

**Boydell & Brewer**  
**University of Rochester Press**

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Chapter Title: The Monsters of Peter and Wolff: Anatomical Preparations and Embryology  
in Eighteenth-Century St. Petersburg

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Book Title: Rethinking the Public Fetus

Book Subtitle: Historical Perspectives on the Visual Culture of Pregnancy

Book Editor(s): Elisabet Björklund, Solveig Jülich

Published by: Boydell & Brewer, University of Rochester Press. (2024)

Stable URL: <https://www.jstor.org/stable/jj.4331928.5>

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## Chapter One

# The Monsters of Peter and Wolff

### Anatomical Preparations and Embryology in Eighteenth-Century St. Petersburg

*Sara Ray*

In the fall of 1776, the German physiologist Caspar Friedrich Wolff wrote to a colleague from the Russian Academy of Sciences in St. Petersburg, saying:

The very rich storehouse of monsters that has been collected and preserved over a long series of years in the Imperial museum has now been handed over to me, so that I can compose a description of them and perform anatomies where I decide to. In this therefore it will be necessary to deal once more with both the origin of monsters as well as with generation in general.<sup>1</sup>

Wolff's "storehouse of monsters" was the remarkable collection of Tsar Peter the Great who had, in the early years of the eighteenth century, initiated a project of collecting and preserving abnormal fetuses. Collected over several decades, the fetuses belonged to Peter's larger anatomical collection, which became the centerpiece of his state museum—the *Kunstkamera*—and its attached scientific institution, the Russian Academy of Sciences. Skilled in anatomy and himself a towering eighty inches tall, Peter was fascinated by bodies that seemingly defied nature. Peter collected "monsters" in hopes

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1 Wolff's letters are reproduced in Shirley A. Roe, *Matter, Life, and Generation: Eighteenth-Century Embryology and the Haller-Wolff Debate* (Cambridge: Cambridge University Press, 1981), 170.



Figure 1.1. Five fetuses prepared with wax-injected placentas on display at Peter the Great's Museum of Anthropology and Ethnography (Kunstkamera). Photo by Lars Björklund.

that doing so would reveal insights into what caused them, transforming one of nature's most capricious mysteries into a scientifically rationalized phenomenon. This project of collection depended on what was, at the time, a novel innovation in visualization: wet specimen preparation, wherein the soft tissues of the body were preserved in a mixture of spirits and sometimes injected with colored wax or even mercury to accentuate certain anatomical features.

Wet specimen preparation brought the hidden processes of gestation into view for both specialist and public audiences. In her book *Disembodying Women*, historian Barbara Duden says, "Body history . . . is to a large extent a history of the unseen. Until very recently, the unborn, by definition, was one of these."<sup>2</sup> For Duden, the key moment in recent history was Lennart Nilsson's mid-twentieth-century photographs of the embryos and fetuses that were published in *Life* magazine. Yet Duden identifies the history of the unborn—of the fetus—as one with a longer history inextricably tied to techniques of visualization. Like Nilsson's photographs, specimens prepared

2 Barbara Duden, *Disembodying Women: Perspectives on Pregnancy and the Unborn*, trans. Lee Hoinacki (Cambridge, MA: Harvard University Press, 1993), 8.

in this way offered in the late seventeenth century a new technique for visualizing pregnancy: no longer hidden within the maternal body, this novel technique made gestation and its materials into tangible, observable objects. Preparations showed no single iconography of the unborn: the fetus might be shown still snugly tucked within the uterus, or with its placenta, or as an isolated body disconnected from that of its mother. Across their broad diversity in style, fetal preparations contributed to new visual narratives about pregnancy and the process of generation—what might now be called reproduction.<sup>3</sup>

A substantial portion of Peter's collection was purchased from the Dutch anatomist Frederik Ruysch in 1717, and this collection contained hundreds of fetuses at various gestational ages who overwhelmingly showed no anatomical abnormalities. But Peter's own project of collecting sought out "those born as monsters," and, indeed, in the first few years of the century he acquired several conjoined twins, a child with two heads, a likely case of cyclopia, and dozens of others.<sup>4</sup> While "monstrous births" had long been a subject of both surgical treatises and popular broadsides, wet specimen preparation also made these into material objects that could be displayed, observed, touched, verified, dissected.<sup>5</sup> For Peter, questions of monsters and of generation were innately bound together—in a 1718 royal *ukaz*, he rejected the idea that monsters were supernatural, claiming instead that they

3 Duden, *Disembodying Women*; Nick Hopwood, "The Keywords 'Generation' and 'Reproduction,'" in *Reproduction: Antiquity to the Present Day*, ed. Nick Hopwood, Rebecca Flemming, and Lauren Kassell (Cambridge: Cambridge University Press, 2018), 287–304.

4 Anthony Anemone, "The Monsters of Peter the Great: The Culture of the St. Petersburg Kunstkamera in the Eighteenth Century," *The Slavic and East European Journal* 44, no. 4 (2000): 592.

5 For more on monsters within eighteenth-century science and medicine, see Lorraine Daston and Katherine Park, *Wonders and the Order of Nature, 1150–1750* (New York: Zone Books, 2001); Katharine Park and Lorraine J. Daston, "Unnatural Conceptions: The Study of Monsters in Sixteenth- and Seventeenth-Century France and England," *Past & Present* 92, no. 1 (1981): 20–54; Michael Hagner, "Enlightened Monsters," in *The Sciences in Enlightened Europe*, ed. William Clark, Jan Golinski, and Simon Schaffer (Chicago: University of Chicago Press, 1999), 175–217; Anita Guerrini, "The Creativity of God and the Order of Nature: Anatomizing Monsters in the Early Eighteenth Century," in *Monsters & Philosophy*, ed. Charles T. Wolfe (London: College Publications, 2005), 153–68; Marie-Hélène Huet, *Monstrous Imagination* (Cambridge, MA: Harvard University Press, 1993); Palmira Fontes da Costa, *The Singular and the Making of Knowledge at the Royal Society of London in the Eighteenth Century* (Newcastle-upon-Tyne: Cambridge Scholars, 2009).

