



PHILLIP PRODGER

DARWIN'S CAMERA

ART AND PHOTOGRAPHY IN THE THEORY OF EVOLUTION



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LO, here a CAMERA OBSCURA is presented to thy view, in which are
lights and shades dancing on a whited canvas, and magnified into
apparent life!—if thou art perfectly at leisure for such trivial
amusement, walk in and view the wonders of my ENCHANTED GARDEN.

— ERASMUS DARWIN, *The Botanic Garden*

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TIMELINE

-
- 1806 Charles Bell's *Essays on the Anatomy of Expression in Painting* published
 - 1809 Birth of Charles Darwin
 - 1816 Fitzwilliam Museum, Cambridge, founded
 - 1824 National Gallery of Art, London, founded
 - 1825–27 Darwin studies at University of Edinburgh, attends Charles Bell's lectures on expression
 - 1827–31 Darwin studies at University of Cambridge, visits Fitzwilliam Museum
 - 1831–36 The voyage of the H.M.S. *Beagle*
 - 1839 *Journal of Researches*, also called *The Voyage of the Beagle*, published; Invention of photography announced
 - 1851–52 Wet-plate negatives available
 - 1857 Oscar Rejlander, *The Two Ways of Life*, exhibited
 - 1859 *On the Origin of Species* published
 - 1862 G. B. Duchenne de Boulogne, *Mechanism of Human Facial Expression*, published

- 1865 Louis Agassiz, photographic survey of Brazil to disprove evolution
- 1869 Thomas Henry Huxley begins photographic survey of peoples of British Empire
- c. 1869 Darwin begins to collect photographs of emotional expressions
- 1871 *The Descent of Man* published
- 1872 *Expression of the Emotions* published
- 1872–73 Muybridge photographs of galloping horses
- 1874 First gelatin dry-plate negatives available (not mass-produced until 1880)
- c. 1878 Francis Galton begins to make composite photographs
- 1882 Death of Charles Darwin

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PREFACE

THIS BOOK BUILDS on the achievements of the “Darwin industry,” that large international community of scholars who have dedicated themselves to studying Charles Darwin’s life and work. Darwin is an intriguing subject, and not just because his theories were important and controversial. He wrote letters to nearly everyone he knew, kept copies of virtually all incoming and outgoing correspondence, and made organized notes about his ideas as they developed. So he is not just an extremely interesting scientist, he is also an ideal test case for how scientific theories developed and spread in Victorian England.

In 1948, largely as a result of the efforts of his son Francis, the majority of Charles Darwin’s archive was transferred to Cambridge University Library, where it is currently held in the library’s department of manuscripts. Although many interesting items are scattered in other locations—there are smaller concentrations, for example, at Darwin’s last home, Down House, in Downe, Kent, and at the John Murray Archive in London—the material at Cambridge is authoritative. Cambridge boasts approximately 9,000 of the 14,500 known letters sent to and from Darwin in his lifetime, as well as his notebooks, nearly all of his personal library, and numerous related items such as handwritten manuscripts, edited proofs, newspaper clippings, and even a handful of specimens from the *Beagle* voyage.

The Cambridge archive also includes an amazing collection of original photographs, drawings, watercolors, and prints commissioned, collected, and in some cases even drawn by Darwin, which are the heart

of this book. Most are kept in posthumously bound albums, where they roughly reflect the order in which Darwin organized them (figure P-1). A Herculean project to catalogue and transcribe the letters in the archive, called the Darwin Correspondence Project, began in 1974 and is ongoing. There is an enormous amount of work to do—transcribing, checking, and cross-checking. As of this printing, the project has published bound transcriptions of all known letters through 1867 and has made most other letters available online. At the time I performed the research for this book, the letters from the late 1860s and early 1870s, when Darwin began to look seriously at art and photography, had not been published. The Darwin Correspondence Project team was an enormous help in my research, sharing early drafts of key letters and pointing out interesting connections. Nevertheless, because published versions of most relevant letters did not exist, the transcriptions contained herein, unless specifically noted, are my own. I should also note that the Darwin Correspondence Project has for the time being set aside visual material such as prints, drawings, and photographs for later study. As a result, all identifications of artists, titles, dates, and media are also my own.

Darwin identified his notebooks by letter. Notebooks “M” and “N” record Darwin’s ideas about emotional expression; I cite these often in this book. He drew heavily on these notes while writing *The Expression of the Emotions in Man and Animals*, published in 1872, which is discussed at length herein. *Expression* was written when Darwin was about sixty-three years old, after several other landmark books, including *The Voyage of the Beagle* (more properly titled *The Journal of Researches*, 1839) and *On the Origin of Species* (1859). The notebooks, however, were begun much earlier. Darwin began notebook “M” in 1838, just before the publication of the *Voyage of the Beagle*. “N,” which he started when “M” was full, began in 1856, three years before the publication of *Origin of Species*. In other words, Darwin began thinking about emotional expression early in his career, long before publishing his famous theories of evolution. As the notebooks show, the questions Darwin addressed in *Expression* nagged at him for at least thirty-four years.

Expression contains wood engravings and photographs. The wood engravings, which Darwin referred to as “figures,” appear as vignettes embedded in the main body of the text. Photographs were collected on separate pages, which Darwin called “plates.” Darwin also referred to his photographs as figures, but referenced them with the plate number to distinguish them from the engraved figures: plate 1, figure 1; plate 2, figure 1, and so forth. I have adopted this convention in this book, using Darwin’s figure number alone when a wood engraving is mentioned, and using plate and figure number together to refer to *Expression* photographs. To distinguish Darwin’s illustrations from the ones herein, my illustrations are numbered with both chapter and figure numbers.

Opposite:

P-1 A page of photographs by Oscar Rejlander from the Darwin Archive, 1871–72. Albumen prints.

INTRODUCTION

WE TEND TO think of photography as having been born whole, with all the ease and authority it currently commands. But the rival processes that the Frenchman Louis Daguerre (1787–1851) and the Briton William Fox Talbot (1800–77) invented around 1839 bore little resemblance to photography as we now know it. Daguerre’s photographs were made directly on metal plates, and Talbot’s with paper negatives, so there were physical differences between the way early photographs looked. Each process also had its strengths and weaknesses, but they shared similar limitations. Chemistry was slow, requiring long exposure times. Ready-to-use materials were not available, so photographers were required to make their own plates and negatives, sensitize them before use, and develop them shortly thereafter. The whole ordeal was expensive, fraught with error, and required specialist training. Success was hard-earned.

The qualities we now associate with photography—consistency, accuracy, economy, and convenience—were unknown to the first practitioners. This meant that photography itself was viewed in very different terms. The idea that it could be objective—that the camera might be used to record things impartially better than a human can—was several decades away. Some commentators imagined photography would one day achieve objective status, but no one argued that the young medium was inherently privileged. Exciting, yes, and distinctive—photographs looked great, they were reproducible (though not nearly as easy to re-

produce as they would later be), and they enabled the more-or-less simultaneous recording of lots of detailed information. But they did not enjoy any sort of special standing. They were seen principally as an alternative to drawing or printmaking, complete with the limitations associated with those media.

In the nineteenth century and before, viewers believed prints and drawings if they met several mutually reinforcing standards. The information they conveyed had to be plausible; in other words, they had to fit with viewer's expectations, evaluating whether a picture resembled a subject or situation that might reasonably exist. The authority of the presenter—in the case of natural history, the scientist who commissioned it—was weighed, and the skill and authority of the artist who rendered it was sometimes considered, too. The best artists were highly coveted, not just because of the quality of their pictures, but also because retaining the right artist added credibility. The participation of a famous illustrator in a natural history work, such as a member of the Sowerby family in England (1700s through 1900s), Georg Ehret (1708–70) in Germany, or Pierre-Joseph Redouté (1759–1840) in France and Belgium, instantly lent authority because those artists were widely regarded as particularly skilled and insightful. And the pictures themselves had to look convincing, regardless of who made them. A crude sketch was viewed with more suspicion than a fine polished rendering—an artist's ability to make realistic-looking pictures had a large role in his or her success.

In all of these criteria, the judgment of the viewer was paramount; essentially, it was up to the reader to determine whether to accept a picture as accurate. This was a negotiated stance—author and artist tried to convince the viewer that what they depicted was real, while the viewer had to decide whether to believe them. This paradoxical position is addressed in a landmark paper published by the historians of science Lorraine Daston and Peter Galison in 1992, “The Image of Objectivity,” and elaborated in their splendid book *Objectivity* in 2007. Daston and Galison describe the increasing clamor for objectivity in scientific illustration over time, as well as the strategies authors and artists used to cultivate the perception of authority and, ultimately, of human noninterference in their works. As Daston and Galison have shown, the drive to achieve objectivity in scientific illustration has a long history, independent of the introduction of photography. Thus, when photography arrived on the scene in 1839, it did not enter a vacuum. It became part of this rich history, and the first authors to use photographs as scientific illustrations acted according to conventions that had been hammered out over previous decades and even centuries.

At first, photographs were judged in exactly the same way as prints

and drawings. The same standards that applied to them—plausibility, authority, skill, and convincingness—applied equally to photographs. But photographic technology improved rapidly. From the 1830s to the 1880s, exposure times were shortened from minutes to fractions of a second. Commercially prepared dry plates were developed for handy use, handheld cameras were invented, and laboratories were created to process and print pictures. Photographs became affordable to make, and photomechanical printing techniques made them increasingly easy to reproduce in books. It took approximately fifty years, but during the latter half of the 1800s photography moved into territory traditional drawing and printmaking could not. Once it became capable of taking pictures faster than what the naked eye could see, it began to affect measures of scientific integrity.

Fast and efficient photography rendered useless the old system of evaluation based on plausibility and authority. No one could judge whether something was right or wrong anymore. Who could decide the way a lightning bolt should look mid-strike? Or the way horses' hooves look as they gallop? Or what a solar flare looks like, or a speeding bullet? Once the vision threshold was breeched, new thinking was required. Photographs assumed a dual role. They illustrated something, but they were also experiments in their own right. They became more than mere pictures—they became data. At that point, scientists became concerned about exactly how their photographs were made. They developed self-contained protocols to enable like-minded scholars to reproduce their results.

This was a time of profound transition in visual culture. It was also precisely the time during which Charles Darwin lived and worked. Darwin published his famous account of the *Voyage of the Beagle* in 1839, the same year Talbot announced photography in England. The maturation of Darwin's theories paralleled the development of increasingly sophisticated photographic technologies. Year after year, photography got better, and year after year, Darwin extended and refined his theories.

This might have been little more than a historical coincidence, except that Darwin eventually found advancements in photography irresistible and began to use photography in his work. Consequently, he became a prominent voice in scientific photography, and his efforts in the field helped shape photo history. He was not a photographer, nor is there any evidence he ever made photographs of his own. Wide-ranging in his interests and concerned with how his books were illustrated, Darwin took great pains to find just the right pictures to make his books compelling. In his first books he used familiar techniques such as lithography and wood engraving; in the late 1860s and early 1870s he began to use photography. At the time, the medium still suffered from pronounced

technical limitations, and practitioners were only just beginning to have success photographing moving subjects. Yet with the publication of his sensational book of 1872, *The Expression of the Emotions in Man and Animals*, Darwin became one of the first scientists ever to publish photographs in a scientific treatise and made significant inroads in action photography. As with his science, Darwin was ahead of his time.

Darwin's Camera tells the extraordinary story of how Darwin not only changed the course of science but also forever changed the way pictures are seen and made. Using photographs to depict fleeting expressions of emotion—laughter, crying, anger, and so on—as they flit across a person's face, he managed to produce dramatic images at a time when photography was famously slow and awkward. The things he wanted to photograph changed too quickly to be photographed easily, and he struggled to get the pictures he needed. So he scoured the galleries, bookshops, and photographic studios of London, looking for pictures to satisfy his demand for expressive imagery.

He finally settled on one of the giants of photographic history, the eccentric art photographer Oscar Rejlander, to make his pictures. It was a peculiar choice. Darwin was known for his meticulous science, while Rejlander was notorious for altering and manipulating photographs. Their remarkable collaboration, and the lengths they went to in order to create the pictures Darwin needed, is one of the astonishing revelations in this book.

Darwin never studied art formally, but he was always interested in art and often drew on his knowledge of the field as his work unfolded. He studied art as a student and befriended the artists on the voyage of H.M.S. *Beagle*; he visited art museums to examine figures and animals in paintings and read art history books and artists' training manuals. He befriended the celebrated animal painters Joseph Wolf and Briton Riviere and accepted the Pre-Raphaelite sculptor Thomas Woolner as a trusted guide. He corresponded with legendary photographers Lewis Carroll, Julia Margaret Cameron, and G.B. Duchenne de Boulogne, as well as many lesser lights. This book provides the first examination ever of these relationships and their effect on Darwin's work, and how he, in turn, contributed to the way scientific illustrations are made and understood.

Photographic illustration was an inexact process. Because there were no preset rules for using photographs in books, Darwin attempted to create them. Working at a time when printmaking still dominated scientific illustration, he internalized prevailing notions about authority and authenticity in picture making. In this regard, he was a transitional figure, with one foot firmly in the past—lessons learned from the books he knew and admired—and one foot in the future, with the enormous

potential he recognized in photography. He was somewhat inconsistent in his approach, and the way in which he compromised between these two poles demonstrates the incremental nature of paradigm shifts, such as photography's rise as a dominant form of scientific illustration. Darwin contradicted himself at times, but he never meant to deceive. Even his foes conceded his scrupulous honesty and commitment to seeking truth; in shaping his illustrations, he attempted to convey accurate information pertinent to his theories.

This is not a book that weighs the virtues of Darwin's theories of evolution by natural and sexual selection, which have been treated at length by many capable authors. Rather, it is a journey, funny and amazing at times, into a time, a place, and a culture. Darwin worked at a decisive time in the histories of science and art. The British Empire was at a peak, incredible advancements in technology and medicine were announced almost daily, and the world of ideas was developing at a dizzying pace. Major discoveries occurred almost routinely, and entire disciplines were created, debated, and defined. When Darwin went to school, the idea of becoming a professional scientist was almost inconceivable—the word “science” as we now know it had not even been coined. Yet he became the archetypal scientist of his day. Information flowed fast and furious, and Darwin, arguably one of the most inquisitive men who ever lived, soaked it up like a sponge. His contributions to many fields—evolution, botany, geology, and psychology among them—are widely known. Now we must add his decisive influence on the history of art to his impressive list of accomplishments.

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DARWIN'S CAMERA




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1

Darwin's Art Collection

THE PRINTS, DRAWINGS, AND PHOTOGRAPHS DARWIN
COLLECTED IN THE 1860S AND 1870S



Collecting, Charles Darwin wrote in his *Autobiography* in 1876, was his passion. It “was very strong in me, and was clearly innate,” he stressed, a side of his personality that fueled his scientific undertakings.¹ Having made a name for himself with the publication of *Voyage of the Beagle* in 1839, he continued to study natural phenomena throughout his career. Over time, his research into the flora, fauna, and geology seen on the voyage of H.M.S. *Beagle* gave way to other interests. With them grew needs for new specimens, from orchid flowers to earthworm castings. Yet his basic method did not change. It was typical of Darwin that when embarking on a new inquiry, he would first acquire, classify, and study as many examples of his subject as he possibly could.

In the late 1860s and 1870s, Darwin turned his attention to emotional expression, a subject different from any he had studied previously.² For much of his earlier work, it was enough to look at dead specimens. Expressions, by contrast, are fleeting, complex behaviors, not simple things that can be sampled in a conventional way. Although they typically come together in a recognizable posture—a smile or a frown, for example—most are composed of dozens of associated muscle contractions. One contraction may precede another, causing an expression to unfold in phases over a brief period. The scientist’s job is complicated by the need to identify which phases of activity are critical, singling out moments when related motions coalesce. Once that is settled, there are degrees of ex-

pression to consider (a chuckle is not the same as a guffaw, for instance), and humans have the uniquely frustrating ability to feign expressions. Darwin, however, wished to study only expressions as they occurred naturally. Acting was a good way to approximate behaviors that could not be seen any other way, but only genuine expressions of happiness, sadness, terror, and ecstasy were suitable for study. What was Darwin to do?

Expressions themselves can be observed, but not collected; the best he could hope for were pictures. One promising source was artists' renderings, so Darwin began by studying expressions in paintings, drawings, sculptures, and prints. Contemporary and ancient art were equally useful. Modern art might better reflect modern sensibilities, but older examples could confirm the existence of behaviors across generations. Yet, manually produced pictures were prone to all sorts of error. The hand of the artist was central to the result; skill in capturing the truth of a situation varied. Besides, works of art are made to communicate ideas, not facts. When artists resort to visual shorthand to represent certain behaviors, as they frequently do, they defeat meaningful analysis. Artists trade in viewers' perceptions, not accuracy for its own sake. It was no good to Darwin if a painter made a subject green with envy, or showed him growling like a lion. Darwin required realism. The comparatively new medium of photography offered a possible answer to these problems, so Darwin began to collect photographs.

In the 1860s and 1870s, with rapid improvements in technology, photography began to be accepted as a practical alternative to manual illustration. Unlike drawings, which are limited by the skill and integrity of the artists who produce them, photographs were thought to afford an objective means of recording empirical events. The question of what constitutes objectivity in the history of science is a subject of lively scholarly interest, discussed by the historians Lorraine Daston and Peter Galison in their book *Objectivity* (2007) and in their landmark 1992 paper "The Image of Objectivity." In retrospect, it is clear that early photographs were at least as contrived as the drawings they were supposed to replace, but scientists increasingly came to equate photography with accuracy in representation. Like many of his colleagues, Darwin accepted the apparent superiority of photography in certain applications. As a result, the photographs he collected assumed a dual role: as specimens for developing his theories and as evidence to demonstrate the validity of his ideas.

Darwin described the ephemeral nature of expression as one of the "main sources of error" inherent to the study of emotional expression:

From the reasons above assigned, namely, the fleeting nature of some expressions (the changes in the features being often extremely slight);

our sympathy being easily aroused when we behold any strong emotion, and our attention thus distracted; our imagination deceiving us, from knowing in a vague manner what to expect, though certainly few of us know what the exact changes in the countenance are; and lastly, even our long familiarity with the subject—from all these causes combined, the observation of Expression is by no means easy, as many persons, whom I have asked to observe certain points, have soon discovered.³

Photography enabled Darwin to capture behaviors for analysis without depending on artists. Artists attempting to render expression are constrained by their ability to accurately absorb and recall the intricacies of the events they witness. Darwin's annotations on the drawings he collected reveal that he frequently disagreed with the details of artists' renderings. While not yet capable of producing truly instantaneous images, photography enabled him to record action without relying on others to witness, visualize, and transmit complex information.

Unlike living subjects, photographs provided a fixed record of activity that could be examined at leisure. They were solid, stationary samples, much like the natural history specimens he so treasured. They were valuable in that they represented discrete moments in complex events and could be used to isolate constituent elements of behavior. This capacity of images of any kind to stand in place of scientific specimens is what the theorist Bruno Latour has described as the “immutable mobile.”⁴ Darwin collected photographs of expression as substitutes for expressions themselves, since they are difficult to observe effectively with the naked eye. Yet the photographs did not stand on their own. Darwin also used them to supplement his first-hand observations of expression in friends and associates.

Darwin's book *The Expression of the Emotions in Man and Animals*, published in 1872, extended Darwin's theory of evolution by natural and sexual selection to the realm of the mind; it was arguably his boldest extension of evolutionary theory. In *On the Origin of Species* (1859) Darwin described the natural selection of organisms best adapted to compete with others for scarce resources. He explained how physical adaptations determine whether living things will survive and breed in a given environment. This is the book in which Darwin laid out his so-called survival of the fittest doctrine, though he actually never used that phrase in the book.

The Descent of Man, and Selection in Relation to Sex, published in 1871, a year before *Expression*, extended Darwin's evolutionary theories to consider how organisms attract mates. It was also the first book in which the evolution of people was addressed. “I have been led to put

together my notes,” he wrote, “so as to see how far the general conclusions arrived at in my former works were applicable to man.”⁵ Darwin examined human beings, their physiology, and behaviors, and discussed in detail the secondary sexual characteristics of animals. *Descent* is best known for its analysis of attractive patterning in animals, for example, in butterfly wings, birds’ feathers, and the colors of tropical fish. It also contains Darwin’s most direct claims for the animal ancestry of *Homo sapiens*, a subject with which he had been identified ever since the publication of *Origin*, but which he had diplomatically avoided. Conceptually, *Descent* is an ambitious and at times difficult work, designed to address some of the criticisms leveled against *Origin* by considering not just how animals find food and survive in harsh climates, but also how they interact with members of their own species.

Expression emerged from that effort. In it Darwin explored emotional expression as a special type of behavior, describing how expressions affect survival. Originally, Darwin thought it might form a single chapter in *Descent*, but, he explained, “as soon as I put my notes together, I saw that it would require a separate Treatise.”⁶ Unlike many scholars of his generation who considered emotion to emanate from the soul and expression a gift from God, Darwin viewed expressions as evolutionary phenomena. He considered them as signals: the vestigial result of something useful in earlier times. For example, he argued that the expression of anger, characterized in humans by baring the teeth and snarling, was related to the ancestral instinct to bite in self-defense. This type of convergent behavior seemed to Darwin to prove the common ancestry of humans and other life forms. According to Darwin, people owed the language of emotional expression to the survival needs of their animal progenitors—we can literally see our animal origins in the way we act.

Expression was among the first scientific books ever published with photographic illustrations, and the only photographically illustrated book produced by Darwin. A handful of other books with scientific themes were published with photographic illustrations prior to or at approximately the same time, but none was so widely circulated, and none so immediately influential.⁷ Darwin’s publisher, John Murray, at first opposed the idea of using photographs to illustrate the book, informing Darwin that it would make *Expression* a money-loser, costing an additional £75 per 1,000 sets.⁸ After startup costs and sales of foreign editions were taken into account, Darwin calculated it would ultimately add one shilling and six pence to the cost of each volume,⁹ at a time when “the public are accustomed to words at 2 shillings.”¹⁰ But Darwin, then one of the most powerful authors in the world, insisted, and the photographs went ahead.

Darwin knew photographs could have special appeal, not just in selling the book, but also in selling his theories. By the time he began assembling notes for *Expression*, photographers had already begun to challenge the accuracy of other media. The French neurologist Guillaume-Benjamin Duchenne de Boulogne (1806 – 75), for example, had written at length about the physiological inaccuracies of sculptures such as the *Laocoön* in the Vatican, revealed by comparing the original object to photographs of models in identical poses.¹¹ Similarly, Oscar Rejlander (c. 1813 – 75), who eventually became Darwin’s main source for photographs of expression, had attempted to judge the accuracy of Italian Renaissance paintings by photographing reenactments of the scenes they represented.¹²

Technical problems slowed the adoption of photography in science. The first photographic materials were complicated and awkward to use—to produce even a simple photograph in the late 1860s, negatives had to be made by hand, usually on wet glass plates.¹³ This was tricky, requiring patience and manual dexterity. To make wet-plate collodion negatives, a sticky, noxious solution had to be poured on glass plates before exposure and sensitized immediately, else they would dry and become impervious to the chemicals used to develop them. As a result, preparation and processing had to be performed at the same time that the photographer was taking pictures. Photographers had to be chemists, craftsmen, and time managers as they shuttled from darkroom to studio and back. Evidence of this is visible in *Expression* itself. In one of the pictures Darwin used, the hands of the photographer Oscar Rejlander, who posed for the pictures himself, are stained with the chemicals he used to prepare his negatives (figure 1-1).

To complicate matters, normal exposure times ranged from several seconds to a minute or two, depending on conditions, so that subjects had to remain absolutely still while their photographs were taken. Action, or “instantaneous” photographs, as they were popularly called, were not possible.¹⁴ Many photographers attempted to produce images that *appeared* to have been taken instantaneously, or at least conveyed the illusion of movement frozen in time, but they were limited in what they could do. In the late 1860s and early 1870s, instantaneous photography was an elusive goal. Prizes were awarded in competitions for the most successful instantaneous photographs, and a wide range of photographic paraphernalia, including lenses, light reflectors, and even whole studios were developed with the express purpose of reducing exposure times.¹⁵ Rejlander condemned the practice. “To award a medal for the quickest exposure seems disrespectful. I mistake much if I believe [a photographer would not be] more gratified by being considered the most artistic photographer . . . than being pronounced the quickest at capping his lens.”¹⁶

For Darwin, the problem of producing photographs of rapidly occurring action was paramount. To illustrate *Expression* convincingly, he required images that captured sometimes subtle and ephemeral muscle activity. As he explained in the introduction:

The study of Expression is difficult, owing to the movements being often extremely slight, and of a fleeting nature. A difference may be clearly perceived, and yet it may be impossible, at least I have found it so, to state in what the difference consists. When we witness any deep emotion, our sympathy is so strongly excited, that close observation is forgotten or rendered almost impossible. . . . Our imagination is another and still more serious source of error; for if from the nature of the circumstances we expect to see any expression, we readily imagine its presence.¹⁷

Photography offered a vantage from which Darwin might observe discrete moments in the occurrence of expressions with accuracy and detachment. The unassisted eye was incapable of recording the kind of detail he wanted to study.

There was no obvious single source for the material he needed, so when he began looking for photographs, Darwin tried a variety of possible suppliers, including a number of London shops and studios. He bought the pictures he thought best; many of these are preserved in the Darwin Archive at Cambridge. Some forty-one photographs in

the archive appear to have been bought specifically for their expressive content, including images by the London Stereoscopic Company (1854–1908), the Leicester firm of John Burton & Sons (fl. 1860s), the Italian photographer Giacomo Brogi (1822–81), the French firm of Fernand Vadon & Cie. (active 1860s) and the American photographer James Landy (1838–97).¹⁸

Like an entomologist hunting for beetles, Darwin rifled through hundreds of pictures seeking useful examples of expressive imagery. Inscriptions on the pictures he collected reveal that in the two years before *Expression* was published, he traveled throughout London looking for pictures, from Victoria to Baker Street and Strand to South Kensington. This is remarkable in itself, as Darwin suffered from frequently debilitating illness and preferred to stay home whenever possible. At this stage of his life he generally avoided public outings, retreating to the comfort of his own home. Yet the desire for pictures of expression apparently reinvigorated him.

Any photograph that revealed aspects of the physiology of expression seems to have interested Darwin, regardless of how and why it had been created. He continued to collect prints, drawings, and photographs right up to the time *Expression* was published. He prized photographs most. Although truly instantaneous photography was not yet possible, he examined as many as he could for clues. They provided a broad overview of how expressions were popularly portrayed and perceived. Ultimately he considered most of them unsuitable for inclusion in his book, but they helped shape his ideas.

LESSONS FROM OLD MASTERS

Darwin's search for expressive imagery probably began at the British National Gallery around the late 1860s, where he studied depictions of people in paintings. Sebastiano del Piombo's *Raising of Lazarus* (1517–19) was a particular favorite (figure 1-2), "exciting in me a sense of sublimity," he would later recount.¹⁹ Of all the pictures he could have singled out for praise, this highly mannered composition was a peculiar choice. The painting depicts the critical moment in John 11 when Jesus, prefiguring his own resurrection, brings the pious Jew Lazarus back from the dead. The central figure of Jesus raises his right hand skyward, palm open, simultaneously commanding attention and metaphorically acknowledging the divine power that fills him. His left arm is extended, with his hand pointing to Lazarus and bidding him back to life. Behind Jesus stand the twelve apostles: "doubting" Thomas, who was said to resemble Christ, appears behind Jesus cloaked in a robe nearly identical to the one he wears; Judas is framed in the "U" created by Jesus' raised

arm, isolating him from the other apostles in a clever foreshadowing of his betrayal. At Jesus' feet kneels Lazarus' sister Martha. It is the moment at which Jesus pronounces "I am the resurrection, and the life: he that believeth in me, though he were dead, yet shall he live: And whosoever liveth and believeth in me shall never die" (John 11:25).

Darwin's reference to the painting's "sublimity" may be an allusion to its potent religious theme. However, he also would have been mindful of the scholarly meaning of sublimity associated with the eighteenth-century philosopher Edmund Burke. Burke divided aesthetics into two categories: the sublime and the beautiful. Beauty, according to Burke, is composed of those qualities of things that relax the viewer: picturesque elements pleasing to the eye. Sublimity, by contrast, is made

up of fierce and terrible qualities, elements that excite wonder, astonishment, and even horror. Darwin owned a copy of Burke's famous *Philosophical Enquiry into the Origin of Our Ideas of the Sublime and Beautiful* (1757), in which Burke explained, "The passions which belong to self-preservation, turn on pain and danger; they are simply painful when their causes immediately affect us; they are delightful when we have an idea of pain and danger, without actually being in such circumstances. . . . Whatever excites this delight, I have called sublime."²⁰ He was among the first to analyze aesthetics in terms of physiological effects on the viewer. Sublimity, for Burke, was not an abstract concept, but a fact that could be observed in very real reactions in people. For all its philosophical content, *Enquiry*, with its detailed descriptions of various emotions ranging from curiosity to revulsion, is one of the pivotal books in which the passions were analyzed. It was certainly one of the sources Darwin consulted as he began to write *Expression*.

