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The heritage of Ukrainian Soil Scientists and its Significance for Global Food Security Revivified

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Graphical Abstract

Ukrainian soil scientists made major contributions that imperial Russian and Soviet systems ignored. Kharkiv professors Nykyfor Borysiak and Ivan Levakovskiy developed an early theory of chernozem soils decades before Vasily Dokuchaev's well-known work, and scholars in western Ukraine later shaped the Polish school of soil science. Despite repression, researchers such as Hryhorii Andrushchenko, N. Vernander and H. Hryn advanced soil surveys, mapping and theory that continue to support modern soil science and global research collaboration.



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Abstract: We review important contributions of Ukrainian soil scientists that were ignored by Russian imperial and Soviet regimes. Pride of place belongs to Kharkiv Professors Nykyfor Borysiak and Ivan Levakovskiy who studied and published a theory of chernozem soils decades before Vasily Dokuchaev's acclaimed *Russkiy chernozem*. Before the Second World War, soil science in western Ukraine also produced a constellation of scholars who later formed the Polish school of soil science, including Arkadiusz Musierowicz and Bohdan Dobrzanski. And Hryhorii Andrushchenko, humiliated by the Soviet authorities and denied certification by the Higher Attestation Commission of the Soviet Union, nevertheless spearheaded historically significant, large-scale soil surveys and the first soil maps of Ukraine. His compatriots N. Vernander and H. Hryn remain overshadowed to this day. Every Ukrainian soil scientist mentioned here, and others not yet mentioned, made a substantial contribution to national science with discoveries, theories and technologies; often founding new schools and scientific directions. Their achievements are still germane, serving as a foundation for the further development of specialized fields. Ukrainian science remains robust under military aggression and with scant research funding; and many countries currently engage Ukrainian scientists within their own research communities.

Keywords: Soil science, Agriculture, Soil maps, Scientific schools, history.

Introduction

On rethinking Ukraine's place and role in the world in the face of invasion and privation, we should rekindle historical memory of the pioneers of Ukrainian agricultural science and soil science. Its erasure and misappropriation go back a long way although the piracy has not been limited to Ukrainian science; *e.g.*, the assertion that Dmitri Mendeleev was sole author of the periodic table of chemical elements. In fact, the German chemist, Julius Lothar Meyer, focusing attention on the atomic volumes of elements, placed elements that Mendeleev had incorrectly classified in 1869 in their correct positions (Au, Hg, Tl, Pb). This groundwork enabled Mendeleev to predict the physical and chemical properties of as-yet undiscovered elements in 1870 [1]. The claim that Mikhail Lomonosov discovered the law of conservation of mass and energy is another fabrication. Even domestically, the first circumnavigation under the Russian flag was achieved by the Ukrainian Cossack captain, Yurii Lisianskyi, who brought back his sloop *Neva* to the port of Kronstadt in 1806, two weeks earlier than the Russian, Krusenstern – but the imperial coterie granted all honours to the Russian captain [2].

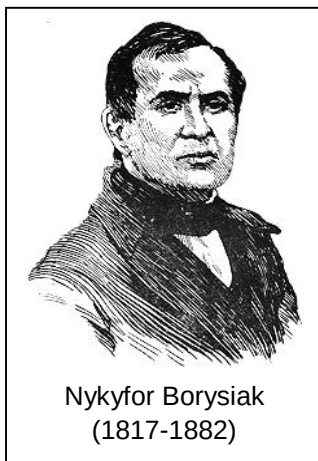
The myth of *great Russian science* is revealed by the 2023 list of the world's highly cited scientists which included 6 835 individuals from 64 countries. Of these, 2 542 were from the United States and 562 from the United Kingdom – no doubt augmented by publishing in English; 333 were from Germany; Russia had eight highly cited researchers; but overwhelming numbers of portraits and books by the hegemon have been imposed on libraries and the scientific community. The worker bees of Ukrainian science are scarcely represented.

Here, we present brief biographies and scientific contributions of remarkable pioneers who were deliberately or, sometimes, unconsciously consigned to oblivion by the Russian imperial and Soviet authorities. Restoration of the historical memory of founders of the natural sciences who investigated and described Ukrainian nature and soils and contributed to the settlement and development of Ukrainian lands has become a priority [3-8], but a review of the literature shows it is no easy task [9]. At the same time, a comprehensive meta-analysis of long-run projections indicates that global food demand in 2050 will be 35-56% higher than in 2010 [10]. Fertile soils are degrading [11,12], and climate change [13] demands ever more of prime soils and our knowledge of them.

Origins of soil science in imperial Russia

When soil science emerged in the late nineteenth century, the Agricultural School in Dubliany (now Lviv National Environmental University) attained the status of a Higher Agricultural School (by 1880) and of an Academy (by 1901). During the same period, Professors Nykyfor Borysiak and Ivan Levakovskyi were active in Kharkiv University.

