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On some methodological issues in the history of medicine regarding the origins and development of cardiac surgery and its relationship with cardiology

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Abstract. This article discusses some of the controversial methodological issues in the history of medicine, concerning such major fields as cardiology and cardiac surgery, their origins and development as well as their relationship as mutually complementary disciplines (specializations).

It is demonstrated that, despite the abundance of literature presented on the "origins" of cardiac surgery from 1810 (the first procedure on wounds of the heart) to 1953 (the first surgery for heart disease under direct vision), its "origins" may be determined depending on the goals of each individual piece of research, and do not always coincide with its "birth". Thus, according to the author, clinical cardiac surgery, or "cardiological surgery", originated in 1938 (in the USA) and in 1948 (in Russia) with surgery for patent ductus arteriosus, and was born in the 1940-1950s in parallel with the formation of clinical cardiology. These disciplines not only influenced each other but mutually enriched their theoretical, diagnostic and therapeutic potential. So, cardiology, occupying a leading position in the treatment of diseases of the heart, blood vessels and the circulatory system, supplemented heart surgery methods with genetic diagnosis of heart defects and disease, electrophysiology of the heart, myocardial mapping and cellular technologies. In turn, cardiac surgery, which was successful in treating previously incurable patients, brought to cardiology not only new methods of diagnosis and treatment, but also new knowledge about the anatomy and physiology of the heart muscle, the respiratory system and blood circulation, triggers and mechanisms of cardiac arrhythmias, "tornado" blood flow in the heart, etc.

Special attention is given to the definitions of concepts (origins and birth, formation and development, scientific discipline and medical specialization, their rankings, and more).

Keywords: methodology of the history of medicine, cardiac surgery, cardiology, their development and relationships

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In 2015, P.M. Bogopolsky and D.A. Balalykin published a polemical article, "On several discussion points on the interrelation of cardiology and cardiac surgery" [1]. In our opinion, the authors touched on a very important issue and one of the cornerstones of methodology in the history of medicine – the question of the origins (appearance, birth) and further development (formation) of broad fields of medicine, including the periodization of this process. This article, in particular, concerns the origin, formation, and development of cardiology and cardiovascular surgery's role in this process. Specializing in, on the whole, the history of cardiovascular surgery and, in part, the history of cardiology, we attempt to follow on from the authors, and together with them, reflect on the subject, as well as discuss the related questions of: the relationship of these disciplines (specializations), their ranking (hierarchy) and more.

Particular attention will be paid to the definitions used in the discussion of concepts, repeating a phrase commonly attributed to

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R. Descartes: "Verify the meaning of words, and you will save mankind from half of their delusions".

The beginning and development of cardiac surgery

The question of the beginning and further development of scientific disciplines and qualifications (in our case – in medicine) is complex. This is the case not least because authors of numerous studies on the subject, on the one hand, do not bother to identify their conceptual apparatus, and on the other, take any one date, any fact or event (chain of facts) from available literature (often arbitrarily, without its point of view being supported), and declare it, without a moment's hesitation, the beginning of a process.

We can say immediately, that, in our opinion, to replace in vain the *origins* (inception) of a process with *birth* is not always correct, since the "origin" ("the first time, the starting point, point") is not always identical to "birth", which, as doctors know well, can be not only rapid but also prolonged. Therefore, turning to Descartes for help, we propose that the starting point (a first step) of a process (development) be referred to with the simple and clearly understood word "origins" (or, if you prefer, "inception"). If in denoting this, a particular point in time is not possible, then the words "occurrence", "birth", "awakening", "genesis", "forming", or others can be used to mark the beginning of the process [2].

