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Tales on the Origin of Life in Primo Levi's Works

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Abstract – This article investigates Primo Levi's representations of the origin of life, particularly considering his essays and science-fiction short stories. After introducing the two main sources of inspiration that Levi refers to when writing narratives on this subject, classical and biblical mythologies and Darwinian evolutionary theory, the article offers a close reading of two short stories, "I sintetici" and "Disfilassi", that depict a moment of 'second genesis' set in the near future. This process is seen by Levi from an ecological perspective in relation to the environmental risks that human technology and overpopulation pose to our planet. Following the analysis of the writer's essays about recent chemical and biological theories on how life originated on Earth, the last paragraph focuses on the tangencies between Levi's investigation of the origin of life and his reflections on the source of literary creativity, summed up by the short story "Carbonio".

Keywords – Primo Levi; Science-Fiction; Origin; Ecology; Literary Creativity.

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1. Life Out of the Mud, Life Moulded in Clay

In this article, I focus on the theme of the origin of life in Levi's works, considering it both in his science-fiction short stories and essayistic writings. As the writer states in one of his last articles, "Argilla di Adamo" (published in *La Stampa* on 15 February 1987), «l'origine della vita sulla Terra non è un problema qualsiasi, è *il* problema, quello su cui tutti gli scienziati, non solo i biologi, si sono scervellati fin da quando la scienza esiste» (Levi, *Opere* 2: 1672). Given the centrality of this question in the history of scientific research as well as in Levi's *oeuvre*, looking into the author's life-long attempt to «leggere a ritroso il gran libro della natura» (Levi, *Opere* 2: 1674) will show the wide range of different answers that the writer gave over the course of several decades.

In his constant interrogation of the origin of life, Levi adopted the perspectives of a wide set of disciplines belonging to both the fields of the natural sciences and literature and the humanities. By reusing their diverse points of view in his narratives and essays, Levi tries to open a dialogue among the answers given by ancient mythology, religion, chemistry, evolutionary theory, and biology. In fact, in his frequent re-narrations of the tales on the creation and the origin of life, Levi often refers to more than one of the aforementioned disciplines within a single short story. This tendency to blend different perspectives, typical of Levi's method as a writer and intellectual, points also to his well-known self-description as a centaur,¹ used both to indicate his hybrid identity and his attempts to open a dialogue between the 'two cultures'. As Redaelli pointed out, this is even more evident in Levi's narratives of the origin of life:

L'archetipo del grande racconto della creazione, del dire (= fare) e separare, trova in Levi una forma o, meglio, per usare un termine a lui caro, una materia duttile (a differenza dalla materia resistente del mondo), plasmata dalla chimica e dalla letteratura, capace di declinare il valore del discernimento in piena alleanza tra le due culture. (Redaelli 121)²

Within the framework of Levi's attempt to create a bridge between the 'two cultures', we can observe numerous possible combinations among different disciplines in a single science-fiction short story. The most renowned and quoted examples of Levi's reinvention of the origin of life are the tales of creation set in mythical times. These narratives draw inspiration from classical and Middle Eastern mythologies as well as from the Bible and Jewish traditions, often blending elements derived from different sources. For this reason, Levi's fantastic and science-fiction narratives on the origin of life always add a personal (and, sometimes, even autobiographical) take to the traditional versions of myths. In "Quaestio de centauris", we do not read about the beginning of the world and the original creation of life, but we learn about the legendary tale of a 'second creation', handed down among generations of centaurs. This

¹ See Belpoliti, "Io sono un centauro".

² On the 'two cultures' in Italy, see Antonello, *Contro il materialismo*. On Primo Levi's relationship with the 'two cultures', see also Battistini; Druker; Antonello, *Il ménage a quattro*.

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tale narrates a moment of exceptional fertility, which Levi calls 'panspermia', when cross-breeding among different animal species, and even plants and rocks was made possible to repopulate the planet after the destruction brought by the Deluge. Even from this summary, it emerges how "Quaestio de centauris" contains elements and characters belonging to classical mythology (centaurs) and the Bible. In addition, we find references to the features of pure and impure animals present in the Torah, evident from the descriptions of the new species: «Perché il delfino è simile ad un pesce, eppure partorisce ed allatta i suoi nati? Perché è figlio di un tonno e di una vacca» (Levi, *Opere* 1 : 596).³ The imaginary hybridization among different animal species also represents a bridge with Levi's work as a chemist. In several points of his work, he insists on the crucial role of impurity and imperfection in chemical reactions in inorganic and organic chemistry – often transposing this metaphor to other fields, such as biology and evolutionary theory. In the chapter "Zinco" of *Il sistema periodico*, Levi explains how impurity is fundamental for life on our planet: «Perché la ruota giri, perché la vita viva, ci vogliono le impurezze, e le impurezze delle impurezze: anche nel terreno, come è noto, se ha da essere fertile» (Levi, *Opere* I 884).