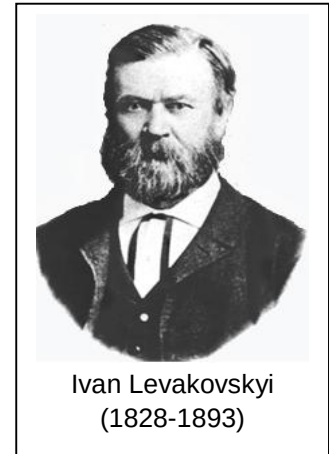
Following his research *On the geognostic relations of soils in the Kharkiv Province and adjacent governorates*, Borysiak was awarded the degree of Doctor of Natural Sciences in 1854 [4] but, as early as 1851, he published his benchmark work *On the Chernozem* in the then not fully standardized Muscovite vernacular (*i.e.*, the contemporary Russian) [14]. He noted that chernozem form under herbaceous vegetation and proposed a classification of chernozem: ‘on loams, clays, sandy loams, eluvium of dense carbonate rocks; solonetzic, marshy.’ He is also known for an early study of *bilozirki* (carbonate nodules and pseudomycelia) which remain a hallmark of the Ukrainian school of soil diagnostics: an objective criterion for distinguishing Typical and Ordinary chernozem and an indicator of the zone of active moisture exchange in virgin soils of the steppes. Moreover, in his earliest works, Borysiak emphasized the need to protect chernozem as a resource. At the time these works were published, the generally recognized founder of genetic soil science, Vasilii Dokuchaev, was only five years old. Fifteen years later, Franz Ruprecht’s *Geobotanical studies on chernozem* (1866) came to be regarded as the beginning of Muscovite soil science [15].



Nykyfor Borysiak
(1817-1882)

In 1867, Borysiak published *Collected materials relating to the geology of Southern Russia, Book 1* (380 pages). It included four of his works; the first entitled *On the stratigraphic relations (connection with the geognomic basis) of soils in the Kharkiv Province and adjacent governorates* (186 pages) [4]. At the same time, as an outstanding geologist, Borysiak substantiated a forecast of the distribution of coal-bearing strata towards the western territories; in effect, was among the first to propose the idea of a Greater Donbas. Besides, he was the maternal uncle of the composer and pianist, Mykola Lysenko and contributed personally to shaping the worldview of the renowned musician.

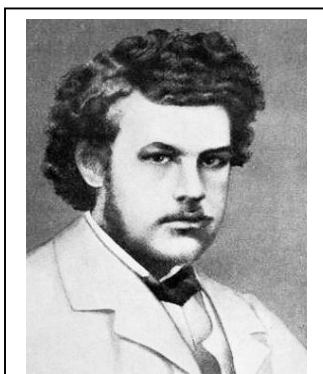
Two decades later, another Kharkiv professor, Ivan Levakovskiy, published *Materials for the study of chernozems* (1871) and, in 1888, *Some additions to studies on chernozem* [16]. Now forgotten, he investigated the geography and origin of these soils; the reasons for their absence in northern Russia; the thickness of chernozems on different relief elements; assessed methods for determining humus content; and worked on soil classification. So it was that Ukrainian scholars published the first detailed descriptions of Ukrainian (or as it was customary to write then) Russian chernozem.



Ivan Levakovskiy
(1828-1893)

In 1888, some 31 years after Borysiak's studies and during Levakovskiy's time, Vasilii Dokuchaev arrived in Poltava Region with funding from the Free Economic Society of St Petersburg (Russia's oldest and most influential economic society) for 'a more correct assessment of lands' and with a covert imperial assignment to establish a basis for higher taxation of more fertile land – as farmers in the non-chernozem regions complained that 'nothing grows there' while they were taxed just the same.

Thus, a recent graduate of the Faculty of Physics and Mathematics of St. Petersburg University



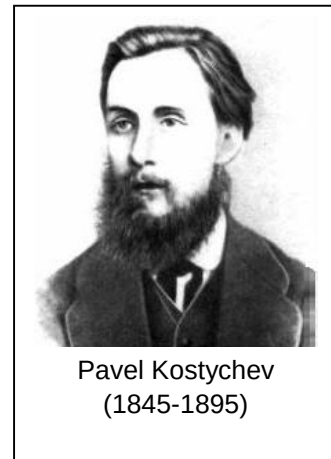
Vasilii Dokuchaev
(1846-1903)

specialising in mineralogy and petrography grasped the opportunity to study the chernozem and, from 1877 to 1881, he travelled across the chernozem belt of the European part of Muscovy. The outcome was his famous *Russian Chernozem* (1883) [17] in which he attested that familiarity with chernozem gained during the Poltava expedition profoundly changed his understanding of its genesis and nature.

Even earlier, on 14 December 1874, Dokuchaev delivered his first report devoted entirely to soils – *On the podzol of Smolensk Province* – at a meeting of the St. Petersburg Society of Naturalists. This gave the imperial coterie grounds to call him, almost immediately, the 'creator of soil science', albeit 23 years after the publication of Borysiak's foundational *On Chernozem* and three years after Levakovskiy's *Materials for the study of chernozem*. No one gainsays the significance of Dokuchaev's work, or that he was an astute and systematic observer; but any field scientist will confirm that, by and large, we only observe and perceive what we are already looking for. In the first place, what we look for comes from clues picked up from colleagues and previous workers in the field. Subsequently, if we have

a good field eye, we may observe further features and links between them. Dokuchaev must have read both Borysiaks's and Levakovskiy's accounts of chernozem and, considering the overlap, presentation of the whole of *Russian chernozem* as his own *de novo* observations smacks of plagiarism.

