

Chapter 7

Pierre Teilhard de Chardin's Phenomenology of the Noosphere



Introduction

Although Pierre Teilhard de Chardin (1881–1955) was thoroughly trained in philosophy and theology, he was first and foremost a paleoanthropologist, directly involved in the discovery of *Homo erectus pekinensis* (“Sinanthropus”) in China in the 1920s and 1930s. He came from a Catholic aristocratic background, was ordained a priest in 1911, survived World War I (as a stretcher-bearer, distinguished with the Legion of Honour), joined the Jesuit Order, conducted paleoanthropological field work during the interbellum, and became entangled in a conflict with his Jesuit superiors (over pantheism and the concept of original sin) until his death in New York (in exile more or less).¹ When his writings were published (shortly after his death, as his superiors forbade publication during his lifetime), he quickly became an intellectual celebrity. Currently, he is credited with having anticipated Gaia theory (King, 2006), the global village concept (McLuhan, 1962), the Internet (Barlow, 1992; Cobb, 1998), the WWW (Garreau, 2005, p. 256; Greenfield, 2014, p. 9), transhumanism (Delio, 2014; Steinhart, 2008), the “global brain” (Stock, 1993), and the Anthropocene (e.g. Crutzen, 2002; Steffen et al., 2011).

While conducting palaeontological research in the Ordos desert, he conceived a vision of cosmic evolution, with anthropogenesis as a crucial moment (Delio, 2014, p. 2; Skehan, 2006, p. 23). For Teilhard, scientific research was a religious activity: a priestly practice, a spiritual exercise, an *Opus Dei* (Udías, 2009). Books such as *The Human Phenomenon* and *The Divine Milieu* foster convergence between evolutionary research and religious faith. His core concept (his *philosopheme*) is the “noosphere” (derived from νοῦς; i.e. “mind” or “intellect”), co-developed with biogeochemist Vladimir Vernadsky and referring to the evolving layer of language and communication, science and technology, information and communication,

¹Positive views on Teilhard’s work voiced by both Pope Benedict XVI and Pope Francis may signal that the “monitum” (formal warning) concerning his work will be withdrawn.

transforming and absorbing both the geosphere and the biosphere, emerging and proliferating *via us*. Although humans should not consider themselves the centre of the universe, by modifying life and creating neo-life, we are uniquely positioned along the axis of evolution, envisioned by Teilhard as an increasingly self-conscious and self-directing process (1955/2015, p. 3), spiralling towards an endpoint, thematised by Teilhard as the *Omega point*, comparable to Hegel's idea of absolute knowing (as will be discussed below).

Teilhard spent many years abroad, in Egypt, China and the United States, and was deeply fascinated by Cro-Magnon parietal art. For Teilhard, cave art represents a turning point in the process of noogenesis (the birth of thinking, the emergence of self-consciousness). He was a close friend of French archaeologist Abbé Henri Breuil (1877–1961), professor at the *Collège de France* from 1929 to 1947, with whom he visited parietal sites like Lascaux and Mas d'Azil (Aczel, 2007, p. 51). Besides being astonishing works of art, these paintings reflect a spiritual (symbolic) dimension. Drawings of animals are accompanied by signs, dots and pairs of lines and often seem superimposed on one another, like playing cards. All this suggests that, rather than being representations, the paintings functioned as symbols or pictograms in shamanistic rituals, to probe and influence the movements of herds. Censorship prevented him from publishing his major writings during his lifetime, but after copies of manuscripts had been circulating for years, books such as *The Human Phenomenon* and *The Divine Milieu* were published immediately after his death in 1955, leading to world-wide fame.

Teilhard sees the ancient, Alexandrian Cosmos as an “imaginary world” (Teilhard de Chardin, 1959, p. 25; Teilhard de Chardin, 1965, p. 238) and modern technoscience as a moment of awakening. Technophobic resistance towards technological progress reflects the extent to which technoscience entails a rupture with the “poetry” of a traditional, agricultural world. Technoscience invokes unease because it entails a dethronement of the narcissistic ego (Teilhard de Chardin, 1959, p. 245). The techno-scientific world is so large that humans become trivialised (Teilhard de Chardin, 1957). At the same time, there is something unique about humans, because the noosphere (the evolving layer of language and communication, science and technology) emerges and proliferates *via us*.

What Is Phenomenology?

Teilhard's oeuvre will be presented in this chapter as a “phenomenology of technoscience”, albeit in a particular sense. Defining phenomenology “point-blank” is notoriously difficult (Spiegelberg, 1965, p. 1) and although both Bachelard and Heidegger can be considered as phenomenologists, they are not phenomenologists in the prototypical (say, Husserlian) sense. In the previous chapter, instead of defining phenomenology, we introduced it as a philosophical approach, a method in the genuine sense, as something which is developed *along the way*. And not by one

authoritative author, but by multiple authors, by a “philosophical movement” (Spiegelberg, 1965).

According to the *Stanford Encyclopaedia of Philosophy* (Smith, 2018), phenomenology is the study of the way we experience things, the way in which things appear to consciousness. Phenomenology studies the structures of consciousness from a first-person viewpoint. The core structure of consciousness is intentionality, i.e. the experience that the conscious mind is not a passive recipient of information, but *directed towards* something and *interacting with* something: the object of experience. Like Bachelard and Heidegger, Pierre Teilhard de Chardin is a phenomenologist, but not in the strict (Husserlian) sense. He studies consciousness from a historical and dialectical perspective. His version of phenomenology (as developed notably in *The Human Phenomenon*) comes close to how Hegel understood the term in his *Phenomenology of the Spirit*. Indeed, while Husserlian (esoteric) phenomenologists never considered Hegel as part of the phenomenological movement, French (exoteric) phenomenology took his inclusion for granted (Spiegelberg, 1965, p. 12). Teilhard de Chardin’s oeuvre is phenomenological in the dialectical sense of the term, presenting a radical extension of the dialectical-phenomenological view compared to Hegel. While Hegel’s phenomenology presents the drama of the genesis of science (“*das Werden der Wissenschaft*”), starting with empiricism and tracing the ascent of self-consciousness up to its fulfilment (i.e. absolute knowing), Teilhard broadens the scope quite drastically, seeing human evolution (anthropogenesis) in the context of evolution as such, against a dramatically extended temporal horizon.

Hegel conceives phenomenology as the study of the historical morphology of the spirit, tracing its long procession through various stages, as revealed and preserved in various *externalisations*, whose remnants constitute the *Schädelstätte* (the skull site) of consciousness (Hegel, 1807/1986, p. 591). It is precisely – *literally* – in this sense that Teilhard’s phenomenology is a phenomenology of the spirit, using paleo-anthropological skull research as point of departure for studying the vicissitudes of the spirit on its way to absolute knowing, the Omega point.