Now we turn our attention to cardiovascular surgery. The following "origins" are known from literature sources: the first intervention "by hand" for heart injury (D.J. Larrey, 1810) and the first puncture of the pericardial cavity (F. Romero, 1816); first stitching of a heart wound in a hospital (A. Cappelen, 1894) and the first such operation that ended with the recovery of the wounded person (L. Rehn, 1896); the conception of the idea for operations on the sympathetic system for the treatment of angina pectoris (C. Francois-Frank, 1899), mitral commissurotomy (T. Brunton, 1902) and ligation of patent ductus arteriosus (J. Munro, 1906); the first (unsuccessful) attempts of pulmonary valvotomy (E.L. Doyen, 1913) and aortic valvotomy (T. Tuffier, 1914); interventions on the thoracic and cervical sympathetic nodes for the treatment of angina pectoris (T. Ionescu, 1916) and operations on the mitral valve (H. Souttar, 1925; E. Cutler, 1925); the first successful surgery for congenital heart defects (R. Gross, 1938, 1944; A. Blalock, 1944; R. Brock, 1947) and acquired defects of the heart and great vessels (C. Bailey, 1948). The first heart surgeries performed under hypothermia (D. Lewis, 1952), and under cardiopulmonary bypass (D. Gibbon, 1953) are significant among this list. However, hypothermia in cardiac surgery would not have taken place without the development of the method of termination of venous flow to the heart (L. Rehn, 1907), and cardiopulmonary bypass – without a method of temporarily stopping the heart in terms of artificial perfusion of the whole body (S.S. Bryukhonenko, 1929). But the modern technique of off-pump cardiac surgery could not have started, had there not already been the birth of a technique for operations on the fibrillated heart under retrograde coronary perfusion (N.N. Terebinsky, 1940). Also, cardiovascular surgery as a whole could not have fully developed without the creation of a method for cardiac catheterization and cardioangiography (W. Forssmann, 1929). What starting date do we accept?

In our opinion, it all depends on the goal of the researcher and what the process involved. If we are talking about the beginning of surgery on the heart as an organ or surgery for heart wounds, then, of course, we must consider 1810 and then 1894 and 1896. The development of pericardial surgery (if you consider it separately from heart surgery) should be taken as starting from 1816. Surgery for angina was conceived in 1899, germinated in the early 20th century, and was born only in 1916. Likewise, ligation of patent ductus arteriosus was conceived as an idea in 1906 but emerged as an operation only in 1938. However, some authors are inclined to consider the beginning of its introduction to be the date when information about the operation was published in *The Journal of the American Medical Association* on February 25, 1939.

Note, however, one detail is debatable. While clinical medicine was born in France in the 1800s-1810s as a result of the work of physicians J.N. Corvisart-Desmarest and R.T.H. Laënnec, and in the period from 1793 to 1814 doctor-

pathologists M. Bailey and D. Farre described the pathological anatomy of the majority of congenital heart defects, we can hardly speak of 1810 as the birth date for "cardio(logical) surgery" ("cardiovascular surgery"). After all, "cardiology" as a science of the structure and function of the heart, it malformations and diseases, including prevention, diagnosis, treatment and rehabilitation,[1] did not yet exist. And heart injuries were associated with therapy, as a forerunner of cardiology, but with surgery.[2]

We propose to make a distinction between the concept of "surgery of the heart" and "cardiovascular surgery". The first, in our view, designates *surgery of the heart as part of general surgery,* as distinguished from the latter (by analogy with the surgery of the brain, esophagus, stomach, lungs). The second term is much broader and originated from the concept of "surgeon cardiologist" that existed in the 1950s. By "cardiovascular surgery" we mean *heart surgery as part of a cardiology,* or as a science (similar to cardiology) "on the structure and function of the heart, it malformations and diseases, including prevention, diagnosis, treatment and rehabilitation", but with the use of surgical techniques.[3] Our opponents agree with our viewpoint by default, arguing that: "Cardiology, by using surgical treatments <...> – this is cardiac surgery" [1, p. 492].

