Bodyworlds: The Art of Plastinated Cadavers

José van Dijck
University of Amsterdam

In the 1950s, when synthetic materials had recently been introduced, people used to admire plastic tulips for their realistic quality. Consumers were charmed by the obvious advantages of these fake flowers: they never withered, and every tulip looked absolutely perfect. When I buy a bouquet of real tulips these days, it strikes me how much they resemble plastic ones. By and large, the famous Dutch tulip is no longer an exclusive product of nature, for its cultivation increasingly depends on treatment with chemical and biotechnological means. The advantages are obvious: the flowers remain fresh much longer, and every single tulip meets the requirements of standardized size, shape, and color. Whereas before, we wanted the artificial object to look like a real one, we have now entered an era in which we want the real object to look like "perfected nature." We are no longer satisfied with a plastic imitation of an organic object, yet neither are we satisfied with nature's own imperfect products. So we tinker with flowers and treat them with chemical and other techniques, until they meet our aesthetic standards. The contemporary tulip, in other words, has become an intricate object, an amalgam of organic material, cultural norms, and technological tooling.

This new preference for the enhancement—instead of imitation—of natural material also pertains to the human body. Dentists who, in the 1960s, did not think twice about pulling a patient's teeth and replacing them with a set of dentures (cheap and low-maintenance), now make every effort to save the original ivories. They have an ex-

Configurations, 2001, 9:99–126

tensive collection of tools and plastic materials at their disposal to perfect our pearly whites, until they resemble the (retouched) teeth of fashion models in magazine pictures. In a similar vein, our physical appearance can be optimized by plastic surgery, anabolic steroids, and perhaps, in the near future, by genetic therapy. "Natural silicone breasts" is no longer an oxymoron, but an indication of a reality in which female bodies are reshaped by cultural norms with the help of advanced technology. The preference for a manipulable body perfectly fits a material, technological culture in which *imitation* has been replaced by *modification*. Just like the tulip, the body has become a mixture of organic matter and artifice.

If the living body has become a mix of nature and artifice, it is no great surprise to find this also applying to the dead body. In the past twenty years, Gunther Von Hagens, a German anatomist from Heidelberg, has developed a preservation technique that he has dubbed "plastination." It involves a sequence of chemical treatments of the corpse, which is then modeled into a sculpture by the anatomist's hand and scalpel. The resulting anatomical object looks like a conflation of an opened-up mummy, a skinned corpse, and an artistic sculpture (Fig. 1). Von Hagens calls his collection of cadavers "anatomical art," which he defines as "the aesthetic and instructive representation of the inside of the body."[1] After its first public showing in Japan, Von Hagens's remarkable collection *Körperwelten* (*Bodyworlds*) was exhibited in Mannheim in 1997–1998, and in Vienna in 1999. The German exhibition lasted four months and attracted more than a million visitors—an exorbitant figure for what was advertised as a scientific exhibition—and the Vienna event was kept open twenty-four hours a day, seven days a week to accommodate all visitors. Even shows in major art museums devoted to the work of canonized painters seldom receive this much popular attention.

What, then, makes the plastinated bodies from Mannheim so fascinating? Why did *Bodyworlds* become such a success? Evidently, in our increasingly medicalized society, people's interest in the human body has risen in proportion to their interest in its normally hidden dimension. And yet, other anatomical-pathological museums in Europe have offered inside glimpses of the body as well, without attracting anywhere near the numbers of visitors that *Bodyworlds* has. A factor contributing to its popularity may well have been the discussion, fanned by the German media, about the ethicality of this

1. In the exhibition's catalogue, *Körperwelten: Einblicke in den menschlichen Körper* (Heidelberg: Institut fur Plastination, 1997), Von Hagens defines anatomical art as the "ästhetisch instruktive Darstellung des Körperinneren" (p. 217).

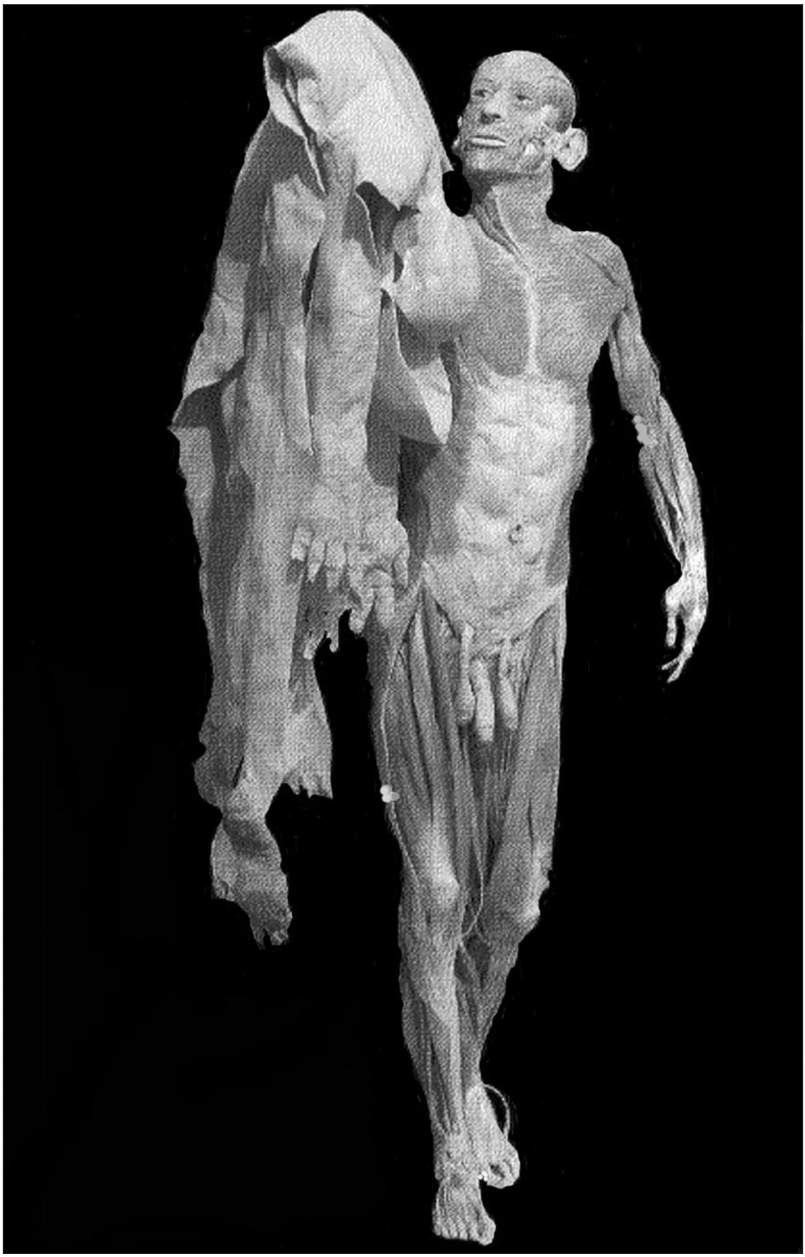

Figure 1. Ganzkörper-Plastinat mit Haut [Posed Whole-Body Specimen with Skin]. From *Körperwelten: Die Faszination des Echten* (Heidelberg: Institut für Plastination, 2000), fig. 9.29, p. 153. (Courtesy of the Institut für Plastination, Heidelberg.)

exhibition. Newspapers and television shows raised the question whether the display of real human cadavers was indeed legitimate, and if so, for what purposes. Did *Bodyworlds* serve any scientific goal at all, or was its prime intention the display of artistic objects? Some reporters even suggested that while any other country could, in good consciousness, feature such an exhibition, Germany could not, due to its dubious medical experiments on living and dead bodies during the Nazi era. Undoubtedly, this media attention drew more visitors to the Mannheim exposition, but that still does not fully account for its immense popularity.

