3 Transgressive Legacies of Memory
The Concept of Techne in Primo Levi’s The Periodic Table

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In a book called Holocaust Testimonies: The Ruins of Memory, Lawrence L. Langer noted that the common aspect of verbal and written testimonies provided by various witnesses is ‘the struggle with the impossible task of making their recollections of camp experience coalesce with the rest of their lives . . . . Each work reflects not defiance but a basic human need to interpret the meaning of one’s experience, or to pierce the obscurities that shroud it in apparent meaninglessness’ (1991: 3, 57). It is precisely this comprehension impetus that drove Italian writer and first-generation survivor Primo Levi to write his award-winning books beginning with the very early Se questo è un uomo (If This is a Man, 1947) and continuing with La Tregua (The Truce, 1963), Storie naturali (Natural Histories, 1966), Vizio di forma (Formal Defect, 1971) and the much-appreciated Il sistema periodico (The Periodic Table, 1975).¹ The aspect that distinguishes The Periodic Table from the other works is the summative and intrinsically humanist intent of combining in narrative form the author’s technical skills as a chemist with his experience as a camp inmate and Holocaust survivor. Hard to classify in terms of genre due to its intriguing mix of technical science, poetic mythology and life writing, this piece is often referred to as a memoir, ‘a condensed Buildungsroman,’ (Gordon 2001: 140) a ‘symbolic autobiography’ (Scheiber 2007: 47) or ‘an intellectual biography,’ (Guiliani 2003: 7) and even a mystery; each description covers but a limited array of this work’s many facets.

In The Periodic Table, the ethical concept of integrity as related to (personal) history, research and writing is closely associated to Levi’s reflections on humanity. His main concern is human probity or the lack thereof, particularly in connection with the problematics of moral survival and the consequences of traumatic history for the present. Equally, Levi stresses man’s lack of rectitude in relationship with other humans and with nature by establishing connections between his family’s history, his pre- and post-World War II experiences and the physical world of chemistry. Additionally, integrity and humankind are examined at the mythical, philosophical and literary levels.
Because Levi's views on integrity overlap with his perspective on humanity in its ontological, creative and technological aspects, I propose an exploration of *The Periodic Table* by means of the Greek philosophical concept of *techné*.

**TECHNÉ—TECHNICS—TECHNICITY—TECHNOLOGY**

Aristotle first coined the term *techné* 2,500 years ago. Its meaning and applicability have since been tapped into 'everything from a philosophical concept or idea, a historical or material process, an anthropological tool or prosthesis, an ontological condition, a mode of discourse, a way of thinking to even the basic state of life itself' (Bradley and Armand 2006: 9). From Plato and Aristotle to Marx, Nietzsche and Freud to Bergson, Husserl, Benjamin, Simondon, Deleuze and Guattari, and further to Derrida, Stiegler and, more recently, Friedrich Kittler, Manuel de Landa and N. Katherine Hayles, the theory and praxis of technicity have been questioned, debated and investigated in relation to larger areas of knowledge such as nature, 'the human and animal condition, history, science, evolution, culture and the political. Particularly nowadays, in our era of quantum computing, neural implants, new media, globalization and postcapitalism, the resurgence of *techné* as technology compels artists, (techno)scientists, philosophers and politicians to rethink the interaction between humans and their (techno)environment, along with its impact on the definition and boundaries of the human.

Plato compared the Socratic idea of recollection of the immortal soul dubbed *anamnesis* to the prosthetic/technical accessory to memory called *hypomnesis* (Plato 2004: 10). By that, a slight hierarchical distinction between thought and artifice (technicity), the transcendental and the empirical, the infinite and the finite were implied. It is Aristotle, though, to whom we owe the actual term *techné*, used mainly to label practical thought/knowledge in relation to the theoretical thought designated by the *episteme* (Aristotle 1999: 192b–193b).

Again, the distinction is made between the philosophical knowledge as an end in itself and the technical knowledge, or craft knowledge, that serves to fabricate objects. Thus, the Aristotelian notion of technicity is synonymous to the particular tool/instrument/prosthesis used by humans to create a so-called 'technical object.' According to Aristotle, unlike natural creations (like a tree's buds, for instance), technical creations require an outside force, or *causa efficiens*, in order to be brought into being. All in all, as Arthur Bradley and Louis Armand suggest, the Aristotelian vision of *'techné* is congruous to a prosthesis (*... pro-thesis*, i.e., an addition; what-is-placed-in-front-of) considered 'in relation to nature, humanity or thought; one that can be utilised for good or ill depending upon who or what happens to wield it' (2006: 2–3).
However, the modern philosophy of technology has moved away from the classical divide between nature and technicity. Karl Marx and the ideas foregrounded in historical materialism challenge this opposition by arguing for a reciprocal codetermination of the human and the technical.² It is Martin Heidegger, though, who was credited with the truly radical shift from the Aristotelian concept of *techne*. He posed the ‘question concerning technology’ from an ontological and aesthetical perspective by defining *techne* as *poiesis*. According to him, technology is rooted in language (*logos*) and the production of text, literature and, implicitly, art. In his now-notorious words, ‘*techne* belongs to bringing forth, to *poiesis*; it is something poetic’ (1977: 15, 33–35). It is therefore Heidegger to whom we owe today’s most common view on *techne* as art, artifice and craft or a system of doing/production. After Heidegger, Jacques Derrida engages with our ‘technological condition’ (1995: 244–45) by questioning the divide between thought and technology (1986: 108) and rendering the Heideggerian distinction between technology and the essence of technology as problematic. He reinstates the centrality of technique in understanding both nature (*physis*) and life (*zoe* and *bios*) as well as thought (*logos*, *psyche*, *anamnesis*) in terms of an ‘originary technicity.’³

