The Face of Physiology

Paul White

Man is gregarious, he looks for sympathy [...] and
the language which expresses it is in the face.[1]

In *Jane Eyre* (1847), there is a rare comic interlude when Rochester, disguised as a gypsy woman, reads the fortunes of his party guests in their faces. In Jane he finds 'the eye [...] favourable [...] the mouth [...] propitious [he sees] no enemy to a fortunate issue but in the brow; and that brow professes to say, – "I can live alone"'.[2] The great importance of facial features and expressions for judgements of character in the nineteenth century has been well-documented. The work of Mary Cowling and others has shown the enduring power of physiognomy and related traditions, phrenology and pathognomy, for the representation and reading of character in literature and the visual arts.[3] Popular treatises and handbooks on the subject appear through the end of the century.[4] Many assumptions about the relationship between external attributes and intellectual and moral capacity persist within the new human sciences, anthropology, ethnology and criminology, with their emphasis on racial, aberrant or degenerate social types. Indeed, such typologies not only endure, but proliferate in the last quarter of the century, underpinned by more precise methods of recording and measuring. Craniometries, nasologies and so forth, gained new legitimacy and purchase through the application of precision instruments. Racial types were marked by facial angles and cranial distances that differed by no more than a millimetre.[5] Photography was enlisted to map and classify facial features across the empire and at home.[6]

Alongside these developments in the study of external features and form, there was another movement that sought the traces of character beneath the surface. In the science of physiology, a range of new procedures and technologies were produced to detect the inner movements of the body.[7] These methods and instruments were used, in turn, to generate models of mind and body that made inner processes crucial to the development and display of character. Could the true nature of another be discerned in the streets or in the witness box, could it be represented in painting or the novel, unless one understood the inner workings of the body and their influence upon the mind and

'heart'? These developments in physiological theory and practice redefined the nature of expression, and challenged the prevailing assumptions of physiognomy, severing inner character from outward appearance. Widely regarded as a medium of sympathy and window to the soul, the face became a device of self-registration, proving that the play of mind and body was no more than a stage-set concealing a mechanism.

I

Physiognomy Beneath the Skin

A physiological approach to expression was developed by the Scottish physician Charles Bell, best known in the history of medicine for his research isolating the sensory and motor nerves. Bell studied the trajectory of facial nerves in patients suffering unilateral palsy and produced in his 1806 *Essays on the Anatomy of Expression in Painting*, a detailed map of the facial muscles and movements associated with particular emotions. Bell later expanded the work considerably. The third edition (1844) was the most influential text on the subject in the nineteenth century prior to Darwin's 1872 work, *On the Expression of Emotions in Man and Animals*. Bell offered an extended scientific intervention in the fine arts and a critique of many of the sources of Lavaterian physiognomy.[8] Lavater's work, extremely popular throughout Europe for much of the nineteenth century, had drawn heavily on

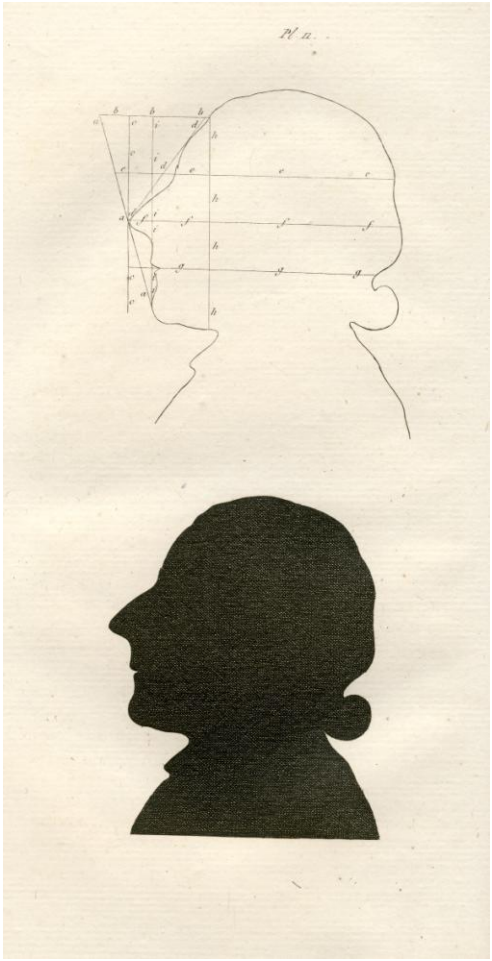

Fig. 1 Line portrait and silhouette of Lavater. Gaspard Lavater, *L'art de connaitre les hommes par la physiognomie*, 11 vols. (Paris: Depelafol, 1820) vol. 1, p. 27 facing.

classical sculpture as well as on the simplified and abstract schemes of Charles Le Brun and Peter Camper for reducing the face to a few lines, or the outline of a silhouette.[9] Bell is critical of classical aesthetics in which human beauty is based on static form and outward appearance. He urges an understanding of the bodily processes beneath the skin for accurate depiction of human feelings.

Fig. 2 Fear and wonder. Charles Bell, *The Anatomy and Philosophy of Expression as Connected with the Fine Arts,* 3rd edn. (London: John Murray, 1844).

Observing a man in fear, for example, (**see fig. 2**) Bell first remarks that his eyebrows are elevated, his eyes wide open, and his steps hesitating; but then Bell moves under the surface to observe the internal correlates of outward expression:

> there is a spasm on his breast, he cannot breathe freely, the chest is elevated, the muscles in his neck and shoulders are all in action, his breathing is short and rapid, there is a grasping and a convulsive motion of his lips, a tremor

on his hollow cheek, a gulping and catching of his throat (88).