The appeal of *Bodyworlds*, as well as the controversy surrounding the exhibition, can be properly understood only if we approach the phenomenon from a historical perspective. Von Hagens's plastinated cadavers perfectly fit the long-standing scientific tradition of anatomical body production, as much as they prolong artistic conventions of anatomical representation. By the same token, the remarkable exhibition setting can be traced to the cultural roots of public anatomy lessons and the artful display of body parts. From the history of anatomy we have learned that anatomical practices, objects, and representations have always been an intricate mixture of science and art, and a hybrid of medical instruction and popular entertainment. During the Mannheim exhibition, the ethical debate centered primarily on the question whether plastination should be looked upon as *either* science *or* art, *either* instruction *or* entertainment. What makes Von Hagens's anatomical art controversial, though, is not that it cannot be classified in clearly defined boxes, but that it defies the very categories on which ethical judgments are grounded.

The Historical Tradition of Anatomical Bodies and Models

Throughout the history of anatomical practice, anatomists have tried to reconcile the contradictory requirements of authenticity and didactical value in the teaching of medical knowledge.[2] On the one hand, the anatomical body should consist of real flesh, so that cutting into a cadaver teaches future doctors the organic complexity of a living human body. Yet working with dead bodies also has a distinct drawback: it is difficult to demonstrate certain aspects of physiology, such as blood circulation or the complex web of muscular tissue. For students to conceptualize anatomical structures, a human cadaver should also be pliable in order to single out particular as-

2. For a general introduction to the history of anatomy and anatomical models, see Roy Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present* (London: Harper Collins, 1997).

pects. Body *models*, shaped and sculpted to show distinct parts or features, have been produced since the early Renaissance, to serve as teaching aids in medical schools. Models have the advantage that certain physiological features can be disproportionately accentuated in order to convey particular anatomical insights. An obvious drawback of body models is that they do not give students a feel for organic texture. From the time of Vesalius to the days of Von Hagens, we see anatomists struggling to combine a preference for authentic bodies with the educational advantages of body models.[3]

During the early Renaissance, watching an anatomist perform a dissection was the only way for future doctors and artists to get a sense of the body's insides. When the Belgian anatomist Andreas Vesalius in Bologna, and his colleagues Jacobus Sylvius in Paris and later Nicolaas Tulp in Amsterdam, performed public dissections, neither students nor onlookers were allowed to touch any body parts.[4] Dead bodies were prone to quick decay, so dissection had to be executed swiftly and expertly. Vesalius (1514–1564), while demonstrating the intricacies of a corpse, opened up our gaze, as Jonathan Sawday aptly puts it, to the depths of physiological reality.[5] The naked realism of dead bodies on the dissection table, combined with the public knowledge of their criminal pasts, provided a mesmerizing spectacle for a large audience who paid a substantial fee to attend these anatomy lessons.[6] However, the educational value of these messy performances was minimal to anyone except, perhaps, the anatomist.

The necessity to preserve corpses beyond several days, as well as anatomists' desire to demonstrate particular physiological features, stimulated the invention of better conservation methods. Between

3. Christina Lammer, in *Die Puppe: Eine Anatomie des Blicks* (Vienna: Turia, 1999), provides an insightful philosophical analysis of the use of body models, or "puppets," as she calls the various anatomical objects produced between the early sixteenth and late twentieth centuries.

4. Andrea Carlino, in *Books of the Body: Anatomical Ritual and Renaissance Learning* (Chicago: University of Chicago Press, 1999), describes in detail the rituals of dissection in sixteenth-century Italy; see esp. chap. 2, "Practices: Norms and Behaviors at the Public Anatomy Lesson in the *Studium Urbis*." For an interesting introduction to the differences among European schools of public anatomy, see A. M. Lassek, *Human Dissection: Its Drama and Struggle* (Springfield, Ill.: Thomson, 1958), esp. chap. 8, "Anatomy during the European Renaissance."

5. Jonathan Sawday, *The Body Emblazoned: Dissection and the Human Body in Renaissance Culture* (London: Routledge, 1995), p. 70.

6. See Ruth Richardson, *Death, Dissection and the Destitute* (London: Routledge, 1987), esp. chap. 2, "The Corpse as an Anatomical Object."

the early twelfth and sixteenth centuries, various techniques for embalming or preserving corpses had been experimented with.[7] The Dutch anatomist Frederick Ruysch (1658–1731), successor to the illustrious Tulp, developed unprecedented standards for the preservation and display of bodies. He injected the veins with a mixture of talc, tallow, cinnabar, oil of lavender, and colored pigments, the precise recipe of which he kept secret; as a result, the body would last much longer, sometimes up to a full year, and dissection was less messy due to the replacement of blood by preservative. Yet Ruysch's technique did more than ameliorate the material preconditions for dissection: it allowed for a new kind of anatomical artifact—a work of art, rather than a scientific work object. As Julie V. Hansen observes, Ruysch created "a new aesthetic of anatomy that melded the acts of demonstration and display with the stylistic and emblematic meanings of Vanitas art."[8] Besides performing public dissections, Ruysch built up a collection of body parts such as hands, limbs, or heads, carefully conserving each one in a separate glass jar. To enliven his objects and disguise the brutality of death and dismemberment, he embellished the compartmentalized cadavers with flowers or garments. His favorite displays were little bodies of fetuses or stillborn babies, which he clothed with scarves and embroidered baby-hats, replacing their eyes with glass to make them look like innocent infants. Even though Ruysch was one of the most respected Dutch anatomists in the seventeenth century, he is consistently referred to as an artist who elevated anatomical bodies to the status of sculpture and painting. As Hansen argues: "Under Ruysch's hand, the body was not dead, it was nature revealed, admired as the handiwork of God, the invisible made visible."[9]

Ludmilla Jordanova, in a similar vein, emphasizes that conflicting requirements of authenticity and didactic value emerge repeatedly

7. Katherine Park, in "The Criminal and the Saintly Body: Autopsy and Dissection in Renaissance Italy," *Renaissance Quarterly* 1 (1994): 1–33, argues that opening the body and later embalming or preserving it, either in its entirety or in parts, was a common funerary practice as early as the twelfth century. In Italy, the corpses of candidates for sainthood were dissected to examine them for miraculous marks, and they were subsequently eviscerated. Between the twelfth and the early sixteenth centuries, various primitive techniques were used to preserve corpses, from simply boiling and drying the anatomical object to tanning it, or soaking it in honey or wine. Anatomists like Ambroise Paré (1510–1590) experimented with the usefulness of alcohol in embalming. See, for instance, F. Gonzalez-Crussi, *Suspended Animation: Six Essays on the Preservation of Bodily Parts* (San Diego: Harcourt Brace, 1995), pp. 43–67.

8. Julie V. Hansen, "Resurrecting Death: Anatomical Art in the Cabinet of Dr. Frederick Ruysch," in *Art Bulletin* 78:4 (1996): 663–679, p. 671.

9. Ibid., p. 676.

throughout the history of anatomical artifacts.[10] After the Renaissance, medical education increasingly called for hands-on practice with anatomical bodies. Increased demand and tougher laws regarding obtaining cadavers forced anatomists to look for body substitutes.[11] Even as practical solutions to the shortage of real cadavers led to the creation of "fake bodies" in the seventeenth and eighteenth centuries, these models were equally subjected to the norms of accuracy, durability, and technical flexibility. The development of wax models catered to these educational needs, and had some advantages over real bodies.[12] Beeswax had the unique quality of resembling organic texture, while it was also fully pliable. Parts of the wax model could be taken out to allow the student to look into the organic complexity, or to manipulate individual parts and organs. In the second half of the eighteenth century, Bolognese sculptors like Lelli and Morandi and Florentine masters like Caldani, Fontana, and Piranesi lifted the craft of wax modeling up to the status of art; they began to be commissioned by a royal Maecenas, and their models were bought up by private collectors.[13] From clinical-instructional settings, the wax models moved to private collections and later to museums, where they can still be admired.[14] After wax, several other materials were used for the production of models.[15]

10. Ludmilla Jordanova, "Medicine and Genres of Display," in *Visual Display: Culture beyond Appearances,* ed. Lynne Cooke and Peter Wollen (Seattle: Bay Press, 1995), pp. 202–217.

11. See Richardson, *Death, Dissection, and the Destitute* (above, n. 6), chap. 2.

12. For instance, wax models are preferable to real bodies when it comes to showing diseases of the skin and specific dermatological pathologies. See Thomas Schnalke, *Diseases in Wax: The History of Medical Moulage* (London: Quintessence, 1995).

