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INSTITUT MORFOLOGII ZHIVOTNYKH IM. A.N.
SEVERTSOVA

Academy of Sciences USSR
Institute of the History of Science and Technology
A. N. Severtsov Institute of Animal Morphology

L. Ya Blyakher

Editor: G. A. Shmidt

With an Introduction by
Jane Maienschein

HISTORY OF EMBRYOLOGY IN RUSSIA

FROM THE MIDDLE OF THE EIGHTEENTH TO THE MIDDLE OF THE NINETEENTH CENTURY

(Istoryia Émbriologii v Rossii
s serediny XVIII do serediny XIX veka)

Publishing House of the Academy of Science USSR
Moscow 1955

Translated from Russian

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GENERAL

When Dr. Robert Multhauf asked me if I would consider editing this translation of Blyakher's volume, he warned that this was part of what seemed to him a most unusual scholarly project. Thanks to a somewhat mysterious and complicated government exchange program, the Smithsonian Institution and the National Science Foundation had been charged with overseeing the translation into English of several foreign language texts in the history of science. Upon the recommendation of experts, the volumes chosen included two by L. Blyakher, a Russian biologist. In particular, these Russian volumes, including THE HISTORY OF THE INHERITANCE OF ACQUIRED CHARACTERISTICS, edited by Frederick Churchill, and this one, were thought to present a valuable exposure to a Russian point of view in the history of science and to detail important episodes of Russian scientific history. Therefore, the translation began.

Following someone's recommendation, this particular volume went to Egypt to be translated by an anonymous translator. I admire the translator's patience in working through the detailed embryological descriptions. Unfortunately, however, the style of the English translation was infelicitous at best, and the translator evidently had trouble with proper names, German references, and embryological terms. My task, then, became to turn the prose into an acceptable style, to correct the names and terms to conform with standard English usage, and to check the references.

The fact that I do not read Russian, except for word-by-word translation with a dictionary, could have posed a fatal problem. But fortunately, the Dickinson College Library and work study office generously donated the services of work study student Lauri Wiener, who reads Russian and possesses the requisite active curiosity and healthy sense of humor. Together, Lauri and I checked the questionable phrases as well as a random sample of other passages to determine the accuracy of the translation. Except for some of the discussion

of German philosophy and a few embryological descriptions, the translation appeared to us to be accurate. The fact that Blyakher's style is straightforward and essentially descriptive undoubtedly helped, since the translator could thus provide a rather literal translation without losing the content or warping the style significantly. The fact that many of the embryological terms had simply been transliterated from Latin or German into Russian and then back in accordance with standard international scientific terminology to make this translation meant that the terms usually remained recognizable. Thus, although I make no pretense of certifying the precision of every detail of this translation, to my knowledge it is reasonably accurate at all points and represents Blyakher's content and style fairly closely. I very much appreciate Lauri Wiener's help in verifying and improving the translation.

Identifying some of the intended proper names and dates required a bit of detective work. Double transliteration or translation into Russian and then into English created much more trouble with some of the names than did translation of embryological terms. Names such as Isidore Geoffroy Saint-Hilaire or Cuvier produced mysterious and occasionally hilarious results, as the former became Izedor Zhefwar Tzent Iler, and the latter Kyuve. Joseph Needham became Nidzhem, Leeuwenhoek became Lev'nhk, and so on. As might be expected, the more obscure names created the greatest difficulties, but with the help of the extraordinarily helpful and competent Dickinson College Interlibrary Loan staff, I managed to track down all but a couple of minor Russian figures to check spellings and dates. In questionable cases, I have used spellings from the Library of Congress National Union Catalog. And some names are left in Russian style, such as Karl Maksimovitch Baer (alias Karl Ernst von Baer, of course) to reflect the importance of Blyakher's claim that these men are essentially Russians. In this case, Karl Maksimovitch Baer is closer to the man's given name when he was born in Estonia.

References to published and unpublished materials provided even more trouble in some cases, though here, too, I was able to check and correct all except a few Russian references. A project of this type and magnitude naturally encourages some errors to creep in, so I expect that there

may be some imperfections in citations. Nonetheless, with the exception of some of the Russian articles, I have been able to verify dates, page numbers, and other significant reference data. Readers with access to a superior library should be able to locate most of the material Blyakher cites, though some of the unpublished Russian materials may well prove inaccessible as they did to me.

