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Evan Hepler-Smith, “Alfred Walter Stewart,” epilogue to J.J. Connington, *Nordenholt’s Million* (Cambridge, MA: MIT Press, forthcoming 2022).

Alfred Walter Stewart

Alfred Walter Stewart (1880-1947), the real-life writer behind the pen name “J.J. Connington,” was born and raised in Glasgow, the industrial city on the west coast of Scotland that is the setting for the second half of *Nordenholt’s Million*.[1] Known as the “Workshop of the Empire” and proud birthplace of James Watt’s steam engine, Stewart’s hometown cultivated the image that civilization itself—a product exported from Britain to its colonial empire, according to the liberal imperialist ideology dominant among the British scientific and industrial elite—rested on Glasgow’s machines, metalwork, and engineers. The city also had a reputation for practical, liberal, affordable education, embodied in the University of Glasgow, where Stewart’s father William, a Presbyterian minister, was Professor of Divinity and Biblical Criticism.[2] Alfred Stewart began his studies of chemistry at Glasgow, proceeded on to research fellowships at the University of Marburg (Germany) and University College, London, and received his doctorate from Glasgow in 1907. At UCL, he worked closely with J. Norman Collie, an organic chemist with special interest in biological chemical processes and electrochemical experimentation bearing upon theories of the origin of life. Such questions never played a central role in Stewart’s

[1] The author gratefully acknowledges the helpful suggestions of three anonymous referees for MIT Press.
[2] On science, engineering, religion, education, and empire in nineteenth-century Glasgow, see Crosbie Smith and M. Norton Wise, *Energy and Empire: A Biographical Study of Lord Kelvin* (New York: Cambridge University Press, 1989).

chemistry research, but he took them up as a textbook writer and, later, as a fiction author. "J.J. Connington" dedicated *Nordenholt's Million* to Collie, via the initials *J.N.C.*

Stewart's transition from student to professional researcher was eased by a three-year Carnegie Research Fellowship (it no doubt helped that his father represented Glasgow University on the Carnegie Trust). In his popular writing, Stewart emphasized the crucial importance of such funding for launching scientific careers; it seems plausible that the autocratic industrialist-turned-philanthropist Andrew Carnegie was among the real-life inspirations for the fictional Nordenholt. In 1909, Stewart was appointed Lecturer in Organic Chemistry at Queen's University in Belfast, a bastion of Presbyterianism in the northwest of Ireland, where descendants of Scottish settlers upheld support for continued British rule against a waxing Irish independence movement. Stewart returned to Glasgow as Lecturer in Physical Chemistry and Radioactivity in 1914, a post opened by the departure of the Scottish radiochemist Frederick Soddy, whose research team had made Glasgow a hotbed of research in radiochemistry. In this capacity, Stewart took part in the mobilization of British science for the First World War, conducting research for the British Admiralty. From 1914-1918, Stewart was thus immersed in two significant developments in British science and society: the development of nuclear science and speculation about nuclear weapons and energy, and the war-catalyzed rise of businessmen such as the chemical industrialist Alfred Mond and the railroad administrator Eric Geddes into leadership roles in the British government, especially encouraged by British Prime Minister David Lloyd George.[3] British fiction authors, above all the highly influential H.G. Wells,

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[3] Keith Grieves, *Sir Eric Geddes: Business and government in war and peace* (Manchester, UK: Manchester University Press, 1989)

eagerly took up these themes as well, in such works as Wells’ *The World Set Free* (1913). In this novel, scientific developments bring about technological dreams and terrors, failures of craven politicians and monarchs lead to disaster, and a technologically-savvy scholarly elite seizes the reins to usher in technocratic utopia. This and similar works of Wells, as well as variations by other contemporary authors, formed a template for Stewart to echo and readers to recognize in *Nordenholt’s Million*.[4]