13. For a description of the Italian school of wax modeling in the seventeenth and eighteenth centuries, see Barbara Stafford, *Body Criticism: Imaging the Unseen in Enlightenment Art and Medicine* (Cambridge, Mass.: MIT Press, 1993), chap. 1 "Dissecting," pp. 62–66. A short overview of the Bolognese collections can be found in Karen Newman, *Fetal Positions: Individualism, Science, Visuality* (Stanford: Stanford University Press, 1996).

14. A large collection of wax models, primarily produced by Clemente Sussini and Paolo Mascagni, is still exhibited in the museum La Specola in Florence; for further reading on the history of these models, see Rumy Hilloowala et al., *The Anatomical Waxes of La Specola* (Florence: Arnaud, 1995). The Pathologisches-Anatomisches Museum Josephineum in Vienna also harbors quite a few samples. For a history of exhibited wax models, see Gabriela Schmidt, "Sammlung anatomischer und geburtshilflicher Wachsmodelle," in *Catalogue Institut für Geschichte der Medizin der Universität Wien*, 1999, pp. 37–40.

15. Wax models, in spite of their beauty and accuracy, had one important drawback: they were very vulnerable. For that very reason, Doctor Louis Thomas Auzoux

The invention of new chemical techniques, particularly the application of formaldehyde in the nineteenth century, allowed anatomists to extend the preservation of cadavers, and enabled students to participate in actual dissections. Dissections were no longer public events, as they had been in the Renaissance, but took place behind the closed doors of the hospital laboratory. Through various modes of public display—most notably, formaldehyde-drenched body parts in glass bottles—we can further trace the typical hybrid requirements of authenticity and pedagogical value. In contrast to the embellished body parts from, for instance, Ruysch's collection, nineteenth-century exhibitions of organs in glass jars show a preference for unadorned, straightforward anatomical parts. Reproductive organs affected by sexually transmitted diseases, or livers degenerated by alcoholism, clearly served a double pedagogical mission: the specimens obviously instructed doctors about the regularities and irregularities of human anatomy, yet their broader aim was to teach ordinary men and women the laws of moral behavior.[16] The primary appeal of such anatomical collections was their focus on the aberrant, especially the monstrous aspect of pathological cases, such as embryos with spina bifida and fetuses with hydrocephalus. Although pathological creatures and "monsters" as objects of spectacle date back at least as far as the European fairs and curiosity cabinets of the Middle Ages, their display in anatomical exhibitions rendered them part of an authoritative medical culture.[17] Monstrosities and deformed fetuses preserved in formaldehyde commanded respect, not only for the relentless power of nature (and, in its wake, the arm of God), but also for medical science, which was capable of dethroning this power. A mixture of authenticity and educational value, of titillation and moralism, characterizes the nineteenth-century specimens still to be found in anatomical museums today.

In the early twentieth century, we may notice a transition from individual organs to erect, full-fledged body models, and from parts

(1797–1880) experimented with papier-mâché and gradually developed body models that were both accurate and "touch-resistant." His models became popular in teaching hospitals, schools, academies of art, and veterinary schools.

16. See B. Sliggers and A. Wertheim, eds., *De Tentoongestelde Mens: Reuzen, dwergen en andere wonderen der natuur* (Zutphen: Walburg Pers, 1993).

17. Lorraine Daston and Katharine Park, in their *Wonders and the Order of Nature, 1150–1750* (New York: Zone Press, 1998), describe the long and diverse tradition of the "wonders of nature" and the "wonders of art," from the medieval tradition to the cabinets of curiosity or Kunst- and Wunderkammer in the Renaissance. They illustrate how, within this tradition, astonishment and horror, the sublime and terror often coincided in the collections on display. See esp. chap. 7, "Wonders of Art, Wonders of Nature," pp. 255–301.

in glass bottles to specimens treated with translucent chemicals, such as plastic. One of the most popular anatomical displays in Germany was a model called the "Transparent Man." First exhibited in 1911 at the Hygienic Exhibition in Dresden, it traveled to world exhibitions in Paris, Chicago, New York, and Berlin before ending up in the German Hygiene Museum.[18] The Transparent Man—soon accompanied by a female counterpart—consisted of a real human skeleton stuffed with fake inner organs harvested from various wax models and protected by a thin layer of celluloid.[19] Most remarkable about the model is not just its erect figure, but its pose: arms outstretched, palms open, gaze directed upward, the Transparent Man conveys to the viewer an image of the divine superhuman, looking up only to God. In 1926, the museum's curator Franz Tschakert applied a layer of cellon—an early form of plastic—to the body's surface, which gave it a translucent shine. Significantly, the Transparent Man became a symbol for the eugenics movement in the 1930s, when it was shipped to the United States as part of an exhibition called "Eugenics in the New Germany."[20] The vitreous figure seemed designed to overcome corporeality, with its association of uncleanliness. After World War II, replicas of the Transparent Couple surfaced in Moscow, a birthday gift of the East German government to Stalin; here, the models were claimed to signify the victory of science over the imperfection of individuality—the body represented as a well-ordered mechanism perfectly manageable by medicine. In retrospect, the Transparent Man is less an anatomical object intended to popularize anatomical knowledge than an interesting token of German's history, tainted by National Socialist ideology and later by Stalin's communism.

The European tradition in anatomical modeling is pivotal to understanding the popularity of *Bodyworlds* as well as the controversy

18. For a detailed history of the Transparent Man, see Klaus Vogel, "The Transparent Man: Some Comments on the History of a Symbol," in *Manifesting Medicine: Bodies and Machines,* ed. Robert Bud, Bernard Finn, and Helmut Trischler (Amsterdam: Harwood Academic Publishers, 1999), pp. 31–62. The German Hygiene Museum is located in Dresden.

19. Although initially there were only the original Transparent Man and Woman, in the 1920s and 1930s a few replicas were produced and exported widely. Between 1945 and 1997, 114 statues were manufactured—their material quality optimized by the latest discoveries in plastic materials—and distributed all over the world. See Vogel, "Transparent Man" (above, n. 18), p. 54.

20. The exhibition "Eugenics in the New Germany," featuring the Transparent Man as one of its main attractions, was held in 1934–1935, and traveled from Portland to Los Angeles to Buffalo and New York. It was promoted and supported by the American Eugenics Society.

surrounding the exhibition. The technique of plastination is supposed to be both a continuation and an enhancement of the centuries-old tradition. Gunther Von Hagens's assertion that "the plastinates are only complete if their authentic representation agrees with their educational function" betrays the same tension between authenticity and the desire to instruct that has defined the manufacture of anatomical bodies and models from the early sixteenth century on.[21] Plastination, according to its inventor, manages to combine the qualities of real bodies with the advantages of body models; in his view, authenticity and didactical value—organic materiality and pedagogical plasticity—are not mutually exclusive features of an anatomical object. His plastination technique is based on a special chemical treatment that renders cadavers pliable while also preventing them from decaying, and keeps the "original" body intact while still accentuating specific physiological details. By carving out the relevant parts and discarding the surrounding tissue, Von Hagens highlights specific features of the body, such as muscles, bones, respiratory functions, or heart functions. For instance, *Bodyworlds* displayed plastinated sculptures that consist only of bone structure, alongside so-called muscle men—corpses that feature only muscle tissue. In other words, the plastination technique purportedly allows for preservation of the organic material, while the corpse simultaneously functions as a body model.

Put briefly, the plastination technique works as follows: The corpse is first immersed in formaldehyde, so as to stop its decay. Next, the cadaver may be prepared in either of two ways. It can be used for *Scheibeplastinate,* which means that the body is cut into slices sometimes less than a millimeter thick. These slices are covered first with a thin layer of plastic, and subsequently pressed between glass plates. More impressive, however, is the second category of plastinates, the *Ganzkörperplastinate*. In the production of these anatomical objects the whole body is left intact, except that certain parts are removed, as a result of which others become visible or pronounced. After being dipped in formaldehyde, the body is submerged in a warm basin to get rid of the remaining body fat, and fluids are then replaced by acetone. The final phase of the chemical process consists of impregnation under pressure: in a warm basin the acetone is replaced by synthetic resin.[22] The *Ganzkörper* are subse-

21. Catalogue, *Körperwelten* (above, n. 1), pp. 195–207, p. 21.

22. In the United States, Dr. Roy Glover, professor of anatomy at the University of Michigan, in collaboration with Dow Corning, has slightly modified Von Hagens's plastination technique, which he applies to the preparation of complete bodies as well

quently put into the desired position. A final treatment with gas or hot air determines the ultimate fixed form—a form that, according to Von Hagens, allows the corpse to be preserved for at least two thousand years.