For Teilhard, being means being in flux, in process, and evolution applies not only to living beings, but to *being as such*, so that even molecules and stars evolve, although Teilhard’s focus as a phenomenologist is on the emergence and dialectical evolution of consciousness (Grim & Tucker, 2006, p. 56). Again, however, consciousness is seen as an integral dimension of being: from primal cellular consciousness via human self-consciousness (i.e. the co-evolution of consciousness, tool-use and language) up the emergence of a global noosphere (the global web of technology, intelligence and information, resulting in hyper-consciousness). Human consciousness, or being-in-the world, is not considered as an a priori given, but as the outcome of a process of becoming, and paleo-anthropology studies a crucial stage of this process, from the birth of humanity up to the daybreak of reflection, twenty-five centuries ago (the *Achsenzeit*, which Hegel uses as his starting-point). The human condition (“*Dasein*”, being-in-the-world) is an *outcome*: the *result* of a long history of hominization, in which language and tool-use play a crucial role (cf.

Sloterdijk, 2001, p. 153), reflected in the development of the human skull (as the object of choice of paleo-anthropological inquiry).

Thus, for Teilhard, consciousness is studied from multiple perspectives, combining an interior (first-person) perspective with an external perspective, informed by scientific (e.g. geological, biological and paleo-anthropological) research, and enriching traditional phenomenology with a diachronic (historical and evolutionary) viewpoint. For Teilhard, the challenge of contemporary thinking is to broaden the scope of philosophical reflection. For many philosophers, the scope of historical consciousness is still defined by the dawn of Western thinking in ancient Greece, twenty-five centuries ago. Teilhard adopts a much deeper historical scale, so as to endeavour a radical broadening of the temporal horizon of human self-reflection, thereby transcending the egocentric, anthropocentric and Eurocentric constraints of classical (Husserlian) phenomenology.

Teilhard de Chardin's Views on Science, Technology and Evolution

Teilhard's magnum opus *The Human Phenomenon* (1955/2015) was completed in China in 1940 and published posthumously. Here and elsewhere Teilhard argues that a direction, an orientation, an axis is discernible in evolution, namely towards increasing complexity and interiority (p. 8), towards integration and sublimation (p. 180), towards self-consciousness and self-directedness. Teilhard sees life as a spiralling process of becoming or "sublimation" (p. 120), while human beings represent the moment in time when evolution becomes "conscious of itself" and consciously self-directed (p. 20, p. 126). Via technoscience, humans are able to drastically reorganise the conditions of their own evolutionary development on an unprecedented scale. This has brought us on the verge of a crucial moment in the history of life, Teilhard claims, as humanity has entered an era of planetisation. Dialectically speaking, current humanity represents the final transition from a more or less implicit awareness of the mechanisms of evolution in animals and other life forms (M_1), via a self-conscious manipulative understanding of these mechanisms (putting them to work on behalf of anthropocentric self-interest: M_2), up to assuming full responsibility over the future course of evolution as such, thereby radically sublating the boundaries between the "natural" and the "artificial" (M_3), giving rise to synthetic hybridisation.

What is disconcerting about the human phenomenon, Teilhard argues, is that scientific portrayals (anatomical, physiological, neurological, genetic, etc.) consistently fall short. They lack a key dimension. Humans are animals, but they also represent a leap, a discontinuity, a metamorphosis, a crisis, a spiritual awakening. Via humans, the *noosphere* (the "layer of thinking", i.e. the global network of science, technology and information) increasingly absorbs and transforms the geosphere and the biosphere. A turn of profound importance is taking place in the world

as we are entering a new era. Via us, evolution has begun to actively redirect itself. Through humans, a techno-cultural world is born, an altogether different form of life. Contrary to anthropocentrism, however, Teilhard emphasises that this is not brought about *by* human beings. Rather, Teilhard points to the presence of something greater than ourselves: the spirit, moving forward *within* us, *drawing* us towards this future, via culture and technology as augmented forms of consciousness and transmissible reflection.

The Human Phenomenon depicts a dramatic, panoramic vision of the evolving cosmos, the process of cosmogenesis, beginning at the atomic and molecular levels, where the stuff of the universe continuously degrades and pulverises (under the sway of entropy), while at the same time giving rise to more and more organised forms of matter, via synthesis and complexification. Stars and planets are basically laboratories for producing atoms and molecules, where matter evolves in the direction of larger molecules (1955/2015, p. 19). On planet Earth, geological research reveals the formation of larger crystal molecules and polymers. In the course of evolution, Teilhard argues, an interior, psychic dimension of things increasingly manifests itself. Planet Earth is a polymerising world (p. 36), giving rise to phenomena of life, to increased interiority and cellular awakening, culminating in the dawn of consciousness (psychogenesis). Indeed, for Teilhard, the phenomenology of consciousness begins with the cellular revolution: the leap from pre-consciousness in prelife to the rudimentary consciousness of prokaryotic single cells as living beings up to multi-cellular organisms and mammals. Cellular awakening is the first transformation in the emergence of consciousness.

A new topological dimension is opened up: a psychic “within”, separating “inside” from “outside”, and phenomenology still builds on this, combining an internal perspective (informed by subjective experience) with an external perspective (informed by scientific experience).

The mega-molecules of life gradually assembled and converged into complex cellular structures. Life began to spread and the nascent cellular world evolved into a global super-organism, a living “film” (p. 54), bent on propagation and complexification from the very outset, giving rise to a first global crisis, by drastically transforming geosphere and atmosphere, producing oxygen (a toxic waste product) on a massive scale. The boundary zone between prelife and life teemed with proliferating minuscule beings: the biosphere appearing. Initially, however, life was a disruptive factor, and oxygen dramatically altered the atmosphere, until an equilibrium on a higher level of complexity was reached, turning oxygen into something positive: a requirement for proliferating aerobic life forms (the negation of the negation). Today, the advent of life can no longer occur spontaneously on Earth. Spontaneous generation now paradoxically (but quite dialectically) requires an abiotic environment: the absence of life. The primordial chemistry of life can be reproduced artificially, in laboratories (*in vitro*), where the creation and propagation of neo-life is already underway. Here the syllogism of generation (from chemical pre-life via biological life up to neo-life) can be consciously mimicked.