Darwin's real interest in Sebastiano's painting will never be known. However, the painting does convey Burke's notion of sublimity in the reactions of some of the characters it portrays, a number of which are based on original drawings by Michelangelo. Mary, for example, standing behind Lazarus with her eyes averted from him, raises her hands in astonishment. Saint Peter crouches at Jesus' right foot, his hands clasped in supplication. Perhaps most remarkable, the figure of Saint Andrew, who appears just behind Jesus' left shoulder, raises both hands to the sides of his face in surprise, a behavior Darwin described as characteristic of astonishment in his book (detail, figure 1-3). Indeed, in

Sebastiano's painting, Saint Andrew resembles Rejlander's pose in the photograph Darwin published of him illustrating surprise (figure 1-1). Could it be that Darwin directed Rejlander to Sebastiano's painting for inspiration?

Darwin clearly was looking for ideas in Old Master paintings. In *Expression* he also cited a picture by William Hogarth in which "a drunkard raises his eyebrows, and this gives to him a puzzled, foolish look."²¹ The picture is not identified, but it may have been *Shortly after the Marriage* (1743), the second of six paintings in the series *Marriage à la Mode* at the National Gallery. Darwin also described a "wonderful" Hogarth in which "passion is represented in the plainest manner by the open glaring eyes, frowning forehead, and exposed grinning teeth."²² This is an apt description of the charwoman depicted in the doorway on the right side of the first plate of *Rake's Progress* (1735), which Darwin would probably have known from engravings (figure 1-4). Similarly, his only exposure to Leonardo da Vinci's *Last Supper* (1498) would also have been through reproductions. Of this he noted: "[T]wo of the Apostles have their hands uplifted, clearly expressive of their astonishment."²³

Darwin's family suggested other paintings for him to look at. His cousin Hensleigh Wedgwood, for example, recommended the works of Benozzo Gozzoli (1420 – 97), particularly "a picture in the Campo Santo at Pisa of Noah's daughter looking at her drunken father, called

the Vergognosa de Campos Santo,” which he reported contained a mock depiction of modesty.²⁴ Overall, though, Darwin confessed disappointment with such historical depictions in *Expression*. “I had hoped to derive much aid from the great masters in painting and sculpture, who are such close observers. Accordingly, I have looked at photographs and engravings of many well-known works; but, with a few exceptions, have not thus profited.”²⁵

Darwin also studied natural history illustrations, including those in John James Audubon’s *Birds of America* (1827–38).²⁶ Audubon was celebrated for his contextual realism; his highly detailed birds were frequently shown interacting with other animals, surrounded by appropriate habitat. Darwin, who owned the text to Audubon’s *Birds* but did not possess the plates (though he surely had access to them), quoted Audubon in *Expression*, describing the tendency of barn owls to extend their wings and tail when confronted, hissing and “clacking the mandibles with force and rapidity.”²⁷ Darwin may have had Audubon’s *Barn Owl* in mind; it is one of the most famous pictures in the book, and Audubon’s depiction shows an animal in exactly the pose Darwin described, raising its wing to strike a rival and defend its meal of a freshly killed chipmunk.

COLLECTING PHOTOGRAPHS

As early as 1866, Darwin started to purchase commercial photographs containing details of emotional expression. He may have begun earlier, but it was in that year that he made the first datable reference to his collection, writing to his friend the Yorkshire psychiatrist James Crichton-Browne (1840–1938), “[S]ometime ago I went into several shops in London to try to buy photographs of the insane, but failed.”²⁸

There is also evidence that Darwin’s friend, the scientist Thomas Henry Huxley (1825–95), accompanied him in his first attempts to find photographs. A letter sent to Huxley from an official of the London Stereoscopic Company describes a group of ethnographic photographs jointly intended for Huxley and Darwin: “Enclosed are some extraordinary photographs of which I beg your acceptance. They were (or rather the originals) brought over by Sergeant Catherall from the spot. I think you & Mr. Darwin will feel interested in them. I do not know the latter gentleman’s address or I would send him a set.”²⁹ Although there are no further direct mentions of photographic collecting in the correspondence between Huxley and Darwin, other connections may be inferred. For example, one of the first photographers Darwin contacted in a scientific context was medical doctor turned professional photographer George Charles Wallich (1815–99), whose studio was at

2 Warwick Gardens in South Kensington, near the newly created Royal College of Science and School of Mines,³⁰ which Huxley directed.

Wallich and Huxley almost certainly knew each other. Huxley's appointment books have not been preserved; however, the diaries of Huxley's colleague Henry Cole, first director of the neighboring South Kensington Museum,³¹ and himself a pioneering advocate of photographic reproduction, indicate that Wallich was a visitor to the museum, where he would likely have met Huxley socially.³²

Darwin did not limit his search to expressions in English culture, nor was he interested in subjects of a specific body type. The arguments in *Expression* were universal in scope. He believed most expressions are innate among humans and that shared expressions are evidence of common descent.

Along these lines, Darwin tried to obtain written evidence that different races express themselves in the same way. In 1867 he devised a questionnaire, titled "Queries about Expression," which he sent to correspondents at outposts throughout the British Empire. Originally titled *Expression of Savages* in Darwin's notes (the word "savage" was widely accepted to describe preindustrial societies at the time), the text consisted of sixteen questions later reprinted in *Expression*. It is unclear whether the published questionnaire is the same as the one he sent to his correspondents: similar versions exist with slightly different wording and an additional question concerning the use of a hissing noise as a signal to be silent.³³ The recipients, most of whom were colonists of European descent, were asked to observe whether the native inhabitants of the countries in which they lived expressed emotions the same way Europeans do. "Observations on natives who have had little communication with Europeans would of course be most valuable," he wrote, "though those made on any natives would be of much interest to me."³⁴ The questions ranged from whether the jaw dropped open and the eyebrows rose when a person was astonished, to whether children pouted and protruded their lips when sulky. The leading nature of the questions and the fact that the respondents varied in training and experience rendered the information he gathered suspect; the exercise lacked objective criteria by which results could be compared. In any case, Darwin used the responses to substantiate his claim that expressions were common to all peoples.

Darwin did not request photographs of the observations he sought. He may have wished to have such photographs, but "Queries" was apparently drafted before he had decided to gather photographic evidence. Moreover, if he had appealed for photographs, it is unlikely he would have received them, given the extreme difficulties involved in producing action shots at the time.

Darwin seems to have been as interested in the perception of expressions as he was in the physiology of the persons displaying them. Although he carefully avoided discussing the communicative function of expressions in *Expression* (voluntary expressions, as opposed to instinctive reactions), he acknowledged their two-part importance as signals first displayed by an originator and second understood by a recipient. Darwin showed photographs to others, asking them to judge the persuasiveness of certain depictions and hoping to gauge their authenticity. Usually the targets of this study were friends and family. In *Expression*, he reported the result of one of his private experiments:

Dr. Duchenne has given us a photograph of an old man with his eye-brows well elevated and arched by the galvanization of the frontal muscle; and with his mouth voluntarily opened. This figure expresses surprise with much truth. I showed it to almost twenty-four persons without a word of explanation, and one alone did not understand what was intended. A second person answered terror, which is not far wrong; some of the others, however, added to the words surprise or astonishment, the epithets horrified, woeful, painful, or disgusted.³⁵

The anthropologist Roslyn Poignant has argued that Darwin had three purposes in using photographs: to freeze transient expressions, to distance himself from the subject, and to provide representations that could be used to prompt comments from others.³⁶ The psychologist Paul Ekman has noted that the last purpose was particularly innovative.³⁷

In a few cases Darwin seems to have sent some of the photographs he collected along with his “Queries” to gather reactions in foreign cultures. In a letter for Darwin’s attention relayed to him by the editors of *Nature*, one J.P. Mansell Weale commented on a sample photograph he had received: “I have been unable to get an answer to this question on grief although I have shown the photograph of the girl sent to me by Mr. D. to several intelligent natives & have had no opportunity of personally determining it.”³⁸ There is no way to know with certainty which image Darwin sent; it may have been the photograph of his niece Katherine, which in edited form became the figure 2 of plate 2 in *Expression*.

When Darwin began his search for pictures of expression, the shops and studios of London were brimming with inexpensive photographic portraits and genre scenes. The photographic industry in London had peaked. According to British Post Office records, in 1860 there were some 150 photographic studios in the city. By 1867 the number had nearly doubled to 275. The total changed little until the mid-1870s, when it decreased slightly.³⁹

To Darwin, it was helpful to have many photographs to choose from.

Effective photographs capturing expressions were rare; however, it was possible to find useful images by sifting through the hundreds on offer. Though partly suspicious of the circumstances in which they were made, Darwin valued commercially made photographs because they were made without precise ideas about the correct form of expressive postures. They were of questionable scientific pedigree, but they were at least relatively impartial.

Darwin recognized that certain expressions are enacted differently when they occur spontaneously than when they are voluntarily produced. Duchenne, whose work he carefully studied, wrote in 1862 that genuine and false smiles could be differentiated by the contraction of the *orbicularis oculi* muscle. Darwin noted in his copy of Duchenne's *The Mechanism of Human Facial Expression, Or an Electro-physiological Analysis of the Expression of the Passions Applicable to the Practice of the Fine Arts* that one of the illustrations represented "natural" laughter, while another represented "sham laughter on the right side."⁴⁰

Ultimately, most of the pictures Darwin found in London failed to satisfy his needs. There were two problems. First, the information they contained was unreliable: because he had not managed their creation, he was unable to evaluate how accurately they conveyed the circumstances they purported to depict. They might have *seemed* accurate, but having been produced without experimental controls, any conclusions that could be drawn were tenuous at best. Indeed, the images Darwin obtained had been created for dramatically different purposes than those he intended. He collected the American photographer James Landy's *Expressive Pets*,⁴¹ for example, a collage of photographs of dogs mimicking the expressions of crying babies, which was sold as a comic novelty.

Another album of novelty photographs by the German actor Ernst Schulz was made in a similar, light-hearted vein.⁴² It contained pictures of Schulz pretending, tongue-in-cheek, to be men and women in various occupations, and with his face painted to resemble various racial types (figure 1-5). Unfazed, Darwin analyzed even these insubstantial pictures for their expressive content. On Darwin's copy, many of Schulz's images show evidence of having been scrutinized; translations appear penciled in English in Darwin's hand, below the original German captions. Among those he singled out were images translated as "hypocrite," "a learned man scholar," "(avaricious) miser," "good nature," "lazy man," "a cocky fellow dandy," "silly (weak head)," "happy simpleton," and "morose grumbler."⁴³ Consistent with his belief in universal expression, Darwin appears to have been less interested in the racial photographs, as they are not annotated.

The second problem with the pictures Darwin found was that, for the most part, they failed to capture expressions as they actually occurred. Much popular Victorian art was mawkishly sentimental. In nineteenth-century Britain, subjects were often portrayed with exaggerated expressions meant to appeal to a popular audience and posed to effect a desired look. Even photographs, which theoretically recorded the actual appearance of things, were often carefully contrived. Because photographic chemistry was extremely slow by modern standards, scenes had to be thoughtfully preconceived. The difficulties Darwin encountered in using commercial imagery is apparent in the many annotations describing the “authenticity” and “genuineness” of photographs in his possession.⁴⁴

In 1870, Darwin adopted a new approach to procuring photographs. While he continued to collect them from commercial sources, in June of that year he wrote to Crichton-Browne that he had begun to *commission* photographs to illustrate *Expression*. Though he knew several photographers, Darwin was unsure whom to approach. His son Leonard, who later became an amateur photographer himself, suggested one possibility:

There was a man called Conder, an art critic &c. and a friend of the Lushingtons, who has a son here in the Engineers, down here the other day, he said for your expression book Falkner was the best photographer for you as he has done children often, and then you should get them heliotyped [printed using an early photomechanical reproduction process]. Today I got a letter from the heliotype man with some examples of bones and flowers printed this way. I could find out the address of the photographer Falkner. Shall I send you the heliotypes?⁴⁵

There is no record of Darwin having approached Falkner, who was likely too far away for convenient collaboration.

Julia Margaret Cameron (1815–79), the photographer Darwin probably knew best, was at the height of her fame in the late 1860s when Darwin began to collect photographs. However, she generally confined herself to portraits with shallow depth of field and ambiguous expressions. The photographs Darwin sought for *Expression* required as much sharp-focus detail as possible and a spontaneous character at odds with Cameron's aesthetic. Although he was cordial in his dealings with her, there are indications Darwin was uncomfortable with her individualistic approach. When Cameron sent him a portrait she made of him during his stay at her guest cottage in Freshwater, on the Isle of Wight (figure 1-6), Darwin signed it with the inscription, "I like this photograph very much better than any other which has been taken of me."⁴⁶ Nevertheless, one year later in a letter to his colleague Alfred Russel Wallace, Darwin described the same portrait as "heavy & unclear."⁴⁷ This criticism, which was frequently leveled at Cameron's work at the time, may help to explain her exclusion from the *Expression* project.

Darwin's correspondence with Cameron was remarkably colorless. Two letters exchanged between them are preserved in the Darwin Archive. The first, dated 10 July 1868, urges Darwin to confirm the length of his stay at her cottage. She reveals herself to be preoccupied with her responsibilities as landlord: "[W]e must only ask you as soon as you can decide this point to let us know because in the season months there is such a demand at Freshwater for the few houses that are at all comfortable & good that I am sure you would not like us for the sake of one uncertain week lose a tenant by one or two months if offered."⁴⁸ The letter concluded with a warning about the unusually hot dry summer. A second, undated letter from that year is more personable, venturing, "My Bromley people rejoice for us in your coming to be our neighbours & friends as we hope."⁴⁹ The rest of the letter, however, explains options for garden and maid service and concludes by advising Darwin to bring his own plates and linen. Such letters demonstrate that at the beginning of their association, at least, Darwin and Cameron enjoyed little more than a landlord–tenant relationship.

From 1868 to 1870, Darwin's picture collection grew as an eclectic blend of bought and donated works, obtained ad hoc. The images he acquired during this period were useful in formulating his ideas, and some even served as illustrations, enabling him to test his theories of emotional expression on others. Still, there were substantial gaps in the range of expressions he had managed to obtain as photographs, and none managed to convey the fleeting moments of expression that truly excited him. The completion of *Expression* would require photographs made expressly to Darwin's specifications.

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2

Illustration and Illusion

STRATEGIES DARWIN USED
IN ILLUSTRATING HIS BOOKS



At the top of a plate of seven photographs, a fragment of a woman's head forms plate 2, figure 3, of *The Expression of the Emotions in Man and Animals*. Only the area from the base of her eyebrows to the top of her skull is visible, her hair neatly parted and gathered in a tightly curled bun (figure 2-1). Her identity is obscured—the shape of her face, her demeanor, manner of dress, and location; no reliable judgments can be made about her class, age, or occupation. Darwin described the picture as “the forehead of a young lady who has the power in an unusual degree of voluntarily acting on the requisite muscles.” It was intended to illustrate the horseshoe-shaped furrows visible on the forehead in acute states of misery, the result of certain muscle groups contracting in opposition to one another. He withheld the rest of the picture, he explained, because the unaltered image was not convincing. The sitter had been so absorbed in enacting the expression for the camera, that “her expression was not at all one of grief.” To correct this, he presented only those elements of the picture he considered true, omitting those he thought unsuitable.

This photograph provides a window, though a narrow one, to the way Darwin approached illustration. Of the thirty photographs in *Expression*, only the disembodied forehead shows such a severely edited view of the subject. The other images were not so radically cropped, but many were pared down more subtly before publication. The Darwin Archive helps us to understand just how much Darwin left behind

in preparing his pictures for publication. In some instances he cropped away legs and torsos; in others he instructed artists, photographers, and designers to remove information he considered distracting.

Darwin made these alterations to help strengthen his arguments.¹ He was extraordinarily successful in winning over readers; though his views were at times controversial, they were embraced quickly by many in the scientific community. The effectiveness of his writing is one reason for this. He wrote in clear, lucid language flavored with pleasing anecdotes and clear examples. He used creative metaphors to explain his theories, and he avoided complicated jargon. The strategies he used to win over readers verbally have long intrigued historians of science, who recognize that carefully crafted prose accelerated the acceptance of his ideas.

Much has been written about Darwin's use of language, but what of his illustrations? If words helped popularize Darwin's books, then it stands to reason that pictures may have behaved similarly. This book is one attempt to examine the remarkable control Darwin had over the illustrations he used, and the surprising lengths he went to in order to find pictures to advance his theories. Darwin knew far more about art than we give him credit for, and he used that knowledge to create persuasive and visually compelling books.

In the 1970s, the historian of science Edward Manier was one of the first to analyze Darwin's written innovations.² Darwin chose words thoughtfully, using new terms for innovative concepts. Not only were his theories innovative, but crucial terms used to explain them such as "natural selection," "struggle," and "chance" were unprecedented in evolutionary science and may account for the relative ease with which his ideas gained acceptance. By developing a vocabulary specific to his theories and his alone, Darwin avoided challenging established scholars

on their terms; by devising new ways of talking about nature, he facilitated new ways of thinking about it. As Manier saw it, Darwin's inventive prose became a neutral framework within which his observations could be considered without prejudice.

Extending Manier's position, literature professor Dame Gillian Beer has argued that the use of literary devices such as analogy and metaphor were also critical to his success: "It is essential for Darwin's theory that the multitudinousness and variety of the natural world should flood through his language."³ As a result, Beer argues, readers engaging a Darwin book were required to assume a rhetorical omniscience comparable to that found in written fiction. Put another way, they were invited to think about evolution abstractly.

The historians Adrian Desmond and James Moore provide another piece to the puzzle of Darwin's rapid acceptance, commenting on the remarkable success of his books as best-sellers, eagerly consumed by an admiring public. Imaginative and accessible, they sometimes read more like first-rate novels than scientific prose, leading readers through the twists and turns of theoretical arguments like so many developments in the plot of an amazing tale. Not only was persuasive writing a sound tactic for swaying doubters, Desmond and Moore contend, but it also helped boost sales. Writing about *Descent of Man*, they explain:

It told an arm-chair adventure of the English evolving, clambering up from the apes, struggling to conquer savagery, multiplying and dispersing around the globe. In Darwin's early anxious jottings such a story seemed dangerously implausible; his secret assault on man's ancestry had been a brazen act of faith, fit only for radicals and their ilk. But now, habituated to material progress, social mobility, and imperial adventure, the *arriviste* reading classes lapped it up.⁴

The same logic that scholars such as Manier, Beer, and Desmond and Moore have applied to Darwin's writing can also be applied to Darwin's illustrations. Darwin wanted his pictures to be content rich, without being too specific; to be metaphorical and abstract, and for their unique visual appeal to help his books sell well. The same strategic logic he used to construct his writing he also used to select and edit his pictures. This meant choosing pictures to help him make his case, but it also meant leaving out pictures, or elements of pictures, he viewed as counterproductive.

LAYERS OF MEANING

Darwin wanted his pictures to have semantic force: to embody a general truth about human or animal physiology. The disembodied forehead in *Expression* takes on the meaning of *all* foreheads, showing everything

Darwin wanted us to learn from a single example. The furrows above the brow are lines he claimed one can see on any person in the right circumstances. So the illustration gives readers information they can extend and apply to other, similar examples. By editing away unwanted and, he would have argued, distracting information, he created a visual abstraction of the original, a directed and carefully condensed version. This process of abstraction is a tactic he used repeatedly in *Expression*.

Yet even if a picture reveals a greater truth, it still has a unique life of its own. Each image has size, texture, clarity, and tone. The distinctive appearance of an illustration forms syntactical meaning: the stylistic qualities that make a Darwin illustration distinct from others. Syntactical qualities are ones that tether them to a certain time and place. Today, many of Darwin's pictures seem old-fashioned. At the time, however, they were an exciting change from the engravings and lithographs to which readers were accustomed. Now, the process itself can be distracting. Modern viewers may not notice the contractions of facial muscles in his pictures immediately, focusing instead on their sepia tint, small size, and grainy texture, or the manner of dress of the sitter. With the passing of time, syntactical information becomes more pronounced, as dated materials and techniques stand out more.

Pictures may also have emotional associations. This is one reason Darwin cropped the forehead picture as severely as he did. He was concerned that if readers saw the rest of it, they might feel pity or humor, which were unwanted associations that detracted from his message. He feared the creep of these elements into his pictures, so often he edited out elements one could react to emotionally. At the same time, he occasionally used personal associations to help the reader relate to a picture, as a means of establishing a picture's authenticity. For example, he sometimes allowed children to be shown in recognizable domestic settings, and in one instance he changed a picture of a cat rubbing against a chair leg to the same cat rubbing against a person's leg. Tension between scientific detachment—what might cautiously be called objectivity—and this kind of calculated emotional weight can be seen in a number of Darwin's illustrations.

Fortunately, we can surmise some of Darwin's thinking about his illustrations from clues left in the Darwin Archive. In the case of the forehead photograph, the discarded portion of the published figure is preserved (figure 2-2). On the back, in colored pencil, is inscribed: "Plate II, Figure 3, the forehead & eyebrows alone / K.E.W. 1871—Grief Muscle."⁵ The archive also contains two variant photographs that were never used (one is shown in figure 2-3). These smaller prints are glued on studio mounts with the name of the photographer, H.T. Melville of Bromley, printed in letterpress. They may have been taken at a different

time than the published version, since they depict the subject against a different backdrop.

Darwin did not identify the sitter, but considering the annotation “K.E.W.” on the verso of one, and given how close Melville’s studio was to his home at Down House, it is likely she was Darwin’s niece, Katherine Euphemia Wedgwood. Initials alone would have been enough to identify a family member, and since K.E.W. seems to have sat for her portrait on more than one occasion, it is reasonable to imagine she was someone Darwin knew well—the picture may even have been made at Down House. Concerns for the woman’s privacy would have prevented him from labeling the photograph with her full name. Omitting the rest of her face in the published illustration obscured her identity further.

Fragmentation is a powerful theme in contemporary art theory. It can make self-contained images enigmatic; removed from context, mere slivers of pictures can assume iconic status. A sculpted foot, when connected to a statue, is a means to an end—it serves only to support the figure above it. But a foot alone standing on a pedestal is an object for contemplation. Many scholars have explored this fertile ground in art. In the writings of theorists Walter Benjamin, Roland Barthes, and their

successors, what constitutes completeness in an image has long been a matter of animated discussion. Without revisiting these positions, it may be sufficient to acknowledge the theoretical potency of Darwin's scissors. He could not have realized it, but by cutting away the nose, mouth, cheeks, and ears of the subject in this modest figure, he tapped into one of the enduring preoccupations of postmodern thought.

Darwin's primary concern was with archetypes. He wanted his illustrations to prove universal truths, and he did not want readers to become preoccupied with the stylistic decisions he made in editing his pictures. In this sense, he was suspicious of syntactical meaning, those elements that draw attention to the way a picture is made. And yet his readers could not help but notice his pictures were *photographs*, a new technology increasingly (but not yet fully) associated with objectivity and authenticity. When *Expression* was published in 1872, photographs in a book were fresh and enticing: they ensured that it would receive attention as a novelty, if nothing else.

Darwin was also sensitive to the question of emotional meaning. His illustrations were designed to stand alone, without explanations of context. But if viewers saw something they recognized in them, this might make them seem more real to readers unaccustomed to photographic illustrations in science books. Convincing the viewer was important; after all, one had to believe that what one was looking at actually happened.

These are the tightropes Darwin walked in illustrating his texts. He wanted them to serve as factual examples to make generalizations about natural phenomena. At the same time, he wanted his pictures to win over readers and to sell more books. A picture revealing too much information could tip the balance toward the syntactical and expressive, and his science might not be taken seriously. Too little, and the pictures would be dry and uninviting. As a result, the process of editing pictures became extremely important. He had to decide what to keep and what to discard. This process of refinement, of whittling away at meaning until the right balance was struck, is seen repeatedly in the steps he took to find and prepare pictures for *Expression*. Consciously and unconsciously, he developed ways of integrating pictures to support his arguments.

In designing his books, Darwin had to choose the number of illustrations to use and the technique with which to print them. For some books, such as *Expression*, *Power of Movement in Plants* (1880), and *Contrivances by which British and Foreign Orchids are Fertilised by Insects* (1862), plentiful illustrations were appropriate; in others, it was more effective to leave illustrations out completely. Leaving the text to speak for itself was appropriate when the subject was more abstract, as in *Origin of Species*. To illustrate the various adaptations described in *Origin* would have been counterproductive. Those who believed in divine creation needed abundant illustrations to support their cause: the more seemingly inexplicable complexity readers encountered, the less likely they were to think that evolution could have been achieved through random selection alone. By withholding illustrations from *Origin*, Darwin kept the discussion on a theoretical level.

Decisions also had to be made about the style of the pictures. Not a single color illustration appears in all of Darwin's published work, even in *Descent of Man*, in which the colorful sexual displays of animals is a major theme. Color illustrations were available; though expensive, they might have enhanced the aesthetic appeal of his books. But it was not worth the risk, because they would contribute to the perception of complexity in the organisms depicted. Darwin would then have been forced to defend them, explaining how pleasing colors can result from random mutation and variation.

Darwin had considerable control over the appearance of his books. From individual pictures and plates to the design of the covers and spine, Darwin decided many design elements personally. For example, the Darwin Archive contains tracing-paper sketches for four of the seven photographic plates in *Expression* (e.g., figure 2-4). The sketches show evidence of having been reworked as Darwin attempted to find the right order to convey his ideas most effectively, working out how images might play off one another, and which one would introduce the

next. In one notable case (plate 6), he wove the images into a narrative: one portrait seemingly reacts to the indignant expression of another. This is purely a result of how the images are arranged on the page; the circumstances leading up to this mock confrontation are invisible in the images themselves. Interestingly, despite such careful contrivances, Darwin was often casual about referring to pictures in his texts. This is surprising, because without being clearly referenced in the text, the purpose of an image is inherently unclear. Images without explanation are cast adrift, free to assume a role assigned by the reader. This does not necessarily mean they are useless, however; Darwin may have hoped they would contribute an air of authenticity without being directly connected to the points he hoped to make.

Naturally, as in the case of the detached forehead, Darwin also had to vet each picture for internal content. For example, a photograph of a crying child (plate 4, figure 2) was useful to reproduce, but not in its raw state (figure 2-5, bottom). The chair the child leant against in the original version was extraneous, while a poodle cowering beneath the chair was distracting. To solve these problems, Darwin drew a line across the image above the chair and dog, indicating to the publisher that the image should be cut down (figure 2-5, top). Variations of this

process played out continually as Darwin assembled pictures for *Expression*. The goal was to find a balance between the compelling and the marginal, to choose a level of information most effective with readers.

ILLUSTRATION AS STRATEGY

For authors to succeed, they must attract and persuade readers. These are substantial obstacles to the acceptance of any new scientific theory, but they were especially challenging for Darwin. The broad shift in belief necessary to the acceptance of Darwinian theory was radical. It was particularly troubling to those who sought to explain biological phenomena in religious terms. It was also a substantial departure from much of the scientific work that preceded it. Darwin's ability to gain acceptance for his theories is remarkable given the explosive nature of his research and its cultural implications.

Numerous scholars, including Manier, Beer, Desmond and Moore, and others have suggested that the assimilation of Darwinian theory into Victorian culture was due in part to Darwin's rhetorical abilities. Building on their accomplishments, it is now possible to address how Darwin's visual acumen also contributed to his success. Like the text they partner with, illustrations can help convince readers of an author's points. Or, as Lewis Carroll's *Alice* put it: "[W]hat is the use of a book . . . without pictures or conversation?"⁶

Yet illustrations are also potentially hazardous. The sociologist of science Bruno Latour puts this point well: "Bringing pictures, figures, numbers and names into the text and then folding them in is a source of strength, but it may also turn out to be a major weakness. Like references, they show the reader what a statement is tied to, which also means the reader knows where to pull if he or she wishes to unravel the statement."⁷

Most of the figures in *Expression* are abstracted versions of larger pictures. As metaphor is to text, abstract images are an indirect means of communication; they force the reader to fill in gaps using personal knowledge. The art historian Ernst Gombrich referred to this phenomenon as "projection," the way in which an incomplete painting or sculpture "can force a beholder's imagination to project what is not there."⁸ Darwin recognized the phenomenon of projection, although he never labeled it as such. In his notes he wrote:

This unwillingness to consider creator as governing by laws is probably that as long as we consider each object an act of separate creation [*sic*]. We admire it more. Because we can compare it to the standard of our own minds. Which ceases to be the case when we consider the forma-

tion of laws invoking laws. & giving rise at last even to the perception of a final cause.⁹

At the same time, Darwin was concerned that his photographs could be abstracted too much and, as a result, be vulnerable to competing interpretations. The Darwin Archive reveals various instances in which he showed photographs to friends and colleagues to gauge their reactions. By presenting pictures to his colleagues and asking “What does this mean to you?” he was checking to be sure that they conveyed enough information to be useful. Their effectiveness was not a foregone conclusion. Darwin went to considerable effort to obtain clear photographs, and he was keen to ascertain whether his friends understood them to convey what he believed them to.

This was both a test of his pictures and an experiment in its own right. Darwin wished to know whether particular expressive features, such as the arrangement of muscular contractions of the face associated with smiling or crying, could be recognized without the visual and aural cues experienced in daily life. He sought to isolate particular elements of expression for comparison without the interference of corroborative information. He was genuinely interested in knowing the minimum amount of information required for an individual to recognize expressions. The understanding of expression was another one of the subjects Darwin was attempting to investigate.