As opposed to the artificiality of wax or plastic anatomical models —including the Transparent Man, which is a combination of both— the "realness" of the plastinated object is advertised as an important asset. Von Hagens stresses the relevance of the authenticity of the plastinates, thus putting them on a higher plane than body models, which are, after all, *imitations* of bodies. Texts accompanying the *Ganzkörper* at the exhibition in Mannheim stated explicitly that the bodies were not compilations of various cadavers or partial imitations, but that they were "real" and "intact." But what is "real"? The objects are manipulated with chemicals to such an extent that they can hardly be regarded as "real" bodies. Just as in the case of living bodies that have been altered by plastic surgery or anabolic steroids, it is almost impossible to use the term "authentic" in this branch of anatomy. By constantly foregrounding the realness of his cadavers, Von Hagens downplays the role of chemical modification—yet it is precisely this technique that he has patented. The novelty of this method is not the selection of chemicals used in preparing the bodies, but rather the way in which they are applied. The plastinated cadaver is thus as much an organic artifact as it is the result of technological tooling. Like the engineers of genetically modified corn and wheat, who insist that these are "natural" products, Von Hagens understates the process of chemical manipulation. The plastinated sculptures, however, are as much "imitations" of bodies as are body models, and they sometimes look less "real" (more like plastic) than eighteenth-century wax figures.

The educational or moral function that dominated nineteenth-century anatomical collections returns explicitly in the plastinated organs or body parts. Visitors to *Bodyworlds* seemed particularly eager to look at the displays of physical defects, both congenital ones and those caused by disease after birth. Tumors of the liver, ulcers, enlargements of the spleen, and specimens of arteriosclerosis show the ruthless destruction of the human body. Plastinates of pathological embryonic growth, such as a fetus without brains and one with hydrocephalus, illustrate what may go wrong during the human re-

as body parts. The body's liquid is replaced with a silicone polymer that contains a catalyst, after which the body hardens within twenty-four hours. According to the *New York Times*, Glover plastinates bodies only for educational purposes, and some of his cadavers will soon be on display in a traveling anatomical museum (*New York Times*, March 7, 2000, sec. F, p. 7).

production process. Unlike the bottled specimens preserved in formaldehyde from the nineteenth century, the exhibition's catalogue explains, the absence of glass jars and fluids allows a more "authentic" or "unmediated" look at physiological reality. In Von Hagens's plastinates, too, a claimed unmediated realism goes hand in hand with outright moralism. Visitors were confronted with unambiguous messages about various types of self-induced physical degeneration. Plastinates of tar-covered black lungs were displayed alongside white, perfectly healthy ones; similarly, a healthy liver and one affected by excessive alcohol consumption were shown side by side. In this way, *Bodyworlds* should be understood as a direct continuation of the realist-moralist tradition in the art of anatomy.

At the same time, the Mannheim exhibition provided a metacommentary on the twentieth-century "nature" of the flesh. Whereas in nineteenth-century displays, natural bodies were shown to be prone to degeneration, either through God's hand or through immoral behavior, the plastinated cadavers celebrate the power of humankind to interfere with life and death. Von Hagens seems to move away from the idea that the body is just an organic object, which people can influence negatively by, for instance, smoking or drinking. In the course of medical history, there have been an increasing number of inventions aimed at countering—if only temporarily—physical deterioration. One of the plastinates explicitly comments on the influence of technology in medicine: the "Orthopedical Plastinate" is covered from top to bottom with all kinds of internal and external prostheses, ranging from a metal knee and external fixtures for broken bones to a pacemaker and a replacement for a fractured jawbone. This remarkable plastinate not only demonstrates technological progress in medical science, but also entails a statement about the contemporary living body: human beings have become hybrid constructs, amalgams of organic and technological parts—cyborgs, in Donna Haraway's definition.[23] The natural body is no longer a given, as both longevity and quality of life can be manipulated.[24] Technological and chemical aids are promoted as "natural" extensions of the living human body, just as the process of plastination prolongs the durability of the dead body.

The history of material production teaches us that the anatomical body has always been regarded as a hybrid object, one of art as well as science, whereby concerns for authenticity and instruction tended to compete with each other. In some periods, the authenticity standard prevailed; at other times, the instruction criterion was fore-

23. See Donna Haraway, *Simians, Cyborgs, and Women: The Reinvention of Nature* (New York: Routledge, 1991).

grounded. In introducing the method of plastination, Von Hagens claims to have moved beyond the body-or-model dilemma, because his cadavers are both real and modifiable. He has repeatedly stressed the authenticity of his anatomical creations, yet their modified nature is the very reason why his plastinated corpses can be patented. Although in many ways his work is a continuation of age-old traditions in the material production of anatomical objects, he also adds a commentary on the "nature" of the human body: humans are no longer subjected to divine nature, as science and scientists to a large extent control longevity and quality of life. By the same token, we can witness a similar mixture of continued tradition and postmodern commentary in *Bodyworlds'* recasting of artistic conventions.

Anatomical Bodies as Artistic Representations

In one of his famous essays, art historian Erwin Panofsky suggests that the rise of anatomy during the sixteenth and seventeenth centuries cannot be understood in isolation from the renaissance in art; the history of anatomy is deeply embedded in art history.[25] He even argues that in order to determine the scientific value of anatomical art, it should be evaluated from the perspective of the art historian. During the sixteenth century, the accumulated knowledge of the body was represented visually in drawings and engravings produced by anatomists and their craftsmen. Anatomical atlases are still admired for their clear depiction of contemporary anatomical insights, but even more so for their artistic qualities mirroring the conventions of early Renaissance art.[26] The drawings in Vesalius's *De humani corporis fabrica* (1543), for instance, are reminiscent of ancient Greek

24. For various interesting angles on this issue, see, for instance, the collection of essays edited by George Robertson et al., *Future Natural: Nature, Science, Culture* (London: Routledge, 1996). See also Nelly Oudshoorn, *Beyond the Natural Body: An Archeology of Sex Hormones* (London: Routledge, 1994).

25. Erwin Panofsky, "Artist, Scientist, Genius: Notes on the 'Renaissance-Dämmerung,'" in *The Renaissance: Six Essays,* ed. Wallace K. Ferguson (New York: The Academy Library, 1953), pp. 123–182. Glenn Harcourt, "Andreas Vesalius and the Anatomy of Antique Sculpture," *Representations* 17 (Winter 1987): 28–61, provides a clear interpretation of Panofsky's views in relation to anatomical aesthetic conventions.

26. A hierarchical tension typically affected working relationships between anatomists and artists, who commonly teamed up to wed scientific precision with artistic refinement in the production of anatomical atlases. These professional marriages of opposite disciplinary bedfellows did not always go smoothly. It is a well-known fact, for instance, that the Dutch anatomist Albinus and his artist-assistant Jan Wandelaar were engaged in constant fights over the scientific accuracy of Wandelaar's illustrations, as Albinus attempted to police his assistant's artistic judgment: see Catalogue Museum Boerhaave, *De Volmaakte Mens: De Anatomische Atlas van Albinus en Wandelaar* (Leiden: Boerhaave Museum, 1991).

sculpture with its strong bundles of muscles and round, broad-shouldered torsos.[27] A characteristic aspect of Vesalius's engravings is that the dissected organs are surrounded by a healthy, living body, distracting from the rather repellent look of death; the scientific reality of the image is embellished, aestheticized, so as to make it more pleasing to the eye. Vesalius's skeletons and so-called muscle men are also imprinted with the principles of sculptural tradition; although they refer to dead bodies, they pose as upright, living figures.[28] Classical conventions of Renaissance sculpture and painting determined the formative elements of his anatomical representations.[29]

Panofsky's view that artistic techniques of representation dominate and shape scientific insights is corroborated by Ludmilla Jordanova, who, in a close analysis of eighteenth-century wax models, shows how neoclassical ideas determined the representation of scientific insights in this genre of anatomical objects.[30] These anatomical models provide perfect specimens of bodies that are partially opened up, thus showing, for instance, the stomach, the intestines, or the reproductive system. Just as in the case of Vesalius's drawings, these models appear extremely vivid and their physical beauty tends to divert attention from the opened-up intestines. Most of the female bodies, for example, are shown in classic Venus-poses; while their main purpose is to display the reproductive functions of the female body, the wax models express images of the seductive goddess of love. Consequently, the aesthetic norms of external appearance outshine the realist representation of the intestines.