The word «terreno» in this quotation from "Zinco" brings us back to an element present in the second creation described at the beginning of "Quaestio de centauris", which is the fertile hot mud that covers the Earth after the Deluge:

Quando le acque si ritirarono, la terra rimase coperta di uno strato profondo di fango caldo. Ora questo fango, che albergava nella sua putredine tutti i fermenti di quanto nel diluvio era perito, era straordinariamente fertile: non appena il sole lo toccò, si copri di germogli, da cui scaturirono erbe e piante di ogni genere; ed ancora, ospitò nel suo seno cedevole ed umido le nozze di tutte le specie salvate nell'arca. Fu un tempo mai più ripetuto, di fecondità delirante, furibonda, in cui l'universo intero sentì amore, tanto che per poco non ritornò in caos. (Levi, *Opere* 2: 596)

Mud, traditionally associated with the origin of life in the book of Genesis,⁴ is here the substratum rich in impurities that enables cross-breeding among different species. Nonetheless, the ground described in "Quaestio de centauris" is fertile because it contains the dead organic matter of all living beings destroyed by the Deluge. As Anna Baldini noted, mud is a recurring element in Levi's work and can be interpreted in almost opposite ways. It is indeed constantly present in the descriptions of Auschwitz in *Se questo è un uomo*, inseparable from the tiring long days of work in the Lager, and occupies a central place in Levi's worldview: mud is thus an oxymoronic symbol, both the element in which life thrives and ends (Baldini 58). As we will see later in this article, mud frequently occurs in association with fictional representation and essayistic analyses of the origin of life in Levi's works, maintaining a highly symbolic value as a crucial element in the eternal cycle of creation and destruction.

Alongside mud, another matter traditionally associated with the origin of life, clay, recurs in several of Levi's short stories inspired by Jewish mythology and folklore, in which the author narrates the creation of humans and human-like figures from the manipulation of this matter. A notable case is *Lilith's* eponymous short story, where the carpenter Tischler tells Levi the

³ On Levi's interest in Jewish traditions, see the essay "Il rito e il riso", collected in *L'altrui mestiere* (*Opere* 2: 943-6). The discussion of pure and impure animals in the Torah and, more generally, of the concept of purity in different cultures is also at the centre of the anthropological research of Mary Douglas – see particularly her groundbreaking study *Purity and Danger: An Analysis of Concepts of Pollution and Taboo* (1966). In 1975, a few years after writing "Quaestio de centauris", Levi translated her book *Natural Symbols* with the help of the Turinese anthropologist Francesco Remotti (see Thomson 368). Levi's translation of Douglas' book was published by Einaudi only in 1979.

⁴ Robert Gordon points out how the image of the creation of the human being out of mud and clay can also be found in the Book of Job, quoted as the first of Levi's key readings in *La ricerca delle radici* (Gordon 164).

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alternative story of the origin of the first woman. Before being turned into a demon, the first wife of Adam, Lilit, was created at the same time and from the same piece of clay as the first man: «La prima storia è che il Signore non solo li fece uguali, ma con l'argilla fece una sola forma, anzi un Golem, una forma senza forma. Era una figura con due schiene, cioè l'uomo e la donna già congiunti; poi li separò con un taglio, ma erano smaniosi di ricongiungersi» (Levi, *Opere* 2: 252). The quasi-human figure of the Golem is also at the centre of the short story “Il servo”, collected in *Vizio di forma*.⁵ The protagonist of the story, Rabbi Arié from Prague, creates a human-shaped figure using the clay of the banks of the Vltava River. Just like God manipulated clay to create Adam, humans can give life to a hybrid, human-like creature made of the same substance, if they follow a precise set of rules:

La differenza fra i Golem sta nella precisione e nella completezza delle prescrizioni che sovrain-tesero al loro costruirsi. Se si dice soltanto: “Prendi duecentoquaranta libbre d'argilla, dà loro forma d'uomo, e porta il simulacro alla fornace affinché si figga”, ne verrà un idolo, come li fanno i gentili. Per fare un uomo, la via è più lunga, perché le istruzioni sono più numerose. (Levi, *Opere* 2: 824)

The other main strand of Levi's science-fiction short stories dedicated to the investigation of the origin of life lies under the sign of Darwin. It is well-known that the works of the English biologist, in particular *On the Origin of Species*, always represented a crucial reference point for Levi.⁶ The writer often adopts the perspective of evolutionary theory to read a wide range of phenomena (including the Lager) but also finds in it a constant source of inspiration for many of his science-fiction short stories. The connection between Darwin and science-fiction is made explicit by Levi in the graph that opens *La ricerca delle radici* (Levi, *Opere* 2: 11) and represents the four trajectories that readers can follow to explore the book. Namely, the arrow called «la salvezza del capire» connects Lucretius to Charles Darwin and William Bragg, and terminates with Arthur C. Clarke. Levi makes explicit the connection between scientific knowledge and science-fiction when introducing a passage selected from the Italian translation of Clarke's essay *Profiles of the Future: An Inquiry Into the Limits of the Possible* (Clarke):

Arthur C. Clarke è una smentita vivente al luogo comune secondo cui coltivare la scienza ed esercitare la fantasia sono compiti che si escludono a vicenda; la sua vita e la sua opera dimostrano, al contrario, che uno scienziato moderno deve avere fantasia, e che la fantasia si arricchisce prodigiosamente se il suo titolare dispone di una formazione scientifica. (Levi, *Opere* 2: 199)

