CHAPTER 27

Darwin and Natural Science

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From the vantage point of the natural sciences, the world Lev Tolstoy was born into in 1828 and the one he passed from in 1910 were unrecognizable. He was born in the year Friedrich Wöhler synthesized urea from inorganic components, thus ushering in the massive synthetic chemistry industry as well as sparking a vigorous debate about the boundary between inorganic matter and the stuff of life. He died ten years after Max Planck inaugurated the quantum age. Born into a European intellectual culture that still debated the merits of atomism as an explanation for matter (revived famously by John Dalton in 1808), his passing was broadcast internationally on radio and via transoceanic cables, taking full advantage of the electromagnetism that was the hallmark of mid-century physics.

From a surface engagement with Tolstoy's life and thought, it would seem that this was of little interest. When compared with medicine (Chapter 28), on which the writer had famously critical and detailed things to say, or industrial technology (Chapter 25) as symbolized by the ubiquitous train that so shaped Anna Karenina's life and death, Tolstoy only rarely delved deeply into the substance of these transformations in the natural sciences. When juxtaposed with Fyodor Dostoevsky, this supposed diffidence is all the more striking. Dostoevsky cared about atomism, non-Euclidean geometry, thermodynamics and the heat death of the universe, and more. Tolstoy's most salient such intervention – his skepticism toward Charles Darwin's theory of biological evolution by means of natural selection – stands out as a surprising exception.

But this impression of a Tolstoy disengaged from the sciences is merely on the surface. Tolstoy was repeatedly confronted with the theories and hypotheses of contemporary scientists, and they shaped his understanding of his own moment even when he did not explicitly invoke them. This attention to science was especially noticeable (though not unique) during the 1870s while he was composing and publishing *Anna Karenina*, with occasional eruptions as he developed his religious thought. This essay

https://doi.org/10.1017/9781108782876.033 Published online by Cambridge University Press

traces three of the crucial contexts which repeatedly brought the world of the natural sciences to Tolstoy and vice versa: the academic sphere of university science; the coverage of scientific advances in "thick journals" (*tolstye zhurnaly*); and the domestic sphere of correspondence and family life.

Professors and Pedagogy

Before he was a novelist, a soldier, or a revered (and excoriated) philosopher-sage, Lev Tolstoy was a university student. In 1844, he enrolled at the University of Kazan, on the Volga River, to study oriental languages, a discipline he abandoned the following year in favor of the law. (He had a career in diplomacy in mind.) In 1847 he withdrew without a degree to embark on a frenzy of autodidacticism and a military life. With respect to natural science, Tolstoy's time at Kazan bears closer attention. Although he did not study in the science faculties, he was surrounded by signs of a major sea change in Russian intellectual life.

During Tolstoy's time there, science in Kazan was marked by two signal developments. The first was the development of a form of non-Euclidean geometry, a mathematics of lines and angles that does not adhere to the ancient Greek "parallel postulate." In 1826 Nikolai Lobachevsky, full professor of mathematics at Kazan, announced a version of geometry (now called hyperbolic geometry) which allowed for more than one parallel line through a point. Although at first largely dismissed by the mathematical community, by the 1870s the non-Euclidean geometries of Lobachevsky and others constituted the century's greatest mathematical innovation. Lobachevsky was a Kazan mainstay, and served as rector of the university. In 1846, when Tolstoy was a student, he was dismissed, supposedly due to failing health.

The second was the efflorescence of a remarkable group of organic chemists, first under the leadership of Nikolai N. Zinin and then under Alexander M. Butlerov, whose theories of organic chemical structure (think of the tinkertoy models of molecules from science class) were pivotal contributions to the dominance of that science across Europe. The Kazan chemical school was especially well situated for the transformation of university science in the 1850s and 1860s, seeding chemistry faculties at both the Petersburg and Moscow universities.

