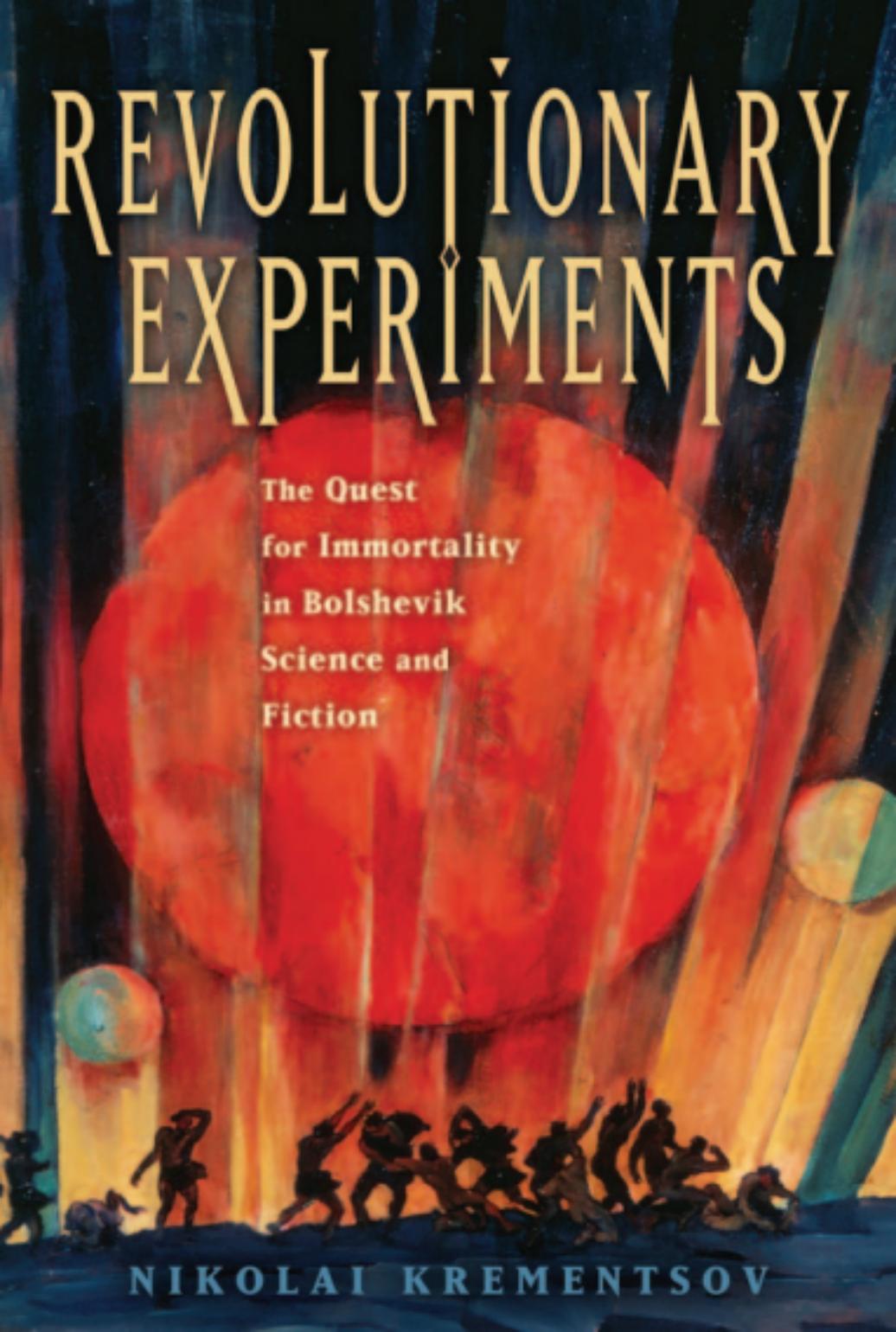


# REVOLUTIONARY EXPERIMENTS

The background of the cover is a stylized, abstract painting. It features a large, central, glowing red sphere. To the left and right of this sphere are vertical, cylindrical structures with colorful, segmented tops in shades of blue, green, and yellow. The overall color palette is dominated by dark blues, reds, and oranges, with a sense of dramatic lighting and shadow. At the bottom of the cover, there is a silhouette of a group of people in various dynamic poses, suggesting a scene of revolution or a collective struggle.

The Quest  
for Immortality  
in Bolshevik  
Science and  
Fiction

NIKOLAI KREMENTSOV

REVOLUTIONARY EXPERIMENTS



---

# Revolutionary Experiments

THE QUEST FOR IMMORTALITY IN BOLSHEVIK  
SCIENCE AND FICTION

Nikolai Krementsov

OXFORD  
UNIVERSITY PRESS

**OXFORD**  
UNIVERSITY PRESS

Oxford University Press is a department of the University of Oxford.  
It furthers the University's objective of excellence in research, scholarship,  
and education by publishing worldwide.

Oxford New York  
Auckland Cape Town Dar es Salaam Hong Kong Karachi  
Kuala Lumpur Madrid Melbourne Mexico City Nairobi  
New Delhi Shanghai Taipei Toronto

With offices in  
Argentina Austria Brazil Chile Czech Republic France Greece  
Guatemala Hungary Italy Japan Poland Portugal Singapore  
South Korea Switzerland Thailand Turkey Ukraine Vietnam

Oxford is a registered trade mark of Oxford University Press  
in the UK and certain other countries.