The feeling of fear is approached here as a problem of reflex physiology. How is fear produced within the body? How are the movements in the heart, lungs and limbs, coordinated with those of the face? Bell worked extensively on the system of nerves extending from the spinal cord through the arms, chest and abdomen conducting feeling downward and outward, raising the heart, lifting the arms, eyebrows and scalp. According to Bell, the face of the man shown in figure 2 expresses fear conjoined with wonder: there is distraction, anxiety and alarm in his eyes and cheeks, indicative of imagination and conscience (168). This, claims Bell, is a distinctly human passion, showing man's superior intelligence and mental feeling. It is in marked contrast to the expression of fear in figure 3 which is purely animal, and displays only surprise, the desire for self-preservation, and the impulse to flee.

Fig. 3 Animal fear. Charles Bell, *The Anatomy and Philosophy of Expression as Connected with the Fine Arts*, 3rd edn. (London: John Murray, 1844).

Bell's functional anatomy of expression was underpinned by a hierarchy of mental and physical characteristics, mapped onto a chain of being. Expressions in which the organs of taste and smell predominated, or the organs of the lower appetites such as hunger, resembled those of brutes and implied degradation. Expressions such as admiration or remorse that, according to Bell, were uniquely characteristic of man, gave a noble countenance: 'model the lips for [...] eloquence and the expression of the softer

passions, and it becomes beautiful ... extend the teeth, and make the lips a mere covering for them, and it is brutal' (40). Bell's hierarchy was partly based on an ancient tradition of writings on the soul, which divided affective states into the lower appetites and passions, rooted in bodily needs and worldly cravings, and the higher affections, which partook in some measure of the divine.[10]

Bell described the emotions as 'conditions of the mind' rather than the body. They had a regulative function, controlling the lower impulses, and formed part of the moral and volitional nature of man. Bell also presented emotional expressions as true indications of character. They were 'a window [placed] before the heart, in order to render visible human thoughts and intentions' (83-4). In this sense, emotions were specially designed by God to facilitate social bonds and, as such, were part of a structure of sympathy that made human communication, human affection and human society possible. 'In every intelligent being', Bell wrote, 'He [The Creator] has laid the foundation of emotions that point to Him, affections by which we are drawn to Him, and which rest in Him as their object [...] these feelings spring up spontaneously; they are universal, and not to be shaken off' (83). Prevailing assumptions about sympathy grounded the reliability and transparency of assertions about inner emotion, so crucial to judgements about the social status and moral character of individuals.

We can see this revised physiognomy of expression employed to powerful effect in novels. In *Jane Eyre*, Brontë makes light of Lavaterian revelations of character in the fortuneteller's physiognomic deductions. Jane is later saved from death by the pastor St. John Rivers and his sisters, who disregard her beggarly manner, and her 'aspect in the last degree ghastly, wild, and weather-beaten', and extend Christian sympathy. Physiognomic readings of her face only come later, confirming gentility despite her abject plainness. Finally, the character of the pastor himself, a classic Lavaterian beauty, with perfectly chiselled features, blond locks, and a straight nose, is not revealed primarily in his face. Beneath the stony surface broods discontent and recesses of feeling disclosed only in the movements of his heart, such as the trembled flush that comes over his face when his secret love, Miss Oliver, enters the room: 'if she appeared [...] his cheek would glow, and his marble-seeming features, though they refused to

relax, changed indescribably; and in their very quiescence became expressive of a repressed fervour, stronger than working muscles or darting glance could indicate'.[11] Charlotte Brontë has often been placed firmly within the Lavaterian tradition, and it is clear that physiognomy remains important for the description and development of her characters; but it is a physiognomy that is highly suspect when restricted to the permanent features of the face, one that unfolds instead through the body's movements and inner workings.[12]

II

The Evolution of Expression

Bell's appeal to the emotions as expressing the 'highest and noblest' part of human nature had great currency for Victorians. Darwin positioned his own work as an extension of Bell's physiological approach to expression. He carefully re-studied the 1844 edition of Bell's work sometime after 1866, as he turned to the systematic investigation of human evolution. He credited Bell with having 'laid the foundations of the topic as a branch of science [and having] built up a noble structure'.[13] In contrast with Bell's concern to separate man from the animals by means of the emotions, Darwin argued that the prototypes for the highest feelings dwelt in lower creatures. In *Descent of Man* (1871), he speculated about the origins of religious feelings in savages by comparing them to a dog's worshipful behaviour towards its human master.[14] Darwin constructed continuities not only between every human feeling and animal emotions, but often also between human rational behaviour and animal reason. Dogs, savages and Victorians (not always in that order) existed on a continuum guaranteed by evolutionary theory. Indeed, animals were in fact better at expressing the noblest emotions than human adults, for as Darwin remarked: 'man himself cannot express love and humility by external signs, so plainly as does a dog, when with drooping ears, hanging lips, flexuous body, and wagging tail, he meets his beloved master' (10). In his 1872 *Expression of the Emotions in Man and Animals*, Darwin extended his argument for the evolutionary origins of human behaviour by identifying emotional expressions

as vestiges of physiological modifications that had once given competitive advantage (**see fig. 4**). Considering the emotion of fear as embodied in a cat, Darwin suggested that the widely-opened eyes enabled it to see as well as possible in all directions, useful to a creature under threat; while the raised hair and exposed teeth made the animal seem more terrifying to its enemy (125-8).

