2

Morphological materialism: a time-lapse of Soviet plant philosophy

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This chapter explores the largely uncharted territory of Soviet plant philosophy, proposing it as a new lens through which to view socialist culture and thought after the October Revolution.[1] It introduces the concept of 'morphological materialism' as a vegetal alternative to the state doctrine of dialectical materialism (diamat), which dominated official philosophy in the Soviet Union from the 1930s onwards. My aim is to sow the first seeds of a new mapping of Soviet philosophy from the point of view of plants, suggesting that this can disrupt the monolithic image of Stalinist dogma and state ideology that still prevails in historiography.

The chapter gathers some traces of a vegetal systems theory, as if reassembled in a series of time-lapse images.[2] It argues

1. I am grateful to Stella Sandford for having invited me to transform scattered notes into this contribution, and for her warm encouragement. Thanks to the Plant Agency Reading Group, whose discussions shaped many of those ideas, including Judith Bastie, Ed Thornton and Fin Worrall. The chapter grew from a talk I gave at the workshop 'Doing Philosophy with Plants' at Royal Holloway, University of London, in 2024. Thanks to all the participants for their valuable feedback, especially Dan Whistler. I also had the opportunity to discuss Vernadsky and *Kyivnaukfilm* with the Soviet Temporalities study group.

2. I use the metaphor of the time-lapse to suggest a form of rewriting the history of philosophy that is itself inspired by the temporality of plant growth, often made visible to the human eye through the time-lapse technique which makes slow motions appear faster. The discovery of time-lapse by avant-garde film-makers in turn influenced

that plants actively decentre the relationship between political economy, philosophy, culture and scientific experiment within the Soviet context. In contrast to diamat's scientifically reductive and anthropocentric view of nature, plant philosophy incorporates ecological energetics, metabolic theories, Goethean morphology and systems thinking, highlighting the potential for a socialist plant philosophy rooted in biophysical cooperation. My time-lapse survey suggests that a focus on plants reveals a hidden line of creative and more-than-human deviations from dialectical materialism. It aims to demonstrate that Soviet plant philosophy both enriches and challenges the current 'vegetal turn'[3] in philosophy; it is simultaneously detour and shortcut into contemporary debates on human interactions with plants, posthumanist ecologies, plant agency and new materialism. Soviet plant philosophy suggests that vegetality is at the roots of all life, fusing the planetary and the microscopic into one social-material metabolism.

One of the leading figures of the vegetal turn in philosophy, Michael Marder, himself emerged from a post-Soviet milieu. In 2013 Marder attended a conference in St Petersburg dedicated to the Russian Heideggerian philosopher and plant thinker Vladimir Bibikhin, whose seminar 'The Woods' (*Les*)[4] struck Marder with an 'accidental proximity' to his own plant thinking. The Russian term *les* – similar to the Greek *hylē* – means both forest and the material of wood, preserving 'the ambiguous interplay of … a living ecosystem and dead matter'.[5] Returning to Bibikhin's forest, according to Marder, is a journey toward

biologists and plant thinkers such as Jakob von Uexküll. On plant time, see Michael Marder, *Time Is a Plant*, Brill, Leiden, 2023.

3. See Marcello Di Paola, ed., *The Vegetal Turn: History, Concepts, Applications*, Springer Nature, Cham, Switzerland, 2024.

4. Vladimir Bibikin, *The Woods*, trans. Arch Tait, Polity Press, Cambridge, 2021.

5. Michael Marder, 'The Proximity of the Wood(s)', *Stasis*, 3(1), 2015, p. 474. The Russian word for 'plants', *растения*, derives from the same root as the verb 'to grow' (*расти*) – evoking plasticity, movement and development – whereas the English 'plant' suggests a being that is fixed in the ground and rooted in one place.

the 'non-philosophical (wooden) source of philosophy' itself.[6] Marder's own vegetal womb, he reveals in the talk, is Moscow's Moose Island (*Losiny Ostrov*), Europe's largest national park, at whose edges Marder grew up. The Russian forest, an imaginary imbued with religious, mythological and nationalistic symbolism, is the terrain from which Marder's own plant thinking arose.[7] Interpreting Bibikhin, Marder states:

> A tree strives up, grows up from a fragile shoot, and becomes stronger, thanks to its becoming stone-like on the outside. It relies on the remains of its own nutritive process, living on its dying away, and it nourishes itself, among other things, on its own waste – for instance, fallen leaves or acorns that have rotten away into compost. In a similar sense, we, humans, rely on our world, taken in the existential sense of the word, looking for support in the results of the dying away, which is ours, human, and that of the wood(s), transformed into construction materials. Except that in the process of constructing our world we forget that that from which we are building – both matter itself and the labor of the bygone generations – has also created and, in some sense, continues to create its world around and within us.[8]

Dissolving the split between human life and nature, the forest poses a foundational entanglement with the woods – that is, with the life of matter (*hylē*). In Bibikhin's plant existentialism, infusing Heideggerian ontology with Russian conservatism and animist metaphysics (a pungent brew), human bodies are trees among trees, deeply enmeshed with matter: 'Together with my proximate one, the body ..., the entire world's wood is given to me, the wood, into which it grows along with other bodies, with which it is linked essentially in the same manner as parts

6. Marder, 'The Proximity of the Wood(s)', p. 475.
7. For a critical investigation of Russian ecology, particularly the reception of metabolic theories of soil, see Mieka Erley, *On Russian Soil: Myth and Materiality*, Cornell University Press, Ithaca NY, 2021.
8. Marder, 'The Proximity of the Wood(s)', p. 467. On *hylē* as a concept of vegetal materialism, see Thomas Nail, *Matter and Motion: A Brief History of Kinetic Materialism*, Edinburgh University Press, Edinburgh, 2024.

of one body are bound to one another."[9] Marder suggests that every cell of our body is a forest; becoming-plant, humans are immersed in matter as the substance into which they grow. As Bibikhin writes, 'matter feels everything, but it does so as though in a dream; life happens when matter awakens'.[10] Co-inhabiting the same milieu of forest, swamp and steppe, across the Soviet empire, the thinkers presented in this chapter traverse another path of plant philosophy – not a return to the mystical origins of human life but the building of socialism as a revolutionary, collective and more-than-human transformation of matter.