My other task in editing this volume lay in making the descriptive chapters on von Baer's UBER ENTWICKELUNGS-GESCHICHTE useful, since Blyakher's page number references to the Russian translation of von Baer's work would obviously not be particularly relevant for most readers of this English translation. Therefore, for the passages Blyakher quotes or cites, I identified page numbers of the German original edition, which has been reprinted recently. And where necessary I checked, corrected, and added the section references to ÜBER ENTWICKELUNGS-GESCHICHTE. The references are thus: (volume, section, German page number) or (volume, section, Russian page number (German page number)). In addition, I corrected translation of the quotations where necessary to accord with more common English versions.

For other references to or quotations from German or English works, I made necessary corrections and substituted standard English versions where available since some passages had been distorted in the double translation.

At this point, the first round of editing was complete. Here Rosemary Regan enters the story. Ms. Regan, a marvelously competent and intelligent assistant to Dr. Multhauf, helped with typing some of the longer and messier chapters; she corrected errors in the entire draft, and she used her knowledge of editing and the history of science to polish details of style and terminology. I thank Rosemary for her considerable help and both Rosemary and Robert Multhauf for their continued encouragement and good humor.

With these acknowledgements and with the above caveats, I feel assured that this descriptive volume should be accurate and usable. Editing this has proven to be an unusual project, as Dr. Multhauf warned, but I feel, as he has felt,

that the translated and edited volume can prove useful, as indicated in more detail below.

OUTLINE OF BLYAKHER'S WORK

In fact, this book represents only half of Blyakher's HISTORY OF EMBRYOLOGY IN RUSSIA, covering only the mid-eighteenth to the mid-nineteenth century. A brief discussion of the second volume, covering the mid-nineteenth to the mid-twentieth century, appears in a review by Charles Bodemer in ISIS. While that second volume describes material less well-known to western historians of science and while it might therefore seem more valuable, this volume is intriguing in part precisely because it deals with apparently familiar figures and works from a different perspective which is distinctly, though on the whole not zealously, patriotically Russian. Blyakher claims that those recognized great embryologists, Kaspar Friedrich Wolff, Khristian Pander, and Karl Maksimovich Baer - heretofore considered German embryologists - were in fact distinctly Russian, and that their Russian connections define their scientific characters and help explain their successes in important ways. This Russian viewpoint is the first of the book's two major offerings.

The second lies in the description and catalog of essentially inaccessible works and the compiling of several descriptions into a single narrative index of sorts. Blyakher discusses works of major embryologists which can be located only with difficulty. For example, even though they appeared in German (which can be read by more English speakers than Russian can), many of the papers cited appeared in some of the little-circulated publications of the St. Petersburg Academy of Science. Thus, Blyakher provides new descriptions which he combines with discussion of other both major well-known and relatively rare sources. Since many of these sources are little known, little circulated, inaccessible, or difficult to read because of the archaic scientific detail or descriptive style, Blyakher has performed a valuable service by describing them.

I will outline the chapters briefly as a guide to Blyakher's work, since this is a descriptive study which could use some index, and its indices have not been translated into English for logistical reasons.

In the INTRODUCTION, Blyakher explains that he will give "a detailed account of the history of Russian embryological investigations" to provide "exhaustive evidence (for) the frequently repeated claim that Russia is the fatherland of embryology as a science, that it developed from Russian soil and became one of the most important foundations of the evolutionary and historical view of the organic world." Embryology - meaning Russian embryology, of course - fell into three distinct periods, according to Blyakher: that of establishing epigenesis and making embryology possible as a science (Wolff), that of discovering the embryonic layers and establishing the prerequisites for comparative embryological development (Pander and Baer), and that of evolutionary embryological development (Alexander Kovalevsky and I.I. Mechnikov). The first two periods form the focus of this volume, while the third is subject of his second volume. The following chapters amass "evidence" for his claim for Russian fatherhood primarily by describing the many accomplishments of native (and adopted) Russians and by showing how these actually were in some essential way Russian accomplishments.

CHAPTER 1 considers the early period, beginning with the late seventeenth and the early eighteenth century, the time of Peter I's reorganization in Russia. Peter wanted to encourage native-born and trained scientists, Blyakher tells us, and so the ruler established a significant teratological and embryological collection in the Kunstkamera to support native medical studies. Peter I initiated Russian interest in embryology, according to the author. And Mikhail Lomonosov stimulated serious embryological studies, drawing on those teratological and embryological collections. Lomonosov, like Wolff and other followers, began the modern era of experimentation, materialism, empiricism, and historical explanation, Blyakher asserts, without fully explaining what he means by each of those recurring terms. Despite his infrequent lapses into enthusiastic excesses, Blyakher convincingly establishes that there was early embryological

interest in Russia, which has not been widely studied, and that historians of science should therefore explore the subject more seriously.

