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CHAPTER FIVE

Science and Social Science

The photographers assigned to military missions frequently carried out ethnographic, topographic, and other kinds of scientific research. Likewise, topographical survey teams were sometimes accompanied by military troops tasked to protect and advance survey work and photography. It was not unknown for photographer-adventurers to enlist the help of armed guards. Thomas Cook, founder of the Cook's Tours, arranged military transport and cultivated the protection of rulers to safeguard them and the high-end tourist groups he escorted to Egypt and the Holy Land. Another component of Cook's Tours was the photographer hired to make and sell group pictures to the sightseers.

Although they increasingly used photography as evidence, science and social science were not firmly differentiated until the end of the nineteenth century. In India, the Schlagintweit brothers (see p. 118) combined geological study with landscape photography, and took time to practice some ethnology by making plaster heads of Indian subjects. Their successors, the Western military and civilian amateur photographers stationed in India, spent years amassing statistical data as well as photographs for the multivolumed *The People of India* (1868–75). To record the 1874 transit of Venus (when the planet Venus passes directly between the earth and the sun, causing a small, round dot on the sun) scientists traveled to distant vantage points. With the relentless expansion of Western political and economic interests during the mid-nineteenth century, photographers increasingly sought to highlight cultural, gender, and physiognomic differences among people. Sexuality and ethnicity merged in images of the exotic; the normal was

implicitly defined with reference to images of people with mental disabilities. As popular and professional science and social science proliferated, they helped to make photography a global activity. Locally powerful people saw the advantages of photography and sometimes took it up as amateurs. Westerners routinely trained assistants, who, having learned the trade, went on to found their own photographic enterprises.

PHOTOGRAPHY AND THE SOCIAL SCIENCES

Photography participated in the production of evidence in many fields. Geology, biology, botany, medicine, astronomy, and chemistry used photography to collect and exhibit evidence. European efforts to establish comprehensive and systematic classifications of human beings were enhanced by the intense discussion of Charles Darwin's writings on evolution and the origins of the human species. Theories about the multiple origins of human beings, akin to those that motivated Louis Agassiz to commission photographic studies of slaves (see p. 38) persisted, despite Darwin's insistence on a single human origin. Some commentators interpreted his writings to validate a natural hierarchy of development, from the lower to the higher races, based on visible differences in anatomy, and on cultural characteristics.

ETHNOGRAPHIC STUDIES AND DISPLAY

Grand schemes to compare and contrast races and to photograph them were launched throughout the later nineteenth century. For instance, it was proposed that the Calcutta exhibition of 1869 should bring together "tribal" peoples from Asia, Polynesia, and Australasia, for purposes of examination and photography.¹ The scheme failed, but ethnographic studies and exhibitions, extensively illustrated

53
CHARLES MARVILLE, 14, Rue des Marmousets (destroyed): View from the East.
At left, Rue de Glatigny (destroyed, replaced by the Hôtel-Dieu), n.d. Paper print.
Bibliothèque Historique de la Ville de Paris.



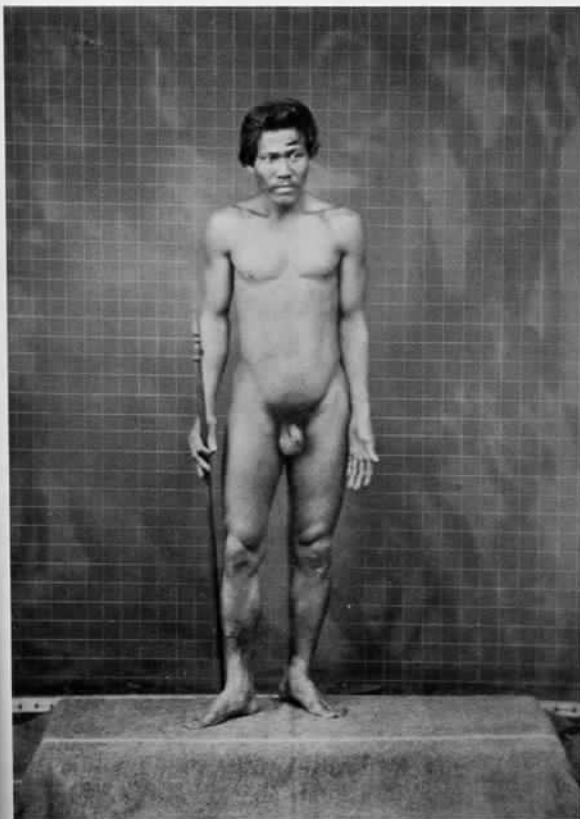
5-3
PHOTOGRAPHER UNKNOWN, *Brinjara and Wife*, plate 161 from *The People of India*, 1868. Paper print. Harry Ransom Humanities Research Center, University of Texas, Austin at Texas.

a tool or weapon denoting their work and social position (Fig. 5-3).