Lorraine Daston and Peter Galison, focusing on nineteenth-century medical representations of the body, reframe Panofsky's argument in terms of a continuous struggle between scientific objectivity and artistic subjectivity; they historicize the concept of objectivity explained by what they term "mechanical" or "noninterventionist" objectivity.[31]

27. See Harcourt, "Andreas Vesalius" (above, n. 25), esp. pp. 33–36.

28. On the symbolic and functional properties of body parts, particularly the hand, see Katherine Rowe, "God's Handy Worke," in *The Body in Parts: Fantasies of Corporeality in Early Modern Europe*, ed. David Hillman and Carla Mazzio (London: Routledge, 1997), pp. 285–312.

29. For a number of historical perspectives on the relationship between anatomical representations and artistic conventions, see various essays in Kathleen Adler and Marcia Pointon, eds., *The Body Imaged: The Human Form and Visual Culture since the Renaissance* (Cambridge: Cambridge University Press, 1993).

30. Ludmilla Jordanova, *Sexual Visions: Images of Gender in Science and Medicine between the Eighteenth and Twentieth Centuries* (Madison: University of Wisconsin Press, 1989).

31. Lorraine Daston and Peter Galison, "The Image of Objectivity," *Representations* 40 (1992): 81–128.

With the arrival of new representational technologies in the nineteenth century, scientists hoped to eliminate artistic contamination. Mechanically mediated representations were thought to be conceptually distinct from earlier attempts to produce "true to nature" depictions of the interior body. New instruments, such as photography and (later) X rays, purportedly ruled out the subjectivity of the artist, replacing it by truthful, objective imprints.[32] Yet the introduction of mechanical inscription, as Daston and Galison convincingly show, "neither created nor terminated the debate over how to depict."[33] The substitution of the engraver by photomechanical instruments, they argue, did not eradicate interpretation; the photographer's very presence meant that images were mediated. New apparatuses mitigated the dream of perfect transparency while promoting a new image of objectivity—objectivity through mechanical reproduction.[34]

The anatomical artifacts that Gunther Von Hagens produces reflect the historical friction between scientific accuracy and artistic or aesthetic embellishment, which he does not perceive as conflicting requirements. Each of his plastinates features a specific physiological feature—such as the musculoskeletal, digestive, or cardiovascular-respiratory system—carved out with tantalizing precision; but what attract most attention are the artistic poses in which they are sculpted. As with the drawings in Renaissance anatomical atlases, we are diverted from the abhorrence of death and the cruelty of dissection by the vivid appearance of each *Ganzkörper*. In line with the

32. Erin O'Connor explores the tension between mechanical objectivity and artistic subjectivity in relation to medical photography in the mid-nineteenth century. The author concludes: "For once we understand the time-honored distinction between scientific photography's documentary operations and art photography's aesthetic pretensions as a rationalizing fiction rather than as a statement of fact" (Erin O'Connor, "Camera Medica: Towards a Morbid History of Photography," *History of Photography* 23:3 [1999]: 232–244, p. 243). Barron H. Lerner has extensively discussed the problem of "mechanical objectivity" in relation to X rays in the nineteenth and early twentieth centuries, in "The Perils of X-Ray Vision: How Radiographic Images Have Historically Influenced Perception," *Perspectives in Biology and Medicine* 35:3 (1992): 382–397.

33. Daston and Galison, "Image of Objectivity" (above, n. 31), p. 98.

34. In her wonderful analysis and description of the collaboration between Joel-Peter Witkin (photographer) and Dr. Stanley Burns (ophthalmologist and collector of historical medical photographs), Rachelle A. Derner touches upon the assumption that the body is a "a display of readable pathology, and that the photograph is the objective recorder," forcing viewers to interpret the body pathologically "as if they were interpreting that body and not the photograph"; like Von Hagens's plastinated sculptures, Witkin and Burns collaboratively produced cultural objects that combine the authority of photography and medicine to authenticate the human body as an object of meaning. See Rachelle A. Derner, "Joel-Peter Witkin and Dr Stanley B. Burns: A Language of Body Parts," *History of Photography* 23:3 (1999): 245–253, quotation on p. 246.

artistic tradition in anatomical drawings, Von Hagens's plastinates are at least as determined by artistic conventions as by scientific insights. A plastinate called *The Chess-Player*, aimed at showing the structure and functions of the nervous system, stylistically resembles Auguste Rodin's bronze *The Thinker*. Another plastinated body, entitled *The Runner*, seeks to demonstrate the workings of human kinetics; it has fluttering bits of skin and tissue attached to its limbs, to suggest the dynamics of a running man. The sculpture triggers associations with futurist art in which movement and speed were represented in new ways (Fig. 2).

Despite the seemingly conflicting character of "true-to-nature" representation and artistic intervention, in *Bodyworlds* both views are explicitly conflated in single bodies. Von Hagens's anatomical bodies, like those of his historical predecessors, incorporate contemporary artistic styles and conventions—in his case, of postmodernism. Although the full-body sculptures look like direct imitations of Renaissance anatomical art, the plastinates are always modifications of earlier artistic styles, rather than straight imitations. This is particlarly illustrated by the "expanded bodies"—drawn-out plastinates that spatially expose inner organs. One such expanded plastinate is stretched lengthwise, as a result of which the body looks like a sculpted totem pole, or like the inside of a Giacometti bronze. Another plastinate is expanded in four directions, and in the three-dimensional space that is thus created, the individual parts of the body are suspended with invisible threads. A third is stretched horizontally from the diaphragm, consequently revealing the intestines. Obviously, expanded bodies are no true-to-nature representations of the body; instead, they have been spatially reconfigured into giant three-dimensional models.

If this exhibition of plastinated bodies were simply a contemporary continuation of an age-old tradition in anatomical art to relate scientific soundness with artistic aesthetics, there would have been no public outcry. But there is an important caveat to this alignment of traditional and postmodern anatomical art: Von Hagens's sculptures are not *representations* of bodies, like Vesalius's drawings in his *Fabrica*, or Govard Bidloo's copper engravings of the interior body in *Anatomia humani corporis* (1685).[35] Rather, the plastinates presented at *Bodyworlds* are *imitations of representations*, executed in modified or-

35. For an informative overview with beautiful illustrations of the history of anatomical illustration, see K. B. Roberts and J. D. W. Tomlinson, *The Fabric of the Body: European Traditions of Anatomical Illustration* (Oxford: Clarendon Press, 1992); K. B. Roberts, *Maps of the Body: Anatomical Illustration through Five Centuries* (St. John's, Newfoundland: Memorial University of Newfoundland Press, 1981).

Figure 2. Ganzkörper-Plastinat des Bewegungsapparates (Läufer) [Whole-Body Specimen of the Locomotive System (The Runner)]. From *Körperwelten: Die Faszination des Echten* (Heidelberg: Institut für Plastination, 2000), fig. 9.44, p. 163. (Courtesy of the Institut für Plastination, Heidelberg.)

ganic material. The most prolific example illustrating this practice is Von Hagens's copy of Vesalius's muscle man: an explicit imitation of a man who carries his own skin in his hand, posing as if he has just taken off his coat. A life-size reproduction of Vesalius's muscle man was depicted on the wall behind the "look-alike" plastinated model at the Mannheim exhibition. Because the "real" body plastinate imitates a piece of art—Vesalius's drawing—object and representation seem to fuse in the sculpted body. This plastinate, at first sight, seems a "reanimation" of a representation, a wink to Renaissance artistic

anatomical tradition. Postmodern literature and art, of course, are full of such gestures—playful imitations of existing styles also known as pastiche.[36] But the alignment smoothes over an urgent question at stake here: can life—or, rather, death—imitate art? The "copy" of Vesalius's muscle man is created from an "authentic" body, which can no longer be labeled "authentic" because of its chemical modification. In our "culture of the copy," observes Hillel Schwarz, authentic and fake seem interchangeable, and their distinction is therefore obsolete.[37] Indeed, the audience may have taken umbrage at the fusion of artistic representation and organic materiality in the exhibited plastinates, yet Von Hagens's actual reversal of art-representing-body into body-representing-art is at least as disturbing.