Darwin's evolutionary account of expression has usually been presented in sharp opposition to Bell's work, and as undermining the norms for representing and valuing feelings in wider Victorian culture. Jonathan Smith has recently argued that Darwin's illustrations and text are in fact a 'running argument' with Bell.[15] Gesa Stedman has claimed that Darwin's 'materialist study' established a new evolutionary agenda for the emotions, while Lucy Hartley has Darwin overturning the physiognomic tradition with its assumptions of natural theology.[16] Such readings are consistent with the prevailing view of Darwinism as a secularist, materialist programme essentially at odds with theological explanations. Yet it is worth noting that Darwin himself tended to emphasise his continuities with Bell, referring repeatedly to the latter's detailed physiological descriptions, and inserting some of Bell's text and drawings into his own book. Incorporating the work of established authorities was a typical practice of Darwin's. Methodological or theoretical differences were usually glossed over with polite, respectful acknowledgement.

Fig. 4 A fearful cat. Charles Darwin, *The Expression of Emotion in Man and Animals* (London: John Murray, 1872), p. 125.

If we put the question of evolution and its implications for religion aside for a

moment, then the contrast between Darwin and Bell appears rather differently. What becomes most striking about Darwin's account of expression is not the preference for evolutionary explanations *per se*, but the asymmetry of explanation. Darwin is completely focused on those aspects of expression that can be measured and manipulated; about the nature of emotions and their relation to character, he is silent. Darwin's instrumental approach to expression, together with his reticence about what might lie behind the physiology of expression, or about the inner nature of the person or animal, would have substantial implications for experimental practice and the moral debates surrounding bodies and machines in the life sciences.

III

The Body as Instrument

Darwin drew heavily on the work of a number of leading physiologists besides Bell. He was particularly interested in the research of Guillaume Benjamin Duchenne, whose *Mécanisme de la Physionomie Humaine* contained many photographs of human expressions. Duchenne's work relied extensively on galvanism in order to map the muscles associated with various facial expressions precisely.[17] The frontispiece to Duchenne's book showed the physiologist together with his prize instrument, a galvanised face, exhibited as happy (**see fig. 5**). Duchenne's research suggested that emotional expressions were in fact a product of nervous discharges and as such, could be reproduced by electrodes applied directly to the skin. Darwin inserted a number of photographs from Duchenne's book, and used several as the basis for woodcuts, enabling him to modify the image somewhat.[18] Darwin did not completely accept the French galvanist's interpretation of emotion as a form of mechanism, but he used Duchenne's instrumental technology to raise questions about the role of reflex action and volition in emotional displays.[19] In one striking plate (**see fig. 6**), Darwin illustrated the expression of joy with three photographs of children, juxtaposed with three more of Duchenne's grinning old man. The last of these showed the man's face charged by electrodes, a sort of visual sleight of hand to Darwin's readers, who might have

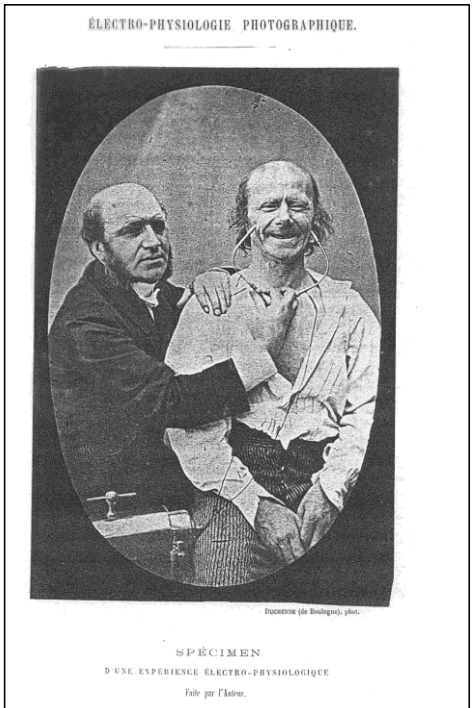

Fig. 5 Duchenne and his instrument. Guillaume-Benjamin Duchenne de Boulogne, *Mécanisme de la physionomie humaine ou analyse électro-physiologique de l'expression des passions applicable à la pratique des arts plastiques* (Paris: Jules Renouard, 1862). Frontispiece.

assumed that such an expression was accompanied by the feeling of happiness. But Darwin noted in the text that this 'unnatural' expression was in fact flawed, as evident in the reactions of many to whom he showed the original picture (201-2). Elsewhere, for example in the expression of grief, Darwin reported that the efforts of various subjects (including one of his sons) to reproduce the violent contractions of the face experienced when weeping, were always unsuccessful in causing tears. His own observations, confirmed by the researches of several ophthalmic surgeons, showed however that tears flowed spontaneously on the contraction of the eye muscles in infants who had reached four months of age (147-54). Darwin thus took up a position between Bell and Duchenne. Expressions were indeed reflexes, but they were neither purely mechanical, nor completely controllable by volition.

Darwin had laid the groundwork for the use of such images in the third chapter of *Expression*, which sketched the reflex action of the nervous system and its gradual modification through habit, drawing on the work of Johannes Müller, Claude Bernard, Herbert Spencer and others.[20] The theories on which Darwin drew had been developed most elaborately in Britain by William Carpenter in a series of physiological textbooks that were widely used in medical education. Carpenter identified the emotions with nervous impulses that acted directly on the muscular system, unmediated in most cases by the intellect or will. Emotional impulses were closely associated with the sensorimotor activity prevailing among the lower animals, that is, with automatic or

mechanical processes. Humans had the ability to regulate these immediate drives by the exercise of the will, in conjunction with intellect. According to Carpenter's reflex model, this power of volitional control *over* the emotions and other impulses is what gave man moral character. Activity ensuing purely from emotional impulses was distinctive of creatures lower on the scale, with pathological conditions, such as hysteria, and with infants. Will was the 'determining power [...] the source of the *self-control* that characterises the well-regulated mind of Man, and distinguishes him alike from the madman and the brute, giving him to a certain extent the power of forming his character *for himself*'.[21] Carpenter later developed his account into a system of ethics, based upon the physiology of the will, including a defence of the intellectual life as epitomised by heroic scientific practitioners.[22]

Fig. 6 Joy. Darwin, *Expression*, p. 200 facing.