“are the result of internal damage, of fear and the thoughts of the mother during her pregnancy.”<sup>6</sup> Wet specimen preparation brought the hidden processes of generation into view for both specialist and public audiences. Generation was a hotly contested scientific subject in the eighteenth century, and central to the subject were uncertainty and disagreements about the physical form of the fetus throughout gestation: Did it, as some believed, increase in size as if grown from an extreme miniature or, as others believed, did it emerge in successive stages? Though wet specimen preparation alone could not settle these debates, it did introduce a novel technique for investigating the questions. Because preparation transformed the body into a stable, observable, and redissectible object, it offered a new empirical tool for conceptualizing of one of the body’s most hidden and mysterious processes. The ability to *collect* bodies—transformed into objects—enabled them to be more directly compared, and it was this quality that made them a crucial visual methodology in the late eighteenth century as Caspar Wolff, using Peter’s collection, sought to substantiate a theory of developmental embryology.

Historians have examined the scientific, cultural, and institutional significance of the *Kunstkamera*’s collections—the museum was a cornerstone of Peter’s vision for a modernized Russia. The present chapter contributes to this rich literature by substantiating the historical connections between Peter’s collecting and the later history of Wolff’s embryological research. The story of Peter’s travels to Amsterdam and his purchase of a remarkable anatomical cabinet has been well documented by historians of art, medicine, and Russian history;<sup>7</sup> Wolff’s embryological research on monsters has been addressed by historians of biology and embryology who have sought to make sense of Wolff’s theories and connect them to nineteenth-century

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6 Robert Collis, *The Petrine Instauration: Religion, Esotericism and Science at the Court of Peter the Great, 1689–1725* (Leiden: Brill, 2012), 453.

7 Petros Mirilas, “The Monarch and the Master: Peter the Great and Frederik Ruysch,” *Archives of Surgery* 141, no. 6 (June 1, 2006): 602; Julie V. Hansen, “Resurrecting Death: Anatomical Art in the Cabinet of Dr. Frederik Ruysch,” *The Art Bulletin* 78, no. 4 (1996): 663–79; Mark Kidd and Irvin M. Modlin, “Frederik Ruysch: Master Anatomist and Depictor of the Surreality of Death,” *Journal of Medical Biography* 7 (1999): 69–77; Lucas Boer, Anna B. Radziun, and Roelof-Jan Oostra, “Frederik Ruysch (1638–1731): Historical Perspective and Contemporary Analysis of His Teratological Legacy,” *American Journal of Medical Genetics Part A* 173, no. 1 (January 2017): 16–41; Anemone, “The Monsters of Peter the Great”; Lindsey Hughes, *Russia in the Age of Peter the Great* (New Haven, CT: Yale University Press, 1998); Collis, *The Petrine Instauration*.

developments in the field.<sup>8</sup> These historical narratives are, however, firmly tied together by the *Kunstkamera's* fetal preparations: the fetuses within the museum's "Chamber of Curiosities" speak to the history of the "public fetus" not only because they isolated the fetal body into a novel material object but also because fetal bodies were brought together into a visual format that facilitated direct comparison. This chapter argues that fetal preparations, including especially those of "monsters," critically shaped modern conceptualizations of gestation as a developmental process by serving as "snapshots" of an unobservable physiological process and its possible pathways.

From their earliest inception, fetal preparations were not confined to the cloistered world of elite science—instead, these objects were deeply connected to the public both in their origins and in their audience. The preparations that would prove so useful to embryological science had been collected for display in museums that, while certainly catering to specialists, made public access a central part of their mission. Collected from members of the public, the museum was a space where fetal preparations might speak to narratives of obstetrical practice, parental mourning, the power of medical science, and the priorities of the state.

This chapter traces an early history of wet specimen preparation within the context of anatomical collecting. While Peter built up the *Kunstkamera's* collection in his own right, he relied substantially on the collection of his anatomy teacher Frederik Ruysch who, in the late seventeenth century, developed a novel technique for preserving a body part in spirits. This new technology of anatomical preparation was impactful not only to collecting practices but also to how the body could be visualized. For medical men interested in generation, the fetus was no longer relegated to anatomical drawing and description but could now be directly observed and even exchanged as objects. This, I argue, made fetal bodies deemed "monstrous" a subject of direct study that was central to eighteenth-century embryology. The collections of Ruysch and Peter emphasize the multifaceted relationship of the public as both suppliers of and audiences for fetal material displayed in museums. This chapter, then, offers insight into the human networks and

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8 Roe, *Matter, Life, and Generation*; Janina Wellmann, *The Form of Becoming: Embryology and the Epistemology of Rhythm, 1760–1830*, trans. Kate Sturge (New York: Zone Books, 2017); L. Ya. Blyakher, *History of Embryology in Russia from the Middle of the Eighteenth to the Middle of the Nineteenth Century* (Washington DC: Al Ahram Center for Scientific Translations, 1982); A. E. Gaissinovitch, "C. F. Wolff on Variability and Heredity," *History and Philosophy of the Life Sciences* 12, no. 2 (1990): 179–201; T. A. Lukina, "Caspar Friedrich Wolff und die Petersburger Akademie der Wissenschaften," *Acta Historiae Leopoldina* 9 (1975): 411–25.

scientific processes that transformed the “unborn” into something visible and even tangible well before modern embryology took shape.