Expressions themselves are communicative and visual. Consequently, his depictions of expression had a double role Darwin could not escape. For each photograph, there were at least two elements critical to their function: the meaning of the expression and the way it was received by those who saw it. In giving his photographs to others for evaluation, Darwin was learning, in a loosely deductive way, both what constitutes an expression and how such an expression is understood. In other words, he attempted to use his pictures not just as illustrations, but also as data. As such, the photographs in *Expression* are incomplete, however, because they were not made according to strict experimental controls. Instead, they invite the reader to evaluate them as true or false based on personal experience. This was a crucial part of Darwin’s method—to invite readers into the anecdote, bringing them along as observers.

In her marvelous book *Nature Exposed: Photography as Eyewitness in Victorian Science* (2006), the historian Jennifer Tucker chronicles photography’s emerging acceptance as an authoritative medium in the middle to late nineteenth century. Photography was not always considered superior to drawing and printmaking. Faster, yes, and potentially more convenient, but given the long exposure times early photography required, there was nothing that could be depicted photographically that

could not be shown equally well with paper and pen. It was only when photography began to push into spheres beyond the limits of human vision—for example, rapid actions that happen too quickly for the naked eye to track—that photography came to assume a privileged place in the visual realm.

At the time *Expression* was published, photographs were judged on how real they looked, not on how scrupulously they had been produced. Later, as scientists began to use photography as evidence of events invisible to the unassisted eye, viewers began to demand proof that the photographs they witnessed were accurate. Scientists began to look more carefully at the circumstances in which photographs had been produced and devised protocols for collecting reliable photographic data. *Expression* was produced at the cusp of this change in attitude to photographic information and is an important part of the story of how photography came to be accepted as “objective.” As the following chapters show, Darwin took liberties with some of his photographs that might be considered unacceptable in scientific work today. He did not do this to be deceptive or tricky—he simply tried to make the best of an imperfect medium at a time when there were no rules about what could or should be done photographically. He was, in a very real sense, making up rules as he went along. His work, and the way in which it was received, became part of the history of how photography achieved its now widely accepted status as authoritative.

Interestingly, Darwin was looking for pictures right at the threshold between what could be seen with the unassisted eye and what could only be seen photographically. What he really wanted became routine about a decade later, with the invention of speedy gelatin dry-plate chemistry of the kind Eadweard Muybridge (1830–1904) in California and Etienne-Jules Marey (1830–1904) in France used to analyze the gaits of galloping horses. Darwin hoped to find instantaneous photographs to enable him to differentiate between discrete phases of emotion, breaking behaviors lasting several seconds into intervals of 1/10th of a second, for example. Although one of his photographers, Oscar Rejlander, experimented with sequential imagery, he was unable to produce sequential pictures suitable to Darwin’s purposes.

Ultimately, photography became a dominant means of representation in nineteenth-century Britain. Even before its status as an objective medium was established, the relative economy of the medium proved irresistible to Victorian consumers. By the 1860s, commercial mass production of photographic materials ensured that even individuals of modest income could afford to buy photographic prints. Even then, the quantity and quality of imagery that could be produced using photography was unprecedented.

Indeed, it is through photographs, as well as his writings, that Darwin is himself remembered. To those who knew him well, Charles Darwin was an expressive man, prone to dramatic gesticulations and facial movements. “When he was excited with pleasant talk his whole manner was wonderfully bright and animated,” wrote his son Francis, “and his face shared to the full in the general animation.” This is a little-known side of Darwin, whose character the public have deduced largely through austere portrait engravings, and photographs imbued with the air of intellectual gravitas that his peers thought befitting a scientific celebrity. In life, however, his laugh was a “free and sounding peal, like that of a man who gives himself sympathetically and with enjoyment to the person and the thing which have amused him.” Francis also remembered his lively use of his hands, which he would wave to indicate some nebulous concept, or bring down on his leg with a slap. “He was given to gesture and often used his hands in explaining anything,” he remarked, “in a way that seemed rather an aid to himself rather than the listener. He did this on occasions when most people would illustrate their explanations by means of a rough pencil sketch.”¹⁰


Portraits made of Darwin in his lifetime show the appearance of the man, but like the disembodied forehead in *Expression*, they show only a narrow slice of him, omitting elements their makers could not or did not wish to convey. For a scientist who routinely used his own expressions to illustrate ideas in conversation, this leaves them substantially incomplete. Darwin was a man whose revolutionary efforts to illustrate his books prompted new ways of thinking about pictures. What we can glean of his working methods can only be reconstructed from his magnificent legacy of published and unpublished works and the amazing pictures he left on the cutting-room floor.

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3

Art, Experience, and Observation

DARWIN'S KNOWLEDGE OF ART HISTORY
AND USE OF ILLUSTRATION IN HIS BOOKS



When Charles Darwin arrived as an undergraduate at the University of Cambridge in 1828, he must have felt relief. He had escaped the sickening lectures he endured as a medical student at the University of Edinburgh, with their grisly investigations into the anatomy of cadavers. For a young man with a weak stomach, nineteenth-century clinical procedures were difficult to endure. Dissections took place without refrigeration, and operations were performed without anesthesia. Three years earlier, in 1825, he had enrolled at Edinburgh at the insistence of his father. He stayed for two years, studying anatomy, chemistry, and other medical matters. Some of the lectures Darwin considered boring, but others were simply horrifying. His experience at Cambridge was much more pleasant. Now a cleric in training, he may still have been subjected to dull lectures, but they were at least inoffensive, and his new course of studies provided opportunity to pursue leisure interests. Afternoons were spent hunting beetles in the neighboring town of Cherry Hinton or strolling the grounds of King's College Chapel listening to the sounds of the daily choral anthem. It was also during these years at Cambridge, from 1828 to 1831, that Darwin began to develop an interest in the visual arts.

Unlike many of his colleagues, Darwin had little talent as a draftsman. He knew almost nothing about the proper handling of line or the effective manipulation of tone, texture, form, perspective, and color. His research notes include some pen-and-pencil sketches, but for the

most part they are crude and tentative. He had no formal training in visual art; nearly all his drawings were traced from books or copied under the microscope. They are mainly thumbnail sketches of ideas or observations more easily recorded in pictures than in words.

Darwin—the dedicated scientist, obsessed with beetles, shells, and finches—is well known from standard biographies. But there is another side of the man. Quietly, he could be found studying paintings in the National Gallery, collecting prints for the walls of his dormitory, debating evolution with John Ruskin (1819–1900) and the Pre-Raphaelite sculptor Thomas Woolner (1825–92) and building a library that included some of the seminal art books of his time. There are many more surprising and consequential connections between Darwin and the arts. He was a man who became fascinated by and deeply immersed in the relatively new realm of photography; who commissioned the most controversial photographic artist of his time, Oscar Rejlander, to create pictures to illustrate his book on facial expressions; who hunted for interesting photographs in shops and studios across London; and who published one of the first science books illustrated with photographs. Visual art was a small part of Darwin’s life, but it was nevertheless important. Darwin had omnivorous tastes, and art was just one of the things he consumed. There was little in intellectual life that did not intrigue him, and he never ceased to crave new information. Yet few realize how profoundly Darwin shaped the visual culture of his time, and how it, in turn, shaped him.

There were at least two factors at play in Darwin’s encyclopedic interests. First, and most obvious, he had an extremely lively mind. When he was not out gathering information personally, as he famously did on the voyage of H.M.S. *Beagle*, he sat in his study like a spider at the center of an immense web, gathering morsels of information as a spider does flies. He gathered as much information as he could through correspondence, and he pored over what he found, discarding the irrelevant and following up promising leads. His genius lay not just in the quantity of information he obtained, which would have overwhelmed a lesser mind, but in the way he processed it. Large amounts of observations were digested, and every piece of evidence was assigned its proper place. Darwin had the rare talent of making order out of the obscure: distilling thousands of facts and assertions to their vital essence and seeing the links between them.

The second reason Darwin was so wide-ranging in his interests is the age in which he worked. The twentieth and twenty-first centuries are characterized by increased specialization of research, by the funneling of ideas into narrowly defined fields of study. It is now commonplace to draw distinctions between closely related fields, as one does, for ex-

ample, between biochemistry, molecular biology, and genetics. Darwin bridged these fields and many more. His work drew on the accumulated knowledge of disciplines now labeled as geology, geography, population biology, psychology, systematics, anthropology, animal husbandry, and anatomy, among others. However, he worked at a time when the very idea of “science” as an enterprise was new. There were few preconceived ideas of what a scientist should do, because science was itself a fundamentally nebulous undertaking. No rules existed, written or otherwise, to discourage Darwin from exploring diverse fields of study. Why not turn to Plato and Aristotle, or Shakespeare and Milton for inspiration? Why, indeed, not examine paintings?

ART AND CAMBRIDGE

“Oh Lord what a jolly place Cambridge is,” Darwin wrote to his friend Charles Whitley shortly before his departure on the *Beagle* in 1831. “But it is all over,” he sighed, “there is no use thinking about it.”¹ Their university days behind them, Darwin embarked on the surveying mission that would help define his career, while Whitley began a quiet life as a vicar. A classmate at the Shrewsbury School and a friend of Darwin’s brother Erasmus, Whitley had become one of his best friends at the university. He was a founding member of a group its members lovingly described as the Glutton Club, and Darwin’s principal guide to the mildly hedonistic delights of the city, including art, music, and the sensation “which some call sublime, but the wise know to be the full round feeling from a contented dinner.”² Whitley also cultivated Darwin’s taste in prints, escorting him to view works from the Fitzwilliam Bequest at Free School Lane, precursor of the Fitzwilliam Museum, and it was under his influence that Darwin purchased several “first class line-engravings,” as the historian Janet Browne has noted. In December 1828, Darwin wrote to Erasmus, telling him of his latest hobby: “I imbibed your tastes about prints, and put it into practice, and have bought some very good prints, which I long for you to see.”³ According to Browne, these included a 1793 study after Raphael by Florentine engraver Rafaello Morghen, a portrait of Leonardo, and an unidentified print by Johann Mueller, whose chief engraved work was the *Sistine Madonna*.⁴

The Fitzwilliam Museum did not move into its current premises on Trumpington Street in Cambridge until 1848, when George Basevi’s imposing neoclassical structure was completed. Housed in the earlier space on Free School Lane was an impressive group of 144 paintings of the Italian, Dutch, and Flemish schools, willed to the university by the 7th Viscount Fitzwilliam of Merrion (1745–1816).⁵ Among the finest of these were such paintings as Titian’s *Venus and a Lute Player*, Rem-

brandt's *Portrait of a Man*, and Lodovico Carracci's *Christ Appearing to the Virgin*. Palma Vecchio's High Renaissance *Venus and Cupid* (figure 3-1) is typical of the style of pictures Darwin would have seen: naturalistic in its portrayal and imbued with narrative content, but not obviously scientific. The print collection, which Darwin and Whitley especially enjoyed, consisted of bound albums that could be viewed by appointment. Some seven years after he left Cambridge, Darwin noted in his Notebook "M," in which he recorded observations on expression, that the Fitzwilliam bequest was still having an effect on him. "When in the National Institution & not feeling much enthusiasm, happened to go close to one & smelt the particular smell of Picture. Association with much pleasure immediately thrilled across me, bringing up old indistinct ideas of Fitzwilliam Museum."⁶

After Darwin left Cambridge for his five-year voyage on the *Beagle*, his interest in natural history intensified and his friendship with Whitley weakened. In 1835, as the *Beagle* explored the coast off Valparaiso, Chile, Whitley wrote to Darwin, anticipating his return and reminiscing about their mutual interests. He invited Darwin to visit him in London: "There are plenty of new things for you to see and do here by way of music & painting. I have made some superb additions to my family of prints, and there are some glorious treasures added to the National Gallery. So let us look forward to intellectual pleasures yet

to come.”⁷ Darwin, however, was thousands of miles away. Despite Whitley’s hopes, he had become preoccupied with natural history and had set aside his interest in fine art.

Darwin’s exposure to art at Cambridge was a significant part of his education. The interest he had displayed in it as a student reflected his strong collector’s mentality, a trait that distinguished him throughout his life. Yet the effects may have been more profound. “Ultimately more significant,” Browne has argued,

Whitley seems to have taught Darwin how to look—to search out the meaning behind the artist’s composition and patiently to follow through the layers of technique and allusion. Though he learned a good deal about how to look at nature from Robert Grant [Darwin’s associate at the University of Edinburgh], this cultural experience of “looking” gained through aesthetics was equally important in the development of his sensibilities.⁸

Darwin himself provides one of the strongest endorsements of Browne’s view. Writing about William Whewell’s *History of the Inductive Sciences* (1837), he noted, “All Science is reason acting (systematizing) on principles, which even animals practically know (art precedes science—art is experience & observation).”⁹

Some early documents in the Darwin Archive hint at an aesthetic interest predating his matriculation at Cambridge. With his rich imagination, restlessness, and eye for visual meaning, the engraving printed prominently on the front of his membership card for Edinburgh’s Plinian Society, for example, would not have escaped his notice. Depicting a ship voyaging at sea, it could as easily have served as an invitation to the voyage of the *Beagle*. The society’s slogan, emblazoned below the engraving, was taken from Virgil’s *Fourth Eclogue*: “*Terrasque traetusque maris coelumque profundum*,” it teased; or, “Earth and wide ocean, and the heavens profound.”¹⁰ The archive also contains notes for a talk Darwin gave at Edinburgh University in 1826, titled “Zoological Walk to Portobello” (a beach resort east of the city), in which he critiqued the city’s architecture. Young and sentimental, he romanticized the royal palace of Holyroodhouse, challenging: “Who can see this venerable pile without at the same time connecting in his mind the various scenes and changes it has witnessed?”¹¹ Not all his comments were so sanguine. Later in the same lecture he expressed growing disaffection with Edinburgh, at the same time revealing his Whig leanings. He railed at violations of the city’s natural landscape. “The far-famed Salisbury Crag,” he scoffed, “another striking specimen of Scottish taste—not of picturesque beauty, but of money. At one time this vaunted hill was perchance an ornament to Edinburgh. Now it merely stands a monument.”¹²

ILLUSTRATION IN DARWIN'S WORK

Although as a student Darwin admired, collected, and even criticized art and architecture, the importance of imagery of all types in his work is seldom acknowledged. In his landmark essay “The Emergence of a Visual Language for Geological Science,” for example, the historian Martin Rudwick goes so far as to describe Darwin as a nonvisual scientist, citing the lack of illustrations in his notebooks and published works.¹³ Rudwick differentiates between communicative and conceptual visualization, stressing the relatively low number of printed pictures in Darwin's works. He defines visual communication as writing with pictures: complementing texts with “maps, sections, landscapes and diagrams of other kinds,”¹⁴ distinguishing this from the less tangible notion of conceptual visualization, such as that involved in the formulation of an evolutionary theory. According to Rudwick, Darwin was a non-visual author, but not necessarily a nonvisual thinker. His works simply contain fewer illustrations than those of his contemporaries.

The idea that Darwin was not particularly interested in illustration may seem beyond doubt. But this view is based on three widespread misconceptions about his work. First is the belief that he used few illustrations in his books, as expressed by Rudwick. Darwin himself perpetuated an additional misconception, by publicly decrying his inability to draw well. And finally, despite his early association with Whitley, he is thought to have had little personal and professional interest in fine art. Collectively, these ideas disguise the true character of Darwin's use of illustrations. Throughout his career, Darwin recognized the importance of supporting his arguments clearly.

The most conspicuous of the contentions about Darwin and art, that he used comparatively few pictures to illustrate his texts, is based on a narrow selection of his works. His two most famous books, *Journal of Researches into the Geology and Natural History of the Countries Visited by H.M.S. Beagle etc.* (1839), and *On the Origin of Species* (1859), are indeed sparsely illustrated. But a different picture emerges when his entire output of seventeen books is considered. Table 1 summarizes these illustrations, as they appeared in the first editions of Darwin's books.

The numbers listed in table 1 are approximate, because many of the listed plates consist of two or more separate illustrations. The seven plates in *The Expression of the Emotions* (1872), for example, actually include thirty individual photographs. Similarly, the individual wood engravings tallied in his other books were in many cases assembled from a number of different drawings. For example, figure 1 of *Fertilisation of Orchids*, listed as one of thirty-three wood engravings, contains six related renderings of the orchid *mascula*, and figure 2 was made from two draw-

Table 1 ILLUSTRATIONS IN DARWIN'S BOOKS (FIRST EDITIONS)	
Book	Illustrations
<i>Journal of Researches, or The Voyage of the Beagle</i> (1839)	2 charts, 4 wood engravings
<i>The Structure and Distribution of Coral Reefs</i> (1842)	3 maps, 6 wood engravings
Geological observations: <i>Volcanic Islands</i> (1844)	1 map, 14 wood engravings
<i>South America</i> (1846)	1 map, 5 plates (1 colored)
<i>A Monograph of the Sub-class Cirripedia</i> (1851)	40 plates (3 colored), 24 wood engravings
<i>A Monograph on the Fossil Lepadidae</i> (1851)	7 plates, 12 wood engravings
<i>On the Origin of Species</i> (1859)	1 diagram
<i>Contrivances by which British and Foreign Orchids are Fertilised by Insects</i> (1862)	1 plate, 33 wood engravings
<i>Variation under Domestication</i> (1868)	43 wood engravings
<i>Descent of Man</i> (1870)	76 wood engravings
<i>Expression of the Emotions in Man and Animals</i> (1872)	7 photographic plates, 21 wood engravings ^a
<i>Climbing Plants</i> (1875)	3 wood engravings
<i>Insectivorous Plants</i> (1875)	30 wood engravings
<i>Cross and Self Fertilisation</i> (1876)	1 diagram
<i>Different Forms of Flowers</i> (1877)	15 wood engravings
<i>Movement in Plants</i> (1880)	196 wood engravings
<i>The Formation of Vegetable Mould</i> (1881)	15 wood engravings
Compiled from Richard Broke Freeman, <i>The Works of Charles Darwin: An Annotated Bibliographic Handlist</i> , 2nd edition [Folkestone, England: Wm. Dawson & Sons, 1977].	
^a Freeman neglected to include these 21 wood engravings in his count.	

ings of orchid pollen masses. The quantity of illustrations is amplified if the increased numbers of pictures appearing in later, revised editions is considered. The first printing of *Coral Reefs*, for example, was published with three maps and six wood engravings. The second edition contained the same number of maps but fourteen wood engravings. The number of illustrations in other books also increased. As a result, the numbers in table 1 show, at most, only the quantity of plates rather than the much

larger number of illustrations. Together, the seventeen volumes listed account for at least 561 maps, plates, and wood engravings.

Table 1 also excludes the sumptuously illustrated, nineteen-part *Zoology of the Voyage of the Beagle* (1838–43), which Darwin edited. Although each volume in the series had its own author, Darwin oversaw this extraordinary publication and had a hand in selecting and commissioning its illustrations. Arguably one of the masterworks of natural history illustration, *Zoology* is composed primarily of richly detailed, full-plate lithographs and engravings, including many spectacular images, such as the British artist Sir George Scharf's (1788–1860) massive slip-cased lithograph *Base of a Skull of Toxodon platensis*, and some fifty full-page, hand-colored lithographs illustrating part XI, legendary British ornithologist and illustrator John Gould's (1804–81) celebrated volume on birds.

Darwin's first published book, *Journal of Researches*, or *Voyage of the Beagle*, was originally the last part of the three-volume *Narrative of the Voyages of H.M. Ships Adventure and Beagle* (1839), edited by Captain Robert FitzRoy. Later that year *Voyage of the Beagle* was rereleased as a separate volume. The close relationship between the nineteen-volume *Zoology*, the three-volume *Narrative*, and the singular *Voyage* complicates analysis of the illustrations in each. Although *Voyage* has enjoyed a substantial life of its own, the number of pictures it contains was determined by the other two sets. As a part of FitzRoy's *Narrative*, the illustrations in Darwin's *Voyage* were chosen to avoid duplication. FitzRoy's diary of the *Beagle* voyage, which constitutes the second volume of the *Narrative*, includes 25 plates and charts. This reduced the need for illustrations in Darwin's account. The *Narrative*, in turn, was intended to complement *Zoology*, and this also affected the number of illustrations it contains.

Further complicating matters, various editions of Darwin's *Voyage of the Beagle* contain different numbers of illustrations. The first edition contained just four wood engravings; the second, fourteen. And in 1890, John Murray released a posthumous edition with two maps and ninety-three wood engravings. However, in modern editions there has been a tendency to reduce the number of illustrations.¹⁵ The popular Penguin edition, for example, an abbreviated version of the original, includes updated renditions of Darwin's maps but omits the wood engravings. This belies the considerable number of images historically associated with the book and fuels the perception that Darwin was not concerned with illustration.

On the Origin of Species includes just one drawing, Darwin's schematic diagram of evolution, usually referred to as the "Tree of Life," but referred to in his notes alternately as "branching seaweed" and

“the coral of life.” The Tree of Life is arguably the least appropriate of these names; the metaphor implies that each leaf and branch remains vital and is connected to a single root. Darwin’s diagram, by contrast, represents both extinct and surviving lineages and is designed to show discontinuous phases of evolution. Darwin argued that living creatures may not have contemporary ancestors because the species from which they evolved may have become extinct. The diagram, rendered with broken lines and discontinuous branches, is intended to convey the erratic course of evolution. Thus, he wrote in Notebook “M”: “The tree of life should perhaps be called the coral of life, base of branches dead; so the passages cannot be seen.”¹⁶

It would be wrong to conclude that Darwin was not interested in illustration on the evidence of *Origin* alone. The book is unique among his works, and somewhat unusual for scientific texts generally for its sweeping theoretical scope. Its central message is difficult to illustrate. As the scholar Howard Gruber has noted, the Tree of Life serves to convey the major elements of his evolutionary theory. It illustrates the fortuitousness of nature, the explosiveness of growth and its limitations, and “most important, the fundamental duality that at any time some must live and others die.”¹⁷ Although it is only one illustration, the Tree of Life thus serves as an index to the entire theory of evolution by natural selection and was arguably the most effective way to illustrate the essence of Darwin’s ideas.

SCIENTIST AND DRAFTSMAN

A second misconception is that Darwin seldom drew pictures himself. He perpetuated this belief in his *Autobiography*, identifying his two greatest failings as the “irremediable evil” of his inability to dissect (which he blamed on the poor quality of the lectures at Edinburgh) and his “incapacity to draw.”¹⁸ Later in the book he expressed regret that his research on the *Beagle* voyage was not as effective as it would have been if he had been better able to record what he had seen. “From not being able to draw and from not having sufficient anatomical knowledge a great pile of MS. which I made during the voyage has proved almost useless,” he wrote.¹⁹ Privately, he repeated the regret. Writing to his close friend the scientist Thomas Henry Huxley, he complimented him on two drawings of barnacles he had sent: “I think your diagrams will do very well—What an advantage to be able to sketch easily! No one has a right to attempt to be a naturalist who cannot.”²⁰ At the end of his career his self-deprecation had not wavered. Writing to John Collier (1850–1934), the artist who painted his portrait for the Linnean Society in 1881, he wrote: “I must thank you for the gift of your art primer,

which I have read with much pleasure. Parts were too technical for me who could never draw a line, but I was greatly interested.”²¹

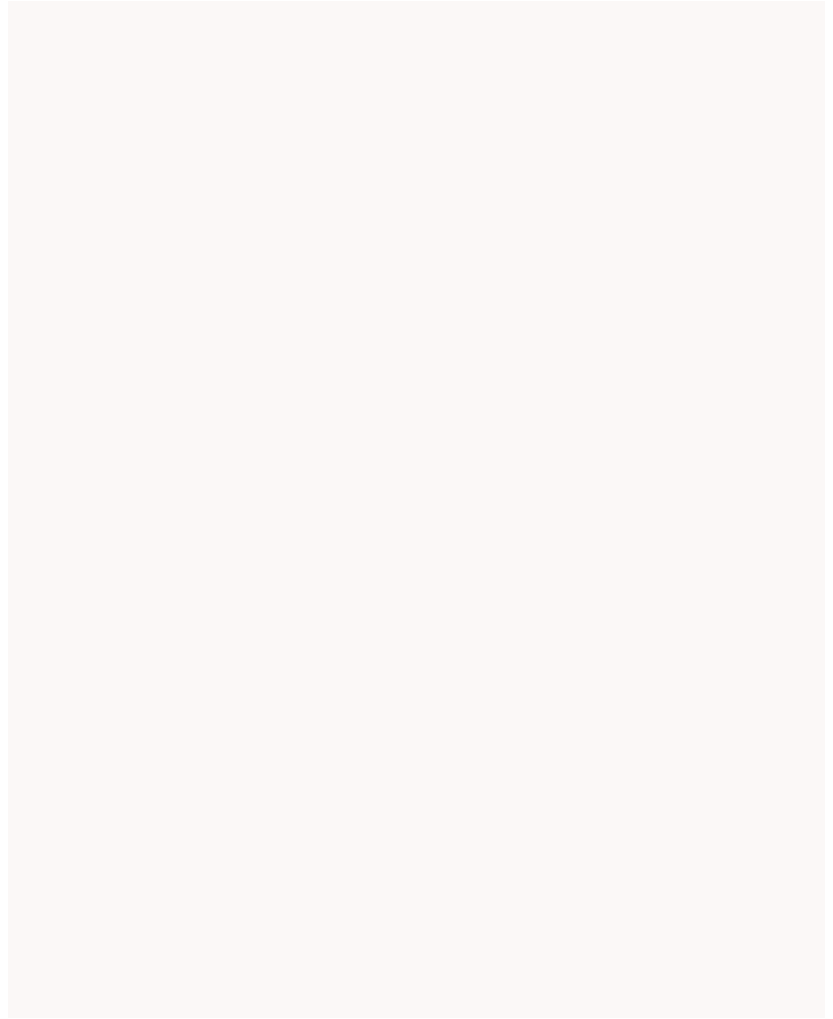
Darwin suffered in comparison to Huxley, who was a talented draftsman and who frequently illustrated his own works. Huxley also supplied drawings for others, including numerous depictions of barnacles that Darwin included in his two volumes on barnacles (or *cirrepedia*) (1851–1854).²² As Huxley’s grandson Julian wrote, “Huxley was a great scientist and a great man of letters; if he had had time and opportunity he would have been a great artist as well.”²³

Although Darwin downplayed his drawing skills, he was able to make basic pictures and occasionally used them to illustrate his books. For example, many of the engravings in *Insectivorous Plants* (1875), attributed to his sons George and Francis, are based on preliminary sketches he made himself. This was not unusual; Darwin frequently roughed out his conception of a drawing for a more talented hand to clean up later. His sketch under the microscope of the vascular tissue in a small leaf of *Drosera rotundifolia* (a kind of sundew; figure 3–2) is typical of the process.²⁴ Once complete, his son George rendered the drawing more clearly, as the note “see George’s drawing” on the lower margin of the sketch indicates. The new drawing was then passed to the engraver, James Davis Cooper (1823–1904).²⁵ Cooper’s engraving is figure 11 of the book (figure 3–3).

Darwin usually confined himself to drawings like this section of *Drosera*—simple images that could be drawn in two dimensions, such as microscopic sections or geologic strata. Unsure and slightly imprecise, they betray Darwin’s struggles as he tried to transmit what he saw to paper. A critic would agree with Darwin’s professed lack of talent: the *Drosera* sketch is shaky and uncertain, and some of the original pencil lines are drawn over in ink to clarify details unclear in the underlying strokes.

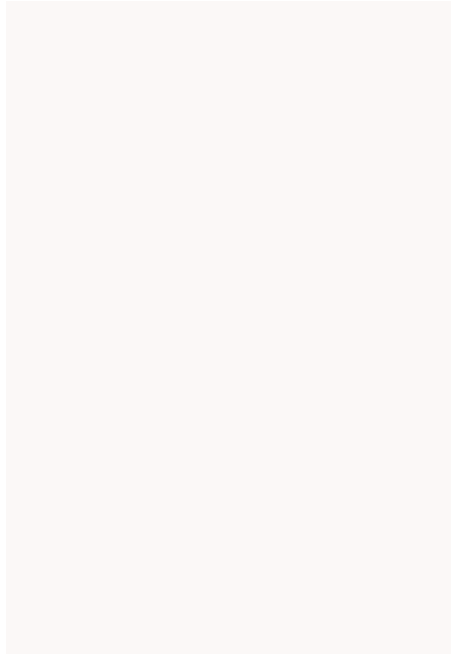
Yet Darwin was exacting in the demands he made of the various artists he employed. Like the figures in *Insectivorous Plants*, several of the illustrations in the barnacle volumes were adapted from sketches he supplied personally. One of Darwin’s collaborators was the distinguished artist and naturalist James de Carle Sowerby (1787–1871). Sending him corrections to some of the plates in 1850, Darwin was firm in his request for clarity:

I yesterday went carefully over some of your drawings. The outlines appear to me very accurate; but yet a few alterations are wanted in most of them; but these are trifling & refer chiefly to lines of growth.—The scale is not at all too large. What I now write for, is to beg you to do them a little harder & with the lines of growth more distinct. Some



of the drawings have the muzziness of Lithography,—a style of art (viz. Lithog.) which in my opinion has been highly injurious to Nat. History—I do not care for artistic effect, but only for hard rigid accuracy.²⁶

Notwithstanding the success of the lithographic plates in *The Zoology of the Beagle*, Darwin's aversion to lithographic printing persisted throughout his career. Of his seventeen books and numerous articles, none was illustrated with lithographs. Moreover, he persisted in his wish for "hard rigid accuracy." It is one of the main factors that drove his use of photography in later works, both in direct form in *Expression* (1872) and copied as engravings in *The Variation of Animals and Plants under Domestication* (1868), *The Descent of Man, and Selection in Relation to Sex* (1870), and *The Formation of Vegetable Mould through the Action of*



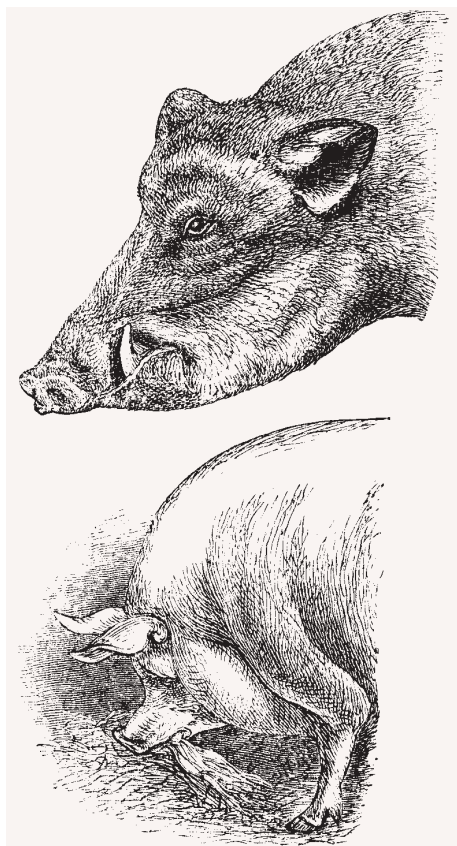
Worms (1881).²⁷ The earliest of these appeared in *Domestication* in 1868. The subject was a large Yorkshire pig named Golden Days, which appeared as figure 3 in the book; the photograph on which it is based is now lost (figure 3-4).

