

The Heritage of Louis Agassiz

• *Thomas G. Aylesworth, Doubleday and Co., New York*

Louis Agassiz was the originator of many of our ideas in using the laboratories and field in teaching biology. The author is Senior Editor of Books for Young Readers.

Jean Louis Rodolphe Agassiz was born in Motier, Switzerland, May 28, 1807. Even as a boy, he was beginning to develop an interest in science that marked him as a future contributor to this discipline. Before he was ten years old he was collecting and raising fish and birds. In 1817 he entered a school for boys at Bienne, and in 1822 he matriculated at the Academy at Lausanne, where he began his studies in zoology. He then moved to Zurich, where he entered the medical school in 1824. The following year he went to the University of Heidelberg, and in 1827 transferred to the University in Munich. There, in 1829, at the age of twenty-two, he earned his doctorate of philosophy, and the following year, his doctorate in medicine.

In 1831 he went to France to study with Cuvier, the French anatomist and paleontologist. Upon the death of Cuvier in 1832, Agassiz accepted a teaching position at the University in Neuchâtel, where he was the first biologist to lecture on the relationships between the different branches of natural history. While at Neuchâtel, he organized a natural history society.

He began a lecture-study tour of the United States in 1864, which led to his appointment as a professor at Harvard, where he founded the Museum of Comparative Zoology. He also helped found the National Academy of Sciences and was a member of the board of directors of the Smithsonian Institution. During this time, he reacted violently against Darwinian evolution and Haeckel's theory of science as a godless philosophy. Agassiz died on December 14, 1873.

Although Agassiz has been called "The Father of American biology," and although it has been said that he trained most of the great biologists in America during the latter half of the nineteenth century, his name is unfamiliar to many public school science teachers. His contributions to science and science

teaching in the areas of content, methodology, and attitudes, however, should never be forgotten.

Content

Agassiz had an abiding interest in geology, as well as in biology, and he was the first to prove beyond doubt that glaciers move. After exploration and experimentation over a period of years, he hypothesized his theory of continental glaciation in 1840.

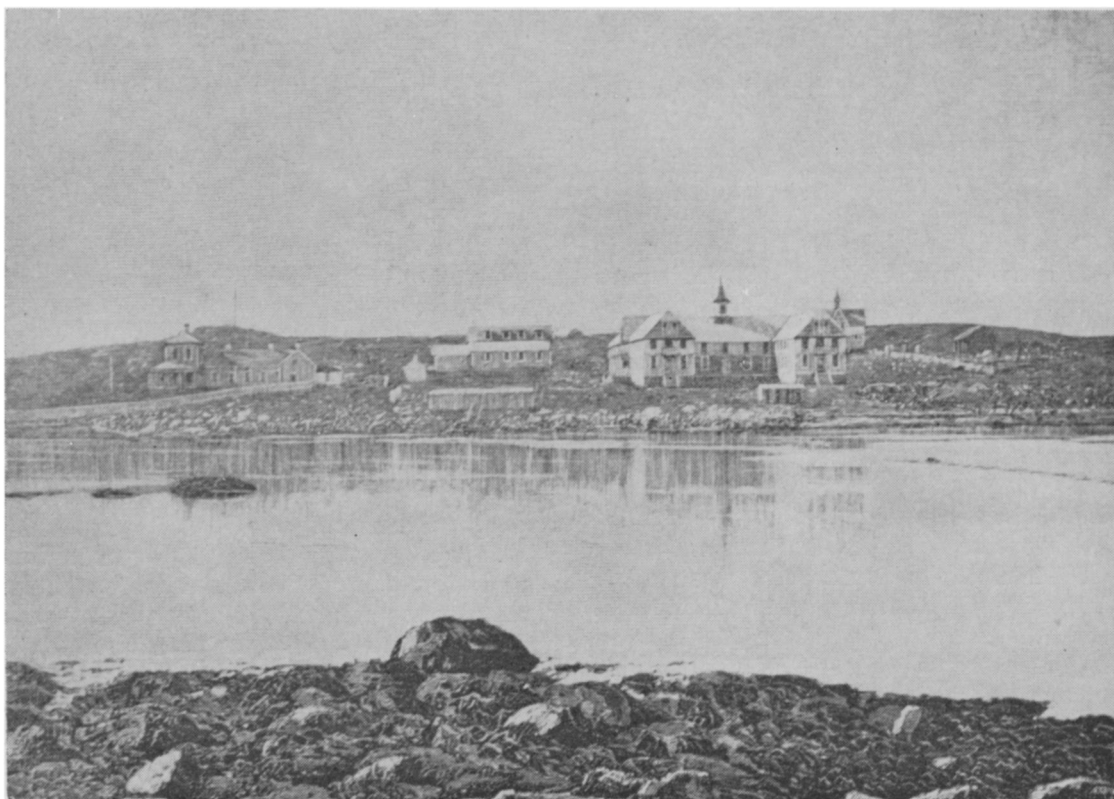
In the field of biology, he formulated an ecological theory of the distribution of the races of man. In 1856, while working with the American catfish, he confirmed Aristotle's theory that the male of some species of fish protect their young by warding off predators by rushing at them and snapping. Agassiz and Bronn, in 1859, counted 129,370 kinds of animals (quite short of the number presently known), which was an early attempt at classifying this knowledge.

