

## **THREE PIONEERS OF COMPARATIVE PSYCHOLOGY IN AMERICA, 1843-1890: Lewis H. Morgan, John Bascom, and Joseph LeConte**

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### **Abstract:**

Scientific comparative psychology in America dates from the mid-1890s, but there is a body of earlier literature on the topic, written during a period of theistic debates over Darwinian evolution. The anthropologist Lewis H. Morgan rejected instinct as an explanation of animal behavior in 1843 and defended the mental similarities between animals and humans, although he was not an evolutionist. John Bascom's textbook *Comparative Psychology* (1878) is the earliest American work to use that title, and its theistic approach anticipates some arguments found in much later evolutionary works. Beginning in 1860, the geologist Joseph LeConte, who is well known for defending the compatibility of evolution and religion, wrote several articles in which he outlined a comparative evolutionary approach to psychological problems. However, these writers did not establish a coherent research tradition and were ignored by the "New Psychologists" of the 1880s.

### **Article:**

A widely accepted account of the early history of comparative psychology in America is roughly as follows. By the last two decades of the 19th century, the evolutionary writings of Charles Darwin and his followers (especially George J. Romanes and Conwy Lloyd Morgan) had brought the study of animal and human psychology under the same theoretical rubric. Stimulated by the ideas of these British writers, and encouraged by the burgeoning success in experimental psychology of methods imported from German laboratories, a handful of scientists began looking for ways to study animal psychology with the same degree of precision and control. The earliest American comparative psychologists—Wesley Mills (1847-1915), Linus W. Kline (1866–?), Willard S. Small (1870-1943), and Edward L. Thorndike (1874-1949)—

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following the lead of Lloyd Morgan, developed methods for the controlled study of learning in animals, using problems such as mazes and puzzle boxes. The comparative study of animal learning that grew out of these early efforts became the backbone of comparative psychology and the precursor of Watsonian behaviorism. According to this account, there was no indigenous American comparative psychology prior to the 1890s.<sup>1</sup>

Historians of psychology have, in general, paid little attention to American psychology prior to the publication of *Principles of Psychology*<sup>2</sup> in 1890. James M. Cattell wittily compared the history of American psychology before 1880 to "the alleged chapter on snakes in a certain natural history of Iceland—'There are no snakes in Iceland,'" and later described American psychology during this period as being "like Heaven, for there was not a damned soul there."<sup>3</sup> Edwin Boring ignored all American psychology before James,<sup>4</sup> and even Ernest Hilgard's 1,000-page *Psychology in America* dismissed pre-Jamesian contributions in a mere six paragraphs.<sup>5</sup> Historical accounts of comparative psychology have thus followed a well-established trend in the historiography of American psychology generally.

However, there was in fact a long-standing tradition of psychological inquiry in America before James, going back to Thomas Upham's *Elements of Intellectual Philosophy* (1827),<sup>6</sup> and at least 10 books with the word *psychology* in their titles were published by American scholars between 1840 and 1880.<sup>7</sup> Although American scientific psychology, including scientific comparative psychology, is a product of the last years of the 19th century, the seeds of its development can certainly be seen in much earlier writings. In this article I discuss the work of three writers, all of whom wrote insightfully on topics that would become centrally important in comparative psychology, although they were often described as belonging to the study of "animal psychology."

What distinguished writers of the period under consideration from the "New Psychologists"<sup>8</sup> of the 1880s and 1890s (of whom Cattell was a pre-eminent spokesman) was that they were much closer to the old tradition of speculative mental philosophy than to the approach of German-trained scientific psychologists usually identified as the founders of the discipline in America—James, Hall, Cattell, Titchener, Münsterberg, and their contemporaries. Nonetheless, the mental philosophers helped to set the stage for the establishment of scientific psychology, which was far from being simply a German import planted in the fertile but unplowed soil of American psychological inquiry.<sup>9</sup>

The mental philosophy of Upham (1827, 1861), Francis Wayland (1854), Laurens P. Hickok (1848), Joseph Haven (1857), James Rush (1865), Noah Porter (1868), and others of this era drew largely on the Scottish common-sense philosophy of Thomas Reid and Dugald Stewart.<sup>10</sup> For example, Upham's *Abridgement of Mental Philosophy* (1861), which drew together ideas developed in his earlier books, built on Scottish philosophy in recognizing three main components of the mind: the intellect, the sensibilities, and the will. The intellect relies on both external and internal sources of knowledge to allow one to understand the world. The external source is experience, as in the earlier empirical philosophy of John Locke and David Hume; however, purely empirical knowledge is, as Hume had shown, incapable of certainty—so long as we rely entirely on our senses, we must remain unsure whether we know the truth about the world. Reid and Stewart, like Kant, found this conclusion unpalatable, and they proposed that the mind comes equipped with certain internal forms of knowledge, which they called *suggestions* or *intuitions*. This internal knowledge provides a certainty

for human understanding that was congenial to the orthodox religious beliefs of American mental philosophers, many of whom were ordained Protestant ministers, preaching the certain truths of Christianity from their pulpits on Sunday and teaching the principles of intellectual inquiry in their classrooms during the week. Indeed, one of their aims was to show how an understanding of the mind could help provide moral guidance to students and the general public. The typical undergraduate curriculum during these years included a final-year course on mental and moral philosophy taught by the president of the college, and most of the psychological texts from this period had their origin in notes prepared for such courses.<sup>11</sup>

The skepticism of Hume's philosophy, and of empiricism generally, was not the only intellectual challenge faced by 19th-century writers on psychological topics. Charles Darwin's *Origin of Species* was published in London in 1859 and, within a few months, the New York publishing house Appleton brought out an American edition. There was a variety of responses to Darwin's evolutionary theory.<sup>12</sup> Whereas some, such as Louis Agassiz, the eminent Harvard zoologist whose Amazonian expedition the young William James would join in 1865,<sup>13</sup> rejected Darwinism entirely, others looked for ways to fit the theory of evolution into the framework of their religious beliefs. Evolution itself, of course, was not a new idea. Robert Chambers's *Vestiges of the Natural History of Creation* (1844) had already ruffled a generation of orthodox religious feathers, and the ideas of Lamarck (1809) had been at least vaguely known in America for much longer, primarily through the writings of Herbert Spencer.<sup>14</sup> Darwin's theory, however, elicited a much broader and deeper rethinking of philosophical and scientific positions, and that rethinking provided the intellectual context within which American scholars wrote on animal psychology, and its relationship to the human mind, during and immediately after the Civil War.

### *Theistic Evolution: The Intellectual Context for Comparative Psychology*

The famous debate between Thomas Henry Huxley—"Darwin's bulldog," as he was known—and Bishop Samuel ("Soapy Sam") Wilberforce shortly after the publication of the *Origin* has become an unfortunate emblem of 19th-century arguments over evolution in general and Darwinism in particular. James R. Moore<sup>15</sup> noted the tendency to cast these arguments in military terms, and the Huxley–Wilberforce debate has all the elements of a stirring military engagement. However, as Moore explained in careful detail, the responses to Darwin were far more complex, and more interesting, than the military metaphor implies. Moore called one group of respondents the "Christian Darwinisticists"<sup>16</sup>—Christians who agreed with some, though not all, of Darwin's arguments but needed to find ways to preserve the central truths of their religion in the face of his theory. These writers agreed with Darwin that the living world has come into being in accordance with natural law, perhaps including the mechanism of natural selection. However, they also believed that divine agency contributed to evolutionary change, a position known as *theistic evolutionism*.<sup>17</sup>

The starting point of the theistic criticism, that Darwin had his finger on some but not all of the truth, was not, it should be noted, exclusively a religious position. There were plenty of purely scientific questions to be asked about the details of Darwin's theory: How do variations in structure and function arise? What are the mechanisms of heredity that ensure successful variants will breed true through many generations? Is natural selection supplemented by other mechanisms, such as the inherited effects of habit? If so, how do the other mechanisms operate, and how important are they? All these questions and more were debated by scientists in the decades following 1859, often without any reference to religious issues. The theists, however, although concerned to sort out the scientific puzzles

surrounding the theory of natural selection, also believed that a place had to be found for divine influence—otherwise, they feared, Darwinism would indeed lead to atheism, as the anti-evolutionists claimed.

There were several theistic objections to Darwinism.<sup>18</sup> Foremost among them was that it proposed the development of different species to have resulted from a purely mechanical process, natural selection, with no room for divine influence of any kind. Even for many who were willing to accept that the world and all its occupants had not been created in a single 6-day period, the idea that God had played no role at all in the production of living things was unacceptable. A second objection was that Darwinism seemed to entail materialism, the belief that the world consists of nothing except matter, leaving no room for soul or spirit. Darwin had deliberately side-stepped the evolution of the human species in 1859, although he dropped hints that his theory was intended to apply to the human as well as all other living species. In 1871, he published *The Descent of Man*, which filled that gap and made it clear that his evolutionary theory was intended to explain the mental and moral evolution of the human species as well as its physical development.<sup>19</sup> Thus Christians were being asked to believe not only that God had played no role in the creation of the natural world but also that the human soul, the divinely implanted source of human intellectual and moral understanding, was a mere fiction.

Theistic evolutionists dealt with these implications of Darwinism in a variety of ways, of which two in particular should be noted. The first was to assert that although mechanical processes play some role in evolutionary development, the course of that development follows a divinely established plan—it is not the result of purely mechanical selection acting on purely fortuitous variation, as Darwin had proposed. The second was to insist that the human soul stands in some sense apart from the material world. The theistic reaction against materialism was not solely a response to Darwin, although his theory was widely understood to have materialist implications. The epithet "materialism" was already being directed at Auguste Comte's positive philosophy, which had reached America in 1853 in the form of Harriet Martineau's English translation and condensation.<sup>20</sup> Comte insisted that all knowledge, philosophical as well as scientific, must be based on observable fact, a position that left no room for a spiritual understanding of the unobservable soul. The terms *materialist* and *positivist* were often used interchangeably, and the theists found both positions equally objectionable.

Because natural selection was the most objectionable feature of Darwinism, theists were attracted to evolutionary positions that emphasized other mechanisms of evolutionary change, the most obvious of which was Lamarckism. In Lamarck's theory, evolution occurs as a result of two processes: a tendency toward complexity and perfection that is inherent in all living matter and a series of adaptations to local circumstances, accomplished by the inherited effects of use and disuse.<sup>21</sup> In the decades after 1859, American scientists were drawn more and more strongly to the Lamarckian perspective, for a variety of reasons, at least one of which was its greater compatibility with the theistic perspective. The inherent perfecting tendency could readily be seen as the manifestation of a divine evolutionary plan, and the inherited effects of use and disuse made it unnecessary to rely on fortuitous variation to explain adaptation to circumstances: Each species could improve its situation as the individual accomplishments of successive generations accumulated in the germ. Around the turn of the century, American science would come to wholeheartedly embrace a neo-Lamarckian perspective that persisted until about 1920.<sup>22</sup> In the decades immediately after the publication of the *Origin*, that had not yet happened, but there was widespread interest in and sympathy

for the Lamarckian position. Indeed, as many historians have pointed out, Herbert Spencer's Lamarckian evolutionism was far more popular in America than in England, and many of the most prominent American advocates of an evolutionary perspective, such as Edward L. Youmans, John Fiske, and Henry Ward Beecher, advocated a Spencerian rather than a Darwinian outlook.<sup>23</sup>

In this article I examine the work of three American scholars from the middle and late 19th century who applied a theistic perspective to questions about the relationship between human and animal minds and so opened a door to the study of comparative psychology: the anthropologist Lewis Henry Morgan, the philosopher and educator John Bascom, and the geologist and popularizer of evolutionary theory Joseph LeConte. Although none of them seemed to have directly influenced the development of the discipline during the last decade of the 19th century, for reasons I discuss at the end of this article all of them were thinkers whose ideas are well worth understanding in their own right, and at least some of their ideas anticipate those of later writers whose contributions are much better known. The three are roughly contemporaneous (they were all born within a 9-year period), and all achieved considerable success in fields other than psychology. Together they constitute an interesting and neglected chapter in the history of American comparative psychology.

#### *Lewis Henry Morgan (1818 —1881)*

Lewis Morgan was born near Aurora, New York, in 1818, one of eight children of Jedediah Morgan and his second wife, Harriett Steele.<sup>24</sup> Jedediah was a prosperous farmer and, although he died when Lewis was 8, he left his wife and family well provided for. Lewis attended Aurora Academy, where he studied classics, then in 1838 entered Union College in Schenectady, New York, to study law, at which time he added *Henry* to his name. Morgan graduated in 1840 and was admitted to the bar, but he was unable to find employment for another 3 years, during which time he managed the family farm and read widely, amassing a large private library.<sup>25</sup> With a group of friends, he founded the "Order of the Gordian Knot," a fraternal organization devoted to discussion and fellowship, one of several such organizations with which he would be associated during his life. He began the practice of law in Rochester in 1844, by which time he had written several essays for literary periodicals, including "Mind or Instinct: An Inquiry Concerning the Manifestation of Mind by the Lower Orders of Animals,"<sup>26</sup> one of four articles he published in *The Knickerbocker* in 1843-1844.