Roots and shoots

Plants are entwined with the revolutionary imaginary of Soviet philosophy, revealing a line of thinking that is non-anthropocentric, dynamic and posthumanist. Rooted in the soil and striving to the sky, plants symbolize the material embeddedness of ideas. Radical philosophy, literally rooted in the earth, transforms society from the ground up, with its shoots reaching towards the sun as an infinite resource of energy to fuel a classless society – the deferred dream of state socialism. Soviet plant thinking is still largely defined by the environmental catastrophes that John Bellamy Foster has likened to an 'ecocide' under Soviet imperial rule.[11] These included mass famines in Ukraine and Kazakhstan following agricultural collectivization, the decline of biology under Lysenko,[12] widespread air and water pollution, the

9. Bibikhin cited in Marder, 'The Proximity of the Wood(s)', p. 478.
10. Ibid., p. 479.
11. See John Bellamy Foster, 'Late Soviet Ecology and the Planetary Crisis', *Monthly Review*, 67(2) 2015, https://monthlyreview.org/2015/06/01/late-soviet-ecology-and-the-planetary-crisis; accessed 16 April 2025.
12. The Ukrainian agronomist Trofim Lysenko (1898–1976) was the most notorious figure in Soviet plant thinking. Born into a peasant family, Lysenko rose to fame under Stalin, rejecting Mendelian genetics (as 'bourgeois' science) in favour of his own Lamarckian pseudoscience. Loren Graham's *Lysenko's Ghost: Epigenetics and Russia* (Harvard University Press, Cambridge MA, 2016) is the most useful recent study of Lysenko and his legacy, including a problematic revival in Putin's Russia. Implemented

degradation of Lake Baikal, the Chornobyl nuclear disaster, soil erosion and the recent drying up of the Aral Sea. The last was driven by invasive irrigation projects and an aggressive cotton industry, both part of Khrushchev's Virgin Lands campaign. Less well known is a large-scale attempt at protection and natural research following the October Revolution, including the world's biggest reforestation programme and the fostering of natural steppe reserves.

Askania-Nova, a UNESCO Biosphere Reserve in southern Ukraine, near Kherson, was a key stage for Soviet plant debates. After the Revolution, Askania-Nova, Europe's largest and most diverse wild steppe, became a *zapovednik* (nature reserve). Home to hundreds of plant species, Askania-Nova was a hub for innovative plant research, pioneered by Vernadsky, Stanchinsky and Sukachev.[13] In *The Biosphere* (1926), the Russian-Ukrainian biologist and mineralogist Vladimir Vernadsky sowed the seeds of Soviet plant philosophy. Popularizing the term 'biosphere', coined by Eduard Suess in 1875, Vernadsky describes the surface of the Earth as a self-contained ecosystem, a 'holistic mechanism'[14] of planetary life. He went to Paris after the Revolution, where his lectures at the Sorbonne in 1922–23 were closely followed by Pierre Teilhard de Chardin and Édouard Le Roy.[15] In his Sorbonne lectures, Vernadsky argued:

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across the Soviet empire and South East Asia, Lysenkoism caused mass starvation, including the Great Chinese Famine (1959–61). Under Lysenko's iron rule, hundreds of Soviet scientists were executed. One of Lysenko's most fervent opponents was Nikolai Vavilov, geneticist and founder of the world's largest plant seed bank in Leningrad (it survived the siege due to the institute's staff refusal to eat the seeds). Brutally persecuted by Lysenko, Vavilov died of starvation in prison.

13. Lenin championed ecological conservation, establishing over thirty *zapovedniki* by 1933. Heavily damaged during World War II, Askania-Nova faces renewed threats today from Russia's large-scale invasion of Ukraine since 2022. The conflict has devastated steppe lands, polluted rivers and targeted the country's energy grid. In Askania-Nova, Russian soldiers have caused significant harm, using the reserve as hunting grounds, digging trenches and inflicting damage with tanks and fires.

14. Vladimir Vernadsky, *The Biosphere*, trans. David B. Langmuir, Copernicus, New York, 1998, p. 40.

15. Through Le Roy, Vernadsky was introduced to the idea of a *noosphere*, first used by Teilhard de Chardin in *Cosmogenesis* (1922). Expanding Darwin's evolutionary theory to a cosmic level, Vernadsky suggested that the third stage in the Earth's evolution

> In most of their works studying living organisms, the biologists disregard the indissoluble connection between the surrounding milieu and the living organism. In studying the organism as something quite distinct from the environment, the cosmic milieu, … they study not a natural body but a pure product of their thinking.[16]

Revolutionizing the biology of his time, Vernadsky introduced the organicist, systemic and dialectical notion 'biosphere'. Vernadsky's plant philosophy reached far beyond the borders of the Soviet Union, shaping in particular the development of French epistemology and ecology. Enthused readers of *The Biosphere* included Georges Bataille and Georges Ambrosino, who grounded their concept of 'general economy' in the excessive circulation of energy in the biosphere. Vernadsky's thought influenced *The Accursed Share* (1949) and Bataille's vision of life as a plant-fuelled, solar excess of self-creation.[17] Vernadsky's biosphere theory incorporates the anti-individualistic tenets of Soviet Marxism, which views the individual as an ensemble of social relations dialectically entwined with its milieu.[18] He defines life as the creation of 'the colors and forms of nature, the associations of

– following the *geosphere* (inanimate matter) and the *biosphere* (living matter) – was the *noosphere* (intelligent matter). Anticipating current debates on AI, Vernadsky's noosphere is a planetary system of intelligence emerging from the mastery of nuclear processes by which humanity begins to create its own resources through the transmutation of matter.

16. Cited in Vernadsky, *The Biosphere*, p. 30.

17. On Vernadsky and Bataille, see Jon Auring Grimm, 'The Movement of the Whole and the Stationary Earth: Ecological and Planetary Thinking in Georges Bataille', *Journal for Cultural Research* 29(1–2), 2025, pp. 4–21. For an alternative genealogy of solar communism in Bataille, see Isabel Jacobs, 'Solar Sacrifice: Bataille and Poplavsky on Friendship', *Journal for Cultural Research* 29(1–2), 2025, pp. 204–19. Vernadsky also left clear traces on Thomas Nail, who defines plants as 'star-eaters' ('On the Geology of Plants', in Di Paola, *The Vegetal Turn*, p. 32) nourished by the luminous waste of a dying sun. For Nail, vegetality is 'a becoming Earth of the Sun and a becoming Sun of the Earth in the same tensional movement that materially courses through their pressurized bodies' (p. 32).

18. Systems thinking, entanglement, synthesis and collectivity have a long tradition in pre-Soviet philosophy. Soviet organicist theories of life can be viewed as an extension of late-nineteenth-century Russian religious philosophy, which criticized Western individualism, crude positivism and a strict nature–culture divide. Russian philosophers such as Vladimir Solovyov emphasized instead the interconnectivity of subjects: a personality (*личность*) and, by extension, non-human forms of life, are born from a communal web of entanglements, or what Russian Orthodox thinkers called *соборность* (a spiritual–material communion of life).

