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Interview with John C. Briggs, recipient of the 2005 Alfred Russel Wallace award

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Brian W. Bowen. Your autobiography (*A Professorial Life*, Xlibris 2009) describes conditions at eight academic institutions across seven decades. What trends did you see in academia over that time, and where are biological departments headed today?

John C. Briggs. From the 1940s to the present time, research in biology departments has undergone three major changes: from (1) problems that involved the study of whole organisms to (2) an increasing emphasis on experimental genetics, embryology, and physiology from the 1940s to the 1980s, and then (3) the rise of molecular biology from 1980 onward. But now a fourth change, an upsurge of interest in environmental biology, is having a profound effect. The course work offered in biology departments has generally followed these trends, and departmental organization has been affected to the point where some departments have become split into two or three different entities.

Beginning in the 1990s, biologists began to take an interest in the number of species that inhabited the world, and the fact that human alteration of the environment was probably eliminating many of them before they had even been described. These findings energized various private organizations and governmental agencies to the point where saving the environment and the species within it became *the* great conservation goal. In many institutions the environmental ethic has spread to numerous departments (law, engineering, geology, social science) and it is often possible for students to major in environmental science. In biology, this has led to a new emphasis on traditional studies such as morphology and systematics and a renewed appreciation for the value of natural history collections.

BWB. Across the timeframe of your career, what are the greatest successes in biogeography, and what is the most surprising change?

JCB. During my career, the most successful innovation and the greatest impetus to biogeographical research was the invention of phylogeography, i.e., the application of molecular methods to reveal the genetic relationship of species and higher taxa. This advance, primarily attributable to John Avise and his students, has become an integral part of biogeography. Phylogeography has solved, and is continuing to solve, problems that have perplexed generations of biogeographers. The growth of phylogeography has been both surprising and beneficial.

The next most influential advance was due to the contributions of several paleontologists over recent years. They found that the generation of the earth's latitudinal biodiversity pattern was primarily due to the continuing movement of tropical lineages toward the poles. This demonstrated that the tropics were the main fount of diversity for all latitudes. As a result, it became clear that the tropics, and particularly the high diversity centers within them, should become a first priority for conservation efforts.

BWB. You witnessed the rise of cladistic biogeography, and opposed their interpretation of species distributions by strict vicariance. How would you characterize the vicariance/dispersal debate today?

JCB. Cladistic biogeography was the result of an uneasy alliance between those who believed in cladistics, a systematic procedure, and those who were advocates of panbiogeography, formation of species by continental movement. The difficulty was that cladistics originally included the recognition of dispersal as an integral part of the phylogenetic process. But the vicarianists did not believe that biogeographic patterns could be formed by dispersal. Nevertheless, the name "cladistic bio-

geography", given by Humphries and Parenti in 1986, was widely adopted by the vicarianists who continued to believe that species could not survive long-distance dispersal. Today, there appears to be a general agreement that both vicariance and dispersal have led to the establishment of biogeographic and evolutionary patterns, so very little debate remains.

BWB. You have been a leading advocate for marine centers of speciation as evolutionary engines. How do the recent papers, postulating ecological speciation in the sea, change the terms of this debate?

JCB. I admit that it has been rather frustrating to find that most of the criticism of the idea that marine centers of origin perform as evolutionary engines has come from those who have discovered that speciation also takes place in peripheral areas. Their reasoning is: if speciation is widespread, evolutionary advances can emerge almost anywhere. This could be true if all new species were formed under equal environmental circumstances. However in 1966, I published a paper in Evolution (20: 282-289) which stated, " Since it is known that speciation is very active in areas peripheral to the major dispersal centers, we should consider that two kinds of evolution may be taking place- one that may be successful in terms of a phyletic future and one that is unsuccessful."

The evolutionary engine hypothesis does not predict that most speciation is concentrated in centers of origin. In fact, the enormous areas of lower diversity that exist outside the centers certainly produce more species than do the centers. The difference is that species produced in the cauldron of high diversity and maximum competition are evidently best equipped to become dominant and geographically widespread. There is now considerable empirical and genetic data to indicate that this is true. Recent research has shown that ecological speciation (including parapatric and sympatric processes) may be the most common mode. But, aside from the mode, I suggest that the most important predictor of widespread success is the place of origin.

BWB. Wildlife management in the United States has recently shifted from a focus on endangered species to an ecosystem-based approach (conservation biogeography). What do you see as the strengths and weaknesses of this approach for marine conservation?