Hence, to talk about the origins of *cardiovascular surgery* prior to 1938, is obviously premature, although the term "cardiology" as a system of methods for diagnosis of defects and disease of heart already existed.[4] Cardiac surgery was born when, on the one hand, due to clinical pathology (M. Abbott, 1936), pediatricians and therapists thoroughly studied pathological physiology defects and heart disease,[5] and surgeons, on the other hand, began to widely operate in mediastinal organs under the cover of general anesthesia and controlled ventilation, having mastered "large" lung surgery (including lobectomy and pneumonectomy).[6] But in order for "cardiovascular surgery" to originate, it was necessary for pediatricians and therapists, who were able to *diagnose* some defects and almost all heart diseases using "cardiology" methods, to realize their limited possibilities for *treating a number* of heart defects and turn to surgeons to treat these problems. Or for surgeons interested in the opportunity to correct the anatomy of the heart, or faulty hemodynamics, to persuade their colleagues to "give" them their patients.

That is, as a result of an agreement between Boston Children's Hospital surgeon R. Gross and Boston Children's Hospital pediatrician J. Hubbard, for the first time in history a successful operation for the correction of congenital heart disease (or rather its great vessels) was born– ligation of patent ductus arteriosus [4]. We propose to consider the beginning of surgery for

[1] Cardiology (from the ancient Greek *καρδία* – heart and *λόγος* – learning) is an extensive branch of medicine dealing with the study of the cardiovascular system: the structure and development of the heart and blood vessels, their functions and diseases, including the study of their causes, mechanisms of development, clinical manifestations, diagnosis of problems and the development of effective methods of treatment and prevention. In addition, the field cardiology practice includes problems of medical rehabilitation for those suffering lesions of the cardiovascular system (https://ru.wikipedia.org/wiki/Кардиология).

[2] Currently, heart wounds are viewed as belonging to "acquired defects (diseases) of the heart" but are still diagnosed and treated by surgeons.

[3] The term "heart surgery", in our opinion, should be considered surgical slang, because, strictly speaking, "heart", as well as brain, chest, and other types of surgery determined by the organ or part of the body on which the surgeon operates, does not exist. There is surgery on the heart, brain, chest cavity and so on. Analogously, there is no child or adult surgery, yet there is surgery on children and adults.

[4] In one of our previous articles, [3] we drew attention to the fact that in the 1930s the concept of "cardiology" only included methods of diagnosing defects and diseases of the heart and, in part, some aspects of clinical practice and treatment (e.g., baths), and "cardiologists" called themselves radiologists, carioroentgenologists (this term appeared in Russian literature in 1932), phonocardiography and electrocardiography physicians and balneologists.

[5] It was namely pathophysiology (pathology) of defects and diseases of the heart, as well as their anatomy and clinical nature, that was examined from the end of the 18th century to the first half of the 19th century. Treatment methods were developed in the second half of the 19th century and diagnostics in the late 19th and early 20th century.

[6] In our opinion, the forerunner of ligation of patent ductus arteriosus was performed with pulmonectomy ligation of lung root vasculature. It is no accident the pioneers of cardiovascular surgery in our country are generally pioneers of lung surgery.

heart defects, or "cardiovascular surgery", to have started from that date (August 26, 1938). Cardiovascular surgery began in the USSR ten years after that operation took place. A.N. Bakulev conducted it on September 24, 1948, in the faculty surgical clinic at I.V. Stalin 2nd Moscow State Medical Institute. Incidentally, therapist-cardiologist V.N. Vinogradov sent the 15-year-old patient with patent ductus arteriosus to Bakoulev's clinic (of course, after consultation with Bakoulev) [5].

The question arises: did the pioneers of the new surgical field consider their work part of cardiology? No, they did not. It is now *a posteriori,* that we can do this. For we are historians. Gross together with his boss, W. Ladd, is considered one of the founders of pediatric surgery. Bakulev did not call himself a cardiovascular surgeon at the time. The surgical department for patients with heart defects, founded in 1956 at the Institute of Thoracic Surgery and headed by Bakulev, was not called the *cardiovascular surgery* department but *heart* department, despite the fact that a cardiology department already existed at the institute. However, Soviet surgeons S.A. Kolesnikov, P.A. Kupriyanov and N.M. Amosov, while visiting the United States in 1961 to study the state of surgery in US hospitals for heart disease and defects, considered themselves "surgeon-cardiologists" in their reports.