The lack of standardization in anthropological photography led scientists such as Thomas Henry Huxley (1825–1925) and John Lamprey (active 1870s) to create systems by which humans could be photographed for observation and comparison. Huxley's anthropometric poses were cumbersome, but Lamprey's recommendations in his 1869 journal article "On a Method of Measuring the Human Form" became influential (Fig. 5-4). Both Huxley and Lamprey proposed that the scientific study of race should be based on observations of the nude human body, so that differences in skin color, hair texture, physique, and the like would be recorded. This strategy strengthened the belief that there were basic differences among human races, observable through distinctions in physical appearance.

Orientalism

One of the most persistent of such types of ethnographic photography showed women from the Middle East and Asia



5-4
JOHN LAMPREY, *Front and Profile Views of a Malayan Male*, c. 1868–69. Carbon prints. Royal Anthropological Institute of Great Britain and Ireland, London.



5.5
 PHOTOGRAPHER UNKNOWN, *Arab Woman and Turkish Woman, Zangaki, Port Said, 1870–80*. Albumen print. Victoria and Albert Museum, London.

In this studio photograph, a Turkish woman is masked by a semi-transparent veil, reclining in the manner of an odalisque suggestively holding a *narghileh* (water pipe). The standing woman grasps a tambourine. By the time this image was made, the harem had been a fixture in Western culture for hundreds of years. The image gratifies the fantasy view of the “Orient” as a place where time has stood still.

in sexually suggestive poses. The term “Orientalism,” adopted by cultural critic Edward Said in a 1978 book of the same title, has come to mean the wholesale social labeling of non-Western peoples as passive, rather than active; childlike, rather than mature; feminine, rather than masculine; and timeless—that is, separate from the progress of Western history. More specifically, it describes the phenomenon of titillating sexual interest or intrusive observation of people from non-Western cultures, especially women.⁴

In Western literature, travel accounts, and art before the invention of photography, Middle Eastern women were contradictorily described as closeted in harems, swathed in thick clothing and veils, and sexually aggressive. Images of the odalisque, the drowsily reclining naked or semi-nude female pictured in an intimate or exotic setting, were frequent in Western art. In photography, the mystery and unavailability of Middle Eastern women were enhanced by costume and pose (Fig. 5.5). Not all pictures of Middle Eastern women, however, were made to please foreign fantasies: Marie Lydie Cabannis Bonfils (see p. 96) is reputed to have made the

photographs of women who came to the Bonfils family’s Beirut studio.⁵ In India, legitimate photography of women in purdah—that is, in seclusion—was done by British women, such as a certain Mrs. Carrick, who is said to have run a studio in Calcutta. By 1885, Indian women had taken up photography.⁶

Nude and semi-nude images of Eastern women were marketed in many ways. Sensual pictures, in which the model wore traditional clothing to mark her ethnic identity, were issued in *CARTES-DE-VISITE*, miniatures, postcards, and *ALBUMEN* prints (Fig. 5.6). The *académies*, or figure studies of women ostensibly sold as aids to painters, sometimes featured Middle Eastern women, whose hairstyle and jewelry signaled their identity and class to the viewers.

Explicit photographs of sexual acts, featuring both Western and non-Western participants, were marketed in the major European capitals and were also available by mail order catalog.⁷ Bruno Braquehais, who photographed the French Commune (see Fig. 4.24), also made images of individuals and couples engaged in sexual activities.⁸



5-6
KUSAKABE KIMBEI, *Geisha Resting*, c. 1885. Hand-colored albumen print. Richard W. Gadd Collection, Monterey Museum of Art, California.



5-7
C. A. WOOLLEY, *Trucanini*, 1866. Paper print.
Royal Anthropological Institution of Great Britain
and Ireland, London.

“Dying Cultures”

Anthropological photography took on a moral urgency as the notion spread that indigenous peoples did not have the physical and mental strength to survive the encroachment of Western civilization. At the 1866 Intercolonial Exhibition in Melbourne, Australia, a section was devoted to “The Last of the Tasmanians.”⁹ The number of aboriginal Tasmanians was indeed severely reduced—in 1847, only forty-six individuals had remained. Professional photographer C. A. Woolley (1834–1922) made a studio study, in the style of Western portraiture, of a Tasmanian woman named Trucanini (Fig. 5.7). The notion of vanishing races was also applied to Native North Americans (see p. 193), though they ultimately fared better than the Tasmanians.

In 1879, responding to the belief that the traditional life of Native Americans was endangered by development, the United States established the Bureau of Ethnology.¹⁰ John K. Hillers (1843–1925) was appointed staff photographer under John Wesley Powell (1834–1902), the agency’s first director. Hillers had met Powell while working as a boatman for Powell’s survey of the Colorado River in 1871. The expedition’s photographer E. O. Beaman (1837–1876) taught Hillers how to use the camera, and when Beaman left the group, Hillers



5-8
WILLIAM CARRICK, *Russian Water Carrier*, c. 1860–78.
Carte-de-visite.



5-9
ARCHIBALD HENNING, *The Rat-Catchers of the Sewers*.
Engraving from a daguerreotype by Richard Beard, illustration
from *London Labour and the London Poor* by Henry Mayhew,
1851. Private collection.

took over, making about three thousand images of the Grand Canyon and of Native Americans. For the Bureau of Ethnology, he produced more than twenty thousand negatives.¹¹ After the massacre at Wounded Knee in 1890, when the Indian Wars all but ceased, photographers took up the “grand endeavor” to capture the likeness of Native Americans before they disappeared.