The theme of Morgan's 1843 article was that the mental abilities of animals

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are the same in kind as those of humans, although they may differ in degree. In particular, he argued that explaining the actions of animals by appeal to something called *instinct* and those of man by appeal to something different, called *mind*, is an unwarranted distinction. We have no direct knowledge of the nature of instinct, Morgan said, and so must rely on indirect evidence, but of course, the same is true of our understanding of mind:

Our knowledge of the qualities of instinct is derived from actions only; of mind from words and actions. But these qualities can be inferred as legitimately from the latter [i.e., actions], under proper restrictions, as from both; and if we should investigate the properties of mind from the actions of men exclusively, we could not arrive at them with any greater certainty than we can at the properties of instinct. (p. 416)

So in understanding the nature of both mind and instinct, we must base our conclusions on the study of behavior and accept the limitations thus imposed on the certainty with which we can draw our conclusions. Morgan then proceeded to describe observations that he believed demonstrate the existence in animals of mental abilities popularly supposed to be unique to humans: memory, imagination, abstraction, and reasoning. The examples he provided were drawn from works of natural history, in particular Buffon's *Histoire Naturelle* (which appeared in 44 volumes between 1749 and 1804), published and unpublished reports of isolated examples of animal behavior, and even classical sources such as Aesop's *Fables* and Pliny's *Natural History*. On the basis of his evidence, Morgan concluded that animals have all of the capabilities mentioned above, developed in some cases to at least as high a degree as we see in humans:

No shade of distinction can be taken, except it be in the degree of strength; and on these terms, while the mass of animals would fall below man, some would rise above him. (p. 416) . . . . We are forced to see the analogies between the manifestations of mind and of instinct; and any candid observer will find it as difficult to detect a distinction, (except in the degree of power), as to prove that these analogies do not exist. (p. 419)

The first part of Morgan's article (published in the November 1843 issue) covered memory, abstraction, and imagination; the second part (published the following month) dealt with reasoning and judgment. His examples were drawn from the behavior of many species, particularly the beaver, which is interesting in light of his book on that animal published 25 years later and discussed further below.<sup>27</sup> Morgan argued that beavers demonstrate abstraction in the selection of sites for constructing dams, which requires that the animal take account of several factors, such as the width and depth of the stream, the height of the banks, and the availability of suitable trees. If any one of these characteristics is missing, then the project will fail, leading to the conclusion "that they had abstractly considered these elements of fitness, before they selected this site, in preference to another" (p. 417). Once again, Morgan urged that the same logic be used to infer the mental ability of animals as would be used in the case of human performance:

Judging from actions, (to which we are confined), the manifestations of instinct in the cases cited, are exactly analogous to the manifestations of mind, under similar circumstances; and had man exhibited such conduct, we should without hesitation pronounce it the consequence of abstract consideration. Now, since we know nothing of the ultimate nature of mind, or of instinct, and hence cannot establish a fundamental distinction between them; and since the manifestations of both are alike, in view of similar premises; it follows, that we can no more deny the quality of abstraction to one than to the other. (p. 418)

Under the heading of imagination, he considered play, birdsong, dreaming (demonstrated by the twitches and sounds of a sleeping dog), and migration; in the last case, he suggested that birds would not migrate unless they had "images of other regions, more beautiful, more abundantly supplied with the means of subsistence, and more agreeable in climate" (p. 419). Imagination depends on perception, and here again we see an analogy between humans and animals—both have similar anatomical systems (retina, optic nerve, and brain) that allow them to obtain knowledge of external objects. "The modes thus far are perfectly analogous; but here inquiry has rested" (p. 420); instead of drawing the logical conclusion that animals, like humans, can reason on the basis of information provided by the senses, animal behavior has been attributed to instinct, "a blind, unfathomable impulse."

The second part of Morgan's paper dealt at length with the question of animal reason, using examples similar to those that would be used 40 years later by the English naturalist George J. Romanes.<sup>28</sup> These included a fox that, having entered a henhouse and gorged itself on chickens, cannot escape

through the small hole by which it entered; when the farmer arrives next morning, the fox feigns death and then escapes when the farmer carries him out and throws him on the ground (p. 507). Another example was that of marmots that, having cut grass for nesting, pile it on the belly of one member of the group who lies on his back, his legs in the air "to make greater room," and allows himself to be dragged by the tail back to the burrow (p. 508). Fanciful as these examples are, they are no more absurd than many offered by Romanes and other naturalists half a century later. Less fanciful examples include animals that store food for the winter (which shows foresight) and an instance of what is actually discriminative conditioning in a nesting bird offered to demonstrate the power of reasoning.

Morgan gave animal construction (including, once again, beaver dams) special emphasis, with an interesting twist on William Paley's argument from design<sup>29</sup> to prove the existence, not of divine but of animal intelligence:

If the argument of Paley is sound, that contrivance forms design, and from design we infer intelligence, it applies with emphasis to all constructed animal habitations. . . Contrivance and construction seem to be impossible without the constant exercise of a reflecting principle; while economy of labor and time indicates the correctness with which this principle directs the conduct. (p. 511)

Morgan's conclusion was that animals possess just the same range of mental abilities as humans, although with different degrees of development. His account of the similarities between humans and animals was not an evolutionary one (publication of the *Origin of Species* lay 16 years in the future)—mental abilities were "created by the Deity, and bestowed in such measures upon the different species as appeared in His wisdom requisite for the destiny and happiness of each" (p. 514). Nonetheless, he considered instinct to be unnecessary and indeed useless for explaining animal behavior:

To pronounce all these phenomena the workings of instinct, a name without a tangible meaning; a designation that prohibits inquiry, because it pretends to furnish an explanation of itself; would be to rest for ever in profound ignorance of the whole subject, when truth might be reached by an investigation. (p. 514)

This is an early version of what would later become known as the *anti-instinct* position, some 80 years before it was reformulated by Knight Dunlap and Zing-Yang Kuo.<sup>30</sup>

In light of Morgan's later, and much better known work in anthropology,<sup>31</sup> it is interesting that his 1843 paper includes a number of references to primitive human societies, all making the general point that when one looks only at behavior one may be hard pressed to distinguish between that of the highest forms of animal and of the lowest form of man. The paper opens with the following paragraph:

The cultivation of the intellectual endowment of man has raised him to such a degree above the other orders of animated existence, that he claims the exclusive possession of the Thinking Principle; forgetting, while he surveys the monuments of human intelligence, that they are but the evidence of his advancement from the savage state; and that while he remained in that primitive condition he might be considered, in fact, as many degrees below his present position in point of mental capacity, as above that of the most sagacious animals; forgetting also that had he continued in a state of nature, like some of the tribes of Africa or America, leaving others to judge of his intelligence from the rude vestiges of his civilization exclusively, they could scarcely attribute to him more intellect than they would to the beaver, or even to the ant. (p. 414)

The accomplishments of civilization, he was saying, do not depend on any special mental capabilities that set mankind above other animals. They depend instead on development in human society that has taken place from some earlier state of savagery. This is a position that Morgan would develop at much greater length later in his career.<sup>32</sup>

In the years following the publication of his first essays in *The Knickerbocker*, Morgan established his law practice and developed his growing interest in American Indian culture. He changed the name of his fraternal club, the "Order of the Gordian Knot," to the "Grand Order of the Iroquois," with an organization modeled on Iroquois customs. He became involved in Indian affairs and began collecting the information on Iroquois customs, governance, and family structure that formed the basis for his great ethnographic work, *The League of the Iroquois*.<sup>33</sup> In 1855, Morgan made the first of several trips to the Midwest in connection with his position as a director of the Iron Mountain Rail Road Company, which he and a group of associates had founded to build a railroad for transporting iron ore from the Upper Peninsula of Michigan to ports on Lakes Superior and Michigan. His friend Gilbert Johnson, a mining superintendent, introduced him to the pleasures of trout fishing during these trips, and Morgan spent many hours not only fishing but also observing the habits of the large beaver population in the region.<sup>34</sup> Although Morgan described his observations on beavers as if they were incidental to the fishing trips with his friend, the prominence given to their behavior in his 1843 *Knickerbocker* article supports Trautmann's suggestion that the animal already occupied a significant place in Morgan's thinking.<sup>35</sup> If one were looking for evidence of an almost-human intelligence among animals, as it seems that Morgan was, the beaver would be a very attractive choice of species to study. Over the next several years, Morgan described and measured the constructions of beavers, collected and dissected beaver carcasses (with the assistance of Dr. William W. Ely, a Rochester physician), and secured the services of a photographer to make accurate engravings of dams and other constructions. In 1861 and 1862 he supplemented his Michigan observations with trips to watch beavers near the Hudson Bay in Canada, and in 1868 he published a book-length account of his work in *The American Beaver and His Works* (see note 24).

The book was the first attempt by an American author to write the comprehensive natural history of a single species, and is still occasionally cited in the literature on beaver ecology and behavior.<sup>36</sup> In it, Morgan described the general characteristics and taxonomy of the beaver, its anatomy and feeding habits, and methods of trapping it, but most of the book (four of nine chapters) deals with beavers' constructions, including dams, burrows, lodges, trails, and canals. Morgan included measurements of dams, maps showing their placement on streams and rivers, sketches of their construction, and engravings made from photographs taken in the field of dams, ponds, and lodges. The book was well received by reviewers for the *American Naturalist*, *The Atlantic Monthly*, *The Nation*, and *The North American Review*.<sup>37</sup> None of the reviews, however, paid much attention to the book's final chapter, titled "Animal Psychology."

This chapter presents a wide-ranging discussion of animal psychology, drawing on Morgan's observations of beavers but including many other species as well. It is based on an unpublished manuscript by the same title that Morgan read on April 7, 1857, to the Pundit Club, an organization that he had founded in 1854 as a forum for scholarly discussion.<sup>38</sup> The two works include many of the same arguments and examples, and both follow the same general organization; Morgan's thinking on these matters does not appear to have undergone significant change between 1857 and 1868. Both works have the same goal as his earlier article: to argue that animal and human psychology



involve the same mental processes and that the term *instinct* has very little use in our understanding of either. His 1857 manuscript opens with a call for the serious study of animal psychology and another denunciation of instinct:

The endowments of animals have, in all ages of the world, excited discussion; but this discussion has neither inaugurated a science, nor offered any exposition of the intellectual life of the lower orders of animals, in the least degree satisfactory. There are difficulties however, one of which, and a very serious one, is the want of a sufficient knowledge of their habits; another may be found in the abysmal nature of all intellectual science; but a greater than either arises from that stupendous blunder as well as fraud upon the animal races, the introduction of the term "instinct." We have here a system of philosophy in a deffinition [*sic*]; we have an installation of the supernatural, which silences at once all inquiry into the facts.<sup>39</sup>

In this manuscript Morgan did not entirely deny the existence of instincts, but he insisted that the term should be applied only to those acts, in both humans *and* animals, that are entirely involuntary and performed without any "anterior mental processes"; that is, without being the result of any reasoning or judgment.<sup>40</sup> He objected that the term was applied far too broadly and uncritically to the behavior of animals, or *Mutae*, as he called them,

leaving each [writer] to concede reasoning powers to the *Mutae* in such measure and degree or none at all as his mere fancy may dictate. It is impossible therefore to assign to the endowments of animals any fixed place in the intellectual scale, while we recognize the principle of instinct as at present defined.<sup>41</sup>

The bulk of both the manuscript and the later chapter is devoted to arguing, as he had done in 1843, that animals possess the same mental abilities as humans, although developed to different degrees. His argument throughout is the same: If certain behavior is evidence for a particular mental power (such as reason) in humans, then similar behavior must be taken as evidence for the same mental power in animals. In his 1843 paper he suggested that one cannot even deny animals a moral sense, although in the 1868 chapter he was more circumspect, saying that this claim "is without support in existing knowledge."<sup>42</sup> He did, however, hint that if a mental principle is assigned to animals, then they must be granted all the properties usually attached to the mind, including perhaps even the immortality of the soul.<sup>43</sup> He also put humans and animals on the same moral plane in another respect, arguing that humans should be more considerate of animal rights (even to the extent of advocating vegetarianism),<sup>44</sup> whether out of a respect for their independent existence or out of a more enlightened sense of our own self-interest:

When the Creator made man omnivorous, He designed his use of animal food. It is not sentimentalism but rather sense, to say that he should exercise that right with reason and forbearance. . . . If we recognize the fact that the mutes possess a thinking, and reasoning, and perhaps an immortal principle, our relations to them will appear to us in a different, and in a better light.<sup>45</sup>

Morgan acknowledged that a large gap exists between the abilities of the most primitive human races and the most advanced animals, and at one point he speculated "that some intermediate species, and perhaps several of them, have dropped out in the course of the early ages, or that some existing species have been degraded beyond redemption."<sup>46</sup> This remark should not be taken to suggest that Morgan was entertaining the idea of evolutionary intermediates between humans and animals; in all of his writings there is nothing to imply that he ever questioned the doctrine of special creation. It is clear that he thought in terms of a beneficent God who equipped each species with the mental powers it needed to live in the way for which He had designed it.