Later on, Bernard Stiegler amends Derrida’s deconstructionist observations on philosophy and technique by highlighting the need to equally tap into the historicist/materialist and discursive aspects of technology. Dwelling on the problematic condition of the ‘living psychic memory’ aggressed by the ‘dead technical memory’ in the current ‘epoch of hyper-industrialisation’ and unprecedented industrial exploitation, Stiegler (2006: 23) contends that *hypermnesis* is arguably the topical question of our age. He engages with the paradoxical (and ironical) case of exteriorized memory as ‘lost’ memory, that is, ‘lost’/‘displaced’ knowledge in the broader context of ‘cognitive’ or ‘cultural capitalism’ (2006: 16–17). This lost knowledge he calls *hypomnesis*, in keeping with the Platonic (and later, Foucauldian) tradition. This is usually the case with ‘material memory,’ that is, such ‘carriers of memory’ like ‘a piece of paper, an annotated book, a diary’ or an object of art that all embody a part of us outside ourselves (Stiegler 2006: 15). Human memory thus exteriorized becomes at once ‘technical’ and *tertiary*.³ Stiegler carries on to explain how lithic tools sharpened in Paleolithic times, although not carved for the purpose of storing memory, are retroactively a ‘support for memory’ and therefore constitute a classic case of *mnemotechnique*. On the other side of the historical spectrum, the ‘supports of objective memory,’ that is, the modern day’s devices such as the personal digital assistant (PDA), television, telephones, GPS and computers, to name just a few, embody what Stiegler calls *mnemotechnology*: these technological devices and services cause a gradual loss of human memory and knowledge, however, that will eventually trigger forgetfulness, followed by ‘human obsolescence,’ impotence and even futility (2006: 17–19). Thus,
as Stiegler and his predecessors warn us, the very nature of the human condition and its boundaries are brought into question.

A defining feature of Stiegler's understanding of technics is his concept of 'organized inorganic matter' that exemplifies the sharpened flint as carrier of 'epiphylogenetic memory,' a process that is essential to 'transindividuation,' or the transmission and survival of historical, collective memory through individual memory: 'A sharpened flint is formed from inorganic matter that is organized by honing it to a point. The gesture of a craftsman [technicien] eng-gam-mes [engramme] an organization which is transmitted via something inorganic, opening up for the first time in the history of human life the possibility of transmitting knowledge that is acquired individually, but in a way that is biological' (Steigler 2006: 26). The existence of such 'retensional devices' (the flint) within 'mnesic environments' (a historical society at a certain point in time) and the possibility of transindividuation (i.e., the transmission of its memory to an individual/collective across space and time) are current phenomena that help perpetuate philosophical, religious and political questions. As the following analysis will show, the classic and modern perceptions of techne, in particular its complex relationship with nature and memory through time, are intrinsically connected to Primo Levi's most profound vision of science, art and the human condition. Chemistry, as scientific knowledge, practical enterprise and stimulus of artistic and mythical thinking, makes the central topic of Levi's audacious, most authentic and thought-provoking work—The Periodic Table.

THE SPIRIT OF TECHNE IN LEVI'S THE PERIODIC TABLE

In Primo Levi's The Periodic Table, the question of techne is dealt with at several levels. Although Levi never showed any conspicuous interest in philosophy in itself and was, in fact, quite sceptical of its 'inconclusive metamorphoses from Plato to Augustine, from Thomas to Hegel, from Hegel to Croce' (Levi 1995a: 26), his work illustrates a concern with the philosophical, ethical and anthropological questions of his time with regard to applied science, technology, art and the human condition. A scientist well known for his austere humanism, he kept well clear from any form of radicalism, from 'polarized positions and ideological short-cuts,' preferring the 'local' and the 'circumstantial' to the general, and a balanced, informed, and well-measured style of writing (Antonello 2007: 91). As Levi declares in his posthumous work The Black Hole of Auschwitz: 'We need to deal with problems one by one, with honesty, intelligence and humility: this is the delicate and formidable task of today's and tomorrow's technicians' (quoted in Antonello 2007: 91).

This 'delicate and formidable task' consists, in his case, in the man's direct interaction with chemical elements and the subsequent production of
a literary text whose meanings are deeply rooted in experience, history and technical knowledge. His involvement with the small-scale, experimental lab craftsmanship, as opposed to the big science, informs his stance on technics and his attitude towards the natural world. He embraces nature, not only as object of scientific or specialized exploration, but also as a means to understand the human experience and his condition on Earth. That is to say, the narrator in Levi's text explores the instrumental and empirical aspects of his profession by applying and testing theoretical assumptions about chemical elements, not only in the laboratory, but also outside it. In that sense, Levi's position regarding nature and practiced science echoes Gaston Bachelard's concept of 'rational materialism' (Antonello 2007: 98–99), which should be thought of, according to analyst Mary Tiles, as 'applied rationalism' (1984: 173). To contextualize, she explains that the periodic table is for chemistry precisely what the Newtonian system is for physics, that is, a turning point suggestive of the transition from the empirical level to the theoretical or rational stage. And so, whereas Bachelard makes nuanced observations on the advantages and disadvantages of theorizing science and cautions against the perils of induction and abstractionism, his rational materialism remains moderate, in the sense that it retains strong ties with empiricism and its functional properties, from which it has developed: 'Transition to this stage [to the rational, theoretic stage] is coincident with transition, at the empirical level, from fenomenology to phenomeno-technique (to use Bachelard's terms), or from natural history to technologically experimental science' (Tiles 1984: 173). The Bachelardian concepts of 'phenomeno-technique' and 'technologically experimental science' resonate with Levi's own view on chemistry, particularly at the operational level. In fact, techne understood as technicist/technological work and applied science permeates Levi's writings, particularly the collection of short stories under scrutiny here. The additional genocidal overtones that applied science and chemistry, in particular, have been loaded with in the aftermath of the Holocaust, doubled up by Levi's own position as chemist-cum-slave-labourer in the Nazi camp, are factors that add up to the complexity of the tainted modern connotation of techne (Belpoliti and Gordon 2001: 174).

