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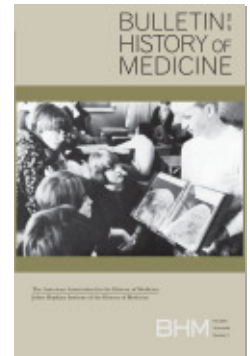
## Introduction: Communicating Reproduction

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# Introduction: Communicating Reproduction

NICK HOPWOOD, PETER MURRAY JONES,  
LAUREN KASSELL, AND JIM SECORD

**SUMMARY:** Communication should be central to histories of reproduction, because it has structured how people do and do not reproduce. Yet communication has been so pervasive, and so various, that it is often taken for granted and the historical specificities overlooked. Making communication a frame for histories of reproduction can draw a fragmented field together, including by putting the promotion of esoteric ideas on a par with other practical activities. Paying communication close attention can revitalize the history of reproduction over the long term by highlighting continuities as well as the complex connections between new technologies and new approaches. Themes such as the power of storytelling, the claiming and challenging of expertise, and relations between knowledge and ignorance, secrecy and propriety also invite further study.

**KEYWORDS:** authority and expertise, communication, generation and reproduction, ignorance and knowledge, secrets and silences, telling stories

Philosophers may debate whether sex is a form of communication, but human reproduction surely is. From the words of power on fertility charms to the online controversy over mitochondrial replacement therapy, technologies of communication have shaped how people reproduce. Yet

This essay introduces a special issue that began in a conference on “Communicating Reproduction” (<http://www.hps.cam.ac.uk/medicine/communicating.html>) held at the Department of History and Philosophy of Science, University of Cambridge in December 2011. This was linked to an exhibition on “Books and Babies” at Cambridge University Library curated by Mary Fissell, Nick Hopwood, Peter Murray Jones, Francis Neary, and Jim Secord (legacy website: <http://www.lib.cam.ac.uk/exhibitions/Babies>). We thank the Wellcome Trust for funding the meeting and the exhibition through a strategic award in the history of medicine on the theme “Generation to Reproduction” (088708), Francis Neary for sterling organizational work, and all participants for their engagement. Jesse Olszynko-Gryn and Tatjana Buklijas kindly commented on drafts. Special thanks to Mary Fissell for constant encouragement and, with Randall Packard and Carolyn McLaughlin, for improving the manuscript and seeing the issue through to publication.

because communication has been so pervasive, and so various, its fundamental significance is easily overlooked.

Communication has been too important, not least in medical encounters, for historians ever to have ignored it altogether, and it has become the object of numerous specific studies. The turn to practice has made clear how demanding the work of communication has been, and how far its history goes beyond the succession of technologies which medicine has used: figurines and amulets, papyrus and parchment, printed books, journals, magazines, and comics, exhibitions, film, radio, television, and the Internet. As scholars show how practices of communication, once treated as an optional extra, belong at the heart of histories of the lecture, the hospital, the breakthrough, and the operation, not to mention disease,<sup>1</sup> it is rewarding to apply this approach to reproduction.

Especially since the 1960s, reproduction has been a site of intense scientific, medical, social, political, and ethical innovation and a crossroads for rich traffic between the biological, medical, and social sciences, agriculture, medicine, and the humanities. Ideas and practices of *reproduction*, and the older, broader notion of *generation*, also have long histories. Importantly shaped by feminism, these histories include some of the most politicized controversies in our field and continue to resonate in public debate. They encompass a wide range of themes: theories of sex and gender; knowledge of entities such as seeds, germs, embryos, monsters, and clones; concerns about creation, evolution, degeneration, and regeneration; investments in maternity, paternity, and heredity; practices of fertility control, potency, and childbirth; and health relations between citizen and state, individual and population.<sup>2</sup> But historians of reproduc-

1. See, for example, on the lecture: Nancy G. Siraisi, *Avicenna in Renaissance Italy: The Canon and Medical Teaching in Italian Universities after 1500* (Princeton, N.J.: Princeton University Press, 1987); the hospital: Volker Hess and J. Andrew Mendelsohn, "Case and Series: Medical Knowledge and Paper Technology, 1600–1900," *Hist. Sci.* 48 (2010): 287–314; the breakthrough: Bert Hansen, *Picturing Medical Progress from Pasteur to Polio: A History of Mass Media Images and Popular Attitudes in America* (New Brunswick, N.J.: Rutgers University Press, 2009); an operation: Ayesha Nathoo, *Hearts Exposed: Transplants and the Media in 1960s Britain* (Basingstoke: Palgrave Macmillan, 2009); and disease: Joan Jacobs Brumberg, "From Psychiatric Syndrome to 'Communicable' Disease: The Case of Anorexia Nervosa," in *Framing Disease: Studies in Cultural History*, ed. Charles E. Rosenberg and Janet Golden (New Brunswick, N.J.: Rutgers University Press, 1992), 134–54; Nancy Tomes, *The Gospel of Germs: Men, Women, and the Microbe in American Life* (Cambridge, Mass.: Harvard University Press, 1998).

2. For ways into a large literature: Joan Cadden, *Meanings of Sex Difference in the Middle Ages: Medicine, Science, and Culture* (Cambridge: Cambridge University Press, 1993); Jacques Roger, *The Life Sciences in Eighteenth-Century French Thought*, trans. Robert Ellrich, ed. Keith R. Benson (Stanford: Stanford University Press, 1997); Ohad Parnes, Ulrike Vedder, and Stefan Willer, *Das Konzept der Generation. Eine Wissenschafts- und Kulturgeschichte* (Frankfurt:

tion have yet to investigate at all systematically how major traditions and innovations have depended on communication.<sup>3</sup>

This dependence is suggested by the strong semantic relations. Digital and biological play off each other in talk of *replication*, *cloning*, and *viruses*. Visions of industrialized childbirth have invoked the steam press as a means of mechanical reproduction, while *gossip* is named for the women who once entered the birthing chamber to help. Bishop Richard de Bury's *Philobiblon*, a Latin manuscript completed in 1344, tells of the making of books as a kind of generation across time; we still think of books as children.<sup>4</sup> To interrogate these metaphors we need to take communication seriously as we historicize questions about reproduction.

What did male and female contribute, and how could they produce healthy children? How did human generation relate to that of animals and plants? What was the status of embryo and fetus, and how did it change through pregnancy? How did environment and geography affect fertility, what constituted a family, and what role should the state play? The questions may endure; form and audience have changed out of all recognition. So rather than presenting the responses as ethereal theory, we should ground the discussions in these basic transformations. Treating the promotion of even the most high-flown ideas as practical, material activities will bring them down to earth and put them on a par with other reproductive practices. Conversely, we know about the use of aphrodisiacs and obstetric analgesia, census taking, and birth control largely from

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Suhrkamp, 2008); Margaret Marsh and Wanda Ronner, *The Empty Cradle: Infertility in America from Colonial Times to the Present* (Baltimore, Md.: Johns Hopkins University Press, 1996); Alison Bashford and Philippa Levine, eds., *The Oxford Handbook of the History of Eugenics* (New York: Oxford University Press, 2010); Staffan Müller-Wille and Hans-Jörg Rheinberger, *A Cultural History of Heredity* (Chicago: University of Chicago Press, 2012); Alison Bashford, *Global Population: History, Geopolitics, and Life on Earth* (New York: Columbia University Press, 2014).

3. But see, for example, Katharine Park, *Secrets of Women: Gender, Generation, and the Origins of Human Dissection* (New York: Zone Books, 2006); Mary E. Fissell, *Vernacular Bodies: The Politics of Reproduction in Early Modern England* (Oxford: Oxford University Press, 2004); Roy Porter and Lesley Hall, *The Facts of Life: The Creation of Sexual Knowledge in Britain, 1650–1950* (New Haven, Conn.: Yale University Press, 1995); Tatjana Buklijas and Nick Hopwood, "Making Visible Embryos" (2008–10), [www.hps.cam.ac.uk/visibleembryos](http://www.hps.cam.ac.uk/visibleembryos); Barbara Orland, ed., "Sexualität und Fortpflanzung in den Medien des 20. Jahrhunderts," *Zeitenblicke* 7, no. 3 (2008), <http://www.zeitenblicke.de/2008/3/>; Peter-Paul Bänziger et al., eds., *Fragen Sie Dr. Sex! Ratgeberkommunikation und die mediale Konstruktion des Sexuellen* (Berlin: Suhrkamp, 2010); Simon Szreter and Kate Fisher, *Sex before the Sexual Revolution: Intimate Life in England, 1918–1963* (Cambridge: Cambridge University Press, 2010); Manon Parry, *Broadcasting Birth Control: Mass Media and Family Planning* (New Brunswick, N.J.: Rutgers University Press, 2013).

4. Richard de Bury, *Philobiblon*, trans. E. C. Thomas, ed. Michael MacLagan (Oxford: Blackwell, 1960), 147.

evidence produced through processes of communication. To interpret this evidence fully, these processes should be front and center. In this way, recovering the conditions for communication can usefully draw various acts together.