The relevance of such a statement backing the intersection between a scientific background and the perspectives opened by literary imagination is proven by many of Levi's Darwin-inspired short stories, the best-known example being undoubtedly “Il fabbro di se stesso”. In this text, the protagonist-narrator tells about its numerous metamorphoses over several millions of years. In this long span of time, it evolved from a fish living near the muddy banks of a river to a human being able to fabricate tools and kindle a fire. The most striking feature of the protagonist is the ability to remember all the stages and changes it went through in its evolution, annotating them in its diary: «io ricordo tutto quanto è avvenuto ad ognuno dei miei avi, in linea diretta, fino al tempo più remoto. Fino al tempo, credo, in cui il primo dei miei avi ebbe in dono (o si fece dono di) un encefalo differenziato» (Levi, *Opere* 1: 813). One of the key Darwinian aspects of “Il fabbro di se stesso” is the description of the modifications happening to the body and behaviours of the evolving protagonist in order to adapt to the changes in the

⁵ On “Il servo”, see Lollini.

⁶ On Levi and Darwin, see at least Pievani; Ghelli, “Umano e non-umano”; Antonello, “Primo Levi e Charles Darwin”.

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natural environment. As we will see more in-depth in the next section, this ecological perspective is present in several of Levi's science-fiction short stories that represent hypothetical second creations or radical mutations of the living beings of the Earth in response to a sudden and profound change in the natural environment.

With regard to this topic, the discussion of the ecological impact of the human species on the planet recurs frequently in Levi's science-fiction.⁷ In "Il sesto giorno", a short story where the perspectives of evolutionary theory and biology meet Middle Eastern mythology and the Bible,⁸ this crucial problem is considered by the council of divinities and technicians meeting to discuss the features they should give to the new human species. One of the first to express his concerns is Ormuz, who declares: «Non ho mai fatto mistero della mia opposizione di principio alla creazione del cosiddetto Uomo. Già all'epoca in cui la Direzione aveva, non senza leggerezza ... formulato la prima stesura della mozione ora letta, avevo fatto presenti i pericoli connessi con l'inserimento del cosiddetto Uomo nell'equilibrio planetario attuale» (Levi, *Opere 2*: 620-1). The worries of Ormuz regarding the potential disruptive impact of the new human species on the natural environment are forcefully abandoned in the closing paragraph of the short story, which sees a sudden change in the plans of the council. A higher supernatural power, the Jewish God, intervenes before an agreement is reached: the first man is created from a piece of clay, and the first woman is modelled from one of the man's ribs. However, as we will see in the next sections of this article, Levi will come back to consider the ecological impact of the human species in several of his later essays and science-fiction short stories.

2. A New Adam: Technology, Ecological Crises, Cross-Breeding

With regard to the theme of the origin of life, Levi's speculative hypotheses often explore how life on Earth could adapt and evolve following the invention of new ground-breaking technologies, which generate profound modifications to the previously existing biological and ecological structure of life at all levels, from the microscopic world of parasites to a planetary scale. These 'second geneses' caused by human technologies could lead to unpredictable outcomes: what, on the one hand, can cause the destruction of the ecological relationships on the entire planet and represent a threat to all living beings, may give the start, on the other hand, to an exceptional moment of creation and prompt the reorganisation of the very structure of life. As we will see, these events sometimes regard mainly the human species, as in the case of "I sintetici", but extend more often to all living beings, animals and plants alike, as we see in "Disfilassi".

In "I sintetici", Levi hints at a near future in which human beings will be generated exclusively through artificial fecundation – a technology actually invented just a few years after *Viziò di forma* was published, as Levi remembers in the preface to the second edition of the book (Levi, *Opere 2*: 655). Nonetheless, in the short story, we see this technology at a very early stage of development, with just a few 'synthetic' children being born in the world. They can be recognised from the absence of the navel, a mark of distinction that they share with the first man, Adam, as they have never been in the mother's womb: «Hai mai guardato quei dipinti in cui si vede la creazione di Adamo? Ebbene, appunto, Adamo non era nato da una donna, e la cicatrice non ce l'ha» (Levi, *Opere I* 684). Synthetic children can be considered new Adams, marking a new starting point for humanity, and are perceived by their classmates as not entirely belonging to the same species. The possibilities of this new reproductive technique are

⁷ On this theme, see Cassata; and Iovino, "La libertà e i segni".

⁸ On Levi's reuse of mythology, particularly with regard to "Il sesto giorno", see the chapter "Miti e creazione" in Pianzola.

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extraordinarily promising because it enables the creation of new hybrid humans with selected features coming from other animal species: «adesso [...] i bambini li calcolano come si fa coi ponti, cellula per cellula, e si possono fare su misura, alti e forti e intelligenti quanto uno vuole, e anche buoni, coraggiosi e giusti. Si possono anche fare che respirino sott'acqua come i pesci, oppure capaci di volare» (Levi, *Opere 2*: 689).

