

## ROBERT BROOM'S MISINTERPRETATION OF LAMARCK AND DARWIN

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Robert Broom (1866-1951), paleontologist, evolutionist, philosopher of science, influential teacher and discoverer of numerous fossil-men, misinterpreted Lamarckian and Darwinian theories. His explorations in the Union of South Africa gave him international recognition as a scientist and philosopher. However, in his writings, Broom reversed the true nature of Lamarckian and Darwinian theories. He maintained that the driving force of Lamarckism was a psychic agency. Darwinism he labeled a mechanical and materialistic philosophy. It appears that Broom did not make any long-term attempt to research and analyze the original works of the two great evolutionists. The possible reasons for these errors of interpretation may have been because Darwin's first generation of disciples was still teaching and dominating the educational structure when Broom was a student. This academic climate may have set him off on an error which he never corrected. Although Broom did intensive investigations and writings, it appears he did not read Lamarck's writings in the original, but may have read most of Darwin's works. Broom's publications affected the development of evolutionary thought of two generations of scientists. The importance of his stature could have been one of the many reasons for the scientific community delaying their revisit to Lamarckian theory.

Robert Broom was a Renaissance man. Born in 1866, in Scotland and highly trained as a physician, paleontologist, anatomist, physical anthropologist, and evolutionary theorist, he misinterpreted and mislabeled the theories of Jean Lamarck (1744-1829) and those of Charles Darwin (1809-1882). In his writings, Broom postulated that the driving forces of natural selection and species variation were materialistic as expressed by the Darwinists. On the other hand, he labeled psychic forces as the prime impetus for inducing the inheritance of acquired characteristics as represented by the Lamarckists.

This paper establishes that Broom's expositions were reversed to the actual way nature expresses itself. The credibility of Broom's preciseness among evolutionary theoreticians established him as one of the foremost authorities of his time. Yet his publications continued to defend these incorrect explanations. Perhaps these errors were not rectified during his lifetime because his colleagues believed them to be accurate and did not reinvestigate his statements as to the degree of correctness. Still there were numerous contradictory articles available in professional books and journals,

Unfortunately, Broom's speculations are at present being perpetuated in some current academic circles. The high esteem of Broom's far-famed reputation and his writings served as a source for the next generation of evolutionary theorizers, who then transmitted these erroneous concepts to the succeeding generations.

Broom was thus a product of his Victorian and Edwardian academic heritage although he lived to 1951. It appears that his major models concerning evolutionary philosophy never adjusted or acknowledged the scientific inquiries made by twentieth century Lamarckists. His works tended to repeat the charges against Lamarck as reported by the nineteenth century Darwinists. As an evolutionist, his philosophy was partly based on Smutism (Jan Christiaan Smuts, 1870-1950) as well as the belief that there is direct intervention by the Grand Designer. Smutism advocated that the composite of life was a result of an orthogenetic motive which stimulated and then produced a choice, the which acted among many possible existing variations. This determination of selection culminated in a complexity that possessed a greater quality than the sum of its parts, and Smuts called this completeness *Holism*. In his later years, Broom openly declared that all evolutionary pathways were organized and pre-designed by the Supreme Being. Broom believed that all of nature's evolutionary attempts, past and present, were symbolic messages from the Grand Designer. Broom advanced a developmental pattern which included the stages of growth from amoeba to man as a preordered arrangement.

Reared in a deeply religious family which was dominated by his mother's strong adherence to the strict principles of the Plymouth Brethren<sup>2</sup>, he attended Hutcheson's Grammar School in Glasgow. He entered the University of Glasgow, serving as assistant in the chemistry laboratory. In 1885 he entered the field of medicine, earning his medical degree in 1889. His studies show the strong influence of F. O. Bower, the botanist, and Professor John Cleland, the anatomist. He spent four years in Australia collecting lizards in North Wales, and practicing medicine in New South Wales. Returning to Scotland for one year, he then ventured on to South Africa for reptilian studies. Recognition was fast in coming, resulting in his appointment to Professorship of Geology and Zoology at Victoria College, Stellenbosch, and Honorable Keeper of Fossil Vertebrates of the South African Museum in Cape Town in 1903. Forty-three years later, on his eightieth birthday, the University of Stellenbosch awarded him an honorary Doctor of Science degree.