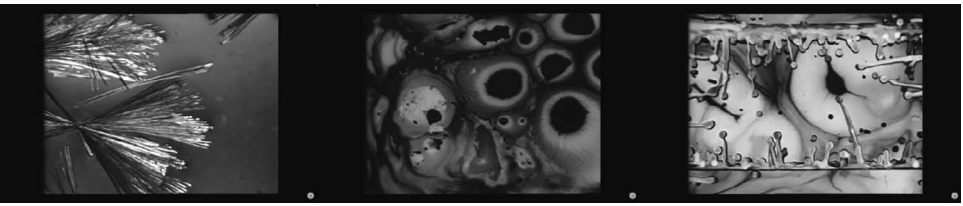

FIG. 1 Stills from Feliks Sobolev, *Biosphere! Time of Realization* (*Биосфера! Время осознания*, 1974).

animals and plants and the creative labor of civilized humanity' on the Earth's crust.[19] Planetary life is a dynamic entanglement between different organisms and the biosphere as a geological force forming the planet. In Vernadsky's solar philosophy, plants occupy a special place; they convert sunlight, seen as cosmic energy. Plants have their own energetics shaped by rhythm and repetition, metamorphoses and the multiplication of matter. And for Vernadsky, morphological evolution on Earth has a cosmic origin in the Sun as the energetic centre of life. The primary medium of solar energy, plants create life by transforming solar rays into an active force nourishing the entire biosphere.

Vernadsky envisioned how plants engulf the planet like a film that makes the Earth look green when seen from space – even 'the surface of the ocean is covered by a continuous layer of green life'. The Earth is covered by a 'green apparatus which traps and transforms radiation ... as continuously as the current of solar light that falls upon it'.[20] Green plants create the energetic conditions for life by continuously providing oxygen to other living matter in the biosphere, including animals and humans. While all 'living matter' participates in the activity of the biosphere, 'only one part of life, green vegetation, the carrier

19. Vernadsky, *The Biosphere*, pp. 57f.
20. Ibid., pp. 126, 59.

of chlorophyll, makes direct use of solar radiation' through photosynthesis. The 'whole living world is connected to this green part of life by a direct and unbreakable link'.[21] Sun rays 'are transformed by living matter – autotrophs – into the bodies of living matter and free energy, which in turn transforms the conditions of life within the biosphere'.[22] For Vernadsky, life is not accidental but a terrestrial reflection of solarity, a cosmic force mediated by plants.[23] In his solar metaphysics, plants create a perfect equilibrium of life:

> Solar radiation and the living green matter of the biosphere, taken together, constitute a system of this kind. When solar radiation has produced the maximum work, and created the greatest possible mass of green organisms, this system has reached a stable equilibrium.[24]

The biosphere, a totality of life forms, embodies this cosmic equilibrium. The ecosystems that have influenced Vernadsky's vision were the virgin steppe in Askania-Nova, which he compared to a green ocean, and the Russian forest where 'the trees are reinforced by herbaceous vegetation in the soil, by mosses and lichens which climb their trunks and by green algae'. While the steppe allows direct access to the workings of the biosphere, he wrote, the cultivated forest requires extensive human energy to counter the 'green weeds' which are 'constantly shooting up'.[25] Steppe and forest, two contrasting milieus, thus pushed Soviet plant philosophy to extremes: on the one hand, the exploitation and domination of nature; on the other, conservation and socialist science.

Askania-Nova was also a breeding ground for ecological energetics, pioneered by Vladimir Stanchinsky, a biologist

21. Ibid., p. 58.
22. Grimm, 'The Movement of the Whole', p. 11.
23. On Soviet solar politics, see Isabel Jacobs, 'Sunstruck: Oxana Timofeeva, Solar Politics', *Radical Philosophy* 213,October 2022, pp. 107–10.
24. Vernadsky, *The Biosphere*, p. 75.
25. Ibid., p. 78.

FIG. 2 The 'Biosphere reserve' Askania-Nova, Kherson Oblast, Ukraine.

researching energy transfers in ecological communities by applying Vernadsky's biosphere concept to steppe life. Stanchinsky viewed the uncultivated steppe as a holistic ecosystem where all living communities interact. He studied the microclimate, plant weights and soils, believing the grasslands in Askania-Nova to be an ideal setting to measure the flow of energy across organisms and trophic levels. He saw the biosphere as a dynamic, balanced system, if untouched by human interference. Similarly, Vernadsky, anticipating debates on the Anthropocene, argued that humans disrupt the energetic balance of the biosphere.

Another steppe theorist in southern Ukraine, Vladimir Sukachev, coined the term 'biogeocoenosis', a socialist alternative to Arthur Tansley's ecosystem concept.[26] For Sukachev, every

26. In response to Vernadsky's biosphere, Sukachev expanded the concept of biocoenosis, coined by the German zoologist Karl Möbius in 1877, to 'biogeocoenosis' in 1947. In *Fundamentals of Forest Biogeocoenology* (1964), Sukachev defined biogeocoenosis as the constant interaction between 'natural phenomena (atmosphere, mineral strata,

organism, including plants, exists in dialectical unity with its environment, functioning as a living community in constant evolvement.[27] Through their dynamic interaction, organism and milieu recursively transform each other. Fusing Russian cosmist ideas with post-revolutionary discourses on energy – encapsulated in Lenin's ambition of constructing communism through electrification (ГОЭЛРО) – early Soviet plant philosophy viewed life as an energetic and metabolic interplay between organisms and the biosphere.[28]

Morphological monism

The growth of Soviet plant philosophy was tied to a turn toward systems thinking in post-revolutionary philosophy of the 1920s, catalysed by the Russian reception of Goethe and Ernst Haeckel. German biology was immensely popular in the young Soviet Union, where 'ecology' and 'morphology' were incorporated into Soviet epistemes of socialist life-building, such as *tektology*, Alexander Bogdanov's proto-cybernetic systems theory of organisms. Transforming Aristotle's biology, Goethe developed morphology as a method cutting across scientific disciplines, which was taken up by Haeckel as a general study of forms of organisms in metamorphoses.[29] Goethe's morphology, placing the individual

vegetable, animal and microbiotic life, soil and water conditions) ... among themselves and with other natural phenomena, ... being in constant movement and development' (cited in Foster, 'Late Soviet Ecology').

27. Sukachev's community ecology influenced Lenin, who read his book *Swamps: Their Formation, Development and Properties* (1926).

28. Vernadsky is often associated with Russian Cosmism, a religious-scientific movement that promoted orthodoxy, space exploration and transhumanism (see Boris Groys, ed., *Russian Cosmism*, e-flux, New York, 2018). Associated with thinkers such as Alexander Bogdanov and Andrei Platonov, cosmism was a key influence on early Soviet culture, particularly *Proletkult* (Proletarian Culture). In addition to his links to cosmism, Vernadsky was an early proponent of exploiting nuclear energy. He also played a key role in the Soviet atomic bomb project in the 1930–40s, conducting research with uranium and nuclear fission at his Radium Institute.

