

Darwin

AND
THE EMERGENCE OF
EVOLUTIONARY THEORIES
OF MIND AND BEHAVIOR



ROBERT J. RICHARDS

Controversies over Animal Instinct and Intelligence in the Seventeenth and Eighteenth Centuries⁴

Aristotelians, Cartesians, and Sensationalists

During the seventeenth and eighteenth centuries, disputes over the nature and capacities of human mind were frequently waged on foreign territory—in the field of animal psychology. Fresh evidence from natural history, whose practitioners increased in number during the period, was brought to bear on metaphysical and epistemological issues. This new evidence, however, did not so much test ideas in contention as open the battle on another front. The disputants grouped themselves into three camps, within which, of course, factional differences often arose. The Aristotelians distinguished the human soul, with its rational abilities, from the animal soul, which could be guided only by sensory cognition. The Cartesians also separated man from animals, though more decisively. For Descartes and his disciples, animals mimicked intelligent action, but operated as mere machines: brutes consisted of extended matter alone and functioned according to the laws of physics. Finally, the sensationalists (who adopted the basic tenets of Locke's epistemology) held that human knowing drew exclusively on the same resources available to animals—sensations. The epistemology of sensationalism seemed to be confirmed by the successes of experimental methods in the various sciences and technologies; but toward the end of the eighteenth century, careful observations of animal behavior began to undermine the assumptions of sensationalist epistemology. Naturalists committed to sensationalism thus faced a critical problem, which had implications for their conception not only of animal psychology, but of human psychology as well. The disputes over animal abilities and the dilemma confronted by sensationalists centered on the problems of brute instinct and intelligence.

Aristotelians and Cartesians differed profoundly on the ultimate principles of animal psychology. They nonetheless agreed that complex animal behavior (e.g., birds' building their nests and bees' their cells)

4. I have discussed the pre-nineteenth-century debates over animal instinct and intelligence in more detail in "Influence of Sensationalist Tradition on Early Theories of the Evolution of Behavior," *Journal of the History of Ideas* 40 (1979): 83–105.

should be explained by appeal to instincts, which they understood as blind, innate urges instilled by the Creator for the welfare of his creatures.⁵ Pierre Gassendi (1592–1655) forcefully opposed this interpretation of animal behavior. In his *Syntagma philosophicum* (posthumous, 1658), he undertook a comparative study of animal and human cognitive abilities and discovered they were logically similar: both human and animal souls operated on sensory images to yield reasoned actions.⁶ Marin Curcau de La Chambre (1594–1669), an associate of Gassendi, concurred in his friend's conclusions;⁷ and through the next century

5. From the resources of Aristotle's *De anima*, Avicenna developed a theory of instinct in *Kitāb al-shifā*, the *Sufficientiae* of the medieval translation. The distinctive and skillful behaviors of different species evinced to him that the estimative faculty, that internal sense which detected *intentiones* not available in the immediate data of the external sense, was infused with a divine "inspiration" (*ilham*, rendered by the Latin translator variously as *cautela naturalis* and *instinctus instus*). See S. Van Rier's critically edited *Avicenna Latinus, Liber de anima*, 4.3 and 5.1 (Leiden: Brill, 1968–1972), 2:37, 73. This elaboration of Aristotelian psychology was adopted by Thomas Aquinas in *Summa theologiae*, I, Quest. 78, art. 4, resp., *Opera omnia* (Romae: Ex Typographia Polyglotta, 1891), 6:99; Francis Suarez in *De anima*, 3.30, n. 7, *Opera omnia* (Paris: Vives, 1856–1878), 3:705; the Jesuit Fathers at Coimbra in *In octo libros Physicorum Aristotelis Stagurita*, prima pars, 2.9, quest. 3 and quest. 4 (Coloniae: Zetznerius, 1602), cols. 420–29; Pierre Chanet in *Considerations sur la sagesse de Charron* (Paris: Le Groult, 1643); Gaston Pardies in part 2 of *Discours de la connaissance des bestes* (Paris: Delaulne, 1672). These are only the more prominent among the many thinkers who contributed to and preserved the Aristotelian interpretation of animal instinct. In the eighteenth and nineteenth centuries, the Aristotelian tradition was kept alive in the works of Hermann Samuel Reimarus, *Allgemeine Betrachtungen über die Triebe der Thiere*, 3d ed. (Hamburg: Bohn, [1760] 1773); Erich Wasmann, *Instinct und Intelligenz im Tierreich* (Freiburg im Breisgau: Herder'sche Verlagshandlung, 1897).