Besides his preference for "reanimated" anatomical representations, Von Hagens also plays with the belief in mechanical objectivity. Visitors to *Bodyworlds* were treated to "transparent" cross-sectioned of the body, illustrated by the *Scheibeplastinate* or plastinated body slices. Exhibited body slices are not particularly new or shocking; cross-sectioned bodies have been showcased in anatomical museums for quite some time.[38] Yet, if we are to believe the German anatomist-artist, his *Scheibeplastinate* offer "an unmediated look into the depths of the body" due to the combined techniques of cryogenic cutting and plastination. A cryogenic saw cuts up the deeply frozen body into thin slices; pieces can be cut either horizontally (coronally) or lengthwise (sagittally). The slices look like two-dimensional representations, yet Von Hagens fashions them into such a position that they ostensibly regain three-dimensionality. One of the sliced plastinates, titled *The Transparent Body*, consists of eighty-three slices some four inches apart from each other, thus

36. The eclectic combination of artistic and anatomical modes of representation indicates that there is an ongoing dialogue between various stylistic traditions and techniques of preservation across the centuries. The art of plastination both legitimizes and parodies such styles and traditions; this constant alternation between imitation and parody is typical of a postmodern sensibility. For an introduction to the use of historical styles, pastiche, and parody in postmodernist art and literature, see Linda Hutcheon, *The Politics of Postmodernism* (London: Routledge, 1989).

37. Hillel Schwarz, in *The Culture of Copy: Striking Likeness, Unreasonable Facsimiles* (New York: Zone Books, 1996), addresses the dilemmas of authenticity, duplicity, and originality in a rather eclectic way, encompassing everything from Xerox machines to self-portraits and Siamese twins. A basic assumption in this book is that the original sin is no less original in its numerous reenactments. Although Schwarz convincingly shows that the "culture of the copy" is nowhere near an exclusive feature of the postmodern era, the ethicality of the authenticity issue resurfaces most powerfully in the context of postmodern genres.

38. See Gonzalez-Crussi, *Suspended Animation* (above, n. 7), chap. 2.

forming a reclining body almost three yards long.[39] The plastinated slices seem to provide direct access to the smallest details of the inner body—complex structures that cannot commonly be perceived by the naked eye. According to Von Hagens, the slices offer the possibility of an entirely unmediated look inside the real body, because "in today's media world in which people are increasingly informed indirectly, the need for unmediated, unadulterated originality is on the rise."[40] Just as the pioneers of photography hailed it as a mode of writing with light beams, so Von Hagens hails his technology as enabling direct inscription, eradicating all mediation between object and representation. The combined technologies of the cryogenic saw and plastination purportedly render all "subjective intervention"—inherent to representation—obsolete.

Once again, Von Hagens's techniques are not merely a prolongation of age-old representational modes. Mechanical mediation—in this case, the application of the cryogenic saw, various chemical solutions, color additives, and a plastic coating—inevitably transforms the appearance of the body. Like his nineteenth-century predecessors, the German anatomist assumes the superiority of mechanical objectivity, thus perpetuating the myth of "a scientific transparent truth"—a pure representation of the human body without the contamination of human intervention. But besides enhancing this myth, he implicitly reverses the roles of anatomical object and representation. As was the case with his imitation of Vesalius's muscle man (a reanimation of a representation), in his *Scheibeplastinate* he "copies" in actual flesh the most common medical-visual representation of a late-twentieth-century body: the MRI or CT scan.

The universal implementation of MRI and CT scans in medical practice has made the millimeter body slices become a common mode of representation. The introduction of magnetic resonance imaging (MRI) and computertomography (CT) in the 1980s allowed doctors to look "through" the body three-dimensionally; magnetic fields and X rays helped generate representations of cross-sections of the body, thus visualizing organic tissue and even the inside of bone material. Images resulting from MRI or CT scans—sometimes cross-sections less than a millimeter thick—actually look like slices of

39. Whether Von Hagen's *Transparent Body* may be seen as a variation of the "Transparent Man" from the German Hygiene Museum, I cannot say. For one thing, he does not imitate the Transparent Man's striking upward pose; however, the title and the technique of plastic-covered slices are certainly reminiscent of the famous early twentieth-century body model.

40. Catalogue, *Körperwelten* (above, n. 1), p. 214.

body parts, but of course they are "photographed" representations.[41] These fairly recent visual technologies have familiarized the public with inferred relationships between the fragmentary, two-dimensional slices and a three-dimensional human body, even if their proper medical interpretation depends on complex insight and visual expertise on the part of the observer.[42] Von Hagens, in turn, restyles two-dimensional representations into three-dimensional organic sculptures. Since most viewers accept the implied relationship between slices and real bodies, the claimed unmediated naturalness of plastinated body slices seems merely an extension of the MRI-induced gaze. In other words, it is precisely the familiarity of this look that distracts from the act of violence involved in cutting the body into slices, and that makes us forget that these objects are "fleshed-out" scans.

As my argument suggests, it is difficult to properly evaluate this sample of contemporary anatomical art without the perspective of art history. Like Vesalius, whose anatomical illustrations were partially based on the conventions of ancient Greek sculpture, Von Hagens looked to artistic conventions for inspiration. However, the

41. For an introduction to the history of the MRI and the CT scan, particularly the development of these two visualizing techniques, see Bettyann Holtzmann Kevles, *Naked to the Bone: Medical Imaging in the Twentieth Century* (New Brunswick, N.J.: Rutgers University Press, 1997), chaps. 7 and 8. MRI and CT scans are also used in the virtual reconstruction of a "real" cadaver; on the Visible Human Project, see Lisa Cartwright, "A Cultural Anatomy of the Visible Human Project," in *The Visible Woman: Imaging Technologies, Gender, and Science,* ed. Paula Treichler, Lisa Cartwright, and Constance Penley (New York: New York University Press, 1998), pp. 21–43. The Visible Human Project, just like Von Hagens's plastinates, has distinct roots in the history of anatomy and dissection; for a cultural-historical analysis, see José van Dijck, "Digital Cadavers: The Visible Human Project as Anatomical Theater," *Studies in the History and Philosophy of the Biological and Biomedical Sciences* 31:2 (2000): 271–285.

42. The plastinated sculptures challenge existing visual conventions as well as the act of observation. In his landmark study, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century* (Cambridge, Mass.: MIT Press, 1990), Jonathan Crary introduced the term *modernizing vision* to refer to the interdependence of new modes of looking (a flexible, physiologized gaze), instruments of visualization (camera obscura, and later the movie camera), and social and cultural developments in the mid-nineteenth century (mobility). Perhaps it is defensible to extend Crary's theory to the twentieth century, and regard MRI and CT techniques as technological tokens for "postmodernizing vision." This technological innovation not only enabled the observer to adopt an infinite variety of vantage points, but also prompted her to switch between different visual registers, both two- and three-dimensional. The emergence of this new way of looking cannot be isolated from a society in which the gaze has become dephysiologized—meaning that digital reconstructions of realities allow the viewer to take multiple angles and positions that they can physiologically never adopt.

plastinated sculptures also call for some knowledge of representation theory in order to comprehend their various signifying layers. I would argue that Von Hagens does not deploy a "true-to-nature technique" but fashions his artifacts into a "true-to-technique nature." What is remarkable about his practice is not that he reverses the order between anatomical object and representation, but that he renders the very distinction between these categories questionable. We are urged to consider Vesalius's muscle man not as a representation, but as the paper model for an animated representation; and because we are so used to seeing MRI scans as representations, we don't even flinch at seeing a body slice of a "real" cadaver. Bodies and body models, bodies and representations, seem to have become interchangeable in *Bodyworlds*. Plastinated organs, orthopedic cadavers, expanded corpses, and sliced body parts tell us that the anatomical body, which was already a mixed object of science and art, has also become a hybrid product of artistic models and modeled organisms. Just as the "real" tulip is now a tulip treated and perfected with chemicals to appeal to current taste, so the "real" body is now a cadaver that is surgically, chemically, and artistically modified in accordance with prevailing aesthetic standards. Before returning to the ethical implications of this technological imperative, I want to take a closer look at the settings of Von Hagens's exhibitions.