ART WORLD CONTACTS

Darwin's bookshelf contained a surprising number of books both directly and indirectly related to theories of art, indicating comfort with developments in the field. In addition to Edmund Burke's *Philosophical Enquiry into the Origin of Our Ideas of the Sublime and the Beautiful* (1757), there were George Harris's *The Theory of the Arts* (1869), William Hogarth's *Analysis of Beauty* (1753), Augustus Pugin's *Contrasts or Parallels between the Noble Edifices of the Middle Ages and Corresponding Buildings of the Present Day* (1841), and Gustav Zerffi's *Manual of the Historical Development of Art* (1876).²⁸ Such books constituted a small portion of the books Darwin owned, but they represented an active dimension of his interests.

Darwin was also personally connected to a significant number of influential figures in the art world. From his grandfather Josiah Wedgwood, founder of the Wedgwood pottery in Etruria (Stoke-on-Trent), he inherited a sizable collection of ceramics and maquettes, including a group of thirty-three early wax reliefs by Giuseppe Angelini

3-4 Maker unknown.
Head of a Wild Boar and of
“Golden Days,” a Pig of the
Yorkshire Large Breed, the
Latter from a Photograph,
c. 1860. Wood engraving.
Figure 3, *The Variation of
Animals and Plants under
Domestication* (1868). A well-
fed pig was the subject of
Darwin’s first photographic
illustration.



(1735–1811), John Flaxman (1755–1826), Camillo Pacetti (1758–1826), and others (figure 3–5), which he eventually sold.²⁹ He also owned an early Wedgwood copy of Sir William Hamilton’s renowned Portland Vase, the exquisite Roman first-century B.C. cameo glass vessel that inspired countless artists after its arrival in Britain in 1778. His other grandfather, Erasmus Darwin, was famously acquainted with the artists Joseph Wright of Derby (1734–97) and George Stubbs (1724–1806). Erasmus’s collection of works by these artists was spread throughout the family. John James Audubon (1785–1851) was also a family friend. Audubon’s wife, née Lucy Green Bakewell, was a daughter of William Bakewell, another of Erasmus Darwin’s associates.³⁰ In 1826, Audubon lectured in Edinburgh, and as a student Darwin saw him speak. Shortly thereafter, Audubon visited the Derbyshire town of Matlock to pay homage to Erasmus Darwin’s tomb, signifying his admiration for the Darwin family.³¹

Like his grandparents, Darwin was acquainted with a number of prominent artists. Among them was John Ruskin, whom Darwin first met at the home of Oxford natural history professor William Buckland

(1784–1856) in 1837.³² After university, the two lost touch until reunited by the American art historian Charles Eliot Norton (1827–1908), who took up residence at Keston Rectory, near Down House, in 1868.³³ As Darwin became one of England's preeminent celebrities, he was introduced to numerous other influential artists, critics, and collectors. One week, for example, he and his wife Emma might dine with Philip Stanhope (1805–75), director of the National Gallery; another they might stay with the photographer Julia Margaret Cameron in one of her cottages on the Isle of Wight. Though the influence these figures had on Darwin's thinking is difficult to gauge, it is nevertheless apparent Darwin had access to current thinking about art and illustration.

These were the resources Darwin had at his disposal as he gathered illustrations for his most richly illustrated work, *The Expression of the Emotions in Man and Animals*, in the late 1860s. Though a mature man of sixty-three, the author of *Expression* was a man Charles Whitley would have easily recognized during their days at Cambridge. In his memoirs, Darwin recalled his frequent visits to the Fitzwilliam with his college companion. "My taste must have been pretty good," he wrote, "for I certainly admired the best pictures."³⁴

Expression is the book around which Darwin's ideas about art coalesced. It contained the most ambitious program of illustrations and is also the only one of his books to contain original photographs. The text is relatively short, but the photographs it contains are unlike anything that came before. It also contains a noteworthy selection of wood


engravings of animals in expressive postures. Written at a time when Darwin was one of the world's most famous scientists, the book and its illustrations commanded immediate attention upon their publication. Though produced by a man possessing little ability to create illustrations himself, they helped to redefine what was possible, and consequently what was desirable, in scientific illustration.

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4

Darwin and the Passions

HOW PASSION MANUALS
INFORMED DARWIN'S RESEARCH



*E*xpression built on three separate but related traditions of illustrated books: physiognomy treatises, passion manuals, and anatomical studies. If Darwin was occasionally guilty of blurring the distinction between art and science in his book, it was understandable given the diversity of publications about facial structure and expression. He was familiar with books illustrating the “passions,” as emotional expressions were habitually called, and owned a number of such volumes himself. The questions of how emotions are expressed and what they represent recur frequently in the history of ideas. One of the earliest known pronouncements on the subject is an Aristotelian text that declares: “[T]he soul and body react to each other; when the character of the soul changes, it changes also the form of the body, and conversely, when the form of the body changes, it changes the character of the soul.”¹ The passions were seen as the visible incarnation of the soul manifesting in the body. In the second century, the Greek physician Galen proposed that the study of expression should be considered a medical subject. Arguing that expressions manifest in human bodies, he proposed that to understand them fully one must undertake physiological research.

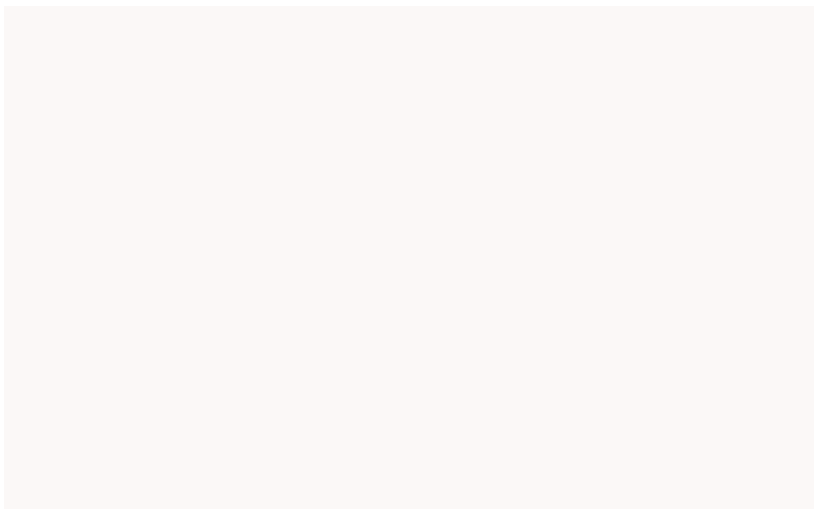
By the sixteenth century, artists were devoting considerable effort to the study of both physiognomy (the external appearance of inner character) and pathognomy (the external appearance of the passions). As early as 1501, the Italian painter Jacopo de Barbari (c. 1440–1516) complained


that contemporary paintings were “improbable and false” because painters lacked the knowledge of astronomy necessary to understand facial expression:

Physiognomy and chiromancy [palm reading] have their being by the force of the stars, which exert their greatest influence over man’s outward appearance in the face and hands. And it is necessary that painters should understand this, in order to record the celestial influences appropriately in their painted histories.²

From the Renaissance forward, a variety of books were produced depicting idealized pathognomic and physiognomic types. These were intended to help students learn how to communicate properly the precise character of people in their compositions. Artist’s manuals were seen as dependent on close observation, for it was only through accurate understanding of the mechanisms of human expression that an artist could hope to paint a true likeness. Albrecht Dürer, Leonardo da Vinci, and Charles le Brun are just a few of the artists who devoted themselves to documenting ideal expressive types.³

Giambattista della Porta (c. 1535–1615) helped to establish the pseudoscience of physiognomy with his *On Human Physiognomy* [*De Humana Physiognomia*, or *Della fisionomia dell’uomo*] (1586), categorizing individuals according to their superficial resemblance to various animals. The character of that animal dictated the personality of its human counterpart. Thus, the man who looks like an ox (figure 4-1) would be brash, stubborn, and dim-witted. According to this theory, one’s character is innate and predetermined. A virtual zoo of personalities was described in della Porta’s treatise, from owl-like and hawk-like people to those resembling leopards and dogs. One illustration even likened a

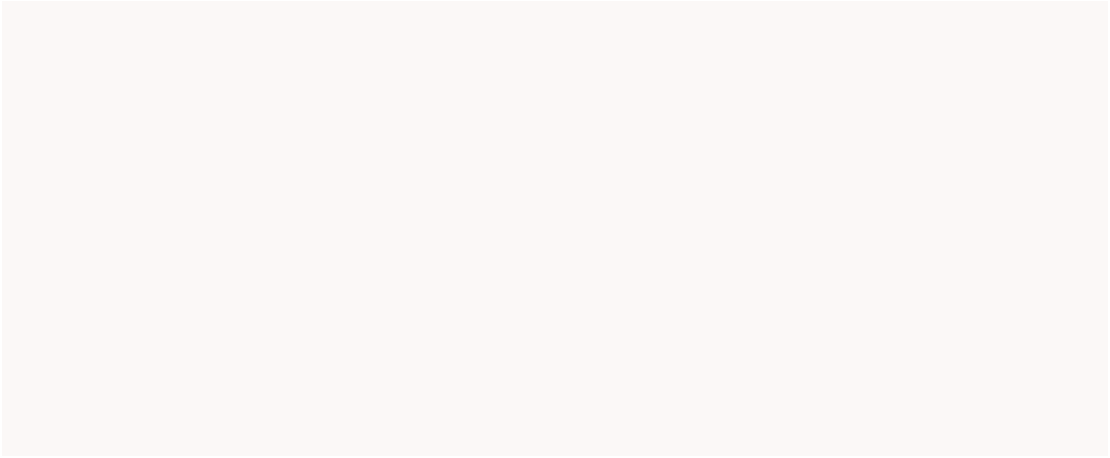




square-jawed man to a monkey, a proto-evolutionary vision that Darwin would surely have appreciated (figure 4-2).

The most popular treatise on expression was published by the Swiss theologian Johann Caspar Lavater (1741–1801) in 1772. His *Fragments of Physiognomy* [*Physiognomische Fragmente*] was elaborately adorned with illustrations by numerous influential artists, including the American Benjamin West (1738–1820) and the Britons Henry Fuseli (1741–1825) and William Blake (1757–1827). The book captured the popular imagination. Followers of Lavater maintained that one could deduce an individual's personality from appearance alone. During the peak of its fashion, educated citizens across Europe paused to assess the physiognomical character of the people they met. *Fragments* went through so many different editions and printings that it is difficult to generalize about its illustrations. Some reappeared with every issue; others came and went. In addition, there were both authorized and unauthorized translations of the book, together with pirate versions in the original German. Seldom has a title so aptly described a book as *Fragments of Physiognomy*: the book existed in numerous discrete sections that occasionally coalesced between the covers of a leather binding. As a result, there are often substantial variations between even closely related printings of the book.

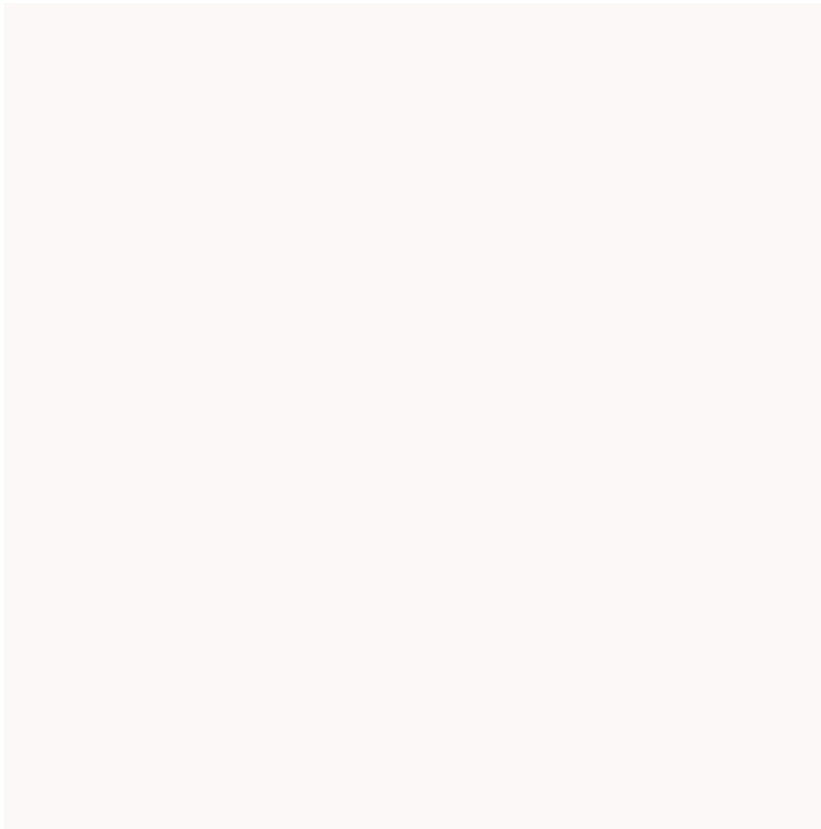
The range of illustrations in *Fragments* was impressive. Included were pictures comparing humans and animals (some clearly indebted to della Porta), silhouettes, catalogues of lips, noses, and other features, portraits of eminent personages, analytical diagrams, and even genre scenes. Most took the form of people dressed in contemporary costume. Ethnicity was strongly emphasized in the work, and manner of dress,



such as headwear (figure 4-3), was used as shorthand for certain national types. At the end of the book, Lavater demonstrated that through the judicious addition of lines, an artist could transform a simple drawing of an animal into a human portrait. He did not intend to suggest that a frog could transform itself into a man exactly, but as with della Porta, his illustrations evoked proto-evolutionary themes (figure 4-4).

The philosopher and scientist René Descartes (1596–1650) wrote *The Passions of the Soul* [*Les Passions de l'âme*], published only a few weeks before his death, one of the first philosophical attempts to understand the relation of the soul to the body. Descartes considered the arts subordinate to reason and was one of the first to propose a psychological theory to explain expression.⁴ He speculated that the soul, united with the whole body, exercises its functions by the mediation of a “little gland” in the middle of the brain.⁵ This gland, he maintained, orients the animal spirits, which in turn affect the nerves and muscles. Although it contained mystical elements, Descartes’s conception of the passions was essentially physiological: he argued that emotional expressions are the result of chemical and physical interactions.

Passions of the Soul was illustrated with schematic drawings, probably by the author himself. A more elaborate presentation was devised by the artist Charles Le Brun (1619–90) to illustrate his artist’s manual, *Method to Learn to Design the Passions* (1667). Le Brun accepted the Cartesian view that expression should be understood in terms of the relationship between mind and body, but ranked artists as foremost in the physiognomic debate, noting that despite the efforts of philosophers and physicians, “no one has ever thought of making it his particular study with an eye to painting.”⁶ The book was extensively illustrated with engravings from his own hand.



The immediate antecedent to Darwin's *Expression* was Scottish anatomist Charles Bell's (1774–1842) *The Anatomy and Philosophy of Expression as Connected with the Fine Arts* (1806).⁷ Copiously illustrated with engraved plates depicting Bell's interpretations of human emotion (figure 4–5), the volume focused on the application of human expression to drawing and painting. In the introduction to the third edition (1824), Bell explained:

I am not without hope that a new impulse may be given to the cultivation of the fine arts, by explaining their relation to the natural history of man and animals. . . . Till he has acquired a poet's eye for nature, and can seize with intuitive quickness the appearances of passion, and all the effects produced upon the body by the operations of the mind, he has not raised himself above the mechanism of his art, nor does he rank with the poet or historian.⁸

This sentiment echoed the aspirations of the artists of the romantic period. In the first half of the nineteenth century, unconscious facility in making pictures became highly prized. Artists tried to become so

adept at their craft that they could spontaneously register their feelings in pictorial form.

Darwin had long been acquainted with Bell's work. On 21 November 1826, the night he petitioned to join the Plinian Society at the University of Edinburgh, he attended a lecture debating the book. Darwin's friend William Browne, whose student research focused on the diagnosis of insanity (see chapter 6), led the discussion. Bell claimed that

anatomy [is] the examination of the structure by which the mind expresses emotion, and through which the emotions are controlled and modified; it introduces us to the knowledge of the relations and mutual influences which exist between the mind and the body. To the painter, therefore, the study is necessarily one of great importance; it does not teach him to use his pencil, but rather it teaches him to observe nature, to see forms in their minute varieties [and] to catch expressions so evanescent that they must escape him, did he not know their sources.⁹

Darwin recorded his reactions to Bell's work in his Notebook "C" (1838). Commenting on Bell's idea that the practice of grinning was designed to expose the canine teeth, Darwin wrote,

[N]o doubt a habit gained by formerly being a baboon with great canine teeth. . . . Laughing modified barking, smiling modified laughing. Barking to tell other animals in associated kinds of good news [*sic*]. discovery of prey. — arising no doubt from want of assistance. — crying is a puzzler. Under this point of view, expression *of all animals* becomes very curious.¹⁰

This brief entry foreshadows the book he would write some thirty-five years later.

Bell believed that facial expressions are endowed by God. He explained:

As the Creator has established this connexion between the mind and external nature, so has He implanted, or caused to be generated, in us, various higher intellectual faculties. In every intelligent being He has laid the foundations of emotions that point to Him, affections by which we are drawn to Him, and which rest in Him as their object. In the mind of the rudest slave, left to the education of the mere elements around him, sentiments arise which lead him to a Parent and a Creator.¹¹

This argument paralleled English theologian William Paley's theory of divine design, based on the contention that the rationality of God is evident in the structure of organisms.¹² Bell in fact collaborated with Paley

on Paley's seminal book *Natural Theology; or Evidences of the Existence and Attributes of the Deity* (1802).

Darwin learned much from his reading of Bell's *Anatomy and Philosophy of Expression*. Beyond the evolutionary implications of its arguments, the book was a primer on depictions of expression in art. His private copy of the book, now in the Darwin Archive, contains annotations highlighting passages in which he was particularly interested. In the chapter on beauty, Darwin highlighted a passage on classical art:

With them (the Greeks) the highest effort of art was to represent man deified; as it were, purified from the grosser characters of nature. This they did, as we have already seen, by exaggerating whatever is proper to the human form, by increasing what gives dignity, and bestowing features capable and prone to the finer emotions; representing them, either as still and unperturbed, or as indicating a superiority to the things of this lower world.¹³

Elsewhere Darwin marked passages that described (in Bell's words) the "intimacy and tenderness" of Madonnas in Italian churches, remarked on the success of William Hogarth's renderings of eyes, praised Michelangelo's command of expression, and recommended Francisco de Zurbarán's (1598–1664) painting of Saint Francis in the Louvre.¹⁴ "The finest possible example of [the] condition of suffering is in the picture of Guercino in the gallery of Milan, *The Departure of Hagar and Ishmael*," Bell wrote, and Darwin duly noted. Bell went on: "Those who have only seen the engraving can have little conception of the beauty of the picture, for the perfection is in the colouring." Later in the text Bell explained the importance of eyebrows: "[W]e have only to repeat the experiment of Peter of Cortona (1596–1669); to sketch a placid countenance, and touch lightly with a pencil the angle of the lips and the inner extremity of the eyebrows. By elevating or depressing these, we shall quickly convey the expression of grief or of laughter."¹⁵

Darwin also underscored a section describing a tour of the Academy of Fine Arts in Bologna. According to Bell, standouts there included Raphael's St. Cecilia in ecstasy, in which "there is not only great beauty, but very fine expression . . . in the picture of the Murder of the Innocents, by Guido Reni, there is an admirable figure of a woman." Raphael and Domenichino, Darwin underlined, "have painted demoniacal boys." He also noted Bell's observation that in Raphael's "great picture of the transfiguration in the Vatican, there is a lad possessed, and in convulsions." Bell's artistic grand tour continues, and Darwin under-

scored additional passages describing paintings by William Hogarth and Leonardo da Vinci, a sculpture by Gian Lorenzo Bernini (1598–1680), and the Laocoön.¹⁶ Judging from the number of annotations in the book, Darwin scrutinized *Anatomy and Philosophy of Expression*. His interest piqued by the pictures Bell described, Darwin would soon begin to explore London museums, looking for alternative examples of expressive imagery.

Bell's book and others formed part of a continuing historical endeavor to analyze the nature of human expression. It is apparent even from this small sampling of books known to Darwin that studies of human expression involved a mixture of artistic and scientific positions. Some, like Le Brun, argued that the artist's eye should be the guide for the proper expression of the passions. Others, like Descartes, argued that expression was the product of physiological interactions and exists separately from aesthetic ideals. Darwin cites much of this material in *Expression*. His understanding of this work informed his effort to illustrate the book.

ILLUSTRATION AND NARRATIVE STRATEGIES

From the Renaissance forward, books on expression were illustrated with pictures of progressive complexity. The increasing quantity and sophistication of these illustrations may be understood in part as a result of technological advancements in printing methods and in that sense reflect the increasing complexity of books on other subjects. As printed books became more common, illustrating them became more economical. These illustrations also proved popular with the public. Viewing the illustrations to Lavater's *Fragments*, for example, was considered not just informative, but also an entertaining parlor distraction in eighteenth-century Britain. By 1810, twenty different English-language translations of *Fragments* had been prepared, many of which were widely available through newly formed book clubs.¹⁷ To compete in such a marketplace, Darwin had to produce a book that was more appealing to his potential audience. His challenge was to produce illustrations that advanced his theories on expression, but that also persuaded and engaged his readers. The use of photography was one means to accomplish this.


Darwin profited from earlier books on expression and incorporated their best ideas in his work. At the same time, he was also wanted people to buy his book; he competed with other titles for consumers' purchases. It would have been clear to Darwin that existing physiognomical, artistic, and scientific literature was well illustrated and had been

for 300 years or more. Illustration was expected in books of this type, so to succeed, of course he would have to use pictures. If his book was to be seen as more appealing to buyers than others in the field, it would be helpful to offer more spectacular images. His decision to choose photography was entirely consistent with the progression in illustration quality evident in previous volumes.

5

Photography and Evolution Meet

CONNECTIONS BETWEEN PHOTOGRAPHY
AND BIOLOGY IN THE 1860S



Throughout the 1860s, Harvard University zoologist Louis Agassiz (1807–1873) was one of the main opponents to Darwinian theory in the United States. Always looking for evidence to challenge the concept of evolution by natural selection, in 1865 he arranged an expedition to Brazil to study the country’s geology and gather biological specimens. Agassiz believed that the country’s spectacular ecology might help him to unravel the mysteries of species development. Organisms as impossibly beautiful and as delicately adapted to their surroundings as Amazonian animals and plants could not have been formed by random mutation and selection, he believed; only divine will could explain their presence. His research on that journey became known as the Thayer Expedition, after the wealthy Bostonian businessman Nathaniel Thayer Jr. (1808–1883) who sponsored it. It was to become a centerpiece of his assault on Darwinian evolution. “The conviction which draws me irresistibly,” Agassiz wrote, “is that the combination of animals on this continent, where the fauna are so characteristic and so distinct from all others, will give me the means of showing the transmutation theory is wholly without foundation of fact.”¹ Agassiz’s research culminated in the book he co-authored with his wife Elizabeth, *A Journey in Brazil* (1867), in which he argued, somewhat predictably, that Darwinian theory was fatally flawed. Tropical plants and animals were not the only evidence of God’s divine creation in Brazil; the racial makeup and behaviors of the *people* who lived in Brazil were just as convincing.

Agassiz's analysis focused on speciation. It had long been his contention that crossbreeding between different subspecies of animals could not give rise to new ones naturally, because hybrid offspring are not biologically viable. This inviability can take two forms. In some cases, for example, when a horse and a donkey mate to create a mule, the offspring are simply sterile. In other cases, Agassiz claimed, the offspring may not be sterile but fail to mate because they do not find suitable partners. For example, if an Eastern Swallowtail Butterfly were bred with a Western Swallowtail, what butterfly would want to mate with such strange-looking progeny? And even if one did, he reasoned, at what point would the offspring become so dissimilar from their parents that they could no longer breed with the founding population, for example, as a Swallowtail is dissimilar from a Monarch? According to Agassiz, hybrid animals are not sexually attractive to their relatives because the mating preferences of the standard population favor animals that look like the norm. And even if they did breed, there is no way such "selected" animals could differentiate themselves so much that they are ultimately no longer able to breed with the founding population. Agassiz considered this "evidence" to be Darwin's Achilles heel; if animals cannot mutate, hybridize, and breed in the wild, then the entire theory of evolution by natural selection unravels.

Brazil, Agassiz wrote, provided the perfect laboratory for studying this sort of "speciation" in humans. He believed his theories would be corroborated in the mixed-race children of the Native American, African, and European peoples who lived in Brazil. He considered such offspring sterile crosses, claiming that when parents from different human races have children, their bloodlines are destined to die out because interracial offspring are not attractive sexual partners.

On his arrival in the river port of Manaus in May 1865, Agassiz began to collect the evidence that he believed would prove his argument. Photography, he decided, was the perfect medium to substantiate his theory. Armed with photographs of mixed-race natives, he would illustrate unpleasant features of their anatomy, confirming the unattractive appearance of mixed-race peoples among the general population. With the assistance of Walter Hunnewell, a hastily trained student, he built a photographic studio and, choosing subjects from among Brazilian racial types that he believed would show once and for all that Darwin was wrong, began taking their pictures.

THE THAYER EXPEDITION

Although Agassiz's Brazilian project seems misguided now, it was important since it marked the first time photography was used directly in

the evolutionary debate.² The images he and Hunnewell produced on the Thayer Expedition were never published; the results were inconclusive, and photographs were generally difficult and expensive to reproduce. But three remarkable albums of their photographs were preserved at the Peabody Museum of Archeology and Ethnology at Harvard University. Agassiz maintained that they demonstrated the immutability of species. Most were taken in Agassiz's makeshift studio, which his wife Elizabeth described as a "picturesque barrack of a room, which [. . .] serves as a photographic salon."³ Another of Agassiz's students, William James,⁴ provided a more colorful description:

I went to the photographic establishment and was cautiously admitted by Hunnewell with his black hands. On entering the room I found Prof. engaged in cajoling three mocas whom he called pure Indians, but who I thought as afterwards appeared, had white blood. They were very nicely dressed in white muslin and jewellery with flowers in their hair and an excellent smell of pripioca. Apparently refined, not at all sluttish, they consented to the utmost liberties being taken with them and without much trouble were induced to strip and pose naked.⁵

The Harvard albums contain more than 100 six- by four-inch studies of people, nude and partially clad, who sat for Agassiz's camera. Nearly all were young adults whom Agassiz considered of prime reproductive age. The majority of them were women, who arrived in the studio wearing fine dresses and showy jewelry, as if ready to pose for a formal portrait.⁶ Agassiz requested that the women lower their gowns to expose their uncovered bodies for the camera (figure 5-1). The results are surreal: elegantly clad over her torso, the sitter's clothes are parted or lowered to expose her breasts. To those not familiar with the project, the pictures look more like voyeuristic fantasies than scientific studies. As the historian Gwyneira Isaac has noted, there is a disquieting element to the photographs, as the women seem to have been "dressed up" only to be "dressed down" for the camera.⁷ Agassiz seems to have been particularly interested in the forms of women's breasts; the *Journey in Brazil* describes the various manifestations of the feature in extensive detail, in a section titled "Comparative Analysis of Women's Breasts and Inguinal Region." In the albums, Agassiz twinned his photographs of native Brazilian breasts with photographs of classical statuary, including Canova's *Three Graces* and the *Venus de Milo*⁸ (figures 5-2, 5-3). He applied a similar technique to his male subjects, contrasting a native male nude with the *Apollo Belvedere*.⁹ The vulgarity of mixed-race sexual characteristics compared with classical European ideals was supposed to be self-evident.¹⁰

Classical statuary was often used as a reference point in nineteenth-

century discussions of human anatomy. This is a conceit with which Darwin would certainly have been familiar. Many early writings on physiognomy espoused the perfection of ancient Greek models; these were taken not as idealizations but as actual representations with which living specimens could be compared. The uncritical absorption of this standard owes much to the view of early art historians, such as the Prussian Johann Winckelmann (1717–1768), who praised the “noble simplicity and quiet grandeur” [*Edle Einfalt und stille Grösse*] of Greek art in his *Thoughts on the Imitation of Greek Works in Painting and Sculpture* (1755).