Earlier, in 1905, his alma mater, bestowed upon him a Doctor of Science degree and forty-four years later, in 1949, two years before his death, honored him with the degree of Doctor of Laws.

Just before World War I, in 1910, a meeting with Professor Henry Fairfield Osborn (1857-1935), a world-known paleontologist, resulted in an invitation to study at the American Museum of Natural History in New York City. Broom's fossil collection given to this museum aided the development and expansion of paleontology in this

country by providing students with fossil material for research. At the age of eighty-three, forty years later, he returned to the museum to lecture there and throughout the United States. In 1913, his appointment by the Royal Society of London as Croonian Lecturer, was viewed by him as the high point of his career. His lectures dealt with many areas within the field of mammalogy. To support himself and his family, he practiced medicine during 1917-1927 in South Africa, continuing his collecting and then publishing his findings in paleontological journals.

In 1924, a fellow physical anthropologist, Raymond Dart (1893- ), discovered the ape-child like skull of *Australopithecus africanus*, which he viewed as an intermediacy between man and ape, with an estimated cranial capacity of 500 cc. Few scientists supported Dart's assertions that this intermediate form between the monkey and human families was the Southern ape. However, Dart's findings were corroborated by Broom's discovery of additional parts of similar skeletons in a subterranean cavern at Sterkfontein, Transvaal, which he called *Australopithecus transvaalensis*. Dart's influence upon General Smuts, Deputy Prime Minister of the Union of South Africa, enabled Broom to accept a post as Keeper of Vertebrate Paleontology and Anthropology at the Transvaal Museum, Pretoria, in 1934, concurrently serving as Lecturer in Comparative Anatomy at the Medical School of the University of Witwatersrand<sup>2</sup>. During World War II he maintained his museum, and continued to expand his knowledge of fossilogy. Broom's research, aided by his assistant, G. W. H. Schepers, reached its highest point with the publication of one of his most significant works, *African Fossil Ape-Men—The Australopithecinae*, which was awarded the Daniel Giraud Medal by the National Academy of Sciences in Washington as the most prominent biological writing in 1946. This masterpiece immediately received international attention and acceptance.

What were the reactions of others to his work, his zeal for life, his love for knowledge and research, and his humanity towards his fellow man? From Lawrence H. Wells, in the *Royal Society of Edinburgh Yearbook*, 1950-51 (1952), "He was an avid collector of the letters of men of science past and present, and an authority on the early postage stamps of the Transvaal. At the same time he had a wide knowledge of literature and literary history, was well read in Philosophy, and a *chess-player of repute*."<sup>3</sup>

Sonia Cole, in "Dr. Robert Broom—A Tribute From East Africa," in the *South African Archaeological Bulletin* concurred with Wells that "He was enthralling when talking about paleontology or medicine and always amusing when recalling his adventures in Manhattan. He had strong views on philosophy and the authorship of Shakespeare's plays and he proclaimed himself an admirer of modern poetry. . . . His unfailing energy and enthusiasm might well have been the envy of a far younger man."<sup>4</sup> L. S. B. Leakey, the great paleontologist, in *By the Evidence-Memoirs*, 1932-1951, has noted that, after an exhausting field trip in the hot sun "I. . . suggested to the older members of the party, including Robert Broom. . . that they not attempt

to visit this particular site. In spite of my warnings, they were determined to make the effort. I shall never forget the sight of Robert Broom—then almost eighty years old—wearing, as always, a dark suit, wing collar, and butterfly tie, negotiating the last steep stretch in the heat of the day. It was indeed an amazing feat for a man of his age in such unsuitable clothing.<sup>5</sup> Those who knew Broom personally were impressed by his indefatigability, for he possessed an astonishing combination of mental and physical energy.

His legacy includes, in addition to his paleontological discoveries and collections, over four hundred papers and several major books in the area of physical anthropology, paleontology, and evolutionary philosophy. Outstanding are the following: *The Origin of the Human Skeleton* (1930); *The Mammal-like Reptiles of South Africa and the Origin of Mammals* (1932); *Finding the Missing Link* (1950); and *The Coming of Man—Was it Accidental or Design* (1933). The latter is considered by many authorities as his most distinguished and celebrated work in evolutionary theory.