## The Collectors

While traveling throughout Europe in 1697, Peter the Great spent several months in Amsterdam where he worked on the docks of the Dutch East India Company and took private lessons with the famous and wealthy anatomist Frederik Ruysch.<sup>9</sup> Ruysch’s international reputation stemmed largely from his vast and singular anatomical museum that showcased his groundbreaking method of embalming. Anatomical collections were not new, but Ruysch’s method was; existing collections contained mainly osteological or dried specimens. One of Europe’s most well-known anatomical collections at the time was at the University of Leiden, where Ruysch attended medical school in the seventeenth century.<sup>10</sup> It was while in Leiden that Ruysch, along with several classmates, devised the materials and method for the long-term preservation of a body part in spirits. The technique was exceedingly difficult, but the results were dramatic: using a combination of wax-injection and spirit preservation, Ruysch was able to create vivid, lifelike anatomical preparations from soft tissue.<sup>11</sup> This technique revealed minute or hidden features of the body, like glands or fine capillaries, which were difficult if not impossible to see during a traditional dissection. Preparations were also capable of showing anatomical layers, as if the viewer was privy to an ongoing dissection that had been frozen in time. Peter was captivated: he was so taken by the lifelike preservation of a young boy that, according to Ruysch, he kissed the child’s face.<sup>12</sup>

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- 9 Luuc Kooijmans, *Death Defied: The Anatomy Lessons of Frederik Ruysch* (Leiden: Brill, 2011), 244; Anemone, “Monsters of Peter the Great,” 596; Blyakher, *Embryology in Russia*, 19.
- 10 Tim Huisman, “Resilient Collections: The Long Life of Leiden’s Earliest Anatomical Collections,” in *The Fate of Anatomical Collections*, ed. Rina Knoeff and Robert Zwijnenberg (Burlington VT: Ashgate, 2015), 73–92.
- 11 Marieke M. A. Hendriksen, *Elegant Anatomy: The Eighteenth-Century Leiden Anatomical Collections* (Leiden: Brill, 2015), 76–83.
- 12 Frederik Ruysch, *Alle de Ontleed-, Genees-, En Heelkundige Werken van Frederik Ruysch* (Amsterdam, 1744), 1222; Rina Knoeff, “Touching Anatomy: On the Handling of Preparations in the Anatomical Cabinets of Frederik Ruysch (1638–1731),” *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences* 49 (February 2015): 32–33.

Ruysch's home museum was a space of both medical training and curious looking. By the 1670s, Ruysch's collection was open to the public who could pay a small fee for one of his daughters to show them around the dazzling collection: the museum quickly became an attraction both for the Dutch public and European elites traveling through Amsterdam.<sup>13</sup> While the artistry of Ruysch's preparations was remarkable, he understood his collection to be primarily for teaching students of anatomy, surgery, and midwifery. Among his medical colleagues, skeptics claimed Ruysch's technique ran the risk of distorting features and misleading viewers into a false sense of objectivity.<sup>14</sup> Yet, Ruysch argued that preparations were valuable objects of evidence since their "truths" could be studied, verified, or contested by observers. For Ruysch's private students, like Peter, preparations were taken out of their jars and actively handled during lessons—they were often even redissected.<sup>15</sup> Ruysch was frustrated by the state of medical research: someone could claim to have made a discovery during a dissection but, because the body decomposed, there was no way to verify the observation outside of that researcher's own depictions and recollections. About such cases, Ruysch grumbled, "I had to leave it at that. Now I preserve everything I depict, so that I needn't resort to such stupid answers."<sup>16</sup> Preparations, then, introduced a new technology for extending the reach and importance of shared observations to medical research.

Roughly a third of Ruysch's collection consisted of fetal bodies collected through his supervisory work of Amsterdam's midwives.<sup>17</sup> Amsterdam, like many Dutch municipalities, employed a corps of midwives trained by the city physician (Ruysch, in this case) and then employed by the municipality to deliver women within a specific geographic zone. These midwives, called *stadsvroedvrouwen*, were autonomous practitioners except in cases of complicated deliveries or stillbirths, at which point they were required to call in the man midwife.<sup>18</sup> Ruysch both trained and supervised Amsterdam's *stadsvroedvrouwen*, and his anatomical collection sat at the intersection of these roles:

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13 Kooijmans, *Death Defied*, 176.

14 Dániel Margócsy, "A Museum of Wonders or a Cemetery of Corpses? The Commercial Exchange of Anatomical Collections in Early Modern Netherlands," in *Silent Messengers: The Circulation of Material Objects of Knowledge in the Early Modern Low Countries*, ed. Sven Dupré and Christoph Lüthy (Berlin: Lit Verlag, 2011), 207.

15 Knoeff, "Touching Anatomy," 33.

16 Ruysch, *Alle de Werken*, 675; Kooijmans, *Death Defied*, 178.

17 Hansen, "Resurrecting Death," 672.

18 "Adviezen van de stadsdoctoren te Leiden," 1719, 0509:406, Erfgoed Leiden en Omstreken; Hilary Marland, "The 'Burgerlijke' Midwife: The *Stadsvroedvrouw* of Eighteenth-Century Holland," in *The Art of Midwifery: Early Modern Midwives in Europe* (New York: Routledge, 1993), 199.





Figure 1.2. Image of two preparations by Frederik Ruysch, a fetus preserved within the amniotic sac and a section of jawbone. Ruysch often depicted his preparations in mixed arrangements that might contrast fetal or juvenile anatomy, adult anatomy, animal anatomy, and other *naturalia*, like shells. From Ruysch's *Thesaurus anatomicus* (1701). Courtesy of Rijksmuseum Boerhaave, Leiden.

he obtained fetuses for preparation through this obstetrical network, and then used the preparations to train new classes of midwives as a supplement to the dissections he performed for them.<sup>19</sup>

19 “Concept-resolutie van de burgemeesters van Leiden betreffende de opleiding van de vroedvrouwen,” 1696, 0509:404, Erfgoed Leiden en Omstreken.