Life is an incessant arena of experimentation (p. 72), passing through multiple instances of negativity, passing over myriads of corpses, while the branches of the

tree of life actually indicate the gaps left behind by vanished life forms (previous waves of natural experiments). But an axis of development can be discerned towards interiority and consciousness, culminating in the “plastic brains of primates” (p. 105). Evolution does not proceed randomly, but moves in the direction of orthogenesis (Procacci & Galleni, 2007). The emergence of mammals (with voluminous, convoluted brains) represents a decisive intensification of this tendency, as biogenesis gives rise to psychogenesis. Although the behaviour of insects is quite complicated and remarkable, their consciousness seems “frozen” into limited sets of functions. In mammals, consciousness becomes more flexible, although even here, development often becomes arrested as animals become prisoners of their external organs. In humans, evolution re-sculpts the brain via tool use and the emergence of language, eventually giving rise to a new geological and evolutionary era. The accelerated hominization of humans represents a leap-like mutation, superimposing itself on evolutionary continuity.

For Teilhard, as indicated, the scientific picture of human existence fails to capture the human phenomenon convincingly. Hominization is a decisive rupture, a moment of discontinuity, when consciousness begins to work upon itself (1955/2015, p. 110). Another world, another way of being-in-the-world is born (p. 111). Life entails a psychic transformation, from the obscure psyche of the first cells up to mammalian consciousness, and the human phenomenon represents a final leap, the awakening of intelligence: a hominizing metamorphosis (p. 114).

Self-consciousness is not a result of brain morphology alone, but a multi-factorial process. The freeing of the hands allowed early humans to gaze on what their hands took hold of (p. 115): a new beginning of subject-object interaction, giving rise to “another kind of life” (p. 116). The spark of reflection eventually affected the whole planet via the emergence and dramatic expansion of the noosphere: the thinking layer, the evolving global network of intelligent beings and their contrivances, over and above the biosphere (p. 124). A new type of being, a thinking animal invaded the planet, gradually eliminating or subjugating other life forms, creating an irresistible tide of fields and factories, resulting in planetary change: the advent of the “psychozoic” era (p. 124). Along the evolutionary curve there are particular points of dense creative activity (the appearance of life, of thought, of globalisation) and we are currently experiencing such a curvature (Teilhard de Chardin, 1969/1971, p. 23). Seen from a distance, planet Earth now becomes “phosphorescent” with thought.

Initially the development and spread of fire, stone tools and pottery evolved quietly, but in the course of time, it resulted in a planetary wave of experimentation. We still recognise ourselves in the language of Cro-Magnon art, spiritually close to us (Teilhard de Chardin, 1955/2015, p. 139). Although the discovery of human fossils is one of the most illuminating and critical lines of modern research (p. 129), the true meaning and impact of the human phenomenon can only be grasped in the course of its unfolding. At this very moment, we are casting off the last moorings tying us to the Neolithic, agricultural era (p. 149). Via astrophysics and space travel, the human phenomenon is acquiring a cosmic scope. Our way of being evolves on a planetary scale, while the noosphere evolves into a new milieu, an intelligent

ecosystem (p. 158).² We have been thrown out of the natural world into a neo-world of spiritualisation and civilisation. Comparable to the first experimentations of the first living cells, we now see the advent of waves of neo-life in laboratories (p. 156).

This triggers a sense of disquiet, a “crisis” of reflection (p. 158). Now that neo-life can be built up chemically (p. 159), we experience disorientation and malaise. Our sense of anguish, Teilhard argues, stems from the awareness that, as life has entered its thinking stage, evolution will from now on develop *via us*. According to Teilhard, scepticism and pessimism towards humanity is notably fashionable among intellectuals (the “luminaries” of his era), eloquently denying progress while stressing the absurdity of human existence. What we are actually facing, Teilhard argues, is a contemporary version of Pascal’s wager (p. 163). We *must* assume responsibility for the undeniable fact that we are about to create new life-forms experimentally, while slow, Darwinian evolution (selection, random variation, struggle for life) becomes eclipsed by conscious experimentation (p. 171). Artificial neo-life is already emerging as a new phylum. A new realm of technology and reflection (and their material products) unfolds: a new “milieu”, increasingly affecting the biosphere, similar to how life once significantly transformed the global geosphere and atmosphere. Heredity is increasingly becoming a revisable and transmissible legacy, is becoming thoroughly “hominized”, and this inevitably gives rise to disquiet, for we seem unable to live up to the daunting challenges and responsibilities entailed in this. In the present situation, without precedent in the history of life, we suffer from collective psychic disorientation. More than at any other moment of history, Teilhard argues, we experience a fundamental anguish of being. Something threatening is opening up in front of us, and something seems more than ever lacking.

The co-authored autobiography by Jennifer Doudna, the Nobel Prize laureate who, together with Emmanuelle Charpentier, initiated gene editing via CRISPR-Cas9, resonates with this assessment. In *A crack in creation: the new power to control evolution* (Doudna & Sternberg, 2017), she explains how she, as a hyper-specialised researcher at Berkeley, had never realised that her microbial molecular tool might have dramatic social consequences in multiple realms of applications. This overwhelming awareness forced her to acquire new, transdisciplinary skills in fields like science policy, science communication, research ethics, and intellectual property rights (Zwart, 2019c). Her willingness to act as a responsible researcher (presupposing human agency and control) became questionable, however, in view of the unsettling experience that CRISPR-Cas9 rapidly seemed to assume a momentum of its own, spreading and developing via human researchers as vectors.

Somehow, however, uneasiness must be transformed into responsibility and foresight, Teilhard argues. We must learn to think and act collectively, assuming a planetary perspective. Teilhard’s “optimism” (Grim & Tucker, 2006, p. 70; Grey, 2006, p. 109) stems from his conviction that reflection is likewise advancing towards a higher level. Via emerging means of interaction and communication, all human

²“The future will decide on the best name for this new era we are entering” (1955/2015, p. 149). In current discourse, the name Anthropocene has been adopted.

beings are now simultaneously present, and their deliberations are brought together on global podiums. Thus, we witness the emergence of pan-human options for investigation and reflection (p. 176). Self-consciousness is evolving into hyper-consciousness, via the noosphere as a planetary network of distributed intelligence and global deliberation: a psychic expansion, a decisive new leap in the development of the spirit. A turn of profound importance is taking place, right before our eyes. Due to this explosive acceleration of noogenesis, intelligence becomes “hyper-intelligence”, and the human spirit evolves into a comprehensive, supra-individual “super-soul”, an ultra-complex, ultra-conscious system, a synthetic confluence of thinking.³

Thus, egocentric contemplation is replaced by technification, collectivisation and industrialisation on a planetary scale, but we receive something in return: the invitation to participate in research and reflection as a collaborative techno-scientific project (1959, p. 246), a genuine *opus humanum*, conducted by global research networks, giving rise to an excess of consciousness, a golden age of knowledge production (p. 350). The world has acquired a new dimension: spatially, temporally and psychologically (1965, p. 165). We are witnessing a period of profound transformation, a restructuring of the spirit, enhanced by computer technology. Humankind is evolving into a global research team, and the earthly globe into a world-spanning laboratory, as the spirit of technoscientific experimentation proliferates. We are heading towards a new chapter in the evolution of life and human consciousness, a redefinition of being as such. This inevitably causes anxiety and malaise (1965, p. 171) and will even disrupt laboratory life in the traditional, artisanal sense (p. 170). We are dissatisfied because something seems absent or missing: a sense of direction, an ultimate collective target, something like a Holy Grail (p. 187).