From the mid-1850s onwards, this mental physiology came to be linked with evolutionary accounts of mental life as an improved modification of instinct. As Spencer argued in an essay on laughter, the emotions had evolved in all of their fine shades and rich variety, because they facilitated a more subtle and precise adjustment of the organism to its environment.[23] Drawing on this reflex model, and in contrast to Bell's disembodied emotions, Darwin examined the mechanisms of feeling, acquired through habit, and accumulated through the inherited experience of the race. Employed in conjunction with evolutionary theory, reflex physiology undermined the relationship between outward expressions and inner feelings. Expression could be an artifice of instrumental intervention, while moral

character was disclosed above all by the power to restrain emotion, behaviour distinctive of adult humans, especially Europeans. The implications of this account for physiognomic readings of character were signalled by Darwin at the outset, when he stipulated that a scientific study of expression should focus primarily on animals, children and non-European races. These groups displayed the emotions more forcefully and purely, because they lacked the ability or the culture to control their passions, whereas civilised adults were skilled at altering facial expression so as to dissemble inner character and emotions (12-17).

Thus, while Darwin left the question of inner character open, still the implications of his severing of emotion and expression ran in several directions. On the one hand, it could serve to build a model of emotions, and potentially of much of human consciousness, as purely mechanical and automatic. Carpenter's writings were based on a wide range of physiological experiments that had been performed on the continent, and by the 1860s increasingly in Britain, pre-eminently on frogs. When their cervical cortex had been severed from the spinal column, these creatures still behaved rationally in response to stimuli, scratching their backs when tickled. Higher mental control was evidently unnecessary for a whole variety of actions and feelings. These sorts of experiments, later recounted in Thomas Huxley's controversial 1874 address on animal automatism, undermined attributions of inner feeling or character on the basis of external behaviour, and therefore undercut claims that a higher mental state was necessary for more sophisticated behaviours, including emotions.[24]

Yet another implication, emphasised by Carpenter himself, was that of control. If emotions were indeed largely or wholly reflexive, then the moral nature of humans rested on the power of the mind or will to be the master of its bodily mechanism. On this point, Darwin's *Expression* was quite conventional. The ability to control emotions, to feign character through fabricated expressions in the manner of an actor, was one of the defining traits of Europeans.[25] As Henry Maudsley in *Body and Mind* (1870) remarked:

> fix the countenance in the pattern of a particular emotion [...] and the emotion will not fail to be aroused ... all manner of beautiful and ugly emotions are simple effects of muscular action and might be produced by

electricity or other stimulus.[26]

IV
Detection and Detachment

A wide range of new technologies and disciplines made powerful use of the reflex model of expression in order to decipher moral character that would otherwise remain hidden. The utility of viewing expressions as physiological events was perhaps most marked with regard to a class of subjects whose moral control was highly suspect, criminals. In his work the *Emotions and the Will* (1859), Alexander Bain had noted that fear was often indicated not only by facial expression, but also through the dryness of the mouth. He reported that suspected criminals in India were forced to take a mouthful of rice. If it remained dry, they were incriminated, their 'evil conscience operating to paralyze the salivating organs'.[27] Guilt, together with deceit, slyness, vanity, conceit, pride and avarice were regarded by Darwin as complex emotions, not necessarily revealed by any definitive expression, but detectable amongst different races by the restless movements of the eyes: 'The guilty man is said to avoid looking at his accuser, or to give him stolen looks. The eyes are said "to be turned askant", or "to waver from side to side", or "the eyelids to be lowered and partly closed"'. Darwin himself had observed a guilty expression without fear in a child two-and-a-half years old which had led to the detection of a small crime: 'It was shown, as I record in my notes made at the time, by an unnatural brightness in the eyes, and by an odd, affected manner, impossible to describe' (262-3).

Whether criminality left its mark on the permanent features of the face, or the expressions, or was manifest only through inner movements, impossible to observe on the surface, remained uncertain. For Darwin, the moral role of physiological phenomena was ambiguous, since it related not to conscience, but to 'regard for the opinion of others', so that even the innocent might blush when accused of a crime (333). This dissembly of external features and inner nature reflects more general transformations in the nature of character in the nineteenth century. Stefan Collini and others have shown

how character was increasingly defined as an inner moral quality, beneath the surface of ranks and titles, outward appearance, manners, and even language. As such, it grew increasingly difficult to read.[28] The eleventh edition of the *Encyclopaedia Britannica* (1912) pronounced the death of the 'the descriptive physiognomy of Lavater', and the rise of the 'physiological school of Sir Charles Bell and Charles Darwin'. In case the point was lost, the article clarifies that the latter is in fact the 'physiological school of physiognomy'.[29] The persistence of physiognomy alongside new techniques of discerning character beneath the skin is a striking feature of the human sciences of the later part of the nineteenth century. The theoretical challenge posed by Bell, Darwin, and Duchenne to Lavaterian deductions, seems to result in a profusion and revision of facial topographies which recruit physiology as a foundation. Rosemary Jane has convincingly argued that the long tradition of human-animal analogy in physiognomy made it both highly adaptable to evolutionary theories, and able to soften or obscure the radical potential of those theories. Traditional progressive hierarchies of the great chain of being, racial stereotypes, the moral and intellectual superiority of Europeans, all gained newly sophisticated and comfortably transparent underpinning.[30]

