Frankenstein Without Electricity: Contextualizing Shelley's Novel

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> It happened, perhaps unfortunately for the inquirers into the knowledge of diseases, that other sciences had received improvement previous to their own; whence, instead of comparing the properties belonging to animated nature with each other, they, idly ingenious, busied themselves in attempting to explain the laws of life by those of mechanism and chemistry; they considered the body as an hydraulic machine, and the fluids as passing through a series of chemical changes, forgetting that animation was its essential characteristic.
>
> —Erasmus Darwin, *Zoonomia*[1]

IT IS WELL KNOWN THAT FRANKENSTEIN IS NOT THE MONSTER, BUT ITS CREator; yet the character of Victor has long been secondary to that of the creation. In fact, he has by now largely been replaced, if not in name, then in characterization, by a man more straightforwardly sinister. The scene from James Whale's film is iconic: under a white cover, a lifeless body, then lightning is sucked in through the gothic machine and gives rise to the hulking form of Boris Karloff. Inanimate matter made to move by the power of electricity, a slave to the unscrupulous man of science.

It is less well known, or perhaps just ignored, that in Mary Shelley's novel there is no mention of electricity at the moment of creation. There are "instruments of life" and there is a "spark of being," but no lightning, no Galvanic fluid, and certainly no robotic slave. Nonetheless, scholars assert the electric animation with surprising confidence, seeing no real need to argue the case: "*Frankenstein* critics generally agree that the battery gives life to the monster," writes Richard C. Sha, and Paul Gilmore adds that *Frankenstein* is the "[most famous] use of electricity in romantic literature." Peter Vernon states flatly: "Anyone who knows *Frankenstein* at all will re-

1. Darwin, *Zoonomia; or The Laws of Organic Life*, vol. 1, 3rd American ed. (Boston: Thomas & Andrews, 1809), vii.

member how important electricity is."[2] The repetition and circulation of a proposition, of course, does not make it a fact.

The most thorough electric case I have seen presented is that by Anne K. Mellor, who states that "[t]o understand the full implications of Frankenstein's transgression, we must recognize that Victor Frankenstein's stolen 'spark of life' is not merely fire; it is also that recently discovered caloric fluid called electricity."[3] There is no question of the quality or breadth of Mellor's historical scholarship when she builds her argument around contextual evidence, citing from the contemporary debate on the connection between electricity and life. But when she turns to the text of the novel itself, instead of demonstrating the presence of electricity, she simply assumes it and bases her interpretation on this assumption. That to me is insufficient: it must be shown that electricity has a real presence at the moment of creation, or at the very least that it can be the answer to a question posed by the text. In this essay, I contend that neither is the case.

The circumstantial evidence on which Mellor builds her case is itself not under dispute.[4] Nor is it in doubt that Mary Shelley knew of the debates on life and electricity at the time she wrote her book. But this in itself does not warrant an electric interpretation, when electricity is all but absent from the book. One could argue that she actively omitted to name the causal agent of the animation of the creature, inviting the reader to fill in the blank. Three things make this interpretative strategy, to my mind, unfeasible. First of all, I am not convinced that this *blank* would automatically be filled out with electricity. Secondly, the text not only omits to name the agent, but more to the point, it spends very little time omitting it—the text, that is, cannot be said to be beating around the bush on this matter, since it is fully occupied with other things. Thirdly, and this point is in a sense at the heart of this essay, one should be very cautious in speculating about the contents of other people's minds, especially when they are long dead. Thus, this essay does not concern itself with what Shelley had in mind, or with her "theory of life," if she had one. Instead it deals with the limitations to what we can know about her *Frankenstein*. When discussing the novel, the text (or texts, rather) sets the limits of the discussion. This is said

2. Sha, "Volta's Battery, Animal Electricity, and *Frankenstein*," *European Romantic Review* 23, no. 1 (2012): 22; Gilmore, "Romantic Electricity, or the Materiality of Aesthetics," *American Literature* 76, no. 3 (2004): 475; Vernon, "*Frankenstein*: Science and Electricity," *Études Anglaises* 50, no. 3 (1997): 276.

3. Mellor, *Mary Shelley: Her Life, Her Fiction, Her Monsters* (New York: Routledge, 1989), 102.

4. See Marilyn Butler, "*Frankenstein* and Radical Science," in Mary Shelley, *Frankenstein; or, The Modern Prometheus*, ed. J. Paul Hunter (New York: Norton, 1996), 302–12.

in the spirit of neither new critical aestheticism nor, in a straightforward manner, of postmodern indeterminacy; *it is simply a question of proper literary methodology.*

The Case for an Electric Frankenstein

A major reason that the question of animation has so overwhelmingly been explained by electricity, in one form or another, is that it would be so fitting if it were true. In the history of scientific ideas, the years leading up to the composition of the novel were the period of the electric pioneers.[5] In the light of contemporary discoveries and debates, one would almost *expect* Mary Shelley to have her monster thus animated. Most famously there are the experiments of Luigi Galvani and Alessandro Volta. By chance, Galvani (so goes the legend) was working separately with static electricity and with a skinned frog at the same table. His assistant then happened to touch the exposed sciatic nerve of the creature, running from the lower back to the lower limbs, with a scalpel that had accumulated an electric charge, and its leg made a spasmodic little kick. According to Galvani, what produced this kick was a new thing, an *animal electricity.* Volta, writing in 1793 to the Royal Society in London an "Account of Some Discoveries Made by Mr. Galvani, of Bologna; With Experiments and Observations on Them," sums it up thus:

> that the electric fluid set in motion in the organs, by pushing its current through the muscles and affecting them with a certain force, excites their natural irritability and thus makes itself the stimulating agent; all muscular motion is caused by such an irruption of electric fluid in the muscles, whether artificial electricity is employed, or whether animal electricity is let loose; that finally the same motions that are naturally in the living animal machine, at least the voluntary motions, has the same cause, namely, the immediate action of the electric fluid on the muscles.[6]

5. Of new ideas concerning the material nature of animation, see Alan Richardson, *British Romanticism and the Science of the Mind* (Cambridge: Cambridge University Press, 2001).