As a final step, therefore, what is required is a conversion and sublation of science and spirituality (religion). Point Omega, the pole of consolidation, attraction and completion (1976/1978, p. 38), is drawing us in its direction (p. 82).⁴ We are taken aback by the prospect of psychic hyper-expansion and intellectual superabundance, by the explosive acceleration of noogenesis, but we are nonetheless inevitably culminating towards point Omega (1955/2015, p. 257), allowing us to make the final leap to overcome inertia and unease (1969/1971, p. 90). Our narcissistic egos will dissolve into a higher, collective, hyper-reflective form of self-conscious “excessive reflection” (1959, p. 357) as a moment of fulfilment (pleroma). The noosphere will sublimate into a planetary layer of thought, but there are no summits without abysses, and therefore Omega, the transcendent pole of universal convergence, must draw us through our current moment of crisis.

³As indicated, Teilhard predicted the Internet and WWW as global forms of consciousness, linking humankind and giving rise to a “second axial period” (Delio, 2014, p. 1). Teilhard anticipated what is currently discussed as “singularity” and the “explosion of intelligence” (Kurzweil, 2005).

⁴For Teilhard, Christianity is a “religion of evolution” (Delio, 2014, p. 1), devoted to an evolutive God: Christ the evolver, drawing us towards fulfilment, towards Omega, guided by the Spirit.

Case History: A Teilhardian Assessment of Human Genomics

For Teilhard, the cosmos is an evolving process, while humans emerged along the evolutionary axis, representing a leap into self-consciousness. Billions of years ago, life began as a process of experimental sublimation, via permutations and combinations of genetic “characters” (p. 63) and now, evolution is becoming self-conscious and self-directed. In the recent past, human thinking already became increasingly mathematical and symbolic, allowing humans to modify their world by recombining algebraic numbers, chemical symbols and other “characters”. And now heredity itself, until recently part of the biosphere, is transposed into the noosphere, allowing us to consciously recombine and adjust the biomolecular “characters” of chromosomal life (cf. Galleni & Scalfari, 2006, p. 167).

From a Teilhardian perspective, the *Human Genome Project* doubtlessly represents a decisive milestone along this axis. Modern science entails a process of progressive disenchantment, as the “imaginary” spherical cosmos (1959, p. 25) gives way to the evolving universe of technoscience, resulting in a decentralisation of humankind (disrupting self-centred worldviews of the past). There is something special about life in general and human existence in particular. As indicated above, whereas the general movement in the universe is towards entropy and dissipation, life evolves in a juxtaposed direction, ascending towards complexity: life as “negative entropy” (Schrödinger, 1944/1967), as the *negation of entropic negativity*. And while post-modernism in its rejection of the “grand narratives” of dialectics celebrates entropy, Hegel and Teilhard emphasise how life and consciousness work in the opposite direction (Burr, 2020). Technoscience intensifies this negative entropic trend, resulting in positivity, in increased complexity. Via biotechnology as a collective project, an *opus humanum*, we self-consciously redirect the course of evolution. This places us, not in a position of anthropocentric centrality, but of *eccentricity* (Teilhard de Chardin, 1959, p. 30), so that humankind (notably its technoscientific avantgarde) occupies a tilted, oblique position near the frontline of evolutionary progress.

Genomics as a research arena concurs with this scenario, sequencing and modifying the molecular *characters* of life, allowing technoscience not only to read, but increasingly also to recombine and “rewrite” the genotype, in the literal sense of “type” (Doudna & Sternberg, 2017; Zwart, 2012; Zwart, 2019c). Via the human sequence, we ourselves become the prime target of research and intervention. As Teilhard phrases it, human genomics reflects a concentration of contemporary research on ourselves (1955/2015, p. 110, p. 201), anticipating gene editing and genetic self-modification, transposing human genetics from the biosphere towards active noospheric reconstruction and evidence-based decision-making, informed by research conducted by large-scale, research consortia, employing automated high-throughput sequencing machines, replacing individual forms of inquiry by coordinated collective action.

The Human Genome Project (HGP) represents convergence and culmination in molecular genetics towards a thoroughly noospheric landscape, whose contours are

explored by a "palaeontology of the future" (Teilhard de Chardin, 1959, p. 11). The absorption of heredity into the noosphere inevitably produces anxiety, Teilhard argues, for it is far from clear whether humans can be entrusted with this type of techno-scientific power, this ability to influence the future of (human) evolution. For Teilhard, the only solution, as we have seen, is a collective, supra-personal system of foresight and reflection, steering away from the abyss of anxiety, heading towards collective deliberation. According to Teilhard, this objective, the ascent towards hyper-reflection, is already discernible on the horizon as Omega, drawing us towards this future.

We are actively redirecting the course of natural history, but strictly speaking this is not due to us, humans. Something (the spirit of technoscience) has come *over* us, realising itself *through* us. Humankind is a carrier or vector, pointing towards a future that is predictable in outline, oriented towards re-synthesis and recreation. We will not only redirect evolution by producing new types of organisms, but also re-sculpt *ourselves*, our own heredity and brains. The artificial will accelerate and redirect the natural, notably because the techniques of transmission of written culture will increasingly be superimposed on genetic forms of heredity, while the organisation of research will increasingly fall under industrial control, resulting in a dramatic increase of pace and scale.

Something enormous was already introduced by industrial production and modern scientific technology, Teilhard argues, from giant telescopes down to atom smashers, but now the knowing subject itself becomes the target of technological intervention, so that the natural and the human sciences converge into a transdisciplinary science of hominization, bent on optimising human bodies and brains, with ethics and foresight replacing natural selection. This may even include "noble forms of eugenics" (p. 202), alongside a "reorganisation of the earth". After centuries of analysis, modern thought is now endorsing the creative evolutionary function of synthesis (p. 191), producing astonishing creatures, beautiful yet fragile experimental entities (p. 191). The conscious pole of the world is drawing the biosphere towards ultra-synthetic super-life, as the artificial is taking over from the natural (p. 198). Change is brought under active control as the techniques of scriptural transmission are superposed on genetic, chromosomal heredity. Evolution gave rise to the noosphere, enabling a global, noospheric organisation of research and the assemblage of "thinking beings" (p. 201). Let this suffice as a summary of Teilhard's vision. In the next section I will highlight the dialectical phenomenological fervour of his thinking, while also indicating how his optimism is problematized by other (congenial) thinkers.