In many literary and artistic productions through the end of the nineteenth century, the relation between inner character and external expression was indirectly configured. True character and conscience reassert themselves against dissimulation in the Victorian fascination with the ultimate crime, murder. Bell had described the traces left by remorse on the face of the murderer: 'that expression which succeeds the last horrid act of revenge: [when] the storm has subsided, but the gloom is not yet dissipated' (178). In Robert Louis Stevenson's *Jekyll and Hyde* (1886), Jekyll attempts through auto experimentation to separate good and evil, and effectively extinguish character in his alter-ego. Significantly, Hyde's face is not legible in physiognomic terms, he slips away and commits crimes freely, undetected and without remorse. But the experiment ultimately fails. Character and conscience win out as Jekyll, at last unable to control his degradation into the figure of Hyde, confesses 'his' crimes and commits suicide. Similarly, in Oscar Wilde's *The Picture of Dorian Gray* (1890), the hero's wickedness is stored in a painting which alters to reveal his evil character as the

years go by.[31]

A more systematic working out of physiognomic relations between external feature and inner feeling was achieved in programs for forensic criminology based on the face (**see fig. 7**). Darwin's cousin, Francis Galton, developed a method of composite portraiture, overlaying photographs of known offenders so as to accentuate those features that were in agreement, leaving only 'a ghost of peculiarities'.[32] Here the Lavaterian technique of reading character through a reduction of the face to its essential features was achieved through a kind of statistical averaging of features, performed on a whole population. But Galton also noted that the criminal was a type renowned for untruthfulness, and adept at deception. The same observation was made by the Italian criminologist Cesare Lombroso, who was allegedly the first to employ the device later known as the lie detector, in order to 'penetrate into the most secret recesses of the mind of the criminal'.[33] Lombroso's device (**see fig. 8**) was composed of a volumetric glove: a large gutta-percha mitt, placed on the hand, hermetically sealed at the wrist, and then filled with air. It was attached to a registration device which recorded oscillations in blood pressure. After talking to the subject on indifferent topics, Lombroso would suddenly mention the

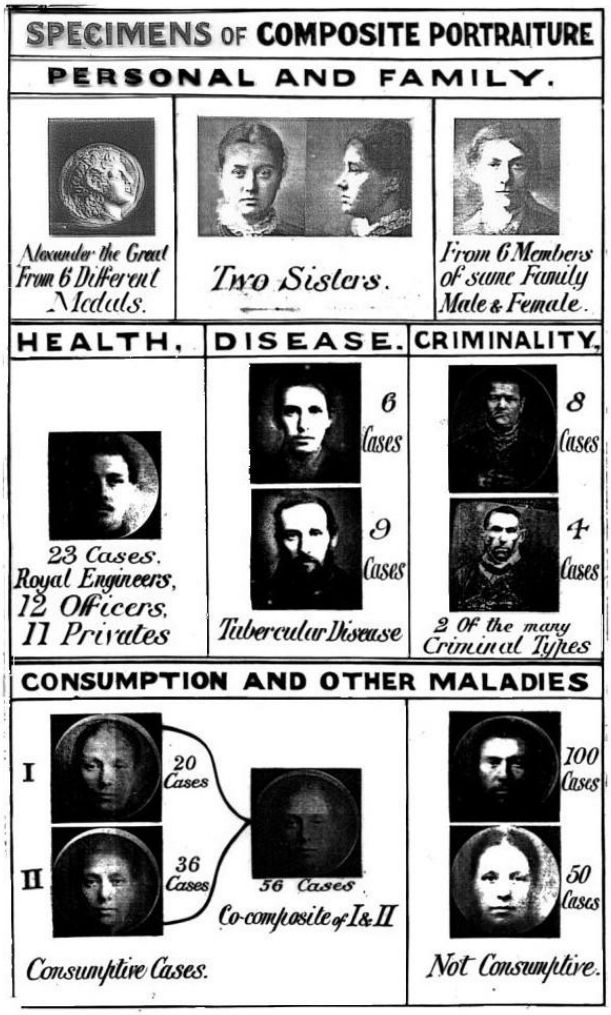

Fig. 7 Composite criminal. Francis Galton, *Inquiries into Human Faculty and Its Development* (London: Macmillan, 1883), frontispiece.

crime, or place a photograph of the victim unexpectedly before his eyes.

Lombroso's lie detector, also known as the polygraph, originated as an instrument for diagnosing heart disease, and was part of the battery of graphic recording devices that had been developed from the 1840s onward, in close connection with reflex physiology, to measure the inner movements of the body.[34] The instruments had been initially used on animals, such as the famous inquiries into animal electricity that followed Galvani's experiments in the 1790s. A range of devices was developed in physiology laboratories to record bodily functions such as heart rate and blood pressure in studies of human automatism and the locus of motor control. The character of Sherlock Holmes as a kind of detective machine appears modelled on these new diagnostic instruments. As Ronald Thomas has suggested, the genre of detective fiction emerges in Britain in close association with developments in medical forensics and diagnostics, in which graphic instruments play a crucial role.[35] The assertion that emotional expressions were purely physiological events, mere by-products of bodily changes, shifted their registration and measurement from the domain of the personal encounter to the domain of the scientific instrument.