Although such problematic references to eugenics inevitably remind us of projects and experiments carried out by the Nazis to create a pure master race⁹ (discussed by Levi in his famous short story “Angelica farfalla”), what is particularly striking about “I sintetici” is that Levi contemplates the hypothesis of extensive use of artificial fecundation as a potential solution to the problems threatening our planet in the present and the near future. The main concerns of the author are overpopulation and the excessive exploitation of natural resources, which could cause massive humanitarian crises and rapidly drive all forms of life on Earth to extinction – a destiny hinted at in many short stories of *Viszjo di forma*, such as the diptych “Recuenco: La nutrice” and “Recuenco: Il rafter”. The discourse of the protagonist, which closes “I sintetici”, has the tone of a dark prophecy and reminds us of other apocalyptic narratives written by Levi on the irreversible and dramatic environmental impact of human activities (such as in “Ottima è l'acqua”):

Non c'è più tempo da perdere: nel 2000 saremo dieci miliardi, capite, dieci: e se non si provvede finirà che ci mangeremo gli uni con gli altri. Ma anche se non si arrivasse a questo punto, ci saranno l'acqua e l'aria contaminate, in tutto il mondo: l'aria sarà diventata smog, anche in cima all'Everest, e l'acqua sarà preziosa perché le sorgenti si seccheranno. (Levi, *Opere 2*: 690)

As demonstrated by Francesco Cassata, Levi's discussion of the environmental problems provoked by the post-war large-scale industrialisation of the world was supported by the timely readings of famous essays and pamphlets dedicated to problems such as the exploitation of natural resources, environmental pollution, food production, and overpopulation: «Levi ha inoltre letto *Primavera silenziosa*, di Rachel Carson, pubblicato da Feltrinelli nel 1963, e conosce il dibattito sul tema della sovrappopolazione aperto dall'uscita, nel 1968, di *The Population Bomb*, del biologo di Stanford Paul R. Ehrlich» (Cassata 371). In the passage immediately following the one quoted above, the schoolboy protagonist of “I sintetici” insists on the need for urgent intervention. He then proposes a radical idea that goes against all laws of natural reproduction, which is to give birth to old and experienced technicians and scientists who could promptly act to resolve the environmental disasters caused by the human species:

Tutto questo non è un'invenzione, ma sta già succedendo: per questo è indispensabile far nascere subito degli uomini anziani, degli ingegneri e dei biologi: non si può aspettare che siano cresciuti i bambini che nascono oggi, e che abbiano finito l'università. Ci vorrebbero trent'anni prima che potessero mettersi al lavoro. Ecco: è per questo che bisogna... che abbiamo bisogno subito di anziani. (Levi, *Opere 2*: 690)

The idea proposed by the protagonist challenges not only the new technique of artificial fecundation but also the very logic of reproduction and life on Earth. However, from a Darwinian perspective, generating adult skilled human beings may represent a paradoxical advantage for the species despite their short life expectancy: indeed, considering the dramatic ecological situation the entire humanity is facing, this appears to be the only possibility to save life on the planet. At the same time, this hypothesis ‘against nature’ addresses the responsibilities of scientists and technicians about the ecological threat that humanity poses to the planet:

⁹ On this topic, see Eleonora Lima's article (“Eugenics and Reproductive Technologies in Primo Levi's Science Fiction: The Importance of the British Interwar Debate”) in this special issue of *Enthymema*.

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they are the only ones that can contribute with their discoveries to either further worsen or radically improve the environmental crisis. The reflection on the accountability of scientists emerges frequently in Levi's essays of the 1970s and 1980s (such as in "Covare il cobra") but is particularly at the centre of several science-fiction narratives of these decades. One of the short stories where this theme is at stake is "Disfilassi", collected in *Lilit e altri racconti*, where the world has been irreversibly affected by the consequences of a scientific discovery gone out of control. The plot of "Disfilassi" revolves around a fictional drug (ipostenone) used in large quantities and for several years in hospitals as a powerful tranquilliser. The intention of the researchers who created the new drug was to open new possibilities for surgery, making transplants of animal organs in humans possible: given that «le difese immunitarie che un tempo impedivano gli incroci fra specie diverse erano deboli o nulle» after the use of ipostenone, anyone could have chosen to become a hybrid creature and have «gli occhi di un'aquila o lo stomaco di uno struzzo» (Levi, *Opere 2*: 315). Since ipostenone is indestructible and can affect all living beings, its accidental release in the natural environment caused unforeseen side effects. Ipostenone eliminated the barriers among different species and made interspecific cross-breeding a reality while simultaneously cancelling any effects of vaccines and medical treatments, radically altering life on planet Earth at all levels:

Quanto alla storia dell'ipostenone, la sapevano anche i bambini: era indistruttibile, ma se n'erano accorti troppo tardi, passava dagli escreti alle fognature al mare, dal mare ai pesci e agli uccelli; volava per l'aria, ricadeva con la pioggia, si infiltrava nel latte, nel pane e nel vino. Adesso il mondo ne era pieno, e tutte le difese immunitarie erano cadute. Era come se la natura vivente avesse perso la sua diffidenza: nessun trapianto veniva rigettato, ma anche tutti i vaccini e i sieri avevano perso il loro potere, e gli antichi flagelli, il vaiolo, la rabbia, il colera, erano ritornati. (Levi, *Opere 2*: 315)¹⁰