Two years after returning to Glasgow, Alfred Stewart married Lily Coats, member of a prominent family in Paisley, a large town abutting Glasgow, whose members put their thread-manufacturing fortune toward patronage of arts, sciences, and their Scotch Baptist faith. In 1919, Stewart was offered the Chair of Chemistry at Queen’s in Belfast, and so Alfred and Lily crossed the Irish Sea once more. Stewart remained in this position through his retirement in 1944. Stewart thus spent the years immediately prior to the writing of *Nordenholt’s Million* grappling with new academic and administrative responsibilities, amidst a city riven by the urban violence of the 1919-1921 Irish War of Independence. It seems likely that the urban portraits drawn in the second half of *Nordenholt’s Million*, contrasting the mission-oriented industrial “Nitrogen Area” of Glasgow with the disordered phantasmagoria of violence in famine-ridden London, were to some degree drawn from Stewart’s perspective on these years, with London standing in for Belfast. The Catholic parishioners of St. Patrick’s in Connington’s London, finding comfort in their Church at the extremity of suffering, would seem to connect to events in Stewart’s Belfast in some way or another. One wonders whether the conflicting views and experiences of Jack Flint and Elsa

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[4] Sarah Cole, *Inventing Tomorrow: H.G. Wells and the Twentieth Century* (New York: Columbia University Press, 2020).

Huntingtower regarding the fictional Londoners—for Jack, cold utilitarian humanitarian logic, rigid psychological compartmentalization, unvarnished revulsion mediated by a decidedly racialized, ethnic, gendered way of seeing; for Elsa, deep and abiding empathy, uncompromising principles of justice, refusal to accept the inevitability of lesser evils—might reflect Alfred Stewart’s own conflicts over conditions in Belfast residents with his wife Lily Coats Stewart, or with someone else, or with himself.

Nordenholt’s Million was the first of twenty-six novels Stewart published under the name of J.J. Connington, a pseudonym Stewart synthesized from the last name of a Victorian classicist and two easy-to-remember first initials. The second, *Almighty Gold* (1924), focused on financial swashbuckling of the sort hinted at in the Nordenholt backstory in *Nordenholt’s Million*. The remainder were mystery stories packed with meticulously reported technical detail. Stewart called them “tec yarns,” and they earned him a reputation with contemporary readers as “one of the clearest and cleverest of masters of detective fiction now writing,” a master of “exact and mathematical accuracy in the construction of the plot.” Connington’s orderly plots came with a vision of social order that latter-day readers have found increasingly difficult to stomach. Throughout his corpus, as in *Nordenholt’s Million*, Connington’s non-white, Jewish, middle- and working-class, and physically disabled characters tend toward foolishness and depravity. So do the novels’ depictions of female sexuality. Only pragmatic, well-read, ruthlessly rational men of action seem able to usher events to a happy conclusion and restore stability to a troubled world. As one critic puts it, the “most striking… theme in Connington’s work is the streak of philosophical Social Darwinist authoritarianism running through it,” while Stewart’s personal correspondence suggests an unyielding faith in Britain’s global empire. Perhaps unintentionally, Connington's novels illustrate how thoroughly entangled scientific research and such social ideologies could be. The 1938 Connington mystery *For Murder Will Speak*, drawing on the cutting edge biochemistry of steroid hormones, centers on a "glandular disorder" that, according to the novel's physician-scientist, is the physiological basis of both intemperate heterosexuality and homosexuality in women, and that leads a female character in the novel to a tragic end.[5] In his memoirs, Stewart averred that "there is no resemblance between the scientific investigator, working from details towards a solution, and the detective-story writer, starting from his preconceived solution and working back to the details of the plot."[6] Whether this specific theory was an invention of "Connington" or drawn from real-life research, it tends to suggest otherwise: such preconceptions as the patriarchy and colonialism of interwar Britain shaped science and fiction alike.