Although Broom was a remarkable man for his age and time, he mis-interpreted the theories of Lamarck and Darwin. This meant that two generations of scientists that studied with Broom learned and then built an incorrect foundation of evolutionary theory. His essential error was reversing the basic concept behind the theories of the two great evolutionists. Broom set forth Darwin as a mechanist and materialist. He saw Lamarck as a vitalist who advocated psychic forces as the driving power behind evolutionary transitions. In reality, the positions were just reversed. The following examples of Broom's writings dealing with Lamarekism and Darwinism as he mistakenly saw them.

In a concise manner he wrote, "The struggle for existence, of which the Darwinians make so much, seems to me greatly overrated."<sup>6</sup> Yet he remarked typically, "If a character is of manifest advantage to an animal, like the powerful canine teeth or the claws of the tiger, then manifestly it arose by Natural Selection."<sup>7</sup> Broom openly declared that mechanistic forces are the operative factors in the Darwinian evolutionary view. "Science red in tooth and claw" are the bywords of those who viewed Darwinism as a mechanistic philosophy.

His misjudgments of the principles of Lamarckism can be illustrated by his use of Darwinian arcane medievalism. He reported that "If acquired characters are inherited, Lamarckism would be a satisfactory explanation of the increase or degeneration of an organ, but it seems to me that it cannot explain the marvellous structure of the flowers in orchids or in *Strelitzia*, and many other plants with the wonderful adaptations for cross-fertilization or for the scatterings of seeds.

Lamarckism has to bring in a psychic element to explain the origin of a new organ which could not be used before it is there."<sup>8</sup> He explained further, "Lamarck's suggestion of a psychic agency stimulating development where it could be an advantage

would be a satisfactory explanation, if there is such an agency."<sup>9</sup> These examples revealed Broom's sentiments that the basic tenets of Lamarckism depend upon an agency which is beyond natural or known physical processes. He expounded that these forces were internal and controlled mental activity. Broom should have attributed these mysterious energies to the philosophical machinations of the Darwinists. Further evidence is noted in his book, *The Origin Of The Human Skeleton*, when he attempts to explain the origin of new organs he once again misinforms and mislabels Lamarckism as a psychic agency. He wrote, "A little over a hundred years ago Lamarck suggested a theory to account for evolution which has received a good deal of support . . . The difficulty of accounting for new organs, which of course could not be used till they have at least originated, he explained by the introduction of a psychic factor."<sup>10</sup> The above interpretation of Lamarckian laws are in error and are classical examples of sophism.

Broom did not appear to understand the basic tenets of Lamarckism. Additional corroboration of his point of view is found in his Presidential Address of 1933, "Evolution—Is There Intelligence Behind It?"

We have in South Africa a remarkable snake called *Dasyveltis scabra* which when adult feeds largely on eggs. Many snakes eat eggs, but *Dasyveltis* has developed a peculiar structure seen in no other snake. From the lower parts of the bodies of the 25th to the 32nd or 33rd vertebrae there are developed sharp bony processes which pass into the lower part of the oesophagus and act as teeth which are used to break the shells of the eggs. That those teeth were developed by natural selection seems quite impossible. There would be no need for a *Dasyveltis* to die even if it never ate any eggs, let alone having teeth to cut the shells of the larger ones. Fitz Simmons assures me that they by no means restrict themselves to eggs, and that they eat also frogs, slugs, larvae, small lizards and fledgeling birds. Lamarckism might be a satisfactory explanation of increased bony ridges on the vertebral bodies, but it is difficult to see how Lamarckism can explain the development of teeth-like processes passing through the oesophagus.<sup>11</sup>

Kenneth R. Porter, Department of Biological Sciences, The University of Denver, pointed out that *Dasyveltis* does have esophageal "teeth" because this species is mainly egg-eating. Porter explained:

At least three taxa of egg-eating snakes in the family Colubridae (*Dasyveltis*, *Elachistodon*, and *Elaphe climacophora*) have esophageal 'teeth' formed by anterior vertebral hypapophyses that project into the esophagus to form an eggshell-cutting apparatus. The neck and mouth of these snakes are enormously distensible so that the egg may be swallowed whole. When it reaches the esophageal 'teeth', compression of the neck muscles and a back-and-forth sawing motion break the shell. The contents of the egg are then carried into the stomach by peristalsis, and the shell is regurgitated.<sup>12</sup>