By highlighting continuities, as well as the relations between new technologies and new approaches, thinking in terms of communication can contribute to conceptualizing the history of reproduction over the long term. Most existing histories tackle tightly defined periods while the established general frameworks are showing their age.<sup>5</sup> The articles in this special issue display changes and continuities in communication from medieval Europe to the late twentieth-century United States and show how these have shaped the theory and practice of making, and not making, babies. This work also shares themes, such as the roles of narrative repertoires, authority and expertise, knowledge and ignorance, secrecy and propriety, which this essay introduces. We start with technology.

## Generation, Reproduction, and Technologies of Communication

Changes in reproduction can be investigated through the introduction of new communication technologies, but the relations are complex and subtle rather than direct and causal. The publication of Elizabeth Eisenstein's *The Printing Press as an Agent of Change* (1979) sparked a major debate about technological determinism, and historians of science were among the book's foremost critics.<sup>6</sup> Little attention was paid to the impact, from the mid-1400s, of the coming of print on practical medicine, where regimen and therapeutics were less obviously revolutionized by the press. Indeed, a strong case can be made that the deeper transformation took place between 1350 and 1500, as householders, friars, and practitioners

5. Framing in terms of communication is only one approach, and within that we focus on human reproduction; a larger-scale revision is the aim of Nick Hopwood, Rebecca Fleming, and Lauren Kassell, eds., *Reproduction: Antiquity to the Present* (Cambridge: Cambridge University Press, forthcoming). Long-term histories include Michel Foucault, *The History of Sexuality: An Introduction*, trans. Robert Hurley (Harmondsworth: Penguin, 1990); Angus McLaren, *A History of Contraception from Antiquity to the Present Day* (Oxford: Blackwell, 1990); and Thomas Laqueur, *Making Sex: Body and Gender from the Greeks to Freud* (Cambridge, Mass.: Harvard University Press, 1990).

6. Adrian Johns, *The Nature of the Book: Print and Knowledge in the Making* (Chicago: University of Chicago Press, 1998); Sabrina Alcorn Baron, Eric N. Lindquist, and Eleanor F. Shevlin, eds., *Agent of Change: Print Culture Studies after Elizabeth L. Eisenstein* (Amherst: University of Massachusetts Press, 2007); Leslie Howsam, ed., *The Cambridge Companion to the History of the Book* (Cambridge: Cambridge University Press, 2015).

began to write manuscript books that assimilated, organized, and transmitted practical medical knowledge. What had been the province of scholars in the universities now leapt the walls and assumed more everyday importance in the control of health and fortunes. Individuals took advantage of the readier availability of paper and ink and the introduction of quicker, cursive scripts to record observations and recipes to promote generation and help in forecasting outcomes.<sup>7</sup> This explosion of writing puts into perspective the introduction of movable type that was so central to Eisenstein's argument; but printing still made knowledge less expensive and more available. It fostered scholarly exchange and patronage, and turned "secrets of women" into market commodities, while anatomies used woodcuts and engravings to offer readers a spectacle of the interior of the body.

In succeeding centuries individual things of all kinds were crafted in ways that united nature and art. Early modern books were made of hand-made paper, with type set manually and every sheet printed by human labor on a hand press. As a result, though print was potentially less error-ridden than manuscript, every copy differed, sometimes substantially, from all others, even within an edition.<sup>8</sup> Natural objects were seen, in parallel, as coming into being through generation, a process likened to artisanal production and, in most accounts, requiring divine intervention at some point. *Matrix* was a word for both the mold for casting type and the womb.<sup>9</sup> William Harvey and other physicians and natural philosophers debated the generation of minerals, vegetables, and especially animals, but by the 1700s living beings and minerals were more often understood as arising in distinct ways.

The term *reproduction* had been used for various kinds of producing again after destruction or consumption: in theology for bodily resurrection at the Last Judgment, in agriculture for the shooting of a pollarded tree, and in natural history for the regrowth of limbs in lower animals, our *regeneration*. The Comte de Buffon's successful *Histoire naturelle* (1749) innovatively tackled "reproduction in general" by applying the model of regeneration to the origin of whole living beings, animals and plants

7. Peter Murray Jones, "Communication in Manuscript and Print," in Hopwood, Fleming, and Kassell, *Reproduction* (n. 5).

8. David McKitterick, *Print, Manuscript and the Search for Order, 1450–1830* (Cambridge: Cambridge University Press, 2003); Johns, *Nature of the Book* (n. 6).

9. Mary Fissell, "Gender and Generation: Representing Reproduction in Early Modern England," *Gender Hist.* 7 (1995): 433–56, on 438; Margreta de Grazia, "Imprints: Shakespeare, Gutenberg and Descartes," in *Alternative Shakespeares*, vol. 2, ed. Terence Hawkes (London: Routledge 1996), 63–94, on 86.

alike. Buffon's invocation of an internal mold linked his theory to the older craft-based tradition, but he postulated the formation of embryos from organic molecules under the influence of physical forces. Like the related speculations of Pierre Louis Moreau de Maupertuis and Julien Offray de La Mettrie, this was highly controversial.<sup>10</sup>

The new theories of reproduction were made for conversation. Generation had long been a fashionable topic in enlightened salons and featured in books of philosophy, medicine, poetry, and imaginary travels. Polite society sought out natural philosophers for their insights into the multiplication of living individuals and populations.<sup>11</sup> The view that whole individuals emerged through a regular, law-like, and repeatable process that could be called *reproduction* gained currency only gradually—*generation* long remained the preferred term—but by the mid-nineteenth century *reproduction* provided an increasingly standard way to link the individual body and that of the species.<sup>12</sup>

The old verb *to reproduce* entered common usage to refer to the multiplication of a range of things from an original plan or blueprint, usually according to a specified process that could be repeated indefinitely. *Reproduction* became associated with mechanization, since machines were reckoned to provide a relatively stable means of replicating texts. The wood-frame hand press gave way to the sturdier iron-frame press, which could

10. François Jacob, *The Logic of Life: A History of Heredity*, trans. Betty E. Spillmann (New York: Pantheon, 1982); Mary Terrall, *The Man Who Flattened the Earth: Maupertuis and the Sciences in the Enlightenment* (Chicago: University of Chicago Press, 2002), 199–230, 310–48; Jacques Roger, *Buffon: A Life in Natural History*, trans. Sarah Lucille Bonnefoi, ed. L. Pearce Williams (Ithaca, N.Y.: Cornell University Press, 1997), 116–31; Barbara Duden, *The Woman beneath the Skin: A Doctor's Patients in Eighteenth-Century Germany*, trans. Thomas Dunlap (Cambridge, Mass.: Harvard University Press, 1991), 28–29, 205; Ludmilla Jordanova, "Interrogating the Concept of Reproduction in the Eighteenth Century," in *Conceiving the New World Order: The Global Politics of Reproduction*, ed. Faye D. Ginsburg and Rayna Rapp (Berkeley: University of California Press, 1995), 369–86; Allison Muri, "Imagining Reproduction: The Politics of Reproduction, Technology and the Woman Machine," *J. Med. Human.* 31 (2010): 53–67; Parnes, Vedder, and Willer, *Konzept der Generation* (n. 2); Susanne Lettow, ed., *Reproduction, Race, and Gender in Philosophy and the Early Life Sciences* (Albany: State University of New York Press, 2014); Nick Hopwood, "Generation and Reproduction as Keywords," in Hopwood, Flemming, and Kassell, *Reproduction* (n. 5).

11. Janet Browne, "Botany for Gentlemen: Erasmus Darwin and *The Loves of the Plants*," *Isis* 80 (1989): 593–621; Mary Terrall, "Salon, Academy, and Boudoir: Generation and Desire in Maupertuis's Science of Life," *Isis* 87 (1996): 217–29; Robert Darnton, *The Forbidden Best-Sellers of Pre-revolutionary France* (London: HarperCollins, 1996).

