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In his 1865 landmark book on experiment in the medical sciences, French physiologist Claude Bernard writes,

Observers, we said, purely and simply note the phenomena before their eyes. They must be anxious only to forearm themselves against errors of observation which might make them incompletely see or poorly define a phenomenon. To this end they use every instrument, which may help make their observations more complete. Observers, then, must be photographers of phenomena; their observations must accurately represent nature. We must observe without any preconceived idea; the observer's mind must be passive, that is, must hold its peace; it listens to nature and writes at nature's dictation.¹

By explicitly comparing observation and photography, Bernard not only champions photography as an exemplary scientific instrument, he also seems to make claims about what observation should be. Above all, according to this passage, it should be passive. Observation should not intervene, like experiment; instead, it should merely record, describe, even transcribe "nature's dictation." It should watch or listen intently, silently, and, if it is implied, at one's leisure. Instruments such as photography are used to insure this state of pure receptivity. They help the scientists arm themselves against the error of the "preconceived idea," which might color the true picture of nature with the taint of human bias. Of all the instruments one might use, Bernard holds up photography as the one that best represents the ideals of scientific observation.

Closer examination of this connection between photography and observation, however, reveals that it is much more complex, especially with regard to "passivity." Even Bernard insists that there is no such thing as purely passive observation; his own characterization, he admits, is a heuristic conceit that breaks down in practice: "At first sight ... this distinction between the experimenter's activity and the observer's passivity seems plain and easy to establish. But as soon as we come down to experimental practice we find that, in many instances, the separation is very hard to make, and that it sometimes even involves obscurity."² The dichotomy between "active" experimentation and "passive" observation seems to be a by-product of the nineteenth-century concern with objectivity and subjectivity and the subsequent attempt to distinguish collective scientific practice from individual theorizing.³ Before the nineteenth century, at least since ancient Greece, observation was considered a very active process.⁴ Since Bernard's time, however, philosophers of science have often demoted observation to a secondary, passive role to experiment.

Yet the history of medical observation resists this distinction between activity and passivity, even as Bernard himself struggled with it. Perhaps the most thorough discussion of medical observation is Michel Foucault's archeology of "the medical gaze." Foucault emphasizes medical perception's relationship to analysis as a process of simultaneously recognizing, separating, naming, and acting upon some disease element. For Foucault, observation is inseparable from the analytic function of diagnosis.⁵ Michael Hau, on the other hand, describes medical observation as an active, Gestalt-like process of holistic apprehension; he argues that many German physicians at the turn of the century objected to the analytic, overly scientific approach to observation that had become fashionable in the medical community.⁶ Even many contemporary philosophers, historians, and sociologists of science who have discussed observation, such as Norwood Russell Hanson, Dudley Shapere, Ian Hacking, Patrick Heelan, Trevor Pinch, Roberto Torretti, and David Gooding, have concluded that it is an incredibly complex, theory-laden procedure that is, above all, highly mediated by instrumentation and interpretation.⁷

Perhaps part of the lasting conceptual appeal of "passive" observation is due to Bernard's own metaphorical comparison (which was not uncommon) between ideal human perception in a scientific context and photography as a device that merely records what is in front of it. Indeed, most histories of objectivity and of the role of photography in science focus on the camera's perceived ability to document phenomena "objectively."⁸ That is, they focus on the camera's privileged relationship to the world it documents—its ability to "automatically" (hence "passively") capture and fix phenomena at a particular moment in time and space, seemingly independently of human agency.⁹ This aspect of photography has received
the most attention and has certainly helped to shape conceptions of what scientific observation is and should be (and, in turn, has been shaped by these very ideals).

But this is not the only salient feature of photography, nor does this particular ability exhaust its utility in science. Instead, I propose we examine another pertinent relationship, namely between observer and image. Thinking about this relationship—as opposed to the relationship between camera and object—highlights certain features of observation that might otherwise go unremarked. Nineteenth-century discussions of medical observation, for example, insisted on careful, methodical observation of patients. These discussions therefore emphasized two important elements of observation. First, all observation had an important temporal dimension. An observation can be made quickly, to be sure, but over and over physicians warned their students against the dangers of hasty observation. Instead, observation was to be practiced carefully, with an eye to detail. Indeed, detail itself precludes hasty observation; if one is to attend to and assimilate the details, it takes time to do so. Of course, this implied that one had the luxury of time that the researcher could proceed at an unhurried, even leisurely, pace, a possibility that separated the photograph from, say, live examination in the moment or even from the motion picture, the rush of which insistently pushes the viewer along. This luxury of time also separated the cultured, leisure class from the other classes. There was, paradoxically, an element of leisure in the labor of observation.