Published in the United States of America by  
Oxford University Press  
198 Madison Avenue, New York, NY 10016

© Oxford University Press 2014

All rights reserved. No part of this publication may be reproduced,  
stored in a retrieval system, or transmitted, in any form or by any means,  
without the prior permission in writing of Oxford University Press,  
or as expressly permitted by law, by license, or under terms agreed with the  
appropriate reproduction rights organization. Inquiries concerning reproduction  
outside the scope of the above should be sent to the Rights Department,  
Oxford University Press, at the address above.

You must not circulate this work in any other form  
and you must impose this same condition on any acquirer.

Library of Congress Cataloging-in-Publication Data  
Krementsov, N. L., author.

Revolutionary experiments : the quest for immortality in Bolshevik science and fiction / Nikolai Kremntsov.  
p. cm.

Includes bibliographical references and index.

ISBN 978-0-19-999298-0 (alk. paper)

1. Literature and science—Soviet Union. 2. Biology—Soviet Union—Experiments. 3. Immortality in  
literature. 4. Biology in literature. 5. Science fiction, Russian—20th century—History and criticism. I. Title.

PG3026.S348K74 2014

891.709'356—dc23

2013037097

9780199992980

9 8 7 6 5 4 3 2 1

Printed in the United States of America on acid-free paper

*To A. E. and E. F.*



---

The Russian revolution is [...] the inauguration of an age of limitless experiment.  
H. G. WELLS, *Russia in the Shadows* (1920)

The biologist is the most romantic figure on earth at the present day.  
J. B. S. HALDANE, *Daedalus* (1923)



---

# Contents

List of Illustrations x

List of Abbreviations xii

Note on Names, Translations, and Transliterations xv

*Prologue: Science and Fiction* 1

1. “*The Ray of Life*”: *Science in Revolutions* 13

2. “*Professor’s Head*”: *Isolated Organs* 39

3. “*Neither Life, Nor Death*”: *Anabiosis* 65

4. “*The Billionaire’s Last Will*”: *Hormones and Institutions* 97

5. “*The Dog’s Heart*” and *Monkey Glands: Rejuvenation* 127

6. “*Quo Vadimus?*”: *Human Biology and Human Destiny* 160

*Epilogue: An Unending Quest* 194

ACKNOWLEDGMENTS 201

NOTES 203

INDEX 261

---

## List of Illustrations

- 1.1 Mikhail Bulgakov, ca. 1926 15
- 1.2 Moscow House of Scientists 19
- 1.3 *The Ray of Death*, 1925 23
- 1.4 “Revolution in biology: The rays of life!” 24
- 1.5 “Science that conquers death” 33
- 1.6 “Revolutionary dreams”: Konstantin Iuon, *New Planet*, 1921 37
- 2.1 Alexander Beliaev, ca. 1906 40
- 2.2 Miss Adams and Dowell’s head 42
- 2.3 Sergei Briukhonenko, ca. 1915 43
- 2.4 Cartoon: “A human-repair workshop” 47
- 2.5 “Severed head”: Cover page of *Sparks of Science* 49
- 2.6 George Bernard Shaw’s head 50
- 2.7 The public and the severed head 61
- 2.8 Anatolii Lunacharskii and Aleksei Kuliabko 63
- 3.1 Porfirii Bakhmet’ev, ca. 1890 68
- 3.2 Anabiosis curve, 1900 72
- 3.3 Petr Shmidt, ca. 1895 84
- 3.4 The 1922 congress of Russian zoologists 87
- 3.5 The “princely villa”: Institute of Experimental Biology 95
- 4.1 Nadezhda Krupskaia, 1919 107
- 4.2 The three who made Soviet endocrinology, 1925 116
- 4.3 Iakov Tobolkin at the Sukhumi monkey breeding station 121
- 4.4 Advertisement for Soviet insulin 122
- 4.5 Dr. Sorokin’s patients 125
- 5.1 Nikolai Kol’tsov and his students, ca. 1913 133
- 5.2 Leonid Voskresenskii at the Sukhumi monkey breeding station 140
- 5.3 Cartoons: a) “Monkeys’ revolt”; b) “Don’t get rejuvenated” 145

- 
- 5.4 Mikhail Zavodovskii's "former chickens" 150
  - 5.5 Cartoon: "Endocrine breakfast" 155
  - 5.6 Cartoons: a) "Rejuvenated carriage"; b) "Rejuvenating rays" 157
  - 6.1 Elie Metchnikoff, ca. 1908 166
  - 6.2 "Knowledge to everyone" 171
  - 6.3 Cartoons: a) "Rejuvenated Wilhelm"; b) "Blood-sucking capitalists" 173
  - 6.4 Modern scientist as "Faust" 176
  - 6.5 "Science-made" monsters (a and b) 179
  - 6.6 A "lonely genius" versus a mass profession: GINZ, 1920 181
  - 6.7 "On the front of the struggle against religion" 189
  - E.1 "Metchnikoff's soured milk" 198