Most of Morgan's writings dealt with anthropology rather than animal psychology, and it is for his anthropological contributions that he is mainly remembered today (see note 28). *The League of the Iroquois* (1851) is considered to be the first ethnographic work on American Indians, and its publication was followed by a number of articles and two major works: *Systems of Consanguinity and Affinities of the Human Family* (1871) and *Ancient Society, or Researches in the Lines of Human Progress from Savagery Through Barbarism to Civilization* (1877).<sup>47</sup> Neither of these deals with "mutes," but they bear mention because both took what Morgan understood to be an evolutionary approach to the history of human societies. Despite his belief in the separate divine creation of species, both human and nonhuman, Morgan claimed that within the human species there has been a progressive elaboration of social organization through history. In his writing on animals, Morgan had already pointed out that human knowledge accumulates from generation to generation, and he left open the possibility that the same might be true in animals as well. The behavior of domesticated animals, he thought, indicates that such progress is possible and might involve the inherited effects of habit.<sup>48</sup> His later anthropological works (especially *Ancient Society*) develop the idea of human social progress at great length, but for Morgan such change had occurred only within the human species; there had been no transformation of one species into another.<sup>49</sup> To call Morgan's anthropology "evolutionary" is true only in a very limited sense of that term; certainly there is no indication that his comparative psychology had an evolutionary dimension.

After 1868, Morgan wrote nothing substantial on animal psychology. He reviewed Paul A. Chadbourne's book on instinct for *The Nation*, criticizing Chadbourne for ignoring natural history observations in favor of an exclusively "metaphysical" (i.e., theoretical) discussion.<sup>50</sup> He repeated his view that instinct does not explain behavior, although he would admit its use "to distinguish unconscious from conscious processes of mind. Beyond this we believe the term should be totally rejected both in relation to men and to animals" (p. 192). Morgan urged the continued accumulation of facts about natural history:

The time is not far distant when these facts concerning the endowment of animals will be subject to scientific treatment upon the basis of the facts themselves. It may be doubtful whether this knowledge is now sufficiently thorough and minute to establish a science of animal psychology. (p. 192)

Until then, he suggested, the instinct hypothesis, which he thought was "certain to break down from the weight of its own incongruities," should be abandoned.

### *John Bascom (1827-1911)*

Unlike Morgan, who never held a university position, John Bascom was a professional scholar and teacher, although his scholarly work is now perhaps less well remembered than that of his fellow New Yorker. Bascom was born in Genoa, Cayuga County, New York, in 1827. His father, also John Bascom, was a Congregationalist minister who died when John was an infant, and he was raised by his mother and three older sisters.<sup>51</sup> John wanted to attend Yale; his family urged him to go to Hamilton, and he compromised by attending Williams College, where his father and uncles had been educated. After graduating in 1849, he spent a year teaching, which he hated, then went to Rochester to study law,<sup>52</sup> at least in part in reaction against family pressure to enter the ministry. He enjoyed the study of law, but not the practice, which lacked the logic and rationality that he had expected. In 1851 he decided to pursue a more intellectual course and entered Auburn Theological Seminary,

drawn by the presence of Laurens Perseus Hickok, whose *Rational Psychology* (1848) was one of the first books by an American author to use the word *psychology* in its title.<sup>53</sup>

Hickok's intellect and personality had a strong influence on the young Bascom; he was beginning to question the strict Puritanism of his upbringing,<sup>54</sup> and in Hickok he found a man of "great intellectual and spiritual powers." He described the months of study with him as

the most delicious and exhilarating of any that I have ever known. . . . I felt the safety of a strong man guiding my thoughts in new and bold research. . . . Doubt and uncertainty were as much in order as belief, and the mind was trained to take possession with cautious conviction of its own captures.

Bascom clearly found Hickok's questioning approach toward religious matters congenial; although a devout man throughout his life, Bascom clearly preferred the intellectualism of the seminary to the religiosity of the pulpit. Indeed, he wanted to become a professor of theology but doubted he could find acceptance within any established church. In the preface to his autobiography he wrote, "My life has been unusually rational" and noted that Mark Hopkins, president of Williams College, "once said to me . . . that my preaching had not a particle of religious power."<sup>55</sup> After a year at Auburn, Bascom returned to Williams, where he worked as a tutor for 2 years. He completed his seminary training at Andover in 1854 and then accepted a professorship at Williams to teach rhetoric and oratory. One of Bascom's students at Williams was G. Stanley Hall, who later obtained the first American doctorate in psychology under William James at Harvard. Hall entered the college as a freshman in 1867 and in his autobiography acknowledged Bascom as the teacher to whom he owed the most during his undergraduate years.<sup>56</sup>

## **PICTURE IS OMITTED FROM THIS FORMATTED DOCUMENT**

At Williams, Bascom wrote a number of books on an impressive array of subjects, mainly because of his dissatisfaction with the texts available for his teaching. In 1869, he published *Principles of Psychology*, which he described as the first book he wrote "simply and singly from my interest in the subject considered."<sup>57</sup> In this book Bascom presented an intuitionist psychology, based on Scottish common-sense philosophy but including Kantian ideas derived from his mentor, Laurens Hickok.<sup>58</sup> The book follows the traditional organization of 19th-century works on mental philosophy, dividing the operations of mind into three categories: the intellect (Book I), the feelings (Book II), and the will (Book III). The book's introduction acknowledges the value of considering the human mind as a part of the natural world and hints at the comparative perspective that would become apparent in Bascom's later psychological writings as he developed more fully his theistic view of evolutionary change:

The forces and lives of the world grade up to [man], and grade down from him; and while he is the highest and latest of living things, he is nevertheless of them, ruling by superiority, not by a complete separation of nature.<sup>59</sup>

Bascom did not advocate naturalistic Darwinism; on the contrary, his comparative approach, here and in all his later works, was suffused with theism and with a belief in the separateness of the mind and spirit from the material body:

Approaching man from below, we interpret him from the types of power we find in nature, we limit his liberty or rob him of it . . . while we seem to find the germ and outline of his intellectual constitution in brute instincts, perceptions, associations. We are thus as those who contemplate in a statue more the pedestal on which it rests ... than the living, spiritual power it expresses. (p. 3)

The longest discussion of animal psychology, almost 10 pages, occurs at the end of Book I, on the intellect (p. 219-228). Bascom accepted that because direct knowledge of the animal mind is impossible, his discussion would be "necessarily somewhat theoretical" (p. 219), but he proposed to seek "the simplest explanation of the facts, with the least assumptions, and the fewest forces [i.e., mental abilities]." In his view, there is no evidence for, and no need to invoke, higher intellectual powers in animals. "Sensation, perception, memory and imagination, evidently belong to the higher animals, and by these faculties, we believe, all the intellectual phenomena they present can be readily explained" (p. 219). He cautioned against making anthropocentric interpretations of animal behavior by drawing too close an analogy with one's own conscious experience. Although animals do sometimes engage in what seems to be reasoned, deliberate action, he said, "Keen perception and quick association by an active, retentive memory offer a complete explanation of the facts involved . . . without supposing the presence of a single act of judgment" (p. 221). He then went on, using an analysis similar to those offered by C. Lloyd Morgan and Edward L. Thorndike a quarter century later,<sup>60</sup> to show how even quite complex behavior by animals can be explained in simple terms; for example:

A cow learns to open a gate; but how? First, by accidentally or impatiently rubbing her head and horns against it, and thus loosening the latch. This process, repeated once or twice, establishes a connection between the act and its results, and later, when she wishes to be free, she worries the gate open again. A change of fastening relieves the difficulty, not because the new method of reaching the latch is necessarily impossible to her, but because it is not accomplished by the same blind movement which removed from the catch the previous one. . . . That the protracted experience of the brute must yield to it not very unfrequently a repeated concurrence of the same cause and effect, and thus enable it to reach the one through the other, in those cases in which appetite impresses on the memory the connection, is obvious. (p. 221-222)

In the rest of this section, Bascom discussed some principles of animal training (including—to use modern terminology—difficulties encountered in the early stages of shaping a new response, the adverse effects of harsh punishment, and the importance of temporal contiguity in conditioning) and suggested that apparent instances of counting in animals can probably be explained by a purely perceptual ability to discriminate among different small numbers of objects. He cautioned against uncritical acceptance of exceptional examples of animal intelligence, warning that

these examples require more searching inquiry as to their exact form and value than they have received, as the shades of action that distinguish association and reflection are unobtrusive and delicate; and few are aware of the extent of results easily within the scope of association alone[,] (p. 225)

a passage that might easily have been written, in a different idiom, by John B. Watson in the 1920s or B. F. Skinner in the 1950s. Of course, Bascom did not share the theoretical and experimental context of these much later writers, and it is important not to attribute too much prescience to his words. Nonetheless, this passage demonstrates his appreciation of the necessity for controlled investigation of animals' mental abilities, the tools for which would only become available some two decades later.

Two years after the publication of *Principles of Psychology*, Bascom revisited the question of the animal mind in an article entitled "Instinct," published in 1871 in the religious periodical *Bibliotheca Sacra*, to which he was a frequent contributor.<sup>61</sup> In this article, he reiterated and extended the points he had made earlier in *Principles* and added further arguments to support his position that animals do not reason. In *Principles* he had made a proposal that anticipated at least the sense, if not the form, of Lloyd Morgan's Canon, which states that one should not use a more complex mental ability to explain animal behavior if a simpler one will do: "Why is not the opposite supposition of reasoning an admissible one? We answer, because it involves at once the entire circle of regulative ideas; postulates more powers than are needed to explain the phenomena."<sup>62</sup> In this later article he restated the proposal in terms even closer to Lloyd Morgan's, by urging that, in general, "the least sufficient cause for any class of facts is the one to be accepted"<sup>63</sup> and going on to argue that in explaining animal behavior:

Our conclusions must rest, not on a few detached and extreme instances, but on the general appearance and character of the phenomena under discussion. The aspect of animal life, as a whole, should have more weight in forming our opinions than rare cases of sagacity. If the explanation we bring to these seems to any a little forced, this is better than to assign exaggerated and disproportionate causes to the bulk of the facts before us. It is more rational to suppose that a given set of powers should sometimes accomplish what at first sight seems beyond them, than to suppose that another set of powers should habitually do far less than belongs to them; that brute faculties should make an occasional leap than that human faculties should lie unawakened on the low level of brute attainment.<sup>64</sup>

The "brute faculties" include those of perception, memory, and learning that he had discussed previously, together with the possibility that the effects of learning might be inherited by subsequent generations; to these, however, Bascom now added instinct, which he had barely mentioned in his earlier work. He recognized three classes of phenomena in living things: vital functions (such as breathing and digestion), sensitive functions (involving direct connections between the senses and action), and judgment or thought.<sup>65</sup> Instinct "has a basis, more or less obscure, in the physical state of the animal" and involves both the vital and the sensory functions—it stands midway between the completely unconscious, vital functions, such as breathing and digestion, and voluntary action based on reason. Some instinctive acts, such as those involved in feeding or reproduction, may be connected with specific organs, and many are elicited by particular sensory inputs.

He pointed out that some of the most complex forms of animal behavior are found among the insects, such as web-building by spiders and comb-building by bees. If one were to attribute them to reason, one would be granting to these very simple animals mental abilities superior even to those of most humans, and one would also need to explain how it is that the rational power that allows a bee to calculate the complex geometry of its comb cannot be applied in other domains as well. Furthermore, these behaviors often depend on the animal's physical constitution (such as the spider's ability to produce two kinds of silk for web construction), suggesting that the behavior itself may have a constitutional basis as well. Bascom also made the interesting point that even purely physical systems can display complex patterns of regularity that cannot be attributed to rational powers: "The waves on the beach work out some fine mathematical forms; they are not therefore geometricians."<sup>66</sup>

In Bascom's view, there is a close connection between instinct and other forms of action, making it difficult, for example, to distinguish between an instinctive act and one that is the result of long practice and experience. He also pointed out that an instinctive act may still be susceptible to extensive control and modification by the senses. He took issue with Alfred R. Wallace's suggestion that nest-

building in birds is not instinctive but, like much human construction, the result of imitation and tradition,<sup>67</sup> arguing instead that the behavior results from a blending of instinct and experience:

If, however, we recognize the presence and modifying power of the senses, and also the instinctive, constructive impulse, both moving toward a common end in an inseparable way, we shall be able readily to include, on the one side, the various material and modifications of the nest; on the other, the certainty and completeness of the general pattern.

Bascom dismissed the evidence that Lewis Morgan had advanced in favor of animal reason, arguing, once again, that parsimony requires us to exhaust simpler explanations before invoking more complex ones. He also denied that attributing an animal's behavior to instinct requires us to invoke some supernatural power, as Morgan had suggested. Instinct, as Bascom understood it, is rooted in the physical constitution of the animal and would eventually be understood in physical terms.

Bascom's paper had been written before the publication of Darwin's *Descent of Man* (1871), but he added a short section at the end taking issue with Darwin's attribution of reason to animals and with his assertion that the human moral sense can be understood in purely utilitarian terms, as an assessment of the likely consequences for the individual of taking this or that course of action. If this were so, Bascom said, "then certainly we are content to find its rudiments in the dog. We disagree with Darwin, not in making brutes lower than he does, but in making men much higher."<sup>68</sup> This is not quite accurate, because Bascom clearly argued that animals do not, in fact, possess human powers of reason; it is obvious that he wanted to emphasize the spiritual side of human nature and to associate reason with the spiritual and moral sense.