Teilhard as a Dialectical Thinker

In a remarkably malevolent and hostile review of the English translation of Teilhard de Chardin's *The Human Phenomenon*, Peter Medawar (1961), once a big name allegedly, stated the following: "*The Phenomenon of Man* stands square in the

tradition of *Naturphilosophie*, a philosophical indoor pastime of German origin which does not seem even by accident (though there is a great deal of it) to have contributed anything of permanent value to the storehouse of human thought". The second half of the sentence (indicative of the remainder of the review) may safely be ignored, but the first half is to the point. Intuitively, the author sensed, and rightly so, that Teilhard is a profoundly dialectical thinker; – although for Medawar this apparently counted as a perpetration, as a reason for outright rejection and expulsion.

In his history of French Philosophy, Frederick Charles Copleston likewise stresses profound "similarities" between Hegel and Teilhard, even though Teilhard "seems to have known little of Hegel" (1975, p. 323). For Copleston this spontaneous convergence is all the more telling. Both authors see the process of becoming as a process of progressive spiritualisation. Cosmogogenesis is a dialectical unfolding, an immense drama in which the universe reveals itself to itself (Tarnas, 1991), evolving dialectically towards fulfilment. Although Teilhard was trained as a philosopher, he was primarily a scientist, an expert in paleo-anthropology, so that the concordance between Teilhard and Hegel may be considered an example of empirical science and philosophy working their way *towards each other* ("entgegenarbeiten", Hegel, 1830/1986a, § 12, p. 57).

Teilhard subscribes to the conviction that a dialectical logic can be discerned in natural and human history, which not only allows us to come to terms with the present, but also to anticipate (and actively contribute to the unfolding of) the emerging future. Dialectics strives to capture the present in thoughts, as we have seen, to conceptualise the *truth* of the current era, i.e. the most radical dimension of contemporary existence, spurring us to come to terms with it. For Hegel, the truth of modernity was the emergence of freedom, of the autonomous human subject. For Teilhard, the truth of the current era is the emergence of the noosphere, representing collective and distributed hyper-consciousness. Dialectics fosters self-reflection, raising awareness of how we ourselves are deeply immersed in the current process, but also outlining emerging options to critically assess and actively contribute to, and become part of the inevitable turn.

Whereas Hegel himself was ambivalent vis-à-vis evolutionary thinking, as was discussed in Chap. 2, Teilhard wholeheartedly endorses evolution, albeit not in the Darwinian sense, but as a dialectical process, spiralling towards increased consciousness and self-consciousness. Starting from a position of relative stability (equilibrium), challenges (negativity) may radicalise into crises, which may give rise to qualitative leaps, allowing nature to attain higher plateaus of complexity. Teilhard agrees with Hegel that the "end" of natural (Darwinian) evolution has been reached in the sense that the biosphere is increasingly affected by the noosphere: the conscious refurbishing of life, now that biotechnology is consciously recombining and adjusting genetic and biomolecular "characters".

There are indeed many instances of convergence between Teilhard's phenomenology (as elaborated in *The Human Phenomenon*) and Hegel's phenomenology (as elaborated in the *Phenomenology of the Spirit*). As point of departure for a comparative analysis, we may point to Teilhard's observation that scientific portrayals of the human phenomenon consistently fall short, since they lack a key dimension.

Precisely this same experience also plays a crucial role in Hegel's *Phenomenology of the Spirit*, most notably in his famous analysis of phrenology (skull anatomy), a research practice which started with the basic contention that the human phenomenon *is* (can be determined in terms of) a bone: the human cranium, the skull. For this, indeed, is phrenology's philosopheme: "*die Wirklichkeit und Dasein des Menschen ist sein Schädelknochen* (1807/1986, p. 250). Phrenology or skull anatomy builds on the grounding idea that bumps or indentation on the inside of the skull may indicate a person's *disposition*. That is how, in the case of phrenology, empirical science (observing consciousness) sees the relationship between anatomy and the mind. The skull is the immediate, tangible presence of the mind.

Evidently, Hegel is critical of this idea. Although one may freely associate in front of a skull, he argues, as Hamlet did with Yorick's, the skull bone as such is and remains an indifferent thing. By attempting to reduce the mind to its most tangible, but also most rigid form of being (a bone), the effort to study the mind anatomically quickly reaches a limit and becomes trapped in an impasse. The result is negativity: the *absence* of the phenomenon as such, demonstrating the deficit of the procedure. The dead skull cannot serve as a window into the living brain. The skull is, literally, the *negative* of the brain. The paradoxical result of phrenology, the moment of negativity, namely the *absence* of the living brain, of thinking and interaction, is an important experience nonetheless. Consciousness must now transcend this trap. It is precisely this deadlock which enables (and calls for) a dialectical turn towards a more comprehensive form of understanding. The deadlock of phrenology makes this turn towards a more comprehensive approach inevitable. We must look for mind or consciousness elsewhere, not inside the skull, but in our practical interactions with the world.

Paleo-anthropology, as practiced by Teilhard and his colleagues, can be considered as the actual outcome of a dialectically syllogism, with phrenology as its starting point. Phrenology began with the naïve conviction that consciousness is contained in the skull ("*der Geist ist ein Knochen*", M_1). This resulted in an impasse, and phrenology as a research practice (as well as the philosopheme in which it was grounded) was negated (M_2). Yet, skull research (starting with the discovery of the first Neanderthal skull in the Neander Valley in Germany in 1856, and of the first *Homo erectus* skull by Eugene Dubois in Java in 1893) does provide valuable evidence for the evolution of the spirit (the process of anthropogenesis), provided we see skull evolution as the *outcome* of a dialectical interaction between tool use, language and the environment. Friedrich Engels saw early human evolution precisely in this manner, presenting the process of anthropogenesis from primates to humans as a process of active interaction with the environment, of interaction between hands, speech organs, tool use and practical labour. What applies to the human hand (as a unique and singular organ, i.e. "*Einzelheit*"), also applies to the human skull: it is not only the enabling organ of human culture, but first and foremost the *outcome* or product of a long dialectical history of labour, praxis and interaction (1925/1962b, p. 445).

