism humanistycznych i społecznych tworzonej przez Muzeum Historii Polski w ramach prac podejmowanych na rzecz zapewnienia otwartego, powszechnego i trwałego dostępu do polskiego dorobku naukowego i kulturalnego.

Artykuł został zdigitalizowany i opracowany do udostępnienia w internecie ze środków specjalnych MNiSW dzięki Wydziałowi Historycznemu Uniwersytetu Warszawskiego.

Tekst jest udostępniony do wykorzystania w ramach dozwolonego użytku.



S. Ya. Plotkin (Soviet Union)

THE MAIN DEVELOPMENTAL TRENDS OF
THE HISTORICAL STUDIES ON SCIENCE AND TECHNOLOGY
IN THE SOVIET UNION

The advance of Soviet science belongs to the greatest achievements of the new society. Science has always played a very important role in the development of the Soviet Union. However, it has never been as significant as it is at present.

The outstanding democratic critic N. G. Chernyshevsky once called literature "the moving force of social life". We are fully justified to say the same of modern science. Science has never influenced all the spheres of social life as actively as it does now. The state has never been guided by science to an extent that it is guided by science in the Soviet social system.

Historically, half a century is a brief period. But within the 50 years of the Soviet state Soviet scientists managed to create eternal values of world importance. Simultaneously, interest in the history of science, its sources and progress has greatly increased. Soviet scholars inherited no steady traditions of historico-scientific study from the pre-Revolutionary Russia. Then, only few scholars interested in the sources of science created some works on the historical advance of their respective fields. Studies on the history of science and technology appeared in this country only after the October Revolution. A centre of such research work was established in the USSR in the prewar period; it grew into a large independent scientific unit, the USSR Academy of Science Institute of the History of Science and Technology.

Over 500 books, monographs and collections devoted to various problems of the history of science and technology, several thousand articles, doctoral dissertations and bachelor theses have been written and published during the 50 years of the Soviet Union.

Recently we face a growth of interest in the history of science and

technology. Over 2000 scholars are at present engaged in studies on the history of science. Historians of science collaborate with civil historians, philosophers, lawyers, economists and specialists in other fields, making wide use of their methods of investigation.

Specialists in different sciences, mathematicians, astronomers, physicians, chemists, biologists, geologists and others manifest an intense interest in the history of science and technology, in the philosophical, cognitive, logical and methodological problems of their respective sciences, this is a logical consequence of the advance of these scientific fields. Scientists are therefore more apt to learn the social functions of their sciences.

Many eminent scientists engaged in their special studies are simultaneously studying the history of their fields. A number of volumes on the history of native and world science were issued within this period. Articles on the history of certain scientific fields, on the history of scientific discoveries and inventions, on the general problems of science were published by such world-known Soviet scientists as the geochemicists Vernadsky and Fersman, the physicists Lazarev, Vavilov, Joffe, the chemicists Arbusov, the botanist Komarov, the mechanician Krylov and others.

Creative contacts between professional historians of science and technology and specialists prove fruitful.

The realization of a series of large monographs devoted to the history of native science within the Soviet period was an event of major importance in the history of science. In connection with the 50th anniversary of the October Revolution a number of collective works on the advance of mathematics, astronomy, mechanics, physics, chemistry, biology, the earth sciences was issued. They were authored by prominent Soviet scientists together with the historians of science.

Fundamental problems are often discussed collectively, which is an important condition for scientific advance. Thus, the problem of the place of the history of science in the general system of sciences is now on the agenda.

The discussion of the place of the history of science is still more urgent because civil historians tend to place the history of science among the natural sciences, whilst scientists and technologists regard it as one of the humanities, a part of general history. The situation is peculiar to many "joint" sciences connecting adjacent, sometimes distinct fields of knowledge. The predominant viewpoint is that the history of science and technology is on the border of the natural and the social fields. Soviet historians of science and technology emphasize the independent position of their field of study. This study requires the unity of two main specializations: humanitarian (general history, philosophy) and scientific (the science or technology under study).

Topics of discussions are numerous methodological problems of the history of science and technology, such as the classification and periodization of science, problems of priority, the balance between the national and the international in the history of science, regularities and contradictions in the advance of science, and other subjects. Most discussions were devoted to the problem of the place and of the significance of facts in the historical studies. The methods of a scientific interpretation of historical events were also discussed.