Fetal preparations exemplified the ability of wet preparations to bring the body's small, fleeting, and hidden components into direct sight.<sup>20</sup> As much as Ruysch claimed his preparations presented the body on its own terms, each preparation required decisions about visual style. Choices about how much of the maternal body to include in the preparation depended on what the preparer sought to emphasize: these choices might produce a preparation of a fetus within the womb with arteries and veins injected to highlight circulatory connections between maternal and fetal bodies, or a fetus within the delicate amniotic sac, or a fetus with its placenta still attached, or an early fetus prepared alone to demonstrate its tiny perfection. This flexibility in visual style meant fetuses could be incorporated into myriad narratives about anatomy, nature, and the body: whether skeletonized or preserved in spirits, Ruysch frequently used fetal bodies in preparations conveying moralistic messages about, for instance, the fleetingness of life or the sins of sexual promiscuity.<sup>21</sup> For midwives, these objects could be used to show, and thus prepare for, obstetrical emergencies like wrapped umbilical cords, vaginal abnormalities or injuries, or unusual fetal presentations. A fetus could only be prepared *in situ* if a pregnant woman had died prior to delivery and her body was available for dissection. But most fetal material in Ruysch's collection came from pregnancy losses and, as such, were preserved either with no remnant of the maternal body or only the placenta.<sup>22</sup>

Preparations reflected many of the questions that undergirded elite scientific interest in pregnancy during this period: namely, the nature and extent of the connection between maternal and fetal bodies and the form of the fetus throughout gestation. A fetus might appear as a body intimately enmeshed with that of its mother, or it might appear as a solitary entity disconnected from context. This second category—what might be thought of as an “embryological” in contrast to an “obstetrical” style—allowed for the isolated fetal body to be directly compared with others on the basis of anatomy. Because Ruysch saw his method of preparation as a way of venerating God and demonstrating the perfection of His design, his collection contained few fetal abnormalities and, instead, sought to preserve specimens exemplifying anatomical perfection.<sup>23</sup>

After months of private lessons with Ruysch, Peter returned to Russia animated by a love for anatomy. In Moscow, the tsar was said to carry a bag of surgical tools with him in case he was notified of an interesting surgery happening nearby. Peter also quickly embarked on his own project of creating

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20 Duden, *Disembodying Women*, 45.

21 Knoeff, “Touching Anatomy,” 40; Hansen, “Resurrecting Death,” 669.

22 Knoeff, “Touching Anatomy,” 36–37.

23 Hansen, “Resurrecting Death,” 673.

an anatomical museum that he envisioned as a centerpiece of his new capital under construction, St. Petersburg.<sup>24</sup> Yet unlike his teacher who sought to preserve instances of perfection, Peter's interest was in nature's unusual products—particularly when it came to collecting bodies. In 1704, Peter issued an *ukaz* forbidding midwives from killing or concealing infants “born as monsters,” instructing them instead to deliver such bodies to local clerics who, in a separate order, were told to send those bodies to Moscow's royal apothecary for preservation.<sup>25</sup> These preserved bodies were added to Peter's rapidly growing collection which, in addition to anatomical specimens, included coins, ethnographic material, and a wide variety of *naturalia*.

Peter moved his collection to St. Petersburg upon the city's establishment in 1714. Three years later, Peter returned to Amsterdam and bought his old teacher's entire collection—2,045 anatomical specimens and *naturalia*—for the sum of 30,000 guilders, roughly equivalent to \$400,000 today.<sup>26</sup> In St. Petersburg, Ruysch and Peter's combined anatomical collections formed the core of the new state museum, the *Kunstkamera*. This made St. Petersburg home to a comprehensive embryological collection containing hundreds of fetuses preserved in jars—a kaleidoscopic view of gestation which included various bodily forms, gestational ages, and levels of connection to the maternal body.<sup>27</sup> Although wet specimen preparation proliferated across Europe and would become a mainstay of anatomical collections by the end of the eighteenth century, Peter was an early and fervent adopter of the technology: when Peter purchased Ruysch's collection in 1717, Ruysch's own medical school in Leiden had not yet begun earnestly building up its collection of wet specimens and would not do so until the early 1730s.<sup>28</sup> In addition to various human and animal “monsters,” visitors to the museum in the 1720s report seeing bottles with human fetuses arranged from the smallest embryo to the mature fruit, a style of display that would only become scientifically commonplace in the early nineteenth century.<sup>29</sup>

24 Mirilas, “Monarch and the Master,” 606; Michael Gordin, “The Importance of Being Earnest: The Early St. Petersburg Academy of Sciences,” *Isis* 91 (2000), 4.

25 Collis, *Petrine Instauration*, 450; T.V. Stanyukovich, *The Museum of Anthropology and Ethnography Named after Peter the Great* (Leningrad: Nauka, 1970), 4.

26 Collis, *Petrine Instauration*, 439.

27 Stanyukovich, *Museum of Peter the Great*, 23.

28 Hendriksen, *Elegant Anatomy*, 9. For insight into the role of tacit knowledge in techniques for creating these preparations, see pp. 5–7.

29 Blyakher, *Embryology in Russia*, 22–23; Nick Hopwood, “Producing Development: The Anatomy of Human Embryos and the Norms of Wilhelm His,” *Bulletin of the History of Medicine* 74, no. 1 (2000): 29–79; Nick



Figure 1.3. A preparation of conjoined twins on display at Peter the Great's Museum of Anthropology and Ethnography (Kunstkamera). Note the restitched incision at the neck and upper chest, indicating that the body was dissected. The anatomist here was likely interested in how the structures of the body separated. Bodies preserved in this way could be redissected, making them ideal for teaching.  
Photo by Annelie Drakman.

By virtue of Peter's early and aggressive collecting, St. Petersburg amassed an embryological collection that remained singular in its scale and scope for most of the century. From its earliest period, then, wet specimen preparation was used to visualize fetal bodies within multiple frameworks—obstetrically, moralistically, and embryologically. In the *Kunstkamera's* Chamber of Curiosities, fetuses with a wide variation of bodily forms were displayed alongside one another, which brought fetuses “born as monsters” and those considered “perfect” into a shared space and method of display. This physical merging brought together two entwined questions, both of which were of intense interest in the eighteenth century: first, the cause of “monstrosity,” and, second, the physiological processes of generation. These preparations were stable objects that allowed for a wide range of audiences to share in observations of otherwise hidden or rare phenomena; as such, they were potent objects for shaping scientific narratives through their use in teaching, public display, and research.

Before this chapter turns to the role of the *Kunstkamera's* fetal preparations in embryological research, it first examines the dual importance of the public to the collection. Peter and Ruysch both relied upon the public to supply their museums with fetal material, although the two men employed vastly different mechanisms for doing so. The embryological collections were meant to be seen by an audience that extended far beyond scientific specialists, even if the preparations themselves were often described and understood as tools of teaching and research. If it is significant that the *Kunstkamera's* embryological collection was a transformative space in visualizing the fetus, it is equally significant that the collection itself was intrinsically tied to the public: this was a visual technology that brought gestation out from the body and into the halls of the museum for viewing and contemplation.