Thus, it is obvious that any particular one exact date for the *origins of cardiac surgery* can not be named. It originated in 1938, but was born (and this is the process, not the "starting point") somewhere between 1938 and 1961 (1940–1950s). This was when cardiology was distinguished from therapy, with cardiology being understood as it is today – surgery of the heart with the introduction of "catheter" diagnostic methods for its defects and diseases. Palliative treatment was developed and implemented at first and then later, radical surgery for the majority of defects and diseases of the heart. There were specialized surgeons who knew cardiology very well and who began to operate *solely on the heart and great vessels.* Outside of the USSR, one of the first such "cardiovascular surgeons" was C. Bailey of Philadelphia [6].

If we talk about Soviet *clinical* (ie, related to an ill person) cardiovascular surgery, the first steps, as we have noted, took place in the late 1940s[7] and *de jure* took place on April 4, 1961. On this day, on the foundations of the Institute of Thoracic Surgery, the Institute of *Cardiovascular Surgery,* was created; its staff began to operate solely on the heart and blood vessels. However, E.N. Meshalkin should be considered the first Soviet "cardiovascular surgeon" who, starting in 1955, conducted no other operations except cardiovascular surgery.

Incidentally, outside of the USSR (except, perhaps, in Germany) the term "cardiothoracic surgery" is more used often than "cardiovascular surgery". Firstly, heart defects and disease are often accompanied by pulmonary pathology, and secondly, surgeons working in the thorax area should be able to operate with equal professionalism on the heart, lungs and other parts of the mediastinum. As concerns the more frequently used term in Russia – "cardiovascular surgery" (more correctly – "surgery of the heart and vascular system"), it can be found in 1945 in American literature, it appeared in Europe (France) in the early 1950s, (European Society of Cardio-Vascular Surgery) and in the USSR (officially) in 1961 in the name of the Institute of Cardiovascular Surgery. It should also be noted that (at least with Soviet) therapists, in the mid-1950s crossing the threshold into surgical clinics which operated on the heart, began to call themselves "surgical" cardiologists as opposed to cardiologist-therapists ("therapeutic" cardiologists).[8]

If we talk about the origins of cardiology as a predecessor of cardiovascular surgery, as the theory of the healthy and diseased heart, it became distinguished from therapy in 1930–1940s, when therapists adopted "cardiological"

[7] Its forerunners, apart from lung surgery, were the experimental works of N.I. Napalkov, I.P. Dmitriev, N.P. Sinitsyn, N.N. Terebinsky, V.P. Demikhov; the indirect myocardial revascularization surgery of E.R. Gesse and B.V. Ognev, the works of S.S. Bryukhonenko on artificial circulation, Yu.Yu. Dzhanelidze on the treatment of wounds of the heart, Bakoulev on surgery of the pericardium, and others' work that took place in the first half of the 20th century.

[8] The outstanding "surgical cardiologist" Professor N.S. Buslenko, who worked for many years in the department of surgery for coronary heart disease at the A.N. Bakoulev Scientific Center for Cardiovascular Surgery, told us of the use of the term in the 1950s in the surgical clinic of A.A. Busalov.

methods of diagnosing defects and diseases of the heart (especially radiological and electrographic) [3]. In turn, cardiovascular surgery evolved from surgery of the heart and the pericardium (19th century), and surgery of the vascular system[9] and lungs (first half of the 20th century), when in the mid-20th century, therapist-cardiologists asked surgeons to help in diagnosis and treatment of congenital and acquired heart diseases, and surgeons offered them their surgical techniques to solve these problems [7].