At an early stage of the history of science many Soviet authors tended primarily to consider the factual aspect; the analysis of and the generalization from the data was sometimes missing. Certain scholars ignored the obvious consideration that fact is not the whole truth, that it is only the raw material to be processed to establish a regularity, a permanent truth. The general and the typical was frequently substituted with the accidental and the casual.

Historians of science are now actively solving problems of sources. The scientific value of sources and archive stores of information is recognized. These stores are recently made wide use of; facts are selected more carefully.

Soviet investigators proceed from the idea that the history of science and technology, as the other branches of historical knowledge, is a true science. It is neither a thrilling narration, nor a merely theoretical speculation. As any science, the history of science considers facts, analyzes, confronts and connects them to draw a conclusion on the interconnection of the past and the present.

Soviet historians of science and technology maintain that the works of our predecessors frequently contain valuable data and notions which continue to be up-to-date and, if used analytically and critically, can render substantial help to the progress of contemporary science.

The study of the newest history of science and technology by no means precludes a consideration of the earlier formations. This is important to emphasize, because up-to-dateness is sometimes substituted for contemporaneity. Therefore, the most significant problems of antiquity or the Ancient East were sometimes not properly studied.

Soviet scholars pertinently oppose any distortion of historical truth; they object to the non-Marxist interpretations of the historical process, to subjectivism in the evaluation of historical events and scholars. They are guided by Lenin's theses that the Party principle in historical science constitutes the highest form of objectivity.

Great work was realized within the recent period. Numerous publications present rich material: a profound analysis, generalization and explanation of the material is now necessary. Soviet historians of science and technology see their main task for the nearest future in the creation of the world history of scientific and technological development at all

its principal stages in Marxist terms. Closest attention will be paid to the history of the 19th and 20th centuries and to the uprise of the newest branches of science and technology. Such a task requires an investigation of the scientific schools, of certain ideas of dominant importance at a given historical stage; experience of foreign historians of science must also be considered.

It would be necessary to speak of the various aspects of interconnection between the different fields of knowledge, between science and technology, economics, general history, their mutual influence etc. A world history of science and technology is possible when the world histories of separate branches of science and technology (mathematics, physics, chemistry, biology, geology, engineering) are available. Correspondingly, contributions of certain countries and peoples into the world science accumulated enough data and experience to start a truly scientific work on the world historical process in all its interconnections.

The capital works generalizing the long progress of the world science and technology are impossible without an analysis of scientific concepts. Soviet historians of science have already started their work on monographs presenting a critical analysis of different concepts and views of scientists, representing different epochs and countries.

Social and natural scholars, including historians of science, now emphasize that no scientific field can advance without theoretical elaboration of its methodological problems. The methodology of any science, including the history of science and technology, sets out to postulate the general tasks of study, to generalize the methods and principles of study of a given subject. Deprived of methodology, science ceases to be science and becomes a field wide open for subjectivism.

A practical issue of methodological discussions is the repudiation of some ready-made premisses, ideas and theses founded in traditions, and the adherence to certain notions.

The Marxist approach to historical study consists in a search for the causes and regularities of historical events, in a generalization from facts aiming to reveal the essence of historical advance. The general trend of the present historicoscientific studies in the Soviet Union is guided by this task. One of the most important problems faced by the Soviet historians of science and technology is that of dialectical (logical) processing of the history of the whole human thought, of science and technology.

The process of rapid differentiation eminent in modern science generated the necessity for a complex study of science itself; a number of methodological problems emerge in this connection. Thus, there is the problem of connection between social and economic factors and the inherent logic of the development of separate scientific fields. This gave rise to the study of the regularities of the development of science

as a whole system and a peculiar activity. Some experience is already accumulated. Collective studies of such problems as the modern scientific and technological revolution, contradictions in the advance of science, analysis of a developing notion, the historical and the logical analysis of scientific development, the evolution of the structure of physics etc., were realized.

The cycle of such studies is to be enlarged. It will comprise such problems as the social and productive functions of science, the place of science in the capitalist and in the socialist societies, correlation between natural and social sciences. With respect to the theoretical foundations of scientific organization, planning and management, Soviet scientists are engaged in the study of the criteria of scientific advance, methods of forecasting the progress of science, connections between basic and applied research. Experience of scientific planning in the Soviet Union and abroad will be studied. The wide variety of problems peculiar to the logic of scientific development and the psychology of creativity are considered. Problems of the science of science are studied in connection with the history of science.