## Public as Source, Public as Audience

Wet preparations were remarkably useful to medical study. This is made plain both by Ruysch's own use of the collection in his teaching and in the widespread proliferation of wet specimen preparation across European hospitals and medical schools by the end of the century. Yet from the beginning, wet preparations were appreciated not only as powerful objects for specialist study but also for public display: the public could view Ruysch's collection at his home at Bloemgracht 15 and, after moving the capital to St. Petersburg,

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Hopwood, Simon Schaffer, and Jim Secord, “Seriality and Scientific Objects in the Nineteenth Century,” *History of Science* 48, no. 3–4 (September 2010): 251–85.



Figure 1.4. Quintuplets preserved with the placenta on display at Peter the Great's Museum of Anthropology and Ethnography (Kunstkamera). While the fetal bodies are not anatomically unusual, multiples—particularly of anything beyond twins—was another phenomenon of pregnancy whose rarity meant its physiology was poorly understood. In the same way preparation enabled the study of anatomical rarities, like conjoined twins, it also enabled physicians to observe physiological rarities, like multiples. Note also the evidence of (re)dissection in the preparation to the right.

Photo by Annelie Drakman.

Peter followed his teacher's example by opening up his own collections to the public.

Fetuses are a unique object within anatomical museums with regard to their relationship to the public. Namely, fetuses had to be obtained *from* the public in a way that differed from most anatomical specimens that could be taken from hospital patients, unclaimed cadavers, criminals, or consenting adult patients. The necessity of dissection to medical education was largely accepted by European anatomists by the eighteenth century although bodies were still difficult to come by: regulations about which bodies could be anatomized differed in municipalities and countries across Europe and, even if dissection was accepted by anatomists, many in the public had reservations. Ruysch's work with Amsterdam's hospital gave him access to the bodies of some patients—hospital administration willing—and his role as the city's forensic examiner gave him access to unclaimed victims of crime.<sup>30</sup> Yet fetuses presented a unique challenge in that they were not isolated bodies. Instead, they were directly linked to a mother through pregnancy and, as such, the acquisition of fetal material necessitated direct contact with the parents. Elsewhere in Europe, such material might be collected from poor or unmarried women who, due to their social station, gave birth in the hospital, but because *stadsvroedvrouwen* were employed to deliver all women—regardless of income level—this was a relatively uncommon situation in Dutch municipalities; in fact, the first hospital-based maternity ward in Amsterdam wouldn't open until the turn of the nineteenth century at which point it did, indeed, become a significant site of anatomical collection.<sup>31</sup>

As the supervisor and trainer of Amsterdam's *stadsvroedvrouwen*, Ruysch was directly connected to the women who were attending deliveries and encountering fetal material. The regulations of this system were such that *stadsvroedvrouwen* were autonomous practitioners except in cases that either required instrumental intervention or carried a risk of maternal or fetal death; these necessitated the presence of a man-midwife. Regarding these

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30 Kooijmans, *Death Defied*, 68, 97. For more on the acquisition of bodies for anatomical research, see Ruth Richardson, *Death, Dissection, and the Destitute* (Chicago: University of Chicago Press, 2001); Michael Sappol, *A Traffic of Dead Bodies: Anatomy and Embodied Social Identity in Nineteenth-Century America* (Princeton, NJ: Princeton University Press, 2002); Katharine Park, *Secrets of Women: Gender, Generation, and the Origins of Human Dissection* (New York: Zone Books, 2006).

31 Laurens de Rooy, "A Cabinet Departs," in *Forces of Form*, ed. Simon Knepper, Johan Kortenaar, and Antoon Moorman (Amsterdam: Amsterdam University Press, 2009), 61; Justus Lodewijk Dusseau et al., *Musée Vrolijk. Catalogue de La Collection d'anatomie Humaine, Comparée et Pathologique de M.M. Ger. et W. Vrolijk* (Amsterdam: Impr. de W. J. de Roever Kröber, 1865), 5.

cases, Ruysch wrote in his *Works*, “I am gratified that often I was called to [miscarriages], when I found the parents very sad . . . I am in the habit of consoling them, and assuring them that perfect infants change after death in the mother’s womb.”<sup>32</sup> To these parents, Ruysch offered his method of preparation as a means of memorialization: with it, he could ameliorate the disturbing visual elements of a miscarriage and restore a fetal body to an idealized, peaceful perfection.<sup>33</sup> The *stadsvroedvrouwen* system in Dutch municipalities was unique in that it integrated midwives into the medical marketplace, which established a straightforward infrastructural connection between parents and elite anatomists. Thus, an enterprising anatomical collector—like Ruysch—could use this regulated medical network as a pipeline for the acquisition of fetal material from members of the public.

While Ruysch’s collection consisted mostly of physically “perfect” fetuses, an account of Ruysch’s negotiations with the mother of conjoined twins offers insight into these encounters. About the case, Ruysch wrote, “I myself have possession of two peoples grown together, being a birth of eight months, which I have embalmed and keep in my house on the condition that the parents are free, as often as it pleases them, to come with their friends to see the children.”<sup>34</sup> While the father of the twins was already dead, Ruysch went on to explain his agreement with their mother that if she were to outlive Ruysch, the preparation of her children would be given back to her; if Ruysch outlived her, the twins would belong to him. Just as preparations did not provide a single iconography of the fetus, nor did they serve a uniform purpose: what Ruysch considered valuable material for teaching and research for himself, he understood as a unique and emotionally meaningful object of memorialization for parents.<sup>35</sup>

In contrast to Ruysch’s reliance on his professional network, Peter collected fetal material using his power as an autocrat. Peter issued his 1704 *ukaz* instructing midwives to hand over the bodies of monstrous infants with the caveat that failure to do was punishable by death. Peter’s interest was equated with an interest of the state, which the public was forbidden to resist. The result, however, was a similar pipeline that delivered interesting fetal material from the birthing bed to the anatomist’s jar although without

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32 Ruysch, *Alle de Werken*, 1022–23.