12. This is true for English and French; in German, *Fortpflanzung* not *Reproduktion* was the main competitor to *Zeugung*: Jocelyn Holland, "Zeugung/Fortpflanzung: Distinctions of Medium in the Discourse on Generation around 1800," in Lettow, *Reproduction, Race, and Gender* (n. 10), 83–103.



work faster and longer, and paper-making machines were developed. The most striking symbol of change was the steam press, introduced on the London *Times* in 1814. Railways and steamships accelerated distribution.<sup>13</sup> Perhaps the most telling invention was of stereotyping, which from the 1820s made a mold of the type to print multiple editions without resetting. A picture introduced into such a text was a *cliché*, a term then adopted for any unthinkingly repeated phrase. Innovations such as stereotyping and the cliché meant that, unlike for early modern books, copies were effectively the same.<sup>14</sup>

Developments in printing and in understandings of reproduction, although not causally linked, were part of larger transformations in craft practices, the control of increasingly urbanized populations, and expertise. In the wake of the Napoleonic Wars states took an increasing interest in such questions and looked to new kinds of expert to navigate the changing map of knowledge and its potential for organizing families, cities, nations, and empires. A novel array of specialties, from obstetrics to embryology, described women's bodies as organized for child-bearing and justified physicians' supervision of midwives and childbirth. Ambitious doctors tried to improve the health of nations by combating abortion and infanticide. There were new places for discussing work in museums, laboratories, and surveys, new roles for specialist monographs, and a new stress on publication in journals.<sup>15</sup>

Many of the general innovations that would transform communication about sex and reproduction were in place by the 1830s, including mechanized printing and paper production, and demands for the reform of mass education. In the United States they led to an explosion in printed materials dealing with reproduction and sex. Like so many features of the industrial revolution, however, these novelties did not fully take hold throughout the industrializing world until the second half of the

13. For entry points into a large literature: James Moran, *Printing Presses: History and Development from the Fifteenth Century to Modern Times* (London: Faber, 1973); David McKitterick, ed., *The Cambridge History of the Book in Britain*, vol. 6: 1830–1914 (Cambridge: Cambridge University Press, 2009); James A. Secord, *Victorian Sensation: The Extraordinary Publication, Reception, and Secret Authorship of Vestiges of the Natural History of Creation* (Chicago: University of Chicago Press, 2000), 24–34.

14. On stereotyping: Adrian Johns, "The Identity Engine: Printing and Publishing at the Beginning of the Knowledge Economy," in *The Mindful Hand: Inquiry and Invention from the Late Renaissance to Early Industrialisation*, ed. Lissa Roberts, Simon Schaffer, and Peter Dear (Amsterdam: Koninklijke Nederlandse Akademie van Wetenschappen, 2007), 403–28.

15. Changes in scientific work and publishing are viewed together in Nick Hopwood, Simon Schaffer, and Jim Secord, "Seriality and Scientific Objects in the Nineteenth Century," *Hist. Sci.* 48 (2010): 251–85.



nineteenth century. By 1900 all but the poorest could afford newspapers, printed on cheap wood-pulp paper rather than expensive linen, in cities throughout Europe and North America. Even small linguistic communities, such as literate urban elites outside the industrial centers, took part. Information and devices relating to pregnancy, birth, and birth control were discretely advertised in penny papers and available by mail order. The seventeenth-century *Aristotle's Masterpiece* achieved its greatest sales in the nineteenth century, in stereotyped editions available at a bargain price.<sup>16</sup> Then Marie Stopes's paean to conjugal heterosexuality, *Married Love* (1918), sold half a million copies in English in its first seven years and was translated into over fifteen languages, including French, German, Danish, Swedish, Dutch, Spanish, Hungarian, Arabic, Portuguese, Italian, Icelandic, Afrikaans, Gujarati, Hindi, Japanese, and Chinese.<sup>17</sup> Nicolas Venette's *Tableau de l'amour conjugal*, first published in Amsterdam in 1686, had gone into the major European languages (it was Englished as *The Mysteries of Conjugal Love Revealed*), but Stopes's book more rapidly achieved far greater scale and reach. Changes in the world of print were accompanied by other new technologies, notably photography (widely available from the 1880s), cinema (from the 1890s), and radio (from the early twentieth century). This made possible the reproduction of cheap images, sounds, and texts across the social spectrum and throughout the world.

It is easy to see technologies of communication as an independent, all-conquering force for sameness. Yet these changes, like the introduction of printing itself, rendered the meanings of texts and images even less stable than before. For they were accompanied by a vast escalation in the size and diversity of audiences, who now came from an ever-expanding range of social classes, religious groupings, and political orientations. Literacy increased, particularly among women, and knowledge about sex and reproduction that had been passed down orally became available in manuals and films. This shift multiplied occasions for conversations between family members and friends, doctors and patients. "Mass culture" produced not uniformity, but a cacophony of voices and views.<sup>18</sup>

16. Mary E. Fissell, "Making a Masterpiece: The Aristotle Texts in Vernacular Medical Culture," in *Right Living: An Anglo-American Tradition of Self-Help Medicine and Hygiene*, ed. Charles E. Rosenberg (Baltimore, Md.: Johns Hopkins University Press, 2003), 59–87, esp. 60–61.

17. Alexander C. T. Geppert, "Divine Sex, Happy Marriage, Regenerated Nation: Marie Stopes's Marital Manual *Married Love* and the Making of a Best-Seller, 1918–1955," *J. Hist. Sexual.* 8 (1998): 389–433, on 396–97; translations identified from online library catalogs.

18. On the parallel case of evolutionism: James A. Secord, "Global Darwin," in *Darwin*, ed. William Brown and Andrew C. Fabian (Cambridge: Cambridge University Press, 2010), 31–57.

Access to knowledge about sex and reproduction was hotly debated. Organized pressure groups such as pronatalist and eugenic societies used the new tools of statistics—surveys and reports, charts, tables, and diagrams—to campaign against national degeneration and for “good breeding.” But with the line between medicine and pornography hard to draw, topics such as abortion and birth control were often framed as obscene threats to the national health, as in the much-reported trial of the freethinker Annie Besant. Publishers in London, Paris, Berlin, New York, and other cities trod a fine line between sexual knowledge, reproductive science, and erotic entertainment. Alicia Puglionesi elucidates in this issue how in the United States after 1873 firms circumvented the Comstock Laws, which decreed it illegal to mail “obscene literature and articles of immoral use,” meaning contraceptives and abortifacients, and often outlawed their sale as well. Regulation was now seen as a duty of governments, which gathered statistics about births, illegitimacy, prostitution, and venereal disease and, alongside lobbying organizations, public institutions, and commercial ventures, produced a blizzard of printed regulations, posters, guides, and packaging, as well as models, exhibitions, films, and radio programs.<sup>19</sup>

Behind the apparent uniformity of such “mass media” productions was a rich potential for diverse and often highly individual responses. Pages might be stereotyped, but readers were not.<sup>20</sup> More than is usually appreciated, especially for books from the machine era, these reactions have

19. On posters, see, for example, Frances L. Bernstein, “Envisioning Health in Revolutionary Russia: The Politics of Gender in Sexual-Enlightenment Posters of the 1920s,” *Russian Rev.* 57 (1998): 191–217; for the power of packaging, Patricia Peck Gossel, “Packaging the Pill,” in *Manifesting Medicine: Bodies and Machines*, ed. Robert Bud, Bernard Finn, and Helmuth Trischler (London: Science Museum, 1999), 105–21; on some models, exhibitions, and museums, Lutz Sauerteig, “Lust und Abschreckung. Moulagen in der Geschlechtskrankheitenauflärung,” *Medizin, Gesellschaft und Geschichte* 11 (1992): 89–105; Monika von Oertzen, “Das Volksmuseum für Frauenkunde (1929–1933) in Berlin: Eine Position zur Abtreibungsfrage in der Weimarer Republik,” in *Unter anderen Umständen: Zur Geschichte der Abtreibung*, ed. Gisela Staupe and Lisa Vieth (Dresden: Deutsches Hygiene-Museum, 1993), 51–57; and Nick Hopwood, *Embryos in Wax: Models from the Ziegler Studio, with a Reprint of “Embryological Wax Models” by Friedrich Ziegler* (Cambridge: Whipple Museum of the History of Science, 2002); and for the example of eugenic films, Martin S. Pernick, *The Black Stork: Eugenics and the Death of “Defective” Babies in American Medicine and Motion Pictures since 1915* (New York: Oxford University Press, 1995); and Angela M. Smith, *Hideous Progeny: Disability, Eugenics, and Classic Horror Cinema* (New York: Columbia University Press, 2011).

20. For examples from a vast literature, see Janice Radway, *Reading the Romance: Women, Patriarchy, and Popular Literature*, 2nd ed. (Chapel Hill: University of North Carolina Press, 1991); Secord, *Victorian Sensation* (n. 13); Nick Hopwood, *Haeckel’s Embryos: Images, Evolution, and Fraud* (Chicago: University of Chicago Press, 2015).

been shaped by the kind of sensory aura that Walter Benjamin evoked in a celebrated talk about the thrills of acquiring and the pleasures of owning books as physical objects and bearers of memories.<sup>21</sup> If collectors associated books with the circumstances in which they had been bought, or occasionally even read, their production was designed to enhance the advantages of routine ownership. As numerous letters from readers evidence, a book like Stopes's *Married Love* could have a transformative effect, becoming a treasured possession through which the author appeared to speak directly to the reader about achieving satisfaction. "Every heart desires a mate": from these opening words of the first chapter, Stopes created a bond, which she cemented by a willingness to draw on her own experience to help others. "In my first marriage I paid such a terrible price for sex-ignorance that I feel that knowledge gained at such a cost should be placed at the service of humanity." The unobtrusive cloth binding, smooth machine-made paper, and readable typeface—as much as the endorsements, message, and style—underlined the importance of clarity. These physical qualities identified the book—issued by a small company until it was so overwhelmed as to transfer the rights to G. P. Putnam's Sons—as modern and modest, understated even in the "Curve showing the Periodicity of Recurrence of natural desire in healthy women." To mention such things in print was controversial, but the aesthetics of production eased the reception and secured success.<sup>22</sup>

Whether consulting a manual or leafing through one of the magazines that informed women about pregnancy, childbirth, and contraception, readers experienced the auratic qualities of paper, ink, and type: the performative power of the words and pictures on the page. Similar considerations apply to conversations and consultations, which depend on a mutual understanding of gestures and tones of voice, and are in play every time we listen to the radio, go to a movie, watch television, and surf the Internet. They are relevant, that is, to the full gamut of media through which communication about reproduction has exploded since World War II. This is when reproduction gained a stronger identity as a field of teaching and research and, in the form of artificial insemination,

21. Walter Benjamin, "Unpacking My Library: A Talk about Book Collecting," in his *Illuminations*, trans. Harry Zohn, ed. Hannah Arendt (1931; New York: Schocken, 1968), 59–67.