The advance of historico-scientific study in the Soviet Union is characterized most evidently by the list of studies realized by Soviet scholars. We are going to speak of some investigations on the history of science and technology.

HISTORY OF MATHEMATICS

A number of monographs on the history of mathematics appeared within the very first years of the Soviet state. The following books can be mentioned: *Mathematics and Its Importance for Humanity* by V. A. Steklov, *Essays on the History of Mathematics* by G. N. Popov, *How People Gradually Arrived at Present Arithmetics* by V. Belljustin.

In the later twenties first attempts were made to employ Marxist-Leninist methodology to the study of the history of mathematics. M. Ya. Vygodsky's book, *Plato as a Mathematician* (1926) proved false the current opinion ascribing great importance to Plato's contribution to mathematics. In the later works of M. Ya. Vygodsky regularities of the development of the notion of number and general problem of the history of mathematics acquired profound methodological basis.

Methodological and philosophical aspects of the history of mathematics were also considered in the early studies of S. A. Yanovskaya, *Hegel's Categories of Quantity and the Essence of Mathematics* (1928), *The Law of the Unity of Contraries in Mathematics* (1929), *The Idealistic Approach in the Modern Philosophy of Mathematics* (1930) and others.

The thirties were in the Soviet history of mathematics a period of intensive source investigations; this enabled the scholars to start studies on mathematics of all epochs and countries. Commented editions of the classical works of world mathematics (Euclid, Kepler, Cavalieri, Descartes, Newton, L'Hopital, Euler, Monge, Carnot, Galois) are published: complete works of native mathematicians (M. V. Ostrogradsky, N. I. Lobatchevsky, S. V. Kovalevskaya, A. A. Markov, A. M. Lyaponov, E. I. Zolotariov, N. I. Luzin, A. N. Krylov and others) are prepared for edition.

An event of major importance was the German language edition of the famous Moscow mathematical papyrus, realized in 1930 by B. A. Turjev and V. V. Struve. This initiated an intensive study of the ancient Egyptian mathematics throughout the world. Also in the thirties works on the history of mathematics by Zeiten, Wieleitner and others appeared.

The publication of Marx' mathematical manuscripts (1933) which remained to a considerable extent undeciphered, was of extreme importance for the methodology of the history of mathematics. Methodological problems were further discussed in such volumes by S. A. Yanovskaya as *On the Views of N. I. Lobatchevsky, From the History of axiomatics*, and in a number of her articles devoted to Descartes' *Geometry*.

Among the generalizing works of the time one must mention M. Ya. Vygodsky's book *Arithmetics and Algebra in the Ancient World* (1941) and the doctoral thesis of A. P. Yushkevitch, *Mathematics and its Teaching in Russia in the 17th to 19th Centuries*, published in the postwar period as a series of articles.

The postwar period saw generalizing works on the history of native mathematics: *Essays on the History of Mathematics in Russia* (1946) by B. V. Gnedenko, the mathematical section of the collective work *History of Science in Russia* (1957—1960) compiled by A. P. Yushkevitch, and the latest works which are in print: *History of Native Mathematics* (4 vols) and A. P. Yushkevitch's monograph *History of Mathematics in Russia*. The mathematical achievements of L. Euler was studied profoundly and extensively; some studies on this scholar were undertaken in collaboration with German historians.

M. Ya. Vygodsky's *Arithmetics and Algebra in the Ancient World* saw a complemented edition in 1957; it was followed by E. Kolman's monograph *History of Mathematics in the Ancient Times* (1961) and *Sumerian-Babylonian mathematics* (1962) by A. A. Waiman (this last work will be reissued in English). Greek mathematics was thoroughly investigated in numerous studies of I. G. Bashmakova.

Great progress was made in publications of medieval and Eastern mathematical treatises, Chinese, Arabic, Hindu, Middle Asiatic. The

first work to generalize this new direction in the Soviet history of mathematics was a monograph by A. P. Yushkevitch *History of Medieval Mathematics* (1961). The author suggests a general conception of the advance of medieval mathematics regarding mathematics of the Eastern and European worlds as a unity.

Soviet historians of mathematics undertake fundamental work on the publications of the newest European classical work, those of Riemann, Poincaré, Einstein and others. Principal directions which emerged in the newest mathematics (the theory of multitudes, variational calculations, trigonometrical rows etc.) are also studied thoroughly in this country.