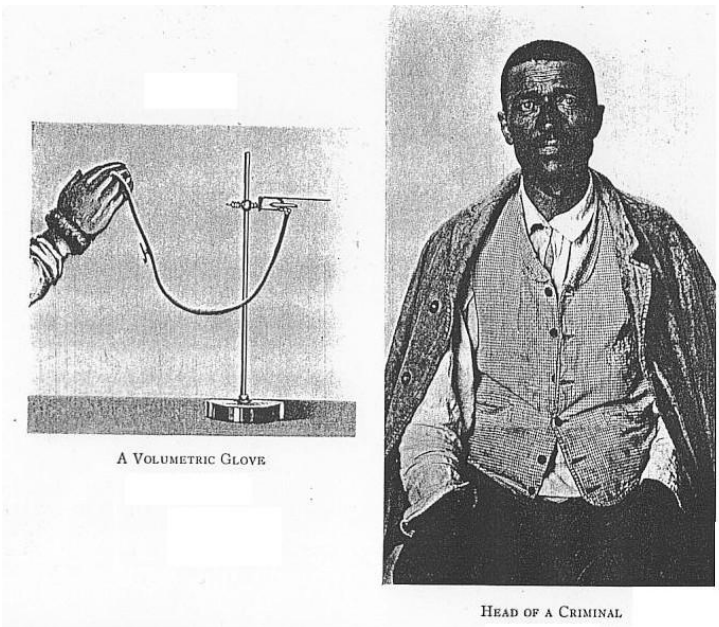

Fig. 8 Polygraph. Gina Lombroso Ferrero, *Criminal Man, According to the Classification of Cesare Lombroso* (London: G. P. Putnam's Sons, 1911), p. 222.

V

Scientific Character

So much for the physiology of the face. What then of the face of physiology? Its *public* face, exhibited for example in new clinical settings, laboratory hospitals and medical education, was literally mechanical. It was that of a precision instrument, impersonal and dispassionate (**see fig. 9**). According to a brief notice in the British medical journal *Lancet* in 1865, Marey's sphygmograph, developed by the French physician for 'feeling' the pulse, could replace human impressions with 'recorded facts self-analyzed'.[36] The physiological research that underpinned accounts of the human body and emotions as a reflex mechanism was thus itself facilitated by instruments that promised to replace the scientific practitioner as observer with a precision machine. In a similar vein, Darwin had introduced photography into his study of expression as a distancing device, obviating against the sympathetic response of the observer who witnessed a powerful emotion. That which was widely regarded by Victorians as the basis for social bonds, authentic communication and deep understanding had become an obstacle to scientific observation. Instinctual or acquired sympathy, as a means of making accurate judgements about character, could now be supplanted by new technologies able to put the body's internal movements on display.

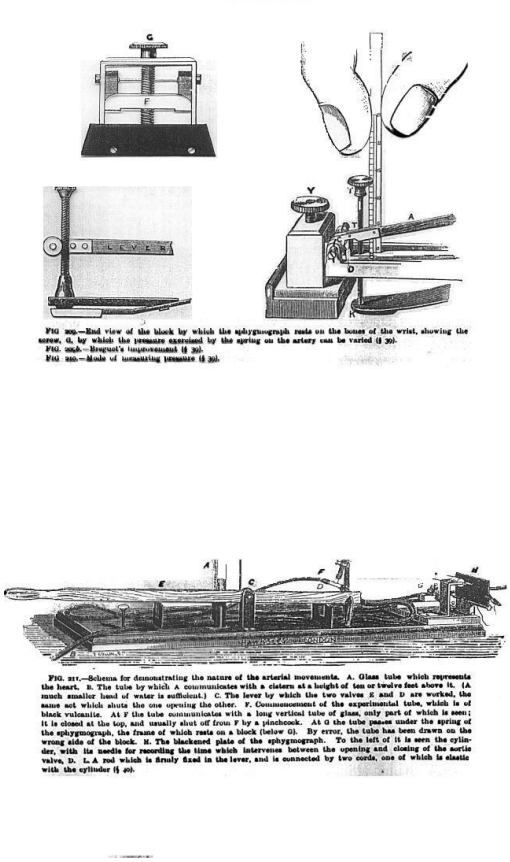

Fig. 9 Sphygmograph. *Lancet*, 2 (1865), 599.

Some critics of this apparently remorseless and inhuman machine did indeed associate the face of physiology with that of crime, especially in the controversies over vivisection, vaccination and gynaecology.[37] They criticised experiments or procedures that were conducted without regard for inner character or feeling, and denigrated the image of the experimenter as a masterful manipulator of instruments and bodies. The use of graphic instruments in medical diagnostics, increasingly prevalent in the last quarter of the century, was also resisted on the grounds that it undermined the physician's essential qualifications of good character and sympathy towards the patient.[38]

We have seen how Darwin separated inner feeling from outward expression, focusing exclusively on the latter. Whether this was degrading to human nature or to the norms of sympathy that governed moral intercourse depended upon what implications one drew from the physiology of expression. Darwin had emphasised the importance of sympathy as an instinct, strengthened by exercise, education, and habit, in the moral nature of man. The flow of fellow-feeling toward others beyond the family circle, to strangers, the poor and unfortunate, even to animals, was crucial to the evolutionary history and future progress of human society.[39] The moral integrity of physiologists, advanced in the debates surrounding animal experimentation and laboratory-based medicine, rested largely on their claims to control this feeling precisely. Unlike the overly sentimental public who criticised their practices, men of science could manage their own bodily mechanism, check the flow of sympathy when inside the laboratory or at a patient's bedside, and then re-open their hearts in the company of friends, loved ones, or the family dog.[40]