---

## List of Abbreviations

- ARAN—*Arkhiv Rossiiskoi Akademii nauk*, Archive of the Russian Academy of Sciences
- GARF—*Gosudarstvennyi arkhiv Rossiiskoi Federatsii*, State Archive of the Russian Federation
- GINZ—*Gosudarstvennyi institut narodnogo zdavookhraneniia*, State Institute of People's Health Protection
- IEB—*Institut eksperimental'noi biologii*, Institute of Experimental Biology
- KN—*Krasnaia nov'* (*Red Virgin Soil*), a journal
- KP—*Krasnaia panorama* (*Red Panorama*), a journal
- MIM—*Muzei istorii meditsiny Pervogo Moskovskogo meditsinskogo universiteta imeni I. M. Sechenova*, Museum of the History of Medicine of the Sechenov First Moscow Medical University
- Narkompros—*Narodnyi Komissariat Prosveshcheniia*, People's Commissariat of Enlightenment
- Narkomzdrav—*Narodnyi Komissariat Zdravookhraneniia*, People's Commissariat of Health Protection
- Narkomzem—*Narodnyi Komissariat Zemledeliia*, People's Commissariat of Agriculture
- NEP—*novaia ekonomicheskaia politika*, new economic policy
- NIOR RGB—*Nauchno-issledovatel'skii otdel rukopisei Rossiiskoi gosudarstvennoi biblioteki*, Manuscript Division of the Russian State Library
- NKVD—*Narodnyi Komissariat Vnutrennikh Del*, People's Commissariat of Internal Affairs
- PZM—*Pod znamenem marksizma* (*Under the Banner of Marxism*), a journal
- RGASPI—*Rossiiskii gosudarstvennyi arkhiv sotsial'no-politicheskoi istorii*, Russian State Archive of Socio-Political History
- RSFSR—*Rossiiskaia Sovetskaia Federativnaia Sotsialisticheskaia Respublika*, Russian Soviet Federated Socialist Republic
- SNK—*Sovet Narodnykh Komissarov*, Council of People's Commissars
- TsGALI SPb—*Tsentral'nyi gosudarstvennyi arkhiv literatury i iskusstva Sankt Peterburga*, St. Petersburg Central State Archive of Literature and Arts

- TsIK—*Tsentral'nyi Iсполnitel'nyi Komitet*, Central Executive Committee
- TsKUBU—*Tsentral'naia komissiiia po uluchsheniiu byta uchenykh*, Central Commission to Improve Scientists' Living Conditions
- VIET—*Voprosy istorii estestvoznaniia i tekhniki (Issues in the history of natural sciences and technology)*, a journal
- VM—*Vechniaia Moskva, (Evening Moscow)*, a newspaper
- VOFEM—*Vestnik opytnoi fiziki i elementarnoi matematiki (Herald of experimental physics and elementary mathematics)*, a journal
- VSNKh—*Vysshii soviet narodnogo khoziaistva*, the Supreme Council of People's Economy
- VZ—*Vestnik znaniia (Herald of Knowledge)*, a journal
- ZhRFKhO—*Zhurnal Russkogo fiziko-khimicheskogo obshchestva (Journal of the Russian Physico-Chemical Society)*



---

## Note on Names, Translations, and Transliterations

DURING THE LAST hundred years, numerous cities and institutions in the territories of the Russian Empire, the USSR, and now the Russian Federation repeatedly changed their names. Thus, St. Petersburg became Petrograd in 1914, Leningrad in 1924, and regained its original name in 1991. Similarly, the St. Petersburg Imperial Academy of Sciences became the Russian Academy of Sciences in 1917, the USSR Academy of Sciences in 1925, and once again the Russian Academy of Sciences in 1991. Throughout the text I use that name for a particular locale or institution that was in use at the time I describe. Since this book deals with a series of social, cultural, and scientific revolutions, I reserve the use of “Revolution” (with the capital “R”) to refer exclusively to the Bolshevik coup in October 1917. In rendering various Russian names in Latin alphabet, I use the Library of Congress’ transliteration system, except for the commonly adopted spellings of well-known names, such as, for example, “St. Petersburg,” “Alexander,” “Leon Trotsky,” and “Elie Metchnikoff” instead of “Sankt-Peterburg,” “Aleksandr,” “Lev Trotskii,” and “Il’ia Mechnikov.” I preserved in the text the original titles of various French and German publications, for their English and Russian translations often differ, giving the available Russian translations of these titles in the references. Except for the names of the country’s two major newspapers, *Pravda* and *Izvestiia*, and a popular science journal, *Priroda* (Nature), I translated into English the titles of periodicals in the text, but preserved their Russian names in the references. Although some of the original Russian sources I cite are available in various English translations, all of the translations in the book are my own.



It has been said by its opponents that science divorces itself from literature; but this statement, like so many others, arises from lack of knowledge.

JOHN TYNDALL, *The Belfast Address* (1874)

The fear of death, and not only on the part of aging senators, has always been a stronger cultural force than the love of beauty or of truth.

ERWIN CHARGAFF, *Voices in the Labyrinth* (1977)

---

## Prologue: Science and Fiction

FROM TIME IMMEMORIAL no other dream has haunted human imagination more than the dream of eternal life, perpetual youth, and immortality. Theologians, philosophers, writers, historians, anthropologists, psychologists, literary scholars, physicians, sociologists, biologists, and ethnographers have explored the origins, developments, and uses of this dream, in the process generating an enormous body of literature that covers a dizzying array of issues, settings, times, and actors.<sup>1</sup> This book examines a particular fascination with this dream, and the role of science and fiction in its pursuit, in one particular locale—Russia—during the decade or so following the country’s political revolutions of 1917. It trespasses on the territories of five different fields: the history of science, literary studies, the history of medicine, cultural studies, and the history of Russia. I realize that it is quite presumptuous to take on such an ambitious project, but I have deeply personal reasons for such egregious transgression of disciplinary boundaries and professional conventions.