Both Lobachevsky and the chemists demonstrate two key features of the natural sciences in Tolstoy's context: that the universities had begun to displace the St. Petersburg Academy of Sciences (founded in 1724 by Tsar

Peter the Great) as the major engine of innovation; and that developments in Russia were no longer seen as derivative or irrelevant with respect to Europe. The Russians were part of a European story, and knowledge of European science flowed into Russia largely through this conduit of higher education.

It was a powerful mechanism. In 1855, Alexander II succeeded his father as Tsar in the midst of the Crimean War, the humiliating defeat that was interpreted by his coterie as indicative of Russia's military, economic, and technical backwardness. A slew of reforms (Chapter 6) followed, among which was a reform of university education in 1863 which expanded access to members of clerical and bureaucratic families (known as *raznochintsy*, "people of different ranks"). These new students flooded especially into the sciences. They not only produced research, but more often served as translators of Western ideas into Russian. They shaped what Tolstoy read and comprise some of the minor characters in his novels (though not to the degree visible in Dostoevsky).

Tolstoy rarely commented on this university world. He was deeply concerned with education (Chapter 17), but it was education of peasants in the fundamentals of literacy and his own interpretation of ethics, not the high ambitions of the professors. When he did, he disapproved of it. In his diary entry of August 24, 1906, Tolstoy observed of his reading of the educational and industrial manifesto of Dmitry I. Mendeleev – famous for his formulation of the periodic system of chemical elements in 1869 – entitled *Cherished Thoughts*: "I was reading in Mendeleev that the significance, the ideal of a person is reproduction. Horribly absurd. This is stupidity ... a consequence of self-confidence" (55:237). Mendeleev returned the compliment. When perusing one of Tolstoy's tracts and remarking upon the author's phrase "If I am not crazy," Mendeleev scrawled in the margins of his copy: "not crazy, but not aware of the methods of exact knowledge, a utopian, a fantasist, a poet."[1] Mendeleev's son-in-law, the gifted Silver Age poet Alexander Blok, used the contrast between the two bearded titans as an allegory for two different futures for Russia: the pastoral versus the industrial.

Periodicals and Polemics

The dominant way in which the Russian public encountered the latest findings in the natural sciences was through the medium of print. Tolstoy was no exception. Although there was a vigorous market in translations and monographs written originally in Russian (not to mention the smaller

trade in foreign-language books, which Tolstoy was exceptionally well placed to consume), the bulk of this communication happened in the medium of "thick journals." These periodicals – *The Contemporary*, *The Russian Messenger*, *The Northern Bee*, etc. – generally appeared monthly or bimonthly, catering to specific audiences by political persuasion and aesthetic taste, and consisted of a mix of belles-lettres, social commentary, literary criticism, historical essays, and popular science. Just about every major novel in nineteenth-century Russia, including *Anna Karenina* and *War and Peace*, debuted as serials within their pages. Thick journals were a long-standing solution to the problem of Russia's scattered reading public, but they entered their prime in the 1860s.

As far as science was concerned, the timing was fortuitous. In 1859, Charles Darwin published *On the Origin of Species*, outlining in full the theory of evolution he had been developing since the early 1840s. He had been sparked to publish by a letter from a young naturalist, Alfred Russel Wallace, who had hit upon the same general mechanism: given that organisms reproduced at a faster rate than the resources able to sustain them, there was a constant struggle for both sustenance and mates, a struggle whereby the weak and unfit perished and those most adapted to their environment through chance variations survived. Wallace and Darwin published side-by-side in the *Journal of the Linnean Society* in 1858, with *Origin* following hard apace. The reactions both within Britain and then across the world proceeded fairly rapidly, as *Origin* and Darwin's later texts were summarily abstracted, extracted, translated, and debated in a variety of formats.