The Ascent of the Spirit and the Noosphere

Another important convergence between Hegelian and Teilhardian dialectics concerns the sublation from geosphere (chemistry and meteorology) and biosphere (life) to noosphere (spirit). Planet Earth began as a geosphere, a terrestrial meteorological system of physical and chemical (inorganic, abiotic) processes. Subsequently, the biosphere emerged, and transformed and absorbed the geosphere: a first sublation (“Aufhebung”) on a global scale, onto a higher level of complexity and organisation. And now, the noosphere, the third step in the global dialectical process, increasingly absorbs and transforms both geosphere and biosphere, even superseding the tensions between the two (for instance by consciously adapting particular life forms to climatological conditions, etc.). Whereas entropy tends to pulverise organised entities into dust, life (biosphere) and technoscience (noosphere) evolve in the opposite direction. Thus, entropy is negated, “aufgehoben”, so that both life (biosphere) and technoscience (noosphere) may serve as instances of the negation of the negation.

3.5 billion years ago, planet Earth (the primordial geosphere) gave rise to a diffuse super-organism, a living film: the biosphere, a green layer covering the abiotic geosphere (Teilhard de Chardin, 1955/2015, p. 94). Currently, Teilhard argues, we are on the verge of another decisive turn: the third moment of evolutionary logic. Via global human activity, a new layer is added, over and above the abiotic, inorganic geosphere and the biotic, organic biosphere, namely the noosphere, the “thinking layer” which, besides noetic *processes* and activities (thinking, calculating, modelling, communicating, deliberating, etc.), also involves noetic *products* (technologies, devices, infrastructures, computers, industrial plants, airplanes, and so on). It is distributed intelligence: a technological materialisation of Hegel’s objective spirit, conceived as an extended, externalised and institutionalised structure on which individual intelligence, autonomy and creativity to a large degree depend (Boldyrev & Herrmann-Pillath, 2013). The noosphere evolves into a quasi-autonomous planetary network of advanced technologies and global circuits.⁵ Humans are obviously animals, and yet we represent a discontinuity, giving rise to the emergence of the noosphere, relentlessly transforming and absorbing the geosphere and the biosphere, and one day (perhaps sooner than we think) we will be able to create artificial life (Teilhard de Chardin, 1955/2015, p. 249). Thus, the noosphere represents a conscious reshaping of the world, an epochal transformation affecting the entire planet. Indeed, it may even amount to an exhaustion of the earth and a frantic desire to invade other planets.

⁵ Compared to Hegel’s objective spirit, the noosphere concept emphasises the technicity, materiality and globalism of the emerging networks. Compared to the *technosphere* concept (the non-anthropocentric view that technology is a quasi-autonomous global phenomenon that follows its own dynamics and represents a new paradigm of Earth history: technology as the next biology, Haff, 2013), the noosphere puts more emphasis on thinking and spirituality.

Evolution and selection are being transposed from the biosphere (“nature”) into the noosphere (“spirit”), leading to the emergence of neo-life (p. 250). In laboratories, life is becoming technologically reproducible (as exemplified by synthetic cell research, discussed earlier). For Teilhard, all this is not *due to* us, as we have seen. Rather, something has come *over* us, realising itself *through* us, something akin to Hegel’s spirit, of which technoscience is the final culmination. What we currently experience is not a situation of human autonomy or mastery, but rather of “excentration”, as Teilhard phrases it (1959, p. 30), for the unfolding of the noosphere entails the destruction of human egoism and self-centredness (1957, p. 93). Rather than being the centre of the universe, humans act as carriers or vectors, pointing towards a future which is predictable in outline (1955/2015, p. 224). Molecular “characters” (A, C, G and T, etc.: p. 226) are entering a new, technological milieu, as passive heredity is assuming a noospheric form. Life becomes a *concept*, and (in vivo) bio-molecules transmute into (in silico) *symbols* (p. 247), so that heredity becomes spiritualised. Evolution becomes conscious of itself due to our ability to decipher, transform and rewrite the “characters” of life. As Hegel already phrased it, the spirit is now able to recognise (read, discern, etc.) its own symbolic logic in the “noumenal” essence of living nature disclosed by technoscience. Passive, slow and natural evolution is sublated into a conscious, accelerated and systematic global endeavour. The artificial is now carrying on the work of the natural, and the transmission techniques of literate culture (i.e. techniques for reading, editing and rewriting symbolic materials) are superimposed on genetic heredity. Conscious biomedical and moral concepts and considerations replace the randomness of natural selection. Life itself has brought into the world a power capable of criticising and improving it, and we are now awakening to the idea of a proactive, synthetic, humanised idea of evolution. Collective practical intelligence may now use these very technologies to domesticate and transform technology itself, so that the “laboratories” (Teilhard de Chardin, 1959, p. 128, p. 129) of nature and those of technoscience become reconciled again, and technoscience becomes bio-compatible again ($M_2 \rightarrow M_3$).

What seems obfuscated in Teilhard’s technoscientific optimism, however, is a crucial implication of the entropy concept, namely that every increase in complexity, productivity and order (e.g. the emergence of life, of culture, of technoscience, of global metropolitan society, etc.) inevitably results in disruption elsewhere. In order to resist entropic disruption and safeguard complexity and organisation, we are constantly sacrificing and consuming (“negating”) natural resources and natural entities. Ideally, this is part of a global metabolism, but the implication of the Anthropocene concept is that the human-nature metabolism has become irreversibly disrupted on a global scale (Foster, 2000).

Thus, Teilhard has been criticised for voicing techno-euphoria. His critics include a prominent dialectician, namely Jacques Lacan who argues that humankind has indeed “hominized” the earth, but first and foremost by *polluting* it (Lacan, 1966, p. 684). Now that the tiny symbols, the little characters and equations of quantum physics and molecular biology indeed allow us to manipulate nature, and even to enter the wider universe (via spacecraft), its Pascal-like immensity and silence no longer *frighten* us, seeing that we have begun to drop our garbage (our *noo-debris*)

there as well. Indeed, the ability to ruin the earth, to destroy all life forms, including human life itself, would be a real “triumph”, a real testimony of human “superiority” over other life forms, Lacan cynically argues (1960/1974/2005, p. 75).

Teilhard’s response to such criticism is that, precisely in order to move away from the disruptive negativity of technoscience (M_2), we must develop a form of “hyper-consciousness” and “hyper-technology” (M_3). Without collective, concerted, planetary action, the negativity of rampant technoscience will indeed increasingly disrupt both the geosphere (“climate”) and the biosphere (“biodiversity”), so that planet Earth will face accumulating contradictions and frustrations (M_2), a situation which must be sublated. This requires significant transitions on the side of the “spirit”, the “noosphere” as well. Research and reflection must become organised on a planetary scale, similar to how laboratories become factories, via global processes of super-organisation (1955/2015, p. 283; 1959, p. 145, p. 152), collectivisation (1959, p. 218, p. 290) and “collective cerebralisation” (1965, p. 202), involving networks (e.g. the Internet) which turn abiotic matter into thinking systems (1955/2015, p. 251) and in which human brains (the final product of evolution) become increasingly entangled (1959, p. 105). The noosphere must evolve into a global network, a collective memory and intelligence of humankind, a spherical thinking circuit, a “brain composed of brains” (1959, p. 134), enabling distributed, transdisciplinary forms of analysis and synthesis, in order to live up to the requirements of the future.