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Stewart's career in science spanned the fields of structural organic chemistry, physical chemistry, and radiochemistry. These fields were linked by the methods of spectroscopy—the investigation of chemical substances through analysis of radiation they emitted and absorbed. Upon taking up the chair at Queen's, Stewart made a priority of acquiring new and more powerful instruments for the university's physical laboratory. During the 1920s, his research program involved spectral emissions induced by a high-voltage Tesla transformer, also known as a Tesla coil. Such devices were and are beloved by

[5] Curtis Evans, *Masters of the "Humdrum" Mystery : Cecil John Charles Street, Freeman Wills Crofts, Alfred Walter Stewart and the British Detective Novel, 1920-1961* (Jefferson, NC: McFarland, 2012), 193-245.
[6] Alfred W. Stewart, *Alias J.J. Connington* (London: Hollis & Carter, 1947), x.

science museums and steampunk authors for their spectacular, arcing electrical discharges. This was the research that occupied Stewart as he was writing *Nordenholt's Million*, which begins with a similarly dramatic electrical encounter of a different sort.

Stewart's defining contribution to the physical chemistry of radioactivity was a theory of atomic structure, published in 1918.[7] Like numerous other contemporaneous atomic models, Stewart's theory riffed on the "planetary system" conception of the atom proposed by physicist Ernst Rutherford in 1911, with a positively-charged nucleus orbited by negatively-charged electrons. Eschewing the mathematically intensive quantum approach exemplified in the work of Niels Bohr and Arnold Sommerfeld, Stewart's model of the atom was mostly qualitative. And whereas quantum models distinguished nuclear phenomena from chemical interactions mediated by orbiting electrons, Stewart sought a unified explanation for both radioactivity and the valency patterns underlying chemical bonding.

Stewart proposed that the nucleus of an atom consisted of a tightly-bound collection of negative electrons and "positive electrons" in concentric orbits. Some of these nuclear particles might themselves have additional electron "satellites," like a planet and its moons. The mass of the atom was concentrated in this nucleus; additional electrons of negligible mass orbited this nucleus along far-flung elliptical paths, "like those of comets in the solar system." The central nucleus was responsible for the characteristic properties of chemical elements; the "cometary" electrons were responsible for chemical reactions. At more distant points along these orbits, cometary electrons could relatively easily be abstracted

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[7] Alfred W. Stewart, "Atomic Structure from the Physico-Chemical Standpoint," *Philosophical Magazine* 36, no. 214 (1918): 326–36.

or inserted; Stewart proposed this as the mechanism that gave rise to changes in an element's valence, citing the example of divalent iron (which combines with oxygen to form a black pigment) vs. trivalent iron (which combines with oxygen to form rust).

The nucleus itself changed only through processes of radioactive decay. But just as comets occasionally approach the sun, so "cometary" electrons occasionally approached the nucleus, Stewart suggested. At this point, they affected the constitutive properties of the element, as if they were part of the nucleus itself. Therefore, changes in valence were changes in elemental identity—at least until a further perturbation restored the original number of electron-comets. Modifications of valency were thus *reversible* changes in an atom's identity, whereas modifications of the nucleus associated with radioactive emissions were *irreversible* changes in an atom's identity. This provided the basis for an analogy between the "normal" chemical phenomenon of change in valence and the radioactive phenomenon known as beta decay. Both changes affected chemical properties without appreciably affecting atomic mass; in Stewart's view, they were parallel changes in element identity. For substances displaying the converse relationship—identical chemical properties, different atomic weights—Frederick Soddy had introduced the term *isotope*, a word coined and suggested to Soddy by the physician and author Margaret Todd. By analogy, Stewart suggested the term *isobar* (meaning "same weight") for fellow members of his equal-mass atomic families. Stewart capped off his theory with an explanation of atomic masses and isotopes involving near-light-speed orbital velocities within his "solar system" atoms and the most famous equation of a scientist 18 months older than Stewart: Albert Einstein's $E = mc^2$.

Stewart's ruminations on mass-energy relations lived on in the work of his character Henley-Davenport and the atomic climax of *Nordenholt's Million*. Otherwise, his theory of atomic structure went nowhere. Abstracted from this theory, however, the term "isobar" stuck, becoming Stewart's most well-known and enduring contribution to science.

