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In memoriam

In memoriam: Ronald J. Barfield (July 25, 1936–September 29, 2015)

Ronald “Ron” Barfield was a pioneer in the development of the modern field of behavioral neuroendocrinology. Starting with his thesis work at the University of California, Los Angeles (UCLA), he performed a series of studies over the course of his career, experiments involving the careful stereotaxic implantation of sex steroid hormones in the brain, that transformed the field. For his doctoral dissertation that he completed in the mid-1960s, he focused on testosterone action in the preoptic area of roosters. He went on to show in a variety of species, primarily rats, how steroid hormones can have direct actions in discrete brain areas and modulate behavior in specific ways. His path-breaking studies of ultrasonic vocalizations in rats in the context of reproduction also have had an enduring impact. In addition to his significant scientific legacy, Ron was an active leader in the field through his participation in many national and international conferences and societies that sponsored research in behavioral neuroendocrinology and through his service on editorial boards for significant journals such as Behavioral Neuroscience and Hormones and Behavior. He served as a program officer at the National Science Foundation both in the Animal Behavior program and in the Neuroendocrinology program from 1994 to 1997, where he was able to support research important to the field.

Ron was born in Detroit Michigan on July 25, 1936, and he died on September 29, 2015 in Palm Beach Gardens, Florida. He received all of his university degrees at UCLA. He graduated with an AB in Zoology in 1959 and then completed a master's degree in 1962 and PhD in 1965. His doctoral advisor was Nicholas Collias, a prominent ornithologist/ethologist at UCLA, who is perhaps best known for his studies of nest building in weaver birds. Collias, like many mechanistically-oriented ethologists, had conducted studies on the hormonal control of nest building and other behaviors related to reproduction in his primary study species, the weaver bird, and Ron collaborated with him in the early 1960s on this project (reviewed in Collias and Collias, 1984). This work planted the seed for Ron to pursue studies of hormones and behavior in birds. An emerging concept in the 1960s was that steroids act directly in the brain to facilitate the activation of adult behavior. It was reasoned that small implants of crystalline steroid placed directly into select brain areas of gonadectomized animals should activate behavior and thereby help build an understanding as to how hormones modulate neural circuits to activate behavior. Robert Lisk at Princeton (Lisk, 1960) pioneered the stereotaxic technique allowing accurate placement of steroids such as estradiol into the brain in order to investigate neuroendocrine effects (Lisk, 1960). For his thesis, Ron Barfield studied the effects of intracranial implants of androgen on sexual and aggressive behavior in capons (castrated roosters; Barfield, 1965, 1969). He found that copulatory behavior was activated by implants of testosterone in the preoptic area (POA), but not in other brain areas, and that copulatory behaviors were activated by such implants in the POA but aggression was not. This approach was in the zeitgeist of the mid-1960s and set the stage for more detailed analyses of hormone modulated neural circuits.

Ron had two famous neuroendocrinologists on his committee – Richard Whalen and Charles Sawyer. While approving Ron's proposed topic during his thesis proposal meeting, Sawyer raised a number of practical issues that Ron had not grappled with. One was how he was going to stereotaxically implant androgens in the chickens. In his proposal to investigate central effects of androgens on aggression and copulation in capons, Ron had not realized that stereotaxic devices were not readily available for studies in birds. At Sawyer's recommendation, Ron went to see David Kopf who had recently started his Los Angeles-based Kopf instrument company, and who was among the first to produce high quality stereotaxic devices. Kopf asked for a few rooster heads and personally modified a stereotaxic device to be compatible with work in chickens so that Ron could conduct his dissertation research.