6. My English translation; Volta, "Account of Some Discoveries Made by Mr. Galvani, of Bologna," *Philosophical Transactions of the Royal Society of London* 83 (1793): 36: ["que le fluide électrique mis en mouvement dans les organes, toutes les fois qu'il poussoit son courant jusqu'aux muscles, et qu'il les frappoit avec une certaine force, fit lui-même l'office de stimulant, et excitât l'irritabilité qui leur est propre; que tous les mouvements musculaires s'executassent par une semblable irruption de fluide électrique dans les muscles, soit lorsqu'on employoit l'électricité artificielle, soit lorsqu'on donnoit jeu à l'électricité animale naturelle; qu'enfin les mouvements mêmes qui se font naturellement dans la machine animale vivante, au moins les mouvements volontaires, reconnussent la même cause, savoir, l'action immédiate du fluide électrique sur les muscles"].

Volta himself, however, was not in the end convinced—"I have had to renounce, not without regret, all these beautiful ideas"[7]—and went on to make a number of experiments also reported in the letter.

He wasn't questioning the agency of electricity as such. He simply did not believe that there were good grounds for distinguishing a separate form of electricity, and by extension, that Galvani had isolated the principle of life. He proposed instead "a new law"—i.e. a natural force—"which is not as much a law of animal electricity, as of general electricity."[8] Electricity for Volta, and this distinction was time and time again repeated by others, was not life. But living matter, and specifically the nerves and muscles, were electric conductors capable of communicating the "electric" or "galvanic fluid." In England, the great chemist Sir Humphry Davy made his own experiments and concluded: "Muscular fibre appeared to be a better conductor than vegetable fibre, and vegetable fibre a better conductor than [a] moistened thread."[9] In the time-honored attempt to reverse engineer the natural body, going back at least to the writings of Descartes and William Harvey's discovery of the circulation of blood, electricity was added to the tool-set, though its precise purpose and range of agency was still indeterminate. Thus, cautiously, Davy:

> Chemical changes are perpetually going on in different parts of the living body, which must be connected with alterations in their states of electricity; and organized beings contain all the substances requisite for forming species of galvanic arrangements.
>
> These circumstances, combined with the facts of the production of muscular contraction by common galvanism . . . afford analogies which render it probable that some phænomena similar to the galvanic phænomena, may be connected with muscular action, and other processes of life.[10]

Life could not be equated with electricity, but electricity very likely played an important role in the motive faculty of the living body.

7. My English translation; Volta, "Account," 36: ["j'ai du renoncer, non sans regret, à toutes ces belles idées"].

8. My English translation; Volta, "Account," 20: ["une nouvelle loi, qui n'est pas tant une loi d'électricité animale, qu'une loi d'électricité commune"].

9. Davy, "An account of some experiments made with the Galvanic Apparatus of Mr. Volta," in *Collected Works of Sir Humphry Davy*, Vol. 2 (London: Smith, Elder and Co., 1839), 141. See also Davy's *Elements of Chemical Philosophy* (Philadelphia: Bradford & Inskeef, 1812), 70–100.

10. Davy, "Outlines of a View of Galvanism, chiefly extracted from a Course of Lectures on the Galvanic Phænomena, Read at the Theatre of the Royal Institution," in *Collected Works*, 2:207.

Elsewhere, others where heading down the straighter Galvanic path. In 1803, in London, a man named George Foster was tried and executed for the murder of his wife, the verdict stipulating that "his body be delivered to be anatomized, according to the law in that case made and provided." Giovanni Aldini, a physicist and the nephew of Galvani, then proceeded to make certain Galvanic experiments on the hanged body:

> On the first application of the process to the face, the jaws of the deceased criminal began to quiver, and the adjoining muscles were horribly contorted, and one eye was actually opened. In the subsequent part of the process the right hand was raised and clenched, and the legs and thighs were set in motion. Mr Pass, the beadle of the Surgeons' Company, who was officially present during this experiment, was so alarmed that he died of fright soon after his return home.[11]

Andrew Ure, the Scottish chemist and philosopher lauded by Marx as the "Pindar of the automatic factory," made his own series of experiments in this vein.[12] On 4 November 1818, ten months after the publication of the first edition of *Frankenstein*, he was given the chance to apply the current of a large "voltaic pile" to the body of the "murderer Clydsdale."[13] But while Aldini contented himself with the role of spasmodic puppeteer, Ure's ambitions were well nigh Frankensteinian. He connected his apparatus to the left phrenic nerve, and "[s]ince this nerve is distributed to the diaphragm, and since it communicates with the heart . . . it was expected . . . that the respiratory process could be renewed."[14] Ure was not disappointed:

> The success of it was truly wonderful. Full, nay, laborious breathing, instantly commenced. The chest heaved, and fell; the belly was protruded, and again collapsed, with the relaxing and retiring diaphragm . . . this respiratory experiment was perhaps the most striking ever made with a philosophical apparatus.[15]

Again, Ure does not equate the vital principle with electricity, but he does speculate that with a battery of sufficient size, and given that the cause of death was not some irreparable damage to a vital organ, "there is probabil-

11. "George Foster," *The Newgate Calendar*, Vol. 5, ed. Donal Ó Danachair (Ex-classics Project, 2009), 98.

12. On Ure and his remarkable quest for fame, see W. V. Farrar, "Andrew Ure, F.R.S., and the Philosophy of Manufactures," *Notes and Records of the Royal Society of London* 27, no. 2 (1973): 299–324.

13. Ure, "An Account of some Experiments made on the Body of a Criminal immediately after Execution, with Physiological and Practical Observations," *The Journal of Science and the Arts* 6 (London: John Murray, 1819), 288.