Second, observation seems to be a process of correlative, by which I mean establishing an often mutual or reciprocal relationship between objects or events, such as correlating lesions in a cadaver to disease elements in a living patient. Observation is an active process of comparison between the phenomenon before one’s eyes and the knowledge one brings to it. Torretti calls it “the principle of the conceptual grasp”: the observer grasps the object as a particular instance of some universal. This involves a constant process of comparison between a variety of different elements past and present (Bernard called this “experimental reasoning”). Discovery depends on the ability to see new patterns from familiar data; Aristotle knew that distinguishing universals from particulars depended on habits of perception, which develop into memories and then into experience with patterns. Medical observation in particular depended heavily on seeing symptoms or patients as part of a series and comparing different elements of that series.

My emphasis on pattern recognition and the duration of the observational act is meant also to tease out the aesthetic qualities of scientific observation. By this I mean not only that scientific observation, with its contemplative and admiring stance toward the beauty of nature, is a practice very much akin to art appreciation. I also mean that there is a marked cultural investment in the expertise that comes with a trained, scientific eye. Skillful, accurate observation is a mark of learning; physicians take pride in their ability to see patterns and details that are not available to laymen. For most physicians during the nineteenth century, when the legitimacy of the medical profession was only emerging, their emotional investment in this mode of viewing was palpable. As a form of cultural capital, scientific observation functions very much like the cultivation of distinctive aesthetic taste.

Duration and correlation were not the only characteristics of medical observation, of course, but I focus on these aspects because they corresponded to certain formal features of photography. Like Bernard, I will compare photography and observation, but in a descriptive, rather than normative sense. I am interested in the reciprocal relationship between the two, especially how the photograph facilitated, encouraged, and amplified certain patterns of observation that were emerging in nineteenth-century medicine. Certain observational strategies seemed to find purchase in aspects of the photographic image. Or, to put it another way, the training in observational methods that physicians underwent—whether “analytic” or “holistic”—found in photography an amiable partner. If these methods—careful attention, accurate description, and correlation across cases—were already in place before or without photography, with the rise of photography they could be applied to a “working object” in ways similar to how they were applied to natural phenomena. This could also be said of other representational technologies; the moulage, or wax model, for example, was very helpful for studying dermatological cases. But photography had advantages that the moulage did not, most notably the relative ease with which one could create a series of images, what we could call its “repeatability.” But it also had features in common with the moulage, especially the rich texture and detail of the image. No single feature makes photography unique. But I will argue that the combination of repeatability and detail made it an especially agreeable, even privileged mode of representation for nineteenth-century medicine.

So this essay has two goals: to offer a brief survey of the types, uses, and venues of medical photography in the nineteenth century, and to suggest some connections between photography and emerging practices of observation in medicine during this time. Specifically, I hope to show that
the temporal and correlative aspects of medical observation correspond to specific features of photography, namely the detail of the photographic image, and its repeatability. To do this, I will chart in a preliminary way the advantages and applications of photography in medicine and place them in the context of discussions about the methods and goals of medical observation in the nineteenth century. What was medical photography during the nineteenth century? How was it used? What hopes did its proponents have for it, and how did these hopes express the needs of the discipline? How did the use of photography conform to ideals of observation and vice versa? First, however, it would be useful to describe the types, venues, and uses of nineteenth-century medical photography.

Varieties of Medical Photography

Over the course of the nineteenth century, photography became an increasingly important medium for medical illustration. By 1894 it was even possible to find an article complaining of "The Craze for Photography in Medical Illustration," which serves as a grumpy indication of the discipline's growing investment in the technology. Even though it still competed with drawings and engravings, photography eventually became the default mode of representation. Among the thousands of medical photographs created in Europe and the United States in the nineteenth century, we can discern a variety of categories, which I will distill into three broad genres: photos of visible public spaces, photographs of hidden private spaces, and portraits. Depictions of public, medical spaces such as hospitals, battlefield hospitals, sanatoria, and asylums, were common. Photographs of hospitals were designed to document the setting, but also to assure a skeptical public of the facility's charity and cleanliness. Likewise, photographs that focus on public health by depicting the state of public houses or streets tried to emphasize the need for or success of systematic sanitation measures. Photographs of educational settings such as lecture halls and dissection rooms were also common, but those of operating rooms and actual surgeries were rather rare until the 1890s, perhaps because surgery is a messy business. But as conventions developed for the depiction of the surgical space as a private, immaculate, and technologically modern arena, such photographs became more commonplace.