33 Knoeff, “Touching Anatomy,” 43.

34 Ruysch, *Alle de Werken*, 1038.

35 For more on the relationship between anatomical collectors and mothers in the context of nineteenth-century America, see Shannon Withycombe, *Lost: Miscarriage in Nineteenth-Century America* (New Brunswick, NJ: Rutgers University Press, 2019).



the pretense of reciprocity found in Ruysch's negotiations with parents. The public's participation in Peter's project of collection was—willingly or not—their contribution to his efforts of remaking Russia into a scientific, European state.

Peter issued another *ukaz* in 1718 further detailing these acquisitions. Although the 1704 order had threatened midwives with death for failure to comply, the 1718 *ukaz* suggests that fetuses were obtained through financial incentives rather than punitive threats. The later *ukaz* set out a price list for monsters that included monstrous animals, dead fetuses, and living children with unusual bodies; this last category commanded the highest reward—one hundred roubles—and these individuals resided in the *Kunstkamera* as “living exhibits” who did odd jobs around the museum.<sup>36</sup>

From its opening in 1714, the museum was accessible to the public with low barriers to entry. The *Kunstkamera* was a centerpiece of the new capital of St. Petersburg, which Peter had designed according to his vision of Russia as a state aligned with European attitudes, educational standards, and institutions.<sup>37</sup> A key advisor was the German polymath Gottfried Wilhelm Leibniz who emphasized to Peter the chief importance of a cabinet of rarities to a modern, scientific state—Russia was, Leibniz claimed, uniquely well situated for collecting due to its massive geographic expanse.<sup>38</sup> Peter was adamant that his collections be open to the public, telling one resistant advisor, “It is my will and intention not only that everybody enters *gratis* but that whenever a company comes to see the cabinet, that they be offered in my name and at my expense a dish of coffee, a glass of wine, or some other refreshment in this repository of curiosities.”<sup>39</sup>

If the *Kunstkamera* museum was a central piece in this broader institutional vision, the anatomical cabinet was one of its core collections. Anatomy, as a science, spoke to Peter's intentions to bring European rationalism to Russia. While dissection had become a commonplace part of medical education across Europe, it was scarcely practiced in Russia due to religious concerns and cultural beliefs, including the potential for certain bodies to become vampires; these beliefs applied most strongly to the same types of bodies that populated dissecting tables across Europe, namely criminals, suicides, and unclaimed bodies.<sup>40</sup> Ruysch's anatomical cabinet was one of

36 Collis, *Petrine Instauration*, 454; Anemone, “Monsters of Peter the Great,” 592–93.

37 Mirilas, “Monarch and the Master,” 603.

38 Gordin, “Importance of Being Earnest,” 4.

39 Collis, *Petrine Instauration*, 443.

40 Anemone, “Monsters of Peter the Great,” 588–89.

several European collections that Peter bought for his new museum, which served as an institutional link between the European scientific community and St. Petersburg society. As such, it was a powerful site for transmitting Peter's vision for Russia, and it was critical that the *Kunstkamera* be open to the public in order to effectively fill this role to Russian subjects. Peter strengthened the scientific messaging of the museum by joining it to the Russian Academy of Sciences when the latter was formed in 1724.<sup>41</sup> Thus the museum itself was a public arm of a state scientific institution—modeled directly on Berlin's academy upon Leibniz's suggestion—which signaled a new, central role of European science in Russia.

Ruysch's original collection in Amsterdam and the combined collection in St. Petersburg merged public and scientific spaces. Both museums offered the public an opportunity to observe and engage with the projects of elite science, and, in the case of St. Petersburg, they established the institutional framework for a new scientific social order. As useful to scientific research as they were, fetal preparations were objects embedded into narratives that involved the broader public, both ones intimately personal and ones of national identity. Museums are never neutral spaces: they materialize ideologies, power dynamics, and domains of knowledge.<sup>42</sup> In the collections of Peter and Ruysch, fetal preparations brought gestation out of the private sphere and into public view, signaling the power of medical science to reveal nature's most hidden secrets. Peter's collection of monsters, moreover, was a rejection of traditional superstition in its claim that, through collection and study, even this pernicious mystery could be brought into rational order: preserved and displayed in Peter's museum, these fetuses signaled Russia's new scientific age.

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41 Stanyukovich, *Museum of Peter the Great*, 23.

42 Eilean Hooper-Greenhill, *Museums and the Shaping of Knowledge* (London: Routledge, 1992); George W. Stocking Jr., *Objects and Others: Essays on Museums and Material Culture* (Madison: University of Wisconsin Press, 1998); Tony Bennett, "The Exhibitionary Complex," in *Culture/Power/History: A Reader in Contemporary Social Theory*, ed. Nicholas Dirks and Geoff Eley (Princeton, NJ: Princeton University Press, 1994), 123–54; Donna Haraway, "Teddy Bear Patriarchy," in *Primate Visions* (New York: Routledge, 1989), 22–58.

## C. F. Wolff, Epigenesis, and the Storehouse of Monsters

Peter established the Russian Academy of Sciences in 1724, shortly before his death. Affiliated with the *Kunstkamera*, Academy physicians gained oversight of the museum's anatomical collection as well as its "living exhibits" who had come to the museum due to the *ukazi*. When possible, academy physicians attempted to gather information about the pregnancies that had produced the abnormal bodies arriving to the *Kunstkamera* in an attempt to discern possible causes of their bodily deviation. While Ruysch's close connection to Amsterdam's midwives gave him more direct access to parents who might answer these questions, this work was significantly more patchwork in Russia where each step of the collecting pipeline—not to mention Russia's vast geographical range—added distance between the people involved in a birth and the physicians preparing the body for display. Yet, physicians always attempted to gather as much contextual information as possible about a body given to the collection in order to discern a causal event: Had the mother experienced a fright? Did other children in the village exhibit similar abnormalities? Had the mother been ill?<sup>43</sup> In his 1718 *ukaz*, Peter declared, "Ignoramuses think that such monsters are born from the actions of the devil . . . monsters are [instead] caused from internal damage, also from fear and the thoughts of the mother in the time of her pregnancy."<sup>44</sup> With this statement, Peter aligned himself with mainstream European scientific thought and, all at once, connected his project of collecting to the dismissal of traditional beliefs and to the authority of European science to replace their explanatory power.