My first passion in life was reading. I grew up surrounded by books and learned to read before I turned four—my father was a professor of Russian literature (as was his father) and my mother taught the same subject at the high school level. It never occurred to me to count how many books inhabited our apartment on the outskirts of Tashkent or my grandfather’s small house in the city’s “old town.” But never once in my childhood did I have to go to a public library when I wanted to read a particular book: I could almost always find that book somewhere on the floor-to-ceiling bookshelves lining every wall of our apartment, from the entry hall to the glassed-off terrace. And if, by chance, I could not find the book at home, I would almost certainly find it in my grandfather’s house, hidden behind the glass doors of the old oak bookcases crowding his spacious “home office.” By the age of twelve, I had devoured everything a boy was supposed to read about

Greek heroes and Baghdad thieves, musketeers and buccaneers, Egyptian Pharaohs and Roman Emperors, pirates and pioneers, noble knights and runaway slaves, cowboys and Indians, aliens and spaceships, archeological digs and undersea adventures, and much, much more—especially, of course, the classic works of Russian literature. I read Tolstoy and Dostoevsky, Bulgakov and Solzhenitsyn, Il'f and Petrov, and the brothers Strugatskii. But it never crossed my mind that I should follow the family trade and make the study of literature my profession.

For my second passion was science. I was born in the first year of a new era: the year of Sputnik. I still remember quite vividly that (sitting on the shoulders of my father amidst a huge crowd lining the sidewalk of our street) I got a glimpse of Iurii Gagarin, the first man to leave Earth and go to the Cosmos: he was being driven in an open car and waving his hand at ME! As did many boys of my generation, I collected pictures of cosmonauts, glued together models of spaceships, and constantly read works of popular science and science fiction. But it was not the exploration of the Cosmos that held my imagination; it was the study of Life. From about the age of ten, enthralled by Alfred Brehm's magnificent multivolume *The Life of Animals* and Jean Henri Fabre's marvelous book *La vie des insectes*, I knew that one day I would be a biologist. By the time I graduated from high school, my decision to study biology had become irrevocable. For five years at university and then three more in graduate school, I greedily learned everything I could in and about my chosen field: the study of the brain—neurophysiology. I studied surgical techniques and electronics repair, brain anatomy and statistical analysis, the basics of veterinary medicine and computer programming, patterns of animal behavior and human psychology. I conducted my experiments at the “world's first and only” Institute of Neurocybernetics in Rostov-on-Don and at the USSR Academy of Sciences Institute of Physiology in Koltushi—Ivan Pavlov's famous “capital of conditional reflexes” near Leningrad. But when the time came for me to write up and defend my dissertation on “Multi-neuronal integrative activity of visual cortex during the sleep-wake cycle of cats,” I realized that neurophysiology did not inspire me anymore. I thought that I could perhaps move from laboratory experiments to more naturalistic research and spent a year trying to retool myself through a master's program in environmental studies at Leningrad University. Alas, this experience only strengthened my conviction that it was not just neurophysiology, but “doing science” in general, that no longer held my interest. I quit academia altogether and joined a company of *shabashniki*—“free carpenters” (meaning, freelancing or independent, and not to be confused with “free masons”). I began spending my summers earning a living by building log houses in remote corners of the Soviet Union, leaving my winters to enjoy the cultural treasures of my new “hometown”—Leningrad.

During one such winter in the mid-1980s, through sheer accident, I discovered the history of science, which seemed to offer a unique opportunity to combine my old passions for reading and for science by *reading and writing about* science, as opposed to “doing science.” After a year of contemplation, I passed the entry exams and enrolled in a graduate program in the department of the history and theory (read—philosophy) of

evolutionary biology at the USSR Academy of Sciences Institute of the History of Natural Sciences and Technology. In the Soviet Union, graduate studies did not involve any coursework. You were supposed to start at once on your dissertation research and in three to four years complete it, along the way passing exams in a foreign language, Marxist philosophy, and your chosen specialty. So, at the suggestion of my advisor, I began working on a dissertation about the history of the interactions between studies of evolution and studies of animal behavior in twentieth-century Russia, using my background in neurophysiology and ecology as a springboard.

I happily burrowed in the vast collections of Leningrad's two largest and oldest libraries: the Library of the USSR Academy of Sciences and the Saltykov-Shchedrin State Public Library, known to aficionados as "BAN" and "Publichka," respectively. But I felt somewhat uncomfortable in my newly found vocation, for I had received no formal instruction in history and knew next to nothing about historical research. I was learning my new trade the same way I had learned carpentry a few years earlier: by reading some basic texts and following the example of my advisors, senior colleagues, and fellow students. Unfortunately, all of my teachers came either from philosophy or biology and none had any background in history, either. This lack of rigorous specialized training, which always includes learning not only the technical skills, but also the important taboos, fashions, and values of the profession, probably explains the gnawing sense of dissatisfaction I felt throughout the years of my graduate studies, as well as the profound dislike for disciplinary boundaries and professional conventions that I acquired over the same period.

What bothered me most was a deep rift, and the nearly total lack of contact/interchange/dialogue, between the history of Russia and the history of Russian science. In the books I was reading—and at that time I had very limited access to Western literature on the subjects, since most of it was considered "anti-Soviet" and thus inaccessible without special "clearance"—science appeared to be something akin to a Kantian "thing in itself." General histories of twentieth-century Russia barely mentioned science, as if it were some foreign object forcefully thrust into and existing entirely outside of the mainstream of Russian life (which admittedly it had once been—in the eighteenth century!). Conversely, books on the history of twentieth-century Russian science completely omitted such critical events as the Civil War, NEP (New Economic Policy), the Great Break, collectivization, the Great Terror, or the Cold War, as if these pivotal episodes in the country's life had no effect on its science whatsoever. In time, surveying the history of my new profession in the Soviet Union, I came to understand the origins of this strange separation.<sup>2</sup> But recognizing its causes did not help my attempts to bridge this divide and figure out a way to write the history of science as an integral part of general history. The dawn of Mikhail Gorbachev's *perestroika*, however, began to offer some possibilities.