Descartes discussed the theory of animal behavior in his letter (1646) to the Marquess of Newcastle, *Oeuvres de Descartes*, ed. C. Adam and P. Tannery (Paris: Cerf, 1897–1913), 4:573–75, and variously in other of his works. Descartes was followed by Antoine Dilly in *Traité de l'ame et de la connaissance des bêtes* (Amsterdam: Gallot, 1676); F. B., an anonymous Englishman, in *A Letter Concerning the Soul and Knowledge of Brutes; Wherein is shewn They are Void of One, and Incapable of the Other* (London: Roberts, 1721); and a host of other disciples. Of particular interest is Thomas Willis's intelligent treatment in *De anima brutorum quae hominis vitalis ac sensitiva est* (1672), *Opera omnia*, ed. Gerardus Blasius (Amsterdam: Westen, 1682); see especially chaps. 6 and 7. Lenora Rosenfield traces the development of the Cartesian conception of animals in *From Beast-Machine to Man-Machine* (New York: Octagon Books, 1968). See also my "Influence of Sensationalist Tradition."

6. Pierre Gassendi, "De functionibus phantasiae," *Physicae*, 3.2.8.4, in *Syntagma Philosophicum, Opera Omnia* (Lugduni: Anisson and Devenet, 1658), 2:409–14.

7. In "Quelle est la connoissance des bestes," an addition to his *Les caractères des passions*, 2d ed. (Amsterdam: Michel, [1640] 1685), Curcau de La Chambre agreed with Gassendi that just as the human understanding composes and divides, so in the beast "the imagination does nothing else but unite and separate images of objects which the senses furnish in order to judge what is good or bad for the animal" (p. 544).

French sensationalists continued to be chary of the use of instinct in the account of animal behavior. The attitude of Jean-Antoine Guer (1713–1764), a historian of animal psychology writing in mid-century, is representative. Guer believed the ascription of instinct to animals confounded any real attempt at scientific explanation, for "nothing is easier to say about whatever animals do than they do it from instinct."⁸ Rather than attempt to uncover the reasons for animal activities, the Aristotelians, according to Guer, invoked the myth of substantial forms (in the guise of brute souls), which were to serve as repositories for instincts that supposedly predetermined behavior. Guer held Descartes and his disciples in no higher regard. The Cartesians refused beasts even the low-level, sensitive cognition granted by Aristotelians. Instead, they presumed all animal behavior to tick off like a clock. Guer delighted in this absurdity of Cartesian animal psychology: "Take your dog. Let us wind up that clock and set it, say, for six o'clock; that is, let us suppose a certain disposition in the organs of the animal, a certain arrangement, a certain sort of heat in its heart and stomach. Behold, the clock runs!"⁹ The Cartesian beast machine, by sensationalists' lights, could be neither living beast nor preset machine. It was not truly an animal, since animals obviously did perceive, feel, and act intelligently, nor a machine, since Cartesian matter lacked any active principles that could explain these qualities.

Sensationalists easily exploited the dilemma of the Cartesians, who wished to explain behavior on simple, natural principles and yet to capture the complexities it revealed. The Abbé de Condillac (1715–1780), for instance, found an exemplar of this Cartesian problem in the theory of animal automatism formulated by the great natural historian Georges Leclerc, Comte de Buffon (1707–1788) in his *Histoire naturelle* (1749–1804). Condillac pointed out that Buffon's insistence that animals were unthinking, instinctive machines clashed with his attribution to them of perception and feelings of pleasure and pain. In Condillac's sensationalist epistemology, such predications implied that a creature could think and make rational determinations, which were merely the results of complex associations of sensory images.¹⁰