If in "I sintetici" the protagonist warns his classmates about the global scale of the threat posed by environmental pollution and overpopulation, presenting artificial fecundation and eugenics as a potential solution for a better world, in "Disfilassi" the human species already lives on a planet irreversibly contaminated by ipostenone, where the progress achieved over several centuries by humanity in the medical fields has been cancelled, and there is no prospect for a solution. The human population has quickly learned to accept life on the post-apocalyptic contaminated planet and finds its potential benefits: «Era stupido fermarsi alla superficie, al moralismo puritano, e annoverare la disfilassi fra le catastrofi» (Levi, *Opere 2*: 318-9).¹¹ In fact, the unpredictable and uncontrolled characteristics of cross-breeding have restored the randomness and openness of primordial chaos. The world can relive the magical moment of the origin of life, similar to the 'panspermia' narrated in "Quaestio de centauris", and observe the fast-paced course of evolution following the new rules determined by ipostenone, in the hope of creating a new Adam, able to overcome the drawbacks caused by the loss of modern medicine:

¹⁰ Levi's fictional drug can bear a possible echo of the Thalidomide scandal, which happened only a few years before Levi wrote the short story. Thalidomide was widely used as a tranquilliser, like 'ipostenone', and an antitumor drug and its teratogenic side effects on newborn babies derived from its use during pregnancy only emerged after several years.

¹¹ If Charlotte Ross pointed out that in "Disfilassi" «repopulation is [...] a political statement, against the Nazi genocide» (157), Damiano Benvegnù explicitly links the monstrous "second genesis" narrated in the short story to the animalisation of Jewish prisoners in the Lager: «Indeed, the new coherent entropy of this hybris *chaosmos* seems to mirror the dreadful organized entropy of pain and suffering in Auschwitz. More specifically, the second creation represented in this story responds to the 'controcresazione' of the concentration camp: the marvelous animal monsters created by the "disfilassi" reverse the imposed bestialization of the concentration camp» (235).

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Ogni anno, ogni giorno, nascevano specie nuove, più in fretta di quanto l'esercito dei naturalisti gli potesse trovare un nome; alcune mostruose, altre graziose, altre ancora inaspettatamente utili, come le querce da latte che crescevano nel Casentino. Perché non sperare nel meglio? Perché non confidare in una nuova selezione millenaria in un uomo nuovo, rapido e forte come la tigre, longevo come il cedro, prudente come le formiche? (Levi, *Opere* 2: 319)

3. Levi and the Primordial Soup

Given his lifelong work as an industrial chemist and his profound curiosity for the natural sciences, it is not surprising that Levi dedicates several essays to considering the problem of the origin of life also from a scholarly perspective. These writings belong to the latest phase of his career as a writer, a moment when he appears to look more and more for a satisfying answer to what he defines as «il problema» (Levi, *Opere* 2: 1672) that natural sciences have tried to solve for centuries. In these essays, Levi focuses on the processes that constitute the foundation of life and attempts to elaborate a general explanation from the perspective of chemistry and biology – despite admitting not always having the professional competence or scholarly knowledge to evaluate all aspects of his hypotheses.

In “L'asimmetria e la vita”, published in September 1984 in the magazine *Prometeo*, Levi starts by considering the problem of the origin of life from a chemical perspective, taking into account the phenomenon of chirality.¹² Since chirality is a property particularly frequent in biochemical compounds, Levi is forced to make «un'invasione di campo» (Levi, *Opere* 2: 1596) and act as an amateur biologist to examine the implications of this property. Namely, all molecules responsible for the existence of life on Earth (proteins, cellulose, carbohydrates, DNA) have a left-handed asymmetry, regardless of the living creature we take into account, «dai virus ai licheni alla quercia al pesce all'uomo» (Levi, *Opere* 2: 1589). However, if life depends on left-handed molecules, how did asymmetry originate in a first place?

In a key passage of the article, Levi considers the famous Miller-Urey experiment, conducted in 1952, which tried to reproduce in a laboratory the conditions of the primordial soup by releasing electrical sparks in a mixture of water, ammonia, methane, and hydrogen. The experiment successfully demonstrated that amino acids were generated in this process, although right- and left-handed compounds could be found in equal amounts. Reflecting on how left-handed molecules could have prevailed, Levi is reluctant to accept this might have been caused by a singular event, either occurring spontaneously within the primordial soup or provoked by molecules coming from outer space. Levi observes indeed that «sui fatti unici non si costruisce una scienza, e quindi il discorso finisce presto, con un atto di fede (o di diffidenza)» (Levi, *Opere* 2: 1594). Sticking with a materialist vision of reality,¹³ Levi suggests that imagining a singular event at the origin of life, if not an external intervention, brings science way too close to religion and the idea of the supernatural. Nevertheless, Levi admits that even his position is problematic and observes that the scientific community had recently agreed on identifying the origin of the Universe precisely in a singular event – the Big Bang.