In The Periodic Table, Primo Levi's humanistic stance shows, however, in his narration of the lager (camp) experience, by engaging the concept of techne to serve such ideas as the restoration of human dignity and humanity after Auschwitz. To that scope, the figure of the chemist is employed as a modern parallel of the Greek concept of homo faber: the technician is the industrious, manual worker and resilient individual (or survivor in his case) who initiates scientific, epistemological and literary experiments and simultaneously becomes the forger of himself.

At the personal level, the joint praxis of chemistry and writing offers propitious opportunities to reorder a life shattered by trauma. As Levi declared in an interview with Roberto di Caro in 1987: 'In my books... I see... an immense need to put things in order, to put order back into a
world of chaos, to explain to myself and the others. . . Writing is a way of creating order' (Belpoliti and Gordon 2001: 174). Not surprisingly, then, Levi's choice of words, *il sistema periodico*, in the collection's title instead of perhaps *la tavola periodica* is evocative of his authorial urge to organize and systematize a life's work and experience according to a meaningful paradigm. As I will show later, however, Levi is ambivalent about order, in that he also insists on the significance of serendipity and chance in scientific progress and artistic achievements.

On a grander scale, Levi's rationalist pragmatism is reminiscent of the values promoted in ancient Greek philosophy, particularly in the Aristotelian virtues of *Nicomachean Ethics*. Of particular relevance to *The Periodic Table* and Levi's outlook on work and art are such ethic virtues as 'choice and responsibility,' 'self-knowledge,' 'justice,' and 'practical wisdom.' As Roger Crisp points out, '[the Aristotelian] virtues . . . are dispositions engendered in us through practice or habituation' (Aristotle 2000: xv), as an exercise leading to the 'virtuous right action.' Yet this is perhaps the aspect where Levi's work ethic diverges most from Aristotle's thought; Levi rejects the righteous outcome in all situations and declares himself most openly an adept of practice and of the trial-and-error approach: 'Whether in his chemistry, his writing, or his life, Levi pursues knowledge through testing out hypotheses and probing for the limits of error' (Gordon 2001: 134). In other words, Levi contends the Aristotelian ideal to excel and the habituation in the quest for excellence do not guarantee the right outcome in all cases.

As for Aristotle's rational choice and responsibility, along with the other virtues and their applicability to Levi's work, they will be looked at in direct relation to the concept of *techné* as the analysis unfolds.

Published in 1975 and covering the narrative period between 1935 and 1967, *The Periodic Table* is Levi's most innovative work in terms of composition and thematic systematization. In biographer Carole Angier's words, it is 'a subtle, teasing book, in which the chemical element which is the title of each chapter is a metaphor for its subject' (Angier 2002: 12). Due to its complex composition, it is alternately categorized as a novel, collection of short stories, autobiography, memoir or poetical myth. In terms of content, it relates episodes of Levi's personal life or fictitious tales organized by analogy with a selection of twenty-one inorganic elements of Mendeleev's periodic table (which contains 105 elements in all). The result is an insightful, relatively chronological glance at Levi's own experience in prewar Fascist Piedmont in Northern Italy, then in Auschwitz and back in Italy after the war, all sequences being woven together by stories of chemical reactions and hands-on interaction with matter. As such, the storytelling perspectives are manifold and range from that of a chemist-physicist, a student partisan, an Auschwitz inmate, Holocaust witness and survivor and last, but not least, a skilled writer who frequently changes narrative voices. In fact, his position as a writer, aware of the difficulty
in categorizing his work, prompts him to commence the last chapter, titled 'Carbon,' with a metatextual disclaimer of sorts, meant to set the boundaries of an otherwise hybrid, polyvalent text whose experimental quality intrigues and fascinates:

This is not a chemical treatise: my presumption does not reach so far. . . . Nor is it an autobiography, save in the partial and symbolic limits in which every piece of writing is autobiographical, indeed every human work; but it is in some fashion a history. It is—or would have liked to be—a micro-history, the history of a trade and its defeats, victories, and miseries, such as everyone wants to tell when he feels close to concluding the arc of his career. (Levi 1995a: 232)

The key concepts employed in this description are 'chemical treatise,' 'autobiography,' 'work' and 'micro-history.' Whereas the first two terms indicate a definition by negation, suggesting this work should be associated with neither scientific nor life writing in the pure sense of either term, the word 'work' alludes to the notion of craftsmanship as both scientific and artistic achievement. Additionally, Levi's transdisciplinary discourse is also a manifestation of his openly declared responsibility as Holocaust survivor, compelled to communicate his 'micro-history,' or individual story, which occasionally turns into a 'counter-history' or a form of epistemological resistance against the Aryan propagandistic strategies of World War II. More often than not, this 'micro-history' is congruent with the 'macro-history' of the Jewish people, that is, the collective memory shared with both Levi's predecessors and his fellow lager inmates.