Photographs of public and semipublic places emphasized the visible world, but a significant portion of photography for medical purposes also documented the hidden space of the human body. We can divide this genre by technology: microscopic, endoscopic, and radiological. Among the earliest and most prominent examples of microphotography are the illustrations by Alfred Donné (1807–1878), a French physician and professor, and his assistant Léon Foucault (1819–1868). Donné presented his microphotographic representations of various bodily secretions to the French Academy of Sciences in 1840 and published his atlas in 1844. Later in the century, German physician Robert Koch (1843–1910) established the criteria for the legitimate photographic representation of microscopic specimens. After Koch's illustrations of the 1870s and 1880s, microphotography became a much more accepted practice in histology and pathology. Endoscopic photography involves using a tubular instrument to visualize the interior of a hollow organ, such as the bladder. Probably the most well-known name in the early history of this technique is Max Nitze (1848–1906), who is credited with developing the first modern practical cystoscope, which was able to magnify and to view the bladder's interior. Between 1891 and 1894, he created a means of photographing the views from his cystoscope and published his results in his urological atlas. Finally, after Wilhelm Roentgen (1845–1923) discovered X-rays in 1895, there were immediate attempts to apply this technology in medicine and to capture the image for medical research and diagnosis. We may also include chronophotography and cinematography in this genre, since they were often used to explore natural phenomena hidden to the naked eye. French physiologist Etienne-Jules Marey (1830–1904) is the iconic figure here; in the 1880s and 1890s, his chronophotographs of human and animal movement transformed ephemeral movement into scientifically acceptable visual evidence, providing the basis upon which motion studies could be counted as a legible and legitimate area of inquiry.

Perhaps the largest category of photographs during this period is the medical portrait, including a surprisingly common type, the portrait of the physician. A photographic portrait taken in the doctor's office or library conferred a sense of dignity and modernity at a time when the general public might have been still quite skeptical of the medical profession. These portraits, as cartes-des-visite, were often given to potential clients, sent to colleagues, and exchanged at meetings. Additionally, one finds a large number of commemorative photographs showing groups of physicians at professional meetings, which together certainly served as visual documentation of medicine's growing legitimacy. Indeed, we could even say that photography and the physician reinforced each other's position: the presumed objectivity of the photograph reinforced the desired objectivity.
3.1 and 3.2 A typical nineteenth-century clinical portrait, here depicting the progression of smallpox eruptions over the course of days. (The patient survived.) From Samuel A. Powers, Variola: A Series of Twenty-One Photographic Plates Illustrating the Progressive Stages of the Eruption (Boston: Samuel A. Powers, 1882).

of the physician, while the physician's authority underwrote the evidentiary status of the documentary photo.22

But when we think of the medical photograph as portrait, it may be the clinical portrait that most likely comes to mind (figures 3.1 and 3.2). Photographs of afflicted individuals were used by a variety of specialties across a range of settings.21 Early examples of clinical portraits are Hugh W. Diamond's (1829–1886) photographs of inmates at the Surrey County Asylum in the 1850s, used to demonstrate "the physiognomy of insanity."24 Similarly, Max Leidesdorf (1818–1889) in Germany assembled an atlas of "psychiatric illnesses" in the 1860s,25 while Jean-Martin Charcot (1825–1893) and Albert Londe (1858–1917) took their famous portraits of patients displaying symptoms of hysteria at Paris's La Salpêtrière hospital beginning in the late 1860s.26 A. de Montméjay (1841–?) a Parisian physician and photographer who worked at the Hôpital Saint-Louis, completed the images for his colleague Alfred Hardy's (1811–1893) photographic atlas of skin diseases in 1868.27 And so on, throughout the century.28

Clinical photographs tend to focus on extreme or abnormal cases, a tendency that corresponds to a general difference between scientific and medical thinking. As Ludwig Fleck has argued, science looks for the typical, normal phenomenon, while medicine attends to precisely the atypical, abnormal, morbid phenomena. This is so because medicine is faced with a huge range of individuality with no clear boundaries between health and illness, so it is only with the morbid case that the physician can clearly see the difference along the continuum. So this is often where medicine starts in defining the normal from the pathological.29 The photographs we see in medicine generally match this concern, while also mediating between the physician and the patient. Photography thus also participates in a larger trend in Western medicine that segregates illness from the everyday and reinforces the uneven balance of power between patient and physician. We can see this in the uses to which photography was put and the venues in which it appeared.