Unsatisfied by the number of questions raised by his attempts to understand the asymmetry of the molecules responsible for life on Earth, Levi will return to this problem a couple of years later, writing a review of the Italian translation of the book *Seven Clues to the Origin of Life* by the organic chemist and biologist Alexander Graham Cairns-Smith (Cairns-Smith). Levi's

¹² Chirality is a property of molecules, that can have two distinct asymmetrical dispositions (called enantiomers) – a right-handed and a left-handed one. Each of these enantiomers has a distinct behaviour and specific chemical properties. On the possible extension of the concept of chirality to other works by Levi, see Belpoliti, “Dall'altra parte”.

¹³ On Levi's materialism, see Antonello, *Il ménage a quattro* 107-9; Ghelli, *The Suffering Animal* 99-144.

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article revolves once again from its very title (“Argilla di Adamo”) around mud and clay, materials that we have already found in the writer’s science-fiction short stories as the substratum responsible for the origin of life. Levi mentions mud for the first time in the opening paragraph of the article in relation to the outdated theories of ancient philosophers and Renaissance scientists, according to whom «la vita nasce per generazione spontanea dal materiale corrotto, le rane dal fango, le mosche dal sudiciume» (Levi, *Opere 2*: 1672) – a process similar to that narrated in ancient myths on the origin of life or, once again, to the ‘panspermia’ of “Quaestio de centauris”.

The crucial question Levi asks himself while reviewing Cairns-Smith’s book is how from chaos came the order. Following the biologist’s ideas (which Levi admits struggling to follow sometimes), the writer compares the natural substratum that might have prompted the passage from simple to more complex molecules to the framework supporting an arch or a bridge during their construction: «Per costruire un arco, anche all’uomo conviene disporre le pietre su un substrato, su un’impalcatura spontanea di sassi ... E se nella creazione della vita fosse avvenuto altrettanto? Se cioè la vita primigenia fosse quanto resta di una costruzione i cui confusi elementi di base sono poi scomparsi?» (Levi, *Opere 2*: 1673). Surprisingly, Cairns-Smith identified this architectural structure that supported the development of biological molecules in some common types of clays – the same material mythologically associated with the creation of life and, specifically, of Adam, the first man:

Graham ritiene di aver trovato questo substrato, e di averlo rinvenuto in un materiale abbondantissimo sulla Terra, complesso come struttura ma estremamente vario nelle sue forme ..., ed oltre a tutto nobilitato da una illustre menzione biblica: la vita primigenia, la proto-vita, non sarebbe stata basata sul carbonio, bensì sui silicati di argilla: sì, quella usata da Dio Padre per fabbricare il primo uomo. (Levi, *Opere 2*: 1673)

Cairns-Smith discovered that many clays have properties strikingly similar to those of organic compounds, such as the ability to self-replicate, build rather complex structures and synthesise substances – a reason why Levi calls them «minuscoli laboratory chimici» (Levi, *Opere 2*: 1673). Acting as a natural substratum, these clays provoked the development of similar properties in carbon-based organic molecules, which mimicked the behaviour of “inorganic life” and progressively replaced it: «Il passaggio sarebbe stato graduale; una ‘usurpazione’, come se da una corda di canapa si sottraessero via via, ad una ad una, le fibre originarie per sostituirle con fibre di nylon» (Levi, *Opere 2*: 1674). After a long-term coexistence, the newly-developing organic life of biological molecules prevailed over the inorganic life of self-replicating clays: Adam would actually be born from clay but without the intervention of supernatural power. Addressing the reader in the closing paragraph of “Argilla di Adamo”, Levi appears so fascinated by the revolutionary discoveries of Cairns-Smith that he compares them to those of Newton and Darwin and praises the biologist’s choice to conduct his research on the origin of life across several disciplines – a crucial aspect also of the method followed by Levi in his amateur investigations of reality:

Sei soddisfatto, lettore che cerchi di leggere a ritroso il gran libro della natura? Io lo sono, nonostante tutto: nonostante che l’autore stesso manifesti i suoi dubbi con decine di *se* di *ma* e di *forse* a ogni pagina. Da questa lettura difficile e convulsa sono uscito con una impressione vaga, quella di aver assistito a uno sfondamento, forse paragonabile a quelli di Newton e di Darwin. O forse invece non si tratta che di una “ipotesi di lavoro”, una impalcatura appunto, che verrà demolita in ogni caso, sia che l’arco resti, sia che crolli. In ogni caso, è entrata in lizza un’idea nuova, a mezza via fra la chimica e la geologia, e oggi sappiamo quanto feconde sono le ibridazioni fra discipline diverse. (Levi, *Opere 2*: 1674)