The achievements of the Soviet school in the history of mathematics and the variety of subjects it has studied enable to present the progress of the world mathematics proceeding not exclusively from the inherent logic of this development, but also in the immediate connection with the advance of other sciences, with the social and economic state which conditioned the uprise of mathematics at different stages.

HISTORY OF ASTRONOMY

Studies on the history of astronomy were proliferous in a number of research collectives after the Revolution. Thus, Leningrad became a centre of such research. One of the first Soviet studies on the history of astronomy, N. I. Idelson's *History of Calendar*, appeared in this city. Numerous later works of this prominent astronomer and theoretician were devoted to astronomical aspects of the work of Copernicus, Galileo, Kepler, Newton, Lomonosov, Lagrange, Lobatchevsky, Clairaut and others.

Another eminent historian of astronomy, D. O. Sviatsky, published a large variety of articles on the history of old Russian astronomy. He summed up his studies in his *Essays on the History of Astronomy in Ancient Russia* (1961—1966). M. V. Subbotin published valuable works on the astronomical achievements of Lagrange, Copernicus, Gauss and scholars of the ancient Middle Asia.

Another centre of the history of astronomy is situated in Middle Asia, where the history of the Samarkand astronomy in the 15th century and the activity of the scholars of Ulugbek's school is studied. Such capital works, as T. N. Kary-Nijazov's *The Astronomical School of Ulugbek* (1950) and the collection *From the History of Ulugbek's Epoch* (1965), were prepared there. A number of works are devoted to the astronomical achievements of Biruni, an erudite of the medieval East (H. U. Sadykov, 1953, and others); a collection of his works is being issued. V. P. Stcheglov devoted numerous articles to Leonardo and Bruno and undertook a number of publications.

Historians in Baku study another famous medieval observatory — the Maragin Observatory; G. O. Mamedbeili (1961) and other scholars devoted their works to the founder of the observatory, Tusi.

The astronomy of ancient Armenia is studied in Erevan. Here a cycle of publications was devoted to an outstanding Armenian scholar of the 7th century, Anany Shiraktsi, and his writings were issued. Numerous studies of Armenian historians were generalized in a capital monograph by B. E. Tumanian, *A History of Astronomy in Armenia* (1964, 2 vols).

Scholars of the Baltic republics reconstruct the history of the Tartu (Derpt) Observatory, the activity of V. V. Struve, the advance of astronomy in Estonia, Latvia, Lithuania (works by P. V. Mursepp, G. A. Zhelnin, P. K. Prüller, P. V. Slavenas, I. M. Rabinovitch and others).

The historian of astronomy, Yu. G. Perel, is the author of a capital monograph *From the Native Astronomical Historiography* and studies on the cosmogonical views of Lambert, Voltaire, Humboldt and other European scholars. This study has led to a monograph on *The Advance of the Notions of the Universe* (1958, 1962) analysing the evolution of cosmogonical views from the ancient times to the modern stage.

I. N. Veselovsky translated and commented writings of ancient and antique astronomers. P. A. Startsev's book *Essays on the History of Astronomy in China* (1961) presents for the first time in Russian the history of Chinese astronomy. L. S. Baranovskaya devoted a number of articles to the history of Mongolian astronomy.

Methodological and philosophical problems of the history of astronomy are discussed in such articles as B. V. Kukarskin's *Certain Methodological Problems of the History of Astronomy* (1961), P. G. Kulinsky's *On Some Problems of the History of Astronomy* (1961) and others.

Among the capital works describing the general progress of Russian and Soviet astronomy we must mention the books by V. G. Resenkov, B. A. Vorontsov-Veliaminov and a collective monograph *The Development of Astronomy in the USSR. 1917—1967*. A. Pannekoek's *History of Astronomy* was translated into Russian in 1966.

HISTORY OF MECHANICS

Publications of the classical works, which were begun in the later twenties are kept on with at present. This indicates an interest of Soviet historians to the wide variety of problems connected with the progress of mechanics.

Among the first publications we find fundamental works of Galileo (reissued in 1964 with new commentaries), Newton, Euler, Huygens,

both Bernoullis, Clairaut, d'Alembert, Lagrange, Kirchhoff, Herz, Ostrogradsky and others. Simultaneously works of the most important Russian and Soviet mechanicians were published. Investigation accompanied the work on editing and commenting.