8. Jean-Antoine Guer, *Histoire critique de l'ame des bêtes* (Amsterdam: Changuion, 1749), 2: 191–92.

9. Ibid., pp. 242–43.

10. Georges Louis Leclerc, Comte de Buffon was convinced that uniformity in the behavior of animals provided strong "proof that their actions are only mechanical and purely material responses." See "De la nature de l'homme" (1749), *Histoire naturelle*, in *Oeuvres complètes de Buffon*, ed. Pierre Flourens (Paris: Garnier, 1853–1855), 2:7. Etienne-Bonnot de Condillac delighted in pointing out the liabilities of mechanistic interpretations of animal behavior. See his *Traité des animaux* (1755), 1.2, *Oeuvres complètes de Condillac* (Paris: Houel, 1798), 3:458–59.

The sensationalists resolved the Cartesian dilemma by reformulating both physical and psychological theory. First, they admitted that animals—and men—were machines, though not composed of inert matter. Thus Julien Offray de La Mettrie's (1709–1751) *L'homme machine* (1748) did not merely extend a Cartesian mechanistic analysis to the human mind, but reconstructed the very idea of matter. According to La Mettrie, matter harbored active properties of motion and sensation, which were expressed when it became organized in living beings. This new conception of matter allowed La Mettrie and other sensationalists to refer intricate and complex behaviors to a medium plastic enough to produce them, but these thinkers could still maintain the ideal of simple, natural principles of explanation.¹¹

The sensationalists also introduced important epistemological and psychological reformations to the account of animal behavior. They argued that ideas were only copies of impressions received by sensory machines. Rational intelligence, they claimed, was not the product of an immaterial mind but of refined habit and complex processes of sensory association. Animals, then, might entertain ideas, which were more or less detailed representations of their environments. Through memory and imaginative associations, their behavior could thus be guided by *reasonable* considerations. Condillac insisted that a careful examination of animal activities would discover, contrary to Cartesian opinion, that supposedly blind instincts were really intelligently acquired habits.¹² Therefore we should not, his expositor Le Roy declared in the *Encyclopédie*, use "instinct" to refer to animal behavior "except that that word becomes synonymous with 'intelligence.'" ¹³

Though Charles-Georges Le Roy (1723–1789) affirmed Condillac's sensationalist interpretation of animal action in the *Encyclopédie*, he remained a bit more conservative in his own diagnoses of mammalian

11. For further discussion of the sensationalists' analysis of matter, see Aram Vartanian, "Trembley's Polyp, La Mettrie, and Eighteenth-Century French Materialism," *Journal of the History of Ideas* 11 (1950): 259–86; and my "Influence of Sensationalist Tradition." In his "From *Homme Machine* to *Homme Sensible*," *Journal of the History of Ideas* 39 (1978): 45–60, Sergio Maravia assumes that physiologists in the seventeenth and eighteenth centuries can fairly easily be distinguished into mechanists, like Descartes and Boerhaave, who regarded organic bodies as composed of inert and statically related parts, and vitalists, like Bordeu, who endowed organisms with extrinsic, vital forces. Maravia fails to emphasize that sensationalists, such as La Mettrie and Condillac, took a middle road, granting nonliving matter intrinsic, active powers which would express themselves when properly organized. This latter conception measurably influenced late-eighteenth-century theories of *homme sensible*.

12. Condillac, *Traité des animaux*, 1.3, p. 534.

13. [Charles-Georges Le Roy], "Instinct," *Encyclopédie ou dictionnaire raisonné des sciences, des arts et des métiers*, ed. Denis Diderot (Paris: Faulche, 1751–1765), 8: 796.

behavior. In his *Lettres sur les animaux* (1768), a work later admired by Charles Darwin, Le Roy traced the development of intelligence in young wolves, foxes, and deer against the background of their social and natural circumstances. In his analyses, he preserved the notion of instinct to refer to basic, physiologically determined desires—the need for certain foods, shelter, and acceptable climate. But he refused instinct any role in directing behavior designed to satisfy those needs. He rather believed this was accomplished by sensory experience and the applications of wakening intelligence.¹⁴