14. Ure, "An Account of some Experiments," 289.

15. Ure, "An Account of some Experiments," 290.

ity that life might have been restored."[16] Thus, electricity was not life itself, and the infusion of the Galvanic fluid was not adequate to full animation, but electricity could be used as a jump-starter to set in motion the "spirit of animation"—as Erasmus Darwin terms it in his *Zoonomia* (1797)—and one by one fire up those conductors controlling muscular motion, the nerves.

There is, then, no doubt that Mary Shelley wrote her novel in a time of electrical enthusiasm, and that were she to employ in her fantasy some naturally observable force to animate the jigsaw monster, electricity was a very likely candidate. But she did not, or at least she omitted to tell us if that was what she had in mind. "Electricity" is mentioned twice, in the same paragraph (to which is added "Galvanism" in the 1831 edition), not too many pages prior to the creation scene, but in a context quite unrelated to it. Lightning, it might be added in passing, does play a minor role in the book, though it is again not directly involved in the act of animation. Interestingly, the creation amid thunderstorm scenario, so intrinsic to the film-era Frankenstein, does appear to be aboriginal, in as much as both the novel and the early dramatizations include lightning as a gothic set piece for dramatic effect, though not necessarily at the time of creation and not causally involved in it. All in all, it must be said, not much of a presence.

The crux of the matter, of course, is the creation scene, a very brief affair of three sentences:

> It was on a dreary night of November, that I beheld the accomplishment of my toils. With an anxiety that almost amounted to agony, I collected the instruments of life around me, that I might infuse a spark of being into the lifeless thing that lay at my feet. It was already one in the morning; the rain pattered dismally against the panes, and my candle was nearly burnt out, when, by the glimmer of the half-extinguished light, I saw the dull yellow eye of the creature open; it breathed hard, and a convulsive motion agitated its limbs.[17]

The basis on which to determine what animates the creature, then, all boils down to a few words: "instruments of life," "spark of being," and "convulsive motion." None of these, to be certain, rules out electricity. But then again, none of these points specifically to it. In fact, no specific agent is mentioned—outside of "life," "being," and "motion," that is, the very terms to be explained. Simply put, there is no named causal agent of animation in the novel; not in the creation scene, nor later on when the creature itself explains what it has read in Frankenstein's research notes, nor anywhere else.

16. Ure, "An Account of some Experiments," 292.

17. Mary Shelley, *Frankenstein; or, The Modern Prometheus*, ed. J. Paul Hunter (New York: Norton, 1996), 34. Subsequent references to this edition are cited parenthetically in the text.

It can be reasonably asked what else it could be, besides electricity? It could be fire, or heat.[18] These are not better candidates than electricity—the mention of "convulsive motion" might just tip the balance in favor of the latter, reminiscent as it is of Galvanic shocks. But it would appear that the creature opens its eyes and begins breathing *before* these shocks. René Descartes, in his "Treatise on Man" (written in the 1630s but not published until 1662), writes of "one of these fires without light" animating the machine that is the body, "a very subtle flame"[19] running through the narrow passages of nerve and muscle, a current that communicates and sets into action the will of the central agency. That account, *mutatis mutandis*, held good credit for hundreds of years, getting a new lease on life with Antoine Lavoisier's oxygen theory of combustion in the 1770s. Erasmus Darwin, who is named in the preface of the novel as an authority for the plausibility of events, gave fire and electricity equal pride of place in his explanation of animated life. In his *The Botanic Garden* (1791), he awakens nature from its freeze with the help of both:

> Pervade, pellucid forms! their cold retreat,
> Ray from bright urns your viewless floods of heat;
> From earth's deep wastes electric torrents pour,
> Or shed from heaven the scintillating shower;
> Pierce the dull root, relax its fibre-trains,
> Thaw the thick blood, which lingers in their veins.[20]

Some ten year later, in his posthumously published *The Temple of Nature* (1803), the balance seems to have shifted slightly in favor of heat:

> As warmth and Moisture blend their magic spells,
> And brood with mingling wings the slimy dells;
> Contractile earths in sentient forms arrange,
> And life triumphant stays their chemic change.[21]

In the introduction that Mary Shelley wrote for the third edition published in 1831, she names the experiments of the same "Dr. Darwin" as a direct inspiration for the composition, but then only goes on to compound

18. See Simon Werrett, "Sparks of Life," *Cabinet Magazine Online* 32 (Winter 2008/2009), http://www.cabinetmagazine.org/issues/32/werrett.php, accessed 1 August 2014.

19. My English translations; Descartes, *L'Homme* (Paris: Charles Angot, 1664), 13: ["vn de ces feux sans lumiere"]; 4: ["vne flame tres subtile"].

20. Darwin, *The Botanic Garden, a Poem, in two Parts; Containing The Economy of Vegetation and the Loves of the Plants with Philosophical Notes* (London: Jones & Company, 1825), Canto 1, 10:461–66.

21. Darwin, *Poetical Works. Volume 3. Containing The Temple of Nature* (London: J. Johnson, 1806), Canto 1, 5:417–20.

the inconclusiveness: "Perhaps a corpse would be re-animated; *galvanism* had given token of such things: perhaps the component parts of a creature might be manufactured, brought together, and endued with *vital warmth*."[22] Note that she is merely speaking of inspiration, not of the actual contents of her book. If we look at the creation scene once more, neither "instruments of life" nor "spark of being" decides the issue ("spark of life" has a citation in the *OED* as early as the fourteenth century). The convulsions *could* be related to the experiments of Aldini, Ure, and others. Then again, the subtitle of the novel, *The Modern Prometheus*, points to the use of heat (Prometheus being the titan punished for giving fire to man), as does Frankenstein's alchemical inclinations (where the alembic, a sort of distillation apparatus, held crucial significance).