This belief in a connection between maternal experience and fetal body was scientifically mainstream in the early eighteenth century. The prevailing theory of generation was called "preformation," and it held that all fetuses had been fully, perfectly formed at the moment of Creation. These fully formed fetuses were stored in extremely miniature form in either the sperm or the egg until conception, which began a process of gestation that grew the fetus in size from its preformed miniature into a full-term infant.<sup>45</sup> Monsters were a thorny problem within this paradigm of generation. Were monsters, as some preformationists suggested, preformed by God in their imperfect state? Or were they, as others argued, the result of damage to the fetus during pregnancy?<sup>46</sup> The latter belief was far more widespread

43 Anemone, "Monsters of Peter the Great," 594.

44 Collis, *Petrine Instauration*, 453.

45 Joseph Needham, *A History of Embryology* (New York: Arno, 1975), 205–11.

46 For more on explanations of monstrosity within a preformationist framework see Maria Teresa Monti, "Epigenesis of the Monstrous Form and Preformistic

and afforded tremendous power to the maternal mind as having potentially deformative power upon an originally perfect fetal body: in addition to illness and injury, a woman's fears or psychic shocks might imprint themselves upon the growing fruit and cause her to birth not a perfectly healthy child but a monstrous one.<sup>47</sup> Contextual information about a pregnancy offered insight into potential causal events.

Although the academy continued to collect fetal material into the 1740s, Peter's death in 1725 began the demise of the *Kunstkamera's* more carnivalesque elements. Over the next half decade, the "living monsters" residing in the museum were released, while new ones were turned away with one academy physician saying, "In the *Kunstkamera*, we keep only dead freaks."<sup>48</sup> A devastating fire ripped through the museum in 1747 and, while the anatomical preparations were undamaged, most were removed from display for nearly twenty years as the museum underwent extensive renovations. These preparations comprised the "storehouse of monsters" that Caspar Friedrich Wolff referenced in his 1776 letter explaining his new research into the cause of monstrosity and, more generally, into questions of generation.

Wolff had arrived at the Russian Academy of Sciences in 1766 after being named chair of anatomy and physiology. His appointment to the Russian Academy of Sciences came after Wolff failed to obtain an academic post in Germany—a denial due, at least in part, to his controversial 1759 dissertation on generation, which had refuted the preformationist theories of one of Europe's most highly regarded scientific minds: Albrecht von Haller.<sup>49</sup> Wolff's was a theory of epigenesis, an ancient theory of generation positing that a body emerges through successive stages of differentiation. Though the theory of epigenesis had its roots in Aristotle, it had fallen out of favor in the mid-seventeenth century due to the philosophical and mechanistic elegance of preformation that, unlike epigenesis, required no "occult" force to explain its operation. Preformationists needed only to accept the possibility of exceptionally miniature bodies; epigenesists, however, had to explain *how*, exactly, undifferentiated matter "knew" how to differentiate and mature into the parts of a coherent animal body. Wolff's research brought epigenesis into the language and practices of eighteenth-century physiological research. He conceptualized of gestation as a developmental process characterized by rhythmic elements of repetition, regularity, and variation and driven by an

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'Genetics' (Lémery-Winslow-Haller)," *Early Science and Medicine* 5, no. 1 (2000): 3–32.

47 Huet, *Monstrous Imagination*.

48 Hughes, *Russia*, 316.

49 Needham, *A History of Embryology*, 220–22. For a comprehensive account of the dispute between Wolff and Haller, see Roe, *Matter, Life, and Generation*.

immaterial organizing force inherent to organic matter itself.<sup>50</sup> Wolff was particularly fascinated by the phenomena of variation: How did traits within a species remain stable or undergo variation, and what variations could be passed down through generations?

Wolff saw monsters as proffering a unique line of evidence for the study of epigenesis precisely because they were dramatic physical variations.<sup>51</sup> Within this framework, the anatomical features of “monstrous” bodies offered insight into the stabilization or variation of traits during the shared, physiological process of development. Put another way, monsters were not singular aberrations that could be explained away by a woman’s fright or sinful desire; instead, they were natural varieties within a species that did not propagate down generations due to the simple fact that most severe “monstrosities” did not survive birth, much less reach reproductive age.<sup>52</sup> This was a major conceptual transformation that placed variation—or “monstrosity”—at the heart of understanding both generation and the physicality of the fetal body. This transformation, however, required others: as historian of the life sciences Janina Wellmann observes, “Wolff needed pictures in order to ‘see’ development . . . a new conceptual framework had to be built, along with new experimental practices, new techniques of observation, and, crucially, new forms of visual representation.”<sup>53</sup> The hundreds of fetuses in the *Kunstkamera*’s collections—those of Ruysch, of Peter, and later academy acquisitions—offered a powerful form of visual representation that was uniquely well suited to Wolff’s research: the collection contained a large number of fetuses preserved in bodily isolation—bodies spanning an enormous range of physical forms and gestational ages. Thus, Wolff could not only dissect a diversity of fetal bodies, but he could also directly compare them against one another and form a visual “map” of embryological development and its possible pathways. Wolff began his research on the fetal preparations shortly after his arrival and remained preoccupied by them until the 1780s, collecting his observations and ideas into an unpublished treatise titled *Objecta meditationum pro theoria monstrorum* that would include a description of “the whole catalog of monsters in possession of the Academy.”<sup>54</sup> *Objecta* remained unpublished at Wolff’s

50 Wellmann, *Form of Becoming*, 95; Lukina, “Caspar Friedrich Wolff Und Die Petersburger Akademie Der Wissenschaften,” 416.

51 Roe, *Matter, Life, and Generation*, 126.

52 Roe, 142; C. F. Wolff, *Objecta Meditationum pro Theoria Monstrorum; Predmety Razmyslenij v Svjazi s Teoriej Urodov*, trans. Ju. Kh. Kopelevich and T. A. Lukina (Leningrad: Izdatel’stvo, 1973), 229.