In 1874, Bascom accepted the presidency of the University of Wisconsin and moved from Williamsburg to Madison, in part because of a growing dissatisfaction with his work at Williams and also because he "found that my growing freedom of religious thought was making my presence less agreeable to the college."<sup>69</sup> His position as president at Wisconsin gave him the opportunity to teach philosophy, ethics, and related subjects, which he enjoyed. It also allowed him to pursue his interest in psychology and in the relation between the animal and the human mind, and in 1878 he published *Comparative Psychology or, the Growth and Grades of Intelligence*.<sup>70</sup> Before 1878, numerous books had been published on the behavior of animals, mainly on the topic of instinct and most of them taking the perspective of *natural theology*—the search for evidence of God's design in the natural world.<sup>71</sup> Bascom's treatment of the subject was both more wide ranging than a discussion of instinct and, although his religious commitment is clear, had much in common with later textbooks of comparative psychology, such as those of George Romanes, Lloyd Morgan, and even John B. Watson.<sup>72</sup> The book begins with a discussion of the relation between mind and matter and of the relation between physical and vital (i.e., living) systems. It then surveys the regulative and psychological processes found among living things (including plants)<sup>73</sup> with chapters on instinct, association and memory, and reasoning. Only in the last chapter, on "The Supreme Reason," did Bascom focus directly on the role of God in the natural world.

Bascom defined *comparative psychology* as "a knowledge of intelligence, of conscious activity, as it exists in all accessible forms of life, a tracing of its development in its several stages through the entire animal kingdom."<sup>74</sup> His approach to the subject was evolutionary, but it was the approach of theistic rather than naturalistic evolution—the "development" to which he referred has both a material and a spiritual component:

We need, in this inquiry, not only to understand, as well as we may, each form of conscious activity, but its immediate nervous conditions, the lower vital and atomic powers on which these are superinduced, and the slow increments one upon another, by which all is finally built up into the composite mind of man, the crowning spiritual structure of the world; which some hold to have come down from Heaven, and some to have sprung from the earth, but which we are ready to believe has, rather, like every living thing, been ministered to by each seen and unseen agent, and taken into itself the strength of both realms. (pp. 2-3)

Bascom was deeply skeptical of the ability of materialism to explain mental function, partly because of his thoroughgoing belief in a spiritual side to human nature, but also because he did not see how materialism could work as a theory. Is it conceivable, he asked (p. 23 ff.), that each and every state of mind, every distinct memory, is dependent on an equally distinct state of the brain? "We do not say that such a multiplicity of distinct processes in the brain is impossible, but that the supposition is very extreme" (p. 25). He preferred to adopt an interactionist view, with mental and physical factors "blending and combining in many ways without a loss on the part of either of their distinctive natures" (p. 34); unsurprisingly, he did not say precisely how this was to be accomplished.

His skepticism about materialism extended to another problem as well, namely, explaining heredity and development.<sup>75</sup> He criticized the idea that purely material particles, such as the gemmules postulated by Darwin in his theory of pangenesis,<sup>76</sup> could be responsible for the complexities of structure and function to be found in living things (p. 50 ff.). He thought the theory simply assigned to gemmules the very properties of organisms that need to be explained, a criticism that has also been leveled at 20th-century explanations of development in terms of genetic programs and blueprints.<sup>77</sup> The theory, he said, invests gemmules:

with intelligent powers, in order that matter in molecules, in a way wholly alien to our experience of it in masses, may do the work of mind. We retreat with our suppositions into infinitesimals, and so escape contradiction. In this region we know nothing and may assume everything. (p. 57)

After a review of the organization of the nervous system through the animal kingdom (chap. 4), Bascom discussed progressively more complex forms of regulation and behavior in animals. Throughout this discussion, he assessed whether one needs to invoke consciousness to explain the phenomena at hand, because consciousness was for him the hallmark of the mental and thus defined the range of phenomena of interest to psychological inquiry. He described various reflexive behaviors (without using that term) in which, he says, there is no evidence of conscious control. He admitted that consciousness may accompany these actions without controlling them but suggested that consciousness involves an expenditure of energy and "Hence, natural selection would work against this purely wasteful element and eliminate it" (p. 139). In support of that view, he pointed out how frequently an initially conscious action may become unconscious as a result of practice until it is indistinguishable from reflexive behavior.

Bascom's discussion of instinct (chap. 6) closely followed that presented in his earlier paper. He saw it as including "the feeble germs of conscious life" (p. 148) though not as fully conscious. Against those who would deny the existence of instinct in animal life, he cited Spalding's experimental work<sup>78</sup> and proceeded to characterize instinctive behavior with the two defining features that pervade 19th-century discussions of the topic: instinct is constitutional (i.e., innate), and it appears to be intelligent while not in fact involving intelligence or conscious control. Instincts are the outcome of evolution—as a result either of natural selection, or of divinely predetermined development in particular directions, or of both working together, the kind of theistic

evolution that Bascom favored (p. 171). Instinct is also important for the evolution of intelligence—it lays the groundwork for intelligent control that can gradually take over actions originally instinctive. Bascom thought it more likely that instinct precedes intelligence in evolution than that initially intelligent behaviors become instinctive—he criticized G. H. Lewes's theory of lapsed intelligence<sup>79</sup> as a general evolutionary explanation, although he accepted that in some cases habits may become instinctive because they modify the organic basis of behavior (pp. 172-175). The importance of organic modifications in Bascom's discussion of this point should be noted—he did not think that purely mental phenomena, such as intelligence, have an organic basis, and so their results cannot be inherited through change in the organic structure of the animal. Habit formation is different from intelligence because it does involve organic change and so provides a way for experience to modify instinct through heredity. The sharp distinction between learning and instinct that is the hallmark of 20th-century ethological theory is absent from Bascom's discussion, as from most other writings in the late 19th century.<sup>80</sup>

Bascom gave a straightforward associationist account of learning (chap. 7), suggesting, as Lloyd Morgan would do 15 years later, that all animal behavior can be explained on the basis of instinct modified and supplemented by association (what Morgan called *intelligent modification*). Like all psychologists of this period, Bascom viewed association as a mental process, not a behavioral one—the behavioral view of learning did not emerge in psychology until Thorndike's experimental work and Watson's behaviorist reformulation of the problem.<sup>81</sup> The formation of associations involves three elements: appetite (i.e., motivation or drive), sensations, and memory. The first two of these are rooted in physical constitution, although with elements of consciousness, but memory is "an absolutely new and a purely mental fact, not . . . the shadow of a physical one" (p. 183). Appetite and sensations play dual roles in association, serving not only to make it possible at all but also to allow the animal to single out certain things to associate in memory:

Let effects be registered in hungry appetites, lively sensibilities; and let the answering causes be recorded in alert senses, and a strong ray of light, falling on each member of the judgment, fastens in memory, and the memory holds it tenaciously for future service. (p. 201)

In the remainder of his discussion, Bascom analyzed various instances of apparently rational behavior in terms of the combined effects of instinct and association, cautioning repeatedly against making too much of isolated reports and against being misled by a superficial resemblance between human and animal behavior.

Reason is what separates the human and animal minds. It is reason that allows humans to think about the future, whereas animals are restricted to the present—their accommodation to future needs is accomplished by instinct, not by reason. Rational thought is assisted by language, which allows subtle relations to be identified and appreciated. Throughout his discussion of reason, Bascom pointed out ways in which various psychological processes (instinct, habit, association, and reason) interact, not always to the individual's advantages. For example, during rational thought, associations may lead reason astray, as illustrated by superstitious beliefs found in the "lower races," which "have been foisted on the mind by accidental conjunctions" (p. 246). In humans, instinct has largely been supplanted by reason and now functions mainly in infancy, before the ability to reason has fully developed (p. 245). In Bascom's intuitionist philosophy, adopted from his mentor Laurens Hickok, reasoning is based on clear and necessary truths that are known intuitively, not on the basis of experience.<sup>82</sup> The fact that these truths are mental, nonphysical entities means that they



cannot be transmitted in heredity. On those grounds, he questioned Galton's claim that mental ability can be inherited, suggesting instead that the tendency for intellectual accomplishment to run in families can be explained as a combination of inherited "organic vigor and fineness of nervous structure" with the educational and other opportunities provided by the position of the parents (pp. 257-258).<sup>83</sup>

Bascom served as president of the University of Wisconsin for 13 years, resigning in 1887 because of political differences with the Board of Regents and returning to Williamstown, where he taught again at Williams College. He continued to write, exploring the relations among philosophy, evolution, science, and religion that had occupied his attention for so long.<sup>84</sup> His writings on comparative psychology dropped from sight; in his autobiography he wrote, "The book [*Comparative Psychology*], though one of the best I have written, has attracted very little attention,"<sup>85</sup> a statement that remains true to the present day.

### *Joseph LeConte (1823-1901)*

Like Bascom, Joseph LeConte saw the theory of evolution as a great unifying idea entirely compatible, if properly conceived, with religious belief. LeConte described himself as a reluctant convert to evolution,<sup>86</sup> although he eventually came to embrace it as "certainly the grandest idea of modern science."<sup>87</sup> Born in Liberty County, Georgia, LeConte grew up in the antebellum South, the son of a prosperous plantation owner, Louis LeConte, and his wife, Ann Quaterman.<sup>88</sup> His father was an enthusiastic amateur naturalist, and Joseph developed an early interest in the natural world that provided a foundation for his subsequent career as a scientist. After graduating from the University of Georgia in 1841, he earned a medical degree at the College of Physicians and Surgeons in New York and then returned to Georgia, where he set up a medical practice in Macon. LeConte recognized early on that his real interests lay in theoretical science rather than in the practice of medicine, and in the fall of 1850 he enrolled in Harvard's Lawrence Scientific School to study with the great Swiss zoologist Louis Agassiz, who had joined the Harvard faculty in 1848. LeConte's first taste of fieldwork came when he accompanied Agassiz on an expedition to study coral reefs in Florida and the two men developed a strong mutual admiration and friendship that lasted until Agassiz's death in 1873. After 18 months at Harvard, LeConte returned to Georgia. He taught for a year at Oglethorpe University and then took a position as Professor of Geology and Chemistry at South Carolina College (later the University of South Carolina), where his older brother John was Professor of Natural Philosophy. LeConte published several articles in the late 1850s on various scientific topics and on education. He left Columbia during the Civil War to attend to his family and property in Liberty County; during this trip, his papers and manuscripts were seized and burned by Union soldiers.

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After the war, LeConte and his family faced considerable hardship, but he managed to continue working when the college reopened, although with a greatly reduced enrollment, and was appointed to the Chair of Chemistry, Pharmacy, Mineralogy, and Geology—a daunting array of subjects for one man to teach. LeConte became interested in problems of vision and published several articles on physiological optics and binocular vision, a body of work that formed the basis for his book *Sight*, published in 1881.<sup>89</sup> LeConte and his brother John were both opposed to the political and cultural changes involved in Reconstruction and urgently sought to move away from the South; by 1868,

both had received appointments at the newly created University of California in Berkeley. LeConte remained in California for the rest of his life and continued to teach and publish into vigorous old age. His scientific work, especially in geology, was of the highest caliber (he was elected to the presidencies of both the American Association for the Advancement of Science and the Geological Society of America), and his writings on the relation between religion and the theory of evolution were well received by both theologians and scientists in the United States and Europe.<sup>90</sup>

The comparative approach to psychological problems was central to Le-Conte's thinking to a much greater degree than it was for Morgan or even for Bascom. He wrote no single major work on psychology, but his articles demonstrate a continuing concern with problems that would, around the turn of the century, become defining issues for the field of comparative psychology: the differences between human and animal psychology, the evolution of instinct and intelligence, the role of consciousness in behavior, and the role of brain processes in explaining psychological function. He applied the principles of evolutionary theory to virtually every domain of inquiry from organic chemistry to aesthetics and theology, and he emerges as a comparative scientist of remarkable breadth—in LeConte's view, evolutionary theory and comparative methodology hold the key to understanding all complex systems, whether they be organisms, minds, or societies.

He first articulated his comparative approach in an early article on the relation between social and organic (or biological) science<sup>90</sup> at a time when he was still very much influenced by Agassiz's anti-Darwinian views. After pointing out similarities between the subject matters of biology and sociology (e.g., that they both deal with highly differentiated systems that grow and develop), LeConte considered the question of their appropriate methodologies. The experimental method allows one to simplify a complex physical phenomenon, providing a degree of understanding that is impossible using observation alone, but in living things "the forces are so numerous, complex and delicately balanced, that we can scarcely touch the organism in the way of experiment, without destroying the equilibrium, and, therefore, the very conditions of the problem" (pp. 53-54). Fortunately, nature has done this for us: "She has, as it were, prepared the experiment to our hands. She has varied the conditions of the problem in every conceivable way, and simplified it to the last degree" (p. 54). LeConte identified four series for comparative study: the *natural history* series (i.e., all living species), the *embryological* series (i.e., the stages of development of individuals of any one species), the *geological* series (i.e., evolutionary history), and the *pathological* series (i.e., natural disruptions produced by disease and accident). True scientific understanding, he thought, must draw on all of these:

We may, indeed, have an *empirical* knowledge of man, or of any other single species or group of species of animals, by the simple study of that species or group alone; but true *scientific* knowledge . . . is impossible without thorough knowledge of all organisms, and in all phases of development—in other words, without extensive comparison in the four series mentioned above. (p. 55)

This is how social science must advance: "If Sociology ever becomes a true science, it must be by the free use of the great method of comparison" (p. 56).