In the late 1980s, Daniil Alexandrov—a fellow graduate student who shared my dissatisfaction with the current state of affairs—and I initiated a series of workshops that brought together historians, sociologists, philologists, archivists, and historians of science and published a "manifesto," calling for the (re)integration of the "social" and the

“cultural” into our explorations of the history of Russian science.<sup>3</sup> For twenty-plus years since my graduate studies, I have sought to do exactly that in my research on particular episodes in the history of Soviet biology and medicine, testing various approaches, sources, and modes of analysis, as well as styles of writing. This book is yet another attempt at bringing science back to its rightful place in the mainstream of twentieth-century Russian history: I believe that one cannot fully understand this tortuous history without acknowledging the central role science came to play in post-revolutionary Russian culture and society.

It all started nearly a decade ago, when I decided to launch a new project on the early history of experimental biology and medicine in Russia, focusing on the years between the end of the fratricidal Civil War that followed the Bolshevik Revolution and the beginning of the so-called “revolution from above” that inaugurated the establishment of Joseph Stalin’s dictatorial rule in the late 1920s and early 1930s. These two revolutions—the 1917 Bolshevik coup and the imposition of a new, Stalinist regime around 1930—undoubtedly represent the most dramatic and traumatic events in the country’s history, which reverberated throughout the entire world and shaped the course of twentieth-century history. Yet the short period between the two revolutions, roughly a decade, proved to be the most dynamic, polyphonic, and creative period in practically all walks of the country’s life, from economics to foreign politics, architecture to jurisprudence, literature to medicine, and arts to sciences. The body of literature dealing with the history of the Russian revolutions is enormous, but it rarely mentions science and/or medicine.<sup>4</sup> At the same time, even though historians of Soviet science and medicine have produced several important studies of the post-revolutionary decade, they (myself included) have paid considerably more attention to the later period of Stalin’s rule.<sup>5</sup> In some of my previous work I have touched upon the profound impact of the revolutions on the institutional structures, patronage patterns, and social practices of Russian science.<sup>6</sup> In this new project I wanted to explore whether the revolutions affected the research agendas and disciplinary developments in the life sciences. In other words, I wanted to tease out the connections between social and political history and the trajectory of scientific research and discovery that is enmeshed in this history.

I began by surveying specialized periodicals of the time to identify specific lines of research in particular biomedical disciplines that could make illustrative case studies and form the core of my project. Ploughing through numerous biological and medical journals of the 1920s, I was struck by the eerie familiarity of much of what I was reading. Whether it was an article on experiments with organ transplants, tissue cultures, telepathy, hormones, or isolated organs, I felt that I had read about these various experiments before. It did not take me very long to recall exactly where I had read about them: in the short stories and novels written by Alexander Beliaev, one of my favorite science fiction writers from childhood. Admittedly, it had been more than thirty years since I had last read Beliaev, and I forgot many details. Still, I remembered enough to recognize the experiments I was reading about in professional journals as important elements of Beliaev’s

numerous stories. I dismissed this recognition as trivial. After all, was this not what science fiction is all about: taking the advances of contemporary science and projecting their possible consequences into the future?

Yet as I continued my survey, I encountered reports on other experiments, which immediately reminded me of something that I had (re)read quite recently and remembered much better than Beliaev's stories: Mikhail Bulgakov's novellas "Fateful Eggs" and "The Dog's Heart." This gave me pause. At the time, I knew very little about Beliaev, his life, and his writings: I did not even know exactly when the stories I remembered so fondly (if a bit vaguely) had been written or where they had first been published. Not so with Bulgakov's: I knew nearly everything there was to know about the two novellas, for Bulgakov was (and still is) my all-time favorite writer.

I first encountered Bulgakov's writings around the same time I read Beliaev's. To this day, I remember my eager-anticipation-turned-deep-frustration when the literary magazine *Moscow*, which in its November 1966 issue had published the first part of Bulgakov's "sunset novel," *Master and Margarita*, failed to print the concluding part in its December issue, as well as the ultimate joy of being finally able to read the entire novel when its conclusion appeared in the next issue of the magazine in January 1967. Of course, as a child, I mostly delighted in the humorous parts of the novel, enjoying the antics of Woland's jester Behemoth the Cat and his partner Korov'ev-Fagot. But I also fell in love with the enchanting "realism" of the Ershalaim chapters, for despite the official militant atheism of my upbringing as a Soviet "young pioneer," I knew the Bible quite well: a pre-revolutionary children's edition with Gustave Dore's remarkable engravings held a place of honor on my personal bookshelf next to a similar edition of Greek myths (both treasured gifts from my grandfather).

*Master and Margarita* left an indelible mark on my imagination: I wanted to read everything Bulgakov had ever written, which in due course I did. In the subsequent years, I also learned as much as I could about Bulgakov's life and works and collected different editions of his books in my personal library. I read and reread all of his writings again and again, every time finding something new, unnoticed and unappreciated during my previous readings. Thus, discovering that two of his best-known novellas were not as "fantastic" as they seemed at first glance, but rather presented a quite accurate depiction of certain scientific experiments conducted at the time when Bulgakov was writing his stories, made a much bigger impression than the earlier observation regarding Beliaev's stories. My curiosity as a historian of science, and not merely as a fan of Bulgakov's, was piqued, for I was sure that there could be nothing trivial in Bulgakov's writing.

I doubted that Bulgakov and Beliaev had read the 1920s specialized medical and biological journals I was reading. How, then, did they learn about those experiments? Why did they choose these particular experiments for their stories? What do their stories actually say about science and scientists? And what could all of this mean for my project investigating the impact of the Russian revolutions on the research agendas and disciplinary developments of the life sciences? Unfettered by the professional concerns and

conventions of literary studies, I decided to include fiction in my examination of what was going on in early Soviet biology and medicine. I expanded the scope of my survey to include popular-science, adventure, and literary magazines, as well as major newspapers, of the period. I examined the catalogues of my old haunts—BAN and Publichka—in search of book-length publications. In one of the few surviving second-hand bookstores in the newly reborn St. Petersburg, I also bought a copy of the eight-volume set of Beliaev's collected works and reread it from cover to cover.