29. For an excellent introduction to the twentieth-century reception of morphological thinking, albeit omitting its important Soviet afterlife, see Eva Axer, Eva Geulen and Alexandra Heimes, *Aus dem Leben der Form: Studien zum Nachleben von Goethes Morphologie in der Theoriebildung des 20. Jahrhunderts*, Wallstein Verlag, Göttingen, 2021.

into a larger whole, provided Soviet plant thinkers with a method of analysing socialist life as it dynamically unfolds in the biosphere.[30] In 1938 Vernadsky worked on an introduction to a Soviet edition of Goethe's scientific writings.[31] The text was only published in 1946, a year after his death. At the height of the Great Terror, Goethe's writings on plants were politically explosive: they challenged Lysenkoism, which dominated Soviet debates on genetics from the 1930s onwards.[32] The Goethe essay reveals Vernadsky's efforts to develop a plant philosophy that was not reducible to the state doctrine of dialectical materialism.

Vernadsky saw Goethe as the father of socialist science rather than a predecessor of Darwin, infusing morphology with Marx's metabolic materialism.[33] The development of experimental botany, Vernadsky states, was 'inextricably connected to Goethe's ideas about the metamorphosis of plants, about the significance of the interstice, the crown leaf, etc.'[34] He identified Goethe's

30. One of the most famous Soviet morphological works is Vladimir Propp's *Morphology of the Folktale* (1927), which transposes plant thinking onto Russian fairy tales. Propp's morphology significantly influenced French structuralism, in particular Claude Lévi-Strauss.

31. On Vernadsky's Goethe, see Jeremy Adler, 'The Whirlwind of the Biosphere: On Vernadsky's
Goethean Cosmos – An Introduction to Vernadsky's Goethe Essay', *Publications of the English Goethe Society*, 93(2), 2024, pp. 132–42; and Larisa Poluboyarinova, 'Vladimir Vernadsky's "Thoughts and Observations on Goethe as a Naturalist": Its Prehistory and Reception', *Publications of the English Goethe Society,* 93(2), 2024, pp. 143–7. While Adler offers some valuable contexts for Vernadsky's reading of Goethe, he underestimates the importance of socialist ideas. Rather than an 'alternative to the prevailing Marxist-Leninist ideology' (Adler, 'The Whirlwind of the Biosphere', p. 137), Vernadsky's vision of the biosphere fuses Goethe, Darwin and Marx with modern science and Russian Cosmism. Poluboyarinova retraces an underground reception of Vernadsky's Goethe essay by Mikhail Bakhtin via the Leningrad biologist and geneticist Ivan Kanaev. In exile in Kazakhstan, Bakhtin reworked Vernadsky's Goethe in his fragments on the *Bildungsroman* in 1933–35.

32. Vernadsky collaborated on the project with the German-Russian Marxist biologist Max Levien (1885–1937), who was arrested and shot in 1937 for his anti-Lysenkoist stance (Poluboyarinova, 'Vladimir Vernadsky's "Thoughts and Observations on Goethe as a Naturalist"', p. 145).

33. Vladimir Vernadsky 'Thoughts and Observations on Goethe as a Naturalist', *Publications of the English Goethe Society*, 93(2), 2024, p. 165. On metabolic materialism, see John Bellamy Foster, *The Dialectics of Ecology*, Monthly Review Press, New York, 2024. On the Soviet context more specifically, see Elena Fratto, 'Metabolic Modernities: Digestion, Energy Transformations, and the Making and Unmaking of the World in Early Soviet Literature', *Russian Review* 83, 2024, pp. 378–98.

34. Vernadsky, 'Thoughts and Observations', p. 178.

concept of life with his own thinking, developing morphology into an organicist theory of the biosphere.[35] In Vernadsky's eyes, Goethean morphology meant 'not only the manifestation of visible form, but also the simultaneous, endlessly changing, internally dynamic contents'.[36] He emphasized that Goethe studied *living organisms*, particularly plants, with all his senses rather than relying on microscopes to make 'visible the cellular construction of some organisms and the monocellular world of others'.[37] For a morphologist, plant forms are just one manifestation of a larger cosmic whole arranged in series that intersect and correlate:

> Minerals, plants, animals, mountain formations, terrain, biocoenosis, the geographic and geomorphic landscape, geochores, rivers, lakes, waterfalls, clouds, manifestations of movements of the atmosphere, seas, volcanoes, mineral sources, stars, the sun, nebulae, and other concrete, distinct phenomena of nature appeal first and foremost in *themselves* to the naturalist.[38]

While an analytic approach to plant life may overlook important features, Vernadsky believed that Goethe's 'synthetic approach can offer new information'. Similar to 'Whitehead's philosophy of the organism or Smuts's holism', Vernadsky argues, morphology describes 'not a mechanism, but ... an organic whole' – an approach that strongly affected Vernadsky's monistic vision of ecology. The biosphere, in morphological terms, is 'a unity of all living things ... that may be explained in such apparently independent facts as the horns of a bull or the empty sinuses of the human skull'. In his comparative osteology, Goethe made a

35. Vernadsky claims that Goethe's morphological ideas met a fertile ground in pre-revolutionary Russia where they were discussed long before 'the German morphologists of the twentieth century paid attention to them' – for example in Iakov Borzenkov's lectures on comparative anatomy ('Thoughts and Observations', p. 159). He even claims that Goethe's research was largely funded by the Russian imperial court (ibid., p. 166).

36. Vernadsky, 'Thoughts and Observations', p. 193.

37. Ibid., p. 192. Vernadsky also remarks how Goethe never wore glasses even though he was severely short-sighted, aiming for an immediate and indivisible perception of the whole.

38. Ibid., p. 164.

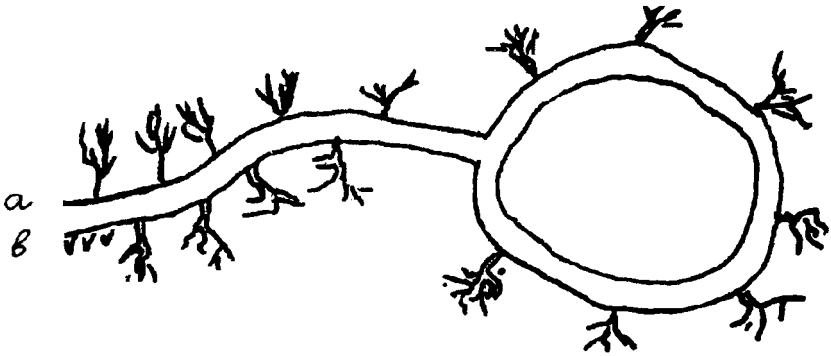

FIG. 3 Child's drawing from Sergei Eisenstein's *Montazh.*

connection between the skull and the spinal cord: while there is no 'genetic connection between the two', they are related on a *morphological* level.[39] The earth's shell is the envelope of all living forms, 'always in a state of growth and creation (*im Werden*)'.[40] As a living organism, the biosphere undergoes sucessions of transformations, as described by Goethe in *The Metamorphosis of Plants* (1790).

