

Embryologies of Modernism

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In October 1926, critic C. H. Rickword observed that “character is, to borrow biological jargon, an emergent quality of the novel. It emerges from the story, which is itself structurally a product of language. . . .”¹In a review of Elizabeth Drew’s study, *The Modern Novel*, Rickword called character an “organizing principle” (“NF,” 156), and defined “the quality that is common to all great works of literature, in no matter what genre” (“NF,” 157): “it is primarily a sequence of events developing in accordance with an inner necessity” (“NF,” 157). In its interest in a sequence of developmental events, the notion of an inner necessity, the concept of an organizing principle, and its opposition between an “emergent quality” and the structural surround from which it emerges, as in its overt admission that it is borrowing from biology, this manifesto from the realm of literature challenges the two-culture divide. Rickword is writing about literature using terms current in modern embryology.

I want to explore the possibility that developments in the scientific field of embryology—concerned as it is with the principle of individual development against a backdrop of species change over time—have a relationship to developments within the art of fiction, with the latter’s emphasis on character creation against a backdrop of narrative and language, in the modern period.²In short, I will ask: What connections may exist between the embryological “take” on the developing individual, and the literary approach to character construction in the first three decades of the twentieth century?

Since its origins in the observations of Hippocrates and Aristotle, embryology focused on “the most obstinate biological problem of all—that of how the egg develops into a complex [End Page 145] organism.”³While in the nineteenth century it was primarily a descriptive science, concerned with morphology, with form, by the dawn of the twentieth century, embryology had emerged as an experimental science as embryologists engaged in a heated series of debates.⁴Vitalists, favoring the notion of a life-force fueling development, were vanquished by mechanists, who held that embryonic development could be explained “on a mechanical cause-and-effect basis” (*SL*,263).⁵Preformationists, who held that the entire adult organism existed preformed in the egg, were decisively overruled by epigenesists, who held that the organism developed through successive processes of differentiation, from a previously undifferentiated entity (*SL*,31). These movements in modern embryology had their parallels in modern culture at large, in its increasing mechanization, breakdown of communal certainties, and threat to conventional ideas of causality and predictability.⁶So just as the seventeenth century saw the development of a “fetal subject” suiting the new requirements of the liberal civil state, early-twentieth-century embryology charted the development of a new embryo suited to its period.⁷This was an embryo neither preformed nor infused with an ineffable life force, but instead machine-like and developing into a greater differentiation subject to the reign of chance.

Three new experimental techniques developed in the first two decades of the twentieth century enabled embryologists to investigate the nature of the relationship between individual and species (phenotype and genotype) or, to put it more broadly, between the problems of embryonic development and hereditary transmission of

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differences. They were tissue culture, grafting, and artificial parthenogenesis. ⁸These techniques are particularly interesting, because they address issues in embryology that echo specific problems of character creation in modern literature: the temporal and spatial boundaries of the individual, the malleability of sex/gender, and the organizing principles of development.

The technique of tissue culture, perfected in 1907, enabled embryologists to excise living tissue and keep it alive, bathed in a nutrient solution, in petri dishes or test tubes. American scientist Ross Harrison first carried out this technique successfully in his anatomy lab at The Johns Hopkins University, when he induced fragments of nervous tissue from frog embryos to stay alive, and to produce outgrowths, when cultured outside the body. The same technique was later practiced with great cultural prominence by Alexis Carrel, who brought it to London—and mass cultural celebrity—in 1924.

⁹The technique of grafting was perfected by Hans Spemann in 1918, when, in what H. G. Wells, Julian Huxley, and G. P. Wells, in *The Science of Life* (1931), dubbed “a series of beautiful experiments with developing newts’ eggs,” ¹⁰he “cut out one part of an embryo and implanted it in another position to see what would become of it” (SL,259). When “Spemann transposed presumptive brain with presumptive belly, and found that each became the kind of tissue which was required by its new environment,” he began the process that led to the discovery of the principle that organized embryonic growth (SL,259). ¹¹