Darwin became an honorary member of the Physiological Society and a figurehead of the movement that sought to defend the practice of experimental physiology from its critics.[41] This was not because of his experimental practice, but because of his public character. Much of the authority of science toward the end of the Victorian period did not rest on mechanical methods and impersonal techniques, but rather on an image of the scientific practitioner as a gentleman and genius.[42] A series of portraits of Darwin were made in 1868 by Julia Margaret Cameron, who had acquired a

reputation with her likenesses of Thomas Carlyle, Alfred Tennyson and John Herschel, as a photographer of eminent men of science and letters (**see fig. 10**). Requiring up to fifteen minutes exposure, her technique emphasised contrasts of light and shadow that gave a depth to facial features. Contemporaries remarked particularly on the eyes, which seemed to look more deeply or beyond the actual, eyes that opened inward to the soul.[43] Cameron's portrait of Darwin is especially striking for the prominence given to the crown of the head, brilliantly illuminated, while many of the facial features recede, as if we are glimpsing something incorporeal. Yet the picture is also legible in traditional physiognomic terms, with the prominent brow and forehead indicating strength of character and intellect. Some of Darwin's friends and colleagues, recipients of his photograph, commented that it showed signs of age, of struggle, and intellectual endurance: a conquest of mind over the frailties of body.[44] The public face of science, it would seem, depended on the same physiognomic readings that the physiology of expression had displaced. It was also produced by the same technology that was supposed to replace the scientific observer with a precision instrument: the technology used by physiology to model the mind as purely physical, and the body as a machine, presents us with the man of science as a disembodied, or embattled mind, as genius.

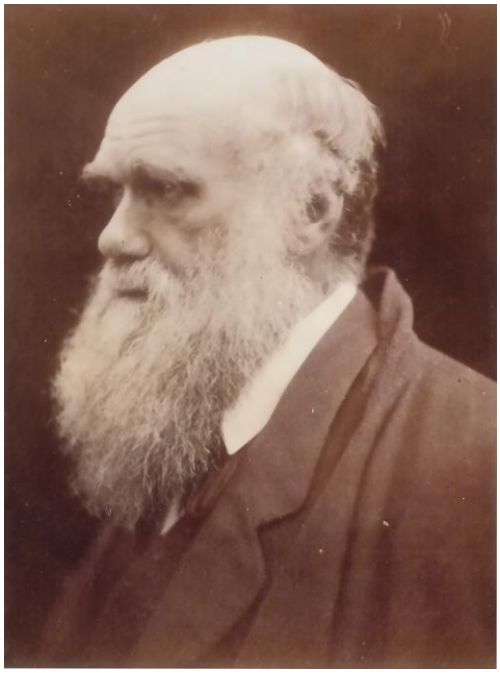

Fig. 10 Darwin in 1868 by Julia Margaret Cameron. Author's collection.

Endnotes:

[1] Charles Bell, *The Anatomy and Philosophy of Expression as Connected with the Fine Arts*, 3rd edn. (London: John Murray, 1844), p. 44. Further references to this work are given after quotations in the text.

[2] Charlotte Brontë, *Jane Eyre* (London: Collins, 1953), pp. 232-3.

[3] Mary Cowling, *The Artist as Anthropologist: the Representation of Type and Character in Victorian Art* (Cambridge: Cambridge University Press, 1989); Roger Cooter, *The Cultural Meaning of Popular Science: Phrenology and the Organization of Consent in Nineteenth-Century Britain* (Cambridge: Cambridge University Press, 1984); Christopher Rivers, *Face Value: Physiognomical Thought and the Legible Body in Marivaux, Lavater, Balzac, Gautier, and Zola* (Madison: University of Wisconsin Press, 1994); Norbert Boormann, *Kunst und Physiognomik: Menschendeutung und Menschendarstellung im Abendland* (Köln: DuMont, 1994).

[4] For example, Gustavus Cohen, *The Modern Self-Instructor, in Phrenology, Physiology, Physiognomy; or the People's Handbook of Human Nature* (London: G. Cohen, 1885); A. Cheetham, *Phrenology in a Nutshell* (Rhyl: Cheetham, Fousham and Co., 1893); and Charles Hartley, *Face and Form* (London: Pitman, 1885).

[5] Compare, for example, the classification of races in Samuel Morton, *Types of Mankind* (London: Trubner and Co., 1854), pp. 411-65, with the highly anthropometric approach in A. Weisbach, *Reise der Osterreichischen Fregatte Novara. Anthropologischer Theil* (Vienna: Kaiserlich-Königlichen Hof und Staatsdruckerei, 1867).

[6] Elizabeth Edwards, *Raw Histories: Photographs, Anthropology and Museums* (Oxford: Berg, 2001) pp. 131-55, and *In Visible Light: Photography and Classification in Art, Science and the Everyday* (Oxford: Museum of Modern Art Oxford, 1997).

[7] On the history of nineteenth-century physiology and its instruments, see R. G. Frank, Jr., 'The tell-tale heart: physiological instruments, graphic methods, and clinical hopes, 1854-1914', in *The Investigative Enterprise: Experimental Physiology in Nineteenth-Century Medicine*, ed. by William Coleman and Frederick Holmes (Berkeley: University of California Press 1988), pp. 211-90, and Soraya de Chadarevian, 'Graphical method and discipline: self-recording instruments in nineteenth-century physiology', *Studies in History and Philosophy of Science*, 24 (1993), 267-91.

[8] Charles Bell, *Essays on the Anatomy of Expression in Painting* (London: Longman, Hurst, Rees, and Orme, 1806). Bell, *Anatomy and Philosophy* (see n. 1). On Bell's physiological approach, see John H. Cule, 'The enigma of facial expression: medical interest in metoposcopy', *Journal of the History of Medicine and Allied Sciences*, 48 (1993), 302-319.