4. The Origin of Life, the Origin of Writing

As we have seen in the previous sections, the natural environment and the ecological relationships of humans and animals with it represent a primary source of inspiration for many of Levi's science-fiction short stories on the origin of life. This perspective offers the writer an occasion to rethink mythical tales on the creation and imagine possible future developments of life on our planet. Even while considering the theme of the origin of life from a more scholarly and technical perspective, as in the essays analysed above, Levi makes use of scientific concepts alongside mythological or literary ideas.¹⁴ Moreover, if we look at the way in which Levi's articles are organised, we can notice how the author tends to create micronarrative structures or use metaphors to make scientific concepts clear and explain them to his readers in a more immediate way. In "L'asimmetria e la vita", Levi uses the terms «dramma» and «iliade» to describe how the conflict between right- and left-handed molecules could have led to the development of life on Earth: «Il dramma potrebbe essersi svolto in vari tempi. Un "brodo primordiale" come quello ottenuto in vitro da Miller, composto in ugual misura da aminoacidi destri e sinistri; [...] Una lunghissima iliade, una silenziosa contesa di milioni di anni tra la vita destra e la vita sinistra, fra loro nemiche ed incompatibili» (Levi, *Opere* 2: 1594). The idea of a small-scale and yet epic struggle is also present in "Argilla di Adamo", where the progressive substitution of organic molecules to inorganic ones in the structures created by the self-replicating clays is called «usurpazione» (Levi, *Opere* 2: 1674), as if we were witnessing the overthrowing of a king.

The use of these metaphors shows how Levi considers «matter as a text, as a site of narrativity» (Iovino, "Stories from the Thick of Things" 451),¹⁵ in line with the most recent theoretical reflections of prominent scholars in the field of the environmental humanities. Levi indeed often reflects on the agentivity of both organic and non-organic matter, imagining the untold stories they could tell and how these stories could help us better understand the world. As Hubert Zupf wrote, «the world of nonliving matter itself [...] is not merely inert or passive but dynamic and agentive. [...] Matter in this sense is an indispensable part and medium of ecosemiotic and ecocultural processes, representing not merely passive conditions but co-agentive substances and energy fields on which all natural and cultural life depends» (52). Drawing from this theoretical perspective, we can observe that Levi stresses the contiguity between the biological phenomena of generation and the act of writing in several points of his *oeuvre*. Particularly in his interviews, Levi frequently reflects on how creativity works and interrogates himself on the origin of literary inspiration, referring to a biological paradigm to describe these largely unconscious processes. When asked by interviewers about how ideas first appear in his mind and are later arranged into a complex narrative, Levi compares the creative work to the replication of cells or the growth of inorganic structures:

Succede all'ingrosso quello che succede per un chicco di grandine o per un organismo: nell'uno e nell'altro c'è un nucleo, una cellula fecondata, un germe cristallino, intorno al quale si stratificano poi in modo crescente gli sviluppi: nel caso del racconto c'è molto lavoro razionale, e cioè questa cellula fecondata a me capitava che mi venisse addosso, particolarmente in laboratorio – e forse è la sola cosa del mio laboratorio chimico che rimpiangi – questa sollecitazione, questo nascere in modo anomalo e imprevedibile di un'idea trapiantata. (Levi, *Opere* 3: 408-9)

¹⁴ Robert Gordon underlined how there are also crucial ethical implications in Levi's exploration of the theme of invention from both a scientific side and a literary, mythological one, rooted in his very idea of literature (164).

¹⁵ On the intrinsic narrativity of organic and non-organic matter in Levi's works, see also Benvegnù 177-210.

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Depending on the genre he is writing, Levi measures consistent variations in this natural, spontaneous creative process because he has «l'impressione precisa di secernere prosa e poesia con due ghiandole diverse» (Levi, *Opere* 3: 474). According to Levi, if compared to the composition of short stories, poetical inspiration originates in a completely different way: short stories grow layer after layer around a nucleus and require a constant effort to give an order to ideas; poems instead emerge more abruptly and without a precise plan, taking the writer himself by surprise. Composing poems, Levi notices, is «come trovarmi in mezzo a una fungata [sic]: non si sa mai dove e quando nasce un fungo» (Levi, *Opere* 3: 469). Levi returns to the metaphor of the mushroom in another interview, where poetry is likened to «un fungo che cresce in una notte, ci si sveglia al mattino con una poesia in mente, o per lo meno il nocciolo di essa» (Levi, *Opere* 3: 686).

In Levi's poems and short stories, the link between literary inspiration, biological processes and the origin of life is even more evident. The act of writing is considered from an ecological perspective and is often seen by Levi as the final point of biological processes. A first notable example is the second half of the poem "Nel principio", composed on 13 August 1970, where Levi traces a direct link between the Big Bang and his own hand, represented while writing the very words we are reading:

Da quell'unico spasimo tutto è nato:
Lo stesso abisso che ci avvolge e ci sfida,
Lo stesso tempo che ci partorisce e travolge,
Ogni cosa che ognuno ha pensato,
Gli occhi di ogni donna che abbiamo amato,
E mille e mille soli, e questa
Mano che scrive. (Levi, *Opere* II 704)