Given their prominence in the scientific and cultural imaginary, it is hardly surprising that both tissue culture and grafting appeared in literary texts as metaphoric [End Page 146] strategies for character creation. As Lucia Sander has shown, Susan Glaspell’s 1922 play, “The Verge,” used a woman scientist’s botanical experiment in the creation of hybrid plants to embody the parallel experiment in living being carried out by the heroine. ¹²Like her prized hybrid “Edge Vine,” Clare’s liminal challenge to conventional gender roles (motherhood, wifeness) is aesthetically, philosophically, and socially risky. Clare’s husband finds her work disturbing: “changing things into other things—putting things together and making queer new things . . . it’s unsettling for a woman.” ¹³Clare’s description of her plants holds for herself as well: “These plants . . . perhaps they are less beautiful—less sound—than the plants from which they diverged. But they have found—otherness. . . . They have been shocked out of what they were—into something they were not; they’ve broken from the forms in which they found themselves. They are alien. Outside.” (V,52) Glaspell explicitly invokes the innovations of contemporary embryology when Clare, speaking implicitly of botany and society, imagines a world in which disparate parts are broken and recombined with disturbing and exciting implications: “I want to break it up! I tell you, I want to break it up! If it were all in pieces, we’d be . . . shocked to aliveness— . . . wouldn’t we? There would be strange new comings together—mad new comings together, and we would know what it is to be born, and then we might know—that we are. Smash it. [Her hand is near an egg.] As you’d smash an egg.” (V,19) We can trace a network of embryological references, from Glaspell’s play to Aldous Huxley’s *Antic Hay* year later (1923), where Shearwater’s horrifying laboratory creations literalize the embryological experiments in grafting and tissue culture of the era, in order to offer ironic commentary on the sexual and social experimentation of the early 1920s. There is the “Cock into which Shearwater had engrafted an ovary,” and who now knows not “whether to crow or cluck,” and the “beetles, who had had their heads cut off and replaced by the heads of other beetles,” and who “darted uncertainly about, some obeying their heads, some their genital organs.” ¹⁴Then, three years later, in 1926, zoologist Julian Huxley published a short story in the *Yale Review* that explored the cross-cultural, cross-species implications of those embryological techniques. “The Tissue-Culture King,” subtitled “A Parable of Modern Science,” is a fanciful adventure story in which the members of an African tribe are taught by a British medical researcher to culture the king’s tissues and so extend his power—and their own. ¹⁵As I have discussed elsewhere, this short story used one of the most celebrated modern embryological techniques to launch a critique of the eugenic control fantasies of modern science. But more importantly for our purposes now, it also drew on embryology to consider the political and psychological implications of thinking



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of identity not as stabilized in space and in one time period, but rather as diffused and disseminated across different spaces and times. Finally, in 1932, Aldous Huxley's *Brave New World* considered how the techniques of tissue culturing could challenge the nature of biological and cultural individuality, with the image of the conformist human products of the Central London Hatchery and Conditioning Center.

While tissue culture and grafting made it possible for embryologists to investigate the temporal and spatial boundaries of the organism, another technique enabled [End Page 147] embryologists to study the relative contribution of the two sexes to the new individual. Artificial parthenogenesis, "one of the most striking discoveries of modern biology," according to Wells, Huxley, and Wells, was first developed by Jacques Loeb in 1901.¹⁶ This technique consists of the mechanical or chemical stimulation of ova, producing cell division characteristic of fertilization, without stimulus by sperm. While parthenogenesis occurs naturally in a number of organisms, Loeb initiated this as a laboratory procedure when he exposed sea-urchin eggs to salt water, inducing them to develop first to the larval stage and then to adulthood.

In an era that also saw the suffrage movement, eugenics, and sexology, artificial parthenogenesis was a particularly rich site for traffic between literature and science, because it explored the proper conditions for fertilization and development, and the relative contributions of paternal and maternal progenitors to the construction and development of the individual. H. G. Wells uses a contrast between artificial parthenogenesis and normal two-sex reproduction to delineate character in his novel *Ann Veronica* (1909). Studying embryology and physiology in the laboratory of the Central Imperial College in London, his protagonist meditates on the fact that

Biology is an extraordinarily *digestive* science. It throws out a number of broad experimental generalizations, and then sets out to bring into harmony or relation with these an infinitely multifarious collection of phenomena. The little streaks upon the germinating area of an egg . . . ten thousand such things bear their witness and are illuminated. . . . It came to Ann Veronica one night . . . that this slowly elaborating biological scheme had something more than an academic interest for herself. . . . she in her own person too, was this eternal Bios, beginning again its recurrent journey to selection and multiplication and failure or survival.¹⁷

Wells contrasts Ann Veronica, who accepts her purportedly natural role in the "biological laboratory" of society, to Miss Miniver the suffragist, who defies both Mr. Ramage's gender-stereotyped model for womanly behavior and the normalized biology from which it springs, subscribing instead to both social and embryological experimentation:

"We do not want the men," said Miss Miniver, "we do not want them. . . . Science some day may teach us a way to do without them. It is only the women matter. It is not every sort of creature needs—these males. Some have no males."