We absolutely agree with Bogopolsky and Balalykin that the political and socio-economic conditions play a role in the birth of a discipline or specialized practice. In our case, one of the conditions that prevented cardiovascular surgery in the USSR from appearing at the same time as in the U.S. and Europe (Sweden), was World War II. But it also stimulated the development of pulmonary surgery and anesthesia, and accelerated the country's development of surgery for heart defects in the post-war years. As a result of this 10-year gap, the beginning of cardiovascular surgery in the USSR using closed techniques (1938–48) was reduced to four years with the introduction of "open" heart surgery; heart surgery with cardiopulmonary bypass began in the US in 1953, and in the USSR in 1957.

On the relationship between cardiology and cardiovascular surgery

The relationship (mutual influence, mutual penetration, mutual enrichment) between clinical cardiology and clinical cardiovascular surgery remains an open issue.

We emphasize that in our article published at the end of 2015, we did not claim a monopoly on the truth. We wrote, "From the late 1940s, the separation of 'cardiovascular' surgery from thoracic surgery began to exert an important influence on the development of cardiology: surgeons began to treat and cure patients who therapist-cardiologists could not cure" [9]. So we were a little surprised to read, in the article of our esteemed opponents, the idea that, "... one can hardly bring heart surgery to the fore as one of the main driving forces behind the development of cardiology in the USSR" [1, p. 491–492]. To *"have a great impact",* healing the sick, which therapist-cardiologists could not cure, and to consider cardiovascular surgery as *"one of the main driving forces behind the development of cardiology*", in our opinion, is not the same thing.

For our part, we continue to argue that it was not just convergence, but the mutual enrichment of cardiology and cardiovascular surgery that took place in the second half of the 20th century. And this is demonstrated not only by the many years of successful cooperation between "cardiovascular" surgeons and "surgical" cardiologists, but also the appearance at the beginning of the 21st century of experts in the field of non-invasive, invasive and surgical arrhythmology, endovascular surgery, interventional radiology, interventional cardiology and more, which on occasion can be hard to classify as a specialization – cardiology or cardiovascular surgery?

So, cardiology, continuing to occupy a *leading position* in the treatment of diseases of the heart, blood vessels and the circulatory system on the whole, supplemented heart surgery methods with genetic diagnosis of heart defects and disease, electrophysiology of the heart, myocardial mapping and cellular technologies. Cardiovascular surgery, which was successful in treating previously incurable patients, brought to cardiology not only new methods of diagnosis and treatment, but continued to enrich it with new knowledge about the anatomy and physiology of the heart muscle, the respiratory system and blood circulation, triggers and mechanisms of cardiac arrhythmias, "tornado" blood flow in the heart, etc.

On formation and development

But if everything would seem to be clear with the terms "origin", "occurrence" or "birth", all is not so simple with the concepts of "formation" and "development". Thus, according to the author of a textbook on the philosophy of L.E. Balashov (2005), "formation is predominantly the movement from the old to the new. This is not the case with development. It is a series of changes in the body (the community), which lead to its strengthening, i.e., this is not a

[9] Previously, we expressed the view that conceptually, heart surgery (or rather, surgery for wounds of the heart) was derived from vascular surgery (more precisely – surgery for vascular wounds), with its technique based on the similar vascular and heart stitching technique and the words of N.I. Napalkov (1900) [8].

transition from old to new, but the development of the new". But then the author, having revealed these provisions, attributes "formation" to *individual properties,* while "development" is attributed to the *characteristics of society* and because "a community processes certain traits found in an organism, ...it may develop in a similar fashion to an organism". Sensing that he had found himself in a semantic impasse, Balashov found a way out: "For 'formation' and 'community development' another single term is used: 'historical development'. But then he once again delves into the philological jungle: "It is important not to confuse 'formation' and 'development' of a community. The community can develop, but stay within the bounds of the one and the same 'forms' of reality, i.e., no change in direction from the lowest to the highest... Development, as it were, is programmed change. Formation is unprogrammed change, although, of course, it 'has' objective conditions. But objective conditions are not a program" [10, p. 672].

We will not continue to draw the reader's attention to such constructions, but we agree with G.V.F. Hegel in his definition of "formation" and "development": *formation is development.* Therefore, in any dialectic process, in our case the history of cardiology and cardiac surgery, we distinguish only two of its characteristics: 1) "origins" (or "inception", "occurrence", "birth", etc.) and 2) "development", which, in turn, can be divided into periods (stages).