Collections of classical studies on certain problems of the history of mechanics (hydrostatics, variational principles of mechanics, the hydrodynamic theory of lubrication, the theory of automatic regulation in the 19th century) are of great and lasting value.

The ancient and medieval mechanics was thoroughly analyzed in V. P. Zubov's works on Aristotle and Leonardo, in his monograph on the progress of atomistic views and in a series of articles. *The Sources of Mechanics*, which A. P. Zubov contributed to the *Essays on the Development of the Principal Notions of Mechanics* (1962), were co-authored by A. T. Grigoryan.

The problems of the history of mechanics in connection with the evolution of physical notions and views (considering methodological problems) were studied by B. G. Kuznetsov in a number of works correlating the advance of mechanics in the ancient and modern epochs.

Soviet historians published a good deal on the formative periods of the classical mechanics. We shall cite books by B. M. Gessen and S. I. Vavilov on Newton, monographs by B. G. Kuznetsov on Galileo (1964), N. I. Veselovsky on Huygens (1959), U. I. Frankfurt and A. M. Frank on Huygens (1961). Important problems of mechanics are approached by L. S. Polac in the *Variational Principles of Mechanics, Their Advance and Employment in Physics* (1960).

Mechanics of the 18th century was studied in the works of A. N. Krylov on Euler, I. N. Idelson and A. N. Krylov on Lagrange, L. S. Freimann on the "Petersburg principle", L. N. Sretensky on Euler's contribution to the solid state mechanics, E. A. Nikolai on Euler's works on the longitudinal bent etc. The activity of D. Bernoulli, Clairaut, d'Alembert and Lomonosov's work on mechanics was also studied.

Among the studies on the latest mechanics investigations of native mechanics predominate. This enabled to trace the onward march of native mechanics in the corresponding chapters of *History of Science in Russia* (1957—1960), compiled by A. A. Kosmodemiansky, A. T. Grigorian and L. S. Polac, and in A. T. Grigorian's *Essays on the History of Mechanics in Russia* (1961).

The advance of mechanics abroad was investigated in Soviet works on Hamilton, Helmholtz, Herz and others. The main directions of 19th century mechanics are studied in I. B. Pogrebyssky's monograph *From Lagrange to Einstein* (1966). An analysis of the problems connected with physical foundations of mechanics up to the middle of the previous century is being carried out by B. C. Kuznetsov.

HISTORY OF PHYSICS

The history of physics started from publications of classical work with simultaneous investigation.

Works by Galileo, Newton, Lomonosov, Galvani, Volta, Davy, Fresnel, Faraday, Mayer, Helmholtz, Lebedev, Carnot, Clausius, Thomson, Roentgen, Herz, Gibbs, Einstein were published in the prewar period.

A number of studies, issued in the thirties mostly as articles, were of principal methodological importance for the uprise of the Soviet history of physics: *A History of Matter and Kant's Foundation of Classical Mechanics* (1935), *On Some Features of a Scientific Theory*, and *On the Principle of Observability* (1935), *From the History of the Problem of Ether* (1936), *Democritus and Epicurus Affirming Atheism* (1936).

In the post-war period two directions of research (the study of the history of physics in Russia and the investigation of the world physics) advanced simultaneously.

The early generalizing works: *Essays on the History of Physics in Russia* (1949) and the part of the *History of Science in Russia* (1957—1960) devoted to physics were highly important. These works were continued with *The Development of Physics in the USSR. 1917—1967*, a collective monograph published in 1967.

The world physics was represented in the manuals of the world history of physics written by P. S. Kudriavtsev (1948—1956, the final volume now in print) and B. I. Spassky (1963—1964). The first Soviet publication to comprise the principal problems of physics up to the earlier decades of the present century was a collective monograph on *The Development of the Principal Physical Ideas* (1959). This edition generalized the experience of Soviet and foreign scholars.

Publications of the prominent physical works were also prolonged. Works of Copernicus, Gilbert, Franklin, Aepinus, Ampère, Gauss, Faraday, Curie, Langevin and others constituted the series "Classics of Science".

Among the recent monographs we shall cite the posthumous work of V. P. Zubov on *The Development of Atomistic Views up to the Beginning of the 19th Century* (1965), B. G. Kuznetsov's works: *The Uprise of a Scientific Picture of the World in the Physics of the 18th and 19th Centuries* (1955), *Foundations of the Theory of Relativity and Quantum Mechanics* (1957) and *Principles of the Classical Physics* (1958).