We are pushing and pulled forward, towards a superior, collective form of intelligence: a new conceptual reality of pan-human discovery, reflection and intervention, bent on reconciling technoscience and nature on a higher level of complexity, and involving global humanity as a whole: a truly *opus humanum* (1959, p. 31). The noosphere, Teilhard predicts, will converge into a single system, a collective, planetary, electronic “super-consciousness” (1955/2015, p. 251; 1959, p. 95).

There are serious risks involved in this, such as the risk of being overwhelmed by a superabundance of information, by an explosive acceleration of noogenesis, relentlessly moving in a direction juxtaposed to entropy (1959, p. 93) and curving upwards towards “hyper-reflection” (1955/2015, p. 259). Here, Teilhard argues, instead of being at the mercy of our limited anthropocentric resources, the “spirit” will provide guidance in our irreversible ascending (1955, p. 273) towards illumination and convergence of research and reflection, of science and spirituality. During the “nadir” of the crisis, we sense the possibility of a final upward turn. Under the sway of the spirit, we may spiral towards the Omega point, the “supreme synthesis” (1959, p. 140), the final moment of convergence, reconciliation and unification (i.e. Teilhard’s version of absolute knowing), where God and evolution no longer constitute two antagonistic centres of attraction (M_2), but rather enter into conjunction (M_3) (1959, p. 94). Towards the final act of the global drama, Teilhard’s thinking becomes increasingly theo-compatible and theo-logical. In the next section, I will zoom in on Lacan’s criticism briefly mentioned above, because it points to that which seems the most questionable aspect of Teilhard’s assessment.

Teilhard and Lacan: From Skulls to Shells

At first glance, Pierre Teilhard de Chardin and Jacques Lacan represent juxtaposed positions in the intellectual spectrum of twentieth-century Francophone philosophy. On closer inspection, however, their oeuvres share important questions, insights and concerns. Although an extensive mutual confrontation (“comparative anatomy”) of their parallel trajectories is beyond the scope of this section, a concise confrontation between their dialectical positions will prove mutually revealing, emphasising the relevance of both oeuvres for the planetary challenges we are facing today.

Teilhard never mentions Lacan, but on several occasions, Lacan mentions a “final conversation” he had with “Reverend Father” Teilhard de Chardin (on July 10, 1954), concerning the existence of angels⁶ and the hominization of the planet. As indicated, Lacan agrees that, from the very beginning, we humans have “hominized” the planet, but first and foremost by *polluting* it, leaving behind a vast trail of garbage and waste everywhere we went. How could Teilhard, a palaeontologist, in his “optimism”, overlook this (Lacan, 1966, p. 684)? According to Lacan, human waste and garbage (e.g. remnants of stone age industries) is what paleo-anthropologists are looking for in the first place.

That their “final conversation” focussed on angels is no coincidence, as both thinkers came from a catholic background.⁷ Lacan grew up with an ardent Catholic mother and a younger brother who became a Benedict monk. Lacan himself attended a Catholic high school (the Marianist Stanislas College), married in church and baptised his first three children, while in later years he was in the habit of wearing an “almost clerical-looking” white shirt-collar (Roazen, 1996, p. 335). His oeuvre is replete with references to Catholic mystics (Eckhart, Hadewijch, Teresa, Angelus Silesius) and Catholic authors (from Saint Augustine and Blaise Pascal up to the Catholic mathematician Georges Gilbaud, who familiarised him with cybernetics and the topology of the Moebius ring). Also, Lacan’s oeuvre contains many reflections on Mannerist and Baroque religious art, in accordance with the dictum that the repressed returns, albeit in another scene (de Certeau, 2006, p. 3). While Freud’s writings reflect his Jewish background and Jung’s oeuvre echoes his Swiss Protestant roots (combined with Gnosticism), Lacan’s discourse is “deeply immersed” in (Francophone) Catholicism (Gale, 2016; Roazen, 1996).

⁶According to Lacan, their final dialogue revolved around the question of the existence of angels (1972–1973/1975, p. 30; 1976–1977, p. 66). Literally, an “angel” (ἄγγελος) is a messenger, a carrier of signifiers, transmitting the Word of the Other. According to Lacan, angels carry the (oral) object *a*, the breath (*spiritus*) which inspires and impregnates (cf. Baroque and Mannerist paintings of the Annunciation). *The ecstasy of Sainte Teresa*, the famous sculpture by Baroque artist Bernini, is discussed by Lacan in his Seminar *Encore* (1972–1973/1975). An angel holds a golden spear whose spear point (as “object *a*”, prime object of desire) is about to pierce the entrails of the swooning saint.

⁷Teilhard sees Catholicism as a privileged cultural “phylum”, an ascending cosmic force, an “evolutive faith” (1976/1978).

Professionally, Teilhard and Lacan represent two completely different worlds, but on closer inspection a basic affinity between palaeoanthropology and psychoanalysis is discernible. Freud himself had a keen interest in anthropology and archaeology. In *Totem and Taboo* (1913/1940), he interpreted contemporary neuroses against the backdrop of events which supposedly occurred during a primordial, paleoanthropological past. Like Teilhard, Lacan was highly interested in Cro-Magnon art, albeit influenced by archaeologist André Leroi-Gourhan (1911–1986), likewise professor at the Collège de France (from 1969 until 1982), who studied parietal drawings from a structuralist perspective, analysing the distribution of images in terms of patterns and binary oppositions. For Lacan, parietal art reflects the shift from the “imaginary” to the “symbolic” (1965–1966, p. 503), i.e. from art as a product of fascination (triggered by the amazing *Gestalt* of the depicted animal) towards images functioning as pictograms, as key symbolic elements (signifiers).