LeConte's scientific publications cover a remarkably wide field, including optics (noted above), geology, meteorology, and physiology, in addition to his writings on instinct and intelligence and the evolution of mind. He gained an especially wide reputation for his works on the relation between evolution and religion, written for both professional and general audiences.<sup>92</sup> As a student of Agassiz's

in the 1850s, LeConte had originally rejected the possibility of evolutionary change, but as his work progressed he gradually became persuaded that the theory was correct; in 1881 he wrote

I frankly avow my belief in evolution as a *scientific theory*. I have come to this conclusion after much thought and at first with much reluctance. As a pupil of Prof. Agassiz, I had deeply sympathized with his views of development. It seemed, and still seems, to me a very noble conception; but I now regard evolution by derivation as a far nobler conception.<sup>93</sup>

Indeed, LeConte applied the theory of evolution to far more than just the organic world. He saw it as a unifying account of all forms of change— organic, inorganic, social, and psychological—and spent much of his career as an enthusiastic advocate for evolutionary thinking.<sup>94</sup> LeConte never thought evolution was incompatible with religious belief. In his theistic view, evolution is the means by which God has brought about change in the world. Evolution, he wrote, is "one *eternal act of creation*—a never-ceasing procession of divine energy."<sup>95</sup> His efforts to reconcile religion and evolution were a manifestation of his constant desire to find unity in apparently opposing points of view, something he thought necessary in any inquiry, and he drew on his work on binocular vision for a metaphor to illustrate his point:

Thus it happens that in all important philosophic questions there are two opposite, mutually destructive, one-sided views; and a *third*, which combines and reconciles them—which explains their differences by transcending them. The first two are opposite *surface views*; the third stereoscopically combines them into *solid reality*. This is the true test of a rational philosophy.<sup>96</sup>

In his work on vision, he had briefly addressed a few topics bearing on problems of comparative psychology, in particular the relation between inherited capabilities and experience in determining depth perception in humans and animals.<sup>97</sup> However, he dealt with these matters in much more detail in his 1875 paper on instinct and intelligence. By this time, LeConte was a thoroughgoing supporter of evolution, and the paper is suffused with an evolutionary perspective. He began by arguing that, although we will never know how brain processes produce psychological states, there is nonetheless a correspondence between brain and mind, and it is the job of a scientific psychology to study that correspondence. However, he went even further than that: Just as anatomy and physiology became truly scientific by becoming comparative,

even so psychology can never assume the rank of a science until it becomes *comparative* psychology; i.e., until it adopts the comparative method, until it studies the different grades and kinds of mentality in their relation to each other, and connects them all by the law of evolution.<sup>98</sup>

Here is an early strong proposal for founding a scientific psychology on evolutionary and comparative principles. (Later, he explicitly included the study of development in his prescription for a comparative psychology, urging the study of psychology "in relation to those foreshadowings and beginnings which we find in the lower animals and in infants."<sup>99</sup>)

With that preamble, LeConte proceeded to discuss the relation between instinct and intelligence in animals and humans.<sup>100</sup> He described some features of instinct and intelligence that are similar to those given by Morgan and by Bascom as well as other writers of the time. First, intelligence depends on experience, whereas instinct is independent of experience:

Like the reflex functions of the nervous system . . . *the wisdom and precision of its actions seem to be the result of structure*, although unlike these, the actions are not removed from the sphere of consciousness and will.

Second, intelligent behavior is variable and improves with age; instinct is invariant (it "belongs to the species") and does not improve with age. If one examined closely the behavior of, for example, bees, one would probably see some variations and some improvement, but this is due to the small amount of intelligence they possess, not to instinct. Third, instinct is more perfect and unerring than intelligence; it is not "liable to mistakes and stumblings and hurtful falls" but is "like the motion of an engine laid upon a track which bears it swiftly and surely to its destined goal." The behavior of all animals, including man, is determined partly by instinct and partly by intelligence, and the two vary in a complementary fashion—where there is more of one, there is less of the other. LeConte saw a fairly large discontinuity between the lowest human and the highest animal intelligence and the greatest reliance on instinct among animals intermediate in the evolutionary scale, especially insects. Like most 19th-century writers on instinct, he was impressed by the complexity of presumably instinctive behavior in social insects like ants and bees and tended to use these as paradigmatic examples. (In several places here and in other papers he also mentions dam-building by beavers as an example of instinct. Although he nowhere cites Lewis H. Morgan by name, one can infer that, like Bascom, he would have disagreed with Morgan's attribution of this behavior to intelligence.)

Most of the remainder of the paper is devoted to sketching out a Lamarckian theory of the origin of instincts. Again, LeConte was clear that evolution must be the unifying principle for explaining instinct:

A scientific explanation or theory of instinct must connect it with intelligence on the one hand and the lower phenomena of the nervous system on the other—must show how all these several capacities are evolved the one from the other—must bring them all under the universal law of evolution. (p. 659)

He distinguished four types of animal action: perfect voluntary movements, habitual movements, instinctive movements, and reflex movements. Habits are formed from voluntary movements through repetition. Every time an act is repeated, it produces a small change in the brain; if the same act is repeated many times, the change becomes deeper and more permanent, "becomes *petrified in brain-structure*. . . . Thus repetition produces structure and structure determines habit" (p. 661). This structural change is transmitted in a small degree through inheritance to the next generation, the principle of use-inheritance proposed by Lamarck and adopted by Darwin and many other evolutionary writers. LeConte gave a detailed illustration of the process as it might have occurred in domestic animals that is worth quoting in full:

We know that the instincts of the pointer and the shepherd's dog have been formed in this way. The great ancestor of all pointers, before he was a pointer, was trained with much coaxing and many beatings to do certain things. The result was doubtless any thing but satisfactory. Still a habit was formed, and, as we must believe, a corresponding brain structure. The pups of this dog were again trained, still with difficulty, but with less difficulty than before, because the habit-structure was partially inherited. The best-trained of this generation are selected, and their pups again trained. The process is still easier, because the habit-structure is more completely inherited, and the result more satisfactory, because the structure is more decided. Thus the improvement goes on from generation to generation, until finally, in the purest bloods, i.e., those having the longest line of well-trained ancestry, without mixture with effacing bloods, little or no training at all is required; the habit-structure is almost perfectly transmitted. Perhaps in this case transmitted habit never becomes perfect instinct; probably the best-blooded pups still require training. But this is because the process has not been continued long enough, the breeding has not been true enough, and the selection careful enough. (p. 662)

This passage describes a mechanism that combines use-inheritance and selection in a very intimate way rather than viewing them as mutually supportive but essentially independent processes, as is typically seen in the work of most authors who accepted both Lamarckian inheritance and selection as mechanisms of evolutionary change. Natural instincts have been formed in the same way "except that in these cases *natural* training and *natural* selection have operated instead of *human* training and *human* selection" (p. 662). This process explains why instinct and intelligence vary inversely—the variable behavior produced by intelligence never has a chance to become habitual and so cannot be turned into instinct.

LeConte continued to develop his views on the relation between the animal and the human mind in a series of papers that ranged over a variety of topics.<sup>101</sup> In the last of these he identified seven "essential differences between the *spirit* of man and the *anima* of animals" (p. 236): language, useful art (i.e., construction), fine art, thought, imagination, consciousness and self-consciousness, and free will. He distinguished between the association of signs with external objects, characteristic of animal communication and the early use of language by infants, and fully developed language, which involves grammar; he claimed that animals could, in principle, master the use of words as signs but not the arrangement of words in their proper grammatical relationships (p. 240). Animal learning, he claimed, involves only a trial-and-error process, not rational thought, and he drew an explicit parallel between such learning and the evolutionary mechanism of natural selection, in terms that anticipate much later proposals by James M. Baldwin, B. F. Skinner, and Donald T. Campbell, among others:<sup>102</sup> "The successive improvement under such blind divergent *trials* and survivals seems to be wholly unconscious and unintentional, and therefore exactly like the improvement of the organism itself under divergent *variation*—*struggle* for life and survival of the fittest" (p. 241).

LeConte also drew a distinction that is very close to the contemporary distinction between explicit and implicit memory. Animals, he said, may appear to have memory, in that they profit from experience, but that experience does not seem to them to belong to the past (p. 252). In a later paper he repeated this point more explicitly, and he explained the lack of true memory in animals in terms of their inability to form a concept of self: "There is no consciousness of self as abstracted from conscious phenomena, and no conception of time as abstracted from events, and therefore no conception of events as occurring in the history of the ego."<sup>103</sup> The lack of a self-concept he saw as the fundamental difference between humans and animals, giving rise to all other psychological differences.<sup>104</sup>

LeConte thought that, despite this fundamental difference between human and animal psychology, there is a nonetheless an underlying continuity among all living things; he argued that all

forces of nature are different forms of Divine energy immanent in nature in a generalized condition, and that throughout the whole geological history of the earth there has been a progressive individuation of spirit, first as the vital principle of plants, then as the *anima* of animals, until at last completed in man.<sup>105</sup>

Thus, in his view there is no contradiction between accepting the theory of evolution as an explanation of the origin and diversification of life on earth and believing that evolution itself, like all natural phenomena, is a manifestation of Divine will.

### *Discussion*

Morgan, Bascom, and LeConte represent a range of positions on the relationships between human and animal psychological abilities, both in terms of their specific views and in terms of the theoretical frameworks within which those views were developed. Morgan, although classified as an "evolutionary anthropologist" in historical accounts of that discipline, was an evolutionary thinker only in a very narrow sense. He acknowledged that there have been changes in human societies since the earliest days of our existence, but he never accepted that species have evolved from one another, as proposed by Darwin. Indeed, he seems to have removed at least one reference to Darwin's work from an early draft of *Ancient Societies* at the suggestion of his friend the Rev. Joshua McIlvaine.<sup>106</sup> In his writings on animal psychology he accepted the separate creation of different species and frequently referred to their being equipped by God with mental powers suitable to their needs. He was not even certain that evolutionary change occurred within animal species, although he was willing to entertain the possibility.<sup>107</sup> His comparative psychology was undertaken at what might be called a purely descriptive level—he provided accounts of animal behavior intended to demonstrate the similarities between animal and human mental processes, but he offered no explanation for those similarities, beyond their creation by a beneficent deity.

In some respects, Morgan's writing bears obvious similarities to that of much earlier writers who argued in favor of animal reason—classical authors such as Pliny, some of whose examples Morgan used himself, as well as those such as Charles Georges LeRoy (1723-1789), master of the royal hunt at Versailles, whose *Lettres sur les animaux* (1768) made the same sort of case as Morgan's.<sup>108</sup> But if Morgan did not write *evolutionary* comparative psychology, he certainly wrote comparative psychology of a kind, and some of his ideas have an interestingly modern ring. He (largely) rejected the concept of instinct, in part because he thought he had the evidence to do so, but also in part because he thought it pre-empted the explanation of animal behavior by attributing their actions to an inherently mysterious force and so closing off scientific investigation—just as Kuo and other anti-instinct theorists would argue in the 1920s. He also rejected the concept because he thought that if one examines only the behavior of animals, without making prior judgments about their capabilities, it is unnecessary. Complex behavior has one incontrovertible explanation, namely, reason, and there is no need to invent another one unless the evidence requires us to. Today, one may question the evidence on which Morgan based his view, but the logic of his approach is quite sound. He was impatient with what he called "metaphysical" speculation on the question of animal mental abilities and both urged and practiced an observational approach to comparative psychological investigation.