Uses and Venues

The images under discussion here—such as operating room photos, endoscopic explorations, clinical portraits—were largely confined to expert communities. They were used in medical instruction or circulated in professional gatherings or journals. If photographs were used in public education, they were of a more innocuous type, stripped of their potentially sensationalist subject matter. In fact, before 1885 photographs were used sparsely in public education or media. After the development of instantaneous photography, dry-plate emulsions, and half-tone printing in the last fifteen years of the century, photographs were much more common in print media and public lectures. Medical images were much more common, too, due to the public excitement over Robert Koch's isolation of the tuberculosis bacillus (1882), Louis Pasteur's rabies vaccine (1885), the discovery of X-rays (1895), and other late-century advances in medical research.30 The growing acceptance of the germ theory of disease meant that photomicroscopic images were more likely to illustrate public lectures on medical topics, while the increasing use of antiseptic techniques provided a new reason to picture and promote hospital facilities—not to mention the thousands of new X-ray images that found their way into every nook and cranny of the public sphere at the turn of the century. But clinical photographs were still mostly for expert eyes only. Indeed, the medical community explicitly frowned upon the public circulation of these images; photographs of the afflicted were painfully similar to purposefully sensa-
tionalist postcards of circus freaks, and when they circulated beyond the medical community, they were often used in the same way. So most public images of medicine from 1885 onward generally consisted of physician portraits, medical facilities and procedures, and microscopic (or X-ray) images, all of which were suitable for health education campaigns.

But the clinical portrait photograph was an important facet of medical training, precisely because its status as a document made it a convenient and viable substitute for live demonstrations of patients. While the live demonstration was a major advance in medical education—a huge step from the centuries-long, scholastic tradition of learning medicine only from ancient texts—it had its own set of challenges. According to an American student taking classes at the Allgemeine Krankenhaus in Vienna in 1865, each professor was provided with a lecture room near his ward: "At the time of lecture this room is filled in with 'specimens' in the shape of men and women who are transferred from the other wards for the occasion. These patients are looked upon and spoken of as 'material' for the medical instruction and as such are submitted to examination by the students without much reference to any feelings which they as men and women may have on the subject."31 Patients did not submit gladly, apparently. In another letter, the student draws a sketch of his routine at the hospital, which includes "scolding and pitching into the patients for coming late (wh. they always do in Vienna)."32 While photography would never replace patients in bedside instruction, of course, physicians were pleased to substitute photographs and slides for patients in lecture, if not to alleviate the obvious ethical concerns, then at least to present all the students with a larger, projected view.33 Many physicians, such as prominent German surgeon and professor Theodor Billroth (1829–1894), maintained their own photographic collection for pedagogical purposes. Billroth published only one book of clinical photography, but it is known he had an even larger private collection, which he used for his medical school lectures.34

Furthermore, Billroth and others active in the scholarly community used photographs to demonstrate a diagnosis and persuade others of the chosen therapy. For example, after the 1880s, the discussions of individual cases filling the proceedings of the Berlin Medical Society were often accompanied by photographic images that circulated among the participants.35 These photos were frequently the basis for demonstration and debate. From the 1860s onward, there arose a number of periodicals and publications designed to present these findings in graphic form. The College of Physicians of Philadelphia, for example, established the Photographische Monatschrift in 1870, which would present a photograph and a clinical explanation of the case in each issue (figure 3.3). Montmêlé started the Revue Médico-Photographique along the same lines in the 1880s, and Ludwig Jankau founded the Internationale Medizinisch-Photographische Monatsschrift in 1894. The kinds of photographs we find in these pages include case documentation, diagnostic aids, and testimonials of intervention outcomes, all testifying to what André Gunther has called photography's "heuristic function."36 We should also remark on the rise of technical books on the subject, such as Albert Londe's La photographie médicale,37 and, of course, the photographic atlas.38

These photographs of medical cases usually became part of a disciplinary archive of images that could be tapped by students and practitioners. Hospitals such as the Saint-Louis in Paris, the Bellevue in New York, and the Charité in Berlin established photographic departments for just this purpose. A report from Bellevue in 1869 indicates that a photographic archive and department could be a magnet for the discipline: "Members of the medical profession begin to visit the Department periodically, for the purpose of obtaining such photographs as pertain to each one's more especially class of investigation. Many interesting cases of skin diseases, fractures, and results of important surgical operations have been fully illustrated by series of photographs, which give opportunity for comparison and study not offered by any other means."39 Unlike previous media, the photograph becomes, in all these various applications, a substitute for the patient—the
human body becomes, through photography, a viable "working object" for medicine. As Bruno Latour notes, "Scientists start seeing something once they stop looking at nature and look exclusively and obsessively at prints and flat inscriptions." Photography, in this respect, is an ideal inscription and archive. Indeed, of all the possible hopes the medical community had for photography, the dream of a universal and portable archive of cases is the most persistent.