POPULARIZING ETHNIC AND ECONOMIC TYPES

The idea of creating assemblages of thematically related photographs of people was not restricted to scientific pursuits. Studios around the world offered exotic images of people deemed typical of an ethnic group. In Rio de Janeiro, a portraitist advertised “a large collection of black tipos [characters] and their customs, very appropriate for those who are leaving for Europe.”¹² The Scottish-born photographer William Carrick (1827–1878) worked in Saint Petersburg, Russia photographing “Rasnoshchiki,” the street sellers of that city¹³ (Fig. 5.8). He also made photographic expeditions to rural areas in Russia, gathering images of workers, farmers, boatmen, and the landscape.

In the later nineteenth century, factories and industrial sites were photographed with increasing frequency, and studio shots of laborers, especially craftspeople dressed in work clothes and carrying their tools, became the subjects of many *cartes-de-visite*.¹⁴ Nevertheless, the reality of the urban poverty associated with industrial capitalism was seldom photographed before the end of the nineteenth century. Despite the historical interests of photography’s proponents, subjects with no evident scientific, archival, artistic, or commercial value were neglected. Child laborers, for instance, are largely absent from early photography. Images of working men and women, except when stiffly posed with tools or clothed in quaint ethnic and regional costume, are also uncommon. Scenes of ordinary activities such as preparing food are exceedingly rare, unless these activities are performed in an exotic culture. The absence of unpleasant and ordinary subjects is highlighted by their presence in other media, such as newspaper and book illustration, which showed child labor, the poor, factory abuses, workhouses, ramshackle homes, urban sanitation problems, and the effects of famine and overcrowded neighborhoods.

One important exception to the norm was created by Henry Mayhew (1812–1887), a newspaper reporter and editor. When Mayhew published the first three volumes of *London Labour and the London Poor* in 1851, they contained engravings based on photographs that Mayhew commissioned Richard Beard (see p. 60) to take (Fig. 5.9). The book, which blends pictures, anecdote, statistical inquiry, and interviews, did not fully escape the biases of its times. It was a financially successful publication, perhaps because minimal government-sponsored welfare programs were beginning to be accepted as a part of modern life. Photographs of strikes, even during the European depression of the 1870s and its labor unrest, are also rare. The poor could not afford



5.10
THOMAS ANNAN, *Close No. 37, High Street*, 1868, from *The Old Closes and Streets of Glasgow*, from *Photographs Taken for the City of Glasgow Improvement Trust*, 1900. Photogravure. Gernsheim Collection. Harry Ransom Humanities Research Center, University of Texas at Austin.

photographs, and newspaper images tended to reflect the point of view of private industry. Moreover, reformers in the mid-nineteenth century were generally not stirred to photograph societal problems or remedial programs, because for them the camera was largely associated with the evils of industrialization.

As European cities implemented modernization schemes,

the people displaced by renovation were seldom photographed, although the buildings were. An unusual picture was made by Thomas Annan (1829–1887), a photographer in Glasgow, Scotland, who was asked by the Glasgow City Improvement Trust in 1866 to record the vast slums that grew up around mills and factories before the buildings were torn down and rebuilt (Fig. 5.10). Charles



5.11
JOHN THOMSON, *The Crawlers*, 1877–78. Woodburytype. Victoria and Albert Museum, London.

Street-dwellers such as the woman pictured here were termed “crawlers,” because they would occasionally have enough cash to buy tea leaves, then “crawl” to a pub for hot water. The image of the crawler shows greater emphasis on the individual, in contrast with Thomson’s often static presentation of street types.

E. E. J. M.
Home for Working & Destitute Lads.



No. 27.—ONCE A LITTLE VAGRANT,
(The same lad as on card No. 28.)

E. E. J. M.
Home for Working & Destitute Lads.



No. 28.—NOW A LITTLE WORKMAN.
(The same lad as on card No. 27.)

PHOTOGRAPHER UNKNOWN, *Before and After Photographs of Young Boys*, c. 1875. Albumen prints. Barnardo Photographic Archive, Ilford, England.

Marville (1816–1879), a French artist and photographer, was commissioned by the city of Paris to record old Paris, before the implementation of Baron Haussmann's (1809–1891) improvements (Fig. 5.1), and the new Paris of buildings like the Paris Opera House.

When John Thomson (see p. 122) returned from Asia to Britain, he became a portrait photographer, whose studio was equipped with the usual painted backdrops and fancy posing stages. He also undertook a photographic survey of London's poor with writer and social activist Adolphe Smith Headingley, who wrote under the name of Adolphe Smith. *Street Life in London* was issued in twelve monthly installments, beginning in February 1877, and was published as a bound book one year later. Thomson and Smith acknowledged Mayhew's efforts on behalf of the poor, presenting their own work as an updated version. Their preface stresses the function of photography to document objectively, without omission or exaggeration. One remarkable picture shows an impoverished

homeless widow who made her living minding the children of poor working women (Fig. 5.11).