To argue successfully that individual intelligence shaped animal behavior, the sensationalists had to deny that innate images, which many instinct theorists postulated,¹⁵ played any role in guiding actions. Conate images, though, were not so much argued against as simply dismissed as repugnant to the accepted Lockean conviction that all ideas ultimately derived from sense experience. This same epistemological tenet also weakened the support for a common feature of traditional theories of instinct, the assumption that instinctive activities were rigidly uniform in a particular species. For instance, René-Antoine de Réaumur (1683–1757), who detected the stirrings of intelligence even among insects, protested the Cartesians' presumption of machinelike, predetermined fixity in the conduct of animals.¹⁶ His objection conformed to the sensationalists' insistence that ideas (including those directing behavior) were not universals but particulars, fainter copies of sensations. Particular ideas could well account for variability in animal activity. And uniformity of action displayed by members of the same species could be attributed, according to Condillac and Le Roy, to the community of fundamental needs and the similarity of environments in

14. Charles-Georges Le Roy, *Lettres sur les animaux*, new ed. (Nuremberg: Saugrain, [1768] 1781), pp. 68–69. Though Le Roy deprecated Cartesian notions of instinct, he nevertheless suggested that habits might, after cultivation for several generations, become hereditary, so that the constitution of animals might be continually reformed and perfected. I owe a debt to Marc Swetitz for bringing this feature of Le Roy's analysis to my attention.

15. Even Descartes referred to "images" and "ideas" of animal corporeal imagination. See, for example, Descartes, *L'homme*, in *Oeuvres de Descartes* 11:177. Thomas Willis described the cerebral dispositions determining animal instinct as "innate notions" (*notitia ingenta*) in his *De anima brutorum*, p. 32. Hermann Samuel Reimarus spoke of the animal having an inborn "idea or image" (*eine Idee oder ein Denkbild*) to guide instinctive behavior. See Reimarus, *Abhandlungen von den vornehmsten Wahrheiten der natürlichen Religion*, 5th ed. (Tübingen: Frank und Schramm, [1754] 1782) p. 405.

16. René-Antoine de Réaumur, *Mémoires pour servir à l'histoire des insectes* (Paris: L'Imprimerie Royale, 1734–1742), 1: 22–23.

which the young were reared. There was no cause to postulate of animals innate, universal ideas to explain their behavior.¹⁷

17. Condillac, *Traité des animaux*, 1.3, p. 534; Le Roy, *Lettres sur les animaux*, pp. 73–74.

The Roots of Rational Thought

One is tempted to credit the English bestowal of generous intellect on animals to their great affection for dogs. The British metaphysician F. H. Bradley once confessed "I never could see any difference at bottom between my dogs & me, though some of our ways were certainly a little different."¹⁰⁹ This explanation will not do for the French, however. They shed their sentiments on other things. The reason lies deeper, in their sensationalist epistemology. French psychological writers enthusiastically adopted the ideas of British sensationalists—Locke, Hume, Hartley, the Mills. Those in the sensationalist tradition argued that ideas were derived from sensations alone, that thought merely reflected darkly the images of sight, hearing, touch, smell, and taste. Intelligence, in this view, was simply the ability to arrange and associate images, something animals—especially dogs—gave ample evidence of doing. On this epistemological basis, Locke concluded that if beasts "have any *ideas* at all and are not bare machines (as some would have them) we cannot deny them to have some reason."¹¹⁰ Locke did, however, deny them the capacity to formulate abstract ideas of the sort Berkeley found so hard to fathom and Hume interpreted as vague images that readily called up previous associations. Erasmus Darwin's theory of intelligence ran deeply in the grain of the sensationalist tradition; and, as I have argued in the previous chapter, it promoted his own peculiar evolutionary views. His grandson's first introduction to the epistemological-evolutionary question likely came through study of the first part of Erasmus's *Zoonomia*.¹¹¹

Charles Darwin, like his grandfather, assumed that sensory images supplied the content of thought: "thinking consists," he recorded in his *M Notebook*, "of sensation of images before your eyes, or ears (language mere means of exciting association) or of memory of such sensation, & memory is repetition of whatever takes place in brain, when sensation is perceived."¹¹² Darwin expanded these sensationalist views about cognition in his *N Notebook*, where he proposed that reason in its elemen-

109. F. H. Bradley to C. Lloyd Morgan (16 February 1895), in the Papers of C. Lloyd Morgan, DM 612, Bristol University Library.