22. Marie Carmichael Stopes, *Married Love: A New Contribution to the Solution of Sex Difficulties*, 9th ed. (London: Putnam's Sons, 1920), 23, 17, chart 1 (facing 68); on the success: Geppert, "Divine Sex" (n. 17); for some letters: Ruth Hall, ed., *Dear Dr Stopes: Sex in the 1920s* (London: Deutsch, 1978); for the complex effects of reading such books: Kate Fisher, *Birth Control, Sex and Marriage in Britain, 1918–1960* (Oxford: Oxford University Press, 2006), 26–75.

hospital birth, the oral contraceptive pill, population control, in vitro fertilization, and cloning, became more widely and prominently contested than ever before.<sup>23</sup>

From textbooks to film and online video, the specificity of different media shaped experiences. The delivery scene in the German film *Helga*, which was screened across Europe, the United States, and the British Commonwealth from 1967, shocked viewers through the vivid immersiveness of cinema—even if critics objected that the heroine’s perfect makeup was a fraud.<sup>24</sup> Yet intensified exchange between media became essential to large-scale success. Two years earlier, the new photojournalism put Lennart Nilsson’s glossy, color pictures of fetuses on the cover of *Life* magazine and into the global best-seller *Ett barn blir till* (*A Child Is Born*). In this issue Solveig Jülich explores the “almost symbiotic relationship” between book publishing, magazines, and newspapers that produced this “hybrid of embryological picture story and practical advice to pregnant women” (pp. 513, 524). The photographs came out of opposition to the liberal Swedish abortion law, and were repeatedly reframed for magazine, advice book, and textbook use; when antiabortionists held them up on placards at rallies, in court, and on television; and when feminists critiqued “the power of visual culture in the politics of reproduction.”<sup>25</sup>

## Telling Stories

Despite their differences, all media technologies have provided means to make sense of the complex and confusing phenomena of generation and reproduction. Behind even instruction manuals and technical papers in

23. For example, Jon Turney, *Frankenstein’s Footsteps: Science, Genetics and Popular Culture* (New Haven, Conn.: Yale University Press, 1998); Wendy Kline, *Bodies of Knowledge: Sexuality, Reproduction, and Women’s Health in the Second Wave* (Chicago: University of Chicago Press, 2010); Joan Haran, Jenny Kitzinger, Maureen McNeil, and Kate O’Riordan, *Human Cloning in the Media: From Science Fiction to Science Practice* (London: Routledge, 2008).

24. Uta Schwarz, “*Helga* (1967): West German Sex Education and the Cinema in the 1960s,” in *Shaping Sexual Knowledge: A Cultural History of Sex Education in Twentieth-Century Europe*, ed. Lutz D. H. Sauerteig and Roger Davidson (London: Routledge, 2009), 197–213; further: Jonathan Zimmerman, *Too Hot to Handle: A Global History of Sex Education* (Princeton, N.J.: Princeton University Press, 2015).

25. Solveig Jülich, “Fetal Photography in the Age of Cool Media,” in *History of Participatory Media: Politics and Publics, 1750–2000*, ed. Anders Ekström, Solveig Jülich, Frans Lundgren, and Per Wisselgren (New York: Routledge, 2011), 125–41; Rosalind Pollack Petchesky, “Fetal Images: The Power of Visual Culture in the Politics of Reproduction,” in *Reproductive Technologies: Gender, Motherhood and Medicine*, ed. Michelle Stanworth (Cambridge: Polity, 1987), 57–80.

specialist journals lie narratives that plot human action in space and time, within lineages and generations, and so set individual experiences about coming into being in larger frames.<sup>26</sup> A repertoire, drawn from biblical or classical sources or rooted in local lore, laboratory procedure, or everyday experience, has inflected what we say and how.

The Bible has been the main source of origin stories in the Western world for the last two millennia. The book of Genesis, and the Old Testament passages dealing with the descent of the House of David, explained human generation and the succession of generations. The New Testament began with the virgin birth; Christ's marriage of human and divine attributes, and his status as heir to David's line, was affirmed as a matter of faith. Through the Middle Ages, illiteracy and the lack of vernacular bibles limited access, but reading aloud in monastic communities was accompanied in the thirteenth and fourteenth centuries by a vast expansion of Dominican and Franciscan preaching. Model sermons circulated in written texts, and preachers' exegesis of scripture was reinforced by the confession of individual sins.<sup>27</sup> Until at least the seventeenth century more Europeans heard than read about generation. Devotional art in churches and households also told Old and New Testament stories, most spectacularly about the cult of the Virgin Mary. Reformation iconoclasm curbed the use of pictures among Protestants, but Catholic regions knew no such inhibitions.

Images of Eve and Mary still serve as a visual shorthand for reproductive ideas, while the Bible continues to shape modern narratives, particularly through the emergence of universal history in the Enlightenment. Though often targeted against traditional religion, the evolutionary epics of the nineteenth century, such as Herbert Spencer's *System of Synthetic Philosophy* (1862–96) and Ernst Haeckel's *Natürliche Schöpfungsgeschichte* (Natural history of creation, 1868), drew much of their narrative drive and explanatory ambition from scripture. Cosmologies surveying development from the creation of the solar system to the rise of civilization have been a major publishing phenomenon of the modern age. Glossy books, television series, films, and computer games still trace an arc from stars to societies, often via the development of the embryo.<sup>28</sup>

26. Laura Gowing, "Knowledge and Experience, c.1500–1750," in *The Routledge History of Sex and the Body: 1500 to the Present*, ed. Sarah Toulalan and Kate Fisher (London: Routledge, 2013), 239–55.

27. David L. D'Avray, *Medieval Marriage Sermons: Mass Communication in a Culture Without Print* (Oxford: Oxford University Press, 2001); Peter Biller and A. J. Minnis, eds., *Handling Sin: Confession in the Middle Ages* (Woodbridge: York Medieval Press, 1998).

28. Bernard Lightman, *Victorian Popularizers of Science: Designing Nature for New Audiences* (Chicago: University of Chicago Press, 2007), 219–94; Steven J. Dick and Mark L. Lupisella, eds., *Cosmos & Culture: Cultural Evolution in a Cosmic Context* (Washington, DC: NASA, 2009); Philip Hefner, "The Evolutionary Epic," *Zygon: J. Relig. Sci.* 44 (2009): 3–8.

The Bible was never the only source. Around the same time as preaching expanded, medieval romances began to draw on national histories for characters and plots. The earliest known version of the complex of stories that grew up around the children of the Roman Emperor Octavian was written in Old French in the thirteenth century, and is found in English, Italian, and German too. Octavian and his wife the empress are childless, until she persuades him to found an abbey dedicated to the Virgin Mary and is rewarded with the conception of twins. But Octavian's mother tricks him into believing his wife has been unfaithful with a baseborn knave, whose bloody head he throws on her bed. Though Octavian threatens to kill her and her twins, they are exiled instead, and after many adventures he recognizes his children.<sup>29</sup> Tales of Caesar's birth and Nero's pregnancy similarly informed the patrician culture of late medieval Florence, which developed the themes of fertility, inheritance, lineage, and legitimacy in diverse models of generation.<sup>30</sup>

Written on parchment, romances and histories were read aloud in gentry and merchant households. With the coming of print, shortened and simplified stories circulated more, and cheap ballads and chapbooks were recited or sung.<sup>31</sup> Broad-sides and title pages, often illustrated, were tacked on posts and pinned to walls. Other literary genres include wonder books that traded on the enduring fascination with extraordinary births,<sup>32</sup> and romances and novels that satirized generation, from the physician François Rabelais's mid-sixteenth-century *Pantagruel* to Laurence Sterne's mid-eighteenth-century *Tristram Shandy*. Sterne united an account of the generation and birth of its author with explicit jokes about type, paper, and print. Over two centuries later, Michael Winterbottom's *A Cock and Bull Story* translated the same pun on the narratives of generation and of communication into the language of cinema, so that the film and the "making of" documentary merged into one.<sup>33</sup>

29. Frances McSparran, ed., *Octovian, Edited from Lincoln, Dean and Chapter Library, MS 91 and Cambridge, University Library, MS Ff.2.38* (London: Early English Text Society, Oxford University Press, 1986); Felicity Riddy, "Middle English Romance: Family, Marriage, Intimacy," in *The Cambridge Companion to Medieval Romance*, ed. Roberta L. Krueger (Cambridge: Cambridge University Press, 2000), 235–52.