For Vernadsky, the 'plasticity of plant forms in relation to their environment' also reflects 'this environment in the plant families'.[41] Soviet morphological materialism thus becomes a '*socio-scientific study of life*' which 'conceives of the universe as a living body composed of organic waves which thread their way throughout the entirety' of reality.[42] Morphological notions of plasticity and metamorphoses cut across artistic and scientific discourses in the decade after the October Revolution, shaping embryology, psychology, botany, neurology and avant-garde

39. Ibid., pp. 197, 198, 194, 196, 179. Read through the prism of Goethean morphology, Andrei Platonov's somatic placing of consciousness in the spinal cord in *Happy Moscow* (1933–36) seems not incidental, but as a direct response to the widespread circulation of morphological thinking in early Soviet art and science.
40. Vernadsky, 'Thoughts and Observations', p. 189.
41. Ibid., p. 186.
42. Adler, 'The Whirlwind of the Biosphere', pp. 141, 136.

film.[43] In his 'anatomical-morphological work', Goethe studied plants 'in their free, living state' as '*living* subjects'.[44] Vernadsky argues that the radical 'seed' of Goethe's morphology is the primacy of activity (*Tat*) over theory, which came to fruition only in the Soviet experiment – which, following Marx, went to the *root* of things. Goethean science, in Vernadsky's eyes, prefigured 'the correct distribution of the wealth of the people and the correct use of productive power – both natural and social' under the Bolsheviks.[45]

Another thinker inspired by Goethe's notion of activity (*Tat*), relating it to Marx's *Tätigkeit*, was the psychologist Lev Vygotsky, known as the founder of cultural-historical activity theory.[46] Vygotsky's notion of activity (*deiatel'nost'*) captures collective and embodied processes of mediation between humans, tools and their social and natural milieu. Drawing on Marx, Vygotsky

43. Morphological thinking, viewing life as a movement of forms, lends itself to cinema. The metabolism of nature, a socialist work-in-progress, dissolves an individualized perspective, as reflected in Soviet avant-garde art, notably Sergei Eisenstein's films. His theory of montage, as Elena Vogman has traced, was inspired by the director's readings of Goethe's *Metamorphoses of Plants* (*Sinnliches Denken: Eisensteins exzentrische Methode*, Diaphanes, Zurich, 2018). His first memory, Eisenstein recalled in his diary, was the close-up of a lilac branch. The plant's multitude of perspective and rhythmical swaying inspired his interest in montage. Instead of the human viewpoint (two eyes), Eisenstein's films create an organic multitude of viewpoints, superimposed by rhythm and collision. In Eisenstein's notebooks, plants are a recurring motif to conceptualize rhythmic oscillation, expression and the relation between inside and outside (see Vogman, *Sinnliches Denken*). In his studies of embodied *gesture*, Eisenstein drew once more on Goethe's plant morphology, particularly the dialectics between eccentric expansion and contraction, opening and closure; and the spiralling movement of the plant body as a movement of pulsing. Like Deleuze and Guattari after him, Eisenstein found in plants a source to think about circular time, the collapse of linearity and a movement of growth without beginning or end. On Eisenstein's montage as a morphological tool, see Elena Vogman, 'Eisenstein's *Capital Diaries:* An Introduction', *October* 188, Spring 2024, pp. 3–20. Eisenstein's morphology left traces in Soviet experimental and popular science film, such as Artavazd Peleshyan's eco-cinema and the Kyiv School of Popular Science Film (*Kyivnaukfilm*), especially Feliks Sobolev's *Biosphere! Time of Realization* (1974) and Anatolii Borsiuk's *Grass Roots* (1981).

44. Vernadsky, 'Thoughts and Observations', p. 169.

45. Ibid., pp. 157, 180.

46. For an excellent study of Vygotsky's philosophy, see David Bakhurst, *The Heart of the Matter: Ilyenkov, Vygotsky and the Courage of Thought*, Haymarket Books, Chicago IL, 2024. A selection of Vygotsky's writings had been edited by Myra Barrs and John Richmond, *The Vygotsky Anthology: A Selection from His Key Writings*, Routledge, London and New York, 2024). For an overview of Soviet activity and its contemporary afterlife, see Alex Levant, Kyoko Murakami and Miriam McSweeney, eds, *Activity Theory: An Introduction*, Ibidem Verlag, Stuttgart, 2024.

viewed the person as a social microcosm in constant flux. A key influence on his enactive morphology was the German psychologist William Stern (1871–1938), who became famous in the 1920s for his studies on the development of his own children, including the future philosopher Günther Anders. Vygotsky described Stern's 'personalism' as encompassing the 'solar system and the ant, the tram driver and Hindenburg, a table and a panther'.[47] Vygotsky, by contrast, was invested in studying the specificity of the human mind. Criticizing Pavlovian reflexology, he proposed a morphological approach to thinking, concerned with series and chains of associations. Vygotsky compared child development to growing a plant, highlighting the importance of 'loosen[ing] the soil before planting seeds'.[48] For Vygotsky, the mind was *plastic*, with 'neural substance' resembling wax:

> Our brain and our nerves, possessing enormous plasticity, readily alter their finest structure under the influence of one or another type of stimulation, and if the stimulation is strong enough … retain memory traces of these changes. … The same thing happens with the trace made by a wheel on soft earth: a track forms, which bears the imprint of the changes made by the wheel and facilitates movement of the wheel along this track in the future. Similarly, strong or frequently repeated stimulation lays down new tracks in our brain.[49]

Those traces form according to morphological, not mechanistic patterns. Similar to Propp, Vygotsky exemplifies his morphological method in reading a fairy tale by Pushkin as a series of motifs: 'An oak, a gold chain, a cat, songs – all these things exist in reality; it is only … the combination of all these elements that is fantastic. … in the enchanted hut the idea of chicken legs is combined with the idea of a hut, and so forth.'[50] Imagination