Bascom's and LeConte's views differ from Morgan's in a number of significant ways. First, both are clearly evolutionary thinkers, albeit of a theistic rather than a naturalistic kind, reflecting the predominant approach to evolution in American science of the time. Both rejected the extremes of materialistic Darwinian evolution involving solely selection among fortuitous variations, on the one hand, and of special creation of species in their present form on the other. Their evolutionism was not the grudging acceptance of a distasteful if compelling theory but the wholehearted embrace of a view that both saw as a persuasive and ennobling framework for thinking about the relation of the human species to the rest of the natural world. Nonetheless, in their writings on comparative psychology, Bascom and LeConte both argued that there is a substantial gulf between the mental abilities of humans and other animals, preserving the special status of the human species in the face of the naturalistic arguments of Darwinian evolutionists. It is ironic that Morgan, with his acceptance of divinely created separate species, was more

willing to accept the continuity of mental function between human and animals than either Bascom or LeConte, despite their evolutionary perspectives. LeConte's writings also reflect a thoroughgoing comparative approach, grounded in evolutionary theory, to the study of complex organic and social systems. Indeed, in many ways LeConte's psychology is more worthy of being called comparative than is the later study of animal learning, with its reliance on a single species and its emphasis on general laws that would supposedly transcend species differences.<sup>109</sup>

Is it appropriate to consider these three writers comparative psychologists, and the works they produced contributions to the discipline of comparative psychology? The answer to the first part of this question must, I think, be "no." Labeling someone a comparative psychologist implies a professional identification that simply was not available prior to the 1890s and did not become widely accepted until the early years of the 20th century. Furthermore, all three of these authors wrote more extensively on other topics than on the psychology of animals, and Bascom's and LeConte's autobiographies give no indication that their psychological work was central to their professional identities. The second part of the question, whether their work contributed to the discipline of comparative psychology, can be given a different answer. I contend that the publications discussed herein certainly are examples of comparative psychological writing, as that term should be understood in the context of the second half of the 19th century. Clearly, none of them represents experimental science, but comparative psychology has always incorporated observational study of the kind advocated and (to some extent) practiced by Morgan, and LeConte offered a principled argument why experimentation is in any case an inappropriate methodology for psychology. However, all of them looked to evidence from a variety of animal species to help them understand general psychological problems such as, for example, the relation of instinct to reason (Morgan), the role of simple learning in apparently complex behavior (Bascom), and the contributions of experience and inheritance to behavioral evolution (LeConte). All these are problems that were of great importance to comparative psychology when it began to develop as a scientific discipline later in the century. Bascom wrote a textbook with the title *Comparative Psychology*, and LeConte explicitly advocated a comparative approach to all psychological problems, so clearly they were working on problems that they themselves considered to be part of comparative psychology, even though their contributions failed to have any impact on the subsequent development of the discipline.

What accounts for the fact that the writings of Morgan, Bascom, and LeConte were completely ignored by the next several generations of psychologists as they laid, and then built on, the foundations of the New Psychology between 1880 and 1910? Certainly William James and G. Stanley Hall had a strong interest in the topic of instinct and the relation of the human and animal minds, yet neither of them made any use of this literature. Even in his autobiography, Hall made no mention of his old teacher Bascom's writings on instinct, a concept that was central to his own and his students' thinking. References to earlier work on animal psychology in publications from the 1890s are mostly confined to the English evolutionary naturalists (Darwin, Romanes, Spalding, and Lloyd Morgan).<sup>110</sup>

There are, no doubt, several reasons for the lack of attention paid to the ideas of these early pioneers by the late 19th- and early 20th-century founders of experimental psychology. In the first place, Hall, James, and their contemporaries were engaged in the self-conscious establishment of a new science, and part of their agenda was to free themselves from the

philosophical and theological concerns of the past. All of them were impatient with the speculative approach of their predecessors and eager to apply the experimental methodologies they had learned in German laboratories to psychological investigations in their home country. In doing so, they often found themselves opposed by the older generation of mental philosophers, many of whom still held influential academic posts and resisted the incursion of these new ideas into the curricula of their departments. James had to struggle against the influence of Francis Bowen, Professor of Moral Philosophy at Harvard, to be allowed to teach his course on "The Relations Between Physiology and Psychology" in 1875, and succeeded in part by emphasizing the difference between his subject and Bowen's.<sup>111</sup> Energized by the new ideas and methodologies that they brought with them from their training in German psychological laboratories, and eager to clear out what they saw as the intellectual cobwebs of mental philosophy, it is perhaps not surprising that the New Psychologists ignored the contributions of their indigenous predecessors.

The situation might have been different if the writings I have described in this article had coalesced into a coherent program of research and investigation, rather than remaining a scattered and disconnected collection of publications. One of the great contributions of the New Psychologists was to institutionalize the discipline by creating academic positions and departments, founding journals and professional societies, and beginning the establishment of an identifiable research tradition that would recruit the next generation of scientific psychologists. Morgan, Bascom, and LeConte worked in isolation from each other, and there is no sign that any of them was aware of the others' work, apart from one reference to Morgan in Bascom's 1871 paper on instinct.<sup>112</sup> Morgan was not an academic; Bascom and LeConte were, but they worked primarily in very different disciplines, their universities were half a continent apart, and they would have had little opportunity to come into contact. Each of the three was deeply and successfully involved in his own professional sphere: Morgan founded a discipline, wrote several influential books, and was elected President of the American Association for the Advancement of Science; Bascom published extensively and presided over the growth of a major research university; LeConte was an enormously successful teacher and a first-rate geologist and served as president of two major scientific organizations (AAAS and the Geological Society of America). However, their work on animal psychology was incidental to their primary professional activities. Morgan wrote almost nothing on animal behavior after the publication of his monograph on beavers in 1868, Bascom's *Comparative Psychology* attracted little attention, and LeConte never integrated his psychological ideas into a coherent theoretical statement or even a single major publication. Furthermore, all three wrote at a time when there were no established publications<sup>113</sup> or professional societies through which they might have communicated about animal psychology. Hall's *American Journal of Psychology* did not start publication until 1887 and was in any case very much a house organ for the Clark University Psychology Department, at least in its early years. The American Psychological Association was founded in 1892 and the *Psychological Review* in 1894.<sup>114</sup> In the third quarter of the 19th century there were no recognized outlets for articles on psychological topics, and articles that appeared in *The Knickerbocker* in 1843, or in *Popular Science Monthly* and *Bibliotheca Sacra* in the 1870s and 1880s, were unlikely to have been read by the experimental comparative psychologists who began their careers in the late 1890s. Taking their cue from Hall, James, and Cattell, these scientists looked to the British naturalists for problems to address and to their German experimental training for methodological inspiration; they did not seek out the writings of their American intellectual forebears. Nonetheless, the work of Morgan, Bascom, and



LeConte represents an interesting chapter in the history of comparative psychology in America, and their ideas merit greater recognition by historians of psychology than they have yet received.

### *Notes*

1. The history of comparative psychology after 1894 is thoroughly discussed by Donald A. Dewsbury, *Comparative Psychology in the Twentieth Century* (Stroudsburg, PA: Hutchinson Ross, 1984). Dewsbury reminds us that although learning was always a prominent focus of research in comparative psychology, other topics have engaged the attention of researchers in this field throughout its history (see especially chap. 6, p. 207 et seq.). Other useful sources are: Gilbert Gottlieb, "Comparative Psychology and Ethology," in *The First Century of Experimental Psychology*, ed. Eliot Hearst (Hillsdale, NJ: Erlbaum, 1979), 147-173; Dewsbury, "A Brief History of the Study of Animal Behavior in North America," in *Perspectives in Ethology, Volume 8: Whither Ethology?*, eds. Patrick P. G. Bateson and Peter H. Klopfer (New York: Plenum, 1989), 85-122; Dewsbury, "Triumph and Tribulation in the History of American Comparative Psychology," *Journal of Comparative Psychology*, 106 (1992): 3-19. The view that comparative psychology did not exist in America prior to the 1890s is reflected even in very early historical reviews. See, for example, Wesley Mills, "Some Aspects of the Development of Comparative Psychology," *Science, New Series* 19 (1904): 745-757; C. J. Warden, "The Development of Modern Comparative Psychology," *Quarterly Review of Biology* 3 (1928): 486-512. Warden divides the history of comparative psychology into "the anecdotal movement" (primarily Darwin and Romanes) and "the experimental period" (starting with Lloyd Morgan).
2. William James, *Principles of Psychology*, 2 vols. (New York: Holt, 1890).
3. James M. Cattell, "The Advance of Psychology," *Science, New Series*, 8 (1898): 533-541, p. 536; Cattell, "Address of the President," in *Ninth International Congress of Psychology, Proceedings and Papers* (Princeton, NJ: Psychological Review, 1930), 12.
4. Edwin G. Boring, *A History of Experimental Psychology*, 2nd ed. (New York: Century Co., 1950; 1st ed. 1929), 493 et seq. Later, Boring described the work of pre-Jamesian psychologists as not "functionally important"; Boring, "The Influence of Evolutionary Theory Upon American Psychological Thought," in *Evolutionary Thought in America*, ed. Stow Persons (New York: George Braziller, 1956), 268-298, p. 294, note 9.
5. Ernest R. Hilgard, *Psychology in America: A Historical Survey* (San Diego, CA: Harcourt Brace Jovanovich, 1987), 5-6.
6. Thomas C. Upham, *Elements of Intellectual Philosophy* (Portland, ME: William Hyde, 1827).
7. Jay Wharton Fay, *American Psychology Before William James* (New Brunswick, NJ: Rutgers University Press, 1939), provides a useful inventory of pre-Jamesian psychological writers and summaries of their works, but his book contains little discussion or scholarly interpretation.
8. The phrase *New Psychology* seems to have been coined by John Dewey as the title of a talk given to the Metaphysical Club at Johns Hopkins University in March 1884. John Dewey, "The New Psychology," *Andover Review* 2 (1884): 278-289; see Jo Ann Boydston, "A Note on the Texts," in *John Dewey: The Early Works, 1882-1898*, vol. 1 (Carbondale, IL: Southern Illinois University Press), lxxiii. G. Stanley Hall used the same title for his talk to the group that October. The phrase soon became widely used to refer

both to the empirical approach pioneered in the last two decades of the century and to the pioneers themselves. G. Stanley Hall, "The New Psychology," *Andover Review* 3 (1885): 120-135, 239-248. See John M. O'Donnell, *The Origins of Behaviorism: American Psychology, 1870-1920* (New York: New York University Press, 1985), chap. 1; David E. Leary, "Telling Likely Stories: The Rhetoric of the New Psychology, 1880-1920," *Journal of the History of the Behavioral Sciences* 23 (1987): 315-331.

9. Alfred H. Fuchs, "Contributions of American Mental Philosophers to Psychology in the United States," *History of Psychology*, 3 (2000): 1-19. Two other very useful reviews are Rand B. Evans, "The Origins of American Academic Psychology," in *Explorations in the History of Psychology in the United States*, ed. J. Brozek (Lewisburg, PA: Bucknell University Press, 1984), 17-60; Graham Richards, "—To Know Our Fellow Men to Do Them Good': American Psychology's Enduring Moral Project," *History of the Human Sciences*, 8 (1995): 1-24. See also R. C. Davis, "American Psychology, 1800— 1885," *Psychological Review* 43 (1936): 471-493; R. W. Rieber, "The Americanization of Psychology Before William James," in *Psychology: Theoretical-Historical Perspectives*, eds. R. W. Rieber and K. Salzinger (New York: Academic Press, 1980), 103-123.
10. See Fuchs, "Contributions of American Mental Philosophers." Thomas Reid's three major works are *An Inquiry Into the Human Mind on the Principles of Common Sense* (1764), *Essays on the Intellectual Powers of Man* (1785), and *Essays on the Active Powers of Man* (1788); see Sir William Hamilton, *The Works of Thomas Reid*, 2 vols. (Edinburgh, Scotland: Maclachlan and Stewart, 1863; facsimile edition, Bristol, England: Thoemmes Press, 1994). The first volume of Dugald Stewart's *Elements of the Philosophy of the Human Mind* (London: A. Strahan) was published in 1792. The works cited are Upham, *Elements of Intellectual Philosophy*; Thomas C. Upham, *Abridgement of Mental Philosophy* (New York: Harper, 1861); Francis Wayland, *Elements of Intellectual Philosophy* (Boston: Phillips, Sampson, 1854); Laurens Perseus Hickok, *Rational Psychology or, The Subjective Idea and the Objective Law of All Intelligence* (Auburn, NY: Derby, Miller, 1848); Joseph Haven, *Mental Philosophy, Including the Intellect, Sensibilities, and Will* (Boston: Gould and Lincoln, 1857); James Rush, *Brief Outline of an Analysis of the Human Intellect* (Philadelphia: Lippincott, 1865); Noah Porter, *The Human Intellect, With an Introduction Upon Psychology and the Soul* (New York: Scribner, 1868).
11. Richards, "To Know Our Fellow Men'."
12. On the intellectual response to Darwin's theory, see especially James R. Moore, *The Post-Darwinian Controversies: A Study of the Protestant Struggle to Come to Terms With Darwin in Great Britain and America, 1870-1900* (Cambridge, England: Cambridge University Press, 1979); Ferenc M. Szasz, *The Divided Mind of Protestant America, 1880-1930* (University: University of Alabama Press, 1982); Frederick Gregory, "The Impact of Darwinian Evolution on Protestant Theology in the Nineteenth Century," in *God and Nature: Historical Essays on the Encounter Between Christianity and Science*, eds. David C. Lindberg and Ronald L. Numbers (Berkeley and Los Angeles: University of California Press, 1986), 369-390. Older works that remain of interest include Bert J. Loewenberg, "The Reaction of American Scientists to Darwinism," *American Historical Review* 38 (1933): 687-701; Loewenberg, "The Controversies Over Evolution in New England, 1859-1873," *New England Quarterly* 8 (1935): 232-257; Max H. Fisch, "Evolution in American Philosophy," *Philosophical Review* 56 (1947): 357-373.