CHAPTER 2 discusses the preformation and new formation (alias epigenesis) exchanges. This chapter offers few new insights into these debates, but the reader should recall that Blyakher was writing in the early 1950's and that his Russian audience was likely unfamiliar (or only recently familiar) with material which a western audience might find much more familiar. Blyakher's listing of partisans on either side and his discussion of the issues here and in later chapters are essentially clear and potentially useful even if not profound.

CHAPTER 3 introduces that great adopted Russian, Kaspar Friedrich Wolff, who then provides the subject of Chapters 5-8 as well. Wolff deserves more credit than he has received (by 1955, remember), Blyakher asserts; everyone from Russian historians to German historians to Wolff's contemporaries have reportedly been consistent in their underestimation of Wolff's significance. Here, Blyakher becomes a bit zealous in his efforts to make Russian everyone and everything which seems good or important. He faults the Russian historian and biographer Boris Evgen'evic Raikov, for example, for suggesting that Wolff felt ideologically isolated after his move to Russia in 1767. Not the case, Blyakher insists. ". . . in Germany Wolff was not evaluated as a first class investigator and advanced thinker. This forced him to move to Russia, and therefore Germany does not have the right to claim Wolff's glory."

While Blyakher's claim is silly as stated and while it might seem exaggerated and annoying to the modern historian of science, it may also reveal valuable insight. It would be well for historians of biology to recall that Wolff was little known in Germany; that he did move from Germany to Russia in 1767, albeit after much of his major embryological work had been completed and published; that his biographers have found the reasons for his move unclear; but that St. Petersburg did offer important collections of embryological and teratological specimens and that Wolff seems to have used them to advantage. Thus, perhaps St. Petersburg

did offer an especially congenial environment for an embryologist who was an epigenesist, and perhaps the reasons should be better examined.

CHAPTER 4 provides a useful outline of Wolff's dissertation - both the original Latin of 1759 and the German, more "popular" version of 1764. The Latin criticized earlier epigenetic suggestions and reflected a great deal of respect for Haller, but Blyakher claims that Wolff appealed to Haller only because he sought the latter's support and that Wolff consistently rejected any tendency toward Haller's preformationist views. In the German, Wolff provided an epigenetic discussion of development and expressed opposition to rigorously mechanical understandings of vital phenomena. Blyakher's description of Wolff's work is valuable, but the reader should be aware that Blyakher has probably had to strain the data here more than elsewhere to support his thesis about Russian priorities in embryology and his view that Wolff was one of the Russian "good guys" on the progressive path to modern scientific embryology. Again, the reader should recall that this was published in 1955, just shortly after other Russian publications of histories of embryology and translated embryological works.

CHAPTER 5 remains somewhat more descriptive, providing a valuable discussion of Wolff's relatively rarely read ON THE FORMATION OF THE INTESTINE. Here begins Wolff's articulated disagreements with Haller over whether development occurs gradually and epigenetically or by unfolding of preformed material. "I consider it proven that the intestine is doubtlessly thus formed (by rolling of material) and did not exist previously in an invisible form, ready to appear at the appropriate moment, "wrote Wolff in opposition to Haller. Just because he could not see the parts early on does not mean that they could not exist already, Wolff realized, but he believed that in fact the parts are only formed as the result of a gradual process. Unfortunately, Wolff's work was little known, even after a translation into German appeared. Only much later was Wolff appreciated, according to Blyakher, and it took figures such as von Baer, the American biologist William Morton Wheeler, and the embryologist-historian of science Joseph Needham to evaluate properly Wolff's "fatal blow for preformation."

CHAPTER 6 considers Wolff's teratological work, performed after his move to Russia and based on the St. Petersburg collections in the Kunstkamera. These studies, published in Latin, have remained essentially unknown until recently. After arguing that God would not have created monsters, Wolff maintained that abnormalities must occur by epigenesis rather than preformation. Blyakher asserts that Wolff's discussion of God reflected his desire to "eliminate God from nature" and that any impression otherwise stems from Wolff's necessary conformity to prevailing popular opinion. But the reader should consider this claim sceptically, a warning reinforced by awareness of Blyakher's efforts through the last few pages of the chapter to make Wolff a predecessor of modern embryology.

CHAPTER 7 presents Wolff's "essential power" as discussed in his commentary for the 1782 St. Petersburg Academy of Science prize competition for understanding nutritional power. In a paper of his own, Wolff responded to papers by Blumenbach and Born by discussing attractive and repulsive forces and the importance of forces as well as structure for organic animal development.