In this case, originating (being conceived) in 1810 with the treatment of wounds of the heart, surgery of the heart germinated within general surgery for a rather long time, drawing upon and being enriched by vascular surgery of the pericardium, the ideas of surgical treatment for defects and diseases of the heart, the development of experimental operations in laboratories, autopsy rooms and clinics, as well as lung surgery and anesthesia, and invasive (puncture and catheter) diagnostic methods. The birth of cardiovascular surgery took place only when surgeons received a social mandate from cardiologists for the development of new surgical treatments for therapies. And this took place in the 1940s-1950s.

Thus, the first period in the development of cardiovascular surgery (from 1810) can be called "perinatal" – when cardiovascular surgery, as such, was neither a scientific discipline nor a medical specialization. Next, the second period (after its birth in 1938) is denoted as a "period of development and introduction of operations on the heart with closed procedures". In Russia, this took place from 1948 to 1957 and did not depend on *"skeptical"* – according to Bogopolsky and Balalykin – *"cardiologists' relationship to the possibilities of surgical treatment for diseases of the heart*" [1, p. 492], but on the contrary, was enriched by cardiology methods. It was during this period that cardiovascular surgery began to form as a scientific discipline, continued and concluded in the following.

If we turn to the periodization of cardiovascular surgery in Russia, then in the third period, which began in Russia in 1957, there was a further acquisition of knowledge and skills by cardiovascular surgeons, the most important of which was the "development of methods for surgical treatment of defects and diseases of the heart under direct vision". During this period, there was a shift from heart surgery in adults and adolescents to similar operations in infants (1964–1966), followed by newborns (1969–1981).[10] New ways to protect the myocardium and the patient's body from surgical aggression were developed, along with methods of direct myocardial revascularization, cardiac pacing, hemodynamic correction of previously inoperable congenital heart defects, valve replacement with new varieties of mechanical and biological prostheses, and thousands of heart transplants were performed. During this period, cardiovascular surgery formed as a scientific discipline, and "cardiovascular surgery" arose as a medical specialization. In the first half of the 1970s, on the orders of health ministers from the USSR and the RSFSR, specialized vascular departments were opened in the capitals of the republics of the Soviet Union and in all major cities of Russia; their staffing levels and bed capacity were determined. Some of these departments were permitted to conduct operations on the heart. During this period, subdivisions of cardiovascular surgeons were created at the Surgical Society in Moscow and the Moscow Region (chairman –

[10] The neonatal period lasts 28 days (four weeks) after birth.

S.A. Kolesnikov), at the All-Union Society of Surgeons (chairman – V.I. Burakovsky), and All-Union Conferences of Cardiovascular Surgeons were held. This period was quite long and lasted until about 1981.

The next, fourth period in the development of cardiovascular surgery in Russia was marked by its relations with cardiology, which were new and quite wide in scope. This began with developments in electrophysiology of the heart, the development of surgical methods for the treatment of arrhythmias, the introduction into wider practice of endovascular technologies for the rehabilitation of coronary blood flow, which had emerged in the third period, and catheter treatment methods for heart disease (e.g., atrial septostomy, balloon mitral valvuloplasty and others), and methods of minimally invasive heart surgery were developed and implemented. This period ended in the country roughly during the first half of the 1990s, after the collapse of the USSR and the widespread introduction of foreign equipment and technology into Russian medicine.

The modern, fifth period in the development of national cardiac surgery was characterized by further minimizing the trauma of surgery, the development and introduction of high-tech robotics and hybrid operations, perinatal diagnostics and surgery of congenital heart defects. There was an increased focus on surgery of critical defects in the neonatal heart, reconstructive surgery of acquired diseases while preserving the valvular. Cardiology and cardiovascular surgery saw the widespread introduction of circulatory support techniques for the treatment of terminal and postoperative heart failure.[11] Together with cardiologists, cell and genetic engineering technologies were developed and implemented to treat diseased hearts with pumping function impairment. During this period, the Russian Association of Cardiovascular Surgeons (1994) was founded, and it began to hold All-Russian Congresses of Cardiovascular Surgery. Angiology, endovascular diagnostics and surgery for heart and vascular diseases, interventional radiology (cardio-radiology) and interventional arrhythmology were separated out from cardiovascular surgery. Federal cardiac centers were created along with vascular departments and centers.