Anatomical Art Exhibited

Anatomical objects—both bodies and models—have aroused the interest and curiosity of a large lay-audience since the late fifteenth century. Anatomists, from the very beginning, have recognized the great potential for widespread professional publicity by showing off the process of dissection. In Vesalius's time, the anatomy lesson was a public spectacle; it took until the late eighteenth century for cadaver dissection to disappear behind the closed doors of the hospital.[43] In some parts of Europe, the exhibition of body parts remained an attraction at traveling fairs as late as the early twentieth century. Between the anatomical theaters of sixteenth-century Europe and the anatomical collections of today, we may notice a gradual move of anatomical displays into a medical-scientific (museum) setting. Although the anatomical body as entertainment and spectacle never disappeared completely, it slowly yielded to a more scientific-clinical

43. On the emergence and disappearance of anatomical theaters, especially in Italy, see Giovanni Ferrari, "Public Anatomy Lessons and the Carnival: The Anatomy Theatre of Bologna," *Past and Present* 117 (1987): 50–106.

gaze.[44] It is striking how Von Hagens reinfuses the element of spectacle into the display—stipulating viewers' "visceral" identification with the dissected bodies. The physical setting of *Bodyworlds*, the self-created image of the anatomist-artist, and the provocation of the visitor all contributed to its popular status.

Von Hagens chooses unusual settings for his unsettling displays. In Germany, *Bodyworlds* was situated, interestingly, neither in an art museum nor in a science museum, but in the Mannheim Museum for Technology and Labor. The large industrial museum with its rusty image came to life when approximately ten thousand visitors per day swamped the corridors, lining up between steam engines and historical labor tools to see the plastinated cadavers. In Vienna, the anatomical bodies were not exhibited as elevated museum pieces: people stuck their noses into the cadavers, or chatted on cell phones while leaning on the vitrines containing body parts; medical students in hospital dress walked around to provide explanations on demand; and the café was separated from the body-sculptures by nothing more than a rope divider. At one point, Von Hagens let two circus acrobats from the neighboring Cirque du Soleil give a show amid the plastinated cadavers, in order to "emphasize the remarkable similarities between the muscular structures of the corpses and the acrobats."[45] The exhibition effectively erased the usual distance between viewer and object, common in traditional anatomical museums, and diminished the awe and fear vis-à-vis the dead.

Another teasing element integral to *Bodyworlds* is the self-presentation of the artist-anatomist. Whereas in the Renaissance anatomical art was commonly produced by a team of two professionals, each holding distinctive professional credentials, Von Hagens stresses his dual scientific-artistic license. On the one hand, he presents himself as "professor doctor," and with the constant articulation of his academic titles he seems to want to establish his name as an anatomist. The Institut für Plastination, where he produces his

44. Luke Wilson shows how spectators originally caught sight of the inside of the body while being confronted by violence and pain. Gradually, the notion of the reconstitution of the body in the performance began to dominate the anatomical dissection, as it yielded to a more clinical gaze in which not the dissection but the formation of a "body of knowledge" took center stage. See Luke Wilson, "William Harvey's Prelectiones: The Performance of the Body in the Renaissance Theater of Anatomy," *Representations* 17 (1987): 62–95. See also Sawday, *Body Emblazoned* (above, n. 5), chap. 4.

45. The circus perfomance took place in July 1999, and was filmed by VPRO-television (The Netherlands); part of this performance and the quoted interview with Von Hagens were broadcast in the program *The Eternal Body* on VPRO public television, November 28, 1999.

plastinated cadavers, is supposedly related to the University of Heidelberg, although it is privately funded. In multiple ways, the academic status of Von Hagens and his institute is firmly grounded in existing scientific networks. Yet in his presentation and appearance, he adopts the identity of an artist, particularly that of Joseph Beuys. Friends and foes alike have compared Gunther von Hagens to the famous German artist and even called him "die Leichen Beuys" (the cadaver Beuys). This is not surprising if you see photographs and videos where the man in the white lab coat always wears a borsalino hat, one of Beuys's trademarks. Professor doctor Von Hagens fashions himself as the eccentric artist, whose stamp of artistic idiosyncrasy marks each of his plastinated objects. Perhaps this mixed profile annoyed some visitors, but more than that, it may be the element of performance that made people uncomfortable. Not unlike Joseph Beuys, the artist-anatomist foregrounds the process of production—in his case, plastination—rather than hiding it from the audience.[46] On a video that was projected on a large screen at the Mannheim exhibition, visitors could see him at work in his studio, submerging the bodies in large basins of pink fluid.[47] With scalpels and knives, he cuts away body fat and chisels his object into shape, much like a sculptor. Besides presenting a finished object of art, Von Hagens also confronted visitors with the violent practice of dissection—a practice reminiscent of the old anatomical theater.

Renaissance anatomical theaters encouraged visitors to identify themselves with the corpse on the dissection table; after all, the dissected body mirrored the observer's own living body and foreshadowed what lay ahead. In a similar vein, the German exhibition catered to the audience's mortal anxiety, inviting them to engage in thanatological voyeurism along with narcissistic identification. But *Bodyworlds* took this process of identification one step further: before leaving the exhibition, visitors could obtain forms to sign up as *Körperspender,* or future donors for plastination. To those wishing to donate their own body to science, plastination offers the possibility to unite posthumous altruism and—more egocentrically—eternal "life." Since antiquity, people have sought to save their mortal bod-

46. The German painter Joseph Beuys is famous not only for his still works of art, but particularly for his artistic performances, in which he often called attention to the similarities between technological and cultural tools and materials. For instance, in a performance in a New York museum in the 1970s, he locked himself into a cage with a coyote, where he stayed for seven days. Within several days the coyote and the artist were sleeping on a blanket together, symbolizing the fraternization of humans and wild animals.

47. Video, *Körperwelten* (Institut für Plastination, Heidelberg, 1997).

ies from total decay by having them mummified or embalmed after death. Yet, contrary to embalmed cadavers, Von Hagens's plastinates cannot be traced back to a specific person, since they are exhibited as anonymous figures.[48] Under the guise of helping the progress of science, plastination offers the opportunity to preserve one's mortal remains for centuries, if not longer, and to be displayed in all naked grandeur in front of millions of curious, astonished, or fascinated observers. It is perhaps not surprising that many prospective donors, when asked on the application form for their motivation, claimed to be elated by the prospect of having their body transformed into a statue or work of art.

The exhibition systematically fed on two ways of looking—scientific and artistic—that are traditionally bound up in anatomical modes of display. *Bodyworlds* also added an element of popular engagement and corporeal identification, revivifying its roots in the tradition of public anatomy lessons. Setting, artist's appearance, and audience appeal all gave a sensational edge to the ostensibly sanctified artifacts commonly revered with awe and respect. Von Hagens's transgressions of boundaries severely tested visitors' aptitude to switch contextual frames, and the anatomist-artist often invoked historical traditions of public dissections and anatomical theaters to justify his practices. Indeed, it was exactly the artistic and entertainment character of the exhibition that became the center of criticism.