I quickly discovered that Beliaev and Bulgakov were by no means the only authors using biomedical experiments in their fiction. Indeed, during the 1920s scores of writers—some familiar, some I had never heard of before—had done the same. Scientists, professors, and doctors engaged in various biomedical experiments populated dozens of novels and countless short stories. Furthermore, it seemed that no experiment conducted by Russian researchers in the 1920s escaped the notice of the literati and failed to provide one writer or another with an intricate plot, an engaging character, an illuminating metaphor, a potent symbol, or at least a telling element of the scenery.

Clearly, contemporary *scientific* experiments inspired many Russian writers to conduct their own *literary* experiments with the ideas and techniques offered by experimental biology and medicine. Some of these literary experiments were overly enthusiastic, hailing a bright future brought about by science and scientists. Others were deeply pessimistic, predicting the ultimate failure of science that would lead to unthinkable catastrophes. To be sure, some authors were frivolous and made fun of science and its practitioners, satirizing their goals and means, theories and practices. Still others were dead serious, questioning scientists' promises and premises, ideals and actions, beliefs and biases. I also found the source of many writers' knowledge of what was going on in contemporary science. As I had suspected, writers did not need to read specialized biological and medical periodicals: all of the scientific experiments that had made their way into fiction had been extensively covered by the media—popular magazines, documentary films, radio programs, and the daily newspapers of the time.

Inspired by all of these discoveries, I began to collect systematically all possible information on the intersections between literary and scientific experiments. Soon I found myself virtually drowning in the ever-growing mass of facts, names, titles, and images related to Russian biomedical experiments and their fictional counterparts. In time, in the cacophony of diverse voices, stories, and opinions, I began to discern certain leitmotifs that intertwined and resonated through, even if they did not quite harmonize, both the science and the fiction of the 1920s: the theme of control over life and death; the theme of liberation and of breaking boundaries; and the theme of creating a new kind of "advanced" human beings.

I realized that I could not possibly aspire to cover all of these grand themes in a single project and decided to limit my present study to the theme of control over life and death, often popularly interpreted as the pursuit of perpetual youth, the abolition of death, and the quest for immortality.<sup>7</sup> I knew that this theme had attracted both scientists' and

writers' attention long before the Bolshevik Revolution, but my reading of 1920s fiction indicated that its treatment in the post-revolutionary decade differed dramatically from practically all previous renderings and was profoundly influenced by the concurrent scientific developments. The contemporary advances of experimental biology and medicine often supplied crucial elements to plots, settings, and the characterization of protagonists. In contrast to pre-revolutionary fiction, the majority of 1920s writings were openly futuristic, depicting a future in which control of life and death, and its extension—immortality—had become a reality. In fact, these writings formed a subset of a new literary genre—scientific fantasy (*nauchnaia fantastika*) as it was called in Russia, or science fiction in the English-speaking countries—which brought together issues of the future, human biology, and human destiny.<sup>8</sup> As elsewhere, this genre had begun to figure in Russian fiction before the Bolshevik Revolution, but it was in the 1920s that it reached a peak in popularity among both writers and readers.

Trying to understand the interrelations between scientific (“actual”) and literary (“fictional”) experiments, I began by adopting the two most common points of view epitomized in the popular formulae: “life imitates art” and “art imitates life.” First, following a standard approach of historians of science, I viewed fiction as a reflection of particular history-of-science/medicine narratives and illustration to various trends and research directions in experimental biology and medicine. Second, following a tradition from literary studies, I looked at science as a source of inspiration, point of departure, and raw material for writers of fiction, searching, to paraphrase Anna Akhmatova, for that “rubbish” out of which “verses shamelessly grow.”<sup>9</sup>

I quickly recognized, however, that such neighborly “cross-gazing” over the artificially erected disciplinary walls severely limited the range of interactions between the actual and the fictional that I was able to discern in my readings. Within each disciplinary approach, the subject of one discipline was given a voice and an agency, while the subject of the other discipline was reduced to silence and passivity.<sup>10</sup> Most important, this cross-gazing excluded from consideration the very ways in which science and literature interacted (e.g., stimulated, cooperated, ignored, questioned, reconciled, assimilated, exploited, and competed) with each other within the larger realm of Russian cultural life. It also obscured from view the broader cultural, institutional, ideological, and economic processes, which might have affected—and were expressed in—these interactions. In particular, I came to realize that the very positions of science and fiction vis-à-vis each other, as well as their relative positions vis-à-vis other constituent components of Russian culture, such as the arts, philosophy, and, especially, religion, needed to be examined.<sup>11</sup> Furthermore, the very fact of an active if often indirect dialogue between science and fiction during the 1920s, as well as the various ways in which this interchange unfolded, begged explanation. So, instead of cross-gazing at scientific and literary experiments, I decided to read them in parallel. My goal was to figure out why and how various writers used (often the same) particular scientific “rubbish” to accomplish their own artistic goals, while analyzing in detail why and how various scientists generated such “rubbish” in pursuit of their own objectives.

The parallel reading of actual and fictional experiments quickly brought an important insight: whether laughing at or lamenting about, lambasting or lauding *science*, practically all literary experiments I encountered focused on the *scientist*. The image of a lonely genius assisted by a single sidekick, or at most by a small group of disciples, dominated 1920s literature. Unlike scientists themselves, writers of fiction completely ignored one of the most important and successful experiments conducted jointly by biomedical scientists and their Bolshevik patrons during the 1920s: the building of “big science.” This unique experiment led to the rapid institutional development of biomedical disciplines and to the transformation of the lonely genius into a *mass profession* in the new, Soviet Russia, but it found no place in numerous fictional experiments.