"There's green-fly," admitted Ann Veronica. "And even then—"

[AV,127–28]

Just as Wells describes the London in which Ann Veronica comes to maturity as "that remarkable laboratory of relationships" (AV,151), so too Virginia Woolf borrows from science, in the manuscript drafts of *A Room of One's Own*. Yet while Wells uses science to enforce conventional sex roles, Woolf draws on it to escape them, defining the conditions that will favor the emergence of the modern woman writer:

what happens when the organism [are we not in a laboratory?] That has been in the dark these million years not only feels the light . . . falling on it, . . . but behold—there [End Page 148] is actually a piece of food coming my <her> way. Knowledge is it? Action? And she reaches out for it . . . & has by some entirely new <activity> organisation & combination to . . . absorb it into . . . a system already so highly developed for other purposes, so *extraordinarily* complex, so sensitive, that . . . it hardly knows what to make do with this astonishing addition.¹⁸

Nine years before the publication of *A Room of One's Own*, Aldous Huxley published his first short story, "The Farcical History of Richard Greenow" (1920). Woolf was familiar with Huxley's story when she drafted *A Room of One's Own*, having reviewed

his *Limbo*, the volume in which it first appeared, for the *Times Literary Supplement* in 1920. There are a number of parallels between Huxley's farcical work and Woolf's serious essay that suggest Huxley's story is an important source for *A Room of One's Own*. I was first struck by the similarity between these two works when I noticed that both featured curious conversational vignettes about a classic example of anomalous development: a Manx cat. In Huxley's story, the protagonist must endure embarrassing questions posed him by his headmaster's wife:

"And so you have a deep, passionate fondness for cats," [she said] as though they had been intimately discussing the subject for the last hour. Dick had enough presence of mind to say that, yes, he did like cats—all except those Manx ones that had no tails.

"No tails," Mrs. Cravister repeated—"no tails. Like men. How symbolical everything is!" ¹⁹

Woolf too includes a conversation about the Manx cat in *A Room of One's Own*, but the detail that in Huxley served to differentiate human beings from animals serves in Woolf to differentiate men from women: "It is strange what a difference a tail makes. . . ." ²⁰ The previously unstudied relationship between these two works merits a longer investigation than I can give here, but what interests me now is the fact that both works are cultural and literary explorations of issues also being investigated by embryologists of that era: the "conditions of emergence" for a modern writer and the relative importance of maternal and paternal, or female and male, influences on the writer's mind and art. Both stories make metaphoric use of a notion of single-sex generation that recalls the technique of artificial parthenogenesis. But the two stories borrow, and use, this concept drawn from early-twentieth-century embryology quite differently.

"The Farcical History of Richard Greenow" concerns a man who finds that he has—parthenogenetically, if you will—germinated a new being inside himself: a woman writer of sentimental fiction named Pearl Bellairs. As Greenow discovers,

He was a hermaphrodite. A hermaphrodite, not in the gross obvious sense of course, but spiritually. Two persons in one, male and female. . . . He was not in the least distressed to discover this abnormality in his character. As long as the two parts of him kept well apart, as long as his male self could understand mathematics, and as long as his lady novelist's self kept up her regular habit of writing at night and retiring from business during the day, the arrangement would be admirable. ["FH," 433]

[End Page 149] While Greenow forges a brilliant career in political journalism, his "lady novelist's self," Pearl Bellairs, continues her nightly output of five thousand words, publishing a series of popular novels that generates a lavish income for him. With the outbreak of the war, relations between the two selves become more difficult: Dick is a pacifist, and discovers to his horror that Pearl Greenow has begun writing articles of "shrilly raucous chauvinism" ("FH," 445). Worse still, when the war ends, and the franchise is extended to women over thirty, Pearl Bellairs shows up in the Town Hall—in *his* body—demanding her woman's vote. Greenow is committed to an insane asylum, where he dies, inhabited to the last by Pearl Bellairs, leaving behind a scribbled sheaf of conflicted ravings and directives dictated by both of his selves.

Huxley gives us a tale of parthenogenetic male "psychic birth" leading to debilitating, involuntary psychic androgyny, while Woolf's *A Room of One's Own* gives us a case of aesthetic androgyny that is not debilitating, but enabling. Greenow's farcical dilemma of being inhabited by a writer of another sex is, in Woolf's essay, literalized as a serious aesthetic principle rather than a psychic (and aesthetic) debility, an argument for psychic androgyny or bisexuality, rather than for masculine resistance to feminine impulses:

in each of us two powers preside, one male, one female. . . . The normal and comfortable state of being is that when the two live in harmony together, spiritually cooperating. If one is a man, still the woman part of the brain must have effect; and a woman also must have intercourse with the man in her. Coleridge perhaps meant this when he said that a great mind is androgynous. It is when this fusion takes place that the mind is fully fertilised and uses all its faculties. Perhaps a mind that is purely masculine cannot create, any more than a mind that is purely feminine. . . .