The Plastination Controversy

The media debate triggered by the exhibition revolved around notions of art versus science, as the ethical acceptability of *Bodyworlds* was discussed almost exclusively in binary terms. The most outspoken objections came from moral theologians, who were offended by Von Hagens's desecration of human cadavers; they said they respected the scientific use of anatomical bodies, but loathed the artistic motives prominent in the plastinated figures. A second group of vocal resisters were medical scientists: anatomists and other medical specialists, who usually subject themselves to rigid protocols regulating the donation and treatment of corpses, strongly objected to Von Hagens's violation of these ethical norms by using dead bodies for frivolous purposes, *in casu* art. Directors of Europe's leading

48. Because of the anonymity of the cadavers, their provenance is somewhat shady. Von Hagens claims that he obtains all his cadavers through private donations, yet questions have been raised about some bodies imported from Asia. Although the anatomist-artist guarantees the anonymity of each body, he admits in interviews that he himself can identify each plastinate, and that some of these cadavers were his friends or relatives.

anatomical museums also responded mostly negatively to the Mannheim exhibition.[49] They stated that plastinated bodies add no scientific or educational component to body models. Moreover, they resented Von Hagens's sensationalism and his catering to the art world; anatomical exhibitions should be in the service of science, not of art, they argued. In interviews with visitors to the exhibition, reactions ranged from indifference to strong ethical objections to the use of human cadavers for other than scientific purposes. Such dubious practices, some contended, would raise eyebrows anywhere in the world, but particularly if they took place in Germany. Inasmuch as Von Hagen's plastinates are inscribed with historical anatomical tradition, they are imbued with Germany's tainted history of scientific experiments on living and dead human bodies and the Nazi ideology of eugenics.

In response to his many and powerful foes, Von Hagens took a surprising defensive position: in all kinds of ways, he emphasized the strictly scientific nature of his work while understating its artistic value. For instance, in Mannheim he hired medical students to provide information to visitors, and to answer their questions. The donor forms distributed at the end of the tour resembled regular forms for organ donation. Countering the criticism from the medical profession, Von Hagens underscored the academic status of the Heidelberg Institut für Plastination, as well as his own scientific qualifications. The anatomist-artist claimed that he tried to liberate science from its ivory tower; unlike his peers, he considers the education of a broad audience an important asset to the discipline. The success of *Bodyworlds* also proved, according to Von Hagens, that ethical norms are no longer imposed from the top down—by, for instance, church authorities—but that people themselves define what they consider ethical or not. While on the one hand it is understandable that Von Hagens, for pragmatic reasons, had to capitalize on his credentials as a scientist to defy his critics, it seems nonetheless peculiar that he had to fall back on dichotomized hierarchies to defend a practice that has historically blurred those categories.

Both the vocal opposition and Von Hagens's defense reinforced the false dichotomy between art and science, implying that a different set of ethical norms or standards applies to each. I don't think that is true, however. Although the viewer of a contemporary art ex-

49. In the documentary *Die Leichenshow: Eine Ausstellung wird Sensation* by Walter Soechel (ARD, April 1998), various people voiced their opinion; commentators included the director of the Anatomisch-Pathologisches Bundesmuseum in Vienna and an anatomist connected with the famous Fragonard Museum in Paris.

hibition is expected to be more "shock proof" than the average anatomical science museum visitor, the use of severed limbs or body parts in a work of art would definitely cause unease and thus probe ethical norms. In recent years, we have witnessed various modes of artistic expression that, either deliberately or unintentionally, questioned the sanctity or integrity of human flesh. Some sensational exhibits featuring the use of organic tissue pushed the envelope of ethical permissibility in the art world.[50] It is clear that Von Hagens also walked a tightrope between artistic articulation and ethical judgment. When asked about his aesthetic-ethical sensibility, he invariably invoked the backing of historical tradition to justify his blending of scientific tools and artistic styling. Indeed, there is no denying the aesthetic refinement of his sculptures; however, the naked sensation they display is every bit as attention-grabbing as the work of some contemporary artists or, for that matter, scientists. The sensationalism, exploitation, and blatant commercialism characterizing *Bodyworlds* unequivocally exposed Von Hagens as a savvy businessman.

Yet neither moral outcry nor professional *scorn* has unveiled a more profound source of discomfort. The most disturbing aspect of Von Hagens's plastinates, in my view, is neither the transgression of art-science boundaries that purportedly fuelled the controversy, nor the resuscitation of public spectacle or display. Something that remained virtually untouched in the public debate concerning the exhibition was that plastinated cadavers prompted visitors to reconsider the status and nature of the contemporary body, both dead and alive. This body is neither natural nor artificial, but the result of biochemical and mechanical engineering: prosthetics, genetics, tissue engineering, and the like have given scientists the ability to modify life and sculpt bodies into organic forms that we once thought of as artistic ideals—models or representations. What Von Hagens does with dead bodies is very similar to what scientists do with living bodies. The reversal of body and representation also underlies the principles of cosmetic surgery; and the problem of authenticity and copy seems more urgent in genetic engineering experiments than in

50. For instance, Marc Quinn's model of a human head filled with his own blood; Orlan's surgical performances (1991–1998) in which she refashions her own body into an organic collage of artistic representations (from the forehead of Leonardo's *Mona Lisa* to the chin of Botticelli's *Venus)*; and the severed head of an executed Maori warrior auctioned at the European Fine Art Fair, 1997. The exhibition *Sensation: Young British Artists from the Saatchi Collection* (London, 1997; New York, 1999) featured some artists who produce body art, such as Mona Hatoum, Marc Quinn, and others; for an introduction to the discussion of the "ethicality" of these art works, see Norman Rosenthal, "The Blood Must Continue to Flow," in the catalogue accompanying the exhibition (London: Royal Academy of Arts, 1997).

plastination. Perhaps most unsettling about the plastinated cadavers is their implicit statement that the very epistemological categories that guide us in making all kinds of ethical distinctions simply do not apply here. Categories such as body versus model, organic versus synthetic/prosthetic, object versus representation, fake versus real, authentic versus copied, have become arbitrary or obsolete. Since we commonly ground our social norms and values in such categories, Von Hagens's anatomical art seems to elude ethical judgments.

Plastination is an illustrative symptom of postmodern culture, just as Frederick Ruysch's anatomical objects were a symptom of Vanitas art and Renaissance culture. Cadavers have become amalgams of flesh and technology, bodies that are endlessly pliable and forever manipulable, even after death.[51] Bodies, like tulips, are no longer either real or fake, because such categories have ceased to be distinctive. Modified tulips that last longer and look absolutely perfect raise the same ethical and philosophical concerns as genetically engineered sheep and manipulated corn. By the same token, our gaze and our view of the body are increasingly challenged and cultivated by the plasticity of technology. In principle, Von Hagens's sculptures might provide an interesting critical perspective on the all-pervasive influence of technology on corporeality and the waning integrity of the flesh. Yet his defense and explanations of plastinated cadavers divulge no such critical or playful intentions. Rather than commenting on the confusion of boundaries, he reconfirms binary labels by propagating his cadavers as "real," "intact," and "authentic." While obviously sustaining the tradition of mixing scientific insights with artistic styles, he quickly retreats to the solid bastion of science to defend himself against criticism. Paradoxically, Von Hagens's denial of distinct categories of embodiment, and thus the ethical norms in which they are cemented, does not prevent him from invoking those same norms to claim the legitimacy of his practices. The artist-anatomist's plastinated cadavers seem exemplary of a culture that is "inhabited by posthumans who regard their bodies as fashion accessories rather than the ground of being."[52] The culture of the posthuman, according to Katherine Hayles, continues the liberal humanist tradition in which the body is discarded as a mere

51. In many respects, the discussion triggered by *Bodyworlds* fits the ongoing debate in contemporary philosophical and cultural criticism concerning the plasticity and manipulability of (especially female) bodies. See, for instance, Elizabeth Grosz, *Volatile Bodies: Toward a Corporeal Feminism* (New York: Routledge, 1994); Anne Balsamo, *Technologies of the Gendered Body: Reading Cyborg Women* (Durham: Duke University Press, 1996).

52. N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University of Chicago Press, 1999), p. 5.

container for cognition, and the religious tradition that holds the body as a temporary vessel for the soul. Von Hagens's technique attempts to detach bodies from their living signifieds, yet they are inescapably infused with historical, local, and cultural meanings. Doctor Von Hagens is perhaps best seen as a postmodern Doctor Tulp—one who deploys medical technology to express a potentially provocative, but in actuality disturbing, commentary on our technological culture.

Acknowledgments

I would like to thank Ton Brouwers, Lisa Cartwright, Hugh Crawford, Joe Dumit, David Keevil, and the anonymous reviewers of *Configurations* for carefully reading and commenting on previous drafts.