CHAPTER 8 addresses evaluation of Wolff's work by Kirchhoff (Wolff brought development from mystery to a science by establishing that organic life follows laws) and Raikov (Wolff was a materialist and denied the existence of Stahl's mystical "soul," an idealist but not a vitalist, stressing the primacy of material over soul). Interestingly, given his retrospective tendencies elsewhere, Blyakher believes that Raikov distorts the proper historical perspective, and he sees Wolff as fluctuating between materialism and idealism. Consistently, Blyakher tries to show how major figures were predecessors of modern science even though they were side-tracked by errors of their day. Thus he is Whiggish in his history, but he is not completely ahistorical. It is not Wolff's fault that he could not do more, Blyakher apologizes; the backward times slowed Wolff's progress in Blyakher's assessment. Thus, like earlier chapters, this chapter begins with useful description and references to relatively little-known material and ends with a claim for Russian priority.

CHAPTER 9 argues that Wolff was essentially ignored but that Russian embryologists nonetheless began to accept

epigenesis by the late eighteenth century. Blyakher discusses such figures as Johannes Beseke, Matvei Pekken, Nestor Maksimovich-Ambodik, and Aleksandr Radishchev, providing a valuable, though brief, introduction to each of these scientists.

CHAPTER 10 is perhaps the most significant in introducing a cast unfamiliar characters and unfamiliar material, and in providing original theoretical discussion. After establishing what Naturphilosophie means to him, Blyakher assesses the impact of German Naturphilosophie on Russian science; he concludes that Russians were generally not receptive to Schelling's philosophy or to idealistic Naturphilosophie in general, even though some embryologists such as Danil Vallanski, Michael Pavlov, and others endorsed seemingly idealistic views. The Russian intelligentsia recognized the unreality of Naturphilosophie and the importance of materialism, Blyakher argues, and thus they moved toward a progressive empirical philosophy. Despite apparent flirtations with Naturphilosophie, therefore (as for von Baer), Blyakher concludes that "the successful aspects of embryology in Russia were thus not connected with Naturphilosophie." Although once again consistently retrospective and apologetic for the seemingly imperfect progress of Russian science, Blyakher has in this chapter addressed the suggestion by others that Naturphilosophie may have directed Russian science and argues that it may have been seriously considered but then rejected or refined in "successful" Russian science. His discussion of those who did accept some form of idealistic philosophy is useful, as is his interpretative assessment of its limits.

CHAPTERS 11 AND 12 sketch, respectively, the contributions of transition figures Louis Tredern and Ludwig Bojanus. Tredern admittedly "was not a Russian, was not born in Russia, and lived there only six years." Yet he was an honorary Russian in Blyakher's view. Tredern did produce an influential dissertation, reportedly inspired by the Russian Wolff and by Tredern's visit to St. Petersburg; there he outlined the preliminary story of the avian egg and its hatching and early development. Bojanus introduced study of the embryonic layers in mammals, which influenced Pander and von Baer, according to Blyakher.

CHAPTER 13 discusses Khristian Pander, von Baer's fellow student at Würzburg studying under Döllinger. Döllinger and von Baer convinced Pander to apply his apparently significant financial resources to procure the necessary large number of eggs in order to trace details of chick development during the first five days of life. Pander's work, despite criticism by Lorenz Oken which Blyakher discusses in detail, provided a starting point for future study in epigenetic developmental biology, and especially notably, it served as a foundation for von Baer's work. At one point, Blyakher almost perversely manages to make Pander's weaknesses sound like strengths. He says that Pander's errors were valuable and that they were important in part because they later "allowed Baer to give the true interpretation." As before, Blyakher's interpretation remains retrospective and frustrating at times, but his data are useful for an introduction to this material.

CHAPTER 14 THROUGH 24 deal with Karl Ernst von Baer, here Karl Maksimovich Baer. 14 provides biographical information and outlines his professional career. 15 presents Baer's discovery of the mammalian ovum and reveals concern both with establishing Baer's priority and with opposition to Baer's work. CHAPTERS 16 THROUGH 22 describe Baer's opus, ÜBER ENTWICKELUNGSGESCHICHTE. Originally published in Germany (volume 1 1828, volume 2 1837, volume 2 part 2 1888), Baer's work appeared in Russian translation only in 1950 and 1953, which may have provided one stimulus to Blyakher to publish his historical study. Blyakher evidently relied on the Russian translation, so I have had to provide references to the German original (as mentioned above). Few people have read through Baer's long and detailed study completely, so Blyakher's discussion of all five scholia and corollaries and of the rest of the work, of which many are aware but which few read, will prove useful.