During the scientific debate of the time, Dokuchaev, unfamiliar with contemporary European advances in biology, phytocoenology and microbiology, could not fully grasp the arguments of his adversary, Pavel Kostychev, regarding humus and chernozem formation [18]. Kostychev considered both humus accumulation and mineralization as a single ecological process within the 'dominant vegetation cover – soil microbiota – dead phase of soil system'. For the anointed *creator of soil science*, it remained a kind of 'natural magic.' Later, Kostychev's work became a basis for modern understanding of the ecology of terrestrial ecosystems, including the soil.



Kostychev, a native of St Petersburg, was reportedly sent to Germany and France around 1880-5 to study vaccination against anthrax. He worked in Louis Pasteur's laboratory [18] which stimulated his interest in soil microbiology. In 1886, he published *Soils of the chernozem region of Russia: their origin, composition, and properties*, accounting for the development of chernozem under the action of the dominant vegetation and plant physiology; but he considered other genetic factors also identified in Dokuchaev's early work, especially climate, as comparable in importance.

So it was that, *de facto* and *de jure*, Ukrainian scientists, Borysiak and Levakovskiy produced the first fundamental works on chernozem genesis and the foundations of the Ukrainian school of soil science. Nonetheless, Dokuchaev was lionized and, at the safe distance of forty years from the October revolution, the Dokuchaev school was transformed into Soviet soil science. It still dominates many scientific and educational institutions although soil science in Europe and beyond has followed other paths pioneered by Borysiak, Levakovskiy, Kostychev and Ukrainian scholars Oleksandr Nabokykh, Heorhii Vysotskyi, Hryhorii Makhiv, Oleksii Sokolovskyi, Volodymyr Krokos and Viktor Kanivets.

Today's focus is increasingly on the concept of *soil health* that entered the lexicon of Ukrainian researchers through the insight of Kanivets; and criteria for assessing soils and pedogenetic

processes have shifted toward the ecological functions of soil biota and genetic analysis of soil properties and processes have moved on from Dokuchaev's analogue factors of soil formation. Modern soil genome sequencing determines the proportions of DNA of the suite of microorganisms that comprise the soil microbiome to identify soil microbial functions and trends in the evolution of soil health, plant performance, and directions of fertility change. *DNA passports* of soil containing recommendations for precision agriculture are increasingly replacing agrochemical passports.

What, then, actually occurred in the history of soil science? Why did non-Dokuchaevian scientists disappear from the discipline? They were many but some remain almost unknown. For example, search engines return only a single portrait of Oleksandr Nabokykh; and the cause of death of the prominent paleogeographer and soil scientist Volodymyr Krokos in 1936 has still not been established. In Ukraine, H. Makhov and V. Krokos in the 1920s published scientific articles and books in Ukrainian (Kharkiv orthography of 1928) (e.g., Krokos V. I. *Pedogenic parent materials of Proskuriv District. Materials of Soil Research in Ukraine*, 1924; Krokos V. *Another proof in favour of the aeolian theory of loess origin. Proceedings of the Kyiv Research Department*, 1927). Their early deaths, Nabokykh in 1920 at the age of 47 and of Krokos in 1936, also at 47, may partially explain the limited body of Ukrainian-language publications.

Professor Oleksandr Nabokykh (1874-1920) organized the first large-scale soil surveys and was among the earliest researchers of loess in Ukraine. He authored the *Methodology of field survey, laboratory mass examination, and mapping of soils and subsoils*, and founded the Odesa Agricultural Institute. He became a sharp critic of the scientific positions of both Dokuchaev and Dokuchaev's loyal follower Mykola Sibirtsev, as well as of Konstantin Hlinka's land-evaluation methodology and soil-geographical generalizations – Hlinka having accompanied Dokuchaev on the Poltava expedition of 1888. Nabokykh self-identified as Ukrainian and initiated a distinctive school of soil scientists (O. Lebedev, V. Krokos, M. Florov, H. Makhiv, and others), subsequently influencing the work of Oleksii Sokolovskyi and the distinctive scientific perspectives of Ukrainian soil scientists today [7].



Oleksandr Nabokykh
(1874-1920)

The Ukrainian school of soil science under the Soviet Union

Academician Heorhii Vysotskyi (1865-1940) is best known for hydroclimatic and soil conditions under forest but his achievements also span soil science, geobotany and physical geography [19]. As a young scholar, he devoted himself to the natural sciences and joined Dokuchaev's Poltava expedition. In 1913, Odesa University awarded him the degree of Doctor of Agronomy and he joined the Dept of Soil Science at Kyiv University where he studied sandy (pine-forest) river terraces, aiming to stabilize sands through vegetation. In 1918, he headed the Department of Soil Science at Simferopol University; and, in 1930-40, he worked at the All-Union (now Ukrainian) Research Institute of Forestry and Agroforestry

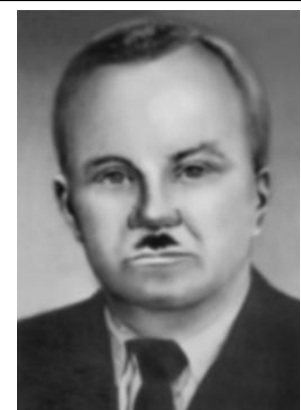


Heorhii Vysotskyi
(1865-1940)

Amelioration (Kharkiv) and was elected a full member of the Academy of Sciences of the Ukrainian SSR. He was the first to establish regularities of near-surface air flows that cause dust storms, developed the foundations of an oroclimatic classification of soils, and introduced concepts including microrelief, microclimate, and illuvium. He was one of the founders and an active author of the world's first journal entitled *Soil Science (Pochovedenie)* founded in 1899).