Text and Context

Neither of these cases, heat nor electricity, are really conclusive, and that is so for a very simple reason, namely, that the novel does not concern itself with the question. One might even be tempted to say that it deliberately avoids it altogether—for its author certainly knew of the debate—and sidesteps the very problem we are trying to solve. Not only is the creation scene underspecified, there is not so much as an allusion to the question in the rest of the book. This is, of course, highly unsatisfying for the modern reader: *Frankenstein*, for us, marks exactly "a transition, in stories of men creating life, because Victor does not invoke the aid of the Deity, or any other supernatural agency."[23] It did not seem to bother Shelley's contemporaries, however, if we are to judge on the basis of its immediate reception in reviews and dramatic adaptations. Nor does it seem to have been a major concern to Mary Shelley herself, Galvanic/caloric speculations being more of an impetus to fantasy than a real touchstone of the end product.

What is at stake here is the question of historical context, or more to the point, the status of the text *vis-à-vis* this context. Contextualizing a text historically can broadly be said to serve two purposes: on the one hand, the context sets certain restraints on what can reasonably be postulated about what is written, and, on the other, it can open up a text, revealing new layers of meaning beneath what can be seen with the unhistorical eye. There is no good contextual reason that electricity could not do the trick. And certainly there is in *Frankenstein* a strong "potentiality" for electricity, as is amply demonstrated by the modern proliferation of "electric Frankensteins" (including those in scholarly works), which might very reasonably

22. Shelley, "Introduction to *Frankenstein*, Third Edition (1831)," in *Frankenstein*, 171–72, my emphasis.

23. Jon Turney, *Frankenstein's Footsteps: Science, Genetics, and Popular Culture* (New Haven: Yale University Press, 1998), 14.

be regarded as an "opening up" of the text. But there is a parallel restraint which must be taken into account, that of relevance. When it is postulated that electricity animates Frankenstein's monster—and, thus, implies that it can add to the text—it must be shown that electricity has a real presence in the text, and that the question of electricity is relevant to the text. Otherwise, *eo ipso*, the text is irrelevant to the question of electricity as such. That is, there would be no real need to discuss it at all.

None of this means that *Frankenstein* is irrelevant to discussions of the principles of living animation. The problem with the electrical assumption is that it tends to obfuscate what is really implied by animation in the novel. Perhaps this is so because modern readers approach the question of animation as a matter of energy, when in fact what awakens and moves the creature is a metaphysically more complex substance. In order to understand the nature of this substance, an observation made by Hermann von Helmholtz, the great popularizer of the conservation theory of energy, provides a useful initial distinction. In a public lecture held some thirty years after the publication of *Frankenstein*, "Über die Wechselwirkung der Naturkräfte," he discussed the spectacular attempts of the eighteenth century to create a human-like machine:[24]

> Out of this endeavor to imitate living creatures, it seems, then developed another idea, which would turn out to be the Philosopher's Stone of the seventeenth and eighteenth centuries. It was the attempt to construct a Perpetuum Mobile. By this is understood a machine that will—without being wound up, without the use, in order to drive it, of falling water, of wind, or of other natural forces—on its own run forthwith, because it can continually draw from itself its own driving power.[25]

The question of Frankenstein's *modus operandi* boils down to two different conceptions of physical work. One, championed by von Helmholtz, revolves around the interchangeable energies of wind, heat, electricity, and so on, energies that cannot be created but merely transformed. He insisted, crucially, that in order to make a machine do something, i.e. transfer en-

24. For the story of these constructs, see Gaby Wood, *Living Dolls: A Magical History of the Quest for Mechanical Life* (London: Faber and Faber, 2002).

25. My English translation; Helmholtz, *Über die Wechselwirkung der Naturkräfte und die darauf bezüglichen neuesten Ermittlungen der Physik* (Königsberg: Gräfe & Unzer, 1854), 8–9: ["Aus diesem Streben, lebende Geschöpfe nachzumachen, scheint sich zunächst . . . eine andere Idee entwickelt zu haben, welche gleichsam der neue Stein der Weisen des siebzehnten und achtzehnten Jahrhunderts wurde. Es handelte sich darum, ein Perpetuum Mobile herzustellen. Darunter verstand man eine Maschine, welche, ohne dass sie aufgezogen würde, ohne dass man, um sie zu treiben, fallendes Wasser, Wind oder andere Naturkräfte anzuwenden brauchte, von selbst fortdauernd in Bewegung bliebe, indem sie sich ihre Triebkraft unaufhörlich aus sich selbst erzeugte"].

ergy, it had to be fuelled, which is to say, energy had to be transferred to it first. The other, older conception had no such stipulation, according to von Hemholtz, because it only really knew the Newtonian forces of mechanics. Forces are quantifiable, of course, but they never become an economy of limited and exhaustible resources, as does energetics. They take on, then, more the character of a quality, a moral quality even, according to von Helmholtz, instead of a quantity, such as energy, which must be sufficient and renewed.[26] Therefore, it seemed to natural philosophers of previous centuries a plausible plan to create a machine of the right quality that would run on its own forever, replacing the need for work.

The text of *Frankenstein* straddles uneasily the chasm between von Helmholtz's two conceptions, the "philosophical machine" of the eighteenth century and the biological animal of the nineteenth. On the one hand, there is nowhere any implication of an economy of energies; on the other, the creature is clearly not simply a mechanical doll (like the constructs of Vaucanson and Droz discussed by von Helmholtz). Shelley's novel was not alone in this position, but this is the context where the text is properly situated: at a time that is discovering that Newtonian mechanics are insufficient for animal motility yet is not quite done with this qualitative conception of physical work. Another way of putting it is that some remnant of the *soul* is still involved in what is supposed to be a mechanical explanation of motion.

I use the word "soul" because that is very much a term used by the text itself, though often ambiguously, metaphorically, as if intended to denote a concern rather than a discrete thing. Interestingly, between the two major versions of the text, the original 1818 edition and the reworked 1831 edition, there is almost a doubling of the number of times the word is used. This is a sign of changing intentions, perhaps, but it is also an indicator of a central thematic concern shared by both texts. Here is a passage from the 1831 text, where Frankenstein describes his own intellectual formation:

> It was the secrets of heaven and earth that I desired to learn; and whether it was the outward substance of things or the inner spirit of nature and the mysterious soul of man that occupied me, still my inquiries were directed to the metaphysical, or in its highest sense, the physical secrets of the world.[27]

26. On the history of the economy of energetics, see Anson Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity* (Berkeley: University of California Press, 1992).