30. Park, *Secrets* (n. 3), 150–59.

31. Tessa Watt, *Cheap Print and Popular Piety, 1550–1640* (Cambridge: Cambridge University Press, 1991); Isabelle Masse, "Bibliothèque bleue et littératures de colportage," *Bulletin des bibliothèques de France* 2 (2000), <http://bbf.enssib.fr/consulter/bbf-2000-02-0103-005> (accessed February 11, 2015).

32. For example, Pierre Boaistuau, *Certaines Secrètes Wonders of Nature ...* (London, 1569).

33. Janine Barchas, *Graphic Design, Print Culture, and the Eighteenth-Century Novel* (Cambridge: Cambridge University Press, 2003); Ariane Hudelet, "Austen and Sterne: Beyond Heritage," in *A Companion to Literature, Film and Adaptation*, ed. Deborah Cartmell (Chichester: Wiley-Blackwell, 2012), 256–71.

As the persistent teaching and discussion of *Tristram Shandy* suggests, technologies of communication can traverse centuries and continents, yet often play on the intimate exchange of spoken words. Writing and speech have always been bound up together. Even a monk or professional scribe might write into the margin of the text he was copying some tip from an oral story, as Peter Murray Jones and Lea Olsan show in this issue for generation rituals in medieval manuscripts. Printed works envisaged reading aloud, as Thomas Raynalde, the English editor of *The Womans Booke* (1545), discussed here by Jennifer Richards, anticipated in his prologue to women readers. But there was no simple gendering of women as speaking while only men read and wrote. As Richards discovered, Raynalde's expectation was borne out by a manuscript dialogue in which two women critique what they have read.

Men and women have shared some of the most significant stories about generation with physicians, midwives, and other healers. Often cast as illness and birth narratives, these encounters tend to be described as oral transactions, but the presence of paper records, diagnostic scans, or online databases suggests a more complicated picture. The physician Sir Théodore Turquet de Mayerne (1573–1655) used to meet his exclusive clientele in the presence of bound volumes of his own medical records, which he would ostentatiously consult.<sup>34</sup> At the other end of the social scale the early modern mountebank, selling remedies on the street, posted bills to advertise his services and displayed paper testimonials from those he had cured.<sup>35</sup> The patients in the casebooks of the astrologers Simon Forman and Richard Napier, which survive from 1596 to 1634, frequently asked about pregnancy and disease. The astrologer would refer to his casebook, like Mayerne, but to judge the cause of the disease also wrote out astral charts there and then.<sup>36</sup> Beyond the authority vested in text

34. Daniel Parsons, ed., *The Diary of Sir Henry Slingsby* (London: Longman, 1836), 70, quoted by Brian Nance, *Turquet de Mayerne as Baroque Physician: The Art of Medical Portraiture* (Amsterdam: Rodopi, 2001), 24; further: Lauren Kassell, "Casebooks in Early Modern England: Medicine, Astrology, and Written Records," *Bull. Hist. Med.* 88 (2014): 595–625, on 611–12.

35. David Gentilcore, *Medical Charlatanism in Early Modern Italy* (Oxford: Oxford University Press, 2006).

36. The astrologers, like the eighteenth-century physician Johann Storch, whose eight-volume *Von Weiberkrankheiten* (On diseases of women) is rich with case histories, were often consulted through letters and messages as well as in person: Duden, *Woman beneath the Skin* (n. 10); Lauren Kassell, *Medicine and Magic in Elizabethan London. Simon Forman: Astrologer, Alchemist, and Physician* (Oxford: Oxford University Press, 2005); Kassell, ed., with Michael Hawkins, Robert Ralley, and John Young, "Casebooks Project," <http://www.magicandmedicine.hps.cam.ac.uk/>



and images and their usefulness as repositories of accumulated experience, these transactions share a ritual element with prognostications that required the writing or pronouncing of powerful words in the presence of the parties concerned (Jones and Olsan).

With the rise of scientific medicine in the nineteenth century, those words from the bedside physician were increasingly grounded in the authority of charted data. Yet after the alleged “disappearance of the sick-man,”<sup>37</sup> the voices and narratives of patients and pregnant women reemerged from the 1970s and were recovered from the past. As Wendy Kline shows in this issue, books by home birth activists bid for authenticity with exemplary stories first heard over the telephone or recorded on cassette tape. Obstetric narratives pitched tales of technological progress against those aspirations to retake control.

Research on reproduction has commonly chosen or had to resist a science fictional frame, most often Mary Shelley’s *Frankenstein* (1818) or Aldous Huxley’s *Brave New World* (1932). Two years later, when Gregory Pincus and Ernst Enzmann claimed to have fertilized mammalian eggs in vitro, the *New York Times* wrote of Huxley’s “fantasy made real” and, in homage to the fictional inventor of the key cloning process, presented the Harvard biologists as “two Bokanovskys.”<sup>38</sup> In postwar reporting on “test-tube babies” newspapers juxtaposed *Frankenstein* fears with intimate stories of desperate couples hoping to conceive via technomedical adventures, and these eventually won out.<sup>39</sup> By contrast, from H. G. Wells and *Brave New World* to *The Handmaid’s Tale* (1985 novel, 1990 film) and *Never Let Me Go* (2005 novel, 2010 film), a distinct literary and cinematic genre, the “demodystopia,” has engaged with the doomsday scenarios of demographic change.<sup>40</sup> Hollywood blockbusters, social media, and smart-

37. For a reprint of Nicholas Jewson’s classic article of 1976 and reflections on it: *Int. J. Epidemiol.* 38 (2009): 622–49.

38. Susan Merrill Squier, *Babies in Bottles: Twentieth-Century Visions of Reproductive Technology* (New Brunswick, N.J.: Rutgers University Press, 1994); Turney, *Frankenstein’s Footsteps* (n. 23); Waldemar Kaempffert, “Rabbits Born in Glass: Haldane–Huxley Fantasy Made Real by Harvard Biologists,” *New York Times*, May 13, 1934.

39. Sarah Franklin, “Deconstructing ‘Desperateness’: The Social Construction of Infertility in Popular Representations of New Reproductive Technologies,” in *The New Reproductive Technologies*, ed. Maureen McNeil, Ian Varcoe, and Steven Yearley (Basingstoke: Macmillan, 1990), 200–229; Michael Mulkay, *The Embryo Research Debate: Science and the Politics of Reproduction* (Cambridge: Cambridge University Press, 1997), 69–82, 116–30; Lisa Hope Harris, “Challenging Conception: A Clinical and Cultural History of in Vitro Fertilization in the United States” (Ph.D. diss., University of Michigan, 2006).

40. Michael Smith, “The Short Life of a Dark Prophecy: The Rise and Fall of the ‘Population Bomb’ Crisis, 1965–1975,” in *Fear Itself: Enemies Real and Imagined in American Culture*, ed. Nancy Lusignan Schultz (West Lafayette, Ind.: Purdue University Press, 1999), 331–54; Andreu Domingo, “‘Demodystopias’: Prospects of Demographic Hell,” *Popul. Dev. Rev.* 34 (2008): 725–45.

phone apps dramatize dilemmas of reproductive choice and coercion: today babies are planned, or avoided, as much on screen as in bedrooms or clinics.<sup>41</sup>

## Authority and Expertise

In debating who could say what about generation and reproduction, expertise was increasingly at stake. Long central to historical writing on medicine, it can best be investigated by studying the acts of communication in which it was claimed or challenged. In education, specialized practice, and the public sphere, people were variously qualified to speak and write on reproduction by experience, skill, examinations, and authorship. Did one need a medical degree or a midwife's license; a textbook, advice book, or journal article to one's name; to have given birth, or attended a birth? The rise of research placed a premium on novelty, and the expansion of the press generated ever more appetite for news. Formal training and qualifications gained importance, but education systems marginalized reproduction long after other aspects of medicine and biology were taught, and the value of experience has been reasserted time and again.

With the medieval establishment of medical faculties, scholars developed specific tools for the exegesis of ancient knowledge on generation. Commentaries and questions for disputation served to harmonize the various opinions in an expanding corpus of writings by Aristotle, Galen, and those Arabic authors, preeminently Avicenna, who worked to reconcile them. The skills thus cultivated are exemplified in manuscript copies of scholastic works such as Giles of Rome's *De formatione corporis humani in utero* (On the formation of the human body in the womb) completed between 1285 and 1295. Giles attempted to harmonize competing views on the maternal and paternal contributions and on the timing of ensoulment.<sup>42</sup> This had little direct impact on conception and childbirth at the time.