110. John Locke, *An Essay Concerning Human Understanding*, ed. John Yolton, 5th ed. (New York: Everyman Library, 1965), 1:127.

111. See chapter 1 and my "Influence of Sensationalist Tradition on Early Theories of the Evolution of Behavior," *Journal of the History of Ideas* 40 (1979): 85–105.

112. Darwin, *M Notebook*, MS p. 61e–62e (Gruber, p. 277).

tary form was merely a comparison of sensations and in its more complex manifestations, only the recollection of several sensory images that resolved themselves into a lively and pleasant conception. As he put it in that notebook: "Reason in simplest form probably is single comparison by senses of any two objects—they by VIVID power of conception between one or two absent things.—reason probably mere consequence of vividness & multiplicity of things remembered & the associated pleasure as accompanying such memory."¹¹³ Darwin's account of thought resonates of Hume's psychology, which his grandfather had also endorsed. Darwin began reading Hume's *Inquiry Concerning Human Understanding* in August of 1838, just before penning the first of the preceding remarks. Hume's conception lent itself perfectly to Darwin's efforts to link human mental abilities with their precursors in animal mind. But Hume had relatively little to say about the specifically biological connections. Here Darwin drew his inspiration directly from Erasmus.

Darwin readily acceded, as we have seen, to his grandfather's theory that cerebral processes determined mental activity. Continuity of physical development of the brain between animals and men thus could be used to argue for the continuity of mental development. Yet this physicalist argument did not quite bridge what was usually perceived as the gulf separating animal mind from human mind: animals acted instinctively; men reasoned. Darwin realized that he had to define further the relationship of instinct to reason, since these appeared to be the polar traits of two different kinds of mind. He worked out his position against the opposing views of Lamarck and Edward Blyth, the hapless naturalist who later became his friend.¹¹⁴

At the beginning of his evolutionary theorizing, Lamarck had yet to escape the grasp of Cartesian rationalism (few Frenchmen ever seem to break entirely clear). In his *Recherches sur l'organisation des corps vivans* (1802), he granted the higher animals intelligence, yet refused them reason—a putatively more numinous faculty that separated man from beast. In the *Philosophie zoologique* (1809), however, Lamarck adjusted

113. Darwin, *N Notebook*, MS p. 21e (Gruber, p. 334).

114. Edward Blyth (1810–1873), whose economic circumstances and frail health prevented university training, undertook his own tutelage in natural history. He published several papers early in his career that caught the eye of fellow naturalists, and in 1841 he accepted a position as Curator of the Museum of the Royal Asiatic Society of Bengal. Through considerable effort, he virtually established by himself the study of the zoology of the subcontinent. But his life in India, as Francis Darwin judged (in *Life and Letters of Charles Darwin* 2:109), was a constant struggle with poverty and unhappiness, especially after the death of his wife. Charles Darwin carried on a lengthy correspondence with Blyth and received him as a guest at Down in 1868.

his theory of reason to allow its presence in animals. Following Cabanis, he came to regard reason as but the guide of experience in the correct use of judgment—something of which all intelligent animals were capable. But the nether end of the chain of being, the lower animals—for Lamarck those wanting cerebral hemispheres—these he still held incapable of reason or intelligence. Darwin recognized that such an apparent break in the linkage of species damaged the case for their gradual transmutation. In this instance again he thought his “theory very much distinct from Lamarck’s.”¹¹⁵ Darwin’s sensationalist construction of reason as sensory association permitted him no distinction between intelligence and reason. And the tradition of his intellectual forebears counseled empirical evidence, not a priori presumption, be used to decide whether an animal exercised reason. Darwin judged that flexible behavior in contingent circumstances and the ability to learn from experience gave evidence that even insects, on occasion, made rational decisions and that their intellectual faculties differed from man’s only in degree of complexity.¹¹⁶ In counting ants, bees, and other small creatures among the rational animals, he set no precedent with fellow naturalists. Even the natural theologians John Fleming, Algernon Wells, Lord Brougham, and William Kirby—all of whom Darwin read with attention (see the next chapter)—would not deny “some feeble rays of reason” to the lower animals.¹¹⁷