Correlation, Series, Repeatability

Having outlined the types and uses of medical photography, we can now consider the relationship between medical observation and the photographic image. What did nineteenth-century physicians talk about when they talked about observation? First, they insisted on the difference between careful and careless observation, which lies in the ability to apply diligently a prescribed method. Textbooks at the time sought to outline this method for students and junior practitioners. British physiologist Thomas Laycock (1812–1876) wrote one such text, in which he made it clear: "The foundation of medical experience is observation of disease, and the requisites to successful observation are minuteness and accuracy. The clinical student must therefore make up his mind to be sedulously minute and carefully accurate in investigating the cases under his notice." German pathologist Rudolph Virchow (1821–1902) described in detail his method of performing autopsies. Autopsies conducted in a haphazard way promoted interpretive error, he argued, so he "drew particular attention to the necessity of insisting—in autopsies for medico-legal purposes, as in everything else now—upon completeness of examination and exactness of method, both in the investigation and in note-taking, so that it might be decided subsequently, though not in anticipation, whether there was any significance or importance in what was observed, or whether it was accidental and unessential." Virchow was particularly careful to describe exactly what and in what order should be observed in an autopsy. Laycock, Virchow, and others emphasize the importance of method in observation, and their equal emphasis on accuracy, detail, and completeness already echoes the rhetoric of the discourse on medical and scientific photography.

These authors therefore recognized, as did Bernard, that observation is never merely looking—it is also an intellectual process of comparison. The physician compares the diseased organ, for instance, with other organs around it, but also with his or her previous experience of that organ.

Virchow gives an example: "The freer the incision—always supposing that it is an even one—the larger will be the field of view, the more numerous will be the points of comparison between normal and abnormal parts, and the more exactly shall we be able to estimate the extent of the pathological territories." Here Virchow's equation of the "field of view" with the "points of comparison" emphasizes the importance of correlation for observation. Likewise, Laycock argued that his method, essentially, "is based upon simple observation of the phenomena, and comparison of them with one another, and with the knowledge which the practitioner has acquired of similar phenomena, either by instruction or experience." In practice, then, there is hardly room for "simple" observation, given the constant activity of isolation and recognition of elements in the field of view. Observation is always comparison and correlation. Because of this constant mental process, observation goes hand in hand with what Bernard called "experimental reasoning," but which was also often called "medical logic"—the principles of reasoning behind observational and experimental methods in medicine.

Fleck and Foucault both argue that medical logic of the nineteenth century owed much to the concept of the series, especially the rise of statistical methods that used the series in computation. According to Foucault, this combination of medicine and statistics "opened up to investigation a domain in which each fact, observed, isolated, then compared with a set of facts, could take its place in a whole series of events whose convergence or divergence were in principle measurable." Each case history became one in a series; facts, such as symptoms or signs, became significant only insofar that they were repeated. As one nineteenth-century physician proclaimed, "With each new case, one might think that we were presented with new facts; but they are merely different combinations, different subtleties: in the pathological state, there is never more than a small number of principal facts; all the others result from their combination and from their different degrees of intensity." The finite number of combinations meant that each presumed "new fact" could be placed in a series of similar "facts." Through the repetition of these facts and their variation—and with its numerous case histories, the clinic allowed an almost endless repetition of symptoms and facts—researchers began to see the pattern that became the essence of the disease.

Like the clinic, both the medical archive and the medical atlas demonstrate the practical connection between observation and correlation. Each showed that medical observation entails the isolation, orderly ar-
arrangement, and careful comparison of different examples of the object under examination.\textsuperscript{9} Photography amplified and, to a certain extent, transformed the character of each of these institutions, in that the photograph became an easy substitute for the patient or the medical specimen. But more importantly, photography promoted a proliferation of cases that simultaneously affirmed, codified, and extended series logic. That is, this feature of photography corresponded to the logic of medical perception. As Fleck notes, "It is only numerous, very numerous, observations that eliminate the individual character of the morbid element."\textsuperscript{10}

Here I want to emphasize the repeatability of the photographic image. By this I do not mean photography's reproducibility—the ability to make a number of prints of the same image—but its ability, especially after the development of instantaneous photography in the 1880s, to take a number of different shots of the same object, or to take a number of roughly the same views of different objects. This ability gave photography a tremendous advantage over hand-drawn illustration: it gave the physician a series for comparison. But it also corresponded to—even instantiated—popular principles of medical observation. When Laycock discusses the application of statistical methods to medical research, he insists that "it is most essential that the observations, facts, or events, be as nearly alike as practicable" and that "the number of observations must be considerable."\textsuperscript{11} Photography's ability to isolate, frame, and repeat similar cases was a powerful aid in the standardization and multiplication of observational views. We should also note that arrangement of photographs in a series allowed not only their sequential organization, but also their simultaneous presentation. Georges Didi-Huberman has argued that Charcot's arrangement of his patients into living tableaux functioned like tables of data by organizing their signs into simultaneous events.\textsuperscript{12} Photography allowed this same organization, and much more easily. In series photography, the sequence was important because it suggested a causal order or chronology, but the simultaneous display of images was arguably equally essential to the process of comparison and correlation. Series photography, as a research tool that could allow both sequential analysis and simultaneous display, succinctly articulated the ideals of medical observation and logic.