Most important, though, is the discussion of Baer's volume 2, and especially in CHAPTER 22 of the fourth part which forms the second part of volume 2. This section was published not by Baer himself but by Ludwig Stieda, after Baer's death. Baer had not completed the work, and Stieda discovered the manuscript while working through Baer's materials in order to produce a biography. Baer had begun his

study of human development, discussed in this part four, in Königsberg in 1834, but his move to St. Petersburg that year disrupted his work and he never completed his examination of human normal and abnormal development.

Human development also forms the subject of part of CHAPTER 23, which deals with Baer's teratological work in St. Petersburg. Here Blyakher addresses Baer's complaints about "lack of consideration or unfair attacks, with which his remarkable discoveries were met in Prussia." The Russians were more sympathetic, of course, according to Blyakher. In part because the Germans did not fully acknowledge the importance of his work, Blyakher establishes convincingly, Baer returned to Russia and gave up his systematic embryological studies, turning instead to anthropology and other scientific and family ventures.

The few studies of fertilization and embryological development which Baer did perform after his move, Blyakher discusses, including several papers detailing what is essentially meiosis and mitosis, according to Blyakher. If fertilization and cell-division initiate development, then there could be no pre-existence of individuals; the unfertilized ovum must contain latent but not pre-formed life, Baer had concluded in a paper of 1847. Some of Baer's teratological and fertilization studies reveal that Baer accepted a limited version of evolution - an evolution of the individual within his system of types. Blyakher neatly illustrates the transition between his second and third historical periods of embryology with the example of St. Petersburg Academy of Science's establishment of a prize for Biological Science in 1864. Kovalevsky and Mechnikov won that prize, thus bridging the move from Baer's older epigenetic work to the new evolutionary embryological science.

CHAPTER 24 considers Baer's theoretical views, including a very brief look at Baer's version of the history of science. This chapter offers intriguing suggestions, but most are incompletely developed and hence do not significantly extend our understanding of Baer. As with the rest of the book, the chief value of these lengthy chapters on Baer lies in the potential of their suggestions, in the descriptions of more well-known sources and of unfamiliar material alike against a background of other familiar works. The

references provided certainly suggest that Baer is as yet poorly understood, despite the several biographical sketches, and that historians of science would do well to explore his complex Russian connections - both before his move to and after his return from Germany.

CHAPTER 25 serves as a transition to the third stage of world and hence Russian embryology (featured in Blyakher's second volume). It considers figures after Baer but before Mechnikov and Kovalevsky. The focus is on Grube, Nordmann, Warnek, and Krohn in particular. These men made way for Kovalevsky and Mechnikov, according to Blyakher, and these latter men effected the revolution from comparative-descriptive to comparative-evolutionary embryological science.

NOTES - These notes have not been translated, obviously. Some offer biographical information, others provide references to additional scientific and other works, while still others elaborate on the text. These notes are cited in the text by the numbers enclosed in square brackets: (#).

The above brief outline sketches Blyakher's volume. Throughout, the work remains descriptive. Each chapter thus provides details of the works and people it considers. Some of these descriptions are so extremely thorough as almost to reproduce the original sources being considered, while others provide essentially an index or overview of their subjects. To my knowledge, the descriptions seem consistently reliable and useful.

VALUE OF THE WORK

As suggested above, Blyakher's work contributes both useful description of little-read source materials and a particularly Russian perspective. The latter, which clearly directs what interpretation Blyakher does offer, only occasionally intrudes on the narrative. As noted earlier, Blyakher does at rare times become fervent in his attempts to establish that "Russia is the fatherland of embryology as a science." Yet he would appear to have considerable evidence that his claim should at least be taken seriously. Western

scholars often tend to dismiss Soviet scholarship and its fiercely patriotic perversions. But Blyakher, despite his effectively cold war context, remains relatively restrained and reasonable.

The author's concern with establishing scientific priorities, with establishing who first discovered such-and-such, seems equally open to objection from the perspective of current history of science. Yet this orientation clearly does not result strictly from Blyakher's Russian point of view; most historians of science in the 1950's sought to establish priorities and to document high points of scientific "progress."

In sum, then, Blyakher does provide a very useful descriptive guide to major works in the history of embryology, many of which happen to be Russian in some sense. His interpretative discussion, which seeks to establish that the Russian connection in important embryological work was not merely coincidental needs to be questioned, dissected, and then explored further to discover just what the essential Russian influences were. We should thank Blyakher for his suggestions and use his volume as a guide for that further exploration.

Because the materials are so widely known, I have decided not to provide a full bibliography of works relevant to the subjects Blyakher discusses. See the DICTIONARY OF SCIENTIFIC BIOGRAPHY entries for the key figures and standard sources in the history of developmental biology for additional references and for discussion of similar materials from various non-Russian perspectives.

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July 1981