Primo Levi's inspired choice of structuring each chapter around a chemical element (the story begins with 'Argon' and ends with 'Carbon', i.e., the element of life) resonates with his deep understanding of and respect for the natural order and life's wondrous material complexity. This holistic view of man as part of nature and subject to constant and constructive interaction with other natural elements emphasizes the relevance of techné to Levi's oeuvre. The guiding principles promoted in his book regard the ways in which the scientist understands and challenges matter, on the one hand, and equally the ways in which the survivor bears witness through writing, in order to make sense of one's existence and one's mission. As such, Levi's persona shares both the traits of homo scientificus and homo scribendus, two modi vivendi with many similarities in approach and execution, which Primo Levi evokes by means of the amphibian and the centaur: 'Io sono un amfibio, un centauro. . . . Io sono diviso in due metà. Una è quella della fabrica. . . . un'altra è quella nella quale scrivo, rispondo alle interviste, lavoro sulle mie esperienze passate e presenti. Sono proprio due mezzi cervelli.' This metaphor, employed to describe the two essential modes of being for Levi as none other than two halves of a brain, reiterates the notion of humanist rationalism that best describes his attitude towards
life. In contrast to the Marxist concept of homo laborans, which portrays the working man as alienated by modern machinery and technology and entirely conditioned by his working conditions,8 Levi's personas do not strip man of his free will, his reason and creative potential. Marx touches a sensitive chord, however, when he sustains that men lose the freedom to own their lives as a consequence of work's oppressive alienation, and that strikes him as a vexatious paradox particularly in the era of modern enlightenment. This observation appears pertinent when associated with forced labour as the founding principle of the lager system.

Inherent to the camp imagery, outside of which Levi's double persona as worker and writer is unthinkable, is Giorgio Agamben's compelling doctrine of homo sacer: namely, the prototype of the outsider, the outcast deprived of rights and susceptible by law to being killed by anyone at any time, but not to sacrifice. The problem with this association is, as both Ernesto Laclau and Dominick LaCapra rightly signaled, an oversimplified view of both victimhood and the Nazi ideology and practice: on the one hand, the individual's isolation from the rest wrongly implies his lack of a collective identity (Laclau 2007: 14); on the other hand, the perpetrator's profile is more complex (LaCapra 2007: 14) than that implied in the victimizing of Muselmänner.

In the following text, I will have a look at the stylistic and scientific aspects of techne in Levi's text and the manner in which they comply with either the classical or modern model of techne.

HOMO SCRIBENDUS OR TECHNÉ AS NARRATIVE SKILL

The stories contained in The Periodic Table, regardless of the various genres they pertain to, are for the greater part autobiographical, with the exception of the fictional/allegorical chapters 'Mercury,' 'Lead,' 'Sulphur,' 'Titanium' and 'Carbon.' The chapters are mostly in chronological order, except the first and last chapters, 'Argon' and 'Carbon,' respectively, which create an 'extra-temporal frame of sorts around the text, the former relating the timeless human history of Levi's ancestors and the latter the equally timeless story of an atom of carbon in the cosmos' (Emmet 2001: 116).

Techne as the art of fictionalizing memory through narrative is a topic that Levi addressed often in his statements. Here is a paratextual example of that sort, the preface to his collection of vignettes titled Moments of Reprieve, where he dwells on the shift from the testimonial to the fictional in his work:

At Auschwitz . . . I had seen and experienced . . . things that imperiously demanded to be told. And I had told them, I had testified . . . With the passing of the years, writing has made a space for itself along- side my professional activity and I have ended up by switching to it
entirely... It is possible that the distance in time has accentuated the tendency to round out the facts or heighten the colors: this tendency, or temptation, is an integral part of writing, without it one does not write stories, but rather accounts. (1995b: vii–ix)

Later, in ‘Cerium,’ Levi readdresses the question of fiction writing in a metatextual, self-referential remark on memory, the relieving power of creativity and his choice of style based on a methodic preference for communicability, strength and clarity:

Alongside the liberating relief of the veteran who tells his story, I now felt in the writing a complex, intense and new pleasure... It was exalting to search and find, or create, the right word that is commensurate, concise and strong; to dredge up events from my memory and describe with the greatest rigour and the least clutter. Paradoxically, my baggage of atrocious memories became a wealth, a seed; it seemed to me that, by writing, I was growing like a plant. (1995a: 160)

Levi’s rigorous selection of narrative material and the striving for balance between silence and language are classical principles of *ars poetica*, which define his profile as a technical writer. Just as in chemistry where ‘distilling is beautiful,’ linguistic refinement is part and parcel of Levi’s concern with *technē cum poiesis*. The aim for consistency and precision is common to both the profession of writer and technician. As critic Antonello shows: ‘Various elements are shared between the two trades of technology and narrative: a need for symmetry, economy, the form fitting the purpose, careful planning and, crucially, a method of trial and error’ (2007: 101).

In *The Periodic Table*, the creative intent overlaps the autobiographical. From the very first chapter, Levi establishes a relationship between argon (a gas, at once ‘rare,’ ‘noble’ and inert) and his Piedmontese-Jewish ancestors through what Baxter describes as ‘disseminated prose form which linguistically embodies the physical Diaspora.’ Baxter maintains that ‘a violent history of discrimination and dislocation means that the Jewish identities have always travelled: names, languages, rituals and traditions are fluid, journeying across vast geographic spaces, absorbing and assimilating salient characteristics along the way’ (2007: 388). This aspect is evident in his ancestor’s toponymic surnames such as Bedarida/Bedarrides, Momigliano/Montemeliano, Cavaglion/Cavaillon, which underwent phonetic changes depending on the family’s migration from Spain to various locations in Italy in about 1500. The nomenclature blended with the agency-inertia dialectic suggests the mutability of their identity. The language Levi artfully employs to describe his predecessors is vulnerable to distortion and equivocation, and it comes counter to traditional accounts of family history; whereas the narrative form is conclusive and exact, the effect is subversively parodic. Instead of passing on to the descendents that unique and ‘memorable
aspect,' Levi chooses to deliberately tell us the mock heroic, mundane story of Aunt Susanna, spiced up with details of her remarkable sausages and quarrelling neighbours.

