ARTHUR NORRIS BRAGG

(1897-1968)

BIOGRAPHY AND BIBLIOGRAPHY

by

C. J. McCoy

CARNEGIE MUSEUM
PITTSBURGH PA. U.S.A.

(Carnegie Museum of Natural History)

and

Jeffrey Howard Black

(Oklahoma Baptist University)

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"Regardless of how what I have done in my thirty or more years of the study of Amphibia in Oklahoma may appeal to later generations, of what false deductions and inadequate interpretations may appear in my papers or of the many mistakes made, anyone interested in the development of natural history in the Southwest must necessarily take what I have done (good, so-so, or bad) into account."[1] The author of these humble words, Arthur Norris Bragg, was born in Pittsfield, Maine on 18 December 1897, and died in Norman, Oklahoma on 27 August 1968, less than two months after his retirement from active teaching at the University of Oklahoma.

Arthur N. Bragg was the fourth child of Nathan and Emma Bragg. When Bragg was six years old his father died, and his mother was forced to support herself and her children. His early schooling was irregular, because the family had to move frequently from place to place, living where Emma Bragg could find work. Because of this unsettled life, his interest in unpopular things, and his clumsiness at group activities he had few friends and was never popular as a boy. But life in rural Maine provided ample opportunity for early development of an interest in observing nature. At the age of eight he first heard a strange sound in a roadside ditch, which in later years he identified as the call of Rana clamitans melanota. He recalled being much impressed at age nine by his first Clemmys guttata, which he called his "polka-dotted turtle."

Bragg's academic progress was slowed by almost overwhelming financial difficulties, but he never gave up his goal of getting a college education. He graduated from highschool at 21, and entered Bates College, in Lewiston, Maine in 1919. During these years he supported himself by working as a chef at summer resorts in Maine and New Hampshire, as a cook for a logging crew, and by working in a wooled factory, among other jobs. Following his sophomore year he spent one year as principal of a grade school, then returned to graduate from Bates in 1924. Bragg married Mary Kierstead on 24 December 1924.

The next year Bragg went to Johns Hopkins University, where he became interested in protozoans after taking classes under H. S. Jennings and S. O. Mast. After one year at Hopkins he took a job as Assistant Professor of Biology at Marquette University. During an eight-year stay at Marquette his interest in invertebrates broadened, and he completed the manuscript for a textbook, unfortunately never published, on invertebrate zoology. One summer was spent on the Maine coast, making illustrations for the book from living animals.

Leaving Marquette, Bragg went to Boston University for his M.A., and studied animal behavior and entomology. His thesis topic was food vacuoles and selection of food by Paramecium, and his first publications dealt with Paramecium. Bragg entered the University of Oklahoma in 1934 to work on a Ph.D. under A. Richards. He collected his first breeding pairs of Bufo cognatus in April, 1935, for research on the mitotic cycle and mitotic distribution in early embryos. During the research for his Ph.D, which he received in 1937, Bragg found yolk platelets in amphibian eggs and developed a technique for determining the amount of cell division occuring at various places in an embryo of any stage. This method (mitotic index) had never been applied to any amphibian, nor to any embryo derived through holoblastic cleavage. His findings were published in well-known journals in 1938 and 1939, yet the general disregard of this work by others bothered him throughout his life.

During the early days in Oklahoma two events of great importance occurred in the life of A. N. Bragg. One was a developing friendship with Charles Clinton Smith, Sr., and the other was the start of his interest in the genus Scaphiopus. In Smith, Bragg found an enthusiastic and sympathetic associate, and their joint field trips set a pattern for the remainder of Bragg's life. In later years he frequently told of the collecting trips when they would be out for days, catching naps in corn fields or in the weeds beside a countyroad during the day, and hunting amphibians all night. Regardless of how many hours he went without sleep, Bragg was never late for his classes, sometimes returning with just enough time to clean up and go to the classroom. Bragg's interest in spadefoots started unexpectedly. He had thousands of Bufo cognatus tadpoles in a large tank, and agreed to share the tank with another graduate student, Minnie Trowbridge, who was studying the development of Scaphiopus. To their amazement, the Scaphiopus tadpoles ate the Bufo tadpoles: thus began the interest in Scaphiopus that became the dominant theme of Bragg's scientific work.

In the early 1940's Bragg developed progressive deafness, and had to wear a hearing aid. During the last 15 years of his life he suffered from serious coronary disease, cataracts, and other medical difficulties. These physical problems, and advancing age, made it necessary for him to work at a slower pace, but he never failed to answer the call of the toads. Every spring except one, and every summer except three between 1935 and 1968 he studied amphibians in the field in Oklahoma and adjacent areas. He visited every county in Oklahoma at least once, and most of them many times. Thousands of specimens were collected at all stages of development, and behavior and distribution were observed and

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[1]We thank Mrs. Mary Kierstead Bragg for permission to use material from Bragg's unpublished autobiography "The making of a naturalist."

studied in themajority of forms. During much of this time he virtually lived with the amphibians. Bragg claimed to be able to "think" like a toad, and his students and friends sometimes referred to him as "Mr. Toad" or "Bufo" Bragg. He seemed to know every pool, permanent and temporary, almost to the smallest buffalo wallow, and he could determine with amazing accuracy whether it had been used for breeding by Scaphiopus, Bufo, Rana, Hyla, or other amphibians. Despite the scope and intensity of his work on the amphibians, his research was always run on a "shoestring" budget, supported principally by the Oklahoma Biological Survey, which he served as herpetologist.

Bragg published more than two hundred papers, and a book on the spadefoot toads. His papers were not entirely devoted to herpetology, but also covered subjects such as protozoans and other invertebrates, religion and science, and biography. He has been criticized for putting out so many short notes, some perhaps superficial or not "scientifically" written, in obscure journals. These criticisms did not appear to bother Bragg. He never worried about where he published, and did not consider this important. He frequently remarked that a person could publish a number of short papers and then later review and discuss these in a longer paper, or save all the data and publish a single long paper. He once said that if something had happened to him, and these small notes had not been published, then we would not have known most of what he had learned about spadefoots. Like many field biologists, he carried an enormous amount of unpublished information and observations around in his head.

Few contemporary herpetologists met Bragg, although he corresponded with many. He was active in the Oklahoma Academy of Science and rarely missed a meeting, but it was unusual for him to attend a national scientific meeting. This was in part due to the financial troubles that plagued him into later life, by which time his health prevented long journeys to meetings. Bragg had many interests outside herpetology. He was at one time active in the Presbyterian Church. He liked to read a wide variety of subjects, and could converse on practically any topic. During later years, when he could read only with the aid of a magnifying glass, he would have his graduate students read aloud favorite selections from the books of poetry that were always at hand. He actively collected stamps, and had a postmark collection.

Arthur N. Bragg enjoyed living, and impressed his sense of enjoyment on those who knew him. Concerning his studies, he wrote: "I firmly believe that one does best what one likes best to do," and "I was made for a field naturalist, not for a laboratory man." His life's work stands as a monument to the accuracy of this self-analysis.

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