And yet we are aware that in our summary the evolution of cardiovascular surgery is presented, basically, as *"the evolution of ideas and methods"* and does not include the full particular features of a *"planned socialist economy, the direction of domestic and foreign policy, <...> failed social transformations, <...> contradictions between the leaders of the domestic medical science ...and representatives of the party and government and medical bureaucracy"* and *"budget allocations, construction of new hospitals, <...> figures from large health providers and medical science"* and so forth. [1, p. 491] All this, of course, is important, but not the main part of the history of clinical medicine, part of which includes clinical cardiovascular surgery.

On the discipline and specialization

In the "New Philosophical Encyclopedia", *scientific discipline* (from the Latin *disciplina* – teaching) is defined as *"the basic form of organization of professional science, unified on the basis of the substantive subject-area of scientific knowledge; the community engaged in its production, processing and translation; as well as the mechanisms for the development and reproduction of the respective branch of science as a profession*".[12] In this case, a discipline that claims to be scientific should be characterized by the existence of relevant scientific institutions, employing research workers, united in a scientific community, scientific journals, monographs, dissertations, corresponding specializations in the Higher Attestation Commission and more. The transmission and reproduction of new (scientific) knowledge concerning the objective reality that surrounds us, including the human body, is conducted also by training departments in universities and professionals studying in them, who practice on the basis of scientific evidence gathered by scientists. In this instance, modern cardiovascular surgery may well be considered a *scientific discipline,* since it corresponds to the above specifications.

[11] If mechanical devices for circulatory support (1960) were looked at solely as a "bridge to a heart transplant" at the beginning, today their role has expanded to a "bridge to recovery" with the rejection of surgery.

[12] See: http://iph.ras.ru/elib/0985.html. Last access date: 07.03.15.

However, there exists in medicine the concept of a *"medical specialization"* that can be defined as a specialist doctor whose professional specialization focuses on the diagnosis, treatment and prevention of certain diseases (e.g., phthisiology), diseases of one organ or system (e.g., cardiology, pulmonology, cardiac surgery, neurosurgery, etc.) on certain methods (e.g., surgery) and replicating (transferring) a corresponding scientific discipline into medical practice. Following a systemic (hierarchical) approach, there should at first appear a medical scientific discipline (a scientific discovery is made, its proponents appear among scientists, reproducing the new knowledge), and then, after the transfer of this knowledge to practitioners, a medical specialization. This happened, for example, with radiology, which began with the discovery by K. Roentgen on November 8, 1895, of invisible rays, later named after him, and physicists became the first the "radiologists".

However, this sequence can be violated when at the outset, often at the intersection of disciplines, a new subject matter specialist appears, followed by a scientific discipline, and then a specialization, which falls in the medical field and turns a scientific discipline into clinical discipline. This happened with cardiology, which originated in Germany in the 1920s as a scientific discipline rather than a medical specialization, bringing together scientists to develop methods for studying the function of the heart (electrocardiography, electrophysiology of infarction) and diagnosis of its diseases (cardio-radiology). Then, this discipline began to develop in the United States, where German Jewish cardiologists had fled, escaping from Nazi persecution. It was namely German Jews in the United States who created the first *cardiology* scientific societies (for example The New York Society of Cardiology, 1945)[13] and practical societies for the training of cardiologists (for example, The American College of Cardiology, 1949). In the USSR, cardiology was identified as a separate scientific discipline a little later, which in our opinion, was again, not because of a "lag" by Soviet scientists falling behind the West, but, above all, because of World War II and its associated social and economic shocks.