**Detail, Presence, Contemplation**

The photographic archive presented physicians with unlimited opportunities to observe and compare. It is true that looking at a photograph was different from bedside observation of a patient, which emphasized the temporal development of signs and symptoms. But sometimes doctors called upon photographs to fulfill this function as well, as in the work of American physician Samuel Powers, who used photos to track the development of smallpox in a patient over several days (figure 3.2).\textsuperscript{13} Nevertheless, to the extent that repetition is a fundamental feature or application of the medium, it mimicked the clinic's emphasis on series.\textsuperscript{14} The case with which photography generated series of images of cases corresponded to the dream of a limitless well of evidence. This dream, however, presupposed the evidentiary status of the individual image. It presumed that each image was a window; seeing through enough of them could give the observer a vision of the whole field. It assumed, in other words, that each image was a fragment or representative of the whole archive. What aspect of the photographic image allowed this assumption? I would argue that it was not simply the automatic, mechanical character of the camera that underwrote its evidentiary status, but the photographic image's abundance of detail. Furthermore, photographic detail emulated and promoted an already established habit of observation—the complete description.

This is not to ignore the problems that photographic detail presented to nineteenth-century practitioners. Unlike human illustrators, who could select the salient elements of the specimen to include in the drawing and leave out the extraneous and potentially confusing details, the undiscerning eye of the camera included everything. It was often hard to tell exactly what was at issue in a photograph, what the illustration was actually meant to illustrate, because the camera could not emphasize, say, texture or shape. An editorial from 1886 voiced a common complaint: "photographs of diseased viscera often fail to instruct the observer, but rather remind him of Ovid's description of chaos."\textsuperscript{15} For these researchers, the photograph had to learn how to "point" before it could be used as an instructional tool.\textsuperscript{16} Richard Kretz (1865–1920), a professor of pathological anatomy at the University of Vienna, agreed that because it could be difficult to find the essential point in photography's "wealth of detail," photography could not be used as a categorical replacement for drawing.\textsuperscript{17} Yet Kretz goes on to say that photography "in many cases is able to perform similarly and to render services that are virtually irreplaceable in scientific cases, as when the photograph of flagellum-bearing bacteria proves their existence in the most striking manner, because the photographic plate first presents to the expert [bewusstseins] eye, in the most detailed and unbiased condition, scarcely detectable objects with unquestionable clarity."\textsuperscript{18} Despite
the pedagogic problems that an abundance of detail could cause, for most physicians the “unquestionable clarity” of the photographic image was, along with the potential for objectivity (“unbiased”) and discovery (“scarcely detectable objects”), its most highly prized attribute. Indeed, the clarity and texture of the image, its ability to represent the structure and randomness of the natural world, were arguably the most important features for its applications in medicine.

Discussions of photography’s advantages to the discipline invariably emphasized its ability to represent—that is, substitute for—the object or patient. This is what physicians meant when they applauded photography as “natürlich,” or “faithful to nature.” Of course, not every aspect of the photograph is perfectly faithful to nature, but in these discussions, “natürlich” referred most often to the level of detail that allowed the photographic image to reproduce patterns of texture and variation. Kretz writes, “Photography is perfectly faithful to nature, that is, the images reproduce . . . all forms and proportions, the distribution of light and shadow in a completely correct manner.” Or Ludwig Jankau declares, “In medicine today, especially in practical medicine, the first requirement is that preparations and such, especially the conditions of the illness, are reproduced exactly as they are. And if reproductions faithful to nature, what can offer us more guarantee than photography?”