53 Wellmann, *Form of Becoming*, 16.

54 Wolff, *Pro Theoria Monstrorum*; Gaissinovitich, “C. F. Wolff on Variability and Heredity,” 71.

death in 1794, and Wolff himself died a fairly marginal figure within the European scientific community.

Wolff's research, however, found two crucial champions in the German embryologists J. F. Meckel the Younger and Karl Ernst von Baer. Meckel is largely responsible for bringing Wolff to a wider European audience through his translations of Wolff's published works and for his own research. Meckel, too, was highly interested in the subject of fetal abnormality and built on Wolff's work through research and observations made from his own substantial anatomical collection in Halle.<sup>55</sup> While visiting St. Petersburg in 1830, von Baer encountered an archive containing the unfinished fragments of *Objecta*, and he seized upon both its novel source of evidence—the fetal preparations—and the work's utility to the field of embryology. Appealing to his fellow embryologists to collaborate on a translation of the work, von Baer stressed that Wolff's anatomical descriptions of the fetal preparations were “the most important and elaborate part,”<sup>56</sup> and praised the collection by saying “it is only through Peter's personal interest in such effects of nature, which attracted him through their veil of mystery, that these objects are brought together . . . [Wolff] regarded the work undertaken as a fruit of the seed of the great emperor.”<sup>57</sup>

From the early days of the *Kunstkamera's* collection, the fetuses within it were understood as offering a valuable line of inquiry into scientific questions of generation. For Peter, this was directly related to his larger project of aligning Russia with European sensibilities, sensibilities that his 1718 *ukaz* on the collections set in contrast to the “ignorant superstitions” that Peter believed guided existing Russian attitudes toward unusual bodies. Yet the utility of the collection to actual embryological research in Peter's time was largely rhetorical. Because monsters were thought to be isolated aberrations whose causes were located in the experiences of the mother, an aberrant fetal body by itself demonstrated little more than the fact that such a body could, and did, exist. Building up the *Kunstkamera's* collections and creating an affiliated scientific institution was, for Peter, a project of statecraft, but an embryological *collection*—one large and diverse—proved to be

55 Owen E. Clark, “The Contributions of J. F. Meckel, the Younger, to the Science of Teratology,” *Journal of the History of Medicine and Allied Sciences* 24, no. 3 (1969): 310–22.

56 Ernst von Baer, “Ueber Den Littärischen Nachlass von Caspar Friedrich Wolff, Ehemaligem Mitgliede Der Akademie Der Wissenschaften Zu St. Petersburg,” *Bulletin de La Classe Physico-Mathématique de l'Académie Impériale Des Sciences de Saint-Petersbourg* 5, no. 9–10 (1846): 159–60.

57 Von Baer, “Ueber Den Littärischen Nachlass von Caspar Friedrich Wolff,” 158.

an extraordinarily useful visual methodology for a paradigm of generation that required comparison.

### Conclusions: Entwined Narratives in the Chamber of Curiosity

The development of wet specimen preparation in the late seventeenth century marks a key moment in the history of the public fetus. Referencing contemporaneous early modern advancements in microscopy and illustration, Barbara Duden says, “The technogenesis of the fetal image of embryology can be related to these instruments of visualization.”<sup>58</sup> Wet preparations of fetuses surely belong within these consequential visual technologies. These preparations brought the fetal body into direct scientific sight both as a body dependent upon and enmeshed with that of its other, as well as a body that could be considered its own isolated being. Although the “disappearance” of the pregnant body from fetal iconography has been largely associated with the twentieth century—exemplified by Lennart Nilsson’s photography for *Life*—wet specimens also allowed the fetus to be evaluated as an autonomous physical being devoid of maternal context.

The technique of anatomical preparation pioneered by Ruysch allowed fetuses to be integrated into a number of overlapping narratives: of obstetrical practice, of personal memorialization, of the power of medical science, and of the nature of gestation as a physiological process. Such narratives were never confined to cloistered halls of elite science; instead, they represent intimate entanglements between researchers and the public’s perception of the scientific enterprise. For Ruysch, fetal preparations were not only useful objects of research but also demonstrated to the public the power of medical science to alleviate emotional suffering and create space for grief. For Peter, fetal preparations—particularly those of monsters—represented the centrality of European scientific methods and knowledge in the state’s new transformative moment.

The anatomical collection at the *Kunstkamera* merged the scientific and the public into a shared space of reconceptualizing gestation. While fetuses were sometimes preserved *in situ* within the maternal body, anatomists seized upon the fact that stillborn or miscarried fetuses could be preserved, making it possible to transform relatively common obstetrical events into new scientific opportunities. This “embryological style” facilitated the comparison of fetal bodies that, in the Chamber of Curiosities, varied from the very tiny to the mature fruit, from the physically “perfect” to myriad

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58 Duden, *Disembodying Women*, 92.

iterations of physical abnormality that had long fallen under the scientific designation of “monstrous.” Wet preparations themselves would not necessarily disabuse an observer of preformationist views. The extraordinarily tiny embryos are remarkable for the way in which they do, indeed, show body parts in extreme miniature. Yet a *collection* of preserved and isolated fetal bodies proved to be a potent methodology for visualizing generation as a developmental process. Since the physiological process itself could not be directly observed, fetal preparations served as “snapshots” that collectively showed not only the stages of development but also “monsters” as its potential variations.

That the fetal body develops during gestation, its body emerging in successive stages of refinement, is so fundamental to modern embryology as to be cognitively invisible to us in the twentieth century. But we owe this conceptualization to a much earlier visual technology which today persists in anatomical collections as curious relics of the past. The embryological collections of Ruysch and Peter are still on display in the *Kunstkamera* in St. Petersburg, still in the original building that was completed in 1727. Although St. Petersburg was unrivaled in the scale and scope of its embryological collection, fetal preparations became ubiquitous features of anatomical collections across Europe as Ruysch’s original technique was replicated and modified. Today, these preparations remain magnetic to museumgoers. Even as fetal imagery has become widespread, these bodies are still a unique, nearly tangible window into an unseen world.