41. For example, Kelly Oliver, *Knock Me Up, Knock Me Down: Images of Pregnancy in Hollywood Film* (New York: Columbia University Press, 2012); Michelle Moravec, ed., *Motherhood Online* (Newcastle upon Tyne: Cambridge Scholars Publishing, 2011); Sarah Pedersen and Janet Smithson, "Mothers with Attitude—How the Mumsnet Parenting Forum Offers Space for New Forms of Femininity to Emerge Online," *Women's Studies International Forum* 38 (2013): 97–106; Sophia Alice Johnson, "'Maternal Devices,' Social Media and the Self-Management of Pregnancy, Mothering and Child Health," *Societies* 4 (2014): 330–50.

42. Romana Martorelli Vico, "Il 'De formatione corporis humani in utero' di Egidio Romano. Indagine intorno alla metodologia scientifica," *Medioevo* 14 (1988): 291–313; Vico, *Medicina e filosofia. Per una storia dell'embriologia medievale nel XIII e XIV secolo* (Milan: Guerini e Associati, 2002); Maaïke van der Lugt, "L'animation de l'embryon humain et le statut de l'enfant à naître dans la pensée médiévale," in *Formation et animation de l'embryon dans l'Antiquité et au Moyen Âge*, ed. Luc Brisson, Marie-Hélène Congourdeau, and Jean-Luc Solère (Paris: Vrin, 2008), 233–54.

Yet, as Monica Green has argued, doctors soon began to claim practical expertise on the basis of their understanding of ancient texts and their experience as learned medical practitioners. From the early fourteenth century physicians linked to the medical school of Montpellier asserted their competence to diagnose and treat infertility, with the emphasis on the womb, whence they expanded into the treatment of women's diseases as a whole.<sup>43</sup> Physicians' treatises of practical medicine circulated as manuscripts to which lay readers and healing practitioners looked for guidance.<sup>44</sup> The doctors disparaged midwives and other women, though compared with antiquity, few women had the occupational title of midwife in Europe before the sixteenth century; "midwife" seems to have been less a medical function and more a social role.<sup>45</sup> Rarely recorded in writing, female attendants' experiential knowledge was shared by imitation or word of mouth. However, as Jones and Olsan show, these women employed birthing rituals and amulets, which not only involved male clerics and borrowed motifs from Christian liturgy, but were also written down for further circulation and later copied into remedy books for household use.

From 1450 printed treatises on generation reinforced manuscript claims of male expertise. As midwife was recognized as an occupation in the sixteenth century, obstetric books became more emphatic than their scholastic antecedents about the limitations of women's knowledge. The most reprinted work of its kind, Eucharius Rösslin's *Rosegarden*, nevertheless helped literate German midwives to function within a structure of civic regulation; the many vernacular editions also instructed laypeople in practical knowledge of generation.<sup>46</sup> As well as finding women readers, Raynalde's revised translation drew on the *De fabrica* of Andreas Vesalius (1543) to put into wide circulation the latest and most sophisticated images of the organs of generation. Vesalius's expertise as dissector was thus enlisted in pictures made to complement and correct ancient textual authority, and to establish a canonical image of the genitals as natural and

43. Monica H. Green, *Making Women's Medicine Masculine: The Rise of Male Authority in Pre-modern Gynaecology* (Oxford: Oxford University Press, 2008), esp. chap. 2.

44. For the genre of *Practica*, see Luke Demaitre, *Medieval Medicine: The Art of Healing, from Head to Toe* (Santa Barbara, Calif.: Praeger, 2013), chap. 8.

45. Green, *Making Women's* (n. 43), 135–36, building on Montserrat Cabré i Pairet, "Nacer en relación," in Marta Beltran i Tarrés et al., *De dos en dos: Las prácticas de creación y recreación de la vida y la convivencia humana* (Madrid: Horas y Horas, 2000), 15–32.

46. Monica H. Green, "The Sources of Eucharius Rösslin's 'Rosegarden for Pregnant Women and Midwives' (1513)," *Med. Hist.* 53 (2009): 167–92; Green, *Making Women's* (n. 43), 303–6.

fashioned by God.<sup>47</sup> Through the seventeenth century, midwifery texts, often illustrating the birthing room as well as fetal presentations and abdominal anatomy, displayed knowledge that male and female practitioners contested.<sup>48</sup>

During the eighteenth century the medical cosmologies of learned practitioners and their patients diverged, as studies of reproduction participated in the rise of the microscopical, surgical, and demographical techniques characteristic of the discipline-oriented world of scientific research and teaching. Advanced instruction was given in obstetrics, anatomy, and physiology through the nineteenth century, and these disciplines also fostered most research. Yet the first experimental physiologists excluded reproduction as intractable, though it remained a more central concern of gynecology, even zoology. The physiology of reproduction was not staked out as a field until Francis Marshall's textbook of 1910, with its expansive vision encompassing academic biology, clinical medicine, agriculture, and through endocrinology, the pharmaceutical industry too. Such research still struggled for legitimacy and hence for government funding through the twentieth century.<sup>49</sup>

The creation of a mass readership changed the communication of research at the same time as this became an activity for which numerous scientists were paid. Late eighteenth-century novels had expressed skepticism about Buffon's theories and exploited experiments by the priest and natural historian Lazzaro Spallanzani on artificial insemination.<sup>50</sup> But major claims could still pass without wider comment. In 1827, when the Prussian professor Karl Ernst von Baer discovered the definitive mamma-

47. Sachiko Kusakawa, *Picturing the Book of Nature: Image, Text, and Argument in Sixteenth-Century Human Anatomy and Medical Botany* (Chicago: University of Chicago Press, 2012), chap. 10.

48. Lisa Forman Cody, *Birthing the Nation: Sex, Science, and the Conception of Eighteenth-Century Britons* (Oxford: Oxford University Press, 2005); Lianne McTavish, *Childbirth and the Display of Authority in Early Modern France* (Aldershot: Ashgate, 2005); Adrian Wilson, *The Making of Man-midwifery: Childbirth in England, 1660–1770* (Cambridge, Mass.: Harvard University Press, 1995).

49. We lack a survey for the nineteenth century, but see Robert A. Nye, "Love and Reproductive Biology in *fin-de-siècle* France: A Foucauldian Lacuna?," in *Foucault and the Writing of History*, ed. Jan Goldstein (Cambridge: Blackwell, 1994), 150–64; and Nick Hopwood, "Embryology," in *The Cambridge History of Science*, vol. 6: *The Modern Biological and Earth Sciences*, ed. Peter J. Bowler and John V. Pickstone (New York: Cambridge University Press, 2009), 285–315; and, on the twentieth, Adele E. Clarke, *Disciplining Reproduction: Modernity, American Life Sciences and "the Problems of Sex"* (Berkeley: University of California Press, 1998).

50. Joël Castonguay-Bélanger, *Les écarts de l'imagination: Pratiques et représentations de la science dans le roman au tournant des Lumières* (Montreal: Presses de l'Université de Montréal, 2008), 167–219.

lian ovum in his mentor's house bitch with an ordinary microscope and without a laboratory, he announced the result in a Latin letter to the St. Petersburg Academy of Sciences and a small demonstration at an early meeting of the Association of German Nature Researchers and Physicians the following year.<sup>51</sup> The work inspired a generation of embryologists and had many indirect effects, but received little immediate public recognition. In the decades around 1900, by contrast, the much expanded French medical, literary, and general press lamented that country's declining birthrate and the specter of national degeneration in relation to reports of ovariectomy, on the one hand, and various doctors' claims to artificial insemination, on the other. In 1885, when the Paris medical faculty somewhat hypocritically turned down a doctoral thesis on that topic, newspapers ran articles on "baby factories" that would "remove the pater from paternity"; the previous year, a novel, *Le faiseur d'hommes* (The man-maker), had already explored public distrust of this extraordinary science.<sup>52</sup> In such an open and contested field, of such high public interest, as reproduction, the general press often played key roles. New contraceptives have recently been tested in the media as much as the clinic; trials of "male pills" foundered, not least, on the difficulty of promoting new masculinities in this forum.<sup>53</sup>

During the nineteenth century, the journal article became the dominant medium for pressing discovery claims. After World War II, codes of conduct, including embargoes, preserved journals as crucial nodes in this system, but everything did not begin or end with them.<sup>54</sup> Oral communication, for example, still mattered. Medical research had always relied on conversation,<sup>55</sup> and from the 1970s (gene) "cloning by press conference" made the fortunes of research programs and companies.<sup>56</sup> In July

51. Timothy Lenoir, *The Strategy of Life: Teleology and Mechanics in Nineteenth-Century German Biology* (Chicago: University of Chicago Press, 1989), 96.

52. Michael Finn, "Female Sterilization and Artificial Insemination at the French Fin de Siècle: Facts and Fictions," *J. Hist. Sexual.* 18 (2009): 26–43, quotation on 41.