Teilhard and Lacan shared a mutual friend in French psychoanalyst Maryse Choisy, who was converted to Catholicism by Teilhard in 1936 (Roudinesco, 1986, p. 206) and founded the journal *Psyché: revue internationale de psychanalyse et de sciences de l'homme* in 1946, dedicated to furthering the convergence of psychoanalysis and Catholicism. Lacan was affiliated with her movement for some time.⁸ Another personal link is Michel de Certeau (1925–1986) who joined the Jesuit Order in 1953 and became intrigued by Teilhard's work in the 1960s, publishing some of his texts and letters, but he also joined the Lacanian movement as one of the first members of the *École Freudienne de Paris* (EFP) in 1964. He co-directed the journal *Christus*, in which due attention was given to psychoanalysis, and was appointed as professor at the “psychoanalytic enclave” (Highmore, 2006, p. 52) within the philosophy department at Paris-VIII Vincennes.⁹

Teilhard and Lacan were highly influential during the post-War period, albeit representing fairly different intellectual approaches and milieus. The rapid spread and reception of their ideas during the 1950s and 1960s concurred with the rise of molecular biology, eventually culminating in the double helix and the sequencing of the human genome, focussing on DNA (λόγος, pure code, as the beginning of life, cf. Collins, 2006). Both authors argued that scientific technologies allow us to redirect and redesign the course of (human) evolution. And both authors claim that science and technology reflect a tendency towards symbolisation, towards incorporation of the biosphere (living nature) into the “symbolic order” (Lacan) or “noosphere”

⁸In 1953, Choisy and Lacan visited Castel Gandolfo together to participate in a public audience by Pius XII (Roudinesco, 1993, p. 275). In 1954, Choisy and Lacan attended a reception organised in honour of Teilhard by the journal *Psyche* (Bousseuyroux, 2013). During this meeting, a group picture was taken (with a crucifixion serving as backdrop), including Françoise Dolto, Jacques Lacan, Maryse Choisy, Rhoda de Terra, Louise Weiss, Pierre Teilhard de Chardin and Jean Hippolyte.

⁹Michel de Certeau (2006) explores the catholic (Benedictine monastic) “archaeology” of Lacan's work. Like Lacan's *École*, a Benedictine monastery is a “school”, established by a monk, after a retreat “in the desert” (Gale, 2016; Roazen, 1996), where a Master provides spiritual guidance by conducting a seminar (*lectio*) for his disciples, working through a text as a spiritual exercise, an ascetic practice, to recover an initial truth, resulting in the production of a new body of texts, allowing the word to re-incarnate.

(Teilhard). Like other scientific breakthroughs, the HGP entailed a “narcissistic offence” because, scientifically speaking (and contrary to initial expectations), there is nothing special about the human genome compared to genomes of other species. All genomes are written in the same 4-letter nucleotide script. And yet, only humans are able to sequence their genomes and reflect on their evolutionary history and future. As evolution becoming conscious of itself, only humans can be “offended” by the outcomes of genomics research.

Let us now zoom in on what seems their most telling point of divergence. In his *Écrits*, Lacan accuses Teilhard of “optimism” for ignoring the disconcerting by-product of human progress: global pollution (1966, p. 684). Humans have polluted the planet, thereby “hominizing” planet Earth, and have now even begun dumping their garbage into space. Landfills have been the hallmark of “hominization” of the planet since prehistoric times – how could Teilhard, a palaeontologist, forget this? From the very beginning, Lacan argues, humankind has “hominized” the planet by *polluting* it. We humans left behind a vast trail of waste and garbage, everywhere we went. For Lacan, palaeoanthropology is “garbage science” and a palaeoanthropology of the future will unearth incredible amounts of industrial and plastic litter left behind by current and future generations.

An interesting object of paleo-anthropological research, discussed by Lacan, are so-called “middens” (Lacan, 1965-1966; Zwart, 2015): pre-historic dumps of domestic waste, consisting of human and animal bones, excrements, botanical materials, mollusc shells, pot sherds and other artefacts and eco-facts associated with past human occupation. These middens are signifiers, carriers of a message, for instance because they may have served as indicators of human dwelling sites (this place is ours!). But they also perform this function in the *literal* sense of the term. Decades before Teilhard and colleagues unearthed *Homo erectus* skulls in China, the Dutch paleoanthropologist Eugène Dubois discovered the first *Homo erectus* skull near Trinil (Java). The fossil collection (now at Naturalis, Leiden) assembled by Dubois (or rather: by his team of convict excavators) also contained shells. Dubois, however, was obsessed with his singular skull (his “object *a*” which both saved and ruined his life: Zwart, 2019a), as the organ of thinking, but isolated from its context, its phenomenological “Welt”. As a result, he neglected the waste, the heap of shells, as evidence of human praxis. This is why paleo-anthropology (like phrenology) requires a dialectical-phenomenological turn, focussing on the interaction between humans and their ecosystem, between *skulls* and *shells*. Recently, it was discovered that *Homo erectus* made miniature engravings in Solo River shells that were part of Dubois’ collection, but apparently ignored by him: tiny geometric strokes, suggesting symbolic patterns (Joordens et al., 2015), although their meaning and function remain unclear: calendars, symbols, number counts, decorations, doodles? This discovery was quite astonishing, because the earliest previously known geometrical engravings were at least 300,000 years younger (Henshilwood et al., 2009). In other words, Dubois’ fossils not only present case material for studying the progression of self-consciousness via cephalisation, but also reflect the dawn of the symbolic (of the signifier) as such (Zwart, 2019a). The symbolic order is not a product of brain evolution alone, but of the interaction between brain and

environment, and we need both skulls and shells (or parietal art) to study it. Tool use gave rise to the clearing, the budding symbolic noosphere. According to Lacan, a signifier is basically an incision, a stroke, a marker, quite like the markings on Trinit shells. Maybe these strokes signified days or months, but in any case, they opened up a new dimension of experience, a symbolic clearing, through practices of symbolisation. At a certain point, these shells, these carriers of letter-like engravings, became littoral litter, became middens. Again, for Lacan, humans are first and foremost *litterers*, polluters, causing *le monde* to become *immonde*.

Lacan agrees that technoscience represents a dramatic restructuring and symbolisation of the Real, so that the organic, the biosphere (e.g. edible shellfish) becomes incorporated into a symbolic order (via inscriptions). Teilhard thematises this as “hominization” of the planet, resulting in a planetary symbolic system, a noosphere. What seems obfuscated by Teilhard, and emphasised by Lacan, is pollution as a by-product of progress. Humans are literate litterers. The genome is the symbolic, which technoscience aims to purify via symbolisation, but waste and pollution are symptomatic for the return of the repressed in the real. While genomes and skulls are *objects* of research of choice, the repressed returns as the *object*. Human praxis is precisely this dialectical interplay between symbolisation and the real, between signifiers and refuse. Insofar as human progress exemplifies “negative entropy” (i.e. the tendency of life in general and human history in particular towards increased complexity and literacy), entropy will inevitably be produced elsewhere, in the form of accumulated litter. Future palaeontologists (or visitors from outer space) will discover the excessive extent to which the advance of human technoscience has polluted the global environment. And plastic litter will carry a logo, a set of letters, an inscription, representing the “logos” of technoscience.

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