[9] On Lavater and his sources, see especially Melissa Percival, *The Appearance of Character: Physiognomy and Facial Expression in Eighteenth-Century France* (London: Maney and Son/Modern Humanities Research Association, 1999), pp. 159-83.

[10] Thomas Dixon, *From Passions to Emotions: The Creation of a Secular Scientific Category* (Cambridge: Cambridge University Press, 2003).

[11] Brontë, p. 415.

[12] On Brontë as a Lavaterian, see Graeme Tytler, *Physiognomy in the European Novel: Faces and Fortunes* (Princeton: Princeton University Press, 1982).

[13] Darwin, The *Expression of Emotion in Man and Animals* (London: John Murray, 1872), p. 2. Further references to this work are given after quotations in the text.

[14] Darwin, *The Descent of Man, and Selection in Relation to Sex*, 2 vols. (London: John Murray 1871), I, p. 67.

[15] Jonathan Smith, *Charles Darwin and Victorian Visual Culture* (Cambridge: Cambridge University Press, 2006), pp. 192-97.

[16] Gesa Stedman, *Stemming the Torrent: Expression and Control in Victorian Discourses on Emotions, 1830-1872* (Aldershot: Ashgate, 2002), pp. 55-58. Lucy Hartley, *Physiognomy and the Meaning of Expression in Nineteenth-Century Culture* (Cambridge: Cambridge University Press, 2001).

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[18] On Darwin's use of galvanic photography and his manipulation of Duchenne's images, see Phillip Prodger, '*Illustration as Strategy in Charles Darwin's "Expression of the Emotions in Man and Animals"*', in *Inscribing Science*, ed. by Timothy Lenoir, pp. 161-70; and Julia Voss, *Darwins Bilder: Ansichten der Evolutionstheorie, 1837-1874* (Frankfurt: Fischer Taschenbuch Verlag, 2007), pp. 264-75.

[19] For some of Darwin's criticisms of Duchenne, see *Expression*, pp. 149-50n.

[20] Johannes Müller, *Elements of Physiology*, 2 vols. (London: Taylor & Walton, 1838-42); Herbert Spencer, *Principles of Biology*, 2 vols. (London: Williams and Norgate, 1864-7); Henry Maudsley, *Body and Mind* (London: Macmillan and Co., 1870); William Carpenter, *Principles of Comparative Physiology*, 4th edn. (London: Churchill, 1854). Darwin's annotated library is in the Cambridge University Library.

[21] William Carpenter, *A Manual of Physiology*, 3rd edn. (London: Churchill, 1856), pp. 596-8.

[22] William Carpenter, *Principles of Mental Physiology* (London: Henry King and Co., 1874).

[23] Herbert Spencer, 'The physiology of laughter' (1860), in *Essays, Scientific, Political, and Speculative*, 2nd series (London: Williams and Norgate, 1863), pp. 452-58.

[24] Thomas Huxley, 'On the hypothesis that animals are automata, and its history' (1874), in *Collected Essays*, 9 vols. (London: Macmillan, 1893-4), I, pp. 199-250.

[25] William Carpenter, *The Doctrine of Human Automatism* (London: Sunday Lecture Society, 1875). Darwin collected a number of photographs of actors and used several in *Expression*, pp. 252, 264 and 300, facing.

[26] Maudsley, *Body and Mind*, p. 33.

[27] Alexander Bain, *The Emotions and the Will* (London: Parker and Son, 1859), p. 77.

[28] Stefan Collini, *Public Moralists: Political Thought and Intellectual Life in Britain, 1850-1930* (Oxford: Clarendon Press, 1991).

[29] *Encyclopaedia Britannica*, 11th edn. (Cambridge: Cambridge University Press, 1910-11), 21: 550.

[30] Rosemary Jann, 'Evolutionary physiognomy and Darwin's *Expression of the Emotions*', *Victorian Review: The Journal of the Victorian Studies Association of Western Canada and the Victorian Studies Association*, 18:2 (1992) 1-27.

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[32] Francis Galton, *Inquiries into Human Faculty and Its Development* (London: Macmillan, 1883), p. 7.

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[34] James Mackenzie, *The Study of the Pulse, Arterial, Venous, and Hepatic, and of the Movements of the Heart* (Edinburgh and London: Young and J. Pentland, 1902). On the history of the lie detector, see Eugene Bloch, *Lie Detectors: Their History and Use* (New York: McKay, 1977); Ken Alder, 'To tell the truth: the polygraph exam and the marketing of American expertise', *Historical Reflections/Réflexions Historiques*, 24 (1998), 487-525; Geoffrey C. Bunn, 'The lie detector, "Wonder Woman" and liberty: the life and work of William Moulton Marston', *History of the Human Sciences*, 10 (1997), 91-119.

[35] See the suggestive discussion of Sherlock Holmes as a diagnostic machine in Ronald Thomas, *Detective Fiction and the Rise of Forensic Science* (Cambridge: Cambridge University Press, 1999), p. 280.

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[37] Ann Dally, *Women Under the Knife: A History of Surgery* (London: Hutchinson Radius, 1991); Coral Lansbury, 'Gynaecology, pornography and the anti-vivisection movement', *Victorian Studies*, 28 (1985), 413-37, and *The Old Brown Dog: Women, Workers, and Vivisection in Edwardian England* (Madison: University of Wisconsin Press, 1985).

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[39] Darwin, *Descent of Man*, I, pp. 391-94.

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[44] Letter from Asa Gray, 11 July 1864, in *The Correspondence of Charles Darwin*, ed. by Frederick Burkhardt, et al., (Cambridge: Cambridge University Press, 2001), XII, p. 271.