Professor Hryhorii Makhiv (1886-1952) was the first Ukrainian soil scientist to lead research in agro-soil science in Ukraine [20]. He authored the first national textbook *Soil Science* (1925) and the first detailed soil map of Ukraine (1927) with accompanying text in Ukrainian and English.

Makhiv headed the soil science section of the Agricultural Scientific Committee of Ukraine, established in 1919 but dissolved in 1927 as a 'nationalist organization.' Many staff members were exiled and Makhiv's name was erased from the history of Ukrainian soil science. The Soviet authorities did not allow Makhiv to attend the 4th International Soil Science Conference in Rome in 1924, for which he had submitted a report on *Issues of soil evolution in Ukraine*. He was also prevented from attending the International Congress of Soil Scientists in Washington in 1927, although O. Sokolovskyi and D. Vilenskyi from the Kharkiv Research Department of Soil Science were permitted to go.



Hryhorii Makhiv
(1886-1952)

From 1929, he was prohibited from teaching in higher education institutions as 'politically unreliable' [20].

Makhiv did not leave Kyiv after the Bolshevik retreat and, in 1942-43, founded and headed the Research Institute of Soil Science, Plant Nutrition and Agrotechnics in Kyiv. In 1944, he emigrated to Germany and in 1949 to the United States, settling in Birmingham [21] where he published the first complete classification of the soils of Ukraine in English (1951) (Fig. 1).

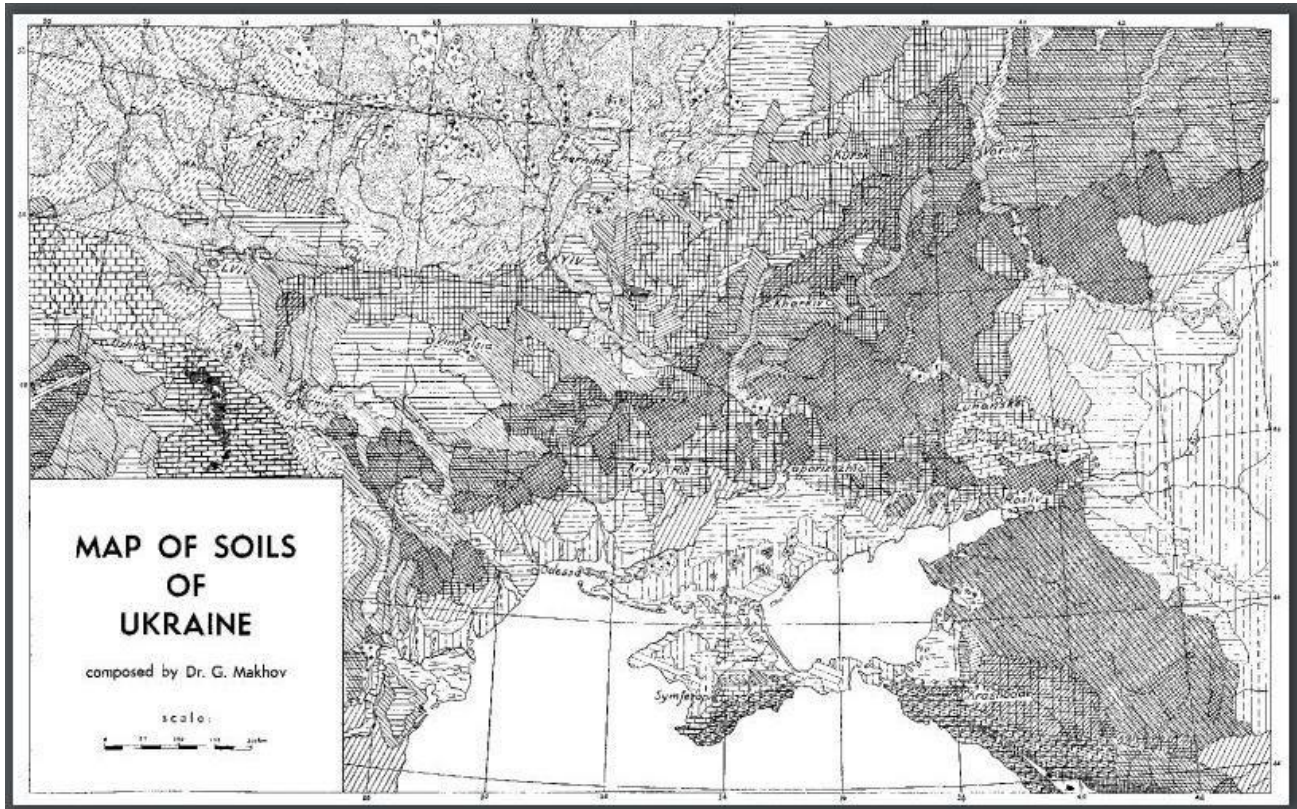
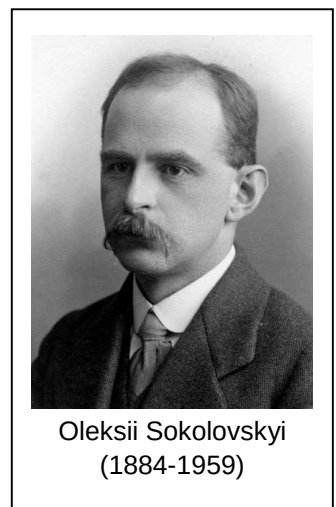
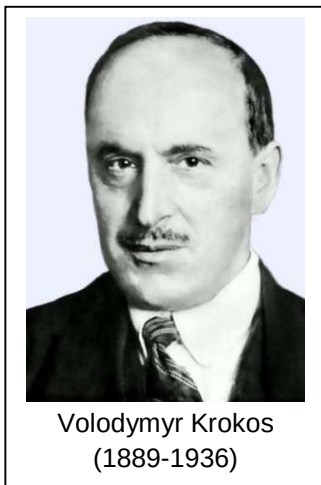