47. Barrs and Richmond, *The Vygotsky Anthology*, p. 47.
48. Ibid., p. 6.
49. Ibid., pp. 117f.
50. Ibid., p. 120.

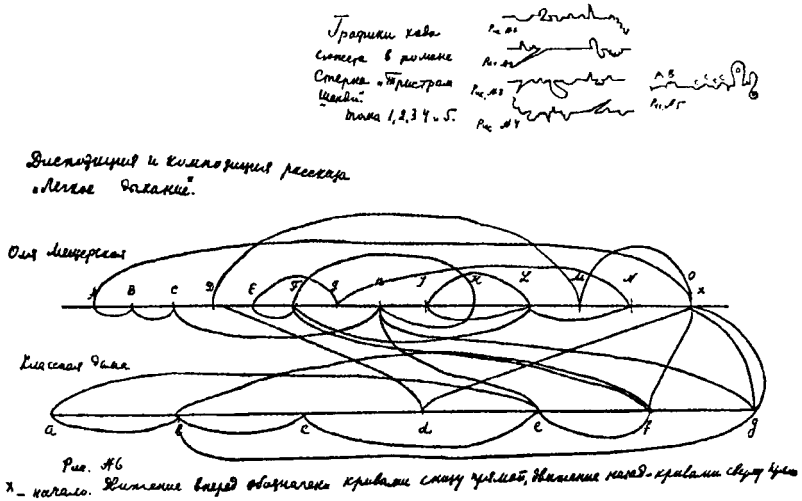

FIG. 4 Vygotsky's schema of Bunin's 'Gentle Breath'.

constructs chains from material supplied by reality. In his morphological analysis of Ivan Bunin's story 'Gentle Breath' (1916), he suggests that 'the events are connected in such a way that they lose their turbidity'. Threaded into free chains of associations, 'they untie the threads connecting them' and 'free themselves of the conventional bonds in which they are presented to us in actuality'.[51] Seriality opens up reality into an open plasticity of potentially endless combinations.

Morphological materialism views life as a constant 'whirlwind' of transformations, where 'every living being is not an individual, but a multitude, ... an assembly of living beings'.[52] Within this multitude of life, each part is connected to the whole according to the morphological patterns of seriality and assemblage. Not only living matter but the biosphere as a whole is

51. Ibid. p. 16.
52. Goethe cited in Adler, 'The Whirlwind of the Biosphere', p. 140.

in constant change. The first attempt to synthesize morphology, energetics and thermodynamics was the Bolshevik revolutionary and philosopher Alexander Bogdanov, whose *Tektology: The Science of General Organization* (1912–17) was a proto-cybernetic systems theory investigating how nature and labour intersect in different forms of organization. In Bogdanov's tektology – a term gleaned from Haeckel – human and nonhuman activity in the biosphere create metabolic processes of energy transformation. For Bogdanov, 'all structures and systems – living and inert – engage in metabolic activity with one another to preserve their equilibrium'.[53]

Using Marx's concept of metabolism (*Stoffwechsel*), Bogdanov's tektology analyses how parts and wholes interact. For Bogdanov, metabolism described the entangled processuality of biosocial labour and bodies, the inorganic and the organic, the individual and the collective. Plants actively engage in those 'metabolic exchanges and transformations (*obmen veshchestv*) with one another'.[54] *Tektology* offers 'a cybernetic understanding of the organism–machine relationship, guiding a Marxist explanation of how living and artificial systems converge and arrange themselves into a mode of production'.[55] It strives for a universal theory that spans political economy, the human body, labour and the environment. Similar to Vernadsky, Bogdanov views the biosphere as a system in a natural equilibrium.

Tektology marks a shift from a human-centred epistemology to a perspectivist framework in which plants actively participate in the revolutionary reorganization of knowledge. As a sort of morphological monism, tektology analyses form changes across parallel series. For Bogdanov, echoing Goethean morphology, matter is structured into 'series, complexes, and systems', where

53. Fratto, 'Metabolic Modernities', p. 380.
54. Ibid.
55. Maria Chehonadskih, *Alexander Bogdanov and the Politics of Knowledge after the October Revolution*, Springer Nature, Cham, 2023, p. 64.

perspectivism becomes central: 'everything relates, and everything is relative'.[56] For instance, the series of labour organizes the worker's hands, tools, materials and environment into a processual whole. Unlike diamat, which aims to sublate contradictions, tektology studies the dynamic interaction of series in a self-organizing system – an energetic metabolism composed of machinery, organisms and labour. For Bogdanov, communism is the collective 'development of the plasticity of life'[57] where living beings adapt to their environment through labour, with all life forms, cells to humans, sensing, reflecting and self-organizing. In Bogdanov's philosophy, the human holds no special status; it simply marks a different degree of organization. Bogdanov defines plants as living machines with the ability to regulate and repair themselves.[58] What is at stake in Bogdanov's tektology is a socialist ontology of living organisms embedded in a socialist whole.

Becoming-plant

Where Friedrich Engels in *Dialectics of Nature* (1883), a key text for diamat, sees a grain of wheat negating itself in a plant, tektology examines relational processes, such as the 'contact of grain with the activities of soil, … the interaction between living and inorganic activities'.[59] Tektology does not describe one single type of agency but recognizes distinct forms of 'organizedness' (machines, humans, plants) within the biosphere. Bogdanov's material collectivism dissolves physiological boundaries, fostering biophysical cooperation between humans, animals and plants. Soviet biologist Boris Kozo-Polyansky, who reinvented cell theory, emphasized 'the synthesis of organisms into symbiotic

56. Chehonadskih, *Alexander Bogdanov*, p. 30.
57. Ibid., p. 48.
58. While Bogdanov replicates mechanistic perspectives, viewing plants as machines, he does not put them in hierarchy as a life form 'lower' than animals or humans.
59. Chehonadskih, *Alexander Bogdanov*, p. 67.

systems' as the motor of evolution.[60] Kozo-Polyansky's *Symbiogenesis: A New Principle of Evolution* (1924) envisions 'a palm tree peacefully growing by a brook, and a lion, hidden in the bushes ... ready to pounce on an antelope'. What makes the palm tree peaceful and the lion violent? Anticipating contemporary research into symbiosis, co-evolution, reciprocity and mututalism, Kozo-Polyansky explains:

> A palm tree is peaceful and passive exactly because it is a symbiotic system; because it contains an entire crowd of tiny green toilers, the chloroplasts. They work and feed it. And a lion feeds itself. But let us imagine that a chloroplast is placed in every one of a lion's cells, and I do not doubt that this lion will then calmly lie next to the palm, and the only other thing it might need would be a little water with mineral salts in it.[61]

By becoming a plant, the lion evolves into a peaceful comrade of the antelope. This reflects Bogdanov's view of systems as dynamic equilibria (*podvizhnoe ravnovesie*), where organisms engage with their milieu in recursive interactions, each acting as both mould and material.[62] Bogdanov's tektology was not just idle theory: as director of the world's first Institute of Blood Transfusion, Bogdanov experimented with blood transfusion, aiming to transform his body into an immortal bio-social machine. Through blood transfer, Bogdanov tried to increase the collective immunity of bodies and transfer vitality and physical traits by breaking down the boundaries of individual organisms. His own attempts to become a comradely plant failed – he died of a contaminated transfusion in 1928.

As Bogdanov's experiments with blood transfusion suggest, he envisioned the communist body as plastic and permeable.