A deeply religious man, Agassiz could not rationalize the difference between philosophical evolution and scientific transformation. His theory of evolutionary change was one in which God destroyed a living thing that had been especially created in order to make another design. This may seem strange to us today, but it is a point of view also held by Cuvier, Linnaeus, Owen, and other scientists of the past.

Agassiz published many items of research. Among them are: *Recherches sur les Poissons Fossiles*, *Nomenclator Zoologicus*, *Histoire Naturelle des Poissons d'Eau Douce de l'Europe Centrale*, *Etudes Critiques sur les Mollusques Fossiles*, *Système Glaciare*, *Contributions to the Natural History of the United States*, *Methods of Study in Natural History*, and *A Journey in Brazil*.

Methods

Agassiz was a great believer in teaching students to observe. He was often quoted as



Agassiz school on Penikese Island in Massachusetts. (From Joseph H. Parkhurst, Jr., *Colonia*, New Jersey.)

saying, "Read nature, not books," and "Take your text from the brooks, not from the book-sellers." Materials, he felt, should be taken from the natural environment of the student, and no lecture should be given unless specimens were available. At times he even presented specimens for continuous observation during a lecture, as when he gave each student a grasshopper to observe while an entomological talk was being presented. The best source for these specimens, he proposed, was the student himself. That is, the student should collect specimens from the natural habitat.

He was the first naturalist to make plaster casts of specimens. At every opportunity, he endeavored to use the inductive approach in his laboratory. Agassiz felt that it was his responsibility as the teacher to isolate a problem for the student, and the student's responsibility to solve this problem. He often went to such lengths in forcing the student to solve his problems that he would leave the room for hours at a time, looking in on occasion to

ask what the student had learned from his specimen. Upon hearing the hypotheses of the student, he would tell him that it was not enough, and leave him with the specimen for a few more hours. Thus, he made every effort to help students learn to apply the scientific method of problem-solving.

Attitudes

In order to foster the proper scientific attitudes in his students, Agassiz was always eager to participate in the formation of museums, institutes, and science organizations. As mentioned previously, he founded natural history societies and museums. He also began the first summer school for teachers on the island of Penikese in Buzzards Bay in 1873, for the purpose of teaching content and methods. His enthusiasm for the broad aspects of biology was mirrored in his lectures, and he identified himself with teachers institutes in Massachusetts and also with the state organization of public school science teachers.

His main thesis in teacher preparation was one of broad understandings of specific subject matter. He criticized the common practice of permitting underprepared teachers to teach, and would say that this is unfair to students. He also told teachers to learn the facts of subject matter as a prerequisite to formulating generalizations based upon the inductive method. Agassiz pointed out that in order to understand a subject matter, we must first study the history of the discipline. He told teachers to have the courage to say, "I do not know."

Here was a man who, before Dewey, told us to use the students' environment, to use laboratory methods, to let students discover for themselves, and to teach students to think scientifically. Here was a man who, when asked what he regarded as his greatest work, replied, "I have taught men to observe." Surely it would profit a teacher to emulate his theories of teaching and scholarship.

Bobwhite

If bobwhite quail could take out life insurance policies, they probably could not afford them. John L. Steele, Jr., an Oklahoma Conservation Department biologist, estimates it would cost a bobwhite \$905 for the annual premium on a \$1,000 insurance policy. "This premium is based," he said, "on the fact that 82 out of every 100 quail will be dead before they are a year old." Fifteen of 100 quail will live 1½ years; two may live three years, but only one in 1,000 will live five years. These mortality figures are based on Steele's quail study which also reached the conclusion that hunting does not regulate quail populations.

Arizona Quail

Some youths stole 20 Masked Bob White Quail from an Arizona research project recently and had what will probably be recorded as the most expensive meal of the year. The quail were being bred in an attempt to re-establish the species in Arizona and more than \$20,000 had been spent on the project. More important than the money, however, is the fact that the birds, 30 of them, were the only remaining Masked Bob White Quail in the United States. Bureau of

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Land Management State Director Fred Weiler says additional breeders might be captured in Mexico, but the birds are near extinction there also

Squirrels

Squirrels are still the top targets of West Virginia hunters, according to a survey of licensed hunters last year made by the Game and Fish Division, West Virginia Department of Natural Resources. Some 85% of the hunters questioned said the bushtail rodent was their favorite game. Second in popularity was the rabbit, followed in order by grouse, deer, turkey, quail, raccoon, and bear.

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lost touch with the public because their experiments and their discoveries relate less and less to what the average human being can experience or understand.

If we make the wrong choice, and alienate the interest of *our* public, we may find ourselves to be biology teachers without an audience. And this, of course, would be tragic in more ways than one.

Philip Goldstein
Abraham Lincoln High School
Brooklyn, New York