This “fidelity” referred not to color or depth or emphasis or any of the aspects of nature and observation that many complained photography could not represent well. Instead, it referred to the same qualities that brought the scientific curiosity to bear on nature in the first place: the abundant variations on patterns of similarity and difference found in the forms and random textures of natural phenomena. Because photography could replicate these forms and textures with such detail, it could act as a substitute or a representation of the patient. This is also why photography was so often equated with immediate and efficient description. “A glance often teaches more than pages of description,” intones Jankau, while Kretz writes,

Kretz may be suggesting that “a picture is worth a thousand words,” as it were, but there is something more to be said here. Kretz describes an observer who directed his or her gaze to the photograph as a substitute for nature itself. The photograph was both an apparently agent-less record of nature, effectively used as a substitute for it, and an enunciation that functioned as a description of nature. The photograph was at once an image and a description—that which is visible is already wholly expressed. The abundance of detail in the photographic image worked in two, contradictory ways. It was at once a tangle of data that required prolonged (and perhaps frustrating) study, and a complete rendering that—if the image was scientifically legible and the eye expert—could be grasped immediately. Lorraine Daston has called this aspect of scientific observation “all-at-once-ness.” Discussing Descartes’s reversion to the language of vision in his quest for ontological bedrock, she notes that “despite all the well-known illusions, the imprimatur of the real, the true, and the certain is the immediate, implicit all-at-once-ness of perception, especially vision.”

This was especially true of the photograph and the observer’s relationship to it. The density of the photographic image not only brought it closer to the ideal description—an immediate, acceleration of knowledge without residue or ambiguity—it also gave the image a presence unlike any previous medium.

Because it could present the object of study in this way, the researcher could use the photographic image as a source of information and discovery. The photograph, more than hand-drawn illustration, acted as a landscape over which the expert eye could roam, and within which discoveries could be made. The photograph was, to be certain, no substitute for observation—the still, flat image could not replicate the act of observation with its intricate process of recognition and comparison. But it did fix a view, which allowed a leisurely, contemplative approach that was fertile ground for detection and correlation. And contrary to the popular conception of the scientist, the aesthetic, contemplative approach was absolutely central to the practice of scientific and medical observation. As Billroth rhapsodized, “Solitary, meditative observation is the first step in the poetry of research, in the formation of scientific phantasies, the reality of which we then test with the tools of logic, mathematics, physics and chemistry. Our tests will be the more successful the better we have learned to handle these tools. The diseased organism, the patient, must be observed in just this way, thoughtfully, and in a state of mental solitude and meditation.”

Contemplation was an integral part of “the poetry of research.”
The aesthetics of scientific observation began with the contemplative gaze and the search for pattern. Because of its density and texture, the photograph could trigger this meditative gaze, and because of its repeatability, it encouraged the search for pattern. One British physician suggested, “A good radiograph in some respects may be said to resemble a painting by Turner. Without intuition or previous study the one is almost as incomprehensible as the other, but as we gaze the wealth of detail rises before our vision until finally we are able to interpret the meaning of streaks and shadows that to the untrained eye are meaningless.” Here the medical gaze takes on a quasi-aesthetic character. What connected the radiograph and the Turner was the observer’s search for pattern. For the critic, the pattern was given, whole, in the painting. For the physician or scientist, the pattern in nature must be discerned from a series of examples. Like art, the photograph presented a new point of view to challenge one’s own. Like nature, the photograph presented an organized field of view or worldview, but the appearance of raw data from which the observer discerned a larger pattern correlated from a series of examples. The line between the aesthetic and the scientific was perhaps not as stark as we might think.

Indeed, in the following passage, Billroth describes the importance of imagination in medical training:

Easily to reproduce sense impressions, to visualize a highly complicated sequence of events, to be able without difficulty to imagine all the different possible results of normal and abnormal processes—in short, to see a thousand things at once and to sense their interrelations—these are the essential qualifications for scientific research. The ready capacity to reproduce sense impressions imaginatively, the sharpening of the powers of observation, the orderly arrangement of mental images in vivid and living pictures, facility in the so-called inductive method of reasoning—these are the qualities that the teacher of science and of medicine must develop in his students; and to this end a certain amount of preparation is indispensable.

Unwittingly, perhaps, Billroth sketches here precisely why photography would be so valuable for scientific and medical research. Not because it documented nature, not because it was objective—although we would be foolish to deny the importance of these properties—but because it aided observation and imagination. It “reproduces sense impressions,” “visualizes a highly complicated sequence of events,” “sharpened the powers of observation,” and allows the researcher “to see a thousand things at once and to sense their interrelations.” Photography, more easily and more persuasively than any hand-drawn illustration, functioned like the physician’s own powers of observation and imagination.

Conclusion

So I am suggesting that certain features of photography—especially those that obtain during the act of viewing the image—corresponded to certain aspects of practical medical observation. Examining the interaction between image and observer highlights characteristics different from those that show up when we focus on the relationship between object and camera. Shifting our attention in this way brings us to a broader understanding of the acceptance of photography as an instrument in medicine and the sciences. That is, photography was not just a handy tool readily available and hence quickly adopted. Nor was it its mechanical, automatic character the only reason for its rise in popularity. It also presented researchers with a set of features that spoke to established and emerging principles and habits of observation. It was not just how it was made that gave the photograph its scientific legitimacy, but how it was looked at.