53. Nelly Oudshoorn, *The Male Pill: A Biography of a Technology in the Making* (Durham, N.C.: Duke University Press, 2003), 191–208.

54. Bruce V. Lewenstein, "From Fax to Facts: Communication in the Cold Fusion Saga," *Soc. Stud. Sci.* 25 (1995): 403–36; Vincent Kiernan, *Embargoed Science* (Urbana: University of Illinois Press, 2006).

55. James A. Secord, "How Scientific Conversation Became Shop Talk," *Trans. Roy. Hist. Soc.* 17 (2007): 129–56; see also Jenny Bangham, "Writing, Printing, Speaking: Rhesus Blood-Group Genetics and Nomenclatures in the Mid-Twentieth Century," *Brit. J. Hist. Sci.* 47 (2014): 335–61, on 351–54.

56. Nicolas Rasmussen, *Gene Jockeys: Life Science and the Rise of Biotech Enterprise* (Baltimore, Md.: Johns Hopkins University Press, 2014).

1978 newspapers and magazines, radio and television persuaded almost (but not quite) everyone that the first IVF baby had been born before the scientific paper was even written; a full account was not published for another two years, though many experts heard and reported on a symposium in January 1979.<sup>57</sup>

It had not always been so easy, especially for women, to discuss such topics beyond the family. Opponents of female medical education had regarded the prospect of their examining the sex organs and learning about procreation and development, particularly in male company, as what the German anatomist Theodor Bischoff called “a gross offense against decency and good manners and ... a shameless abandonment of all feminine delicacy of feeling.”<sup>58</sup> But the many women reluctant to broach intimate matters with male professionals created opportunities for physicians of their own sex. Doubly qualified by gender and (more or less recognized) medical examinations, female doctors followed the lead, in Germany, of Hope Bridges Adams with her *Frauenbuch* (Women’s book) of 1896 and carved out a niche as authors of advice.<sup>59</sup> By this time American women had been writing and lecturing about sex and reproduction from various perspectives for decades.<sup>60</sup> Feminists organized new networks from the 1960s, when the potential of medical science to control fertility was widely advertised just as the authority of scientific medicine was challenged as never before. Bypassing mainstream publishing and malestream medicine, they gave alternative, even countercultural, stances on sex and reproduction.<sup>61</sup> By the 1980s many of these were becoming standard, but had also provoked a backlash, especially against the legalization of abortion.<sup>62</sup>

Authority could be grounded in other skills than knowledge or experience of reproduction. For centuries some artists had their primary training in, for example, illustration or model making, and then had to

57. Gena Corea, *The Mother Machine: Reproductive Technologies from Artificial Insemination to Artificial Wombs* (London: Women’s Press, 1985), 115–17; Turney, *Frankenstein’s Footsteps* (n. 23), 175–87; “Researching Reproduction,” <http://www.lib.cam.ac.uk/exhibitions/Babies/researching.html>, accessed March 1, 2015.

58. Theodor L. W. von Bischoff, *Das Studium und die Ausübung der Medicin durch Frauen* (Munich: Literarisch-artistische Anstalt [Riedel], 1872), 33–35 (“einen groben Verstoß gegen Anstand und gute Sitte und ... eine schamlose Preisgebung alles weiblichen Zartgefühles”).

59. Marita Krauss, *Hope. Dr. Hope Bridges Adams Lehmann—Ärztin und Visionärin. Die Biografie*, 2nd ed. (Munich: Volk, 2010).

60. Helen Lefkowitz Horowitz, *Rereading Sex: Battles over Sexual Knowledge and Suppression in Nineteenth-Century America* (New York: Vintage Books, 2003).

61. See, most recently, Kline, *Bodies of Knowledge* (n. 23).

62. See, for example, Cynthia Gorney, *Articles of Faith: A Frontline History of the Abortion Wars* (New York: Simon & Schuster, 1998).

negotiate, often with medically more qualified practitioners, the right this gave them to produce images of bodies.<sup>63</sup> As Jülich shows, Nilsson built on, but also played down, his status as a celebrity photographer when the publicity for *A Child Is Born* presented him as a white-coated scientist at the microscope and as having contributed to discoveries (pp. 516–17). After World War II health communication became a field of expertise in its own right.<sup>64</sup> Without a communication strategy, no new intervention in reproduction, at individual or population level, now stands a chance.

Yet communication was never only about the speaker, writer, broadcaster, or photographer; it always presupposed skills in listeners, readers, and viewers too, as the history of images shows. Vesalius had valued pictures as less instructive than a private lesson, but better than texts, while Harvey mistrusted illustrations as unable to do justice to observation. By the early 1800s most researchers demanded new pictures to support new claims and understood vivid images as easing access. But were pictures powerful, their messages so alluring they needed to be controlled; or weak, hence presupposing so much expertise they would mean nothing without extensive interpretation? Some still rejected book illustrations lest they fool readers into thinking mere pictures could ever substitute for practical experience. Others argued that images embodied conventions unintelligible to the untrained; a few promoted models as more suitable for midwives or laypeople than flat pictures. As visual education proceeded apace, however, the greater concern, not least among Catholics, was that pictures might excite the senses of the young or otherwise give readers ideas.<sup>65</sup>

## Knowledge and Ignorance, Secrets and Silences

Potentially so exciting, knowledge of generation and reproduction was often shrouded in silence or framed as secret. Its history is thus marked by complex relations between knowledge and ignorance. It is also entangled with histories of the body and of sexuality, for which Michel Foucault, despite all the challenges to his research, established the framework of a

63. For example, Kusakawa, *Picturing the Book* (n. 47); Nick Hopwood, “Artist versus Anatomist, Models against Dissection: Paul Zeiller of Munich and the Revolution of 1848,” *Med. Hist.* 51 (2007): 279–308.

64. Parry, *Broadcasting Birth Control* (n. 3).

65. Kusakawa, *Picturing the Book* (n. 47), esp. 210–13; Hopwood, “Artist versus Anatomist” (n. 63); Hopwood, *Haeckel’s Embryos* (n. 20), esp. 12–13, 32–35, 189–200; more generally on the power of pictures: David Freedberg, *The Power of Images: Studies in the History and Theory of Response* (Chicago: University of Chicago Press, 1991); W. J. T. Mitchell, *What Do Pictures Want? The Lives and Loves of Images* (Chicago: University of Chicago Press, 2005).



long-term shift from external sanctions to self-control. Discourse on sex was problematized, he argued, but in fact proliferated. Language was a technology of power, exercised through the churches, the state, the schools, and the family, but silences spoke volumes, and ignorance was produced as well as knowledge.<sup>66</sup>

Christian doctrine and the ecclesiastical authorities forbade sex outside marriage, and the ideals of family and nature provided the norms against which sexual and procreative deviance was defined. In the decades around 1700, at least in England, secularizing imperatives relativized sexual norms and virtue began to be understood as instilled from within a person rather than imposed from without. Sex became a private matter and individuals—especially gentlemen—were free to do what they liked in bed, provided this was considered “natural” and did not harm the general good. At the same time, newspapers, pamphlets, novels, and prints broadcast and debated the private lives of individuals more publicly than ever. Ignorance about sex and reproduction—among the young, women, and people in other times and places—also became a dominant trope.<sup>67</sup>

Women’s knowledge—both of women’s bodies and possessed by women—had long been secret. From the thirteenth century, manuscripts collected “secrets of women” from learned texts and practical traditions. Where “books of secrets” advertised recipes for experiments ranging from the functional to the fabulous, “secrets of women” detailed the mysteries of generation.<sup>68</sup> The expansion of print led to a proliferation of sexual facts and a rhetoric of secrecy; women’s authority became dubious as their bodies became more private and shameful.<sup>69</sup> By the eighteenth century, (young) women were presented as in need of advice. This ignorance was no mere absence of knowledge, but through the nineteenth and for much of the twentieth century often a state suffered in the face of ambiguous and contradictory messages or maintained in the service of a desired innocence and respectability.<sup>70</sup>

66. Foucault, *History of Sexuality* (n. 5).

67. Katherine Crawford, *European Sexualities, 1400–1800* (Cambridge: Cambridge University Press, 2007); Faramerz Dabhoiwala, *The Origins of Sex: A History of the First Sexual Revolution* (London: Allen Lane, 2012).

68. William Eamon, *Science and the Secrets of Nature: Books of Secrets in Medieval and Early Modern Culture* (Princeton, N.J.: Princeton University Press, 1994); Pamela O. Long, *Openness, Secrecy, Authorship: Technical Arts and the Culture of Knowledge from Antiquity to the Renaissance* (Baltimore, Md.: Johns Hopkins University Press, 2001); Elaine Leong and Alisha Rankin, eds., *Secrets and Knowledge in Medicine and Science, 1500–1800* (Farnham: Ashgate, 2011).