In the last third of the nineteenth century, photographs were used slightly more often in private social-reform efforts. Thomas Barnardo (1845–1905), who administered homes and training programs for poor and homeless children, made before-and-after images to advertise his work and to raise funds (Fig. 5.12). In most of the images, Barnardo exaggerated the children's poverty, dressing them in torn clothes and posing them in pitiful positions. The images could be purchased singly or in packets.

PHOTOGRAPHIC STUDIES OF HUMAN EXPRESSION

The notion that inner human character could be interpreted through facial expressions persisted throughout nineteenth-century portraiture in all visual media. In fact, as photographs became more generally available, they seemed to encourage the reading of inner character. Gallery displays of

ICONO-PHOTOGRAPHIQUE

MÉCANISME DE LA PHYSIONOMIE HUMAINE

Pl. 6.



Duchenne (de Boulogne), phot.

photographs taken of public figures supported the public's speculation, as did growing personal collections of photographs. Writing in the July 1863 issue of the *Atlantic Monthly*, Oliver Wendell Holmes envisaged a new human possibility called "photographic intimacy," a friendship established by the exchange of photographs, between two people who have never met. The relationship starts after the exchange of letters and views of scenery. It culminates in an exchange of photographic self-portraits carefully staged among personal objects, and the sharing of photographic pictures of loved ones. In time, Holmes wrote, photography would make the "outer and ... inner life a reality ... but for his voice, which you have never heard, you know ... [the photographic correspondent] better than hundreds who

call him by name, as they meet him year after year."¹⁵ The conviction that a clear correspondence existed between inner moods and outward appearances also informed scientific experiments on human gestures and facial expressions, such as the photographs of mental patients taken by Dr. Hugh Welch Diamond in the 1850s (see p. 35).

Duchenne de Boulogne

Outwardly, the explorations undertaken by the French doctor Guillaume Benjamin Duchenne de Boulogne (1806–1875) resemble Diamond's work. Duchenne was a physician at the Paris hospital La Salpêtrière, which treated people suffering from epilepsy, neurological problems, and insanity. Duchenne's *Mécanisme de la physionomie humaine* (*The*

5-13

G. B. DUCHENNE DE BOULOGNE, "Electrical contraction of the eyelids, the forehead with voluntary lowering of the jaw: terror." plate 63 from *Mécanisme de la physionomie humaine: ou analyse électro-physiologique de l'expression des passions*, 1876. Paper photograph tipped in book. Victoria and Albert Museum, London.

Duchenne used electrical currents to stimulate facial expressions. He seems to have had few scientific or moral reservations about provoking the appearance of emotions in his subjects.

Mechanism of Human Physiognomy), published in 1862, was accompanied by an atlas of eighty-four photographs taken between 1852 and 1856 of human subjects whose facial muscles were stimulated by an electric current (Fig. 5.13). With the technical advice of photographer Adrien Tournachon (1825–1903), brother of the famous Parisian photographer Nadar, Duchenne attempted to arouse through electrical stimulation the individual facial muscles that he considered to be involved in human expression. Most of his photographs were of people with mental retardation; forty-five of the eighty-four images are of one old mentally retarded man.

To aid the camera's recording, swift and subtle muscular reactions were ignored in favor of more dramatic and visible ones. Duchenne took his subjects' emotional responses to be typical of all humans; the individual's personality and distinctive range of reactions did not interest him. Unlike Diamond's efforts, Duchenne's work was very specifically related to art as well as science. His *Mécanisme* contained plates in which works of art were compared with his photographic experiments, so as to show how art did not always show physiologically true depictions of human emotional responses. Photographic historian Nancy Roth found that, to his contemporaries, Duchenne's representations seemed too naturalistic for art: one critic wrote that "he's ... to be reproached for stripping art of its every ideal, reducing it to an anatomical realism every bit in keeping with the tenets of a certain modern school of art."¹⁶ The nineteenth-century clash between two approaches to painting, represented by the realism of Gustave Courbet (1819–1877) and the idealism of Jean-Auguste-Dominique Ingres (1780–1867), was specifically referenced by the commentator in relation to Duchenne's physiological photography.

Darwin

After he published *The Origin of Species* (1859) and *The Descent of Man* (1871), the British scientist Charles Darwin (1809–1882) completed a study that he had begun in 1838. *The Expression of the Emotions in Man and Animals* (1872) argued that the physical signs of emotional states were inherently the same in all humans, and that animals had emotions that they expressed in ways similar to people. The volume underscored Darwin's hypothesis that humans were not a separately created species, but resulted from the processes of natural selection and evolution.