27. Shelley, *Frankenstein; or, The Modern Prometheus*, 1831 Edition, page 24, University of Virginia Library, http://search.lib.virginia.edu/catalog/uva-lib:476367, accessed 1 August 2014.

Here Shelley puts into words exactly that complicated vision of the natural so essential to the character and his narrative, at once physical and metaphysical, mechanical and moral. And because this conception colors everything in the novel, the search for the motive power cannot restrict itself to a mere energy. It is to that search I turn now.

Spark of Being

In 1817, Mary Shelley's husband, Percy Bysshe Shelley, composed a short text on *Frankenstein* (not published until 1832, ten years after his death), in which he very neatly pinpoints the take-home message of the piece:

> Nor are the crimes and malevolence of the single Being, though indeed withering and tremendous, the offspring of any unaccountable propensity to evil, but flow irresistibly from certain causes fully adequate to their production. They are the children, as it were, of Necessity and Human Nature. In this the direct moral of the book consists; and it is perhaps the most important, and of the most universal application, of any moral that can be enforced by example. Treat a person ill, and he will become wicked. Requite affection with scorn;—let one being be selected, for whatever cause, as the refuse of his kind—divide him, a social being, from society, and you impose upon him the irresistible obligations—malevolence and selfishness.[28]

The crucial thing to notice in Shelley's reading is the unflinching admixture of naturalism and moralism. Crimes, malevolence, and selfishness are caused by "irresistible obligations" explained through a capitalized "Necessity," and through "certain causes fully adequate to their production," as it were a Natural Law. But this is not simply a classic biology of evil holding that some are born with a greater propensity to evil than others. Instead what Percy Shelley seems to be saying, in a language seamlessly threading together sociality and nature, is that a good or social life itself is a fragile thing in need of both nurture and sustenance. This sustenance could be termed "light," encompassing both material and soul-like connotations. That word—quite unlike electricity and heat, though less satisfying to a materialist sensibility—connects with a system of metaphors very much pervasive in the novel, as will be demonstrated later. How this connects with animation, however, must be elaborated first.

As we saw, Erasmus Darwin regarded both electricity and heat as conducive to animal motion, but he considered them inadequate as explanations—"animal contraction [= animation] is governed by laws of its own, and not by those of mechanics, chemistry, magnetism, or electric-

28. Percy Shelley, "On *Frankenstein*," in Shelley, *Frankenstein*, 185–86.

ity."[29] What is needed, in essence, is something outside of the causative factors, something that precedes and initiates motion: "this agent is here termed the spirit of animation, or sensorial power, but may with equal propriety be termed the power, which causes contraction; or may be called by any other name, which the reader may choose to affix to it."[30]

Darwin's use of the term "spirit" is not without metaphysical content, but he is more interested in the logical distinction than the substantial and takes care to point out that spirit "may consist of matter of a finer kind," just as may "the powers of gravity, specific attraction, electricity, magnetism."[31] Between *what* and *what* is Darwin drawing his logical distinction? Not between matter and spirit in a strict sense. It is more a question of distinguishing the phenomena connected with motion from those that give motion its form and meaning, its quality, what Darwin calls "idea." The spirit of animation adds that something extra, which distinguishes, say, a twitching frog's leg from a frog on the move, the difference between a semblance of animation and real animation. But even this, the spirit of animation, is not quite adequate, especially not when it comes to human motility and motivation.

The physician William Lawrence, whom the Shelleys had consulted on a number of occasions in the years leading up to the composition of *Frankenstein* (and who had to face not a few accusations of materialism), makes a point not too dissimilar:

> Of the attempt at explaining the sentient and contractile operations of the nerves and muscles by chemical agencies, or at resolving life in general into a mere play of chemical affinities, I can only say that they appear to me injudicious. . . . Living bodies, as well as all dead ones, exhibit electrical phenomena under certain circumstances: but the contrast between animal functions and electric operations is so obvious and forcible, that the attempts to assimilate them do not demand further notice.[32]

Living motion "is by its very nature, fluctuating and indeterminate," and hence "cannot be in the slightest degree elucidated by mechanics."[33] What is needed, in addition, is again nothing spiritual, not a soul *per se*. Lawrence is not too clear on this point, but certain suggestions may be read from his lectures. He sets great store by the fact that life is pervaded by individuality:

29. Darwin, *Zoonomia*, 46.

30. Darwin, *Zoonomia*, 45.

31. Darwin, *Zoonomia*, 80.

32. Lawrence, "Lecture 3," in *Lectures on Physiology, Zoology, and the Natural History of Man* (London: J. Callow, 1819), 75–76.

33. Lawrence, "Lecture 3," 72, 71.

> [T]he character of variety is stamped on all Nature's works. She has made it a fundamental law, that no two of her productions shall be exactly alike; and this law is invariably observed throughout the whole creation. Each tree, each flower, each leaf, exemplifies it; every animal has its individual character; each human being has something distinguishing, in form, proportions, countenance, gesture, voice;—in feelings, thought, and temper;—in mental as well as corporeal physiognomy. This variety is the source of every thing beautiful and interesting in the external world,—the foundation of the whole moral fabric of the universe.[34]

This sliding argument, going from physiognomic observation to moral fact in the blink of an eye, sums up Lawrence's strange position well: living beings are matter through and through, but organized in such a way that they differ, not only from non-living matter, but from each other, so that they will always meet the world in the aesthetically and morally obligating state of otherness. And vitality *is* this organization, however exactly it comes about.