69. Gowing, “Knowledge and Experience” (n. 26), 252.

70. Fisher, *Birth Control* (n. 22), 75.

Gestures of decorum were one long-standing means of negotiating this minefield. The more public and open the medium, the more controversial. Latin was safer than the vernacular, manuscript than print. Clarity was thus polemical. A useful vernacular work needed to set out clear, brief, and ordered information, like the fifteenth-century *Speculum al foderi* (Mirror of coitus).<sup>71</sup> The vernacular guides to healthy living that first became common in Italian gentry households in the sixteenth century included decorous tips about sex and fertility alongside sleep, exercise, and diet.<sup>72</sup> Early modern anatomical and midwifery books displayed the secrets of women, but cautioned against prurient use. The physician Helkiah Crooke fashioned his English anatomy of 1615 so that the sections illustrating and describing women's parts could be extracted.<sup>73</sup> Naughty reading of medical books became a standard trope and clandestine habit for centuries to come. To distance themselves from such practices, nineteenth-century men of science deliberately deployed Latinate terms lest "purely English words ... shock modern decorum."<sup>74</sup> The subtitle of Charles Darwin's *The Descent of Man, and Selection in Relation to Sex* (1871) was revised at the last moment to avoid the word "sexual" and to distance selection from sex; but neither this nor some judicious Latin footnotes saved the celebrated naturalist from accusations of moral deviance and impropriety.<sup>75</sup>

Different words did not just say the same thing in different ways. From "fruits of the body" and "children to come" to waste material that had to be "tipped out," the discourses in which priests, medics, lawyers, and, especially, plebeian women described the unborn represented different social worlds, or "communication communities," even in the early twentieth century.<sup>76</sup> Medical communication across these divides dispensed knowledge and constructed ignorance, often gendered as old wives' tales. Because reproduction was controversial, the medical establishment,

71. Michael Solomon, *Fictions of Well-Being: Sickly Readers and Vernacular Medical Writing in Late Medieval and Early Modern Spain* (Philadelphia: University of Pennsylvania Press, 2010), 16.

72. Rudolph M. Bell, *How to Do It: Guides to Good Living for Renaissance Italians* (Chicago: University of Chicago Press, 1999).

73. Lauren Kassell, "Medical Understandings of the Body, c.1500–1750," in Toulalan and Fisher, *Routledge History* (n. 26), 57–74.

74. P. H. P[yc-S]mith, "Haeckel's History of Creation," *Nature* 13 (1875): 121–23, quotation on 122.

75. Gowan Dawson, *Darwin, Literature and Victorian Respectability* (Cambridge: Cambridge University Press, 2007).

76. Cornelia Osborne, *Cultures of Abortion in Weimar Germany* (New York: Berghahn, 2007); for "communication communities": Simon Szreter, *Fertility, Class and Gender in Britain, 1860–1940* (Cambridge: Cambridge University Press, 1995).

while claiming authority over midwives' training and disparaging lay incomprehension, was reluctant to intervene. Spearheaded by mavericks and freethinkers who spent time in or were threatened with prison, Neomalthusian campaigners broke official silence and challenged obscenity laws by giving lectures and publishing advice. In 1854 the German medic, zoologist, and radical politician Carl Vogt justified including some reproductive physiology in a large tome of "familiar letters" on the grounds that a false "prudery" had left the field to books "in duodecimo or even smaller format." He dismissed their guidance on family limitation, sex selection, and VD as products of "shameless charlatanry" and "the crassest ignorance."<sup>77</sup> But the heterodoxy of many high-circulation writers helped them inform and often empower readers without devaluing existing practice altogether (Puglionesi).

Things could be said about sex, pregnancy, and familial resemblance within a household that could not be said in a pub or on the street, and vice versa. Early modern graffiti, ballads, and jokes breached these norms, but the authorities often objected more to political and religious than to sexual content. Conversation may have been franker in single-sex settings, while chaperones reduced opportunities for exchange between the sexes. Puglionesi shows that to evade the Comstock Laws and inhibitions about women's reading on reproduction, agents selling subscriptions to publications advertising contraceptives hinted on doorsteps at what potential subscribers might find inside their books and magazines.

Mobile, capitalist societies increasingly relied on printed presentations of medical knowledge, but also created new kinds of group reading. In the 1970s members of the Santa Cruz Birth Center shared knowledge derived from childbirth books, as they recalled for Kline. Classes, voluntary associations, informal networks, and conferences facilitated the exchange of information, much as household, family, and parish connections must earlier have done. Second-wave feminists made that connection as they valorized the knowledge of women in past centuries and critiqued its demonization and usurpation by men.

Despite the rhetoric of revolution from the darkness of sexual ignorance, many conventions have long histories. We can only conjecture as to the antecedents of the "English translation of a midwifery manual . . . purchased at New Age Natural Foods in San Francisco," and wonder if Rahima Baldwin wrote *Special Delivery* (1979) as a dialogue in part to echo earlier genres (Kline, pp. 544, 553). It is clear that for all the innovation, books such as *Aristotle's Masterpiece* were a force of continuity through major changes. They were legitimate conduits of secret knowledge.

77. Quoted in Hopwood, *Haeckel's Embryos* (n. 20), 50.

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What unnameable thing did Lady Mary ask Anna to buy from the village pharmacy? As the millions worldwide who follow the country-house television drama *Downton Abbey* will know, the answer was hidden inside a small brown bag. We never see the contents, but Lady Mary's romantic entanglements make it clear that the embarrassed maid has been asked to purchase a contraceptive. It is 1924, and Lady Mary has learned the technical details of modern birth control from a book by Stopes.<sup>78</sup> The slim volume is as familiar downstairs as upstairs—in an earlier episode the scheming maid Edna is shown (improbably) to have a copy of her own.<sup>79</sup> But it is a different matter when Anna's husband Mr. Bates opens a box in their lodgings, and discovers the book with Stopes's name on the title page, together with a contraceptive device. He accuses Anna of trying to prevent them from having children, but Anna, ever the innocent, is just keeping the items for Lady Mary, who as a marriageable heiress cannot afford to have her sexual experiments known.<sup>80</sup>

Mainstream television offers diverse contemporary audiences ways of working through issues in their own lives. Even so conservative a drama as *Downton*, with its stress on family, marriage, inheritance, legitimacy, and sex, provides viewers with regular, repeated occasions for discussion and debate.<sup>81</sup> If one point needs to be stressed, it is that communicating reproduction—especially in the seemingly globalized, homogenized world of the modern mass media—is a story of gaps and silences, of misunderstandings and misreadings. Or perhaps not reading at all, at least by the producers. For despite the attention given Stopes, the book Anna hides is revealed on screen as *Married Love*, which has little to say about contraception that Lady Mary would have found useful. Somewhere else in that great house there must be a copy of the sequel, *Wise Parenthood*, which includes a frank description and depiction of the vaginal insertion of a cervical cap.<sup>82</sup>

78. *Downton Abbey*, series 5, episode 2, first screened September 28, 2014.

79. *Ibid.*, series 4, episode 4, first screened October 13, 2013.

80. *Ibid.*, series 5, episode 6, first screened October 26, 2014.

81. For recent work in this field, see James Leggott and Julie Anne Taddeo, eds., *Upstairs and Downstairs: British Costume Drama Television from The Forsyte Saga to Downton Abbey* (Lanham, Md.: Rowman & Littlefield, 2015).

82. Marie Carmichael Stopes, *Wise Parenthood: The Treatise on Birth Control for Married People, A Practical Sequel to "Married Love,"* 12th ed. (London: Putnam's Sons, 1923), 28; Hilary McCreery and Russell Johnson, "As Seen on TV: Marie Stopes and Downton Abbey," Louise M. Darling Biomedical Library Blog, UCLA, February 12, 2015, <http://blogs.library.ucla.edu/biomedical/2015/02/12/as-seen-on-tv-marie-stopes-and-downton-abbey/>.

In our world, as in *Downton's* Yorkshire, communication and reproduction are intertwined. In both, communication is as uncertain and messy as reproduction can sometimes be: more than most knowledge, understandings of reproduction have, metaphorically at least, often been half-concealed in brown paper or (less tantalizingly) in learned Latin or technical jargon. Talk about reproduction is caught up in differentials of authority, rank, class, and gender. Lady Mary tells Anna, "I don't think one should rely on a man in that department, do you?" and Anna appears to agree: "Suppose I was a working woman with eight children, and I didn't want any more. Wouldn't I have the right?" A real-life Anna would more likely have accepted that in matters of contraception, her husband should take the lead, but the underlying argument rings true.<sup>83</sup> From trials for infanticide to the abortion wars, control over reproduction and control over communication about reproduction have gone hand in hand.



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83. *Downton Abbey*, series 5, episode 2 (n. 78); Daniella Graham, "Saucy Lady Mary Enlists Anna's Help as Lord Gillingham Romance Steps up a Notch," *Metro*, September 28, 2014, <http://metro.co.uk/2014/09/28/saucy-lady-mary-enlists-annas-help-as-lord-gillingham-romance-steps-up-a-notch-4885202/>. For working-class women's reliance on men: Fisher, *Birth Control* (n. 22).

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