13. Christopher Irmscher, *The Poetics of Natural History: From John Bartram to William James* (New Brunswick, NJ: Rutgers University Press, 1999), 260-269; Louis Menand, *The Metaphysical Club* (New York: Farrar, Straus, and Giroux, 2001), 117-148.
14. [Robert Chambers], *Vestiges of the Natural History of Creation* (London: J. Churchill, 1844); Jean-Baptiste Lamarck, *Philosophie Zoologique* (Paris, 1809), trans. by Hugh Elliot as *Zoological Philosophy* (Chicago: University of Chicago Press, 1984); Herbert Spencer, *Principles of Psychology* (London: Williams and Norgate, 1855).
15. Moore, *The Post-Darwinian Controversies*, 19ff.
16. *Ibid.*, chap. 10.
17. Peter J. Bowler, *The Eclipse of Darwinism: Anti-Darwinian Evolution Theories in the Decades Around 1900* (Baltimore: Johns Hopkins University Press, 1982), chap. 3.
18. Moore, *The Post-Darwinian Controversies*; Gregory, "The Impact of Darwinian Evolution."
19. Charles R. Darwin, *The Descent of Man and Selection in Relation to Sex* (London: John Murray, 1871).
20. Auguste Comte, *The Positive Philosophy*, 2 vols., trans. Harriet Martineau (New York: W. Gowans, 1853). Cashdollar suggested that Comte's philosophy was known in America primarily from secondary sources, in particular the work of James McCosh, the Scottish emigrant who came to America as president of the College of New Jersey (later Princeton University) in 1868. Charles D. Cashdollar, "Auguste Comte and the American Reformed Theologians," *Journal of the History of Ideas* 39 (1978): 61-79; James McCosh, *The Method of Divine Government, Physical and Moral* (New York: R. Carter, 1855).
21. Richard W. Burkhardt, *The Spirit of System: Lamarck and Evolutionary Biology* (Cambridge, MA: Harvard University Press, 1977).
22. On the American embrace of Lamarck and Spencer in the late 19th and early 20th centuries, see Moore, *The Post-Darwinian Controversies*, chaps. 6 and 7; Bowler, *The Eclipse of Darwinism*, chap. 4; George Stocking, "Lamarckianism in American Social Science, 1890-1915," *Journal of the History of Ideas* 23 (1962): 239-256.
23. Edward L. Youmans (1821-1887) was the founding publisher of *Popular Science Monthly*, a widely read periodical that published both technical and popular scientific articles as well as reviews of books on scientific and philosophical subjects. He founded Appleton's International Scientific Series and was a vigorous promoter of Herbert Spencer's books, arranging for their U.S. publication and organizing a farewell banquet for Spencer at Delmonico's Restaurant in New York at the end of his American tour in 1882. John Fiske called him America's "apostle of evolution." Mark Pittenger, "Youmans, Edward Livingstone," in *American National Biography*, eds. John A. Garraty and Mark C. Carnes, vol. 24 (New York: Oxford University Press, 1999), 143-144. John Fiske (1842-1901) wrote a number of books and articles defending and promoting evolution to a general readership; see, for example, Fiske, "The Triumph of Darwinism," *North American Review* 124 (1877): 90-106; *Excursions of an Evolutionist* (Boston: Houghton Mifflin, 1884); *The Destiny of Man Viewed in the Light of His Origin* (Boston: Houghton, Mifflin, 1884). Henry Ward Beecher (1818-1887), a popular Congregationalist preacher, incorporated Darwinism and Comtean philosophy into his sermons and lectures, later published as *Evolution and Religion* (New York: Fords,

Howard, and Hulbert, 1883). See Moore, *The Post-Darwinian Controversies*, for further information on these three men.

24. For biographical information on Morgan, see Carl Resek, *Lewis Henry Morgan: American Scholar* (Chicago: University of Chicago Press, 1960); Thomas R. Trautmann, "Morgan, Lewis Henry," *American National Biography Online*, retrieved September 1, 2001, from <http://www.anb.org/articles/14/14-00423.html>.
25. Thomas R. Trautmann & Karl Sanford Kabelac, *The Library of Lewis Henry Morgan* (Philadelphia: American Philosophical Society, 1994), published as *Transactions of the American Philosophical Society*, vol. 84, pts. 6 and 7.
26. Aquarius [Lewis Henry Morgan], "Mind or Instinct: An Inquiry Concerning the Manifestations of Mind by the Lower Animals," *The Knickerbocker* 22 (1843): 414-420, 507-515. For reasons that are not evident, Morgan submitted his article under the pseudonym of C. E. Shepherd; Lewis Gaylord Clark (editor of *The Knickerbocker*) to Lewis Henry Morgan, 30 October 1843, *Lewis Henry Morgan Papers, Correspondence, Box I* (1839-1854), Rush Rhees Library, University of Rochester, Rochester, New York. See Timothy D. Johnston, "An Early Manuscript in the History of American Comparative Psychology: Lewis Henry Morgan's 'Animal Psychology' (1857)," *History of Psychology* 5 (2002): 6,323-355, note 7.
27. Lewis Henry Morgan, *The American Beaver and His Works* (Philadelphia: J. B. Lippincott, 1868, reprint edition, New York: Burt Franklin, 1970).
28. George J. Romanes, *Animal Intelligence* (London: Kegan Paul and Trench, 1881).
29. William Paley, *Natural Theology* (London: R. Faulder, 1802). Paley's argument is that just as a complex mechanism like a watch implies a watchmaker, so complex biological organisms imply a creator.
30. Knight Dunlap, "Are There Any Instincts?" *Journal of Abnormal Psychology* 14 (1919): 307-311; Zing-Yang Kuo, "Giving Up Instincts in Psychology," *Journal of Philosophy* 18 (1921): 645-664. Dunlap and Kuo were primarily arguing against the instinct theory of William McDougall, although Kuo at least argued that the concept of instinct in whatever form was scientifically indefensible; see D. L. Krantz and D. Allen, "The Rise and Fall of McDougall's Instinct Doctrine," *Journal of the History of the Behavioral Sciences* 3 (1967): 326-338; Gilbert Gottlieb, "Zing-Yang Kuo: Radical Scientific Philosopher and Innovative Experimenter (1898-1970)," *Journal of Comparative and Physiological Psychology*, 80 (1972): 1-10.
31. Morgan's contributions to anthropology are discussed in Meyer Fortes, *Kinship and the Social Order: The Legacy of Lewis Henry Morgan* (Chicago: Aldine, 1969); Elman R. Service, "The Mind of Lewis H. Morgan," *Current Anthropology* 22 (1981): 25-43; Thomas R. Trautmann, *Lewis Henry Morgan and the Invention of Kinship* (Berkeley and Los Angeles: University of California Press, 1987); Elizabeth Tooker, "Lewis H. Morgan and His Contemporaries," *American Anthropologist* 94 (1992): 357-375; Gillian Feeley-Harnik, "The Mystery of Life in All Its Forms': Religious Dimensions of Culture in Early American Anthropology," in *Religion and Cultural Studies*, ed. Susan L. Mizruchi (Princeton, NJ: Princeton University Press, 2001), 140-191.
32. Lewis Henry Morgan, *Ancient Society, or Researches in the Lines of Human Progress From Savagery Through Barbarism to Civilization* (New York: Holt, 1877).
33. Lewis Henry Morgan, *League of the Ho-de-no-sau-nee, or Iroquois* (Rochester, NY: Sage & Brother, 1851, reprint edition, New York: Corinth Books, 1962).

34. Morgan, *The American Beaver*, Preface, 323-355.
35. Trautmann, Lewis Henry Morgan, 24.
36. For example, D. E. Wilson and S. Ruff, *The Smithsonian Book of North American Mammals* (Washington, DC: Smithsonian Institution Press, 1999), 548, characterize Morgan as "arguably the first American ethologist" and describe his book as a milestone in the study of animal behavior. See also Dewsbury, "A Brief History," 88.
37. Reviews of Morgan's book appeared in the following places (all are anonymous): *American Naturalist* 2 (1868): 156-158; *The Nation*, 6 (1868): 176; *The Atlantic Monthly*, 21 (1868): 512; and *The North American Review*, 106 (1868): 725-727.
38. Resek, Lewis Henry Morgan, 61; "Origin and History of the 'Club,'" Lewis Henry Morgan Papers, Box 22, Folder 43, Rush Rhees Library, University of Rochester, Rochester, New York. For an annotated transcription of the 1857 manuscript, see Johnston, "An Early Manuscript."
39. "Animal Psychology," Lewis Henry Morgan Papers, Box 22, Folder 41, Rush Rhees Library, University of Rochester, Rochester, New York, 1.
40. *Ibid.*, 27-28.
41. *Ibid.*, 27.
42. Morgan, "Mind or Instinct," 515; Morgan, *The American Beaver*, 251.
43. Morgan, *The American Beaver*, 256, 284.
44. Morgan, "Mind or Instinct," 515
45. Morgan, *The American Beaver*, 283-284.
46. Morgan, "Animal Psychology," 21.
47. Morgan, *League of the Ho-de-no-sau-nee*; Morgan, *Systems of Consanguinity and Affinities of the Human Family* (Washington, DC: Smithsonian Institution, 1871); Morgan, *Ancient Society*; see Trautmann, *Morgan and the Invention of Kinship*, 267-271, for a complete bibliography of Morgan's writings.
48. Morgan, "Animal Psychology," 23-24; *The American Beaver*, 281-282.
49. Adam Kuper, "The Development of Lewis Henry Morgan's Evolutionism," *Journal of the History of the Behavioral Sciences* 21 (1985): 3-22; Trautmann, Lewis Henry Morgan, 32.
50. Paul Ansel Chadbourne, *Instinct: Its Office in the Animal Kingdom and Its Relation to the Higher Powers in Man* (New York: G. P. Putnam and Sons, 1872); [Lewis Henry Morgan], "Chadbourne on Instinct," *The Nation* 14 (1872): 291-292.
51. For biographical information on Bascom, see John Bascom, *Things Learned by Living* (New York & London: G. P. Putnam's Sons, 1913); Sanford Robinson, John Bascom, *Prophet* (New York: G. P. Putnam's Sons, 1922); R. Douglas Geivett, "Bascom, John," *American National Biography Online*, retrieved August 21, 2001, from <http://www.anb.org/articles/20/20-00049.html>. For a list of Bascom's books, articles, addresses, and sermons, see Bascom, *Things Learned by Living*, 212-228.
52. In *Things Learned by Living*, 51-52, Bascom reported that in 1850 he "went up to Rochester to study law ... [and] spent eight months in a law office." He would therefore have lived in Rochester at the same time as Morgan was practicing law in the city, and it seems at least plausible that the two men may have met, especially given their mutual interests and Morgan's wide circle of intellectual acquaintances. However, there are no letters from Bascom in the Morgan manuscript collection at the University of Rochester, and no letters from Morgan in Bascom's papers, either at the University of Wisconsin or

at Williams College. There is also no listing for Bascom in the Rochester city directories for 1850 or 1851 (Lois Gauch, Rochester Historical Society, personal communication, February 12, 2002).

53. Hickok, *Rational Psychology*; Fay, *American Psychology*; J. K. Bare, "Laurens Perseus Hickok: Philosopher, Theologian, and Psychologist," in *Portraits of Pioneers in Psychology* vol. 3, eds. Gregory A. Kimball and M. Wertheimer (Washington, DC, and Mahwah, NJ: American Psychological Association and Erlbaum, 1991), 1-15.
54. John Bascom, "Laurens Perseus Hickok," *American Journal of Psychology* 19 (1908): 359-373.
55. Quotations are from Bascom, *Things Learned By Living*, 120, 120-21, viii, 150.
56. G. Stanley Hall, *Life and Confessions of a Psychologist* (New York: D. Appleton, 1923), 157.
57. John Bascom, *Principles of Psychology* (New York: G. P. Putnam & Son, 1869); Bascom, *Things Learned by Living*, 160-161.
58. John Bascom, "The Relation of Intuitions to Thought and Theology," *American Presbyterian & Theological Review* 15 (1866): 272-291; Bascom, "Intuitive Ideas and Their Relation to Knowledge," *Biobliotheca Sacra* 23 (1866): 1-48; see W. H. Werkmeister, *A History of Philosophical Ideas in America* (New York: Ronald Press, 1949), 87-95; Robert A. Jones, "John Bascom 1827-1911: Anti-Positivism and Intuitionism in American Sociology," *American Quarterly*, 24 (1972): 501-522.
59. Bascom, *Principles of Psychology*, 2. Subsequent page references are to this work. For Bascom's views on evolutionary theory, see Bascom, "Darwin's Theory of the Origin of Species," *American Presbyterian Review*, 3rd Series 11 (1871): 349-379; and "Evolution, As Advocated by Herbert Spencer," *Presbyterian Quarterly and Princeton Review* 1 (1872): 496-515.
60. C. Lloyd Morgan, *An Introduction to Comparative Psychology* (London: Walter Scott, 1894); Edward L. Thorndike, *Animal Intelligence* (New York: McMillan, 1911).
61. John Bascom, "Instinct," *Bibliotheca Sacra* 28 (1871): 654-685. Bascom published 30 articles in *Bibliotheca Sacra*, the last 2 of them appearing in 1911, the year of his death.
62. Bascom, *Principles of Psychology*, 223.
63. Bascom, "Instinct," 660.
64. *Ibid.*, 660 - 661.
65. These three classes of activity in living things are borrowed from the classically defined divisions of the soul into vegetative, sensitive, and rational functions, a distinction that goes back to Aristotle and informed much of medieval and early modern psychology. See Michael Haren, *Medieval Thought: The Western Intellectual Tradition From Antiquity to the 13th Century* (New York: St. Martin's Press, 1985). The quotation that follows is from Bascom, "Instinct," 668.
66. Bascom, *Instinct*, 668.
67. Alfred R. Wallace, "The Philosophy of Birds' Nests," *Intellectual Observer*, 11 (1867): 413-420. The quotation that follows is from Bascom, "Instinct," 672.
68. Bascom, "Instinct," 685.
69. Bascom, *Things Learned By Living*, 60.