Nor did Edward Blyth, whose papers on animal instinct and intelligence Darwin read in early 1838.¹¹⁸ Blyth, also tintured with the doctrine of sensationalism, conceded that animals did sometimes reason and reflect; though like Condillac and Le Roy in the previous century, he assumed that they engaged their cognitive powers only when compelled by a rapidly changing environment.¹¹⁹ Their instinctive knowl-

115. Darwin, *First Notebook on the Transformation of Species*, MS p. 214 (de Beer, p. 66).

116. Darwin, *First Notebook on the Transformation of Species*, MS pp. 207–208 (de Beer, p. 66); *M Notebook*, MS pp. 62e–63e, 72–73 (Gruber, pp. 277, 278).

117. Algernon Wells, *On Animal Instinct* (Colchester: Longman, Rees, Orme, Brown, Green, and Longman, 1834), p. 20.

118. Edward Blyth, “On the Psychological Distinctions between Man and all other Animals,” *Magazine of Natural History* 1, n.s. (1837): 1–9, 77–85, 131–41. Darwin first mentioned this essay by Blyth in his *Second Transmutation Notebook*, MS p. 198 (de Beer, p. 106). His own copy of the article is annotated and well marked.

119. Blyth, “On the Psychological Distinctions between Man and all other Animals,” pp. 3–4: “I wish not to defend the untenable doctrine, that the higher groups of animals do not individually profit by experience; nor to deny to them the capability of observation and reflection, whereby to modify, to a considerable extent, their instinctive conduct.” Blyth understood “reason,” as other sensationalists had, to be the name for learning from experience through observation and reflection. “Reason . . . in human beings,” he remarked (pp. 4–5), “can, of course, be only the result of observation and reflection.”

edge—he thought of instinct precisely as a kind of innate knowledge—had been foreordained by a beneficent Providence; and it usually served their wants.¹²⁰ But if the innate repertoire of animals did fail in alien surroundings, he suspected they might, as a kind of aid to Divinity, restock from natural sources. Alterations in the instincts of domestic animals attested that such changes in the wild might occur. Blyth consequently ventured that the experiences—and even anatomical modifications—acquired by an animal in nature might be transmitted to its progeny through inheritance, thus securing for future generations a legacy of reformed adaptations appropriate to new circumstances. Blyth supposed, however, that such transformations only happened occasionally. And like Lyell, he denied that inherited characteristics were potent enough or animals plastic enough to produce new species from what were mere varieties.

Blyth discovered in the human animal neither preternatural nor acquired instincts. “The human race,” he asserted, “is compelled to derive the whole of its information through the medium of the senses,” while “the brute is, on the contrary, supplied with an innate knowledge” of those things affecting its welfare.¹²¹ When a juvenile chimpanzee, for instance, confronts a python, its natural enemy, “it ‘instinctively’ recoils with dread.” “But,” he asked, “does a human infant evince the like recognition?”¹²² He thought not. His reader, however, was not so easily convinced. In the margin of his copy of Blyth’s article, Darwin offered a refuting observation: “Child fears dark before reason had told it.”¹²³

To Darwin’s mind, Blyth’s separation of instinct and reason only preserved the conventional distinction between animals and men. Darwin rejected what he regarded as Blyth’s assumption of a “saltus” between instinct and reason. He preferred to term the difference a “hiatus,” a description which for him implied a matter of degree rather than of kind; for he found sufficient warrant to consider reason and instinct as really continuous powers.¹²⁴ In his *C Notebook*, where he responded to Blyth’s article, Darwin considered that human mentality was subject to acquirable and hereditary determinations: the nervous factors which enabled men to use language, for instance, must have been gradually acquired as innate structures. This meant that animal instincts, also the result of acquirable and hereditary determinations, could not be so radi-

120. See Blyth’s remarks about “innate knowledge” quoted in the following paragraph of the text.

121. *Ibid.*, p. 2.