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60. Ibid., p. 83.
61. Cited in Chehonadskih, *Alexander Bogdanov*, p. 83.
62. In a way, such a view is of course not too far removed from dialectical materialism. Bogdanov, too, saw the relation between plant and environment as *dialectical-material*: Each plant is enclosed in its milieu and simultaneously acting upon it.

New Soviet Beings could be created out of the molecular self-organizing of matter. One of the aims of Bogdanov's tektology is collective life-building grounded in 'biophysical cooperation'.[63] In the first book of *Tektology*, the 'law of the leasts' guides Bogdanov's idea of a planned economy where all resources are evenly distributed, contributing to a social and ecological equilibrium. Bogdanov explains his vision through the lens of agriculture, drawing on Justus von Liebig's organic chemistry:

> Plant growth requires a whole number of measurable conditions: the energy of light, warmth, water, carbonic acids, oxygen, salts of potassium, magnesium, ferrum, nitrous and phosphoric compounds, etc. Liebig established that crop yield is determined by that one of these conditions which is available in the relatively least amount.[64]

This vision of socialist planning as an intelligent system of equitable distribution radically anticipated Soviet debates on cybernetics and automation from the mid-1950s onwards.[65]

Bogdanov's dream of placing a chloroplast in every cell, turning people into comrade-plants, found its most resonant expression in the work of Andrei Platonov. Like Bogdanov, Platonov was actively involved in the *Proletkult*, a radical organization of proletarian culture, envisioning a planetary communism that involved humans, animals, plants and machines. In Platonov's texts, all living organisms make up one

63. Chehonadskih, *Alexander Bogdanov*, p. 89.
64. Cited in Chehonadskih, *Alexander Bogdanov*, p. 89.
65. On Soviet cybernetics, see Slava Gerovitch, *From Newspeak to Cyberspeak: A History of Soviet Cybernetics*, MIT Press, Cambridge MA, 2002. In the 1980s the Siberian cybernetician Olga Burmakova – the only woman in this time-lapse; a systematic account of Soviet plant philosophy must bring women botanists and plant thinkers from the margins and footnotes to the main stage – worked on reconciling economic planning with the protection of Lake Baikal. Threatened by a new railway cutting through the permafrost, enabling Moscow to exploit the natural resources in the east, the ecosystem of Lake Baikal not only required protection, Burmakova thought, but could also help model an economic plan. See Troy Vettese and Drew Pendergrass, *Half-Earth Socialism: A Plan to Save the Future from Extinction, Climate Change, and Pandemics*, Verso, London, 2022. Based on the local networks between plants and their environment, Burmakova modelled a 'territorial production complex' able to tie economic production to the specificities of plants and natural conditions – a creative adaptation of vegetal systems theory to the needs of a socialist command economy (Vettese and Pendergrass, *A Plan to Save the Future from Extinction*).

poor, labouring, more-than-human body, embedded in nature while aiming to overcome it – projecting itself into the emptiness of the vast Soviet steppe. Platonov's novel *Chevengur* (1927/28), banned until perestroika, explored the violent extractivism of post-revolutionary agricultural transformation. *Chevengur* drew on Platonov's work in Russian peasant communities.

In the 1920s, stationed in Southern Russia as an electrical engineer and land-reclamation expert, Platonov oversaw the draining of swamps, the digging of ponds and the construction of a hydroelectric power plant. Struggling against drought, Platonov witnessed horrific poverty and starvation, with some people living off old cabbage and grass. Platonov's brother and sister, aged fourteen and twelve, had died from eating poisonous mushrooms during a devastating famine in 1921. The novel portrays the fictional town of Chevengur, where communism has already been fully realized – only the Sun works, creating a microclimate which makes trees grow and grasses flourish. The steppe grasslands represent the comradeship of living plants. Platonov's plant-comrade is a dualistic, nonhuman being that he calls, with a neologism, *dubekt*, fusing the idea of a doubled subject with the oak tree (*dub*).[66] Platonov's vegetal *dubekt* is both halved and multiplied – it is the deterritorialized and uprooted subject of the Revolution. The vegetal *dubekt* has no fixed place; it is exiled from the soil.[67] *Chevengur* is a dark eco-socialist dystopia set in the steppe, the raw material for Platonov's planetary socialism. Revolution, for Platonov, is a force of nature – like the grass that breaks through the soil when it grows.

66. For a vegetal reading of *Chevengur*, see Isabel Jacobs, 'Communism and Back Again: Andrei Platonov's Chevengur', *e-flux Notes*, March 2024.
67. On the agricultural origin of many of Platonov's neologisms, see Chehonadskih, *Alexander Bogdanov*, p. 182.

New Soviet plant

In Platonov's 'On the Improvement of the Climate' (1923/26), we read: 'Man is not only Columbus, he is also the mechanic of his planet. Siberia without ice! A warm country on the shores of the Arctic Ocean!'[68] After revolutionary climate change, the biosphere can finally reassemble under communism. Platonov's early visions of terraforming and geo-engineering reached the highest echelons of the Soviet government: in the second half of the 1940s Stalin proposed his large-scale Great Plan for the Transformation of Nature, aiming to improve agriculture in steppe and forest. Stalin's ecological programme combined invasive agricultural reform and irrigation with reforestation. His ambitious plan, largely unrealized, aimed to improve crop yields while reversing anthropogenic climate change in deforested areas. The main character of the Great Stalin Plan was the infamous Lysenko, whose pseudo-scientific plant philosophy was implemented top-down, violently replacing the morphological paradigm, as it had been developed by Vernadsky, Stanchinsky and Sukachev in Askania-Nova. In the 1930s Lysenko raided the steppe research institute, eventually ordering Stanchinsky's execution. He repurposed the nature reserve for his Institute of Acclimatization and Hybridization, marking a dark endpoint of early experiments with plant philosophy.

Lysenko planted hundreds of trees in dense 'nests' – where comrade-plants of the same species (class) would give each other a helping hand to grow toward a bright future; in reality, the majority of Lysenko's nests died within a year. Drawing on Lamarckism, Lysenko's vegetal ideology was an eclectic synthesis. Lysenko considered Mendelian genetics bourgeois idealism and claimed that modifications of an organism during

68. Andrei Platonov, 'Ob uluchsheniiakh klimata', http://platonov-ap.ru/publ/ob-uluchsheniyah-klimata; accessed 7 March 2025.

its lifespan, its 'experience' and environmental factors, can be passed on to the next generation – which is, at least to some extent (although based on entirely different premises) also argued in epigenetics.[69] He was inspired by Pavlov and Ivan Michurin, who saw no contradiction between Lamarck and Darwin – just two sides of the evolutionary coin. Lysenko affirmed a 'Socialist Darwinism' that projected class struggle onto evolutionary theory. Fusing Michurin's plant science with Darwin's *The Origin of Species* and Engels's *Dialectics of Nature*, Lysenko tried to 'prove' that environmentally induced features in organisms become heritable. Sharing some ground with morphological materialism, Lysenko saw the living organism interacting with its environment as one unity of life. This view suited Soviet propaganda of the New Soviet Man (swiftly incorporating biosocial eugenics) and Stalin's collectivization of agriculture. Lysenko's plant thinking was rooted in agricultural experiment: manipulating the environmental conditions of plants, such as temperature and sunlight, Lysenko redefined heredity as an 'internalization' of environmental conditions, similar to what Vygotsky had called, using a plant metaphor, 'ingrowing' (вращивание) – the 'transplantation' of social activity into the organism.