As in Shelley's exposition, Lawrence's argument drifts from the level of individual physiology to that of social interaction and order, as if organization at both levels were expressions of the same principle. This holds true for animate life in general, to various degrees. But for human beings, of which Frankenstein's creation can be considered a variety, this principle has a special poignancy, for a very specific reason. Humans have none "of those natural offensive weapons, fangs, talons, claws, &c." that characterize other animals.[35] They have no natural defenses, they cannot fly, or burrow into the ground; instead, they have a superior form of sociality:

> Social life and progressive civilization, instead of being unnatural to man, are therefore parts, and very valuable parts of his nature, as much as the erect stature and speech. . . . It is as much the nature of man to form societies, to build up political associations, to cultivate arts and sciences, to spread himself over the globe, and avail himself of both organised kingdoms for his support, as it is that of the bee and ant to establish their communities, to gather honey and lay up provisions, or that of any other animals to perform the actions by which they are respectively characterised.[36]

But social life is not a given; it is a need. If humans generally are defenseless on their own, human children are completely so, which means that there is

34. Lawrence, "Lecture 4," in *Lectures*, 95.
35. Lawrence, "Natural History of Man," in *Lectures*, 186.
36. Lawrence, "Natural History of Man," 213–14.

a "necessity of a long intercourse between parents and children," providing not simply protection but also a "first ray of intelligence, [that,] when cherished, cultivated, and communicated, expands, in process of time, into the full splendour of reason and intellect."[37] Children need time to grow into themselves; their vital principle needs light to germinate, ripen, and come to fruition in social individuality.

So animated life is from the start distinguished from mere mechanical motion by the qualities of organization and variation, and these same qualities, in rarefied form, distinguish higher, social life from mere animation. Infantile defenselessness, individual development, and social organization are present in all of the so-called higher animals; in humans, it just reaches its pinnacle form. Among these, the "continued intercourse of affection and kind offices, and those endearing relations, which constitute the most exalted pleasures of human life," nurture and sustenance, never really cease to be a necessity. That does not mean, of course, that they are necessarily provided, and the flowering of life may be stunted, the "spark of being," finally, may be all but put out. That is the tragedy of man—"designed, by nature, for social union"[38]—and, I would argue, the tragedy of *Frankenstein*.

The Light of Reason

The word "light" has the major drawback that, as an explanation of animation, it is not properly materialistic. It is a metaphor for that something extra (which used to be the soul) that characterizes life: comparable to the moral quality that von Helmholtz identified in the older conception of physical work, to the "spirit of animation" of Darwin, and to organization and variation in Lawrence. It does have the major advantage that it is, as metaphor, very much present in the novel, unlike fire and electricity. If the basic synonyms of "light" and their cognates are combined, there are just short of 200 occurrences (compared to about 30 for "fire" and 7 for "electricity," of which 5 are "lightning"), and pretty evenly strewn throughout the book. If "dark" is added by the same principle, the total exceeds 250. Pushing it slightly, "vision," "eye," "discovery," and their synonyms turn up about another 250 times. Now, in a book of more than 65,000 words, all this amounts to nothing more than circumstantial evidence, albeit at a rate of roughly 1 in 112.[39] In reading the novel, however, we find the whole metaphoric complex of illumination and vision has a striking pres-

37. Lawrence, "Natural History of Man," 227.

38. Lawrence, "Natural History of Man," 235, 226.

39. All of these numbers stem from full-text searches in the 1818 edition, downloaded from archive.org, http://archive.org/stream/Frankenstein1818Edition/frank-a5_djvu.txt, accessed 1 August 2014.

ence. A good example is the scene where Victor Frankenstein makes his fateful discovery:

> I paused, examining and analysing all the minutiae of causation, as exemplified in the change from life to death, and death to life, until from the midst of this darkness a sudden light broke in upon me—a light so brilliant and wondrous, yet so simple, that while I became dizzy with the immensity of the prospect which it illustrated, I was surprised that among so many men of genius, who had directed their inquiries towards the same science, that I alone should be reserved to discover so astonishing a secret. (30)

It is exactly the question of discovery that is at the core of the novel: scientific discovery, of course, but much more poignantly the discoveries of the "soul." This is the rhetoric of illumination and, one might be tempted to say, enlightenment.

In this sense, the novel is not really that materialistic. Not that it invokes religious explanations, but it quite simply is not that concerned with causality at all. What is striking about the animation of the creature, in fact, is how carefully any sort of explanation is avoided. There is one physical science, however, that has a real presence in *Frankenstein*, partaking in the creation and discussed at some length: anatomy. Victor has "the capacity of bestowing animation," yet he still has "to prepare a frame for the reception of it, with all its intricacies of fibres, muscles, and veins" (31). In order to construct this artificial vessel, he famously—and here the novel for once corresponds with its modern versions—uses the body parts of the dead: "I collected bones from charnel houses; and disturbed, with profane fingers, the tremendous secrets of the human frame. . . . The dissecting room and the slaughter-house furnished many of my materials" (32). What is brought to the fore in these passages is how Victor is affected by "the horrors of my secret toil," how it clouds his vision and darkens his aspect: "My limbs now tremble, and my eyes swim with the remembrance; but then a resistless, and almost frantic impulse, urged me forward; I seemed to have lost all soul or sensation but for this one pursuit" (32). His grim fascination with the purely material body, it seems, is covering over his light.

Anatomy had as much a claim on actuality as did Galvanism, these being the years of Cuvier and St. Hilaire, but just as Shelley's chemistry is rather alchemical, her anatomical science is largely indebted to an older tradition. Morbidity might seem inherent in studies based on dissection, and certainly that was how it was perceived as it developed in the fifteenth and sixteenth centuries. In the great pioneering work, Andreas Vesalius' *De humani corporis fabrica* (1543), it can be seen with the naked eye how the genre grew out of a religious tradition of representing death, which can as a shorthand

be called the *memento mori*,[40] a conception easily recognized in the novel when Victor says,

> I became acquainted with the science of anatomy: but this was not sufficient; I must also observe the natural decay and corruption of the human body . . . I saw how the fine form of man was degraded and wasted; I beheld the corruption of death succeed to the blooming cheek of life; I saw how the worm inherited the wonders of the eye and brain. (30)

Two aspects of the *memento mori* are of special significance to the novel. One is the mockery of life that is death; the grim imitation of true animation that the anatomical artist bestows, with lifelike postures, on "fibres, muscles, and veins." The other can be read directly out of the Latin term itself, "remember that you will die": a double exhortation to live and to stay virtuous while still alive.