Since my interest lay in uncovering patterns and trends, I had to fight the temptation to include in my study every single instance of intersection between scientific and literary experiments I encountered in my indiscriminate readings. I had to force myself to be selective and to examine closely only what I came to recognize as the most telling and representative examples. Organizing and surveying the mountain of materials I had accumulated over the years, I discovered that among several dozens writers appearing in my notes, my two old favorites—Beliaev and Bulgakov—were the ones most consistent in their attention to contemporary biomedical science, most broad-ranging in covering its various trends, disciplines, and directions, and, arguably, most talented and inventive in using science in their own literary works. Unsurprisingly, Beliaev’s and Bulgakov’s stories came to occupy a prominent place in this book, serving as the major representatives of the literary experiments with control over life and death conducted in the 1920s.

All these discoveries guided to a considerable degree my choice of scientific experiments, which became the four key case studies included in this book: research on isolated organs (severed heads), attempts to freeze and thaw living organisms (anabiosis), studies of the products of internal secretions (hormones), and manipulations of sex gonads (rejuvenation). Each of these four research trends had begun to develop rapidly in Russia and elsewhere in the last decades of the nineteenth century, and all four flourished, albeit in different ways, during the first decades of the twentieth century. The contrast among their individual trajectories and the differing degrees of attention they attracted from both the literary and the scientific communities after the Revolution make the four cases particularly illuminating. During the 1920s, severed heads got a lot of play in both literature and science, but anabiosis, while extensively covered in fiction, generated no new research. Rejuvenation inspired a large amount of research and a huge literary response; but the study of hormones received scant attention in fiction, even though it was the most successfully institutionalized trend in experimental biology and medicine in post-revolutionary Russia: endocrinology.

My choices of particular case studies were thus guided by three main considerations. First, I picked those trends of experimental biology and medicine that had begun to develop before the Bolshevik Revolution and continued, albeit in different forms, in its aftermath, which allowed me to trace the specific changes in their trajectories induced by

the Revolution. Second, I looked at those trends that elicited the most vocal responses from the literary community, which made it possible to analyze what particular elements (premises, ideas, techniques, promises, etc.) of scientific experiments attracted the closest attention of the lay public. Third, I focused on those components of scientific experiments that provided an important nexus of scientists' relations with their Bolshevik patrons but went largely unnoticed by writers and the public at large. As such, an examination of these long histories put the similarities and differences, convergences and divergences, continuities and ruptures in their developments in Russia and elsewhere into sharp relief, and enabled me to discern the specific impact of the Bolshevik Revolution on both scientific and literary experiments, as well as their interrelations and interactions.

Many observers (myself included) have approached the history of 1920s Russia with the hindsight of the tragic events that were to come—famine, Gulag, and terror—looking for the early signs of Stalinism and often creating a linear, almost teleological account of events leading seamlessly from the Bolshevik Revolution to Stalin's "revolution from above" and beyond.<sup>12</sup> This book's focus is different: it looks at the 1920s as a distinct period in its own right and on its own terms. I have deliberately constructed this book as a series of essays, each following its own chronology and narrative structure, rather than attempting to impose a singular chronological or thematic narrative on the bewildering complexities and fantastic riches of 1920s science, fiction, and their interactions. Indeed, one of my goals in writing this book was to highlight the multitude of actors involved, the polyphony of voices raised and silenced, the diversity of pathways opened and closed, and the multiplicity and multidimensionality of stories generated at the junction of scientific and literary experiments.

None of the essays offers a definitive or comprehensive analysis of its subject: each of the cases I examine deserves a monographic book-length treatment in its own right. In fact, an essay about the work of Alexander Bogdanov—a prominent Bolshevik, physician, philosopher, science fiction writer, and the first director of the Moscow Institute of Blood Transfusion—who advanced a vision of "physiological collectivism" and rejuvenation through blood exchanges, which I had originally conceived as part of this study, refused to submit to my wishes and burst out of this project to become a separate volume.<sup>13</sup>

Many protagonists of my essays, as well as the majority of literary texts I examine, are unknown to Western audiences, and little known even to Russian ones. The accounts of their dramatic life stories included in the book illustrate the multiple contexts of their research and writing, while brief summaries of amazing and amusing literary experiments provide textual evidence illuminating the various ways writers addressed and assessed scientific experiments. To make the text accessible to a wide audience, I have sought to avoid professional jargon and polemics with the specialized literature in the five fields with which this book intersects.

Although each of the essays could stand on its own, I hope that this book exceeds and transcends the mere arithmetical sum of its constituent chapters, presenting a dynamic, polychromatic, and multidimensional picture of 1920s Russian science, fiction,

and their interactions. Taken together, the essays depict the period's hopes and fears, promises and expectations, desires and anxieties, and dreams and realities embodied in scientific and literary experiments. Through the lens of published and archival materials, they examine why and how biomedical science came to occupy such a prominent place in the stories of numerous litterateurs and in the culture and society of post-revolutionary Russia more generally, documenting the rapid rise of science's funding, public resonance, and cultural authority in the aftermath of the Revolution. Using popular-science and science fiction writings of various authors, the essays show which particular elements of scientific activities (ideas, techniques, institutions, individuals, promises, and premises) captured the public's attention and which went unnoticed. They illuminate the complex relations of science to other constituent components of Russian culture, such as religion and literature, by comparing and contrasting the actual scientific experiments and their fictional incarnations. Tracing the similarities and differences of these relations in Russia and the West, the chapters assess the role of the Bolshevik Revolution in continuities and ruptures in the developments of certain scientific ideas, institutions, and ideologies, as well as certain literary traditions and cultural practices. They chronicle the transformation of knowledge generated by experimental biology and medicine into a powerful cultural resource, a resource that a panoply of actors used to their own ends, but which also fed public expectations that science was about to bring to humanity its ultimate gift—immortality.