About nine thousand copies of the book sold in the first four months of publication, both because Darwin was a well-known, controversial author, and because the subject of emotional expression was popular at the time.¹⁷ Darwin's introduction acknowledged his debt to the insights and photographs of emotion made by Duchenne de Boulogne. In fact, Duchenne lent Darwin photographs, which he published as part of his study. With some of Duchenne's images, Darwin asked the engraver who worked on the photographs to temper the wrinkles and to remove the instrument that



1



2



3



4



5



6

5.14 O. G. REJLANDER (1, 3, 4, 6); A.D. KINDERMANN (2, 5), *Untitled*, from Charles Darwin's *The Expression of the Emotions*. Heliotype.

directed an electrical stimulus to the subject's face. Along with illustrations provided by artists, Darwin also included photographs commissioned from the London photographer Oscar Rejlander (see Fig. 3.13), who personally acted out some of the emotional states before the camera. Believing that babies exhibited the purest, least acculturated signs of emotion, Darwin used photographs of babies made by Rejlander and the German photographer Adolph Diedrich Kindermann (1823–1892) (Fig. 5.14). In all, five photographers provided images to Darwin.

Darwin investigated the means by which photographs might be inexpensively included in the text. This had proved difficult because the presses that printed text ran too fast to reproduce photographs and type at the same time, and

because most photographs needed to be printed on special paper, not newsprint. But a technique known as HELIOTYPE, invented by the photographer Ernest Edwards (1837–1903), who made a portrait of Darwin in 1868, used printing-press plates to reproduce photographs, and thus keep down the price of the book. The resulting images are not sharp and detailed, but they do convey facial gestures adequately.

Charcot

Like his teacher Duchenne de Boulogne, the French physician and neurologist Jean-Martin Charcot (1825–1893) worked at La Salpêtrière, where he drew upon photographs to document his case studies, and was interested in the expression of emotion in art. In one sense, Charcot carried Duchenne's work to an extreme, making weekly public presentations of his patients, many of them female, to an audience of scientists and socialites.¹⁸ Charcot's particular concern with hysteria attracted his most famous admirer, Sigmund Freud (1856–1939).

From 1877 to 1880, Charcot published *L'Iconographie photographique de La Salpêtrière* (*Photographic Iconography of the Salpêtrière Hospital*), a three-volume work that contained photographs of hysterics (Fig. 5.15). Collaborating with the clinician Désiré Magliore Bourneville (1840–1909), and assisted by Paul Régnard (1858–1927), an intern at La Salpêtrière, Charcot sought to photograph the physical expression of mental states. He chose subjects who were known throughout France to be able to respond well to hypnotic suggestion.¹⁹ Like those of Hugh Welch Diamond, Duchenne, and Darwin, Charcot's work and his photographs emphasized facial expression as an infallible indicator of psychological states. And like them, Charcot regarded himself as a neutral observer. Of his visual recording, he stated: "I stand here merely as a photographer, I write down what I see."²⁰

PHOTOGRAPHY IN MEDICINE AND SCIENCE

Because the American Civil War was fought near towns and cities, there was acute public awareness of battle injuries and the needs of soldiers. The Sanitary Commission was a charitable organization of private citizens who came together to do whatever the United States government did not do for soldiers during the war. The commission, modeled on the British equivalent that was active during the Crimean War, worked with the government to provide food and medical supplies, ambulance service, rehabilitation, and aid to dependent families. To raise money, the Sanitary Commission held fairs, which included the sale of photographs of landscapes and famous individuals. Disabled soldiers were the subject of postwar photographs (Fig. 5.16).

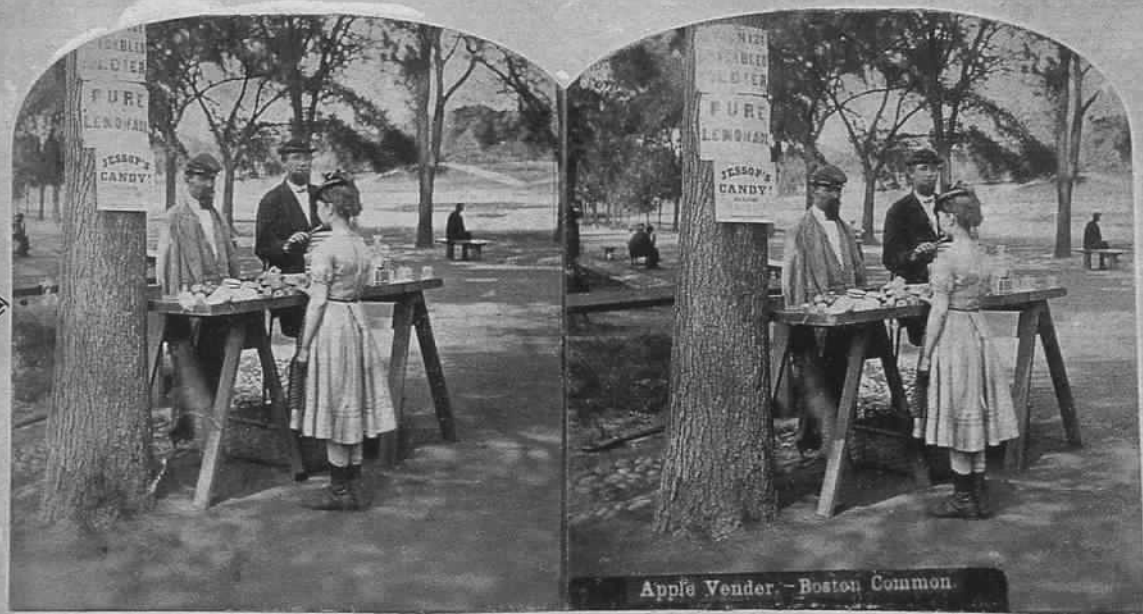
Throughout the war, Clara Barton (1821–1912), the first woman clerk in the United States Patent Office, organized relief efforts for wounded soldiers. She managed to secure permission to be on the front lines, where she ministered to northern and southern soldiers. Like many of Brady's sitters, she was a popular figure in American civic life, and gave many public lectures (Fig. 5.17).