As early as 1910, Raymond L. Ditmars, Curator of Mammals and Reptiles at the New York Zoological Park, recorded that the *Dasypeltis scabra*'s "food of the species is restricted almost entirely to eggs."<sup>13</sup> Twenty-seven years later, Charles H. Curran, Department of Entomology, American Museum of Natural History, and Carl Kauffeld, Curator of Reptiles, Staten Island Zoological Society, boldly declared, "There is an African snake (*Dasypeltis scaber*) that has become so addicted to egg-eating that it will eat nothing else."<sup>14</sup>

It is rather surprising that Broom did not find the answer to his question why the "teeth-like" processes are found in the esophagus when he makes note that in *Dasypeltis scabra* the food is ingested in the form of calcium carbonate shells containing the egg yolk. The "teeth-like" processes evolved in this species because of a biological need to crack the shell so that the yolk materials can be acted upon by digestive enzymes. This example confirms that in order for the Lamarckian principle of use and disuse to function over periods of immense duration, favorable environmental conditions can allow the origin of new organs.

Lamarck's writings presented his point of view with forceful announcements that psychic powers did not influence or unfold predetermined biological developments. Lamarck's elucidations of the evolutionary development of the human mind evinced that he did not, in his exposition of scientific thought, incorporate the philosophical doctrines of ontologism. He set forth his facts in a detailed explanation, arguing in Chapter VIII, "Of The Understanding, Its Origin, And The Origin Of Ideas," in *Zoological Philosophy* that:

The question is, how purely physical causes, that is to say, simple relations between different kinds of matter, can produce what we call ideas; how, out of simple or direct ideas, complex ideas may be formed; how, in short, out of ideas of any kind, faculties can arise, so astonishing as those of thought, judgment, analysis and reasoning.

He indeed is more than bold who undertakes such a research, and flatters himself that he has found in nature the origin of these wonderful phenomena.

Assuredly, I have not the presumption to suppose that I have discovered their causes; but I started with the conviction that all acts of intelligence are natural phenomena and hence derive their source exclusively from physical causes.<sup>15</sup>

Numerous authorities over the last eighty years have recognized that Lamarck set forth point by point that the biological and chemical processes of formation and development was uncompromisingly based on materialism.<sup>16</sup>

Broom did not become familiar with Darwin's lifestyle or his philosophy. If he did, he would have known that the self-appointed viceroy of evolutionary thought was a Theist. Darwin never abandoned his early 1830 teleological beliefs. In 1871, in *The Descent Of Man And Selection In Relation To Sex*, Darwin acknowledged that "I was not, however, able to annul the influence of my former belief, then almost universal, that each species had been purposely created; and this led to my tacit assumption that every detail of structure, excepting rudiments, was of some special, though unrecognised, service."<sup>17</sup> Darwin's son and co-worker, Francis (1848-1925), wrote of his father, "One of the greatest services rendered by my father to the study of Natural History is the revival of Teleology."<sup>18</sup>

Broom interpreted Darwinian theory as mechanistic and substantiated it with the following:

In 1859 Darwin gave to the world, in his book, *The Origin of Species*, another theory, which, supported by a great wealth of examples from the animal and vegetable kingdoms, gained the acceptance of most zoologists and botanists for over fifty years. The theory is, briefly, that in all animals and plants there are little variations, and that in the struggle for existence those forms with the more suitable variations survive and carry on the race. This has been called 'the survival of the fittest.'<sup>19</sup>

Broom retraced the important developments and pointed out that Alfred Russel Wallace, the co-theorizer of the process of natural selection, was disenchanted with Darwinian mechanical explanation which Wallace perceived as inadequately defining the causes of physical and psychical evolutionary changes. He summarized it thus:

Russel Wallace, who with Darwin in 1858, announced the theory of Natural Selection, for a time believed that all evolution could be explained by Darwinism; but very soon his opinion under-went a change and he came to regard natural selection as inadequate to explain several of the physical as well as psychical characters of man, such as his soft, sensitive skin, his speech, his colour sense and his mathematical, musical and moral attributes. He concluded: 'The inference I would draw from this class of phenomenon is that a superior intelligence has guided the development of man in a definite direction and for a special purpose.'

In his later years, Wallace not only considered that natural selection could not explain the mental and spiritual nature of man, but he also considered that it could not explain the beauty of butterflies or of birds.<sup>20</sup>

In the past twenty years of this investigator's research, he found through an in-depth study that both Darwin and Wallace believed that psychic factors influenced the development of the rational mind. Nevertheless, Broom still adhered to identi-

fying natural selection as a mechanical sweeper in eliminating the biological unfit. He reported in a synoptic manner that "Natural Selection, certainly eliminates the unfit and establishes the fit. . . ."<sup>21</sup> However, Broom delegated the creation of the fit to a realm of another type of agency.