Later in the third chapter, titled 'Zinc,' Primo Levi maintains the satirical slant when reminiscing how naively unaware he used to be of his Jewish otherness before the war. Forced to acknowledge his 'impure' quality, he compares it with 'the impurity that makes the zinc react.' Before the war, he regarded his Jewishness as 'an almost negligible but curious fact, a small amusing anomaly . . . a Jew is somebody who at Christmas does not have a tree, who should not eat salami but eats it all the time, who has learnt a bit of Hebrew at thirteen and then has forgotten it' (1995a: 39). Later in the story, however, things change when Fascism 'posits itself as the discourse of absolute truth,' causing this 'accident of birth' to be 'no longer inconsequential' (Wilson 1995: 98). Levi's aversion to the politicized Aryan discourse based on racial purity and national homogeneity manifests itself through his narrative of dissent. In the fragment below, his contorted, overly abundant style make a strong derisive case against the nonsensical Fascist parlance:

The rejection was mutual. The [Jewish] minority erected a symmetrical barrier against all of Christianity (goyim, narelim, 'Gentiles', 'the uncircumcised'), reproducing on a provincial scale and against a pacifically bucolic background the epic and Biblical situation of the chosen people. This fundamental dislocation fed the good-natured wit of our uncles (barbe in the dialect of Piedmont) and our aunts (magne, also in the dialect): wise, tobacco-smelling patriarchs and domestic household queens, who would still proudly describe themselves as 'the people of Israel' . . . . And then in the case of the uncles and aunts who reach an extremely old age (a frequent event: we are a long-lived people, since the time of Noah), the attribute barba ('uncle'), or, respectively, magna (aunt) tends gradually to merge with the name, and, with the occurrence of diminutives and unsuspected phonetic analogy between Hebrew and the Piedmontese dialect, become fixed in complex, strange-sounding appellations . . . . Thus came into existence Barbaioto (Uncle Elijah), Barbasachin (Uncle Isaac), Magnaieta (Aunt Maria), Barbamoisin (Uncle Moses). (1995a: 7)

Examples like these show, as Baxter explains, Levi's subversive use of language:

Protracted clausal constructions are populated with parenthetical interjections, which in turn are interspersed with etymological explanations, which themselves are saturated with indulgent digressions or polyglottal translations. Levi's strategies, then, are to mobilise, babelise, and bastardize the language that discriminated against him on the grounds of alterity. (Baxter 2007: 390)
And it is in fragments like these, where Levi displays the linguistic potential for caricature and mockery, that Levi’s artful employment of language becomes counterpolitical.

In other chapters, such as ‘Lead,’ ‘Mercury,’ ‘Sulfur’ and ‘Titanium,’ Levi continues to challenge the reader by writing tales within tales and dispersing the authorial responsibility among several narrators. These fictional identities have nothing to do with the postmodern idea of play. Instead, Levi is more interested in creating counterhistories of otherness and testimonial acts in the fictional mode.

Further testimony to Levi’s experimentation with language are such metanarrative paragraphs where ‘the survivor compulsively writes and rewrites the story of his own radical transformation from Italian citizen to disenfranchised ‘Other’, from chemist to thief, from man to animal’ (Baxter 2007: 398). Such accretive strategies as repetition, rewriting and retelling are meant to suggest the protean nature of human identity, as this fragment from ‘Cerium’ describes:

I was a chemist in a chemical plant, in a chemical laboratory (this too has to be narrated), and I stole in order to eat...and at a certain point I realized that I was reliving—me, a respectable little university graduate—the involution-evolution of a famous respectable dog, a Victorian, Darwinian dog who is deported and becomes a thief in order to live...
I stole like him and like foxes: at every favourable opportunity but with sly cunning and without exposing myself. (1995a: 145)

This particular episode, which reveals the shameful secret of his survival, is narrated in ‘Cerium,’ the only chapter in which Levi addresses his deportation to Auschwitz. Not surprisingly, this chapter occupies the central position within the collection, with ten chapters preceding it and another ten following it. Written almost three decades after his memoir *If This Is a Man*, in which he dealt extensively with the story of his survival, this chapter is written in a composed, more detached manner:

At a distance of thirty years I find it difficult to reconstruct the sort of human being that corresponded, in November 1944, to the name or, better said, to my number 175517. I must have by then overcome the most terrible crisis, the crisis of having become part of the Lager system and I must have developed a strange callousness if I then managed not only to survive, but also to think, to register the world around me, and even to perform rather delicate work, in an environment infected by the daily presence of death... Desperation and hope alternated at a rate that would have destroyed almost any normal person in an hour. (1995a: 144)

This profound psychological mutation, impossible to fully grasp without a firsthand experience of the Shoah, reinforces the idea that man, like
matter, changes under the influence of his environment: just as the chemical elements metamorphose under pressure, due to modified physical conditions or through combination with other elements, so does the human character become transfigured under persecution and the assault of trauma.

This tremendous change explains the crisis of understanding that makes Levi affirm elsewhere that the reason why the Holocaust is so hard for others to conceive is that the survivor himself, once escaped from the camp system (*il sistema concentrationario*), finds it impossible to relate to his previous condition as inmate later on.

**HOMO FABER OR TECHNÉ AS CRAFT**

Throughout his written work, Levi projects the image of the chemist as *homo faber*, or the man as tool-maker, creator, fabricator, a ‘technician’ focused on his work upon nature, be it stone, wood, metal or any chemical substance at hand. By practicing a premechanized trade, Levi favours a premodern human relationship to nature and craft and, thus, rejects the Aristotelian idealist separation between the human/cultural and the natural. Echoes of Bachelard and his rational materialism permeate Levi’s view on the continuity and mutual determination between humans and nature, that is, between technology and the natural environment (Bachelard 1953: 32). As a technician, Levi rejoices in the act of breaking the matter’s passive resistance. He may be thought of as a mediator between *physis* and *techné*. Matter is also ‘the Spirit’s great antagonist’ (1995a: 36), as well as ‘our hostile mother’ (41) who both facilitates and hinders learning. The chemist’s confrontation with such a grand force is both empowering and dignifying, in that it gives humans the privilege to analyse and theorize the natural world. Science or scientific knowledge, in fact, was classified by Aristotle, along with ‘practical wisdom,’ ‘skill,’ ‘intellect’ and ‘wisdom,’ among the five virtues/states of the soul that lead to truth ‘by affirmation or denial’:

> The nobility of Man, acquired in a hundred centuries of trial and error, lay in making himself the conqueror of matter . . . conquering matter is to understand it, and understanding matter is necessary to understanding the universe and ourselves: and . . . therefore Mendeleev’s Periodic Table . . . was poetry, loftier and more solemn than all the poetry. (1995a: 47)

The preoccupation with operational science is, for Levi, ‘the antidote to Fascism’ because its methods are ‘clear and distinct and verifiable at every step, and not a tissue of lies and emptiness’ (1995a: 46). He counters the ignoble political lie with the verifiable truth on which technoscience is based. In chemistry, the truth about matter is discovered by trial and
error and experimentation with the elements in situations governed by serendipity, lateral thinking and intuitive decision making. As Levi shows, technicity is inconceivable without hazard: it is central to production and progress and, at the personal level, ensures professional experience because error is also ‘a vessel of ethical building’ (Gordon 2001: 139). In fact, the freedom to commit errors is what distinguishes the work in the factory from the work in the lager, where even the slightest failure or infringement of the rigid laws of the camp meant death. Unlike in chemistry, where scientific law applies to all elements, the discriminatory laws of the lager are destructive of human dignity: the ‘failure to follow orders, failure to understand orders, failure to work beyond physical collapse, the error of assuming any identity or the barest human rights’ could lead to instant death at Buna-Monowitz (Gordon 2001: 144). In derisive cynicism, the words inscribed by the Nazis over the Auschwitz gate ‘Arbeit macht frei’ stand for what Philip Roth calls ‘a horrifying parody of work’ (2001: 5–6). He digs deeper into that notion in an interview with Levi, when he asks the latter about the role of writing in cleansing the concept of work, so tainted by the Shoah. Is the narrative effort in any way motivated by the wish to restore the damaged humanity contained in the ‘disfigured’ perception of arbeit? Dehumanizing as the camp work might have been, the people there, including Levi, were paradoxically driven to do their work properly (lavoro ben fatto) as an incentive to retain their dignity:

I am fully aware that after the camp . . . my two kinds of writing (chemistry and writing), did play . . . an essential role in my life. . . . Human beings are biologically built for an activity that is aimed towards a goal and . . . idleness, or aimless work (like Auschwitz’s Arbeit) gives rise to suffering and to atrophy. In my case, work is identical to ‘problem solving.’ (Roth 2001: 6–7)

Continuing his work as a chemist in a paint factory after the war and simultaneously writing about the camp and professional experience may have solved for Levi the very dilemma of survival after Auschwitz. In The Periodic Table, it is cerium, the chemical element that he stole and scraped at surreptitiously with Alberto by night, that ensured Levi’s survival. Like every other element in the book, cerium is described as having its own identity, with the same reverence and sense of wonder as every other element:

There was a mysterious jar on one of the shelves. It contained about twenty gray, hard, colorless, tasteless little rods and did not have a label . . . an element about which I knew nothing, save for that single practical application, and that it belongs to the equivocal and heretical rare-earth group family, and that its name . . . celebrates (great modesty on the chemists of past time!) the asteroid Ceres, since the metal and the
star were discovered in the same year, 1801; and this was perhaps an affectionate-ironic homage to alchemical couplings: just as the sun was gold and Mars iron, so Ceres must be cerium. (Levi 1995a: 146–50)

The metaphor of the flint and its honing for ignition purposes connotes the historical regression to the Stone Age and the Darwinian 'survival of the fit,' a concept that is not foreign to firsthand survivors of the Shoah. At the same time, the flint as metaphor of techné is a prosthesis, that is, a carrier of 'tertiary,' 'epiphyllogenetetic memory' in Stiegler's parlance; it is a memory that is symbolically and tragically relived during the Holocaust through a paradoxical reversal of order/values: thus, the return to origins is a ritualistic escape of death, whereas regress stands for progress, that is, survival of the species. In the lager, the fit and the vicious outlived the virtuous, rendering completely useless the Aristotelian code of virtues on the one hand and the Machiavellian concepts of virtù and fortuna on the other: 'The logic and scale of cause and effect are all skewed, chance determined life and death with a force overwhelmingly beyond the capacity (or virtù) of individuals to try out means to circumvent it' (Gordon 2001: 145). And so, although Alberto had better chances of survival being immune to scarlet fever, he dies in Auschwitz due to the illogical piccole cose (insignificant things), whereas Levi contracts the illness but eventually survives the Holocaust.

Throughout The Periodic Table, the work/struggle with matter is the generative matrix of storytelling. Thus, in 'Chromium' we witness the narrator struggling to trace the cause and solution for the mysteriously solidified paint; in 'Arsenic' the chemist is up against the hidden substance in the sugar sample, only to solve that mystery in 'Potassium'; the true nature of the uranium rock is detected in 'Uranium'; and 'Hydrogen' tells the story of young Levi's efforts to advance as a future chemist. 'Zinc' narrates his endeavours to be initiated into laboratory work at university; 'Nickel' describes the difficulties involved in extracting nickel, followed by the fictional story of Rodmund and his attempts to extract lead in the chapter of the same name. In 'Gold,' Levi is struggling as a partisan and faces imprisonment for the first time, and in 'Chromo' he depicts his trials of finding work after returning to Turin after the war. Before the war, Levi's work on diabetes under the commendatore of a chemical factory in Milan, although frustrating and sometimes abusive, mechanical and brutal, helps Levi understand phosphorus and its wondrous nature, while explaining the difficulties of working in an oppressive environment:

Phosphorus has a very beautiful name (it means 'bringer of light'), . . . a Professor Kern, half biochemist and half witch-doctor, in the environment impregnated with black magic of the Nazi court, had designated it as a medicament. . . . Unknown hands left on my bench at night all sorts of plants, a species a day . . . onion, garlic, carrot, burdock, blueberry [etc.] I, day by day, determined their inorganic and total
phosphorus content, and I felt like the donkey tied to a bucket pump. Just as much as the analysis of nickel in the rock had exalted me, . . . so was I humiliated now by the daily dosage of phosphorus, because to do work in which one does not believe is a great affliction. (1995a: 120)

Although most chemical elements he works with are intrinsically connected to some vital physiological function in humans, plants or animals, it is carbon that is considered the epitome of life. It is therefore significant that Levi completes his journey through the periodic table and his autobiographical and mythical meanderings with 'Carbon,' the story of the element of life to which he has 'an old debt' (1995a: 233). In his description of carbon, echoing Bachelard, Levi challenges, as he often does, the Aristotelian duality of form and matter. As critic Pierpaolo Antonello puts it: 'Matter is not an undefined substance shaped by abstract forms superimposed from outside. It is rather a multifold entity, that displays an infinite array of behaviour and features according not to given "form," but to given "combination."' This indebtedness to what Bachelard dubbed the nature's 'conscience mélangeant' challenges fixed categories like 'pure' versus 'impure,' uniformity versus difference, noble versus vile, stable versus unstable (Antonello 2007: 99). And carbon, Levi shows, is no exception: 'Carbon dioxide . . . is not one of the principal components of air, but rather a ridiculous remnant, an "impurity," thirty times less abundant than argon, which nobody even notices' (Levi 1995a: 236). It is this very element, however, that is credited with the creation and maintenance of life. As Levi has shown before, impurities are essential constituents in chemical interactions, and they are most often credited with the advance of knowledge. The carbon dioxide is, in that regard, the essential other in the process of chemical contamination, indispensable for life (Levinas 1969: 43). Not only does Levi warn his reader against the danger of the discriminatory gesture, but he is also an inexhaustible supporter of the holistic view on chemistry: rational judgment is often enhanced by the keenness of 'smell and touch and the intuitiveness of the eye,' to which such virtues as 'humility, patience, method, manual dexterity, nervous and muscular stamina, [and] resilience when faced by failure' are essential (Levinas 1969: 98).

In this context, the hands as instrumental objects of performance are the embodiment of techné. They symbolize the human ability to work, and they also stand for human dignity and autonomy (Gordon 2001: 182). Moreover, the hand as tool for chemical experiments and holder of the pen is both artifice (or technical support of scientific work), and manual producer of written, literary text.

It is with this scientific profile in mind that the reader can understand Levi's reverence towards and description of a single carbon atom's journey over the course of many centuries through various forms of matter: the green leaves, water, air and lungs of humans and animals:
Carbon, in fact, is a singular element: it is the only element that can bind itself in long, stable chains without a great expense of energy, and for life on earth . . . precisely long chains are required . . . but its promotion, its entrance into the living world is not easy and must follow an obligatory, intricate path. . . . If the elaboration of carbon weren't a common daily occurrence on the scale of billions of tons a week, wherever the green of a leaf appears, it would by full right deserve to be called a miracle. (1995a: 234–35)

As if by miracle, the wandering carbon cell permeates the chemist's own brain and then transcends the anatomical medium by stepping onto the material, written page through the tip of the author's pen. This surprising trajectory of the carbon atom stands for the symbiosis of chemical and literary production. At this moment, the difference between *techné* as craft and *techné* as production of written text (language, literature, testimony, etc.) is collapsed, and the two media cohere in the materiality of punctuation, the full stop:

[The carbon cell] is . . . amongst us, in a glass of milk . . . . It is swallowed . . . . One [cell] crosses the intestinal threshold and enters the bloodstream; it migrates, knocks at the door of a nerve cell, enters, and supplants the carbon which was part of it. This cell belongs to a brain, and it is my brain, the brain of the *me* who is writing. And the cell in question, and within it the atom in question, is in charge of my writing, in a gigantic minuscule game which nobody has yet described. It is that which at this instant, issuing out of a labyrinthine tangle of yeses and nos, makes my hand run along a certain path on the paper, mark it with these volutes that are signs: a double snap, up and down, between two levels of energy, guides this hand of mine to impress on the paper this dot, here, this one. (1995a: 241)

In the context of Levi's Holocaust survivorship, this journey is symbolic of the complexity of life, of its synthetic and repetitive quality in which the process of mediation and communication and the pure-impure binary play an essential role. As does, of course, chance alone. As both a physical element and a sign open to interpretation, the carbon atom's possibilities of ontological and literary meaning are dependent on the nature of the mediator (or interpreter): its possibilities of combination (in both realms) are limited depending on the context. For instance, once the carbon reaches the intermediary vine leaf, its future journey and potential 'narrative possibilities become limited by the surrounding' (Martin 1996: 230).

But if chance has it and the carbon takes on the shape of a full stop on the piece of paper, its journey is bound to continue through other human minds through an indefinite number of acts of medit(j)ation.
CONCLUSION

The Periodic Table distinguishes itself from Levi's other significant works in that it fosters a wide range of responses in relation to the thematic goals of specific analyses, depending on whether the stress falls on memory and testimonial records, literature, mythos, ethics or specialized areas of technoscience. As a system meant to bridge the gap between things and words, the periodic table grants Levi the ideal medium to explore interdisciplinary grounds of knowledge and transgress them in an attempt to grasp the meaning of natural life in general, and human life (and posttraumatic experience) in particular. Levi's exceptional merit consists in his courageous endeavour to come to terms with an existence marked by the enormous shadow cast by the Holocaust and to reassess the boundaries of human and professional integrity.