[R, 102]

While in "Greenow" the war calls forth the jingoistic female effusions of Pearl

Bellairs, in *A Room of One's Own* elicits a purely male creation—a hideous parody of artificial parthenogenesis, whose progeny is produced in the absence not of the male, but of the female progenitor:

There has been a meeting of academicians whose object it is “to develop the Italian novel.” “Men famous by birth, or in finance, industry, or the Fascist corporations” came together the other day and discussed the matter, and a telegram was sent to the Duce expressing the hope “that the Fascist era would soon give birth to a poet worthy of it.” We may all join in that pious hope, but it is doubtful whether poetry can come out of an incubator. Poetry ought to have a mother as well as a father. The Fascist poem, one may fear, will be a horrid little abortion such as one sees in a glass jar in the museum of some country town. Such monsters never live long, it is said: one has never seen a prodigy of that sort cropping grass in a field. Two heads on one body do not make for length of life.

[R,107]

Woolf briefly toys with the notion of a mental parthenogenesis in her image of women writers learning from a rediscovered female tradition: “we think back through our mothers, if we are women” (R,79). One of the critical problems posed [End Page 150] by *A Room of One's Own* has been to reconcile this argument for reclaiming a female literary lineage with Woolf's final model of the androgynous artist. Woolf recoils from the notion—shared with, and possibly even drawn from, Huxley—of a parthenogenetic, male-male or female-female, lineage, imaged in the writer who comes into being without being “fertilized” by a partner of the opposite sex (whether it is Pearl Bellairs or the Fascist poet of *A Room of One's Own*). This is the main subject of critique both in Huxley's farce and Woolf's serious essay. The solutions to these dangerously narrow models for literary creativity are dramatically different, however. Huxley suggests that Greenow would have been better off if Pearl Bellairs had never inhabited him, while Woolf calls not for less gender blending, but more.

In their adaptations of embryological techniques to questions of character construction—among them the temporal and spatial boundaries of the individual, the malleability of sex/gender, and the organizing principles of development—these modern literary texts demonstrate the range of cultural meanings both borrowed from, and enabled by, the discourse of early-twentieth-century embryology. The interest that modern writers demonstrated in these new techniques in the years between 1900 and 1935 has been echoed, since 1980, by a parallel explosion of global interest in embryology, embodied in a number of fictions exploring fetal life, from Salman Rushdie's *Midnight's Children*, Ariel Dorfman's *The Last Song of Manuel Sendero*, and Carlos Fuentes's *Christopher Unborn* to Kenzaburo Oe's *A Personal Matter* and Pascal Bruckner's *The Divine Child*, each of which can be understood as drawing on embryological models to articulate a new, national fetal subject.²¹ In the intervening years (1940 to 1980), as Evelyn Fox Keller has recently shown, embryology was nearly eclipsed by the new disciplinary prestige of genetics and molecular biology. It has taken two decades to refocus from the “discourse of gene action” (as Keller styles it) to a study of “higher organisms,” and the embryology to which we have returned is not the same as the discipline abandoned in the rush of enthusiasm for genetics and molecular biology in the late 1930s.²² The cultural and aesthetic implications of this changed scientific construction of the individual remain to be understood, and to shape our reading of the embryological borrowings of contemporary fictions.

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Footnotes

¹ C. H. Rickword, “A Note on Fiction,” in *The English Modernist Reader, 1910–1930*, ed. Peter Faulkner (Iowa City: University of Iowa Press, 1982), 157; hereafter abbreviated “NF.” The article originally appeared in *The Calendar of Modern Letters* 3 (July 1926): 166–68.

2. Joseph Needham explains that the “principle of emergence in its simplest form is the statement that there are levels of existence in the universe, at each of which some more complicated form of being comes into existence, containing some essence absolutely new, and which could not have been predicted, even if all the properties are not the sum of the properties and peculiarities of its constituents.” (Joseph Needham, *Chemical Embryology*, vol. 1 [New York: Hafner Publishing Co., 1931], 30)

3. Gordon Rattray Taylor, *The Science of Life: A Picture History of Biology* (London: Thames and Hudson, 1963), 254–55; hereafter abbreviated *SL*.