Darwin's opposition to materialistic evolution has been accepted and confirmed by both historians and philosophers of science. Max Muller (1823-1900), philologist and mythologist contended, "With all my opposition to Darwin, I have really gone far beyond the point where he stopped, for I have always treated man not only as a descendant of an animal, but as to all intents and purposes an animal."<sup>22</sup>

Moritz Schlick (1882-1936), analytical philosopher, strengthened the assurance of certainty to the fact that "Darwin's idea of 'selection' especially makes plausible how through purely random variations, through the struggle for existence and through heredity, given teleological features could be perfected."<sup>23</sup>

In 1959, Charles Singer (1876-1960), historian of science, offered reasons why Darwin presented his belief in final causes as masked mechanism. Singer, after investigating, reached the decision that "Darwin repudiated teleology, but in his title, almost as though wishing to emphasize it, but he repeats the teleological metaphor and speaks of the *Preservation of Favoured Races*. But how do we know that races are favoured? By their preservation! And what is preservation? A favour! And what is the favour? Preservation!"<sup>24</sup> The historian, Theodore Roszak (1933- ), submitted the definition of Darwinism as parochial and self-serving. Roszak's analysis is helpful because he summarized the upshot of the controversy. He concluded that "The main purpose of Darwinism was to drive every last trace of an incredible God from biology. But the theory replaces the old God with an even more incredible deity-omnipotent chance."<sup>25</sup>

Singer explained further that "Darwin was an investigator of the very first rank, but he was inexpert in the exact use of language and had little philosophical insight. Nor was his discovery quite of the nature that many of his followers thought it to be."<sup>26</sup>

The above evidence indicates that a number of historians and philosophers of science described Darwin as a leading teleologist whose philosophy and beliefs decelerated the development of evolutionary theories.<sup>27</sup>

## CONCLUSION

Broom, a noted paleontologist and evolutionist who held the first place in rank among scientists in his discipline for fifty years, somehow misconstrued the theories of the two giants of modern evolutionary theory. His religious belief led him to believe that impelling spiritual forces were the causes of both biological variations



and the origin of species. Broom misinterpreted Darwin's teleological position and identified him as a mechanist. Why did a professional paleontologist of Broom's scholarly status accept the garbled and inaccurate accusations made against Lamarckian philosophy? It may be due to the feverish defense of the theory of natural selection by Darwin's advocates. These erudite and articulate scholars still dominated the field of evolutionary thought when Broom was a student.

Such Darwinists as Alfred Russel Wallace (1823-1913), Sir Joseph Hooker (1817-1911), and Thomas H. Huxley (1825-1895), maligned and traduced Lamarckian theory with false statements. In this writer's investigation he found no evidence that Broom actually read Lamarck's works in the original. For a close observer of his standing, Broom should have been enterprising enough to conduct a detailed examination of Lamarck's writings without relying on the previous descriptions of the Darwinists.

Broom, in his evolutionary reports, did a disservice to Lamarck by repeating the calumnious utterances of Darwin's flatters. These encomiasts discredited the scientific validity and reliability of the theory of inheritance of acquired characteristics and staunchly proclaimed the theory of natural selection as the omnipotent truth.

The biological examples given by Broom did not illustrate or represent the paradigms used by Lamarckians to substantiate the theory of use and disuse. Broom's nonpragmatic application and use of poor illustrations, along with his emphasis upon the driving forces of the inheritance of acquired characteristics centered on psychic powers, aided and comforted those individuals who debased Lamarck's outstanding credentials as a biologist. Broom, as a respected scientist, did not contribute in establishing the scientific landscape for a revisit and a new looking-into and upright comprehensive analysis of Lamarckian theory. Had he done so, possibly the various new subdivisions of biological science such as embryology and immunology might have started serious experimentation and, by this time, either proved or disproved the validity of Lamarckism. However, Broom was a product of Victorian and Edwardian educational period and he could not surmount the avalanche of anti-Lamarckian propaganda. Hopefully, history and daring experimenters, will in the near future vindicate the scientific reputation and works of the only father of modern evolutionary theory, Jean Lamarck.

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