The Periodic Table as memoir, fiction, autobiography, treatise of chemistry or all in one offers a rich enough exegetic spectrum to lend itself to an interpretation based on the Greek concept of technē. The current study has centred on technē as both the art-and-craft approach to science and writing and has covered its meanings in ancient and modern times. As such, the stories built around the twenty-one inorganic elements of Mendeleev's periodic table have engaged in complex ways with representations of man as both homo faber (man at work) and homo scribendus (creative man/ man who writes), occasionally calling in interpretations of homo sacer (Giorgio Agamben) and homo laborans (Marx). The common ground of all these prototypes of man is integrous work, understood as scientific, technological and creative instances of decent labour focused on the extraction of practical and theoretical.

Although not openly interested in philosophy and abstract thinking, Levi's outlook on honest work and the human condition shifts away from such Aristotelian dualities as episteme versus technē, abstract theoretical thought versus practical thought; alternatively, he prefers to conceive of labour in terms of Bachelard's rational materialism and the Heideggerian understanding of technē as poiesis. Aristotle, however, looms large as a classical model of ethical thinking, and his perennial views on ethical virtues imbue Primo Levi's discourse on practical wisdom, choice and responsibility, scientific knowledge, skill and intellect. In terms of narrative style and so-called ars poetica, Levi is a declared adept in terms of intelligibility and communicability of style, clarity and accessibility.

Levi is a compelling writer engrossed in profound meditations on and communication of the meaning of technē and its metamorphoses into technics, technique and technology pertinent to our modern time—a time fraught, as it is, with contradictions, symmetries and inconsistencies. The message he transmits via his multifarious work is a wholistic understanding of the integral man as constitutive part of his physical, social, political and cultural environment, and a strong belief in man's resilience in the face of historic cataclysms.
NOTES

1. All quotations refer back to the 1995 edition in English, translated from the Italian by Raymond Rosenthal.
2. For an interpretation of the problematic radicalism in Marx, see Bradley and Armand (2006: 5).
3. 'Tertiary' as in third after 'the memory common to the species, or genome, which Weismann called germen, and the memory of the individual, termed somatic, conserved by the central nervous system in which is deposited the memory of experience' (Stiegler 2006: 26).
4. In the introduction to an edited collection of chapters, J. Farrell describes Levi as belonging to a generation of austere humanists who believed in the 'cult of reason' and perceived man as 'rational animal.' He mentions R. Gordon's placement of Levi within the 'Enlightenment' current of thought that prioritizes such 'ordinary virtues' as 'common sense, a respect for rights, a recognition of the worth of a pursuit of happiness' (2004: 9–11), which partially echo the Aristotelian system of virtues as enumerated in his Nicomachean Ethics.
5. Tiles had previously explained how 'a reading of Boyle, Newton, Priestly or Lavoisier shows just how difficult was the problem of determining chemical compositions and establishing a list of elements' in the absence of a unifying theory that determined the objective identity of such elements in relation to their chemical composition, and not their appearance, taste or combinatorial qualities (Tiles 1984: 172–73).
6. For a riveting account of the classic versus modern connotations of technē in literature, philosophy and politics, see the documentary film by D. Barison and D. Ross titled The Ister (which is the ancient name for Europe's greatest waterway, the Danube). In this video-film contemporary philosophers (Bernard Stiegler, Jean-Luc Nancy, Philippe Lacoue-Labarthe and Hans-Jürgen Syberberg), along with archeologists, natural scientists and architects discuss the concept of technē starting from M. Heidegger's 1942 Hölderlin lectures and meditate on the nature of war, oppression and genocide. Particularly interesting is the long meditative pause on the significance of technē as technology and its logistic and philosophical implications in the occurrence of the Holocaust. D. Barison and D. Ross, The Ister (Melbourne: Blackbox Sound and Image).
7. 'I am an amphibian, a centaur .... I am divided in two halves. One belongs in the laboratory. The other one is in my writing, my response to the interviewers, and in the work on my past and present experience. I am like the two halves of a brain’ (Emmett 2001: 117; author’s translation).
8. 'Marx is not prepared ... to define the essence of humanness in terms of ... reason or faith .... For Marx human beings are not essentially rational creatures, or children of god, or political animals. By contrast, human beings are not essentially anything; they are what they do—and what they do is work to derive a life for themselves from the world around them. Everything about them, including their consciousness of themselves and their understanding of nature and their belief in God is a direct product of what they physically do in their daily lives' (Johnston 1999: n.p.).
9. They are for the most part ethnological or allegorical stories that carry an ethical message.
10. 'There are the so-called inert gases in the air we breathe. They bear curious Greek names of erudite derivation which mean “the New”, “the Hidden”, “the Inactive” and “the Alien”’ (Levi 1995a: 3).
11. The racial laws were made public in Italy as the Manifesto of Italian Racism (1938).

12. The centrality of Levi’s testimonial gesture to his narrative work exemplifies the Aristotelian virtue of ‘voluntariness and responsibility’: Levi makes a rational choice to preserve memory and, one may argue, he does so by conferring Auschwitz the central position. His sense of responsibility for the preservation of truth also shows in his choice to narrate a less-than-laudable act of greed—not a virtue, but a vice.

13. Aristotle, *Nicomachean Ethics* (vi.3. II 39b). The acquisition of practical wisdom requires experience, and its role is mainly to figure out the means to aims that are determined independently of it. By ‘science,’ Aristotle means the acquisition of ‘what is necessary and eternal;’ skill involves ‘production rather than action,’ and intellect is ‘concerned with non-demonstrable first principles’ (xxv).

REFERENCES