122. *Ibid.*

123. Darwin’s annotation appears in *ibid.*, at the bottom of p. 2.

124. Darwin, *Second Transformation Notebook*, MS p. 198 (de Beer, p. 106).

cally different from the reasonable acts of men.¹²⁵ Intellect might be understood, Darwin proposed a few months later, as "a modification of instinct—an unfolding & generalizing of the means by which an instinct is transmitted."¹²⁶ In this conception, intelligence emerged when cerebral structures determining instinct became less fixed, more flexible and responsive to environmental contingencies. Intelligence, then, was not opposed to instinct, but rather grew out of it (a conception Herbert Spencer would also advance). This interpretation of the instinct-intelligence relationship echoed Darwin's then favorite philosophical author, David Hume, who characterized human reason as "a wonderful and unintelligible instinct in our souls."¹²⁷

At the present time, when sociobiologists and ethologists make claims for mental continuity between men and animals, the ensuing debate usually turns on the question of rationality: Can animals reason as we do? While this issue played a role both in Darwin's formulation of his theory and in his opponents' attempts to refute it, in nineteenth-century England the question of animal reason was not so strenuously mooted. The British sensationalist tradition, which carried along many of the century's leading scientists and philosophers, had precluded an effective distinction between human and animal intellectual abilities. The more significant question was: Can animals make moral judgments as we do? Or more pointedly: Is man essentially no more moral than a rutting pig? In our day even many committed evolutionists have abandoned our animal forebears on the other side of this Rubicon: they believe that men have become moral creatures and consequently exempt from an evolutionary rendering of their ethical behavior. Only the benighted sociobiologist, they argue, attempts to generalize from the 'altruism' of the ant soldier to the altruism of the human soldier.¹²⁸ Dar-

win, however, recognized early on that the question of man's moral nature had to be faced and an evolutionary account constructed. For if the moral sense—that property commonly regarded as essentially distinctive of man—were explained in some other fashion, then such explanation might serve for all other traits, thus emasculating his entire evolutionary conception. Darwin's theory of the moral sense, which underwent continuous development from this earlier period until the composition of the *Descent of Man*, reveals, I believe, his peculiar genius. The theory in its finished form, which will be examined in chapter 5, is biologically and philosophically sophisticated. In the second appendix, I will plump for a refined version of it.

125. Darwin, *Second Transformation Notebook*, MS p. 198 (de Beer, p. 106).

126. Darwin, *N Notebook*, MS p. 48 (Gruber, p. 339).

127. David Hume, *Treatise of Human Nature*, ed. L. A. Selby-Bigge (Oxford: Clarendon Press, [1739] 1888), p. 179. In his *N Notebook*, MS p. 101 (Gruber, p. 348), Darwin seized on Hume's analysis: "Hume has section (IX) on the Reason of Animals . . . he seems to allow it is an instinct."

128. Robert Trivers, in "The Evolution of Reciprocal Altruism," *Quarterly Review of Biology* 46 (1971): 35–57, and Edward Wilson, in *Sociobiology: The New Synthesis* (Cambridge: Harvard University Press, 1975), pp. 562–64, have renewed the earlier efforts of Julian Huxley, in *Evolution and Ethics, 1893–1943* (London: Pilot, 1947) and C. H. Waddington, in *The Ethical Animal* (New York: Atheneum, 1961), to give an evolutionary account of human moral behavior. These attempts have been severely criticized by evolutionists of a different stripe: see, for example, Stephen Jay Gould's "Biological Potentiality vs. Biological Determinism," in his *Ever Since Darwin* (New York: Norton, 1977), pp. 251–59, and Richard Burian, in "A Methodological Critique of Sociobiology," in *The*

Sociobiology Debate, ed. Arthur Caplan (New York: Harper, 1978), pp. 376–95. The ethical issues aroused by evolutionary theory receive vetting in the following collections: *Sociobiology and Human Nature*, ed. Michael Gregory, Anita Silvers, and Diane Sutch (San Francisco: Jossey-Bass, 1978); *Morality as a Biological Phenomenon*, ed. Gunther Stent (Berkeley: University of California Press, 1980); and *The Sociobiology Debate*.