There may not be a single reliable archetype of attractiveness, as

Agassiz suggested in his comparisons of Brazilian women with ossified European figures. And, although one may speculate that the ancient statues faithfully depicted people, it is a stretch to think such works are records of real individuals. A standard that incorporates an artist's conception of the ideal, in which muscles are exaggerated, forms streamlined, and blemishes removed to achieve a desired effect, is theoretical rather than actual. These are issues with which Darwin wrestled while preparing *Expression*. Can one generalize a smile, a laugh, or a frown, from a distinct expression on a particular individual? If so, how should that individual be selected? Would a random person suffice, or one chosen from a cross section of people of different ages and cultures? Darwin chose not to illustrate *Expression* with classical examples.

Darwin may never have seen Agassiz's Brazilian photographs, but he was aware of his work in Brazil and corresponded with him about his journey. Despite the antipathy each had for the other's research, the two remained congenial adversaries. Agassiz wrote to Darwin shortly after his return from Manaus that while he was opposed to Darwin's views, this did not blind him to "the great value of his original researches."¹¹

For his part, Darwin, too, professed respect for the Harvard scientist. Unfailingly diplomatic, he sidestepped Agassiz's more extreme theories, including his stance on miscegenation. Instead, he inquired about less controversial matters such as his thoughts on the sexual coloration of Amazonian tropical fish.¹² Ironically, Darwin included this information in *Descent of Man*, which contains his broadest claims for the shared ancestry of humans of any of his works. Darwin's biographers Adrian Desmond and James Moore have described his exchange with Agassiz during this period as "turning the poor man's anti-Darwinian gains into serviceable spoil, pickpocketing him so gently that he was none the wiser."¹³

Agassiz's use of photography would not have escaped Darwin. From 1869 to 1870, Louis's son, the natural historian Alexander Agassiz (1835–1910), took up residence in England. During this time he made several visits to Darwin at Down House, serving as a sort of unofficial emissary from his father. A specialist in sea urchins and starfish, the younger Agassiz was also employed at Harvard, where after his father's death in 1873 he succeeded him as director of the University Museum of Comparative Zoology. He was also involved in U.S. coastal surveys and shared with Darwin an interest in the formation of coral reefs.

Perhaps for this reason he was less skeptical of Darwin's work than was his father, but he was just as interested in harnessing photography to the cause of science.

Upon his return to Boston in 1871, and shortly after his last visit with Darwin, Alexander published an appeal to scientists in the *Bulletin of the Museum of Comparative Zoology*, urging the use of photography in their research. Perhaps the first article to advocate the use of photography in a scientific journal, it was accompanied by two sample photographs of sea urchins, each printed using a different photomechanical printing technique (figure 5-4 demonstrates photomechanical Albertype printing). He encouraged readers:

The rapid progress made in carbon printing by the Woodbury and Albert processes¹⁴ promises to furnish us, within a short time, the means for direct application of photography to illustrations of natural history, and these new methods of printing are likely to replace to a great extent the ordinary lithographic plates. The accuracy of photographic printing is of course far beyond that of an engraving or lithograph,

and as soon as a few difficulties of printing the separate figures of a plate with one impression are overcome, we shall be able to illustrate our memoirs accurately and economically, and give figures with an amount of detail which the great expense of engraving or lithographing would normally make impossible, even if it were mechanically practicable.¹⁵

In the winter of the following year, Alexander Agassiz repeated this advice in a letter to Darwin: “I have made pretty extensive use of photographic printing in my book [*Revision of The Echini* (1872)], and from what I have succeeded in obtaining trust it will hereafter be possible to supersede the old lithographic processes, which are wasteful in time and money, and not half as accurate.”¹⁶

HUXLEY AND THE ANTHROPOLOGICAL DEBATE

Just as Darwin’s rivals were seeking to enlist photography in their campaign against the theory of evolution by natural selection, his allies were preparing their own pro-Darwinian photographic campaign. In England, Thomas Henry Huxley, Darwin’s staunch ally, had become interested in photographic anthropometry, that is, the application of photography to the mathematical analysis of anthropological specimens. Huxley was a leading member of the London Ethnological Society, a splinter group of the Anthropological Society, which formed in 1863 to fashion a Darwinian approach to anthropological research. The Anthropological Society favored the traditional, static classification of peoples (the approach with which Louis Agassiz was most comfortable), in which researchers aimed to develop a simple topology of various human races. They viewed humans as unchanging, created by God to be separate and distinct. The ethnologists, by contrast, attempted to trace the social evolution of peoples from a common universal ancestor.¹⁷

In the late 1860s, photography became a centerpiece of the new society’s investigations. The anthropologist Roslyn Poignant notes that the *Ethnological Journal* is full of accounts of photographs being exhibited as evidence at meetings of the society, ranging from reproductions of Peruvian antiquities to a picture of a boy in Saigon who grew a tail.¹⁸ Huxley himself began working with photographic evidence at least as early as 1866, when he received a packet of photographs of the legendary Neanderthal cranium from Karl Fuhlrott, the German school teacher who had announced the specimen some nine years earlier.¹⁹

In 1868, Huxley probably first saw photographs being presented by his ethnologist colleagues, a packet of photographs by the Ellis Studio of a Burmese family with apelike hair all over their bodies. William

Houghton (1821–95), who sent him the images, explained that they were “photos recently brought home by Captain Houghton—a brother of mine. I read a paper on the subject lately before the Ethnographic Society.”²⁰ These photographs may have been a hoax, as the hair covering the subjects has the look of a costume. Nevertheless Huxley and Darwin were probably familiar with the condition they supposedly depict, which is also illustrated in Johann Caspar Lavater’s *Fragments of Physiognomy* [*Physiognomische Fragmente*] (1772). Lavater described the case of a girl who had grown hair “like a deer” all over her body and included two illustrations of the phenomenon in his book²¹ (figure 5-5).

It is now known that these accounts are consistent with the symptoms of a rare genetic abnormality known as congenital generalized hypertrichosis.²² However, there is little evidence that Huxley took such accounts seriously. Darwin, too, seems to have been uncertain what to make of them. In *Descent of Man* he claimed that the thin layer of short hairs that cover the bodies of humans to varying degrees is undoubtedly “the rudiments of the uniform hairy coat of the lower animals.”²³ But he did not mention the condition described by Houghton and Lavater. He did, however, possess a set of four photographs similar to those Houghton sent, reproductions of oil paintings photographed by the Austrian studio F.R. Bopp. Portraying a family of four who were said to have grown thick fur, they were described on the mounts as the

“Hairy family of Ambras.”²⁴ The daughter of the family is shown in figure 5-6.

In March 1869, Huxley delivered the keynote address for a series of six lectures before the Ethnological Society on the peoples of India, North America, and Polynesia. The first of the subsequent lectures, delivered by one G. Campbell, was titled “The Peoples of India, as Traced in Existing Tribes and Castes.” To illustrate his talk, Campbell used albumen prints from *The People of India*,²⁵ an ambitious eight-volume collection of photographs of indigenous residents of the subcontinent. The photographs were produced principally by the Indian photographic firm of Bourne and Shepherd.²⁶ Campbell, speaking less than a year after the first volume was published, would have had access only to the earliest sections of the work. Typically the images feature sitters adorned with selected indications of social status: jewelry, costume, occupational tools, and weapons (figure 5-7). Poignant argues that while the photographs were considered successful, the sitters’ accoutrements constituted visual “noise” that worked against anthropological discourse at the lec-

tures.²⁷ After Campbell's lecture, the members agreed that it would be preferable to give a "more scientific character" to meetings in future.

Perhaps with this resolution in mind, some six months later Huxley embarked on a more structured photographic survey of the peoples of the British Empire. Working with the Colonial Secretary George Leveson-Gower, the second Earl Granville (1815–91), Huxley devised a plan for an encyclopedia of "measurable" and "comparable" photographs "of the various races of men comprehended within the British Empire. . . . Great numbers of ethnological photographs already exist," he wrote, "and they lose much of their value from not being taken from a uniform and well considered plan."²⁸ Under Lord Granville's guidance, the project obtained the official support of the Colonial Office, which conveyed formal requests for the photographs Huxley sought to each of the colonial governors general.

The idea was to create an improved *People of India* on a grander scale, one that encompassed all the tribes and races in the British Empire, to be used for scientific study. In August 1869 Huxley sent Granville the protocol for making such photographs (figure 5–8). Each record was to comprise four parts: two full-figure nudes and two close-ups of the head alone. The photographs were to be no less than three inches long,

preferably all to the same scale so that the “relative proportions of the different figures could thus be apprehended almost at a glance.” The subjects were to be “in a condition of absolute nudity or as near thereto as may be practicable.”²⁹ Both full-frontal and profile views were desired, with the sitter in an attitude of “attention”:

[T]he right arm should be stretched out horizontally—the hand being fully open with the fingers & thumb extended, and the palm turned forwards. The feet should be parallel and with the ankles fairly touching one another. The arm will need a rod to prevent it from trembling and a measuring rod divided in feet and inches may either be fixed to this rod or otherwise included in the plane of the body so as to present a scale. In the profile view, the left side should be turned to the eye of the photographer; and the left arm bent at the elbow and so disposed as not to interfere with the outline of the pectoral region. The back of the hand should be turned toward the photographer and the fingers & thumb extended.³⁰

Perhaps mindful of Louis Agassiz’s dip into pseudoscience, Huxley eliminated a passage alluding to the female breast. Crossed out, but still visible on his copy of the letter, was the further prescription, “In the female it is desirable that the arm should not be so disposed as to interfere with the contour of the breast, which is very characteristic in some races.” Huxley’s specifications for photographs of the head were similar

to those for the full figure. They were to be taken head-on, and again in centered profile, the larger the better, with a scale divided into width and length photographed together with each head.

Along with these instructions, Huxley enclosed sample photographs illustrating his method³¹ (figure 5-9). In contrast to Agassiz, who used Grecian statues as models, two Caucasian sitters were used, one male and one female, presumably local English models whom Huxley enlisted for the purpose. The shock with which correspondents around the world received these images must have been considerable: little was left to the imagination. The photographs of the female model, young, buxom, and completely nude, would certainly have excited the attention of male officials to whom they were sent. There is some indication of this in the Huxley Archive itself, in which Huxley's copy of the head-on female sample is missing. A note is penciled in the margin next to its intended location. "Full face photo of accomp. woman *stolen* during Aug. '98. It is believed by a sapper who shortly afterwards went abroad and cannot be traced."³² By using classical statuary, Louis Agassiz had at least avoided such difficulties.

Although Huxley's system was an improvement over the haphazard approach in *People of India*, his controls were not enough to produce the sort of measurable anthropological data he sought. The system was too fluid. As the anthropologist Frank Spencer has pointed out, Huxley failed to make adequate provision for accurately determining the sub-

ject's stature.³³ In the photographs it was unclear whether the subjects were standing completely straight, and even if they were, it could not be determined if their fully erect postures were equivalent. As Spencer has explained, the system was similar to one used more than a century earlier by the Flemish artist Jacob de Wit (1695–1754) in *Handbook of Proportion* (1747). The subject was directed to stand in the same plane as a measuring rod, with both rod and subject free-standing. This not only permitted the subject to hunch slightly, but also created some doubt as to precisely where the various parts of the sitter's body were in relation to the rod.

Huxley's project also presupposed the availability of a skilled international network of photographers, but few qualified photographers lived in the more remote areas of the Empire, and even the best might be prone to interpret his instructions slightly differently. Inconsistencies in the tilt of the head, the raising of the arm, and the thickness of the subject's hair rendered measurements unreliable. Differences in lens selection, focus, and manipulation of the camera bellows to adjust perspective rendered them virtually useless for scientific data.

As if that were not enough, reactions of the government bureaucrats whom Huxley and Granville approached ranged from enthusiasm to indignation, with apathy perhaps the most common response. The governors of Mauritius and Barbados replied that their colonies contained no populations of interest to the ethnologist,³⁴ while the governors of British Guyana, Tobago, and the Virgin Islands claimed they had no photographer qualified for the job.³⁵ The Central Board for Aboriginies [*sic*] in Melbourne considered it politically inadvisable:

I am of the opinion that it would be unwise to ask the Aboriginies of this colony to submit themselves to the photographer in the manner described by [Professor Huxley]. In Victoria the Aboriginies, I am glad to say, are civilised as regards their habits, but they are not sufficiently enlightened to submit themselves in a state of nudity for portraiture in order to aid the advancement of science. Indeed they are very careful in the matter of clothing. If I empower a photographer to visit the stations and take photographs with professor Huxley's instructions in his hand, I would I am sure offend the Aboriginies. . . . I shall be glad to collect photographs of full length figures . . . but I can promise such only as have been gathered with the cheerful consent of the blacks.³⁶

In Ceylon, the surveyor general in Colombo, Captain A.B. Fryers, sent photographs fulfilling Huxley's request, noting that he had "more difficulty than anticipated." He overcame resistance among the natives by using prisoners as subjects, producing just two sets of photographs: one of a tribal chief, "sentenced two years ago to 20 years imprisonment

with hard labour for an alleged rape” and the other, a female Tamil, “21 years of age, a coffee picker by day, a prostitute by night.”³⁷ In Grenada, the reaction was especially strong. The lieutenant governor reported that the House of Assembly had convened to debate the proposal and passed a resolution forbidding “the furnishing of photographs required in accordance with Professor Huxley’s desire.”³⁸ Although the bill tactfully cited pecuniary concerns, the serious and unequivocal reply conveyed a fundamental distaste for the undertaking.

Although Huxley gathered dozens of photographs, many of which are preserved in the Thomas Henry Huxley Archive at Imperial College London, his dream of documenting the peoples of the British Empire was never realized. The project was simply too ambitious.

DARWIN AND PHOTOGRAPHY: EARLY INDICATIONS

At the same time that Huxley was struggling to apply photography in his research, Darwin was also becoming interested in the scientific potential of the medium. His own involvement began with the exchange of portraits with colleagues, a practice that was becoming increasingly common in scientific circles. References to portrait photographs first appear in Darwin’s correspondence in the late 1850s and were in keeping with the vogue for small *carte-de-visite* photographs that the photographer André-Adolphe-Eugène Disdéri (1819–89) had launched in 1854. Such personal use of photography was of particular value to Darwin, who was both a prolific letter writer and, due to ill health, a reluctant traveler. Many of his correspondents had never met him, and the exchange of photographs was an effective means of introduction. Darwin sent dozens of portraits to associates internationally and received many in return. Some of the exchanges were formal, as when an entire scientific society would send Darwin a souvenir album of its members. More often the exchange was casual, for example, with Asa Gray (1810–88), Darwin’s strongest advocate in the United States (and who, like Louis and Alexander Agassiz, also served on the Harvard faculty). At Gray’s request in 1861, Darwin sent him an unmounted crumpled portrait, suggesting apologetically that he might “iron it smooth.”³⁹

Darwin disliked having his picture taken. He was notoriously self-conscious about his appearance and unenthusiastic about photographs made of him.⁴⁰ Writing to the botanist Joseph Dalton Hooker (1817–1911) about Maull & Polyblank’s portrait of 1855, he wrote, “You ask about my photograph. I have been done at the Club, but if I really have as bad an expression as my photograph gives me, how I can have one single friend is surprising.”⁴¹ Eight years later he sent Hooker an updated photograph, with a similarly wry description: “As regards my photo-

graph, I believe I have very little expression. I have often remarked that I am not recognised except by those who know me tolerably well; that I have often to introduce myself—added to which all my photographs & portraits make me look either silly or stupid or affected.”⁴²

In his autobiography, Darwin described the alarming reaction his portrait had caused among the members of a German scientific society:

A few years ago the Secretaries of a German psychological society asked me earnestly by letter for a photograph of myself; and some times afterwards I received the proceedings of one of the meetings in which it seemed that the shape of my head had been the subject of public discussion, and one of the speakers declared that I had the bump of Reverence developed enough for ten Priests.⁴³

This was a more generous interpretation than that pronounced by Robert FitzRoy, the captain of the *Beagle*. He once confided that after their first meeting he had nearly decided against retaining the young Darwin as the ship’s naturalist. A keen physiognomist, he had been troubled by the shape of his nose. According to Darwin, “he doubted whether anyone with such a nose could possess sufficient energy and determination for the voyage.”⁴⁴

Despite constant demand for his portrait, by 1863 Darwin had never had a professional carte-de-visite portrait done, relying instead on pictures made by friends and photographs made in larger formats. Writing in January of that year to the Swiss botanist Alphonse de Candolle (1806–93), he made this clear: “I have never had a proper ‘carte photographique’ taken of myself; but I enclose one done 2 or 3 years ago by my son, if worth your acceptance.”⁴⁵

Darwin’s son William had taken up photography in July 1857. That summer, the twelve-year-old budding artist prepared, exposed, and developed photographs within the family home. An upstairs room had been converted into a temporary darkroom, and the boy proceeded to photograph members of the family and the grounds around the house. When he returned to boarding school, his father told him it was “odd not having you rushing up & down the house, with your Photographs & very dirty hands.”⁴⁶ A tutor had evidently offered to adapt a room for him at school, but William had not brought his equipment. “By the way,” Darwin admonished, “I think it not amiss that you did not take your Photography, as you wd. have no time for school work.”⁴⁷

The biographers Desmond and Moore describe William as “grasping glass plates” as he ran from room to room, implying that he used the wet-plate collodion process.⁴⁸ Wet-plate photography involved making photographic negatives by hand, using a sticky and noxious solution of

silver nitrate, potassium iodide, and guncotton dissolved in ether. It is reasonable to suppose William used this technique, as it was becoming the most common form of photography at the time. However, Darwin's correspondence does not identify the materials his son actually used. For the boy to have worked successfully using any photographic process at such a young age would have been a precocious feat, because the medium was famously demanding. The intricacies of processing collodion wet plates posed challenges even for professional photographers, and amateur practitioners in the 1850s, though not rare, were still uncommon. It is unclear how William became interested in photography or who may have instructed him. Someone familiar with the process would likely have been required to train him, at least initially. Some parental supervision would have been necessary, too, given his tender age and the hazards associated with early photographic chemistry. Possibly Darwin joined his son in the enterprise occasionally, either out of curiosity or simply to check up on him. In any case, it is likely he was at least broadly familiar with the operation of a darkroom and the basic requirements of the materials and methods used.

THE DARWIN FAMILY AND THE INVENTION OF PHOTOGRAPHY

Ironically, it was around this time that members of Darwin's extended family were identified as contributors to the invention of photography. On 16 April 1863, the Birmingham *Daily Post* reported that it had uncovered the earliest known photographs, believed to be the result of experiments conducted about 1791 by James Watt, inventor of the steam engine.⁴⁹ The photographs he was said to have made, depicting eighteenth-century architectural features destroyed before the invention of any previously known photographic process, later proved to be forgeries. Nevertheless, the story propelled the members of the eighteenth-century Lunar Society, which included not only Watt but also Darwin's grandfathers Josiah Wedgwood and Erasmus Darwin, to the forefront of discussions about photography's invention.

Although the report was eventually disproved, it had challenged the accepted view that William Henry Fox Talbot (1800–77) and Louis-Jacques-Mandé Daguerre (1787–1851), the nearly simultaneous inventors of the earliest British and French processes, should share recognition for the invention. This, in turn, revived discussion of the contributions made by Charles Darwin's uncle, Thomas Wedgwood, who with pioneer chemist Humphry Davy had published the influential paper “An Account of a Method of Copying Paintings upon Glass and of Making Profiles by the Agency of Light upon Nitrate of Silver” in the *Journal of*

the Royal Institution (1802). Some English writers argued, with patriotic zeal, that Wedgwood and Davy should be credited with the invention of the first truly photographic process, although the two did not devise a method for fixing the images they created. They did manage to produce evanescent images on paper and leather using silver nitrate and exposure to light. But without a means to preserve them, the importance of this advance was not immediately appreciated.

Although they were not friends, Darwin and Talbot were both alumni of the University of Cambridge and mixed in similar circles. Talbot, whose main occupations were linguistics and crystallography, was Darwin's senior by about nine years. However, by coincidence, Talbot's perfection of his photographic process and the initial conception of Darwin's theory of evolution by natural selection were nearly simultaneous. Darwin returned from his voyage on the *Beagle* in 1836, just as Talbot made his first successful photographs of his estate in Lacock, Somerset. In the late 1830s, Darwin and Talbot's audiences overlapped, as both men attempted to win support among London scientists. There are, however, no accounts of the two having met.

The most direct link between them was their mutual friend the astronomer Sir John Herschel (1792–1871), who was instrumental in perfecting Talbot's process. It was Herschel, for example, who suggested Talbot use a bath of sodium hyposulfite to fix light-sensitive silver nitrate, rather than the ordinary table salt first used. Talbot described Herschel's efforts as the "steps of a giant."⁵⁰ In addition to the invention of an effective fixer, Herschel's contributions included invention of the cyanotype process, the first practicable method of applying photographic materials to glass, the use of photography in astronomy, and the use of miniaturized photographs (an antecedent of microfilm) as a method for storing public records.

Even as he guided the progress of photography, Herschel also had a profound effect on Darwin's concept of natural history. Desmond and Moore have described Herschel as one of Darwin's heroes.⁵¹ Darwin wrote that Herschel's *Introduction to the Study of Natural Philosophy* "stirred up in me a burning zeal to add even the most humble contribution to the noble structure of Natural Science."⁵² He described the book as one of the two most influential he ever read. He met Herschel on several occasions and exchanged at least ten cycles of correspondence with him. In a long letter passed among Darwin's circle by the geologist Charles Lyell (1797–1875), Herschel expressed great interest in the scientific understanding of the origin of life, describing it as the "mystery of mysteries." The question of origins for Herschel was linked to the understanding of time itself. Lamenting that a literal interpretation

of the Bible had hindered understanding of the true age of the Earth, he wrote emphatically, “We must interpret [time] in accordance with whatever shall appear on fair enquiry to be the truth for there cannot be two truths.”⁵³

Thus, Herschel joined the chorus of gradualists, who, like Lyell, argued that speciation can best be explained on a scale of millions, not thousands, of years. Dissatisfied with existing theories on the subject, Herschel offered no explanation for the origin of species himself, but maintained that a convincing scientific answer would soon be forthcoming. Darwin was, in effect, the most illustrious of those to pick up the gauntlet Herschel had thrown down.

It was in this context in the late 1860s that Darwin began to explore the use of photography in his research. Privately, through the exchange of portraits with other scientists, through his son’s amateur enthusiasm, and through personal connections, he had become acquainted with its possibilities. Professionally, with the burgeoning use of photography in the research of Louis and Alexander Agassiz, Thomas Huxley, and others, he had witnessed its potential as a scientific tool. His repeated exposure to photography in these two spheres ultimately convinced Darwin that it could be useful in his own work.

His approach would be different from that of his friend Huxley. Darwin viewed photography as a potent source of information, as Huxley did, and as a means to illustrate his theories. But his understanding of the medium was more intuitive. Whereas Huxley attempted to create structured, measured records of carefully selected subjects, as Darwin began to study expression in humans he looked for spontaneous, candid pictures of ordinary people in various emotional states. There were to be no guidelines or measuring grids in his photographs. Instead, he began to gather pictures capturing natural behaviors, that is, pictures taken outside of a formal, experimental context. Herschel, in a prophetic article for the *Photographic News*, had described such photographs in 1860 as the “representation of scenes in action—the vivid and life-like reproduction and handing down to the latest posterity of any transaction in real life. . . . [T]he possibility of taking a photograph, as it were, by a snapshot—of securing a picture in a tenth of a second of time.”⁵⁴


Having spent most of his career considering the rise and fall of populations of animals over vast expanses of time, in the 1860s Darwin took a new tack. By obtaining photographs of emotional expressions taken in mere fractions of a second, he hoped to discover evidence of previously undocumented similarities between species. His interest lay not just in the anatomy of various organisms, but in the subtle and some-

times imperceptible ways they behaved. Martin Rudwick has described the established practice of portraying the “vanished reality of the past” through depictions of ancient animals and their habitats as creating “scenes from deep time.”⁵⁵ Toward the end of his career, Darwin began to gather photographs that might be termed, in the spirit of Rudwick, “pictures from shallow time.”

6

Method to Their Madness

HOW PHOTOGRAPHY IN MENTAL HOSPITALS
INFLUENCED DARWIN

 The first photographs Darwin found that he considered suitable for publication had already been published in another groundbreaking scientific treatise. In 1862, the French neurologist Guillaume-Benjamin Duchenne de Boulogne published a photographically illustrated guide to facial expression, with the unwieldy title *The Mechanism of Human Facial Expression, or an Electro-physiological Analysis of the Expression of the Passions Applicable to the Practice of the Fine Arts*.¹ Darwin owned two copies of this magnificent book: a small, octavo version, and a rare, unbound, grand-in-quarto edition. Darwin's copy of this larger version may be the most complete in existence.²

Duchenne was a physician at the Salpêtrière, a hospital for the poor in the suburbs of Paris. The hospital treated patients with neurological problems, such as epilepsy, palsy, paralysis, and insanity. Believing these conditions to be the result of electrical dysfunction in the nervous system, Duchenne began to experiment with electrical current as a means of inducing neural action. He wanted to understand the way human bodies are wired, believing this could help him develop therapies to cure his patients. He soon learned that by using electric probes it was possible to cause isolated groups of muscles to contract. Applying this technique to groups of muscles in the face, he found that he could artificially induce a variety of recognizable facial expressions in his subjects.

By applying a gentle flow of electricity, Duchenne was able to hold

the expressions he induced long enough to produce photographs of several seconds' exposure. Instead of accelerating the photographic process to produce instantaneous images, as others had tried to do, Duchenne devised a system for freezing the activity of his subjects long enough to accommodate the lengthy exposure times necessitated by photographic technology at the time. Although his photographs still required reasonably quick exposures to register, the electrical system allowed him to overcome the major limitation of photographic technology—its slowness. He merely held the subject in position as long as necessary for the camera to record the experiment.

Mechanism was produced with the assistance of the photographer Adrien Tournachon (1825–1903). Known as “Nadar jeune,” after his brother, the great French photographer Félix Nadar (1820–1910), he achieved notoriety in the early 1850s for his photographs of horses and, in 1854–55, for a cycle of instantaneous portraits of the mime Debureau enacting various dramatic expressions.³ Under Duchenne's supervision, Tournachon produced eighty-four large-format photographs depicting human subjects in various expressive poses. Published in *Mechanism*, these proved invaluable in Darwin's project to portray expression.⁴

Mechanism was organized in three sections. In the first part Duchenne introduced his experiments, providing an overview of the physiology of facial musculature. The heart of the volume lay in the second part, which Duchenne called the “scientific” section, and was of primary concern to Darwin. In it Duchenne described his electrical experiments and assessed the specific muscles that contribute to facial expressions. The section concluded with a criticism of anatomical errors made in several classical sculptures; in contrast to many of his contemporaries who accepted Greco-Roman statuary as ideal, Duchenne challenged their anatomical accuracy (figure 6-1). The third section, titled “Aesthetics,” concluded the book. It included a sequence of photographs of a costumed blind woman enacting dramatic poses, with and without electrical stimulation. As a sightless person she afforded a distinctive view of how emotions manifest themselves. She had developed her expressions instinctively, without visual cues from others.

Six models participated in Duchenne's study: an elderly man, an opium addict, a child, a blind girl, a blind woman, and a sculptor. Only the latter was not a patient at the Salpêtrière, a man with an elaborate handlebar moustache whom Duchenne had met at the Academy of Arts. Duchenne was criticized for his choice of subjects, which was said to be unrepresentative of the general population. Indeed, aside from convenience, there was little reason to rely almost exclusively on patients. Healthy subjects would have served equally well for his photographs. The photographs are disquieting in part because of the state of the

participants' mental and physical condition. The electrode procedure may have been painless, but the expression of joy induced in a drug addict and the look of sadness inscribed on the face of a blind girl are provocative (figure 6-2). The subjects were vulnerable, and one cannot help but imagine, despite Duchenne's justifications, that they fell victim to his camera.