The Russian engagement with Darwin was swift. Sergei A. Rachinsky's translation of *On the Origin of Species* appeared in 1864, with a second edition the subsequent year. Ivan M. Sechenov, a noted physiologist and progressive thinker, translated Darwin's most sensational work, *The Descent of Man*, in 1871, the same year it appeared in English. That decade a slew of Darwiniana was published in Russian, including *The Expression of Emotions* and *Voyage of the Beagle*. Between 1907 and 1909, Tolstoy would have witnessed a Russian edition of Darwin's collected works by botanist Kliment A. Timiriazev, sometimes known as "Darwin's Russian Bulldog." Wallace had his own Russian moment in the 1870s. Extracts of and commentaries on all of this material made it to the thick journals, and Tolstoy read much of it.

In an interesting contrast to the prominent objections to natural selection in Britain and America, the early Russian response was relatively accepting. Russian naturalists vigorously debated natural selection, but

not on the grounds of religious orthodoxy: they disputed the Malthusian hypothesis of overpopulation that undergirded Darwin's tropical data in favor of "mutual aid" theories more suited to the inhospitable steppe where they did their own fieldwork. Radicals of all sorts embraced the theory both as a vindication of materialism and as a convenient allegory through which they could discuss "revolution" under the guise of "evolution." (Nikolai Chernyshevsky, usually a bellwether of the radical intelligentsia, was unusual in his rejection of Darwin, largely because of the Malthusian assumption.) Even the Orthodox Church refrained from attacking Darwinism either officially or through proxies until 1884, two decades after its Russian debut.

The death of Charles Darwin on April 19, 1882, prompted the thick journals to closely analyze his legacy. This may have triggered the main salvo from Nikolai Danilevsky, a pan-Slavist ideologue, who in 1885 published *Darwinism: A Critical Study*, which deepened a building public dispute over the moral implications of Darwin's theory. Nikolai Strakhov, a polemicizing intellectual who fashioned himself as a scientific savant, had been sniping at Darwinian evolution for some years by now, but Danilevsky reinvigorated his interest. Strakhov brought the book to the attention of Tolstoy, who refined his own views on evolution by natural selection over the next few years. By 1890, Tolstoy's negative assessment of Darwin was essentially set: even if natural selection were true, it was irrelevant to the only important question of how to live; the trouble with Darwinism was the *social* Darwinism of intellectuals valorizing cruelty and struggle. This was more of an objection to British philosopher Herbert Spencer's social theory, which became imbricated with Darwin's ideas in Russia and elsewhere, than an attack on the biological theory itself.

Indeed, Tolstoy had begun to develop these ideas already in the 1870s in the context of *Anna Karenina*, serialized in the *Russian Messenger* from 1875 to 1877. The accompanying articles, ranging from reports on emergent hostilities with the Ottoman Empire to debates over materialist science, crept into the narrative. Prince Vronsky's friend Golenishchev – treated in the book as a shallow faddist who is tolerated by the protagonists because he continues to associate with the disgraced Anna and Vronsky – mentions "*évolution*, selection, struggle for existence" (19:36/Pt. 5, Ch. 9) in conversation with the couple. Needless to say, Golenishchev's endorsement is a mark of disapproval from Tolstoy. Likewise, Levin (Pt. 8, Chs. 8, 12) repeatedly returns to the topic of valorizing struggle in nature in order

to reject it for the same ethical reasons Tolstoy does. Decades later, Timiriazev would single out Levin's musings by grumbling: "Did you read the book you are so eloquently denouncing?"[2] Interestingly, the word Tolstoy used to describe the theory was not "evolution" but rather "development" (*razvitie*), which is a mark of Tolstoy learning most of what he knew from the polemics in the journals rather than from reading the scientific monographs.

Pens and Parlors

A third important context for Tolstoy's engagement with natural sciences, and one common to many of the wealthier members of the nobility and intelligentsia, was the home and estate. Today one commonly thinks of science as actively produced in laboratories and only passively consumed in the home. In the nineteenth century, and certainly in a rural context like Yasnaya Polyana (or the English countryside, for that matter), this was far from the case. New scientific knowledge was eagerly sought after and deployed in these contexts as well, though sometimes with a critical edge.