Notes

4. Gianna Pomata, “A Word of the Empirics: The Ancient Concept of Observation and Its Recovery in Early Modern Medicine,” paper presented at the Science in Human Culture Program, Northwestern University, April 2009. For the eighteenth-century view of observation, see Daston and Galison, Objectivity. Perhaps part of what is at issue is the definition of “activity” in relation to observation; scientists up to the nineteenth century readily conceded that observation was an active, cognitive process, but for Bernard and others, it was helpful to distinguish between activities that physically intervened and those that did not.


13. William Keiller, MD, “The Craze for Photography in Medical Illustration,” *New York Medical Journal* (23 June 1894): 788–89. In the same issue there are a variety of articles that use photography for medical illustration, giving some substance to this complaint.


21. Fox and Lawrence, Photographing Medicine, 21–27.


23. Comparing these two types of portraits—which, we should be careful to note, was not a common practice—we see that one of the by-products of the genre is an implicit contrast between the healthy or “normal” physician and the “pathological” patient, a distinction that was probably helpful, if not explicit, during medicine’s budding professionalization. As concerns privacy and sensationalism rose, conventions for photographing patients gradually moved away from those of portraiture; these changes also coincided with the growing legitimacy of the medical profession. For more on the conventions of portraiture in clinical medicine, see Chris Amrhein, “Posing the Subject of Early Medical Photography,” Discourse 16, no. 2 (Winter 1993–94): 51–76.


28. In the United States, for example, George A. Otis (1830–1881), assistant surgeon of the United States Army, was instrumental in collecting wartime medical photographs into a monumental, multivolume edition of The Medical and Surgical History of the War of the Rebellion (1861–65), which was published in the 1870s and 1880s. See Joseph K. Barnes, Joseph Janvier Woodward, Charles Smart, George A. Otis, and D. L. Huntington, The Medical and Surgical History of the War of the Rebellion (1861–65), 3 vols. (Washington: Government Printing Office,

35. An example, picked more or less at random, is Adolf Magnus-Levy, *Ueber Organ-Therapie beim endemischen Kretinismus*, *Verhandlungen der Berliner medicinischen Gesellschaft* 34, Part II (1903): 350–57. See also the discussion of this presentation on 22 July 1903 in Part I, pp. 246–49.


38. On the scientific atlas, see Daston and Galison, *Objectivity*.


43. Ibid., 40.

44. Laycock, *Lectures*, 94.

46. Foucault, Birth of the Clinic, 97.
49. Of course, I do not want to argue that this method is unique to medicine, since it is an age-old practice in science as well. But my argument assumes the successful integration of scientific principles into medical observation, even if this integration was at times contested. For more on this debate, see John Harley Warner, "Ideals of Science and Their Discontents in Late Nineteenth-Century American Medicine," Isis 82, no. 3 (September 1991): 454-78.
50. Fleck, Same Specific Features of the Medical Way of Thinking,” 40.
51. Laycock, Lectures, 169.
52. Didi-Huberman, Invention of Hysteria, 24-25.
54. Photography also fits into the emphasis on repetition, demonstration, and visual stimuli common to nineteenth-century German pedagogy, especially the tradition of Anschauungsunterricht ("visually based method of instruction"). This tradition was especially important to nineteenth-century medical education's investment in demonstration, as opposed to mere book learning. I cannot develop this connection here, but for an example, see S. Stricker, "Ueber den Anschauungs-Unterricht in den medicinischen Schulen," Medizinische Jahrbücher 82 (1886): 120-52, esp. 135.
56. On "visual pointing" in medical photography, see Martin Kemp, "A Perfect and Faithful Record: Mind and Body in Medical Photography before 1900," in Beauty of Another Order: Photography in Science, ed. Ann Thomas (New Haven, CT: Yale University Press, in association with the National Gallery of Canada, Ottawa, 1997), 122. The abundance of detail was only one problem, however. Researchers quickly recognized that the photograph did not always depict faithfully and that what they saw was not always what they got in the image. For example, until the introduction of orthochromatic and panchromatic photographic emulsions in 1884 and 1905 respectively, the reddish-yellow color of anatomical specimens came out too dark in photographs unless special precautions were taken. See Gernsheim, "Medical Photography in the Nineteenth Century," 87. Kelly Wilder, in Photography and Science, rightfully emphasizes that standardization was definitely not photography's strong suit in the nineteenth century. For more positions against photography, see Daston and Galison, Objectivity, 161-79.
58. Ibid., 832.
66. Theodor Billroth, The Medical Sciences in the German Universities, 102.