4. Jane Maienschein, “The Origins of *Entwicklungsmechanik*,” in *Developmental Biology: A Comprehensive Synthesis*, vol. 7, *A Conceptual History of Modern Embryology*, ed. Scott F. Gilbert (New York: Plenum Press, 1991), 43. Jane Oppenheimer points out:

It is quite often said, by those who try to outline the methods by which science operates, that a first phase in its development consists of the observation of data, a second, of their classification, and that there finally follows an inquiry into their relationships. If there is any single generalization that can be safely formulated concerning the history of embryology as a whole, it is probably that this science has carried out all these procedures simultaneously at all phases of its development, from the time of Aristotle through to our own. [Jane M. Oppenheimer, “Present Embryology,” in her *Essays in the History of Embryology* (Cambridge, Mass.: M.I.T. Press, 1967), 9]

5. Donna Haraway explores how the German embryologist Hans Driesch “was instrumental in breaking the limits of a too simple mechanism in biology and in precipitating the crisis leading to a nonvitalist organicism” (*Crystals, Fabrics, and Fields: Metaphors of Organicism in Twentieth-Century Developmental Biology* [New Haven, Conn.: Yale University Press, 1976], 13).

6. See Malcolm Bradbury and James McFarlane, “The Name and Nature of Modernism,” in *Modernism: 1890–1930*, ed. Malcolm Bradbury and James McFarlane (London: Penguin Books, 1976), 19–55; and James McFarlane, “The Mind of Modernism,” in *ibid.*, 71–93.

7. See Andrea Henderson, “Doll-Machines and Butcher-Shop Meat: Models of Childbirth in the Early Stages of Industrial Capitalism,” *Genders* 12 (winter 1991): 100–119.

8. See Evelyn Fox Keller, *Refiguring Life: Metaphors of Twentieth-Century Biology* (New York: Columbia University Press, 1994), 4.

9. Donna Haraway observes that Ross Harrison’s “extraordinarily rich scientific career included development of tissue culture, a technique that he used to demonstrate the nature of nerve outgrowth” (Haraway, *Crystals, Fabrics, and Fields*, 13). For further information on Alexis Carrel’s work in tissue culture, see J. A. Witkowski, “Alexis Carrel and the Mysticism of Tissue Culture,” *Medical History* 23 (1979): 279–96, esp. 282, n 20.

10. H. G. Wells, Julian Huxley, and G. P. Wells, *The Science of Life* (London: Cassell and Company, Ltd., 1931), 582.

11. See *ibid.*

12. Lucia Sander, “Of Genes, Genres, and Gender or Of the Political Implications of ‘Transposition,’” unpublished paper. Sander reads Glaspell’s play in relation to the scientific achievement of cytogeneticist Barbara McClintock, arguing that both Glaspell and McClintock’s disciplinary marginalization follows from their radically “other” perspectives on science and drama. My thanks to Lucia Sander for sharing this paper with me.

13. Susan Glaspell, *The Verge* (Boston: Small, Maynard and Co., 1922), 20–21; hereafter abbreviated *V*.

14. Aldous Huxley, *Antic Hay* (London: Chatto and Windus, 1923), 325, 325, 326, and 326, respectively.

15. See Julian Huxley, “The Tissue-Culture King,” *Yale Review* 15 (April 1926): 479–504; repr. in *Amazing Stories* (August 1927): 451–59.

16. Wells, Huxley, and Wells, *The Science of Life*, 509.

17. H. G. Wells, *Ann Veronica* (1909; London: J. M. Dent, 1993), 119; hereafter abbreviated *AV*.

18. Virginia Woolf, *Women and Fiction: The Manuscript Versions of A Room of One’s Own*, ed. and trans. S. P. Rosenbaum (Oxford: Blackwell, 1992), 117.

19. Aldous Huxley, “The Farical History of Richard Greenow,” in *Twice Seven: Fourteen Selected Stories by Aldous Huxley* (London: The Reprint Society, 1944), 423; hereafter abbreviated “FH.”

20. Virginia Woolf, *A Room of One’s Own* (1929; New York: Harcourt Brace and World, 1957), 13; hereafter abbreviated *R*.

21. Salman Rushdie, *Midnight’s Children* (New York: Avon Books, 1982); Ariel Dorfman, *The Last Song of Manuel Sendero*, trans. George R. Shivers with the author (New York: Penguin, 1987); Carlos Fuentes, *Christopher Unborn*, trans. Alfred MacAdam

(London: André Deutsch, 1989); Kenzaburo Oe, *A Personal Matter*, trans. John Nathan (New York: Grove Press, 1989); and Pascal Bruckner, *The Divine Child*, trans. Joachim Neugroschel (New York: Little, Brown, 1992).

22, Keller, *Refiguring Life*, 32.

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