Figure 1. Soil map of Ukraine, created and published by G. Makhov in the USA

Academician Oleksii Sokolovskyi (1884-1959) organized the establishment and development of experimental research in soil science and created the Ukrainian horizon indexing and nomenclature for genetic soil horizons (the Sokolovskyi indexing system) taken up by some national classifications and the international World Reference Base [5]. In 1919, he defended his Master's thesis *On phenomena associated with the colloidal part of soil*, with key conclusions made independently of K. Gedroitz. In 1924, he was elected a member of the soil science section of the Agricultural Scientific Committee of Ukraine (under the People's Commissariat of Agriculture of Ukraine), headed by H. Makhiv and from 1926 until the Committee's liquidation, Sokolovskyi served as its head.



In 1938, he was arrested and tried for alleged participation in an ‘anti-Soviet insurgent-terrorist espionage organization’ of Ukrainian social democrats; purportedly aiming to overthrow Soviet power by armed uprising and create an ‘independent Ukrainian fascist state’. He was sentenced to execution, accused of destroying agricultural research stations and promoting a theory of shallow tillage – charges that effectively ended an open scientific debate on the future of Ukrainian soil science (1925-1941) with Professor Makhiv. In 1940 the verdict was annulled for lack of evidence and he was reinstated.

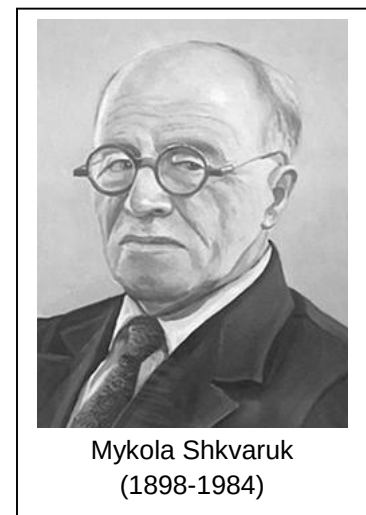


Volodymyr Krokos
(1889-1936)

Professor Volodymyr Krokos (1889-1936) geologist, geomorphologist, soil scientist and paleontologist joined early Nabokykh expeditions, published in Ukrainian in *Geological observations in the Tyligul basin*. From 1922, at Odesa University, he taught courses on Quaternary deposits of Ukraine, mineralogy, geology, soil science, mineral resources, and the theory of inorganic evolution. From 1925, he was a professor at the Odesa Melioration and Land-Management Technical School and was awarded a doctoral degree for his 1927 his monograph *Materials for the characterization of Quaternary deposits of eastern and southern Ukraine*. Subsequently, at the Faculty of Geology and Geography of Kyiv State University, he published in Ukrainian the first textbook *Course of Paleozoology* (Vol. 1 Invertebrates; Vol. 2 Vertebrates) and a series of manuals in geology, earth science, and astronomy.

In autumn 1936, after a Bolshevik denunciation alleging hostile activity, Krokos was summoned to the Kyiv NKVD (Peoples Commissariat for Internal Affairs and Secret Police); he took his own life in late November.

Professor Mykola Shkvaruk (1898-1984), a native of Bukovina, created his own research school in soil studies at the Uman Agricultural Institute, working on tillage and fertility and soil conservation [6]; his textbook *Soil Science* was reprinted several times. During the German occupation, the Institute’s historic greenhouse complex and library were threatened with destruction but saved by Shkvaruk’s courage and efforts. He worked there productively until the end of his life.