After UCLA, Ron went to the Institute of Animal Behavior at Rutgers, Newark to pursue post-doctoral studies with Daniel Lehrman. He conducted work on ring doves with Lehrman, but he also initiated

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studies on rats with Benjamin Sachs (Barfield and Sachs, 1968), who was also at the Institute at that time, and rats became the primary study species for the rest of Ron's career. After his two years of post-doctoral research at Rutgers, Newark, in 1967 he joined the Zoology Department as an assistant professor at Douglas College on the New Brunswick campus of Rutgers. This position initiated a series of appointments that he held at Rutgers until his retirement in 1999. In 1970, he joined the Biology Department of Livingston College as an associate professor, and he was promoted to Full Professor in 1974 and to Professor II in 1981. The biological sciences at New Brunswick were amalgamated into a single department in 1974, and Ron's appointment over the remainder of his career was in that single Department of Biological Sciences.

Ron's impact on our science can be appreciated based on three related lines of research that he pursued nearly throughout his career. First in 1972 he discovered that male rats produce ultrasonic vocalizations during the postejaculatory refractory period (Barfield and Geyer, 1972). He then conducted a series of studies investigating these ultrasonic calls in several different contexts related to sexual, social and parental behavior, that resulted in a large number of publications spanning more than two decades. This work was summarized in a general review in 1986 (Barfield and Thomas, 1986). A second line concerned the neuroendocrine regulation of sexual and agreesive behavior in female rats.that was also very impactful. The third line of research concerned reproductive behavior and ultrasonic vocalization in male rats and combined studies of central and systemic administration of sex steroids. Ron even ventured into studying mice, because beginning in the 1990s, they were considered as a potentially better model for behavioral endocrinology in gonadectomized animals, because they could be used for conduct transgenic studies.

The hallmark of Ron's work was his ability to perform careful stereotaxic implantations that provided foundational information on the sites of action of steroid hormones in relation to the activation of sex and aggression. Work from Ron's lab played a key role in the development of a consensus on where steroid hormones act to regulate male-typical and female-typical sexual behaviors. He also addressed the issue of steroid specificity, identifying the importance of estrogenic metabolites of testosterone acting in the POA in the regulation of many male-typical behaviors. Over the course of a 30-year publishing career (from 1968 to 1998), Ron published about 100 refereed journal articles in addition to an influential set of book chapters and other reviews.

Ron mentored a series of students at Rutgers who went on to make contributions to the field of behavioral neuroendocrinology and other fields of science, including Tracy McIntosh, Mary Erskine, Beverly Rubin, John Matochik, Eric Pleim, Lynette Geyer, and Nicholas White. Moreover, he was supportive of many young scientists in our field whom he encountered in a variety of places. Ron also was a spokesperson for the field, often facilitating conversations at conferences by asking questions or making comments related to hormones and behavior in the broader contexts of ethology and neuroscience.

On a more personal note, Ron was intellectually generous to both of us during our entire careers. He enjoyed talking with us in part because our work is in birds, and we built on his thesis work in chickens. He was always a great sounding board for new ideas, and he would take the time to discuss them. One of us (JB) personally encountered Ron's insightful reactions at the end of talks during conferences at his first oral presentation. It was 1975 during the International Ethology conference in Parma, Italy. At the time JB was working on the endocrine control of reproductive behavior in male ducks and had the privilege of presenting his results in front of a large audience including very prominent members of the field such as Konrad Lorenz, Uli Weidman, Frank McKinney and Irenäus Eibl-Eibesfedlt. As a young PhD student who was a native Francophone, at that time he had a less than optimal command of English. Needless to say, there was much stress when the talk was completed based on the fear that questions would come afterward in English that would not be understandable. However, at the end of the presentation, Ron Barfield, whom JB did not know at the time, stood up and started commenting about the presentation. The comments were mostly positive even if they were hard to follow for a native French speaker. In this case, Ron had so much to say that he spoke about as long as the length of the original talk so that at the end of his comments there was no time for other questions, much to JB's relief!

After retirement Ron enjoyed an active life in Florida including sports such as softball and sailing with his wife, Paula Davis. Ron is survived by Paula and his two children, David and Rachel. We miss his collegial and supportive presence in our field, both intellectually and socially.

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