This connection of the act of writing to the cosmos and, in particular, the last image of the hand tracing the words of the poem clearly reminds us of the closing paragraph of "Carbonio". Famously, the short story follows the journey of a single atom of carbon: after it is released into the atmosphere by a miner digging the rock where it was trapped for millions of years, the atom starts to travel and takes part in several chemical processes in plants, animals and the natural environment. "Carbonio" represents a perfect example of the concept of a «creative biosphere» (Zaupf 53) since it highlights the continuity between the agency and the creativity of non-living matter and living beings (plants, animals and human beings alike), that participate together in the constant effort of material and cultural reshaping of the planet's environment.¹⁶ The last lines of the short story describe the atom of carbon entering Levi's body and brain, determining the movement of his muscles and prompting him to trace the full stop that closes the sentence and the book:

Uno, quello che ci sta a cuore, varca la soglia intestinale ed entra nel torrente sanguigno: migra, bussa alla porta di una cellula nervosa, entra e soppianta un altro carbonio che ne faceva parte. Questa cellula appartiene ad un cervello, e questo è il mio cervello, di me che scrivo, e la cellula in questione, ed in essa l'atomo in questione, è addetta al mio scrivere, in un gigantesco minuscolo gioco che nessuno ha ancora descritto. È quella che in questo istante, fuori da un labirintico intreccio di sì e di no, fa sì che la mia mano corra in un certo cammino sulla carta, la segni di queste volute che sono segni; un doppio scatto, in su ed in giù, fra due livelli d'energia guida questa mia mano ad imprimere sulla carta questo punto: questo. (Levi, *Opere* 1: 1032)

¹⁶ In this sense, "Carbonio" fits perfectly within the recent ecosemiotic reading of Levi's *oeuvre* carried out in Iovino, "La libertà e i segni".

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As this quotation shows, although “Carbonio” is part of Levi's autobiography (*Il sistema periodico*) and concludes it, the use of a radical cognitive estrangement in the narration of the cycle of a single atom of carbon makes this writing a science-fiction short story. Even more than the examples considered above in this article, “Carbonio” is undoubtedly Levi's ultimate narrative on the origin of life, and opens up the author's autobiography (began with the story of his ancestors, narrated in “Argon”) by linking it to the stories of all humans and all living beings: «il carbonio [...] dice tutto a tutti, e cioè non è specifico, allo stesso modo che Adamo non è specifico come antenato» (Levi, *Opere* 1: 1026).¹⁷ Moving on in the short story, we see how carbon is strictly linked not only to the physical act of writing but also to Levi's career as a writer and his very idea of literature. The author remembers how the first literary idea he ever had was to write a short story on the adventures of a single atom of carbon: «Al carbonio, elemento della vita, era rivolto il mio primo sogno letterario, insistentemente sognato in un'ora e in un luogo nei quali la mia vita non valeva molto: ecco, volevo raccontare la storia di un atomo di carbonio» (Levi, *Opere* 1: 1026-7).

Many scholars have stressed the crucial role of “Carbonio” within Levi's *oeuvre*. Among them, Antonio Di Meo considered the short story foundational, backdating its first idea to the moment Levi read one of the books that had a stronger impact on him as an adolescent: «Un sogno antecedente al lager, che probabilmente era nato in lui quando, liceale sedicenne, aveva letto il libro del premio Nobel 1915 della fisica William Henry Bragg *L'architettura delle cose. Dagli atomi ai cristalli*, edizione italiana del 1934 del libro divulgativo *Concerning The Nature Of Things* (1925), acquistato dal padre Cesare, lettore onnivoro e compulsivo» (417). Levi will include a passage from Bragg's book in his autoanthology *La ricerca delle radici*, stressing the importance that the physicist (together with Darwin) had for him at sixteen years old. Bragg introduced for the first time the young Levi to the immensity of the universe and the concept of scale: «i modelli in scala umana, i concetti di forma e di misura, arrivano molto lontano, verso il mondo minuscolo degli atomi e verso il mondo sterminato degli astri; forse infinitamente lontano?» (Levi, *Opere* 2: 37).¹⁸ However, what Bragg also taught Levi was that reality could be explored at the same time through the means of scientific research and literary imagination: «viviamo in un cosmo immaginabile, alla portata della nostra fantasia, e l'angoscia del buio cede il posto all'alacrità della ricerca» (Levi, *Opere* 2: 37). As I showed in this article, these are exactly the tools Levi would use during his career as a writer, especially in his attempts to understand how life originated on our planet, exploring the potentialities of hybridising the points of view of different disciplines both in his essays and science-fiction short stories.

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¹⁷ In the article “Nelle vicinanze non si vede un altro Adamo”, dedicated to extraterrestrial forms of life, Levi compares the carbon-based organic molecules responsible for life on Earth to the clay used to mould the first man: «Non c'è un altro Adamo, almeno nelle nostre vicinanze, non c'è nemmeno il suo più rudimentale progenitore: ci sono solo composti moderatamente complessi del carbonio, cioè l'argilla per costruirlo» (Levi, *Opere* 2: 1513).

¹⁸ On the theme of scale in Levi's science-fiction, see Marzia Beltrami's article in this issue of *Enthymema*, “Il complesso straniamento della fantascienza di Primo Levi: Giochi di scala in ‘Una stella tranquilla’ e ‘Visto di lontano’”.

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