What follows is a result of my parallel reading of—rather than cross-gazing at—certain scientific and literary experiments aimed at the abolition of death and the pursuit of eternal life. With Bulgakov's novella "Fateful Eggs" as its entry point, the first chapter identifies the common (political, institutional, cultural, economic, ideological, demographic, etc.) contexts that shaped the interactions of various actors, ranging from anarchists-biocosmists to physiologists and from popular novelists to Bolshevik Commissars, involved with this particular cluster of experiments in the aftermath of the Revolution. These multiple contexts were generated by the historic coincidence of the Bolshevik Revolution with three major scientific revolutions<sup>14</sup> unfolding during the first decades of the twentieth century: an experimental revolution in the life sciences, which dramatically changed understandings of life and death, health and disease, human nature and human future; a revolution of scale, which marked the transition from "small" to "big" science and made science a mass profession; and a revolution in science's public visibility and cultural authority, aptly manifested in the explosion of "popular science" in the media and the spectacular rise of a new literary genre, science fiction.

Chapter 2 presents literary and scientific experiments with isolated organs. Focusing on Alexander Beliaev's 1925 novella "Professor Dowell's Head" and Sergei Briukhonenko's extensive research on extracorporeal blood circulation conducted on isolated dog heads, it compares the goals and outcomes, techniques and values, and traditions and innovations in the fictional and actual investigations of "severed heads" whose life was sustained by elaborate scientific machinery. It follows the transformation of a severed

head from a frightening symbol of certain death into both an exciting emblem of “science’s victory over death” and an epitome of scientists’ “ethical deafness,” examining the attitudes of scientists, science government patrons, newspaper reporters, writers, literary critics, and the lay public toward the possibility of life without a body.

Starting with Alexander Beliaev’s story “Neither life, nor death,” the next essay explores actual and fictional investigations of anabiosis. It follows Porfirii Bakhmet’ev’s discovery of the “border between life and death” by freezing and thawing living organisms: insects, bats, and fishes. It documents Bakhmet’ev’s efforts to further this research and build a special laboratory for his studies, halted by his untimely death in 1913. It chronicles the period of “suspended animation” that research on anabiosis entered following the Revolution, despite the enthusiastic popularization of anabiosis by the media. It analyzes numerous fictional experiments conducted by scores of writers, including Vladimir Mayakovsky, Aleksei Tolstoy, and Boris Pil’niak, with “freezing and thawing” of humans inspired by Bakhmet’ev’s discovery.

Chapter 4 focuses on actual and fictional experiments with internal secretions—hormones—which both scientists and writers saw as a powerful tool for manipulating the shape and functioning of the human body. Opening with Porfirii Bakhmet’ev’s vision of future science presented in his fictional story “The Billionaire’s Last Will,” this chapter shows how, for scientists, hormones also became a convenient instrument for influencing their Bolshevik patrons and for insinuating their own dreams of “big science” into their patrons’ visions of the country’s future. It documents the joint efforts—and different goals—of scientists and their patrons in conducting a unique experiment: building large institutional structures for a new biomedical discipline, endocrinology. It also reveals that although the transformative power of hormones over human body and personality did fire up writers’ imagination, the institutional embodiment of that power completely eluded their attention.

Through the lens of Mikhail Bulgakov’s novella “The Dog’s Heart,” the next essay describes the “rejuvenation craze” that swept Russia during the 1920s, following the widely publicized experiments on sex glands (testicles and ovaries) by the Austrian biologist Eugen Steinach and the French surgeon Serge Voronoff. The essay portrays numerous Russian scientists testing and debating various techniques of manipulating sex gonads and equally numerous writers mocking, glorifying, or decrying their results and quickly extending the promise of rejuvenation into a certainty of immortality. In addition, it documents the efforts to rejuvenate old revolutionaries and to build a “monkey farm” to ensure a domestic supply of monkey glands for rejuvenation. Finally, it examines the attitudes of some members of the lay public toward the intertwining of science and sex that raised hopes of science fulfilling their wildest dreams of changing human (sexual) identities and getting control over human nature.

Chapter 6 brings the separate case studies together to illuminate the place of biomedical sciences in the culture and society of 1920s Russia. It investigates the role that the new knowledge of human biology played in answering the “big” questions of human nature

and human destiny, which had haunted humanity for millennia and assumed a particular urgency and saliency in the aftermath of the Revolution. It also demonstrates the particular cultural affinity of the Bolsheviks' visions of the country's future with the promises of eternal life and hopes for conquering death generated by concurrent biomedical research. Furthermore, it examines collective, though not necessarily coordinated, efforts of scientists, their Bolshevik patrons, and their literary fans/critics, which transformed esoteric biomedical knowledge into an influential cultural resource, a resource that facilitated the establishment of large specialized institutions, inspired numerous science fiction stories, displaced religious beliefs, and gave the millennia-old dream of immortality new forms and new meanings in Bolshevik Russia.

A brief Epilogue sketches the profound impact of the "revolution from above" on the biomedical research, science fiction writings, and revolutionary visions of the 1920s, as well as the continuing quest for immortality in post-Soviet Russia.

St. Petersburg—Toronto, January 2012.