Transforming the environment, for Lysenko, resulted in a new genetic make-up, producing comrade-plants superior to capitalistically produced crops. Agronomic techniques, such as grafting, vernalization and the summer planting of potatoes, were employed as both basis and evidence of Lysenkoism. *Vernalization* describes the process of accelerating the maturation of plants by exposing them to cold until their 'habit' changes. It was introduced to millions of hectares of collective farms from the mid-1930s onwards. Through vernalization, Lysenko claimed, the plant acquired new features, thereby transforming

69. On epigenetics, see Graham, *Lysenko's Ghost*.

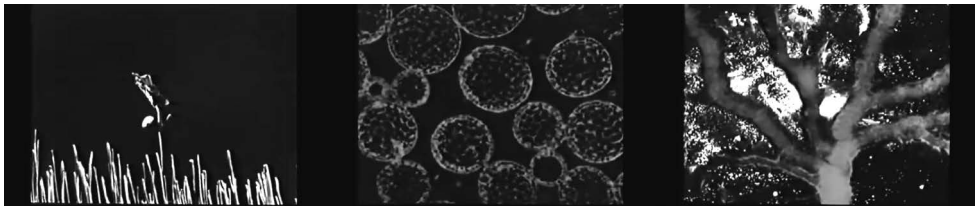

FIG. 5 Stills from Anatolii Borsiuk, *Grass Roots* (Корни травы, 1981).

its own development and conditions of life. Vernalization thus 'breaks' the fatal heredity of a plant. Vernalization was combined with experiments in hybridization, grafting and cross-breeding, striving to achieve what Michurin had called 'broken heredity', in order to speed up plant growth and increase yield. The socialist engineering of plants, Lysenko insisted, could transform evolution itself. But unlike Vernadsky's holistic vision of the biosphere, Lysenko's plant philosophy is grounded in anthropocentrism. In a report at the Academy of Agricultural Sciences in 1948, with Stalin present, he claimed humans could force any plant to change its form.[70] After Stalin's death, Lysenko faced growing backlash from the scientific community, with Sukachev being elected as president of the Moscow Society of Naturalists (MOIP) in 1955.

The Thaw period marked a return to the creative Marxism of the 1920s, including a revival of morphological materialism. This shift away from Stalinist dogma to an opening of Soviet philosophical discourse was epitomized by the work of Evald Ilyenkov, who fused Spinoza, Hegel and Marx with Vygotsky's activity

70. Lysenko's speech was discussed globally, causing the 'Lysenko affair' in France that transposed Cold War divides onto the philosophy of science, as explored in Dominique Lecourt's controversial *Proletarian Science? The Case of Lysenko*, New Left Books, London, 1977. Drawing on unpublished material from Michel Foucault's archives, Judith Bastie and I have recently begun to research Foucault's engagement in the debate. Our analysis of how his critique of Lysenkoism has shaped Foucault's work on sexuality, psychiatry and the archeology of knowledge is forthcoming as 'Vegetal Epistemologies: Foucault, Lysenko and (Soviet) Marx', *Genealogy+Critique*. See also Bastie in this volume.

theory.[71] Similar to Vygotsky, Ilyenkov conceptualized personality as a node of social interrelations.[72] In his Spinozist philosophy of the 'thinking body', Ilyenkov argued that we do not see with our eyes but through a collective body shaped by the totality of social activity. Ideals are 'transplanted' – another vegetal image – into us not through sensory perception but through our dynamic interactions with others.

These ideas were further developed in Ilyenkov's work with deaf-blind children in the radical school of Zagorsk, where he nurtured a new type of personality rooted in one communal body. Ilyenkov's vision of a cosmic expansion of consciousness, arguably inspired by Vernadsky's biosphere, found its culmination in the 1968 sci-fi book *On Idols and Ideals* which developed a critical stance on cybernetics and machine thinking. Ilyenkov's posthumanist stories feature non-human thinking machines, such as a brain on spider legs, a lazy flying saucer, a deaf ear, a brainless set of hands and a sticky film of mould. In their communist gatherings, machines and plants celebrate the overcoming of the human. In this thought experiment, the very concept of thinking becomes unstable. Can those vegetables think? And do machines think? Can they be comrades? On their journeys through the cosmic biosphere, the New Soviet Person eventually encounters intelligent extraterrestrial comrades:

> In the age of cosmonauts ..., couldn't a highly organized and thinking being not have some kind of physical appearance completely unexpected by you? Why couldn't it look like an octopus, a mushroom, an ocean, like a mould spread out over the stones of some far-off planet? Must it have a nose and two eyes?[73]

71. For a systematic interpretation of Ilyenkov's philosophy, see Bakhurst, *The Heart of the Matter*; on Ilyenkov's life and work, see Isabel Jacobs, 'Evald Ilyenkov (1924–1979)', *Filosofia: An Encyclopedia of Russian Thought*, 2024.

72. On Ilyenkov's ecological thinking, see Isabel Jacobs, 'Evald Ilyenkov's Ecology of Personality', *Journal of the History of Ideas Blog*, November 2023, www.jhiblog.org/2023/11/20/evald-ilyenkovs-ecology-of-personality; accessed 17 April 2025.

73. Evald Ilyenkov, *Ob idolakh i idealakh*, Sobranie *sochinenii*, vol. 3, Kanon+, Moscow, 2020, p. 276.

Opening a door to nonhuman consciousness, Ilyenkov insists that thinking is not reducible to human bodies, neural networks or measuring brain waves. We think through many organs, including our bodies, hands, tools and friends. Ilyenkov's critique of technocratic capitalism grew from the soil of morphological materialism, which envisions communism as a more-than-human reassembly of matter. Communism, Ilyenkov concludes, 'is not a fairy tale about some bright future, but a real movement of modernity'.[74] As this chapter has aimed to trace in a time-lapse, this alternative modernity – Soviet socialism, as it gradually emerges from the long shadow of the twentieth century – might offer a radical departure from both the rigid orthodoxy of dialectical materialism and late capitalist postmodernity. Only by continually shifting our perspective might we finally become comrades with plants.

74. Ibid., p. 495.