With Duchenne's permission, Darwin used eight illustrations from *Mechanism in Expression* (plate 2, figures 1 and 2; plate 3, figures 4-6; plate 7, figure 2; and the engraved figures 20 and 21). Initially, Darwin wrote asking permission to reproduce just four or five, all of which, he said, would be reproduced in wood engravings. He offered to pay for the right to publish them, but Duchenne replied that he was an admirer of his "magnificent" researches and declined compensation. He gallantly declared, "The question of money should not exist between men of science. Choose, in my album, all the figures you wish."⁵ It was a generous offer, but Darwin had forced the issue somewhat with his initial request. While offering to pay a modest fee for the pictures, he hinted that he might lose interest if the demands were too steep. "I could manage very well without copying two first, if you objected, as I have photographs which would serve my purpose," he wrote, "but they are not so good as yours; nor are the others indispensable for my work."⁶

Six of the Duchenne plates published in *Expression* were of a single subject (figure 6-3), whom Duchenne described as "an old, toothless man, with a thin face, whose features, without being absolutely ugly,

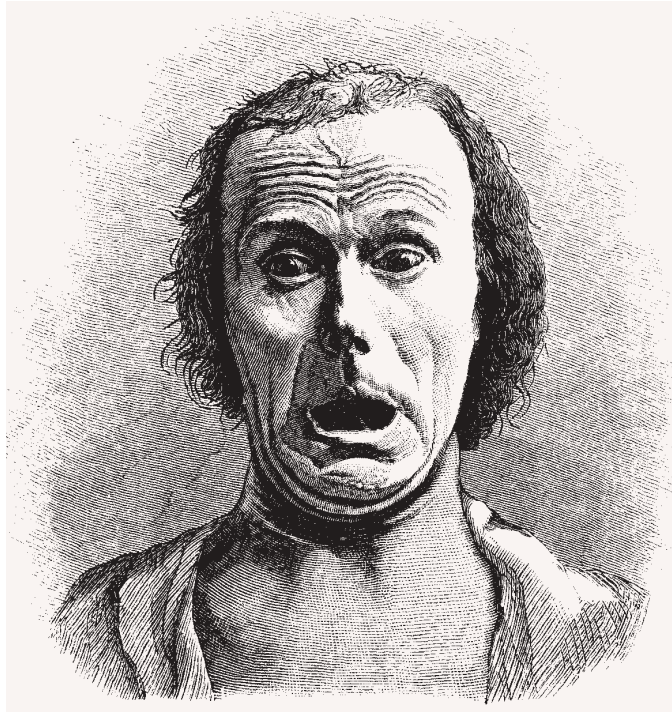
approached ordinary triviality and whose facial expression was in perfect agreement with his inoffensive character and his restricted intelligence.”⁷ According to Duchenne, the subject, who appears in *Expression* plate 3, figures 4–6; plate 7, figure 2; and engraved figures 20 and 21, was chosen for practical reasons: he suffered from an anesthetic condition of the face, which made it possible to stimulate individual groups of his facial muscles without causing involuntary response among others. It was as if, as Duchenne remarked, he were “working with a still irritable cadaver.”⁸

Darwin made changes to some of Duchenne’s plates before publication. Two were copied into wood engravings (figures 20 and 21 in *Expression*); the others were reproduced photographically and appear in plates 3 and 7 of Darwin’s book (figures 6–4 through 6–7). Duchenne’s toothless man is the only subject portrayed in the book both in photographs and in engravings. Although the photographic plates are accurate copies of Duchenne’s originals, the engraved reproductions are substantially different from their predecessors.

Opposite:

6-2 Guillaume-Benjamin Duchenne de Boulogne, Expression of Pain in a Young Girl, c. 1862. Albumen print. Plate 28 of *Mechanism*.

6-5 James Davis
Cooper after Guillaume-
Benjamin Duchenne de
Boulogne, *Terror*, 1872.
Wood engraving. Darwin
instructed Cooper to remove
the electrical apparatus.



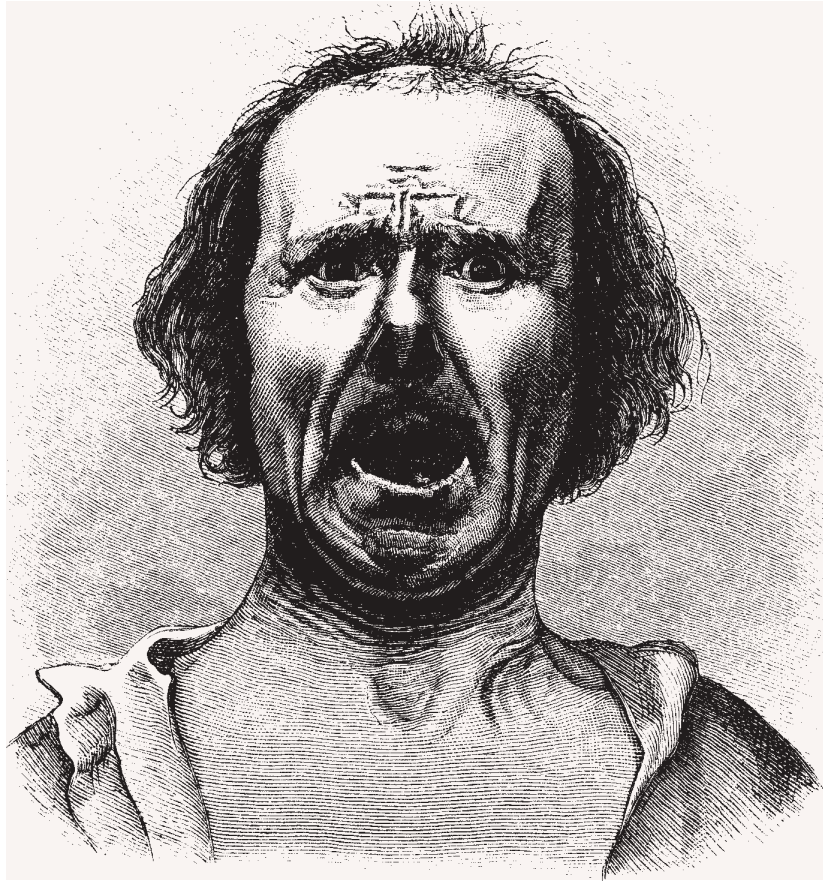
In the engraved figures, Darwin instructed the engraver, James Davis Cooper, to “Attend to the wrinkles on neck & forehead—form of mouth. Omit galvanic instruments and hands of operator.”⁹ Thus, the finished wood engravings (figures 6-5, 6-7) show the subject completely out of context—there is no indication of the electrical probes that caused the expression registered on the man’s face. The metallic rods used as stimulus looked more like torture devices than the instruments of a more or less benign test. Duchenne’s experiments had been performed with the consent of his subjects and with minimal discomfort to them. Nevertheless, the results were chilling. The subjects had been stimulated to assume false expressions, and the wires and probes were clearly visible in the original photographs. Darwin thought it best to remove them; they were distracting and unnecessary.

This decision gave the final engraved versions new strength. They immediately grab the reader’s attention; there is a revelatory quality about them. Without probes to ground the images, and without text to explain them, readers were confronted with iconic pictures of unmitigated terror, horror, and agony. Duchenne’s two engraved figures in *Expression* (figures 6-5, 6-7) are bold, commanding images. As Darwin well understood, emotional expressions do not merely emanate from the person who displays them; they are also received in the mind of the person who witnesses them. They veritably jump from the page, bursting with energy and import.

Opposite:

6-4 Guillaume-Benjamin
Duchenne de Boulogne,
Terror, c. 1862. Albumen
print. Plate 61 of *Mechanism*.
Duchenne’s original
photographs revealed
a great deal about the
circumstances of their
creation.

6-7 James Davis Cooper
after Guillaume-Benjamin
Duchenne de Boulogne,
Horror and Agony, 1872.
Wood engraving. The
engraved version was
striking.



Not only did Cooper remove the probes and hands of the operator, but he also removed any solid background. In the engraved figures, the old man is shown within an oval vignette, built up of tightly stacked horizontal hatch marks. Faint jagged lines animate the area surrounding the figure, suggesting motion, energy, or perhaps clouds. The man is rendered with varying densities of the same style of marks that make up the background, giving the figure an ethereal, otherworldly quality. He is given more hair in the engraved version, but the gape of his shirt is preserved. This, combined with his direct gaze, form an incomplete narrative. In “Terror” (figure 6-5), the subject looks down and away as if seeing something dreadful beyond the frame of the picture. In “Horror and Agony” (figure 6-7), the last illustration in *Expression*, the subject looks directly at the reader.

Opposite:

6-6 Guillaume-Benjamin
Duchenne de Boulogne,
Horror and Agony, c. 1862.
Albumen print, plate 65 of
Mechanism. The version
Darwin owned.

In *Expression*, Darwin praised Duchenne’s photographs. However, he did not embrace them fully. Some of the pictures, such as those of horror and agony, could not be mistaken for anything else. Others were more ambiguous. Mindful that these might be misinterpreted, Darwin

showed them to friends and colleagues and asked them to judge the expression portrayed. In *Expression* he explained:

It fortunately occurred to me to show several of [Duchenne's] best plates, without a word of explanation, to above twenty educated persons of various ages and sexes, asking them, in each case, by what emotion or feeling the old man was supposed to be agitated; and I recorded their answers in the words which they used . . . the most widely different judgements were pronounced in regard to some of them. This exhibition was of use in another way, by convincing me how easily we may be misguided by our imagination; for when I first looked through Dr. Duchenne's photographs, reading at the same time the text, and thus learning what was intended, I was struck with admiration at the truthfulness of all, with only a few exceptions.¹⁰

Duchenne had photographed people in such unusual circumstances that viewers had difficulty resolving what they were meant to communicate. Their appearance was abstracted, with codifying elements that could be used to deduce meaning removed. In Duchenne's pictures, perhaps the abstraction had gone too far. While Darwin marveled at the "truthfulness" of the images, those less schooled in the intricacies of expressive musculature had trouble interpreting them. Their indeterminacy undermined their effectiveness, and they required text to make them truly meaningful. Perhaps this is why Darwin considered Duchenne's images insufficient to illustrate expression. They were anatomical, but they left readers without a clear idea of how to place them. He needed them to reinforce and illustrate his text, not to distract and confuse readers.

Duchenne's electrical experiments gave the human face the status of an appliance; expressions were just so many bundles of muscles to be tweaked and stimulated at the will of an experimenter. He was principally an anatomist, concerned with the physiology of facial mechanisms, and did not attempt to explain the origins of expression as Darwin did. Duchenne was also concerned with beauty; having dissected expression on a mechanical level, he proceeded to ask what makes certain expressions appealing. In a largely neglected section of *Mechanism*, he attempted to reconcile his discoveries regarding the structure of the human face with contemporary notions of aesthetics.

Apologizing for having used the face of a common, ugly man in the preliminary or "scientific" section of the book, in his "aesthetic" section Duchenne employed an attractive young adult woman for his experiments. His stated goal was to explore the intersection between beauty and expression, or "the set of conditions that constitute beauty from an aesthetic point of view."¹¹

Using his electrical procedure to isolate fine gradations of expression, and taking advantage of advancements in photographic technology since the completion of his so-called scientific pictures in 1856,¹² Duchenne caused his subject to display degrees of expression, differentiating between full and partial contractions, and experimenting with symmetry in the face. Relying only on “my judgement and on my artistic feeling,”¹³ Duchenne attempted to create archetypal depictions of such narrow classes of expression as “remembrance” or a “young woman’s spirit being exalted by her ardent faith” (figure 6–8). He even dressed the subject in theatrical garb. The depth of faith Duchenne sought to convey was expressed in the text:

[D]oes not her white veil and homespun dress signify that she is doing something great, that she is going to renounce this world? If you cover the eye and forehead of the left side, the sadness of her features (due to the slight lowering of the angle of the mouth) makes you feel that she is not leaving her dearest loved ones without some regrets. And if you cover the eye and forehead of the other side, you see that her face is sorrowful; you feel that the heart of the nun, who is perhaps leaving her dear mother and family, has not yet been withered through the exaltation of religious feelings.¹⁴

Duchenne came to believe that his photographs were too mechanical to engage his readers without supporting prose. Too far removed from daily life, his photographs could be criticized as inaccurate. By attempting to reinject beauty into his work, Duchenne attempted to legitimize his methods. He wished to demonstrate that highly complex expressions, even beautiful ones, could be attained through electrical stimulation.

JAMES CRICHTON-BROWNE

References to *Mechanism* first appear in correspondence between Darwin and the psychiatrist and amateur photographer James Crichton-Browne in 1869. Crichton-Browne was another contributor to *Expression*. As director of the West Riding Lunatic Asylum in Yorkshire commencing in 1866, he had adopted photography as a tool in the treatment of those in his care. He was a progressive administrator, treating inmates as patients rather than charges. He arranged potted plants in the halls, invited musical performances, and even allowed the patients to drink beer.¹⁵ It was a far cry from the methods used in many contemporary asylums, in which residents were belittled and confined. Crichton-Browne also created a lecture series on the grounds of the asylum, in which medical problems were discussed, and published a journal, *West Riding Asylum Medical Reports* (1871–76), which for a time was the preeminent publication in the field.

As a forward-thinking physician, Crichton-Browne embraced research developments that promised to improve the health of his patients. Photography was one such development. In fact, psychiatry was one of the few scientific disciplines in which the use of photography had become established at this time. In the 1850s, the psychiatrist Hugh Welch Diamond (1809–86) reported success in using photographs of patients as a therapeutic tool. In an oft-quoted paper read before the Photographic Society of London in 1856, he reported: “The photographer catches in a moment the permanent cloud, or the passing storm or sunshine of the soul, and thus enables the metaphysician to witness and trace out the connexion between the visible and the invisible in one important branch of his researches into the philosophy of the human mind.”¹⁶ Diamond claimed that he had been able to cure some of his patients by showing them their photographic portraits. The shock of seeing oneself depicted in a diminished state, combined with the psychological distance afforded by using a static picture, was said to be enough to bring some patients to their senses.

Although not widely reproduced, these findings attracted public-

ity, and the usefulness of photography as a remedy was widely touted. Photography also offered a second, indirect benefit. In addition to being useful to patients as catalysts for mental transformation, photographs enabled physicians to catalogue behavioral disorders. Crichton-Browne was one of numerous Victorian psychiatrists who followed in Diamond's footsteps by assembling a photographic record of patients organized according to ailment. One goal of this effort was to document and analyze the physiognomy of the mentally ill.

Darwin found pictures of the insane especially revealing. He believed that one of the things that characterized the mentally ill was their inability to conform to social norms; often they flouted conventional rules of behavior. This was seen by many, including Darwin, as reversion to a primitive state. According to this idea, their expressions are uninhibited and unconstrained because they have lost the ability to control their emotions. By studying their behaviors in photographs, Darwin hoped to see raw emotional expressions sometimes suppressed in adults. In this regard, the insane were seen as comparable to children, of whom he also strived to obtain good photographs.

Darwin had a long-standing interest in the physiology of the insane. As a student at the University of Edinburgh, he had been nominated for membership in the student-run Plinian Society by his fellow student William Browne, who had devoted himself to studying the nature of madness. Browne wrote a thesis in 1826 focusing on inmates of the Montrose Lunatic Asylum in Angus, Scotland. It was his contention that religious fervor was a kind of insanity and that the charismatics who had been canonized by the church in prior centuries would have been committed to asylums in nineteenth-century Britain.¹⁷ He believed this demonstrated the hopeless inconsistencies of church doctrine, and criticized the orthodox church. It was Browne who gave the lecture refuting Charles Bell's pious *Anatomy and Philosophy of Expression as Connected with the Fine Arts* on the night of Darwin's petition for admission into the society.

Among those who followed Diamond's example was Henry Hering (active 1857–74), who in the 1860s documented patients of Bethlem Royal Hospital in Beckenham, Kent. Little is known about the circumstances under which Hering produced pictures of the insane, because he is usually eclipsed by Diamond, his contemporary. Stylistically, their works are very similar and so are easily confused. Hering is better known as a portraitist; his 1857 image of Florence Nightingale is perhaps his best-remembered work. Darwin owned a photograph Hering took in Beckenham: on the back it is annotated, "Insane Woman from Bethlem Hospital," and "bought at Hering, Nov. 1866"¹⁸ (figure 6–9).

Hering's family maintained a studio at 137 Regent Street in London from 1857 to 1874, along the route Darwin is known to have taken in his search for pictures.¹⁹

A duplicate of Darwin's photograph is held in the archives of the Bethlem Royal Hospital, Beckenham, Kent.²⁰ It is a salt print, rich in tone and in pristine condition, suggesting it was little used. The date on the back indicates that it was one of the first photographs Darwin acquired and is unusual in the Darwin Archive for its exquisite quality. Unusually, Darwin did not make any annotations about the diagnosis of the sitter or her name, and there is little about her expression that would recommend its inclusion in *Expression*. It is possible that he was drawn

to the woman's tousled hair. Later, he obtained another photograph of a woman with more obviously disheveled hair from Crichton-Browne, which he included in the book.

Darwin and Crichton-Browne corresponded regularly between 1869 and the publication of *Expression* in 1872. Crichton-Browne's letters to Darwin were often accompanied by portraits of patients in the asylum. Among them were images of people with various physical abnormalities or suffering from mental illnesses from "melancholia" to "homicidal impulses."²¹ For example, he sent five portraits of a man with a disfiguring tumor on his neck by the Wakefield firm of G. & J. Hall (figure 6-10). They were arresting, but Darwin bundled them together with a cover slip labeled "Idiots—of no use."²² The photograph of an "Insane Ear" was more noteworthy, because Darwin had expressed an interest in the evolution of ears in his *Descent of Man* and revised the illustrations in the second edition (figure 6-11). However, the photograph Crichton-Browne sent, a close-up of the deformed ear of a male patient, did not mesh with Darwin's analysis and was left out. The image was titled "The Insane Ear," which suggested only one kind of ear was ever seen among the mentally ill. Dar-

win was not sure what to do with it. He put it in an envelope labeled “Photograph of the insane from J. Crichton Browne, March 4, 1873. Perhaps of no good use—the insane ear.”²³

Another example of this type is an image of a family of mentally ill patients in Scotland. Photographed by a firm called Bryson Studios, it was labeled “Brother and Sister ‘Imbeciles’ All Inmates of One Asylum in Scotland” (figure 6-12). On close inspection it is clear this image was made from seven separately photographed portraits, cut out and collaged to make the image. The print that Darwin received was a photograph of this collage. Crichton-Browne meant well, but the expressions on the subject’s faces, which ranged from stupefaction to absence, were not in the slightest bit revealing. Evidently, he could not resist sharing photographs he found interesting, even if they did not relate to Darwin’s investigations. From a clinical point of view, they may have been highly compelling, but they were useless to Darwin.

Crichton-Browne also sent photographs of people whose physical appearance belied their mental disquiet. Crichton-Browne had personally participated in the making of many of these images. In total, he sent Darwin at least thirty-seven photographs of his patients, many accompanied by lengthy descriptions of their symptoms. One wonders what transgressions caused the woman diagnosed as suffering from “Erotomania” to be confined in Crichton-Browne’s ward (figure 6-13). She glares at the camera with eyes half shut, half-knowing, contemptuous, and indifferent to the forces that sent her there.

A similar portrait of an “Obstinate Imbecile” also invites reflection (figure 6-14). Stout, round-faced, and with square jaw, he looked the part. But how did his physician define obstinacy? Crichton-Browne’s pictures represent people categorized according to the mores of the time. Moreover, they represent a typological approach to personality that Darwin strived to avoid. To the extent that Crichton-Browne captured expression, his successes were limited to “abnormal” individuals, and they were of minimal use to Darwin as illustrations. In fact, he chose only one, the head of a “lunatic” woman with frizzy hair, to reproduce in *Expression* (figure 6-15). Darwin wrote on the back of it in pencil, “Insane woman with horror prevalent—taken in paroxysms—hair like wire.” As with several other illustrations in *Expression*, Darwin had it copied as a wood engraving (figure 6-16). He credited the image to his colleague in the text.

Ironically, it seems that Crichton-Browne may not have made this particular photograph but had rather collected it, even though it is signed by Crichton-Browne on the mount. An identical print in the University of Edinburgh Library is marked “Dumfries” on the back, suggesting it was made by another photographer.²⁴ Psychologist Paul Ekman has argued that the engraved version is actually incorrect, be-

cause the wrinkle on the subject's forehead is anatomically impossible. Because the wrinkle is not present on the original photograph from which the copy was made, Ekman believes the engraver added it, possibly on his own initiative.²⁵ Because both extant copies of this image have faded with time, it is impossible to know what would have been visible in the photograph at the time of its creation.

Crichton-Browne's main contribution to *Expression*, then, was conceptual. Darwin had asked his opinion on anatomical matters relating to expression, including his interpretation of Duchenne's *Mechanism of Human Facial Expression*. Darwin's large copy of *Mechanism* is full of marginalia, inscribed by Crichton-Browne and Darwin as they passed the book back and forth. Darwin incorporated so many of Crichton-

6-16 James Davis Cooper after a photographer in the Circle of James Crichton-Browne, *Insane Woman, Showing the Condition of Her Hair*, 1871–72. Wood engraving. Figure 19 of *Expression*.



Browne's observations in *Expression* that in March 1871 he wrote suggesting that he should be credited as coauthor of the book.²⁶ Crichton-Browne declined politely. It was, perhaps, an exaggeration of his role. However, Darwin's gratitude was genuine. His contribution to the project, practical or otherwise, was considerable.

Opposite:


6-15 Photographer in the Circle of James Crichton-Browne, *Insane woman, Showing the Condition of Her Hair*, c. 1870. Albumen print. The original contained little detail in the forehead.

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7

Laughing and Crying

DARWIN'S QUEST FOR PICTURES OF EXPRESSIVE BABIES

 Virtually everything in the life of Charles Darwin was the subject of research and experiment, so it was not long after he married and began to raise a family that his wife and children became prime specimens in his personal laboratory. His home, Down House, was by all accounts a warm and loving place to grow up, but it was also a place where the residents knew that even the smallest quirks might be jotted down for future analysis.

The progression of infancy was a matter Darwin took seriously, so when Darwin's first son, William, was born in 1839, his development immediately came under scrutiny. Notes on the the mental and physical growth of William and other Darwin children form a substantial part of Darwin's notebooks "M" and "N," two volumes he devoted to observations on expression. These notes, in turn, became crucial evidence in the formulation of his ideas about evolution; many subsequently found their way into *Expression*. Together with a diary centering on the developmental phases of William himself, they also formed the basis for an article he published in the journal *Mind* in 1877, "Biographical Sketch of an Infant." In it Darwin described what amounted to his son's decidedly secular private Genesis: "During the first seven days various reflex actions, namely sneezing, hiccupping, yawning and of course sucking and screaming were all well performed by my infant."¹

Such parental pride as may be detected in this account of his son's accomplishments was offset by more clinical reports of the savage quali-

ties of his offspring. Darwin saw children as primitive, uncontaminated versions of adults, plainly displaying the ancestral characteristics of their animal progenitors. His notebooks are full of observations likening children to various animals, such as his speculations on the origins of hide-and-seek: “Children have an uncommon pleasure in hiding themselves and skulking about in shrubbery, when other people are about: this is analogous to young pigs hiding themselves.”² Similarly, viewing animals at the London Zoological Gardens he drew comparisons with human children: “The orang outang [when touched] threw itself down on its back & kicked and cried like a naughty child. Do monkeys cry? (They whine like children.)”³ He was fascinated by infant expressions of irritation, jotting in his Notebook “M”: “whine of children, puppies do so, dogs nearly silent, so with men.”⁴ In his article in *Mind*, Darwin even likened the unintentionally violent arm movements of young children to the snapping of jaws in newborn crocodiles.⁵ With fish, however, he drew a mental line, remarking blithely, “What a contrast does the mind of an infant present to that of a pike.”⁶

Darwin always acknowledged a developmental dimension to his evolutionary theories. In *Origin of Species* he devoted a subchapter to embryology, explaining that embryos of vastly different species can appear indistinguishable in their primordial state. Citing the experience of his rival, Harvard scientist Louis Agassiz, he wrote that once when Agassiz forgot to label a number of embryonic specimens, Agassiz could not tell “if it be that of a mammal, bird, or reptile.”⁷ Darwin concluded:

Thus, as it seems to me, the leading facts of embryology, which are second in importance to none in natural history, are explained on the principle of slight modifications not appearing, in the many descendants from some one ancient progenitor, at a very early period in the life of each, though perhaps caused at the earliest, and being inherited at a corresponding not early period. Embryology rises greatly in interest, when we thus look at the embryo as a picture, more or less obscured, of the common parent-form of each great class of animals.⁸

By the time he wrote *Expression*, however, his attention had shifted slightly. Darwin studied only humans from a stage after which their organs had differentiated; there could be no mistaking the body of a one- or two-year-old child for an equivalently developed monkey, for example. Whereas in *Origin* he had pointed out the similarities between the fetal states of different species, in *Expression* he studied children as fully formed human beings with untrained animal minds.

Darwin regarded all people, young and old, as governed by the same biological forces. However, the expressions of children are more transparent, as their moods are less controlled than in adults, and because

children are less likely than their elders to suppress their true feelings; they have not yet internalized social constraints. As a result, he reasoned, their expressions are honestly expressed. Infants were especially useful, because they are too young to have learned to manipulate their expressions in any way. He viewed them as ideal for studying the similarities between human and animal behaviors, revealing human instincts at their least contaminated. Infants, therefore, became a focus of *Expression*.

CHILDREN AND ANIMALS

Darwin treated children as experimental blank slates on which to study the expression of emotions.⁹ Though their bodies contain all of the muscles used in the expressions of adults, they lack adult control and conditioning and therefore unconsciously reveal instinctive tendencies. Darwin believed that such tendencies are common to all humans, regardless of culture. He claimed that the universality of most expressions could be determined, especially by observing “very young children, those born blind and the most widely distinct races of man.”¹⁰ He valued observations of the insane for the same reason, because he considered their actions unguarded compared to ordinary persons.

Of the five behaviors Darwin identified in the first seven days of his son William’s life, only one was an emotional expression: screaming, which he associated with the experience of pain, suffering, grief, dejection, despair, fear, anger, or terror.¹¹ He considered it pivotal to his investigations, because it is one of the most common expressions and one of the first exhibited. In “Biographical Sketch,” Darwin described circumstances in which William exhibited the expression:

[W]hen a little over seven months old, and perhaps much earlier, there could be no doubt, from the manner in which the blood gushed into his whole face and scalp, that he easily got into a violent passion. A small cause sufficed; thus, when he was a little over seven months old, he screamed with rage because a lemon slipped away from his hands.¹²

In *Expression* Darwin elaborated, quoting novelist Elizabeth Gaskell’s (1810–65) *Mary Barton* (1848). “An excellent observer,” he wrote, “in describing a baby crying whilst being fed, says, ‘it made its mouth like a square, and let the porridge run out all four corners.’”¹³

Fourteen of the thirty photographic illustrations in *Expression* are of children. Five of them, the first photographs in the book, and the only pictures of babies, appear on plate 1. An older child appears in another figure on plate 1, and other children appear on plates 2–4. Of these, ten

were made by Oscar Rejlander, who was well known for his seemingly spontaneous photographs of children. The oceanographer and photographer George Charles Wallich provided one example (plate 3, figure 2), and another three were provided by the ironically named Hamburg photographer and portrait artist Adolph Diedrich Kindermann (1823–1892) (plate 1, figures 2 and 5).

The order of illustrations forms a pseudoevolutionary progression, from cats, dogs, and birds to monkeys, and then from infants to older children and adults. The photographs of infants on plate 1, illustrating the chapter “Special Expressions of Man: Crying and Weeping,” mark a narrative transition from animals to humans.

GINX’S BABY

The first of these photographs, referred to as “Mental Distress” in the text but known to the public as *Ginx’s Baby*, is the most storied of the illustrations in *Expression*¹⁴ (figure 7-1). It was one of the photographs Darwin commissioned from Rejlander, but unlike any of the other illustrations in the book, it grew to have a commercial life of its own. Hailed as one of the first “momentary” images ever made, Rejlander sold thousands of copies as individual photographic prints. The picture was considered a technical *tour de force* because Rejlander supposedly had captured body and facial muscles in vigorous movement. The picture

has been described as exemplary of the collaboration of Darwin and Rejlander.¹⁵

“Mental Distress” was intended to demonstrate the actions of a child in a fit of rage:

Infants, when suffering even slight pain, moderate hunger, or discomfort, utter violent and prolonged screams. Whilst thus screaming their eyes are firmly closed, so that the skin round them is wrinkled, and the forehead contracted into a frown. The mouth is widely opened with the lips retracted in a peculiar manner, which causes it to assume a squarish form [much as Gaskell had described]; the gums or teeth being more or less exposed.¹⁶

But the picture was deceptive. Although widely praised for its instantaneity, it is now apparent that the picture was not a true photograph, but a drawing made to look like an original photograph.

Although Rejlander had succeeded in producing a modest photograph of a crying child for Darwin, it was too small and unclear to be used in *Expression* (figure 7-2). To get around this problem, he made a

large chalk drawing of the original, then photographed it. The negative, when printed, looked like an original. Darwin knew that the image had not been made through conventional photography, as readers were led to believe. But neither admitted the sleight of hand, preserving its reputation as a significant photographic achievement.

Ginx's Baby is the only photograph in *Expression* that changed between editions. The rephotographed drawing is more common, appearing in most known versions of the book. Strangely, the unaltered photograph does appear in some early editions, too, particularly in certain issues of the first edition.¹⁷ Darwin never commented on this variation, so it is impossible to know whether it was intentional. One can only speculate that when the actual photograph was tried, it looked inferior to the drawn version and was quickly replaced.