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By the time "J.J. Connington" published *Nordenholt's Million*, Stewart was already an accomplished author of scientific monographs and books for the science-savvy public. His *Recent Advances in Organic Chemistry* (1908) and *Recent Advances in Physical and Inorganic Chemistry* (1909) were well received by reviewers and student readers. He continually expanded and updated both throughout his career, publishing seven editions of each. The introductions to these books, penned by distinguished colleagues, testify that Stewart was a gifted synthesizer with an eye to the future, talents that would serve him well as a science fiction author.

Fellow Glasgow native and 1904 Nobel Laureate William Ramsay penned the introduction for the book on physical and inorganic chemistry. (Stewart likely became acquainted with Ramsay during Stewart's fellowship at University College London, where Ramsay was Professor of Chemistry.) Describing the ever more massive primary journal literature as "indigestible masses of what is often very crude material," Ramsay wrote that "Dr. Stewart may be likened to a skilful cook, who has trimmed his joint, rejecting all innutritious and redundant excrescences, and has served it up to table in a palatable form. Such essays, I venture to think, will do more to encourage a taste for chemistry than many text-books."[8] In his introduction to the organic chemistry book, Stewart's UCL mentor J. Norman Collie focused on the book's forward-looking orientation: Unlike so many books "covering the same ground, with a fine disregard of the fact that to the pioneers the outlook is constantly changing," Stewart's stood out as one of the few "which are not mere narrations of facts, and which do point out not only what has been done, but what might be accomplished, and which do make the reader think," marking out "the paths along which the pioneers of the science are likely to go in the immediate future."[9]

Stewart mapped out these paths for a popular audience in his 1914 *Chemistry and its Borderland*, a well-reviewed work discussing new research in chemistry, its industrial and medical applications, and how best to fund and organize it. Chapter XIII of this book, "Chemical Problems of the Present and Future," takes up chemical aspects of the provision of food and power. Stewart noted that these were questions of the utmost importance: "Given food and power, the mechanical side of our civilization could always exist much as it does at present; but the disappearance of these agents would entail a complete collapse of the whole fabric." Anticipating the eventual exhaustion of coal, Stewart envisioned a future in which tidal engines, windmills, and some yet-unknown method of directly capturing solar radiation would provide the world with power, distributed via improved batteries and perhaps some sort of artificial coal. In addition to these technologies, already known, there was the more distant prospect of harnessing the massive intra-atomic energies that researchers on radioactive elements were just beginning to investigate. Turning to food, "the more fundamental problem," Stewart explained that this boiled down to a question of

[8] Alfred W. Stewart, *Recent Advances in Physical and Inorganic Chemistry* (London: Longmans, Green, 1909), xiv.
[9] Alfred W. Stewart, *Recent Advances in Organic Chemistry.* (London: Longmans, Green, 1908), xiii.

nitrogen. With the help of a diagram of the nitrogen cycle, he illustrated how "nitrifying bacteria" took nitrogen from the atmosphere, decaying organic matter, and animal wastes and made it available to plants for growth. Complementary "denitrifying bacteria" returned nitrogen back to the atmosphere. However, intensive agriculture had unbalanced this cycle, effecting a massive transfer of nitrogen compounds from soils to waterways and oceans via sewage. Imports of Chile saltpeter had balanced this deficit, but those would soon be exhausted. Fortunately, new power-intensive technologies for fixation of atmospheric nitrogen were beginning to come into use; Stewart predicted that fertilizer-producing "sewage farms" and farming of oceanic kelp would provide supplementary nitrogen sources in the future. After a brief discussion of synthetic foods—synthetic proteins presenting a daunting challenge but one "within the limits of possibility"—Stewart ventured a few closing remarks on the possibility of synthetic life. The accidental discovery of some novel, barely-living organism "might involve us in very serious consequences. Assume that it had great powers of assimilation and reproduction, and we might find it rather a dangerous neighbor…. Such speculations, however, take us out of the chemical field entirely, and belong in the meantime to pseudo-science."[10]

There it is: denitrifying bacteria, headlong reproduction, soil exhaustion, looming famine, nitrogen factories, coal scarcity, atomic power. In this 1914 book chapter, Stewart laid out virtually all the scientific and technological ideas he would mobilize as plot points in *Nordenholt's Million*—and, retrospectively, a decent sketch of twenty-first century renewable energy systems and the non-impossibility of Impossible Burgers.