The work of Einstein received lately special attention. The complete works of Einstein, which are being issued in the U.S.S.R., constitute the fullest edition in the world. A great number of studies are devoted to his contribution to the development of physics (works by

D. D. Ivanenko, B. G. Kuznetsov, U. I. Frankfurt, B. I. Spassky and others).

The history of atomic physics was in the last years studied widely. Here the most prominent contribution is a book by O. A. Staroselskaya-Nikitina on the *History of Radioactivity and the Uprise of the Nuclear Physics* (1963) and a scientific biography of Rutherford, issued in 1967. We shall also mention such monographs, as *The Lightest Atoms and the Lightest Nuclei* (1963) by A. N. Vyaltsev and *Electron* (1966) by N. I. Dukov.

HISTORY OF CHEMISTRY

The earliest works on the history of chemistry were naturally fulfilled by pre-Revolutionary historians (N. A. Menshutkin, P. I. Velden, B. N. Menshutkin and others). Soviet historians in the thirties emphasize the philosophical problems connected with the history of chemistry.

The publication of the scientific works by Lomonosov, Zinin, Butlerov, Mendeleev, Markovnikov and others formed a valuable basis for later fundamental historico-chemical studies on the advance of chemical views in Russia (G. V. Bykov, Yu. I. Soloviov, N. A. Figurovsky, V. I. Kuznetsov and others).

Among the principal studies of the kind it is necessary to note S. A. Pogodin's work on chemistry in the Petersburg Academy of Science prior to Lomonosov and a many-volume work by P. M. Lukianov *A History of the Chemical Industry in Russia*. We shall also cite the *Chronicle of Lomonosov's Life and Work*, fundamental works of B. M. Kedrov devoted to Dalton's atomistics and to Mendeleev, commented edition of the works of Dalton, Davy, Liebig, publications and monographs devoted to outstanding chemists etc.

Publications and studies of Mendeleev and Butlerov (B. M. Kedrov and G. V. Bykov) constitute an important branch of the history of chemistry. Soviet historians of chemistry (Yu. I. Soloviov, V. I. Kuznetsov, G. V. Bykov) engaged themselves, in the study of different aspects of inorganic and physical chemistry, in problems of structure and reactivity of organic compounds, of the uprise and advance of metalloorganics, catalysis, structural chemistry, chemistry of proteins etc.

HISTORY OF BIOLOGY

The systematic study of the history of biology initiated after the October Revolution was manifested in publications of works by Aristotle, Hippocrates, Helmholtz, Mendel, Keuleuter, O. Sargé, Ch. Naudin,

Schwann, Lamarck, Pasteur, Lucretius, Goethe, Poulter, I. I. Metchnikov, K. M. Baer, A. O. Kovalevsky, V. O. Kovalevsky and other prominent scientists. We must mention several complete editions of Darwin's works, edited and commented by the highest authorities in Soviet biology. Complete works of outstanding, Russian and Soviet biologists were also published.

The biological sections of the *History of Science in Russia* (2 vols, 1957—1960) and *A History of the Academy of Sciences* (3 vols) presented a general view of the biological advance in this country.

Among the studies on the evolutionary doctrine we mention monographs by Yu. A. Filiptchenko (*The Evolutionary Idea in Biology*, 1928), V. V. Lunkevitch (*Heraklites to Darwin*, 1960, 2 vols, 2nd ed.), and B. E. Raikov (*Russian Evolutionists before Darwin*, 4 vols, 1952—1959) and a collective work on the *History of Evolutionary Doctrines in Biology* (1966).

The history of native biology is presented in S. R. Mikulinsky's book on *The Development of the General Problems of Biology in Russia. The Earlier Half of the 19th Century* (1961).

Monographs by S. Ya. Zalkind, Z. S. Katsnelson (1939, 1963) and E. M. Vermel (1946) reconstruct the history of the cell theory and the work of its founder T. Schwann.

Soviet historians published a number of biographical works in connection with the history of general biological problems. Thus we find I. E. Amlinsky's book *Geoffroy de St. Hillaire and his Conflict with Cuvier* (1955), a monograph by S. R. Mikulinsky, *K. F. Rulier and his Doctrine of the Development of the Organic World* (1957), a book by A. E. Gaisionovitch, *K. F. Wolf and the Doctrine of the Development of Organisms in Connection with the General Evolution of the Scientific Outlook* (1961). We emphasise such capital works as I. Ya. Bljacher's *History of Embriology in Russia* (1955), L. Sh. Davitashvili's *The Uprise of Ideas and Methods of Paleontology from Darwin onwards* (1940, 1941), H. S. Koshtojants' *Essays on the Development of Physiology in Russia* (1946), S. L. Sobol's *History of Microscopes and Microscopic Studies* (1949) etc.