HELIOTYPE PRINTING

The two variations might also be traced to the printer, the newly formed Heliochrome Company, which struggled to produce the plates Darwin needed on time. More than 7,000 copies of the first edition of the book were printed in Britain alone, putting enormous pressure on the firm. The plates seem to have been the company's first large commercial order, and the company had not yet perfected mass production. There was also labor unrest at the company, and a strike was called just six days before publication. Darwin wrote to the offices of his publisher, John Murray, expressing his concern:

It is a very bad job about the Heliochrome plates and will I fear cause us loss; but it is obvious that the Co. must be at least as anxious as we are, and therefore I honestly hope the difficulty will soon be overcome. It will be necessary to have a look at the plates, to see that they do not palm off poor copies owing to the employment of incompetent workmen.¹⁸

Produced in a rush and possibly even with replacement workers, the plates were of uneven quality. Darwin wrote to his publisher again, suggesting they lay down the law: "One of my sons saw a copy of 'Expressions' the other day with very poor Heliochromes. Would it not be well to caution the Co. that they will lose credit if they distribute poor copies?"¹⁹

Heliochrome had been Darwin's idea. Normally, photographic illustrations had to be glued, or "tipped," into the pages of books. This was labor intensive, and the quality of the finished product was difficult to control. In an effort to reduce costs, he had canvassed photographic printers in London for suggestions of alternative ways of reproducing

photographs. Heliochrome was a new photomechanical method of reproduction invented by the photographer Ernest Edwards (1837–1903), for whom Darwin had sat for a portrait in 1868.²⁰ Although he had no experience in photographic publishing, Darwin suggested this new technique to John Murray. In April 1872 he wrote to Murray’s assistant, Robert Cooke, telling him what he had learned: “I think it would be worthwhile to get estimates,” he suggested, from “Edwards & Kidd, 22 Henrietta Street. For reproduction of photographs the size of paper of Origin. By this process common paper is printed on & there is no need for mounting. I have seen many very good illustrations of this process.”²¹

The use of heliochrome for photomechanical reproduction was innovative. Unlike ordinary photographs, which must be printed individually, heliochromes are made using printing plates and may be mass-produced. The heliochrome process involves coating a printing plate with light-sensitive gelatin emulsion, which is exposed photographically using an ordinary negative. When exposed to light, the gelatin emulsion reticulates, or develops tiny fissures, in a pattern corresponding to the negative used. These fissures form a relief copy of the photographic image on the plate, which is then inked and run through a printing press using ordinary paper. The finished prints may be bound together directly with pages of text, eliminating the need for expensive, tipped-in photographs. Although low in detail and high in contrast compared to alternatives such as the rival Woodburytype (a photomechanical process involving lead intaglio plates), heliochrome reduced the costs of production considerably, enabling Darwin to afford the unprecedented number of photographs appearing in *Expression*.

Darwin was not without his doubts about the suitability of heliochrome. “I am very much perplexed what to decide about printed photographs & woodcuts,” he confessed in May.

I believe the former would certainly be best. I’m equally perplexed whether to try the Woodbury or the Heliochrome process. You [Cooke] think the latter best; Mr. Rejlander [the main photographer on the project] (who wishes that his photos should be well given) feels confident that the Woodbury process is best. Dr. Wallich has just been here & he considers the autotype [a photomechanical technique using carbon pigments] process superior to either of the above.²²

Two weeks later, he was leaning toward heliochrome, and a trial run was proposed. “The Heliochrome seems consistently the cheapest, & I think I could not do better than try one set of plates. What do you think?”²³

Eventually, Darwin and Murray settled on heliochrome. Using the process, it was possible to publish photographs without relying on copyists

to make facsimile engravings. This allowed Darwin to claim that the details of his originals had been reproduced with absolute precision. Once the plates were printed, however, Murray complained about escalating production costs. Darwin defended himself, saying, “I could not possibly have given many of the expressions by wood-blocks,” but conceded, “I would not have given so many photos had I foreseen the cost.”²⁴

Confusion about how best to illustrate *Expression* is evident in the mixture of photographs and wood engravings it contains. By the time Darwin and Murray had agreed to use photographic illustrations, Darwin had already paid the engraver James Davis Cooper to prepare wood-engraved versions of three photographs.²⁵ Rather than waste them, he appended them, somewhat incongruously, alongside the photographic plates. These are figures 19–21 in the book, the illustrations of a woman with wiry hair, and photographs from Duchenne illustrating looks of horror and agony. Darwin was pleased, but remained committed to true photographic illustrations. “They are excellently done,” he admitted, “but some of my friends tell me they think photos would be better than even facsimile engravings, in as much as the former are a guarantee of absolute accuracy.”²⁶

Production turmoil may have caused the actual photograph of *Ginx’s Baby* to be substituted for the drawn one. Considering the uncertainties at the factory, it is also possible the job was subcontracted to another firm and a fresh set of plates created. Heliotype plates are made of fragile gelatin and, unlike more robust printing methods like wood engraving, must be replaced frequently. Plates could easily have been mixed up and the correct placement confused. In all of the seven plates, apparently arbitrary reversals may be found from one edition to the next, as new plates were created and images mistakenly flipped. In fact, few of the photographs in *Expression* initially appeared with the correct left-right orientation. Only recently was this problem corrected, in the psychologist Paul Ekman’s 1999 edition of the book.

REJLANDER TO THE RESCUE

But such printing difficulties occurred after *Ginx’s Baby* had been made; the biggest obstacle to the publication of the image was its creation in the first place. The first written reference to the difficulties Darwin and Rejlander anticipated in making this and other commissioned photographs appears in a letter of November 1871. Responding to Darwin’s request, Rejlander wrote, “In spring-time one might get up such scenes with the chance of taking it photographically, instantaneously, but not now—not now. . . . You ask more than I can do—at this time of the year—at least.”²⁷

This marked the second time Rejlander had written to Darwin to discuss his commission. An illustration of a screaming child was the picture he most prized. He wanted an image of an infant uttering “violent and prolonged screams,”²⁸ caught on camera at the height of distress. The photograph would have to be taken so quickly that the minutiae of muscle movement could later be analyzed and studied. Rejlander knew such a photograph would be a challenge to produce. The best available technique, collodion photography (which involved coating glass plates with a sticky photosensitized solution of guncotton mixed with ether), was on the face of it too slow for the task, as it usually involved exposures of several seconds or more. The time of year exacerbated the problem, because the pale, angled light of an English winter meant low natural light levels. Yet he managed to deliver the photographs Darwin requested in the spring of 1872, including the challenging crying-baby image. This picture, and the obstacles that had to be overcome to make it, became a centerpiece of their collaboration.

Although *Expression* sold well, the popularity of *Ginx’s Baby* owed more to Rejlander’s manufacture of carte-de-visite and cabinet card (6-½ x 4-½ in) versions of the image than to its appearance in the book. In the three years between the publication of *Expression* and his death in 1875, Rejlander is reported to have sold more than 60,000 nine- by twelve-inch prints and a quarter of a million cartes-de-visite of *Ginx’s Baby*²⁹ (figure 7-3). These were sold independently, as mounted prints, with no commercial connection to *Expression*. Separated from the book, *Ginx’s Baby* developed a popular status removed from its scholarly origins. Most who bought the photograph were probably not even aware that it had once served the cause of science.

There are two reasons for the extraordinary reception of *Ginx’s Baby*. One was the innovative way it portrayed a child in action. The second was its timely association with Edward Jenkins’s satirical novel, *Ginx’s Baby, His Birth and Other Misfortunes* (1870), the story of a child born into a poor London family.³⁰ In the book, the baby’s father, Mr. Ginx, grief-stricken at his inability to provide for his thirteen children, attempts to drown his newest child at birth, sparing him the misery of his family’s meager existence. Caught in the act by a policeman, he is forced to surrender the child to a nunnery. According to the novel, because the mother was not Catholic, an evangelical group files suit to save the child from papist hands. They succeed, but the money they raise to provide for his care is instead spent on the lawyers who free him. As a result, the boy is returned to his father, who abandons him on the front steps of a gentlemen’s club. The club raises him for a while, employing him as a page, but soon he is fired for stealing silver spoons. Broken, the hopeless child throws himself off Vauxhall Bridge and drowns. A potent blend of Dickensian storytell-

ing and biting political satire, the prose version of *Ginx's Baby* enthralled readers of the early 1870s. Thirty-six editions of the book were printed in Britain in the first five years of its publication, and a similar number were produced and distributed in the United States.

The screaming baby Rejlander photographed for Darwin, with his preternaturally furrowed brow, became identified with Jenkins's hero. It is not clear who first identified the photograph with the character. Readers may have imagined the picture illustrated the child's chaotic baptism in the Catholic faith:

I have no hesitation about describing the impious behaviour of little Ginx. Whatever swaddled infant could do in the way of opposition, with hands, and legs, and voice, was done by that embryo saint. The incense made him cough and sputter; the lights and singing raised the very devil within him. His cries drowned the prayers. He frightened the conductress by the redness of his face. He ruined the red cross with ejected matter. You would have taken him for an infant demoniac.³¹

Inspired by such vivid descriptions, quantities of Ginx-themed goods entered the marketplace. The songwriter J.C. Drane composed a "*Ginx's Baby* Polka," which was published as sheet music with a litho-

graphic reproduction of Rejlander's photograph printed prominently on the cover³² (figure 7-4). Later editions of the novel were illustrated by former Charles Dickens illustrator Frederick Barnard (1846–1896), with etchings loosely based on Rejlander's image (figure 7-5). The photograph soon became indistinguishable from Jenkins's character. Although Darwin—and, at least publicly, Rejlander—objected, they were powerless against the might of the marketplace.

THE BIRTH OF GINX

Darwin was determined that his illustration of a crying child should be a photograph.³³ Babies' features are tiny, and the subtle movements that make up their expressions can change too quickly to be observed accurately with the unassisted eye. As with adults, photography promised a relatively objective tool for recording infant expression. As Darwin explained: "It is easy to observe infants while screaming; but I have found photographs made by the instantaneous process the best means for observation, as allowing more deliberation."³⁴

Rejlander was not the first photographer Darwin approached to produce his crying baby image. In 1870, he had contacted another photographer, unidentified by name but probably George Wallich, with the same request.³⁵ Wallich was a medical doctor by training, best known for discoveries he made while serving as oceanographer on the voyage of the *Bulldog* in 1860. Retiring from marine biology, he opened a professional photographic studio. Darwin must have known him from his natural history work, and he was one of Wallich's first customers. Darwin lamented, "I have been trying to get a London photographer to make one of a young baby screaming or crying badly, but I fear he will not succeed."³⁶

His pessimism seems to have been justified, because Wallich's efforts resulted in only two photographs: a picture of a nun in prayer (figure 7-6) and a charming but somewhat conventional portrait of Wallich's daughter Beatrice smiling while wearing a fancy bonnet. The praying nun was useful for comparison with José de Ribera's *Mary in Egypt* (see figure 8-6), but it was not reproduction quality. The picture of his daughter served to illustrate moderate laughter in an older child, so Darwin included it as plate 3, figure 2 of *Expression*.³⁷ In the text Darwin remarked only that her expression had been a "genuine one."³⁸

A German contact, presumably Darwin's former governess at Down House from 1859 to 1865, Camilla Ludwig, put him in touch with Adolph Kindermann. (The contact is identified only as "Miss

Ludwig” in Darwin’s correspondence.) In March 1871, Darwin wrote to Kindermann:

I am writing an essay on the Ex. of the emotions in man & the lower animals. Miss Ludwig forwarded to me several of your photographs of young children, which are quite excellent. I write now to know whether you will grant me the favour to allow me to have 2 or 3 copied & engraved for the sake of illustrating my book.—I should of course have printed beneath each, “copied from a photograph by M. A. Kindermann of Hamburgh.”

I sent a message telling Miss L that I shd. be very glad if you could make for me a photograph of an infant, only a month or two old, which weeps with the eyes firmly closed, adequately to [illegible] for the eyes, so as to show the wrinkles round them, & permit me to have it engraved.³⁹

In reply, Kindermann sent Darwin more than a dozen lively portraits of children he had photographed in his studio⁴⁰ (figure 7-7). In the text Darwin praised Kindermann’s pictures as some of “the best photographs in my collection,” and reproduced three of them on plate 1, figures 2 and 5, and plate 2, figure 2.⁴¹ Better than the images Wallich had provided, they succeeded in depicting children and infants actually crying,

open-mouthed with eyes clenched shut. The children themselves were oblivious to being photographed, slumping and leaning awkwardly in a way any parent would quickly recognize. The natural feeling of these photographs satisfied Darwin's demand for realistic portrayals of expression in children. Lacking in detail, however, they were ineffective in conveying the contractions of distinct muscle groups.

There is evidence in the Darwin Archive that Darwin bought photographs of crying children during his London picture-shopping excursions. The dates of these purchases are not clear, but he may have begun as early as 1869, when the first known reference to collecting photographs appears in his correspondence.⁴²

Darwin owned a copy of American portraitist James M. Landy's celebrated *Expressive Pets*, a montage of a dozen photographic portraits of human babies compared with dogs in sympathetic poses. Presented as an eleven- by fourteen-inch grid of carte-de-visite-sized portraits, the dogs appeared to be mimicking the expressions of the children, and vice versa. Viewers enjoyed the strange parallels between the expressions of babies and dogs. One reviewer simply described Landy's crying babies as "very amusing."⁴³ Another, writing in the *Photographic Times*, declared that Landy's "precocious" babies should be classed among the photographic wonders of the era:

If you want to insure calm repose on the part of your restless sitters, hang one of Mr. Landy's large pictures upon your studio wall. Your customers will laugh so violently, that they will be so exhausted when they go to sit for their picture, that there will be no move in them. We guarantee a pleasant expression, however. Every gallery ought to have a set of Landy's *Pets*. Twelve laughing, and crying, and screaming babies. . . . Never was so much fun concentrated on so small a sheet of albumen paper before.⁴⁴

Expressive Pets was a commercial success. Landy sold hundreds of copies of the image set for \$1.50 each, then reissued the composition in a deluxe version with 28 plates.⁴⁵ The piece earned him a gold medal for portraiture at the Cincinnati Exhibition of 1872.⁴⁶ The idea of uniting portraits of dogs and babies, both beloved subjects of nineteenth-century consumers, was inspired. Yet it was the execution of Landy's *Pets* that ensured its success, because it had captured the fleeting expressions of its subjects with clarity. A reviewer in *Anthony's Photographic Bulletin* concluded in June 1874, "This group of infants is exceedingly interesting," for it "represents every stage of infantile infelicity and satisfaction."⁴⁷

Darwin was not deterred from his investigations by the work's humorous theme. He analyzed the expressions it portrayed with scientific detachment, dissecting the work from a biological perspective. Darwin cut the image into eight strips to form his own comparisons, and taped the strips back together (figure 7-8). The result was three new, smaller combinations, each of which contained four portraits from the original photograph.

It may seem surprising that Darwin would have considered *Expressive Pets* worthy of study; it was designed only to entertain. However, he did not believe commercial intent negated a picture's empirical value. Darwin believed that interspecies comparisons are basic to understanding the evolutionary origins of expressive behaviors. He also held that observations made of other animals could shed light on aspects of human expression, noting in *Expression* that "facts observed both with man and with lower animals will here be made use of; but the latter facts are preferable, as less likely to deceive us."⁴⁸ *Expressive Pets* may have been comical, but that alone did not disqualify it as evidence.

CHARLES BELL RETURNS

Even as he studied contemporary images obtained on his London shopping trips, Darwin returned to imagery familiar from earlier in his career. In April 1871, the same month that the first reference to Rejlander appeared in Darwin's correspondence, Darwin wrote to John Murray asking to borrow a first edition of Charles Bell's 1806 treatise, *The Anatomy and Philosophy of Expression as Connected with the Fine Arts*.⁴⁹ Darwin owned a copy of the posthumous third edition of 1844, given to him by his brother Erasmus in 1866,⁵⁰ but the first edition, published in full quarto size and illustrated with handsome stipple engravings, was more visually effective. In the later edition, Bell's engravings had been reduced to a cheaper octavo format, and they were not as detailed or as fresh as they had been in the first edition.

The clarity of illustrations in Bell's first edition and their successful integration into the text also provided a useful model for the design of *Expression*. Darwin described the book as "in every way deeply interesting; it includes graphic depictions of the various emotions, and is admirably illustrated."⁵¹ The loan from Murray came just three weeks after Darwin had written to James Crichton-Browne noting that he had met Rejlander, which, in turn, was just a few months before the creation of *Ginx's Baby*. The final version of Rejlander's image bears a striking resemblance to Bell's drawn illustration of a crying child, the only illustration of an infant expression appearing in that book⁵² (figure 7-9).

Bell included his crying baby in a section devoted to weeping but did not comment on the illustration itself. Referring obliquely to the manifestation of grief in adults and children, he remarked, "I have thrown the expression of weeping, from pain, into the face of a Faun; for such expression is inexpressibly mean and ludicrous in the face of a man."⁵³ The animal parallel may have intrigued Darwin; however, in the margins of his personal copy of the book, he wrote that Bell's observation that the lachrymal or tear glands are the first organs affected in crying

Opposite:

7-8 James Landy, Portion of the montage *Expressive Pets*, c. 1872. Albumen print. Darwin cut out the portraits to make interspecies comparisons.

does not apply to babies,⁵⁴ a point that he stressed in *Expression*. Evidently, Darwin repeated the experiment himself, also noting his results in the margin, “upturned corners give look of silly complacency.”⁵⁵

The remarkable similarities between Bell’s crying child and *Ginx’s Baby* suggest that the former may have been used as a model for Rejlander’s commission. The child has the same curly hair, is approximately the same age, and adopts a similar posture, with his head tilted slightly and mouth equally agape. Unlike *Ginx’s Baby*, however, Bell’s drawing illustrates only the child’s head, whereas *Ginx’s Baby* is full-length. Darwin may have passed Bell’s book, perhaps even Murray’s first edition, to Rejlander to copy or reinterpret photographically. Such reinterpretations were not unusual. Rejlander’s friend Henry Peach Robinson (1830–1901), for example, is known to have sketched elaborate preparatory drawings, down to the location of individual sheep in a landscape, before taking up his camera to execute the same composition.⁵⁶ Photographs made in this way were consistent with the concept of conscious composition, which Robinson advocated, and which formed the basis of Rejlander’s claim that photography should be considered a fine art.

BACK TO THE DRAWING BOARD

The original drawing of *Ginx’s Baby* is in the collection of the National Museum of Photography, Film and Television in Bradford, England⁵⁷ (figure 7-10). Mounted on a yellowing piece of cardboard, it is a large

black and sepia chalk drawing, heightened with white. It is skillfully drawn and, apart from its unusual scale and color, is a convincing replica of the original albumen photograph. In fact, when it belonged to the Royal Photographic Society, it was catalogued as a hand-colored photograph. The three shades used to define the image were probably chosen to make copying easier. Through a quirk of chemistry, early photographic materials were relatively insensitive to low-frequency light; that is, colors in the blue range of the optical spectrum. Areas colored in reddish sepia, however, recorded easily, appearing in photographic copies as a subtle, light gray tone. This would have been difficult to achieve using black and white chalks alone. Large swathes of the drawing were rendered in this color, including portions of the face, hands, and legs, as well as the folds of the child's clothing and selected parts of the background.

Rejlander's first successful attempt to produce Darwin's crying-baby image is preserved as a small, faded photograph in the Darwin archive (see figure 7-2). It is a carte-de-visite albumen print, made from a wet-plate collodion negative and glued to a Rejlander studio card mount, measuring approximately four by two and one-quarter inches. At first, it is indistinguishable from the published version. The crying baby closely resembles his published counterpart; his bearing, clothes, and expression are nearly identical to those that appear in the book.

Because the final image was to be reproduced using the newly invented heliotype process, resulting in high-contrast prints of limited detail, any photographs submitted to the printer had to be as clear and detailed as possible. The negative was too small to reproduce successfully in heliotype, and the child fills just a small part of the frame. To achieve better results, Rejlander would have had to photograph the child at close range, yet it seems he was unable to take the photograph any closer than he did in this instance, perhaps as a result of the lens he used.

To make an instantaneous image of this sort, Rejlander would have had to have used every method at his disposal to speed up exposure. His fastest lens would have been his shortest one; that is, the one in which the front and rear objectives were closest together. Such a lens has the additional advantage of producing a final photograph with maximal depth of field. Unfortunately, it would also have the effect of widening the field of view, much as a wide-angle lens does today. He might have been able to get away with such an arrangement photographing a subject the size of an adult, but not with an infant.

The original also contained chemical blotches that would have been unappealing in reproduction. Rejlander had fallen prey to pitfalls he had warned his colleagues about in the *British Journal of Photography* in

1864, that they should contain “[n]o draining lines, nor crape, nor ‘stars and stripes,’ nor comets!”⁵⁸ It is hard to separate flaws intrinsic to the original negative from those that have developed over time. However, it is likely that many of the defects visible in the photograph would have existed at the time it was made. Wet-plate collodion photography was an awkward process, but the pressures of capturing rapid action made it additionally difficult. It is likely Rejlander rushed to produce the negative, which may have caused the quality of development, and washing, to suffer. In addition, he may have overdeveloped, or “pushed” the negative to compensate for underexposure. This also could have caused some of the chemical discoloration visible on the print.

Although Rejlander’s crying baby was imperfect, it did capture a crying child at the height of agitation, just as Darwin had requested. The picture was unique, and Rejlander was unlikely to replicate its success in a separate sitting, even if the same model were still available and could be coaxed to act in the same way. It was a point of pride with Rejlander that his infant sitters should develop their poses naturally. As Rejlander’s biographer A.H. Wall explained:

One of his favourite plans was to get up morsels of mimicry or little plays, if I may so call them, into the spirit of which the children were sure to enter, often with a wonderful degree of histrionic cleverness. But then, having inspired them with his idea and feeling—the studio ringing, perhaps, with childish merriment—he generally left them to carry it out themselves, suggesting, perhaps, in a merry way, never gravely commanding, alterations. . . . He appealed to the imagination. . . . As the result, some of the most child-like portraits of children ever produced emanated from Rejlander’s studio.⁵⁹

It is clear Darwin knew the final image was drawn, because his copy of the new version is inscribed “Photograph of a chalk enlargement of action photograph,”⁶⁰ while another image in which the drawing appears is inscribed in Rejlander’s hand, “Child, copy of my large drawing.”⁶¹ To make the drawing, Rejlander would almost certainly have used the procedure he outlined in his article “Photography as the Handmaid of Art,” published in the *British Journal of Photography* in 1866. In the article he described a method for projecting photographs to provide drawing templates. A contact transparency of a photograph, such as a lantern slide, would have been hung in a window against the sky, with the rest of the window darkened around it. A view camera with its film plate removed was aimed at the transparency, transforming the camera into a makeshift projector. The artist projected the image onto a canvas or sheet of drawing paper of the requisite size. It could then be traced, ensuring fidelity to the original photograph. Rejlander assured

his procedure could “save for you the most precious thing you have, your time—no mean service in these electric-torrent-living times.”⁶²

There is substantial evidence in the Darwin Archive that Rejlander wrestled with the problem of enlarging and reducing his photographs for Darwin. The archive contains multiple printings of a number of the photographs used in the book, some with inscriptions identifying them as “copies.” These are resized versions of photographs that were originally produced for sale as cabinet cards or larger commercial prints, or which happened to have been made earlier using large-format negatives. For example, the photograph published as plate 3, figure 3 of *Expression*, a young girl with her hand to her mouth, was sold in the early 1860s in cabinet-card size⁶³ (see figure 9-8). The archive contains two reduced versions of the same image, made using a stereo camera, in which the original print was propped on an easel for reproduction⁶⁴ (figure 7-11).

Because a number of the prints Darwin took from Rejlander were chosen from stock that Rejlander had on hand, they existed in odd sizes.

Other than those that had been made as cartes-de-visite, many were too large to be published in heliotype, because the process required negatives of the same size desired in the finished print. Routine enlargement and reduction of negatives was not possible until the introduction of gelatin dry plates and gelatin paper in the mid-1870s and early 1880s. Although commercial enlargers, known as solar cameras, were available as early as the 1850s, these were cumbersome and expensive to use. Furthermore, the quality of the enlargements that could be made using solar cameras was generally poor, and they were capable only of simple enlargements.⁶⁵ Given the substantial investment required, and the indifferent results that could be obtained, it is clear that Rejlander did not use one. However, he did put considerable effort into making photographs of an appropriate size and sharpness for publication. For example, in two photographs in the Darwin archive, he even tried using cyanotype (a process similar to blueprinting) to make corrected negatives. Although they are now badly faded, one is inscribed on the reverse in Rejlander's hand, "Better photographs of these. I have used for making better negatives."⁶⁶

The most obvious difference between the large drawing and the photograph on which it is based is the addition of a large padded chair to support the crying baby. In the original photograph, he sits on a table, without support. The chair in the drawn version is relatively small, giving him a slightly larger-than-life appearance. Rejlander may have altered the scale of the chair to give the baby a more commanding presence. The perspective of the chair is also slightly incorrect, suggesting it was drawn freehand. If Rejlander had used his projection technique, the chair would have been perspectively perfect—it was a prop Rejlander kept in his studio, because it appears in at least one other carte-de-visite produced at approximately the same time as *Ginx's Baby*⁶⁷ (figure 7-12). In the drawing, the chair serves to ground the child in a domestic setting, giving it an illusion of domesticity lacking in the original.

With Rejlander's corrections, the drawing conveyed a tangible moment in everyday life readers could mentally verify, and with which they could sympathize. In the drawn version of *Ginx's Baby*, the wall behind the child is more fully delineated than in the photograph, and the edge of the wall to the right is moved into the child's plane. The drawing reproduces the limited depth of focus evident in the original photograph, however, leaving the background blurred and giving the drawing a distinctly photographic appearance. The child is only slightly changed. His left eye is enlarged a little, better revealing his pupil, and his hair is enlivened and brushed over the top of his head, exposing the wrinkles of his forehead, which seem prematurely well defined. The groin of the child is darkened, deemphasizing his exposed genitals.

Rejlander's naturalization of the sitter contrasts with the working methods of Lewis Carroll (1832–1898) and Julia Margaret Cameron, two other celebrated photographers of children with whom Darwin communicated. As the art historian Marcia Pointon has observed, they had an opposite tendency:

There are instances in the photography of [Carroll and Cameron], and in some of Millais's child portraits, of repetitions and thematic recurrences that suggest an overdetermined relationship of artist to subject. Making the child twice other by locating him or her in another time and/or another culture safeguarded the desirability of the object of the gaze, requiring the adult spectator's knowing engagement with a past that is neither his or her own nor that of the portrait subject.⁶⁸

ROLE PLAY

Rejlander made his drawing of *Ginx's Baby* approximately life-size, which made it a suitable prop for role-playing and experimentation. The drawing appears in two stereo photographs in the Darwin Archive, in which Rejlander himself mimicked the child's expression. Edgar Yoxall

Jones described one of these as Rejlander “laughing at himself,” musing “who would have dreamed that *Ginx’s Baby* would have made him solvent?”⁶⁹ Indeed, Rejlander annotated on the back of one, “Fun, only. There I laughed! Ha! Ha! Ha! Violently—In the other I cried—e, e, e, e. Yet how similar the expression”⁷⁰ (figure 7-13).

It is unlikely Darwin would have dismissed the images as a good-natured prank; he was keenly interested in examining physiological differences between infants and adults. In each set of stereos, Rejlander assumed the same posture as the infant in *Ginx’s Baby*, and in one he attempted to replicate the position of his hands. On one side he pretended to be crying, on the other he pretended to laugh. This constituted a further innovative use of the stereo camera in Rejlander’s work for Darwin. Had Darwin chosen to view the images through a stereopticon (a stereo viewer), he would have seen Rejlander’s laughing and crying faces superimposed, enabling him to study the divergences between the muscle contractions associated with each expression. Each set of images was useful for different reasons. The close-up version (figure 7-14) af-

fords a better view of facial musculature, whereas in the other one the hands are better seen. The differences between childhood and adult expressions were not a trivial matter for Darwin. He had vested a great deal in the idea that children use the same expressive muscles as adults. Rejlander's mimicry tested this assumption.

Although Rejlander described his experiments as “fun, only,” Darwin was intrigued by the physiological parallels between laughing and crying. For example, he owned a photograph by the London Stereoscopic Company depicting a pair of laughing and crying sculptures by the French artist Adolphe Itasse (1830–93).⁷¹ The Itasse stereo print, made in 1871, employs the same technique of superimposition that Rejlander used in his poses with *Ginx's Baby*. A different image was placed on either side of the stereo card, so that the viewer could see Itasse's laughing and crying sculptures appearing one on top of the other.

While playful, Rejlander's description of the exclamations “Ha! Ha! Ha!” and “e, e, e, e” also had serious implications. The German physiologist Hermann von Helmholtz (1821–94), whom Darwin admired,

studied the effects of mouth shape on vocal pitch. With regard to young infants, Darwin wrote,

When [they] cry they open their mouths widely, and this, no doubt, is necessary for pouring forth a full volume of sound; but the mouth then assumes, from a quite distinct cause, an almost quadrangular shape, depending, as will hereafter be explained, on the firm closing of the eyelids, and consequent drawing up of the upper lip. How far this square shape of the mouth modifies the wailing or crying sound, I am not prepared to say; but we know from the researches of Helmholtz and others that the form of the cavity of the mouth and lips determines the nature and pitch of the vowel sounds which are produced.⁷²

In 1872 Rejlander sent Darwin a final photograph featuring the *Ginx's Baby* drawing. Titled *O. G. R. the Artist Introduces O. G. R. the Volunteer, or Introducing . . . Mr. Rejlander*, it is a double self-portrait made from two negatives posed in the Rejlander studio (figure 7-15).