[10] Alfred W. Stewart, *Chemistry and Its Borderland* (Longmans, Green, and Company, 1914), 226-47,

This brings us back to Stewart's distinction between science and fiction: according to Stewart, science works forward, from details to conclusion, while fiction works backward, from solution to details. A historian working backward from the rise of European fascism and the present science of environmental change will find details in *Nordenholt's Million* that anticipate these developments; working backward from twenty-first century political and environmental values, they will find many ideas to critique, ideas whose long-term legacies one might wish to grapple with. Conversely, a historian working forward from biographical and historical details may find that the fiction of H.G. Wells, the philanthropy of Andrew Carnegie, the technocratic governance of Alfred Mond, Stewart's nuclear speculations, and life in revolutionary Belfast made a mark on the fictional world of *Nordenholt's Million*. These approaches are not mutually exclusive. They are complementary ways of telling history, just as, notwithstanding Stewart's claims to the contrary, they are complementary ways of writing fiction and doing science.[11] As a chemist, Stewart should have known better. The interplay of making and unmaking, nitrification and denitrification, synthesis and analysis, is what chemistry is all about.

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Bibliography

Bowler, Peter J. *A History of the Future: Prophets of Progress from H.G. Wells to Isaac Asimov*. Cambridge, UK: Cambridge University Press, 2017.

Cole, Sarah. *Inventing Tomorrow: H.G. Wells and the Twentieth Century*. New York: Columbia University Press, 2020.

[11] On the relationship between science fiction and science in modern history, see Amanda Reed and Iwan Rhys Morus, eds., "Presenting Futures Past," *Osiris* 34 (2019) and Peter J. Bowler, *A History of the Future : Prophets of Progress from H.G. Wells to Isaac Asimov* (Cambridge, UK: Cambridge University Press, 2017).

Evans, Curtis. *Masters of the "Humdrum" Mystery: Cecil John Charles Street, Freeman Wills Crofts, Alfred Walter Stewart and the British Detective Novel, 1920-1961*. Jefferson, NC: McFarland, 2012.

Grieves, Keith. *Sir Eric Geddes: Business and Government in War and Peace.* Manchester, UK: Manchester University Press, 1989.

Kauffman, George B. "Alias J. J. Connington: The Life and Work of Alfred W. Stewart (1880-1947) Chemist and Novelist." *Journal of Chemical Education* 60, no. 1 (January 1, 1983): 38.

Rees, Amanda, and Iwan Rhys Morus, eds. "Presenting Futures Past: Science Fiction and the History of Science." *Osiris* 34 (2019).

Smiles, Samuel. "Obituary Notice: Alfred Walter Stewart, 1880–1947." *Journal of the Chemical Society* (1948): 396–98.

Smith, Crosbie, and M. Norton Wise. *Energy and Empire: A Biographical Study of Lord Kelvin*. New York: Cambridge University Press, 1989.

Stewart, Alfred W. *Recent Advances in Organic Chemistry.* London: Longmans, Green, 1908.

Stewart, Alfred W. *Recent Advances in Organic Chemistry.* London: Longmans, Green, 1908.

Stewart, Alfred W. *Chemistry and Its Borderland*. London: Longmans, Green, 1914.

Stewart, Alfred W. *Alias J.J. Connington*. London: Hollis & Carter, 1947.

Smith, Crosbie and M. Norton Wise, *Energy and Empire: A Biographical Study of Lord Kelvin.* New York: Cambridge University Press, 1989.