For all the many things that Yasnaya Polyana meant to the Tolstoy family (Chapter 4), primary among them was that it was a farm. Tolstoy would sporadically focus his attention on agriculture and sought to deploy the knowledge of naturalists in this domain (Chapter 26). A case in point is beekeeping. In Tolstoy's calendar for April 1887, he endorsed setting up beehives following the instructions offered by Alexander Butlerov in a recent monograph on the subject (40:27). This was the same Butlerov who was a leading representative of the Kazan school of organic chemistry, spending the second half of his career in St. Petersburg at the Academy of Sciences and the University.

Butlerov provides an entry point to another mode in which natural science – although not perhaps as many would define it today – was present in the private worlds of correspondence and the home. Butlerov was a leading Russian representative of spiritualism (*spiritizm* in Russian), an immensely popular movement that originated in upstate New York in the 1840s and then crossed the Atlantic to set up offshoot traditions in London, Paris, Berlin, Petersburg, and beyond. Spiritualists would gather in darkened rooms, often parlors in private homes, in the presence of a person called a "medium," who mediated between the psychic world of departed souls and the physical world of levitating tables, rapping on

furniture, and automatic writing. Dismissed frequently as superstition both now and at the moment (certainly Mendeleev and Dostoevsky both considered it such), in the 1860s and 1870s numerous scientists across Europe wanted to use the methods of the natural sciences to investigate the phenomena revealed during these séances.

Tolstoy did not care much for what he saw as the worst mix of reductionism in the realm of the spiritual and simultaneously almost a parody of the ills which had moved organized religion away from the ethical precepts that ought to guide Christian living. Strakhov, who disapproved strongly of scientists' involvement, was instrumental in drawing Tolstoy's attention to spiritualism in the 1870s, though the novelist would have found it even without Strakhov's mediation. The same issues of the *Russian Herald* which carried installments of *Anna Karenina* in 1875–6 also contained a vigorous polemic on spiritualism featuring Butlerov. Tolstoy incorporated a critique of this into his ongoing novel, depicting the weak and inauthentic Karenin as subservient to his medium, Landau (Pt. 7, Chs. 20–2).

Tolstoy continued to simmer over the errors presented by spiritualism. In 1886 his children asked him to pen a play for domestic production as a family activity, and he completed it in 1889, when it was first staged at Yasnaya Polyana on December 30. The result, *The Fruits of Enlightenment*, is a rural farce about clever peasants manipulating a deluded spiritualist landowner in the name of justice (Chapter 22). The butt of the comedy is a distinguished scientist named "Kutler" (originally Kutlerov, an even more transparent jab at the recently deceased Butlerov). The play is an exposé of what happens when "science" is brought inappropriately into the domestic space, while the play itself was the result of just such an incursion.

Lev Tolstoy was not dismissive of science. That does not mean that he necessarily agreed with it, and it also does not imply that he welcomed the new scientific theories that were buffeting his intellectual culture. Russia, no less than Western Europe, was in the throes of coming to terms with a new understanding of nature brought about by the professionalization of science and the proliferation of its methods, a transformation that reached into every corner of the culture. Tolstoy's engagement concentrated on a single axis: did this new understanding of nature alter the fundamental ethical precepts? If the tenets emerged unscathed, then the science was at best irrelevant; if they contravened them – as Tolstoy worried Darwinism might – then they were something to be taken very seriously indeed.

Notes

1 R.B. Dobrotin and N.G. Karpilo, "D.I. Mendeleev o L.N. Tolstom," *Priroda* 9 (1978), 11–13 (at 12).
2 K.A. Timiriazev, "Darvin, kak tip uchenogo," in *Charlz Darvin i ego uchenie: S prilozheniem nashi antidarvinisty* (Moscow, 1898), 36; translation from Anna A. Berman, "Darwin in the Novels: Tolstoy's Evolving Literary Response," *Russian Review* 72:2 (2017), 331–51 (at 350).