That is precisely the moral situation that arises around Victor Frankenstein's act of creation. Not only does he create a mockery of vitality (and in more ways than one), but he also immerses himself in death instead of enjoying "the tranquillity of his domestic affections." This last is a central point: Frankenstein does not sin though malevolence, or even selfishness; his real fault is forgetting "simple pleasures," what Lawrence calls "social union." None of this means that *Frankenstein* is a religious work, any more than it is materialistic in the rigorous sense of the word. What it does mean is that it draws on a set of thoughts and *topoi* with very much a religious history, and that it shares with the "Lectures" of Lawrence that mixed conception of vitality, discussed above, where the moral and the mechanical blur into one another.

Frankenstein's creature is much more a work of anatomy than of electricity. Not merely a piece of animate matter, he is a *re*-animation of dead body parts that had already lived once.[41] He is a combination of loose parts, "his features [selected] as beautiful." Selected, rather than grown, as in the recommended method of procreation. But instead of these parts being, in

40. On the visual history of anatomy, see Michael Sappol, *Dream Anatomy* (Washington: Government Printing Office, 2006), and Benjamin A. Rifkin and Michael J. Ackerman, *Human Anatomy: From the Renaissance to the Digital Age* (New York: Abrams, 2006). On the *memento mori*, see Nigel Llewellyn, *The Art of Death: Visual Culture in the English Death Ritual c. 1500–c. 1800* (London: Reaktion Books, 1991).

41. Maureen Noelle MacLane speculates interestingly, à propos this transgression: "Violating the 'ideal bounds' of life and death, Victor inadvertently confronts another threshold, the boundary between species. He produces a biological anomaly; moreover, the production of this anomaly threatens his own 'human nature,' which 'turn[s] with loathing from [his] occupation'": "Literate Species: Populations, 'Humanities,' and *Frankenstein*," in *Mary Shelley's* Frankenstein, ed. Harold Bloom (New York: Chelsea House, 2007), 99.

combination, beautiful, they turn out hideously detached from their organic origin. The result is a mockery of individual organization produced by morbid curiosity, an anatomical monster:

> His yellow skin scarcely covered the work of muscles and arteries beneath; his hair was of a lustrous black, and flowing; his teeth of a pearly whiteness; but these luxuriances only formed a more horrid contrast with his watery eyes, that seemed almost of the same colour as the dun white sockets in which they were set, his shrivelled complexion, and straight black lips. (34)

It is an interesting piece of speculation whether Frankenstein really thought that this selection of parts, taken from the dead, would keep their vital luster for the time required to piece them together and ready them for "the instruments of life." That is, whether the reader is supposed to think that the process of animation brings them back to relative wholesomeness, or that they had been kept in some preservative fluid or other, as in a medical *Wunderkammer.* It is interesting because it is a question of imagination, of how Shelley conceived of this horrid form. Had she in mind perhaps the wax figures of the deceased made by Marie Tussaud, who was employed during the French Reign of Terror as a maker of death masks of guillotine victims?[42] Or perhaps she knew of the work of Frederik Ruysch who in the seventeenth century used arterial embalming to create fascinating, if grisly, sceneries out of various organs. *Nature morte* indeed.

Speculation aside, the crucial thing to note about the monster is that while "the aspect of the being" is hideous, a mockery of life, his personality is beautiful, or at least innocent. Precisely that discrepancy is what drives the narrative on for the good fifth of the book in which the monster himself recounts what has happened since Frankenstein fled from him in disgust. "Unfeeling, heartless creator! you had endowed me with perceptions and passions, and then cast me abroad an object for the scorn and horror of mankind," he says (94). (The idea of the speechless creature seems to have been prevalent as early as the first dramatic versions of the 1820s, but in the novel he is both eloquent and loquacious.) His contention is that his creator should have stuck with him and taken responsibility for his actions ("on you only had I any claim on pity and redress" [94]). In other words, Victor Frankenstein should have stuck to the parenting of his offspring, as he himself fantasized before its creation: "A new species would bless me as its creator and source; many happy and excellent natures would owe their

42. For a related account of Madame Tussaud and wax models, see the first chapter of Marina Warner's admirable *Phantasmagoria: Spirit Visions, Metaphors, and Media into the Twenty-first Century* (Oxford: Oxford University Press, 2006). Warner is another critic prone to assumptions about electricity in *Frankenstein.*

being to me. No father could claim the gratitude of his child so completely as I should deserve their's [*sic*]" (32). It is the act of creation that has made *Frankenstein* famous, but it is this shortcoming on the creator's part that determines the chain of events for the remaining four-fifths of the novel.

The greatest irony of all is that Frankenstein has tried to make a beautiful creature and thinks that he has failed. He comes to believe that he has created a mockery of life, but in fact he has created a remarkable being, richly endowed with vital warmth in both its moral and its mechanical sense. As fantastically horrifying as the monster is at first glance, he is a wonder of natural curiosity, trust, and understanding. Having been rejected by his would-be parent, he is still capable of only the most tender feelings. By imitation, improvisation, and innate ability, he teaches himself the necessary skills of life and survival, and then he teaches himself the skill, so crucial in the eyes of Lawrence, of language (French, to be exact):

> Other lessons were impressed upon me even more deeply. I heard of the difference of sexes; of the birth and growth of children; how the father doted on the smiles of the infant, and the lively sallies of the older child; how all the life and cares of the mother were wrapt up in the precious charge; how the mind of youth expanded and gained knowledge; of brother, sister, and all the various relationships which bind one human being to another in mutual bonds. (81)

A couple of paragraphs later, he has read Plutarch, Milton, and Goethe. All in all, he is better, more human of mind, than any human. And yet, when he tries to interact with people once more, he is again repulsed and chased away. It is this recurrence, being spurned by society and refused "social union," that in the end makes him a true monster and a murderer.