JCB. It has become obvious that no-take, marine protected areas (MPAs) must be at the core of any scheme to put fisheries on an ecologically sustainable basis. They presently cover a cumulative area of only 0.7% of the world's oceans. There has been a general agreement (Parties of the Convention for Biological Diversity, 2008) that a 10 % coverage needs to be attained, so this goal has a long way to go. We will have to set up larger MPAs at a faster pace for this approach to have the desired effect. As long as the MPAs are properly located according to the ranges of the species to be protected, and if they are policed to prevent poaching, I see no apparent weakness.

In the meantime, fishing in many areas has reduced the populations of some species so low that their eventual recovery, even under MPA protection, seems unlikely. In such cases, particularly where the overall species diversity is low, I have suggested that transplantation of species from equivalent high-diversity environments be considered. The fisheries of the North Atlantic could benefit from this procedure provided it is carried out under MPA protection.

BWB. What is the relationship between phylogeography and biogeography in your view?

JCB. Phylogeography has become an essential part of biogeography in that it has made possible the solution of problems that have vexed traditional biogeographers for decades. Solutions to problems such as the influence of long-distance dispersal and the operation of biogeographic boundaries, have made good progress.

BWB. Ernst Mayr posed the question of whether speciation in the sea is the same process as on land. He decided that it was the same. Do you agree?

JCB. Basically, I do agree but Ernst Mayr believed in centripetal speciation, whereby small popula-

tions that had been separated from a larger, parent one, were the source of successful new species that eventually replaced the parent one. On the other hand, W.L. Brown had pointed out that centrifugal speciation, where new species were produced from within a large parent population was far more likely. The latter hypothesis appears to be confirmed by many origination and dispersal patterns.

BWB. What were the key events that lead to your career in marine biogeography?

JCB. One of my Stanford professors, George S. Myers, was interested in biogeography, particularly the distribution of freshwater fishes. When I undertook a worldwide revision of the clingfishes (Gobiesocidae), I found interesting evolutionary patterns and attempted to trace their history from their morphology. Also influential were works by such people as A.R. Wallace, C. Darwin, W.D. Matthew, S. Ekman, and P. Darlington.

BWB. You have been an avid airplane pilot for most of your life. How many times did you crash, and which was the scariest?

JCB. I found flying an airplane to be an exhilarating experience that provided a birds-eye view of the earth's surface, perhaps valuable for a future biogeographer. When people are young and single, they sometimes take foolish chances. While still in the Army Air Corps, I owned a little, single-engine Taylorcraft. I had three forced landings, two of them because I misjudged the rate of gas consumption. The third one ended in disaster when I was trying to cross the Rocky Mountains, so I lost an airplane that I had loved. I only wrecked one military aircraft but that accident was not considered to be my fault so I did not suffer any consequences. I might add that my wife and I owned an airplane and enjoyed flying for about 30 years without any crashes.

BIOSKETCH: John C. Briggs

The usual biosketch, submitted along with manuscripts to the *Journal of Biogeography*, gives one the opportunity to publicize achievements such as books and awards. But now that I have passed my 90th birthday, I feel that I should be more retrospective and express my gratitude for the numerous fortunate occurrences (lucky breaks) that came my way. First, and perhaps most important, I had a mother and father who loved each other and provided a secure home for my two brothers and I as we grew up. Second, I was lucky to be able to attend some good public schools in Burlingame, Los Altos, and Palo Alto, California. Third, despite having been a mediocre student in high school, I was admitted to Oregon State College in the fall of 1939.

At Oregon State, two professors R.E. Dimick and F.A. Gilfillan provided encouraging support. In 1942-43, I enrolled in the Civilian Pilot Training program that was supported by the U.S. government. I graduated from Oregon State in the spring of 1943, in midst of World War II, and served in the U.S. Army Air Force for most of the next three years. The next good break, perhaps the best for my professional career, came when I was admitted to graduate school at Stanford University. There, I had more good professors including G.S. Myers, R.L. Bolin, and D. E. Wohlschlag. After earning a Ph.D. in 1952, I remained at Stanford for two years as a post doc. Then, I was fortunate to be offered a position as an instructor in biology at the University of Florida.

After UF, I made several other moves, not that I was footloose, but each time opportunity beckoned because of the prospect of a better salary and/or promotion. Subsequently, I enjoyed jobs at the University of British Columbia, University of Texas, and University of South Florida. At USF, I met an attractive economics professor, Eila Hanni, who had never been married in spite of numerous suitors. Why she consented to marry me, I'll never know, but I am most fortunate to have been wed to her for 37 years. I stayed for 26 years at USF until my retirement in1990. From 1990 to 2000, I had an honorary appointment at the University of Georgia and was able to work at their Natural History Museum. Finally, I am once again affiliated with Oregon State University so my academic life has come full circle.