70. John Bascom, *Comparative Psychology or, the Growth and Grades of Intelligence* (New York: G. P. Putnam's Sons, 1878); reissued as *The Growth and Grades of Intelligence, or Comparative Psychology* (New York: G. P. Putnam's Sons, 1894), with an addendum.
71. Paley, *Natural Theology*, chap. 18; William Kirby, *On the Power Wisdom and Goodness of God as Manifested in the Creation of Animals, and in Their History, Habits, and Instincts* (7th Bridgewater Treatise), (London: Pickering, 1835); Chadbourne, *Instinct* (see note 49); Chabourne, "Design in Nature," *Princeton Review* 1 (1878): 272-303. It is interesting that Chadbourne (who had also moved from Williams to serve as president at Wisconsin from 1866 to 1870) was chosen in preference to Bascom to succeed Mark Hopkins as president of Williams College in 1872. Bascom seems to have been the preferred candidate of the faculty, but both Hopkins and the board of trustees considered him too liberal in his religious views and selected the safely conservative Chadbourne instead. Stan W. Jorgensen, "A Passage of Faith: The Thought of John Bascom (1827-1911) and His Intellectual Successors" (Ph.D. diss., University of North Carolina at Chapel Hill, 1976), 189. On the contributions of natural theology to the study of animal behavior in the 19th century, see Robert J. Richards, "Instinct and Intelligence in British Natural Theology: Some Contributions to Darwin's Theory of the Evolution of Behavior," *Journal of the History of Biology* 14 (1981): 193-230.
72. George J. Romanes, *Mental Evolution in Animals* (London: Kegan Paul, Trench and Co., 1883); Morgan, *Introduction to Comparative Psychology*; John B. Watson, *Behavior: An Introduction to Comparative Psychology* (New York: Henry Holt, 1914).
73. Textbooks of comparative psychology from Lloyd Morgan to the present have generally ignored plants and microorganisms. One exception is Norman R. F. Maier and T. C. Schneirla, *Principles of Animal Psychology* (New York: McGraw-Hill, 1935); despite the title of their book, which appears to restrict it to animals, Maier and Schneirla devote their first chapter to plants and protista. Bascom paid careful attention to the responses of sensitive and insectivorous plants, based largely on Darwin's two books: Charles R. Darwin, *The Movements and Habits of Climbing Plants* (London: Longman, Green, 1865); and Darwin, *Insectivorous Plants* (London: John Murray, 1875).
74. Bascom, *Comparative Psychology*, 2. Subsequent page references are to this work.
75. It should be noted that although these two problems are sharply distinguished today, that distinction was not clearly made until Weismann's work at the end of the 19th century: e.g., August Weismann, *The Germ Plasm: A Theory of Heredity* (New York: Scribner's, 1893); see Frederick B. Churchill, "From Heredity Theory to Vererbung: The Transmission Problem, 1850-1915," *Isis* 78 (1987): 337-364. For Bascom, as for his contemporaries, heredity and development were simply two sides of the same question: How are complex characteristics passed from parent to offspring?
76. Charles R. Darwin, *The Variation in Plants and Animals Under Domestication* (London: John Murray, 1868), chap. 27: "Provisional Hypothesis of Pangenesis."
77. See Timothy D. Johnston, "The Persistence of Dichotomies in the Study of Behavioral Development," *Developmental Review* 7 (1987): 149-182; H. F. Nijhout, "Metaphors and the Role of Genes in Development," *BioEssays* 12 (1990): 441-446; Susan Oyama, *The Ontogeny of Information*, 2nd ed. (Durham, NC: Duke University Press, 2000).
78. Douglas A. Spalding, "Instinct, With Original Observations on Young Animals," *MacMillan's Magazine* 27 (1873): 282-293.

79. George H. Lewes, "Instinct," *Nature* 7 (1873): 437-438. This Lamarckian idea, also known as use-inheritance, originated with Herbert Spencer and was widely accepted by naturalists in the late 19th century. Romanes distinguished between two classes of instincts on the basis of whether they had originated from natural selection ("primary instincts") or were the inherited result of habits ("secondary instincts"). Romanes, *Mental Evolution in Animals*, 177. See Robert Boakes, *From Darwin to Behaviorism: Psychology and the Minds of Animals* (Cambridge, England: Cambridge University Press, 1984), 204; Robert J. Richards, *Darwin and the Emergence of Evolutionary Theories of Mind and Behavior* (Chicago: University of Chicago Press, 1987), 90ff.
80. Timothy D. Johnston, "The Influence of Weismann's Theory of the Germ Plasm on the Dichotomy Between Innate and Learned Behavior," *Journal of the History of the Behavioral Sciences* 31 (1995): 115-128.
81. Thorndike, *Animal Intelligence*; John B. Watson, "Psychology As the Behaviorist Views It," *Psychological Review* 20 (1913): 158-177. On associationism in the history of psychology, see Robert M. Young, *Mind, Brain, and Adaptation in the Nineteenth Century*, 2nd ed. (Oxford, England: Oxford University Press, 1990).
82. Jones, "John Bascom 1827-1911."
83. Francis Galton, *Hereditary Genius: An Inquiry Into Its Laws and Consequences* (London: Macmillan, 1869).
84. John Bascom, *Science, Philosophy and Religion* (New York: G. P. Putnam & Sons, 1872); Bascom, *Evolution and Religion, Or Faith as a Part of a Complete Cosmic System* (New York: G. P. Putnam's Sons, 1897).
85. Bascom, *Things Learned By Living*, 169. A search of various sources has identified no reviews of this book in either its 1878 or its 1894 editions.
86. Joseph LeConte, "Evolution in Relation to Materialism," *Princeton Review*, 4th series 7 (1881): 149-174, p. 169.
87. Joseph LeConte, "Man's Place in Nature," *Princeton Review*, 4th Series 2 (1878): 776-803, p. 785.
88. For biographical information on LeConte, see *The Autobiography of Joseph LeConte* (1903), Documenting the American South Collection, University of North Carolina at Chapel Hill, retrieved February 18, 2002, from <http://metalab.unc.edu/docsouth/leconte/menu.html>; Lester D. Stephens, *Joseph LeConte: Gentle Prophet of Evolution* (Baton Rouge and London: Louisiana State University Press, 1982); Stephens, "LeConte, Joseph," *American National Biography Online*, retrieved September 1, 2001, from <http://www.anb.org/articles/13/13-00966.html>. Stephens's book includes a complete bibliography of LeConte's writings (pp. 319-332).
89. Joseph LeConte, *Sight: An Exposition of the Principles of Monocular and Binocular Vision* (New York: D. Appleton, 1881); see Stephens, *Joseph LeConte*, 139 -147.
90. Stephens, "LeConte, Joseph"; Phillip C. Cato, "The Evolutionary Theology of Joseph LeConte" (Ph.D. diss., Emory University, 1977).
91. Joseph LeConte, "The Relation of Organic Science to Sociology," *Southern Presbyterian Review* 13 (1860): 39-77. Subsequent page references in this paragraph are to this article.
92. Joseph LeConte, *Religion and Science* (New York: D. Appleton, 1873); LeConte, *Evolution and Its Relation to Religious Thought* (New York: D. Appleton Co., 1888); see Cato, "The Evolutionary Theology," and Stephens, *Joseph LeConte*, for a discussion of LeConte's wider contributions.



93. LeConte, "Evolution in Relation to Materialism," 159.
94. LeConte combined Darwinian and neo-Lamarckian elements in his view of evolution, as did most American scientists at this time. His writings also include some strikingly original evolutionary ideas, including a "law of cyclical evolution," in which geological and organic cycles leave small residues that slowly accumulate, forcing a transition from one steady state to another, and the proposal that evolution is not a continuous process but occurs in "paroxysms" of sudden change alternating with periods of relative stability. The latter idea is similar to the theory of punctuated equilibrium proposed by Niles Eldredge and Stephen J. Gould, "Punctuated Equilibria: An Alternative to Phyletic Gradualism," in *Models in Paleobiology*, ed. Thomas J. M. Schopf (San Francisco: Freeman, Cooper, 1972), 82-115; LeConte, "Evolution in Relation to Materialism," 159. For LeConte's "law of cyclical evolution," see "The Relation of Organic Science to Sociology."
95. LeConte, "Evolution in Relation to Materialism," 164-165.
96. *Ibid.*, 158. This conception may reflect a Hegelian influence on LeConte's thought. LeConte records in his autobiography that he "dipped into" the works of Hegel, among other philosophers; *The Autobiography of Joseph LeConte* (New York, D. Appleton, 1903), 287. See also Stephens, *Joseph LeConte*, 228-229.
97. Joseph LeConte, "On Some Phenomena of Binocular Vision," *American Journal of Science & Arts*, 3rd Series 2 (1871): 417-426, p. 425.
98. Joseph LeConte, "Instinct and Intelligence," *Popular Science Monthly* 7 (1875): 653-664, p. 655; see also "Scientific Relation of Sociology to Biology," *Popular Science Monthly* 14 (1879): 325-336, 425-434, p. 426.
99. Joseph LeConte, "The Psychical Relation of Man to Animals," *Princeton Review*, 4th series 13 (1884): 236-261, p. 237.
100. LeConte, "Instinct and Intelligence," 657. Subsequent page references are to this article.
101. Joseph LeConte, "Man's Place in Nature," *Princeton Review*, 4th Series 2 (1878): 776-803; "Illustrations of a Law of Evolution of Thought," *Princeton Review*, 4th Series 8 (1881): 373-393; "Mutual Relations of Intellectual and Moral Culture," *Overland Monthly*, 2nd Series 1 (1883): 10-16; "The Psychical Relation of Man to Animals," *Princeton Review*, 4th Series 13 (1884): 236-261. Subsequent page references are to the last of these articles, which was republished with only minor changes as LeConte, "From Animal To Man," *The Monist* 6 (1896): 356-381.
102. James Mark Baldwin, "On Selective Thinking," *Psychological Review* 5 (1898): 1-28; B. F. Skinner, "Selection By Consequences," *Science* 213 (1981): 501-504; Donald T. Campbell, "Evolutionary Epistemology," in *The Philosophy of Karl Popper*, Vol. 1, ed. P. A. Schlipp (LaSalle, IL: Open Court, 1974), 413-463.
103. Joseph LeConte, "The Relation of Philosophy to Psychology and to Physiology," *Bulletin of the Philosophical Society of Washington* 12 (1892, February): 19-38, p. 22.
104. LeConte, "The Psychical Relation," 260.
105. *Ibid.*; see also LeConte, "Man's Place in Nature."
106. Trautmann, *Lewis Henry Morgan*, 173.
107. Morgan, *The American Beaver*, 282.
108. Charles Georges LeRoy, *Lettres sur les animaux* (Nuremberg, Germany: Saugrain, 1768). See also LeRoy, *The Intelligence and Perfectibility of Animals From a*

- Philosophic Point of View, With a Few Letters on Man (London: Chapman and Hall, 1870); Richards, Darwin and the Emergence of Evolutionary Theories, 25-30.
109. Cheryl A. Logan, "The Altered Rationale for the Choice of a Standard Animal in Experimental Psychology: Henry H. Donaldson, Adolf Meyer, and 'the' Albino Rat," *History of Psychology* 2 (1999): 3-24.
  110. Three articles on comparative psychology published around the turn of the century make no reference to Morgan, Bascom, or LeConte: James Sully, "Is Man the Only Reasoner?" *Popular Science Monthly* 40 (1892): 506-517; Joseph Jastrow, "The Problems of Comparative Psychology," *Popular Science Monthly* 42 (1892): 35-48; Mills, "Some Aspects" (see note 1). John Dewey cited Bascom, along with Darwin and Spencer, in the discussion of instinct in his textbook, but provided no discussion of his ideas; Dewey, *Psychology*, 3rd rev. ed. (1891), in *John Dewey: The Early Works, 1882-1898*, vol. 2 (Carbondale: Southern Illinois University Press, 1967), 308.
  111. Leary, "Telling Likely Stories," 317-318 (see note 8).
  112. Bascom, "Instinct," 680-681.
  113. An exception might have been Alexander Bain's journal *Mind*, founded in 1876. *Mind* was a British journal, as were most of its contributors in its early years. However, the first article in the first issue (Herbert Spencer, "Comparative Psychology of Man," *Mind* 1 [1876]: 7-20) would surely have appealed to all three of these writers.
  114. On the insitutionalization of American psychology, see Hilgard, *Psychology in America*, chap. 10; T. M. Camfield, "The Professionalism of American Psychology, 1870-1917," *Journal of the History of the Behavioral Sciences* 9 (1973): 66-75.