Mykola Shkvaruk
(1898-1984)



Mykola Krupskyi
(1903-1986)

Professor Mykola Krupskyi (1903-1986) studied colloidal and physicochemical properties and the sorption capacity of soils. He established a powerful scientific school and was internationally active [22]. One of his most important contributions was the development of conceptual and methodological principles for large-scale soil surveys and agrochemical zoning of Ukraine based on soil fertility indicators. From 1959 to 1974, he headed the Ukrainian Research Institute of Soil Science.

Galician Ukrainian soil science

Ukraine has both national history and a regional, Galician history of soil science, agrochemistry and agriculture in Dubliany — then a distant eastern province of the Austro-Hungarian Empire carved out of the Polish-Lithuanian Commonwealth. Key contributors to the early development of soil science in Ukraine included: Severyn Plakhetko (1835-1880), professor of geology and mineralogy; Emil Godlewski (1847–1930), professor of botany and agrochemistry; Władysław Lubomęski (1841-1907), Director of the Higher Agricultural School and, from 1901, the Agricultural



Arkadiusz Musierowicz
(1894-1966)

Academy in Dubliany and, professor of physics and physical chemistry of soil; Stefan Jentys (1860-1919), professor of soil and fertilizer chemistry, head of the agricultural-chemical laboratory [8]. In 1901, the higher agricultural institution in Dubliany became an agricultural Academy by decision of the Austro-Hungarian Minister of Agriculture [23]. In 1919, the newly constituted Polish authorities incorporated it into Lviv Polytechnic as a separate Faculty of Agriculture and Forestry. The Department of Agrochemistry and Soil Science in Dubliany was headed until 1923 by the agrochemist Professor Marian Górski (1886-1961).

From 1926, the first university-educated soil scientist Arkadiusz Musierowicz (1894-1966) worked as an adjunct at the Department of Agrochemistry and Soil Science [23]. He survived the German occupation in Dubliany and continued working at the department. From 1945, he served as professor and head of the Department of Soil Science at the newly established Warsaw University of Life Sciences (SGGW) and also worked at the University of Warsaw.

Another Dubliany soil scientist, Adam Wądrausz (1904-1977), a student of Musierowicz, studied the soils of Galicia and published a map of the local soil cover (Fig. 2) [8].

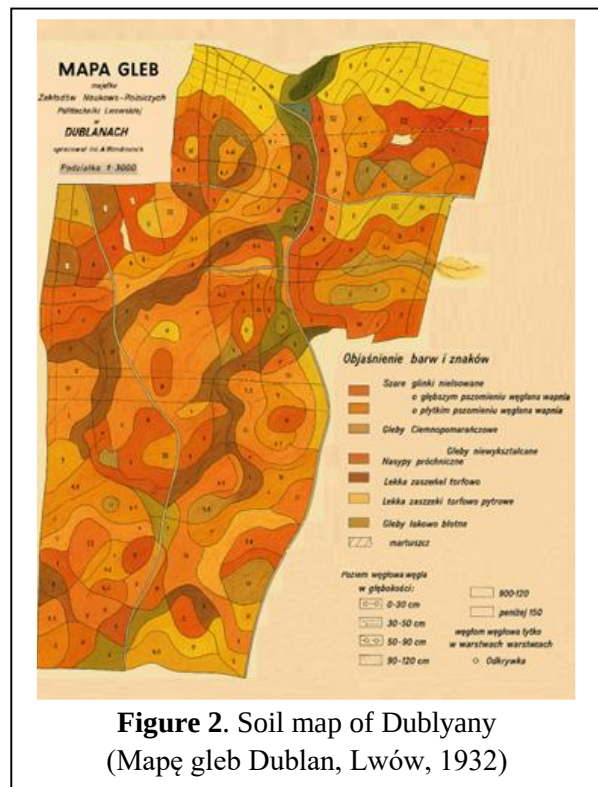


Figure 2. Soil map of Dubliany (Mapę gleb Dublan, Lwów, 1932)

A student of Musierowicz, Professor Marian Kępka (1922-2005), was scientific adviser to Prof. hab. Józef Chojnicki, sometime head of the Dept of Soil Science at SGGW and current Editor-in-Chief of *Soil Science Annual*, who repeatedly visited Dubliany and delivered presentations at scientific forums at Lviv National University of Environmental Management.



Bohdan Dobzhanskyi
(1909-1987)

Professor Bohdan Dobzhanskyi (1909-87), a native of Vinnytsia Region, obtained the degree of agricultural engineer specializing in soil science in 1933, and in 1939 received a doctoral degree at Lviv Polytechnic. His dissertation *Study of soils on loess of the northern margin of Podillia* was prepared under Professor Musierowicz. In 1941-1944, he worked in the Sielce-Bieńkowski forestry, also lecturing in soil science at the Faculty of Construction of State Specialized Courses (Lviv Polytechnic) From 1951 to 1955, he served as rector of Lublin University.