The number of amputations suffered by Civil War soldiers shocked both doctors and the general public. In the May 1863 issue of the *Atlantic Monthly*, Oliver Wendell Holmes described how photographs of able-bodied people walking on city streets might be observed in order to devise effective and comfortable artificial limbs.²¹ Medical practitioners and hospitals, meanwhile, commissioned photographs of soldiers with wounds (Fig. 5.18). During the war, the surgeon general founded the Army Medical Museum in Washington, D.C., one of whose purposes was to collect photographs of war injuries.²² Over a thousand pictures were collected in compendiums of photographs and engravings based on photographs, including the eight-volume *Photographs of*



5.15
PHOTOGRAPHER UNKNOWN, *Attitudes Passionelles*, plates from Charcot's *L'Iconographie photographique de La Salpêtrière* 1876. Paper print. Bibliothèque Interuniversitaire de Médecine, Université René Descartes, Paris.

Charcot not only photographed sitters acting out various symptoms of mental illness but also invited the public to his sanatorium on Tuesdays to see the performances. His subjects exaggerated expressions and physical positions resemble poses assumed by actors in the theater, largely because they were called upon to act out their symptoms for the camera, not experience them afresh.

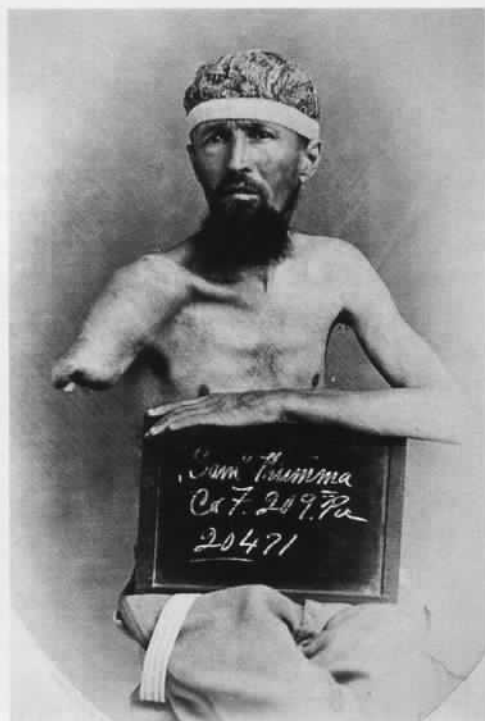


Apple Vender - Boston Common.

PHOTOGRAPHER UNKNOWN, *Patronize the Disabled Soldier*, from *American Views: New Series*, c. 1866. Stereograph. Bob Zeller Collection, Pleasant Garden, North Carolina.



5.17
MATHIEW BRADY, *Clara Barton*, c. 1866. Albumen silver print. Library of Congress, Washington, D.C.



5.18
PHOTOGRAPHER UNKNOWN, *Untitled* (Corporal Samuel Thummam, wounded at the battle of Petersburg), 1865. Burns Archive, New York.

Photographs of wounded American Civil War veterans were made and circulated to teaching hospitals for study in an effort to improve battlefield care, recovery, and the quality of prosthetics.



5.19
DR. JULES LUYIS, *Four-Diameter Cross-Section of Segments of Cerebellum*, plate 68 from *L'Iconographie photographique des centres nerveux*, c. 1873. Albumen silver print. Bibliothèque de l'Institut de France, Paris.

Surgical Cases and Specimens (1866). Though thwarted by shortages of paper and printing supplies, Confederate doctors also published a journal largely devoted to battlefield medicine. The *Confederate States Medical and Surgical Journal*, issued from January 1864 to February 1865, printed a few photographically derived woodcuts of injured soldiers.²³

PHOTOMICROGRAPHY AND ASTRONOMICAL PHOTOGRAPHS

From the first, objects and organisms made visible by microscopes and telescopes were subjects of photography (see Figs. 2.1, 2.13, 2.14, 2.15). Indeed, photomicrography became a photographic specialty beginning in the 1850s.²⁴ For the French physician and anatomist Jules-Bernard Luys (1828–1897), photomicrography was an important aid to scientific objectivity. In his *L'Iconographie photographique des centres nerveux* (*Photographic Iconography of the Nerve Centers*) (1873), which was issued with an atlas of photographs and lithographs of neurological subjects, Luys wrote that photography substituted “the action of light for ... personality, in order to obtain an image both impersonal and accurate”²⁵ (Fig. 5.19).