A great number of popular essays on Darwin, Lamarck, Baer, Linnaeus, Bernard, Vesalius, Buffon and numerous Russian biologists were published.

HISTORY OF GEOLOGY

Studies on the history of geology followed the familiar pattern. In the first post-Revolutionary decades scientific biographies and jubilee collections were published. Branches of geology and mineralogy were

studied in the historical aspect. The further work embraced the history of the study of regions and the history of methods and ideas.

Soviet historico-geological literature was rather abundant in the pre-war period. Such capital works as V. I. Vernadsky's *Ideas on the Actual Meaning of the History of Knowledge* (1927), A. A. Borisjak's *V. O. Kovalevsky, His Life and Work* (1928), V. O. Obrutchev's *History of the Geological Survey of Siberia* (1931—1949) etc., appeared.

We should also mention V. V. Belousov's works evaluating the geotektonic concept of J. Hutton and N. Steno (1935), studies of N. S. Shatsky on the importance of Darwin in the spreading of the uniformist doctrine. L. Sh. Davitashvili's article on Darwin's theory of the coral reefs and its importance for the modern science. Studies on separate branches of geology produced such books, as F. Ya. Levinson-Lessing's *Introduction to the History of Petrography* (1936), V. I. Vernadsky's *History of Minerals of the Earth Crust* and A. E. Fersman's works on the history of mineralogy and geochemistry (1922—1940).

The first historico-theoretical articles on the central problem of geology, that of the theory of geosynclinals, and of the method of actualism, of the importance of time, of the principle of continuity etc., appeared in the thirties (A. A. Borisyak, N. S. Shatsky, E. V. Milanovsky, L. V. Pustovalov etc.).

Studies on the work of Russian and Soviet geologists, on the world geology, and publications of the works of prominent geologists (Steno, Leonardo, Romais-Delisle, Goethe, Lamare, Agricola, the great medieval scholars of Middle Asia) become proliferous.

The progress of Russian geology was generalized in the 2-volume *History of Science in Russia* (1957—1960). Detailed works on the history of geology in Russia were published by V. V. Tichomirov (1960—1963), I. I. Shafranovsky (1962), D. I. Gordeev (1954) and others.

First sketches of the general history of geology appear in the fifties. An interesting attempt to characterize the most important stages in the advance of geology was undertaken by V. V. Tichomirov and V. E. Hajin in *A Brief Essay on the History of Geology* (1956) and by A. I. Dzhanlidze in his *Essay on the History of Geology* (1959).

The history of theoretical views is presented in I. G. Idoplitcho's monograph *On the Glacial Period*. Interest in methodological problems of the history of geology has greatly increased in the postwar period. Studies characterizing the position of geology in the system of knowledge (G. L. Pospelov, E. V. Shantser, 1961; B. P. Vysotsky) and speaking of periodization of the history of geology (V. V. Tichomirov; D. I. Gordeev; A. I. Ravakovitch), appeared. The collection *Interaction of the Sciences in the Study of the Earth* presents materials of the discussion of the philosophical (and the historico-philosophical) problems of geology, which occurred in 1961—1962.

HISTORY OF GEOGRAPHY

The problem of the subject of the history of geography constantly attracted Soviet scholars (D. N. Antchin, M. S. Bondarsky, A. A. Kruber, A. I. Soloviov, L. S. Berg, D. M. Lebedev and others).

Within the very first years of the Soviet state a great number of studies aiming to proceed from description to a Marxist analysis of the advance in geography appeared. Numerous works on the history of geographical discoveries embrace whole historical epochs.

The first generalizing monograph, L. S. Berg's *History of Russian Geographical Science*, was published in 1920; his fundamental *Essays on the History of Russian Geographical Discoveries* went to 3 editions (1946, 1949, 1963). M. S. Bodnarsky compiled an anthology of the ancient geography.

In the postwar years such voluminous collective publications, as the *Atlas of the History of Geographical Discoveries and Studies* and *Native Physical Geographers* (1969) appeared. A cycle of works on Russian geographical studies in the 19th and 20th centuries were published.