The western Ukrainian school of soil science and its European orientation



Hryhorii
Andrushchenko
(1902-1972)

The first Ukrainian head of the Dept of Agrochemistry and Soil Science in Dubliany, Hryhorii Andrushchenko (1902-1972), was born in Poltava Region [24]. From 1935, he conducted soil and hydrogeological research and, in 1946, at the Kharkiv Agricultural Institute, defended a dissertation titled *On changes in the physicommechanical properties of saline soils in hydraulic structures under load and filtration*. From 1947, he worked as an associate professor at the Department of Agrochemistry and Soil Science of the Lviv Agricultural Institute and headed the Department of Soil Science from 1954. As a son of a prosperous peasant (kulak) and community elder, he was identified as a ‘hostile class element’. Despite being a fundamental researcher, his principled, non-conformist stance and non-party status (expelled from the Communist Party during the 1933 purge) prevented official recognition by the USSR Higher Attestation Commission and approval of his Doctor of Sciences degree. Nevertheless, in 1973 a specialized doctoral council at the Kharkiv Agricultural Institute awarded him the doctoral degree. His two-part work *Soils of the western regions of the Ukrainian SSR* (1970) remains widely cited in Ukraine and abroad. He produced a soil map of the western regions of the Ukrainian SSR at a scale of 1:7 500 000 (Fig. 3) co-authored with N. Vernander, H. Hryn, O. Kanash, V. Kysil, S. Skoryna, and V. Rebezo.

Professor Nataliia Vernander (1901-86) classified podzolised soils, separating dark grey podzolised soils and podzolised chernozem [3]; worked on their improvement; and presented *Soils of Right-Bank Ukraine*, as her doctoral thesis.

Heorhii Hryn (1904-76) a ‘soil scientist from God’ began work in the Uman school of agriculture together with future leading figures such as Petro Vlasiuk, Mykola Shkvaruk, and Oleksandr Hrinchenko. He coordinated the epochal large-scale mapping of Ukraine's soil cover in 1957-61 [3]; authored a series of soil maps of Ukraine, field diagnostics and agroproduction grouping of soils; and studied the process of halogenesis of forest subsoils in depth.

Dubliany soil scientists participated in the 10th International Congress of Soil Science (1974). Andrushchenko himself attended and served on the organizing committee, along with Associate Professors Iryna Sukhorska and Andrii Bilan.



Figure 3. Soils of Ukraine – map created with the participation of H. Andrushchenko 1967

The Kharkiv school (this is an equivalent section)

Kharkiv also gave rise to several schools of soil science through its students including Oleksandr Hrinchenko, Mykola Polupan, and Dmytro Tykhonenko [3]. Hrinchenko (1904-98) began his scientific activity by compiling a map of liming regions of Ukraine under Sokolovskyi. In 1934-35, working with Krokos under Makhiv, he experienced repression but, even so, served as rector of the Kharkiv Agricultural Institute from 1959 to 1969 and headed its Department of Soil Science until 1989. He developed theoretical foundations and practical measures for the amelioration of solonetz and acid soils of the Polissia Forest-Steppe. Polupan (1935-2023) specialized in soil genesis and soil classifications, including soil ecological zoning based on parametric principles, culminating in the, now, standard soil bonitat appraisal based on potentials of natural and effective fertility. Professor Dmytro Tykhonenko (1937–2019) was a long-term teacher at the Kharkiv Higher Agrarian School, researching soils of sandy river terraces, and the evolution and classification of Ukrainian soils under the plough. Professor Fedir Topolnyi (1942–2023), Doctor of Biological Sciences and a native of Cherkasy Region, taught soil science, agrochemistry, and amelioration at the Podillia State Agrarian and Engineering Academy and at Central Ukrainian

National Technical University. He studied the chemical-genetic characteristics of brown mountain-forest soils of the Carpathians and their changes and amelioration under agricultural use [9].

Conclusion

Ukrainian science remains robust in spite of severe economic conditions, military aggression, and minimal research funding. Each of the mentioned scientists, and others not yet mentioned, made a significant contribution to national science with discoveries, ideas, theories and technologies, and by pioneering new scientific directions. Their achievements are used worldwide and remain today as a foundation for further progress.

Many countries seek to attract Ukrainian scientists into their own research communities and one path to strengthening Ukraine's international position is respectful recognition of previously marginalized Ukrainian scholars.

The Ukrainian scientific community stands ready to oppose erasure of civilization by intersecting problems of food, water and climate breakdown.

Conflict of interest

The authors declare no conflict of interest. This research did not involve human or animal subjects.

References

- [1] Lernhelfer, 2026, *Lothar Meyer*. Lernhelfer. Duden Learnattack GmbH: <http://www.lernhelfer.de/schuelerlexikon/chemie/artikel/lothar-meyer>
- [2] Lisiansky, U., 1883, A voyage round the world in the years 1803-6 performed by order of His Imperial Majesty Alexander the first of Russia in the ship Neva (London: S. Hamilton).
- [3] Shatalov, M., 2019, Scientific and pedagogical activity of Professor V.I. Krokos, first dean of the Faculty of Geology and Geography of Taras Shevchenko National University of Kyiv (on the 130th anniversary of his birth). *Bulletin of Taras Shevchenko National University of Kyiv. Geology* 4(87), 100-103. <https://doi.org/10.17721/1728-2713.87.15> (Ukrainian)
- [4] Shatalov, N.N., 2017, Professor Nykyfor Dmytrovysh Borysiak – creator of the idea of Greater Donbas and founder of the Kharkiv school of geologists (on the 200th anniversary of his birth). *Geological Journal* 3(360), 93-96. (Ukrainian)
- [5] Verhunov, V., 2024. Academician O.N. Sokolovskyi (1884-1959) – founder of modern agronomic soil science and organizer of sectoral scientific and educational processes in