On the right stands Rejlander dressed as he was in *Indignation* (plate 6, figure 3) and *Surprise* (plate 7, figure 1), illustrations taken from the first batch of photographs he made for Darwin. On the left Rejlander appears again, wearing the uniform of the “Artist’s Rifles,” 38th Middlesex Regiment, his gun by his side. The artist Rejlander motions with his hands in the direction of his soldier twin, as if to introduce him to the viewer. The soldier replies with a suspicious stare. The soldier Rejlander leans on the banister of a set of stairs, while the artist Rejlander stands in front of the enlarged *Ginx’s Baby*, propped on an easel.

Historians have traditionally treated *Introducing . . . Mr. Rejlander* as little more than a curiosity, a late-period print in a checkered career. Rejlander was notorious for making composite photographs of this type, in which two separate negatives were combined in a single print to create the illusion of a scene that never existed. The photohistorians Heinz Henisch and Bridget Henisch, for example, described the image as a last attempt at composite photography, remarking on its military aspect.⁷³ However, it was almost certainly designed as a serious and complex self-portrait. Contained within it are references to some of the most significant accomplishments of Rejlander’s career.

Humor was certainly one aspect of its message; in sending a copy to Darwin he wrote, “My wife insists upon me sending this for you that your ladies may see that I can put on a more amiable expression.”⁷⁴ Rejlander cherished art’s ability to entertain, and it is fitting that he would have chosen a light-hearted tone for his self-portrait for Darwin. His double appearance in the image also conveyed his two strongest professional loyalties, as an artist and a volunteer soldier. The image was also a commentary on the medium and its possibilities. As the photohistorian Robert Sobieszek noted, “Gesturing, grimacing and doubling himself, Rejlander clearly anticipated more contemporary artistic conventions of feigning passions and self-referentiality.”⁷⁵

Given the financial difficulties Rejlander experienced as an artist, he may have intended to equate his military voluntarism with his inability to prosper in the studio. The stairs on which the volunteer Rejlander stand are the same as those used in his renowned photograph *Poor Jo* (1860), a portrait of an abandoned orphan boy, bent in despair, his head pressed miserably in his hands (figure 7-16). Was Rejlander’s portrait meant to invoke this melancholy image? Before *Ginx’s Baby*, *Poor Jo* was his most commercially successful picture. Like *Ginx’s Baby*, it depicted a child in circumstances similar to those described in Jenkins’s novel. The inclusion of these very recognizable stairs thus united Rejlander’s two most illustrious photographic children.

Produced just three years before his death, *Introducing . . . Mr. Rejlander* foreshadows his reported last words: “I shall die a volunteer, let

Opposite:


7-16 Oscar Rejlander, *Poor Jo, or Night in Town*, c. 1860. Albumen print. One of Rejlander’s most celebrated images; the stairs reappeared in the photograph he made for Darwin.

me be buried as one.”⁷⁶ Viewed as a reflection on his career, it commemorates his devotion to his adopted country and to his art. It is also a tribute to his remarkable collaboration with Darwin. Like a magician performing his best trick in slow motion, the image shows the artist standing next to an easel holding his most enduring illusion, *Ginx’s Baby*. His double appearance hints at the trickery embedded in *Ginx*, hinting at his facility with composite printing. The true nature of *Ginx* remained undiscovered in his lifetime. Perhaps Rejlander left *Introducing* as a time capsule, to be decoded and appreciated by future audiences. The artifice involved in the production of *Ginx’s Baby* was not easily detected. Professionally, it was a final triumph—its authenticity was never challenged.

8

Darwin's Eyes and Ears

THE ARTISTS WHO GUIDED DARWIN'S SEARCH
FOR PICTURES



The Pre-Raphaelite sculptor and poet Thomas Woolner left England for Australia in 1852, lured, as the *Beagle* voyagers had been some twenty years earlier, by the continent's distinctive natural history. Woolner, however, did not go seeking pure knowledge—he hoped to profit from the gold rush that gripped Australia in the 1850s. Nor was he planning to return, at least not soon. Disappointed by the response his art had received in England and perhaps sensing the imminent breakup of the original group of seven Pre-Raphaelite brothers, Woolner abandoned his artistic career and planned to settle in the young colony, trading his hammer and chisel for a pickaxe and prospecting pan.

The venture lasted just over two years. Mining was more difficult than he had imagined, and while there was gold to be had, extracting it was arduous and the returns unpredictable. Woolner did not find gold himself, but he did discover a rich vein of colonists who had, many of whom were eager to be immortalized by a former student of the Royal Academy. Embracing this unexpected market, he quit the mining profession and returned to making artwork, accepting commissions for portrait medallions. In two years in Australia, he produced twenty-four portrait sculptures, more than he had made in England in the preceding decade and breathing life into what had been a flagging career.¹ In 1855 Woolner returned to England, rededicated to his art and bolstered by increased critical respectability.

Woolner's Australian expedition marked a new phase in his career. Previously, he had specialized in idealized renderings of fictitious and mythological scenes. He did produce a handful of portrait medallions during these early years, including plasters of the essayist Thomas Carlyle and the poet Alfred Tennyson in 1852, but it was only in Australia that he received enough orders to prosper in such work.² Upon returning to England, he continued to work principally as a portrait sculptor. This, in turn, provided the financial security he needed to be able to pursue narrative subjects occasionally.

WOOLNER AS DARWIN'S GUIDE

Although their stories were different, both Darwin and Woolner had embarked on youthful journeys to the far reaches of the globe, returning to England focused and invigorated. This similarity, though coincidental, helps to explain the friendship the two men developed after their introduction in the early 1870s. They had visited many of the same places, and Darwin came to regard Woolner as a seasoned observer. Darwin routinely tapped friends and acquaintances for information, valuing especially those who had been exposed to extraordinary situations. He viewed artists not as subordinates but as colleagues and included them in the network of contacts with whom he corresponded. Sometimes he found artists that simply corroborated his views, but often they enriched or challenged his understanding. As his own drawing skills were limited, he relied on the talents of draftsmen to help illustrate his ideas. Yet he also appreciated the insight of seasoned artists.

By the late 1860s, when Darwin first became acquainted with Woolner, his clients ranked among the most celebrated sitters of his day. Among them were a number of Darwin's colleagues, including the natural historians Adam Sedgwick (1860), William Jackson Hooker (1860, 1866), John Stevens Henslow (1861), and William Spottiswoode (1864). Not all of the portraits Woolner made of these figures were considered successful. In a letter to Woolner in 1860, the painter and poet Edward Lear (1812–88) wrote commiserating with him about the criticism his bust of Sedgwick had received during its exhibition at the Royal Academy.³

In 1869, Woolner completed a portrait medallion of Darwin for the Wedgwood company.⁴ It is unclear who initiated this commission. In June, Darwin's son William wrote to Woolner thanking him for a cast of the medallion and inquiring whether his version, or the original in Woolner's possession, should be sent to the firm to be copied.⁵ The following year Woolner completed a bust of Darwin, more than five years after the project was conceived.⁶ The scientist John D. Hooker

had commissioned the bust in 1864, but Darwin declined to pose at that time on grounds of ill health. With Hooker's encouragement, Darwin eventually agreed to sit for Woolner. The first sitting was to have occurred shortly after Darwin recovered, but no sooner did he feel better than Woolner also excused himself due to illness.

When Woolner finally began Darwin's portrait, Darwin wasted little time probing the artist's knowledge of expression. Coming from a lesser authority, Darwin's request for information in 1871 might have seemed indecent:

I daresay you often meet & know well painters. Could you persuade some *trustworthy* men to observe young & inexperienced girls who serve as models, & who at first blush much, how low down the blush extends. . . . Moreau says a celebrated French painter once saw a new model blushing all over her body. So that I want much to hear what the experience is of cautious & careful English artists: I always distrust memory—can you aid me?⁷

Woolner's response is not preserved, but Darwin concluded in *Expression* that “as a general rule, with English women, blushing does not extend beneath the neck and upper part of the chest.”⁸ The French editor Jacques-Louis Moreau de la Sarthe (1771–1826) had cited the authority of a “celebrated painter” regarding the French propensity to blush in his edition of Johann Caspar Lavater's *Fragments of Physiognomy* in 1820; Darwin cited this observation in *Expression*. Darwin had also sought advice on the subject of blushing from several physicians, including James Paget (1814–99), Charles Langstaff (n.d.), and James Crichton-Browne.⁹ All confirmed the view that blushing was generally confined to the face and neck, noting that in some exceptional cases it had been observed on lower extremities. This approach to fact-finding was typical of Darwin. When searching for information beyond his experience, he routinely consulted friends and colleagues.

Woolner worked according to the Pre-Raphaelite creed, which called for exactitude and attention to detail. He has been described as one of the Pre-Raphaelite brothers most committed to artistic naturalism.¹⁰ Like many artists of his generation, it is likely he used photographic studies to make his renderings more accurate.¹¹ Ironically, Woolner's friend and housemate, the art historian and poet Francis Turner Palgrave (1824–97), cautioned against the increasing trend toward using photographic studies in late Victorian sculpture. Palgrave, the nephew of renowned Kew Gardens botanist William Jackson Hooker (1785–1865), admonished those who embraced the new medium in his *Essays on Art* (1867):

And let us here remark . . . on the ludicrous impossibility of effecting anything in sculpture that can in the very least deserve the name, by any mere mechanical process, be the means ever so ingenious. We would apply this criticism to what is named “Photo-sculpture.” Those, indeed, who “patronise the invention,” as the phrase goes, from the petty passion for novelty, deserve no better fate than to throw away their cash. We cannot pretend to pity them, if the ugly stare of the photograph—which it is happily hopeless to secure from fading—be perpetuated in distorted and lifeless plaster.¹²

Even though Woolner evidently used photographs as studies, Palgrave enthusiastically praised his sculpture in his anonymous handbook to the South Kensington International Exhibition of 1862.¹³ In 1871, he commissioned Woolner to provide the frontispiece for his *Golden Treasury of the Best Songs and Lyrical Poems of the English Language* (1871), an illustration of a piping shepherd. Woolner dabbled in poetry himself; the same character returned in his epic poem of 1884, *Silenus*, as the god Pan.¹⁴

However, it was not Pan but Puck who became the focus of discussions between Darwin and Woolner from 1869 to 1871. The Celtic hobgoblin, an appropriate subject given the Pre-Raphaelite preference for British rather than classical Greek and Roman mythological characters, was featured in Woolner’s first well-known sculpture (figure 8-1). Woolner had exhibited a plaster of the subject at the Royal Institution in 1847.¹⁵ Traditionally, Puck was believed to be a sprite who played tricks on unsuspecting persons. He was the mischievous protagonist of *A Midsummer Night’s Dream*:

Thou speak’st aright;
I am that merry wanderer of the night.
I jest to Oberon and make him smile
When I a fat and bean-fed horse beguile,
Neighing in likeness of a filly foal:
And sometime lurk I in a gossip’s bowl,
In very likeness of a roasted crab
And when she drinks, against her lips I bob
And on her wither’d dewlap pour the ale.
The wisest aunt, telling the saddest tale,
Sometime for three-foot stool mistaketh me;
Then slip I from her bum, down topples she.¹⁶

The sculpture, which Woolner exhibited in bronze at the Royal Academy in 1866, portrayed a bald imp with pointed ears, partly clad in a cape and loincloth, standing on a giant toadstool. Unlike most of

his works, which depict immobile subjects, *Puck* is an action scene. The central figure rests heavily on his left foot and twists his body to the right, leaning back and extending the toes of his right foot to touch the back of a crouching toad. A snake coils over Puck's planted foot, preparing to attack. In her 1917 biography of the artist, Amy Woolner reprinted an explanation of the work first published at the time of its exhibition: "A snake is stealthily creeping towards an unconscious toad. Puck is about to touch the toad with his foot, that thus warned it may escape the jaws of the enemy. A smile of half mischievous satisfaction is on his face."¹⁷

Darwin, however, was intrigued by the structure of Puck's ears. The structure and use of ears as expressive organs were of considerable concern to Darwin as he began to prepare the *Expression* manuscript. In *Descent of Man*, Darwin argued that the human body exhibits residual features of animal progenitors. Among these was a slight inward indentation of the outer ear, "a little blunt point, projecting from the inwardly folded margin, or helix,"¹⁸ which is visible in certain individuals. This, Darwin believed, was a vestigial form of the pointed ears of apes and other simians. Since he proposed that humans have evolved from apes, he reasoned that human ears must have evolved from ape ears. The slight inward protrusion of some human ears is all that remains of the pronounced point evident in apes.¹⁹

The example was effective as it enabled individuals to appraise their relation to apes by scrutinizing the shape of their own ears. In *Descent*, Darwin credited this discovery to Woolner:

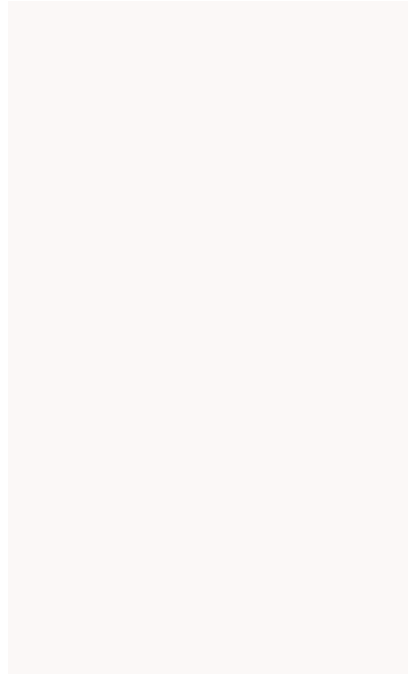
The celebrated sculptor, Mr. Woolner, informs me of one little peculiarity in the external ear, which he has often observed both in men and women, and of which he has perceived the full signification. His attention was first called to the subject whilst at work on his figure of Puck, to which he had given pointed ears. He was thus led to examine the ears of various monkeys, and subsequently more closely those of man.²⁰

In 1869 Woolner sent Darwin a drawing after the sculpture to be included in *Descent*. Darwin replied gratefully, saying "it does excellently—the 'Woolnerian tip' is worth anything to me."²¹ The drawing appeared in engraved form as figure 2 of *Descent* (figure 8-2). Two years later, Darwin wrote to Woolner again: "The tips to the ears have become quite celebrated. One reviewer (*Nature*) says they ought to be called, as I suggested in joke, *Angulus Woolnerianus*."²²

The example of *Puck's* ears demonstrates the utilitarian approach Darwin took to his illustrations. He accepted imagery because it conveyed what he wanted to show. To him, it was sufficient that the depiction of Puck had been carefully researched by comparison with living models and came from a reputable source. The origin of the drawing, which he acknowledged in his text, does not seem to have concerned his readers, either.

Although he remained convinced of Woolner's observations, Darwin was dissatisfied with the published engraving of *Puck*. In 1871, he wrote to the zoologist Edwin Ray Lankester (1847–1929), asking him

8-2 After Thomas Woolner, Human Ear (Puck), 1871. Wood engraving. Figure 2 of *Descent of Man*. The model for the illustration was Woolner's sculpture *Puck*.



to procure a photograph of a friend whom Lankester had noticed had the “Woolnerian tip.” Photographic evidence, he reasoned, would be more convincing than Woolner’s drawing, which he confided, though “no doubt accurate does not seem to me good.”²³ The friend, a German zoologist named Hinrich Nitsche (1845–1902), sent Darwin photographs of both his ears (figure 8-3), together with a photograph of an orangutan fetus, in April 1871. Nitsche, wary that his photographs might cause some people to deduce that he was a close relative to a simian, provided them on the condition that they remain anonymous:

I send you the life sized photographs of both my ears. I must however remark that only the photograph of the right ear can be considered as quite successful, and only on this one is the projection of the helix (made prominent by you) strongly marked and even as you will easily perceive, much more strongly developed than in the engraving given by you. Both ears however are on their upper ends really pointed, from which my friends maintain that I have Satan ears. I add a photograph of a fetus of an Orang, life size; it is in the Zoological University Collection of this place. Its ears are, as you will easily perceive, much further removed from human ears, than one usually finds in the ears of full grown anthropoid monkeys. I shall be very glad if the photographs are really of use to you. You can dispose perfectly freely of them, I should

only beg you not to mention my name, in case the photograph of my ears should be incorporated into a new edition of your book.²⁴

Darwin decided against publishing the photographs of Nitsche's ears and retained the *Puck* engraving in the second edition of *Descent*. However, he did use Nitsche's photograph of an orangutan fetus (figure 3 in the second edition) as evidence of the phenomenon in apes. The original photograph was engraved, showing a profile view of the head, "an exact copy of a photograph."²⁵ The Darwin Archive contains the original photograph from it was made²⁶ (figure 8-4). While the engraving is accurate, it is a substantially cut-down version of the photographic original, which shows the full length of the animal.

Darwin continued to ask colleagues for information about interesting ears. The physiologist William Preyer (1841–97) offered Darwin information about paintings he had seen in German museums, noting peculiarities in the renderings of the ears of Egyptian mummies. "It is situated higher up than in Europeans" Preyer explained. "Now I have never seen in civilised company anything like [it]. But apes shew the

same position of the ear. Now I should very much like to know whether any existing race has this peculiarity and whether you think it might be considered as a connecting link." Preyer continued: "It was interesting to me to see that Rubens in his beautiful picture in the Dresden gallery gives the satyr pointed ears. The ear is very large but human with the only difference that it is pointed."²⁷

The painting in question was almost certainly Peter Paul Rubens's *The Drunkenness of Hercules*, also known as *The Effects of Wine* (c. 1612–14), depicting the inebriated god slumped in a daze, his right arm supported by an adoring woman, and his left arm held by a mischievous satyr²⁸ (figure 8–5). Recent scholarship has revealed that this painting is not an original composition by Rubens, but a copy of an ancient Roman relief in the Mattei Collection in Rome.²⁹ The ear of the satyr to which Preyer referred, exaggerated beyond the limits of ordinary human development, is also evident in its Roman predecessor.

After *Expression* was published, Darwin also discussed facial asymmetry in Rubens's portraits with his colleague the physician Thomas

Lauder Brunton (1844–1916).³⁰ Darwin offered to send a photograph of a Rubens painting to Brunton in exchange for a cabinet card then identified as José de Ribera's (1591–1652) *Mary in Egypt* (1641), but now known to represent Saint Agnes³¹ (figure 8-6). Brunton claimed that one side of the central figure's face expressed repentance, while the other expressed devout joy. Darwin received the Ribera, which he showed to his family for comments. On the mount Darwin wrote, "Hensleigh W [Wedgwood] thinks one side more seraphic than the other. F [Francis Darwin] thinks one side more hopeful, the other sadder."³²

JOSEPH WOLF: AS TRUTHFUL AS A PHOTOGRAPH

The two engravings of the black ape *Cynopithecus niger* (figures 16 and 17 of *Expression*) were made by the artist Joseph Wolf (1820–99), whom his biographer, A.H. Palmer, described as a friend of Thomas Woolner³³ (figure 8-7). The original conté drawing for these figures, preserved in the Darwin Archive, contains numerous annotations in Darwin's hand, directing Wolf to “attend to the ears in both figures”³⁴ (figure 8-8). Wolf prepared his drawings from specimens in the London Zoological Gardens, but Darwin did not believe they represented the ears correctly, and asked him to lay the ears back further than he had. Wolf evidently complied, as the drawings show evidence of extensive reworking around the tips of the ears.³⁵ Darwin had additional instructions for the engraver, James Davis Cooper. “The point of the ear is decidedly too sharp—Please look at the ear in the other drawing, & round off the point a little—The outline of upper part of ear is perhaps a little too black & thick.”³⁶ These annotations appear in pencil on a proof of Cooper's plate (figure 8-9).

Wolf's account of the creation of *Cynopithecus niger*, *Pleased by Being Caressed*, is related in Palmer's 1895 biography:

Early in 1871 Darwin was preparing the materials for his *Expression of the Emotions in Man and Animals* (published in the following year), and mentioned to Mr. Bartlett his wish to have some work done at the [Zoological] Gardens which required unusual care. The Superintendent spoke of Wolf's accuracy and closeness of observation in high terms, and in due course introduced the two men to each other. Darwin, with a view to that section of his fifth chapter dealing with "Astonishment" and "Terror" in Monkeys, caused a living fresh-water Turtle to be placed in one of the cages. Wolf's account of the incident is this:—"One of the Turtles was put into a covered basket, and the keeper was asked to place it carefully under a heap of straw which was in the cage. Whilst that was being done, the Monkeys suspected something and kept looking down from on high. Clever fellows! I shall never forget that. The keeper then retired, and presently the heap of straw began to move. The Turtle came out, and instead of showing fear, the Monkeys crept nearer. The Black Crested Ape [*Cynopithecus niger*], came and looked at it, and walked in front of the Turtle as it

crept under him. Finally he went and sat on the Turtle. Darwin was much amused, and asked for a drawing of the incident.”³⁷

Darwin undoubtedly appreciated Wolf’s accuracy and attention to detail, but he also valued his flexibility in portraying animals as he himself perceived them. The request to reposition the ears in the renderings of *Cynopithecus niger* was one example of this.

Darwin had initially written to Wolf in March 1871, requesting drawings of a “monkey’s face while laughing.” He suggested the Barbary ape would have been “incomparably the best” for the purpose; but, as he reported, it “is dead.” Instead, he suggested that Wolf attempt to draw specimens of *Cynopithecus niger*, although he was concerned that its “permanent transverse wrinkles on the face” might make the expression of laughter difficult to see. “When Sutton the Keeper allows this monkey to play with his hair,” Darwin wrote, “it chuckles or laughs, and keeps moderately still. The face then becomes a good deal wrinkled, and as far as I could see under disadvantageous circumstances, the skin is

especially raised and wrinkled around the eyelids.”³⁸ Wolf prepared the drawing as requested, but when interviewed later about the illustration, he admitted, “I never believed that that fellow was laughing, although Darwin said he was. I am not one of those who place absolute belief in ‘authority.’”³⁹

Wolf’s remark about Darwin’s “authority” sheds light on the relationship between Darwin and some of his illustrators. Unlike Wolf, Woolner had volunteered his illustration of the “Woolnerian tip” and limited his observations to a specific area of knowledge. Wolf, however, Darwin commissioned, asking him to illustrate a range of subjects about which he may have had no particular expertise. In total, Palmer records eleven sketches of animals that Darwin requested, ten of which are preserved in the Darwin Archive.⁴⁰ All are rendered in conté crayon heightened with white, using the same paper stock, and signed with Wolf’s stylized “JW” monogram.

Two of these, *Head of a Snarling Dog* and *Cat in an Affectionate Frame of Mind*, correspond to engravings in *Expression* that are credited to another artist, Thomas William Wood (fl. 1855–72). Unlike photographs from the period, which are frequently inscribed with observations and analysis, annotations on the drawings and prints in the archive frequently instruct the artist to make corrections. For example, in Wolf’s renditions of *Dog Approaching Another Dog with Hostile Intentions*, and *The Same in a Humble and Affectionate Frame of Mind* (figure 8–10), Darwin wrote in the margin, “Please do not destroy this drawing.” “The hair is generally smooth on the loins, & this makes the roughness on the back & neck more apparent.” There ought to be no collar and the hair erect on the neck.” “Head rather lower & more in line of the back.”⁴¹ Evidently, Darwin felt himself a better judge of behavior in animals than his artist colleagues. Ultimately, Darwin decided not to publish even revised versions of Wolf’s drawings, instead commissioning substitutes from the artist Briton Riviere (1840–1920).

Wood, who provided eight of the engraved figures in *Expression*, was an illustrator frequently used by Darwin’s publisher, John Murray. His versions of the *Dog* and *Cat* figures (figures 14 and 10, respectively) conform to Wolf’s overall plan for the composition, but change the posture of the animals slightly. In *Cat in an Affectionate Frame of Mind*, Wood also changed the background. Wolf’s drawing depicts a cat arching its back as it rubs up against the leg of a table, while in Wood’s version, published in *Expression*, the cat is shown rubbing against the leg of a person⁴² (figures 8–11, 8–12). The substitution may have been intended to reinforce the idea of “affection,” which would have seemed comparatively unconvincing directed at an inanimate object. Nevertheless, Darwin apparently felt Wolf’s drawings had to be altered before

they would be suitable for publication. Although there is no written record of Darwin's discussions with Wolf about the drawings, it may be surmised that Wolf was either unable or unwilling to alter them to match Darwin's understanding of how the expressions of dogs and cats should be represented. Wood's revised drawings differed enough from Wolf's original conception that he may have simply disavowed their authorship.

Abraham Bartlett (1812–97), whom Palmer credited with having introduced Darwin to Wolf, reportedly described Wolf as having “an eye like photographic paper, it will seize on anything!”⁴³ However, Wolf was often required to draw from his imagination or to subordinate his observations to the wishes of a patron. In Darwin's case, this meant altering the ear tips of *Cynopithecus niger*, but in his biography of Wolf, Palmer described several other instances in which Wolf was forced to compromise in his depictions of animal behavior. In one case, he had been asked by an unnamed author to illustrate an orphaned mouse, said to have been raised by a mother cat. Purportedly based on an event he

had observed himself, the author called for an illustration of the mouse suckling from one of the cat's teats.⁴⁴ Wolf was convinced that such behavior had never occurred. Nevertheless, he agreed to produce the drawing according to the author's instructions.

Despite tensions of this sort, Darwin and Wolf were genial collaborators. Darwin occasionally visited Wolf at his studio on Berners Street in London, near Oxford Circus.⁴⁵ Wolf recounted an anecdote that he said typified the tone of these visits:

Among the artist's birds at that time was a particularly tame piping Bullfinch, which had learned, among many accomplishments, to distinguish the note of his master's bell from the others. At the first tinkle, he would fly to a chair-back near the door of the studio, where he would sit and bow and pipe to his favourite visitor, but would attack any person he mistrusted. One day Darwin called; and the Bullfinch, not liking the look of his long white beard, flew straight at it, pulling with all his little might, while the old man laughed and chuckled.⁴⁶

Privately, Wolf referred to men of science as “dry sticks,” who “work with their noses a few inches from their desks.”⁴⁷ Darwin, however, was different. He “was not like many great men of science who would put you down with a look or a sentence,” Wolf recalled. “A child might have talked to that man. He was wonderful in that respect.”⁴⁸

THE TAIL WAGGING THE DOG

The most famous of the artists Darwin engaged to produce illustrations for *Expression* was Riviere, whom the magazine *Connoisseur* described in an obituary as “the successor to Sir Edwin Landseer in the role of animal painter to the British public.”⁴⁹ During the years 1868–71, when Darwin discussed his desire for illustrations of dogs with him, Riviere was employed by the satirical magazine *Punch*. His introduction to Darwin came just as Riviere was beginning to perfect the narrative style for which he remained popular the next twenty years.⁵⁰

Initially, correspondence between Darwin and Riviere was relayed by their mutual friend, Elinor Mary Bonham-Carter (n.d.).⁵¹ In June 1871 Riviere sent Darwin a long letter describing the characteristics of emotional expression in dogs, focusing particularly on the arrangement of the ears during expressions of pleasure.⁵² He believed that dogs put their ears back when expressing pleasure and prick their ears up when alerted. This puzzled Darwin, who believed that the drawing back of ears in affection was related to the tendency to bite playfully while uncovering the lips.⁵³ Ten months later, in April 1872, Darwin asked Riviere if he would be willing to provide illustrations of the expressions he described, for inclusion in *Expression*. Riviere readily agreed and offered to draw directly on woodblocks for convenience.⁵⁴

More than a month later, Riviere wrote apologizing for the delay, offering to coordinate the cutting of the plates directly with the engraver Darwin had retained, James Davis Cooper. “Expression hangs upon so subtle a difference of lines,” Riviere wrote, “that what may be right in the drawing can easily be made wrong in the engraving.”⁵⁵ Darwin approved the first drawing, *Dog Approaching Another Dog with Hostile Intentions*, with minor alterations. He rejected the second, *Dog in a Humble and Affectionate Frame of Mind*, in which the dog was supposed to be shown with a wagging tail. Riviere explained:

With regard to the second dog I endeavoured to carry out your written remarks & in one important respect did so contrary to my own belief & experience (viz, in putting the head down instead of up) I trust that a dog seldom or never puts its head down when it sees its master unless it is afraid of him. A dog never puts on the expression you want except

in the presence of a man & always looks at the man's eye & so always puts its own head up.

To give the effect of a wagging tail is impossible in a *drawing*, which can only illustrate a climax. In *painting* it can only be hinted at & the observer must know what is meant before he looks at the picture. Setting on one side the “wagging tail” I think that the accompanying rough sketch gives an idea of the expression you want & should you think so I should have much pleasure in drawing it on the wood for you.⁵⁶

A compromise was struck. Darwin accepted Riviere's advice regarding the elevation of an affectionate dog's head, and Riviere provided an updated drawing (figure 8-13). Darwin published the revised drawing, with additional modifications, as engraved figure 6 of *Expression* (figure 8-14).

Earlier, Darwin had attempted to obtain a similar drawing from Thomas Wood, who declined on the grounds that he was “not very familiar with dogs.”⁵⁷ Darwin also referred in his correspondence with Riviere to a photograph and two related drawings of a dog he had obtained by “a German artist, lately dead, whose name I forget.”⁵⁸ These materials have since been lost.

As noted, Joseph Wolf was also among those Darwin approached about the humble and affectionate dog, but Darwin was unhappy with the version Wolf submitted; like Riviere, he resisted Darwin's request