Also important are studies on Arabic geography, on the geographical undertaking of Chinese, Mongolian and other scholars. The history of the study of Antarctica, of the Northern Ocean, of the Pacific was restored in the works of L. S. Berg, A. A. Grigoriev, D. M. Lebedev, A. F. Treshnikov, A. V. Efimov and others.

The permanent interest of Soviet historians of geography in the ancient undertakings till the period of the great geographical discoveries, to the famous travels on land and sea resulted in such capital works as N. K. Lebedev's *The Conquest of the Earth* (3 vols, 1923—1925), I. P. Magidovitch's *Essays on the History of the Geographical Discoveries* (1956), a series of books "Discovery of the Earth" etc.

A number of publications of the great Russian, Soviet and foreign geographical works (Strabo, Theophrastus, Columbus, Cook, Livingstone, Humboldt, Darwin, Davis etc.) and studies on these works appeared. We possess a variety of manuals of the history of geography.

At present, Soviet history of geography accumulated valuable data, especially on the history of geographical discoveries and studies. Studies on theoretical views and ideas become increasingly profound.

*

Anniversaries of the world-famous scholars are widely celebrated in the U.S.S.R. Thus, A. Humboldt's anniversary was observed with numerous articles and books. In an article published in the *Problems of the History of Science and Technology* (1957), academician A. Grigoriev spoke of the

scientific value of Humboldt's work in such terms: „One of the surest proofs of the greatest influence exerted by A. Humboldt's work on scientists of materialistic outlook is Ch. Darwin's utterance of the impression which Humboldt's description of the American travellings produced upon him.

Another article of the same periodical, written by I. Gellert (G.D.R.), spoke of Alexander Humboldt as “a great investigator and scholar, whose exact observation and profound theories paved new ways for science.”

The historian of science A. P. Yushkevitch wrote of Pascal: “He possessed a thorough understanding of the tasks faced by the theory and the practice of this epoch. He was conscious of the further advance of science. The main characteristic of the value of a scientist's work is the degree of influence it displays on further scientific and cultural advance. Pascal's work inspired such men, as Huygens and Leibniz” (*Problems of the History of Science and Technology*, 1964).

The 400th anniversary of Galileo was observed with a special issue of the *Problems* (1964). Here the immortal *Sidereus Nuncius* was published together with articles of A. Einstein “About Galileo and his *Dialogue*,” V. Ronchi (Italy) on “The Influence of the 17th Century Optics on the General Progress of Science and Philosophy.” O. Fleckenstein (Switzerland), “From the «New Science» of the Renaissance to the «New Method» of the Baroque” etc. The publication was complemented with articles of Soviet scholars: V. P. Zubov's “Galileo's Atomistic Conceptions,” I. B. Pogrebyssky's “Galileo and Mathematics” and others. The works of Galileo were issued in two volumes.

Numerous articles appeared in the Soviet press in connection with the 10th anniversary of A. Einstein's death. *Problems of the History of Science and Technology* published a report by Louis de Broglie “Dualism of Waves and Corpuscles in the Works of Albert Einstein,” read at the annual meeting of the Académie des Sciences on 5 December, 1955; the collection included recollections on Einstein, his correspondence and a forgotten paper of the great physicist “Masses Instead of Units,” written in 1929 for a Soviet periodical.

A series of articles was published in connection with the 100th anniversary of H. Herz (1957). An eminent Soviet scientist, Academician B. A. Vvedensky, wrote in an article published in the *Problems*: „Rare are the cases in the history of science when the scientific heritage of a scholar is so immense as that of Herz... He was the man to pave the way for the invention of radio; this was emphasized by the inventor of radio, A. S. Popov.” The scientific achievements of Herz were appreciated in the articles of A. T. Grigoryan, L. S. Polac and others.

An American historian of science G. Lester studied the notoriety of Lomonosov in Europe. He speaks of the great importance of the

Russian scholar in his articles for the *Problems*. "The activity of Lomonosov can not be regarded separately, because he maintained immediate contacts with fellow-scholars from abroad. Experiments of Lomonosov were widely known even in North America, so remoted from British scientific circles."

*

Soviet historians of science had lately participated in international scientific meetings, conferences and the like. The widening scientific connections of Soviet scholars enable to get a better notion of the history of science abroad, to elucidate the correlation between Soviet and world science, to analyse the state of science abroad.