- Ukraine. In: *Proceedings of the 19th All-Ukrainian Scientific Conference of Young Scientists and Specialists*. NAAS, Vinnytsia, at: <https://dnsgb.com.ua/assets/files/2024/05/istoriya-osvitu-nauki-i-tehniky-v-ukraini-2024.pdf> (Ukrainian)
- [6] Hasitsa, S., 2025, *University science through personalities: A historical essay*. <https://science.udau.edu.ua/ua/nauka-universitetu-v-osobistostyah-istorichnij-naris.html> (Ukrainian)
- [7] Mykhailiuk, V.I., 2023, Substantive-genetic principles of soil classification and diagnostics in the scientific heritage of O.H. Nabokykh. *Bulletin of Odesa National University. Geographical and Geological Sciences* **28**(2), 133-145 (Ukrainian)
- [8] Tokarskyi, Y.M., 2004, *Bibliographic dictionary (1856–1947): Professors, associate professors and assistants of educational and research institutions in Dubliany* (Lviv: Lviv State Agrarian University) (Ukrainian)
- [9] Topolnyi, F.P., 2022, Consequences of colonial influence on the formation of soil science in Ukraine. *Melioration, Agriculture, Crop Production* **14**, 117121. <https://doi.org/10.32848/agrar.innov.2022.14.17> (Ukrainian)
- [10] Dijk, M. van, Morley, T., Rau, M.R., & Saghai, Y., 2021, A meta-analysis of projected global food demand and populations at risk of hunger in the period 2010-25. *Nature Food* **2** (7) 494-501.
- [11] Lykhochvor, V., Hnativ, P., Petrichenko, V., Ivakhiv, M., & Partyka, T. 2022. Threat of degradation of agricultural land in Ukraine through a negative balance of nutritional elements in growing of field crops. *Journal of Elementology* **27**(3), 695-707. <https://doi.org/10.5601/jelem.2022.27.2.2290>
- [12] Hnativ, P., Jonczak, J., Ivaniuk, V., Lykhochvor, V., & Partyka, T. 2024, Stoichiometry of arable black soil on the Ukrainian Western Forest Steppe. *International Journal of Environmental Studies* **81**, 1-14. <https://doi.org/10.1080/00207233.2024.2314869>
- [13] Polovyy, V., Hnativ, P., Chojnicki, J., Lykhochvor, V., et Partyka, T., 2022. Changes in the agrochemical indices of Luvic Greyzemic Phaeozems under the impact of West Ukraine climate aridization. *Soil Science Annual* **73**(1), 146855. <https://doi.org/10.37501/soilsa/146855>
- [14] Borysyak, N., 1852, *On the chernozem* (Kharkiv: Kharkiv University Printing House, in Russian)

- [15] Soil Science, 2026, Brockhaus and Efron Encyclopedia. <https://libbabr.com/?book=4394> (Russian)
- [16] Levakovskiy, I.F., 2020, *Ivan Fedorovich Levakovskiy – geologist, hydrographer, the first professor of geology at Kharkiv University*. http://www-library.univer.kharkov.ua/pages/exhibitions_2020/Levakovsky.pdf (Ukrainian)
- [17] Dokuchaev V.V., 1883, Russian chernozem (St Petersburg: Imperial Free Economics Society) (Russian)
- [18] Borkin, L.Y., 2009, P.A. Kostychev (1881-1890): competition as a factor of plant succession. *Historical and Biological Research* 1(1), 66-84. (Russian)
- [19] Pohrebniak, P.S., 1950, Georgii Nikolaevich Vysotskyi (1865-1940). In: *Outstanding Figures of National Forestry* 2, 117-46 (Moscow-Leningrad, in Russian)
- [20] Makhov, G., 1928. Territorial studies of soil cover in Ukraine for the period 1887–1927 and their immediate prospects. *Soil Science* 3-4, 248-273 (Russian)
- [21] Makhov, G., 1951. A new soil map of the Ukraine. *Annals of the Ukrainian Academy of Arts and Sciences in the USA* 1(1), 43-57. <https://uvan.org/wp-content/uploads/2013/07/Annals-of-UVAN-1951-1.pdf>
- [22] Kunets, V.V., Laktionova, T.M., & Parasochka, I.F., 2024, Professor M.K. Krupskiy (1903–1986): life path and main milestones of scientific creativity. *Agrochemistry and Soil Science* 96, 58-74. www.doi.org/10.31073/acss96-07 (Ukrainian). <https://agrochemsoilsci.org/index.php/journal/article/view/208/178>
- [23] Kuźnicki, F., 1967, Professor Doctor Arkadiusz Musierowicz. *Rocznik Gleboznawczy –Soil Science Annual* 17, 5-28. (Polish). <https://ssa.ptgleb.pl/issue/1967-17/>
- [24] Personal file of Hryhorii Ovksentiiovych Andrushchenko (02 March 1947–26 September 1973). Archive of Lviv National University of Environmental Management, Lviv, Ukraine, 1973