However, given the fact that this separating off occurred in the 1950s and 1960s [9, p. 351], when "cardiovascular surgery" developed at the same time as "therapeutic cardiology," to deny the fact of mutual influence and mutual enrichment of these disciplines is difficult, if not impossible. Because of this, we cannot agree with the fact that cardiology and cardiovascular surgery are *"two separate branches of clinical medicine"* [1, p. 486]. How can two disciplines (branches) be considered "independent" if they are studying and treating the same organ (the heart) in the same system (circulation), not only, as we have shown above, interpenetrating, but mutually enriching each other?

Conclusion

Thus, we have covered some, in our opinion, extremely important issues in the methodology of studying the history of medicine – as we understand, reproduce and communicate them. Perhaps it is even obvious that other researchers who are professionally engaged in the study of the history of medicine, the history of cardiology, cardiovascular surgery or other medical disciplines (specializations), may have an opinion on the questions raised in this article, and answers to them. Therefore, without any claim to our opinion's exclusivity, we would welcome the emergence of a discussion forum on the pages of our historical and medical publications, especially due to the fact that articles devoted to questions of methodology in the history of medicine in general, all the more polemical (such as the one with which we started our essay), are not simply few and far between, but unacceptably rare.

[13] The American Heart Association was established in 1925.

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This article discusses some of the controversial methodological issues in the history of medicine, concerning such major fields as cardiology and cardiac surgery, their origins and development as well as their relationship as mutually complementary disciplines (specializations). It is demonstrated that, despite the abundance of literature presented on the â€œoriginsâ€ of cardiac surgery from 1810 (the first procedure on wounds of the heart) to 1953 (the first surgery for heart disease under direct vision), its â€œoriginsâ€ may be determined depending on the goals of each individual piece of research The American College of Cardiology (ACC) and the American Heart Association (AHA) have jointly engaged in the production of guidelines in the area of cardiovascular disease since 1980. The ACC/AHA Task Force on Practice Guidelines (Task Force) directs this effort by developing, updating, and revising practice guidelines for cardiovascular diseases and procedures. Every issue of this Cardiac Consult newsletter features a â€œVitalsâ€ insert in the centerfold that shares a sampling of outcome and vol-ume statistics from across Cleveland Clinicâ€™s Miller Family Heart, Vascular & Thoracic Institute. We have been publicly reporting sta-tistics like these for years because we believe these data are useful to colleagues around the world when they consider where to refer their most complex cases. Public reporting of outcomes also keeps our teams at the top of their game and always striving to do better.Â It details annual in-hospital mortality rates and volumes for Cleveland Clinic adult cardiac surgery cases over the past 13 years. As the graph shows, mortality has declined fairly steadily from a high of 3.3% in 2007 to a low of 1.1% in 2019. of Cardiology Working Groups on Nuclear Cardiology and Cardiac Computed Tomography and Cardiovascular Magnetic Resonance and the American Society of Nuclear Cardiology, Society for Cardiovascular Magnetic Resonance, and Society of Cardiovascular Computed Tomography, Liege, Brussels, Leuven, Belgium, Rochester, MN, Padua, Italy, Vienna, Austria, Bucharest, Romania, Oslo, Norway, Zurich, Switzerland, Naples, Italy, Cleveland, OH, Palo Alto, Stanford, CA, Rotterdam, The Netherlands, Milwaukee, WIÂ 0894-7317/$36.00. Co-published in the European Heart Journal-Cardiovascular Imaging and Journal of the American Society of Echocardiography. This article discusses some of the controversial methodological issues in the history of medicine, concerning such major fields as cardiology and cardiac surgery, their origins and development as well as their relationship as mutually complementary disciplines (specializations). It is demonstrated that, despite the abundance of literature presented on the â€œoriginsâ€ of cardiac surgery from 1810 (the first procedure on wounds of the heart) to 1953 (the first surgery for heart disease under direct vision), its â€œoriginsâ€ may be determined depending on the goals of each individual piece of research