From the late 1850s on, proposals to miniaturize and store information in photographs became more frequent.

The *American Journal of Photography* for 1858 recommended storing public documents on photographic negatives. With its usual exuberance, *Photographic News* opined that “the whole archives of a nation might be packed away in a snuff box.” Businesses were founded to produce microscopic photographs, either as a means of record-keeping or for novelties, such as penholders fitted with a lens that magnified tiny calendars.²⁶

Despite much enthusiasm for its potential, telescopic photography did not proceed as rapidly as photomicrography. Astronomical photography was beset with technical problems resulting from low light, the movement of the earth, and the limitations of photosensitive materials, while the sun's brightness created its own difficulties. Nevertheless, many astronomers, such as John Herschel, saw the potential to create systematic recording of the sun and its features. Others, in the spirit of François Arago's original conjectures (see p. 15), considered that photochemical reactions might be used to measure light rays.

Photographers continued to have difficulty creating clear images of the moon. Throughout the 1870s, American astronomer and photography advocate Lewis M. Rutherford (sometimes spelt Rutherford) (1816–1892) circulated his 1865



5.20
LEWIS RUTHERFURD, *Moon*, March 4, 1865. Albumen silver print. George Eastman House, Rochester, New York.



5.21
JAMES NASMYTH AND JAMES CARPENTER, Moon, Crater of Vesuvius, 1864. From *The Moon, Considered as a Planet, a World, and a Satellite*, 1874. Woodburytype. National Gallery of Canada, Musée des Beaux-Arts du Canada, Ottawa.

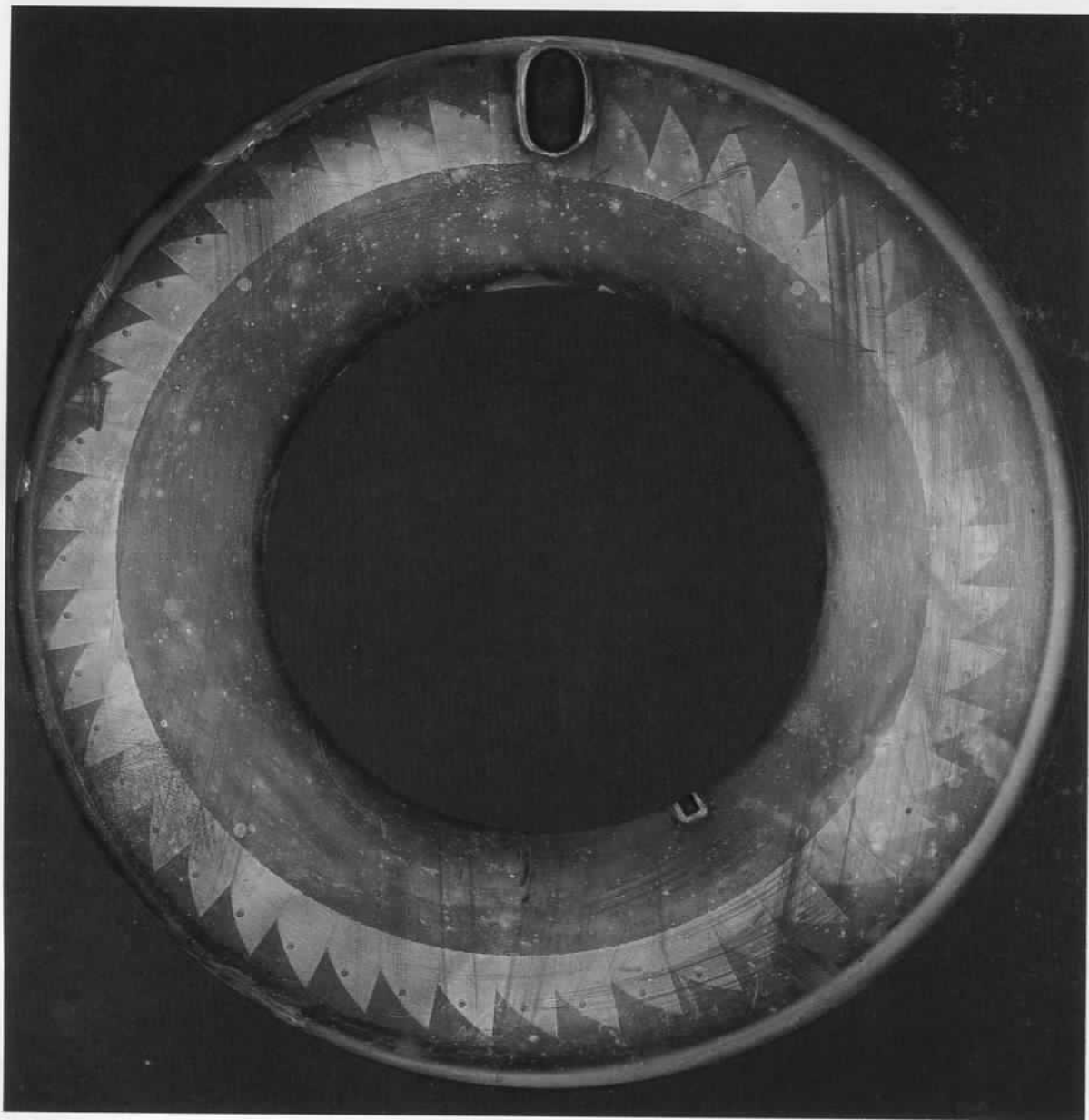
photograph of the moon (Fig. 5.20). Working together, engineer James Nasmyth (1808–1890) and astronomer James Carpenter (1840–1899) created a unique series of astronomical pictures. Among the images in their 1874 publication *The Moon, Considered as a Planet, a World, and a Satellite*, were WOODBURYTYPE PRINTS of photographs of plaster models of the moon, constructed in accordance with Nasmyth's drawings based on telescope observations. Far from fakery, in their minds, the model was conceived as an instructional tool that provided clear, close-up details not technically possible in actual moon photographs. Nasmyth and Carpenter even created events, such as a volcanic eruption on the moon's surface (Fig 5.21), and drew parallels between such natural phenomena as the creases on the surface of the moon, a human hand, and an apple²⁷ (Fig. 5.22).