Gillian Beer has pointed out that "[w]hen Mary Shelley came to describe a monster in *Frankenstein* she shows a creature denied the experience of growth. He is fabricated as if he were a machine, but out of organic bits and pieces."[43] This sums up neatly the real theme of the novel: just like a plant, the vital spark of being needs light to grow—the light of the sun and the "light of reason," as Lawrence calls it[44]—or it will turn into a stunted piece of organic matter. As Denise Gigante rightly points out, Frankenstein's monster is ugly because of an "excess" of organic matter—"the raw, unaestheticized stuff of humanity."[45] I would add that this is because the

43. Beer, *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction* (Cambridge: Cambridge University Press, 2000), 103. On cue, Beer goes on to state: "The monster has never been conceived in anything but an intellectual sense. He is the result of external labour, piecing together, and *galvanic* impulse" (my emphasis).

44. Lawrence, "Lecture 4," 96.

45. Gigante, "Facing the Ugly: The Case of *Frankenstein*," in *Mary Shelley's* Franken-

monster was animated too hastily. Frankenstein's monster has been denied not only a childhood, but also a true process of germination. Life takes time and cannot be hastened without repercussions. And that is in fact the threat posed by science, or modernity, in the novel: it interferes with the natural rhythms of life.[46] "A human being in perfection ought always to preserve a calm and peaceful mind, and never to allow passion or a transitory desire to disturb his tranquillity. I do not think that the pursuit of knowledge is an exception to this rule" (33), says Victor Frankenstein himself. This opinion is echoed and expanded in Lawrence's characterization of the nosology of modern living:

> The accumulation of numbers in large cities, the noxious effects of impure air, sedentary habits, and unwholesome employments . . . the unnatural activity of the great cerebral circulation, and excited by the double impulse of our luxurious habits and undue mental exertions . . . the delicacy and sensibility to external influences, caused by our heated rooms, warm clothing, inactivity, and other indulgences, are so many fatal proofs that our most grievous ills are our own work, and might be obviated by a more simple and uniform way of life.[47]

Conclusion: Frankenstein as Icon

Steven Earl Forry lists over ninety dramatic versions of *Frankenstein*,[48] to which must be added at least half as many film derivatives (including eight by Universal Pictures and seven by Hammer Films), not counting parodies, television series, and literary adaptations. Add then the derivatives of derivatives (such as the cinema of zombies, clones, and artificial monsters in general) and the numbers themselves start to grow intractable. The sheer amount of *things* the monster can call its hideous progeny, to borrow a pun from Forry, is beyond counting, so that in this modern mythology, the title of their progenitor, *Frankenstein*, names them as well. In the novel itself, however, and in the early adaptations I have read, as well as in its earliest film version, there is hardly a trace of electricity. The first film adaptation,

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stein, 128. Gigante has also written a very good book on Romanticist conceptions of life: *Life: Organic Form and Romanticism* (New Haven: Yale University Press, 2009).

46. This part of my argument parallels Mellor's reading of the novel; see *Mary Shelley*, especially chapters 1, 2, 3, and 5. Of the improper haste of the creation, she writes, "Rather than letting organic life-forms evolve slowly over thousands of years according to natural processes of sexual selection, Victor Frankenstein wants to originate a new life-form quickly, by chemical means" (100).

47. Lawrence, "Natural History of Man," 239.

48. Forry, "Dramatizations of *Frankenstein*, 1821–1986: A Comprehensive List," *English Language Notes* 25, no. 2 (1987): 63–79.

Edison Studios' *Frankenstein* from 1910, uses some combination of indefinite chemistry and flame-like sparks. As far as I can see, Universal Pictures, with James Whale as director, and Ken Strickfaden as special effects electrician, made it a mainstay of Frankenstein mythology with the 1931 film.

From a cultural historian's perspective, one of the most interesting things about *Frankenstein* the novel is how little it has to do with its modern reception (if that indeed is the proper noun). Perhaps even more so than *Dracula*, Shelley's creation has lived a life independent of its parentage, and the modern versions owe an almost greater debt to the film of 1931 than they do to Shelley's novel. There is a whole *iconography* surrounding the name "Frankenstein," consisting of such elements as the creature's expansive forehead, the lab assistant Igor, and an electrical animation, often by lightning. None of this came from the novel. Elements of plot and setting do live on: for example, the initial innocence of the monster, surfacing from time to time, as strange remains of a forgotten past. But all in all, Mary Shelley's legacy is of a gossamer order, very difficult to pinpoint and weigh. In a way, this is fitting for a novel about the unintended consequences of creation.

This complex relationship between origin and offspring explains to a certain degree the prevalence of the electrical reading. Another factor is that it is not positively wrong; nowhere in the novel does it say that the monster was animated with anything else. It is merely absent. Mary Shelley might very well have been thinking of electricity, seeing sparks flowing from batteries in her mind's eye, but if so, she chose not to put it into writing. Perhaps she wanted to stay out of the debate, perhaps she preferred to leave the situation ambiguous, or perhaps she did not think it a relevant point in a book very much concerned with other matters. Her own most famous creation, the iconography of Frankenstein, was not on her mind, naturally.

But the point I have tried to argue here is not merely that electricity is practically absent from the text of the novel. Rather, electricity is not the right *kind* of answer because animation as it takes place and is developed in the novel is more complex in nature, comprising simultaneously the mechanical and the moral, both motility and growth. Electricity is the answer to a question only posed in the long aftermath of the novel, not by the novel itself, and not by Mary Shelley.

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