The largest international effort in astronomical photography during the period took place in December 1874, when scientists from Germany, Britain, and France entered into a friendly competition to record the passing, or transit, of the planet Venus across the face of the sun.²⁸ The French team included the scientist and photographer Pierre-César



5.22
JAMES NASMYTH AND JAMES CARPENTER, Back of Hand, Wrinkled Apple, 1864, from *The Moon, Considered as a Planet, a World, and a Satellite*, 1874. Woodburytype. National Gallery of Canada, Musée des Beaux-Arts du Canada, Ottawa.

The search for universal laws in nature led Nasmyth and Carpenter to compare the wrinkling of the human hand to that of an apple, and, eventually, the processes that created the furrowed surface of the moon.



5-23
PIERRE-CÉSAR JULES JANSSEN, *Transit of Venus*, 1874. Daguerreotype, partly colored, full plate. Société Française de Photographie, Paris.



524
 AIMÉ CIVIALE, *Circular Panorama Taken from Bella Tolla (3030 metres)*, 1866. Collotype, printed by Jean-Dominique Gustave Aroca, 1882 or earlier.
 Bibliothèque Centrale du Musée National d'Histoire Naturelle, Paris.

Jules Janssen (1824–1907), who developed a revolver camera, in effect a gun fitted with a lens, to make sequential exposures on a DAGUERRETYPE plate (Fig. 5.23). Though outmoded for portrait and landscape photography, the daguerreotype was chosen by the French team, in part because its metal plates were not subject to breakage, as were glass plates.

In the second half of the nineteenth century, the public experience of photographs depicting human society and the natural world increased. With that expansion came an intensification of the visual effects of images. The three-dimensionality of STEREOGRAPHS is perhaps the most prominent example, but there are others. Photographers created panoramic views, some of which mimicked the span of human vision, others of which attempted to reproduce a circular, 360-degree view. Throughout the nineteenth century, painted and photographed panoramas were used for popular

entertainment and education. Whereas painted panoramas were rendered on long canvas scrolls, photographic panoramas were constructed from connected sequences of camera images.

From 1859 to 1866, French geologist Aimé Civiale (1821–1893) made a striking series of twenty-eight large photographic panoramas in the Italian, French, Austrian, and Swiss Alps (Fig. 5.24). Civiale did not conceive his photographs to show how a human might perceive the scene, nor to render the beauty of the Alps. He wanted the panoramas to illustrate the tremendous geological uplift that originally formed the European mountain systems. Civiale developed a scientific aesthetic for his purposes, in which the large patterns of the mountains' geological development were emphasized and the myriad surface details were decreased. His work was shown in the exhibitions of the French Photographic Society for a decade, from 1859 to 1869.²⁹

RETAKE

Photography made possible a new age of discovery comparable to that of the explorers who charted the globe from the fifteenth to the seventeenth centuries. From the mid-nineteenth century onward, great and small explorations were routinely photographed, as were medical achievements. Topographical survey teams made pictures of the terrain, mineral deposits, and potential transportation routes, as well as the lives and customs of indigenous peoples along the way. Scientists developed special instruments to record astronomical events, and planned lengthy expeditions, like those to view the transit of Venus in 1874. Prompted by the thin premise that the psychological and moral qualities of human beings are unerringly written in their physical appearances, amateur and professional scientists sought to

use the camera to create a visual dictionary of the inner life. Like the earlier age of discovery, the photographically driven exploration of the mid-nineteenth century increased human knowledge while extending Western influence around the globe. But where earlier explorers could paint and draw their discoveries, later ones could fix their finds with the camera's glass eye and disseminate their views as never before. While more and more average people were able to make virtual visits to the world's various cultures and natural wonders, they were able to do so often through a configuration of ignorant and prejudicial ideas. Photographs of non-Western people exaggerated their physical and cultural difference from Westerners. The falsehoods of science and social science, aided by the camera, were as undeniable as their advances.