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FRANK AMBROSE BEACH

1911—1988

A Biographical Memoir by
DONALD A. DEWSBERY

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Biographical Memoir

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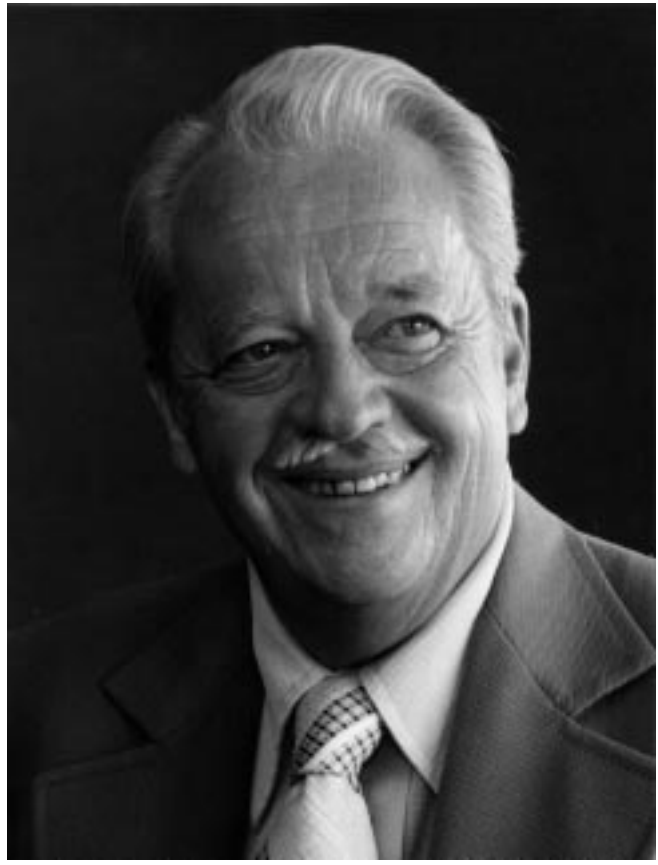

F. A. Beach

Photo by Betty Jane Nevis, Berkeley, California

FRANK AMBROSE BEACH

April 13, 1911—June 15, 1988

BY DONALD A. DEWSBURY

FRANK A. BEACH WAS arguably the premier psychobiologist of his generation, influencing the development of psychobiology in numerous, diverse ways. Believing that learned behavior was too complex for detailed analysis, he shifted the focus of the field toward the study of instinctive, or as he preferred, species-specific behavioral patterns, such as mating and parental behavior.

A major impact was Beach's movement of the field toward increased physiological considerations, as in research on the neural and endocrine determinants of behavior. Along with William C. Young, he established the field of behavioral endocrinology. Physiological analysis can quickly become reductionist; in Beach's hands, by contrast, it was integrative. He sought to understand behavior not only with respect to the two-way relationships with neural and endocrine processes but in dynamic relation to the complex environment in which animals live. Further, Beach believed that behavior should be understood in an evolutionary framework. The function of behavior was to permit animals to adapt to complex and ever-changing environments. He sought an integrative psychobiology that would transcend these levels of analysis and focus on behavior, but it would be rooted in the study of its physiological

correlates on the one hand and its adaptive function on the other. He thus tried to unify the physiological and comparative factions of psychobiology.

Beach strongly valued experimentation and was a skilled experimenter—a seat-of-the-pants, follow-your-nose kind of experimentation, rather than one based on sophisticated mathematical analysis or elaborate equipment. He was a down-to-earth Midwesterner. Beach's most lasting influence stemmed from his ability to think about the field and to write integrative articles that would synthesize developing trends and shape their evolution toward an improved integrated psychobiology. His sense of timing was exquisite.

PERSONAL HISTORY[1]

Frank Ambrose Beach was born in Emporia, Kansas, on April 13, 1911. His mother was Bertha Robinson Beach; his father, Frank A. Beach, was a professor and head of the Department of Music at Kansas State Teachers College in Emporia. The music building at what is now Emporia State University is named in his honor. Beach rarely used the "Jr." associated with his name.

Beach attended the teacher's college with the goal of becoming an English teacher. He received his B.S. degree in education in 1932. His course was not always smooth. Freshman year grades were so low that Beach's parents sent him away to Antioch College for a year to improve his academic motivation. The strategy worked, and he returned to Emporia for his junior year, becoming a campus leader and taking his first course in experimental psychology. Although its effect was not immediate, this course altered his life's direction. His instructor, James B. Stroud, had earned his doctorate with Harvey A. Carr at the University of Chicago, and Beach later named Stroud as the teacher who had exerted the greatest influence on his professional development.

Unable to find a job teaching English when he graduated at the peak of the Depression, Beach accepted a fellowship from Stroud on the condition that Beach would pursue an M.S. in psychology. Although his work was in clinical psychology, Beach chose as a thesis topic the determination of whether rats had color vision. Because the department had no animal facilities, Beach had to establish and run them himself. He did this successfully and received his master's degree in 1933.

Still unable to find a steady job, Beach took Stroud's advice to explore the possibility of further study in anthropology at the University of Chicago. He traveled to Chicago and found that he was unable to pursue that path because the Department of Anthropology had no stipends for beginning students. However, a courtesy call to Carr led to a fellowship and graduate study in psychology during 1933-34. Between the fellowship and odd jobs, including singing in a choir, Beach was able to study for a year in Chicago. Carr, the noted leader of the Chicago functionalist school of psychology, proved to be an ideal teacher. Beach was not enamored of the mathematical approach of Louis Thurstone, one of Chicago's "star" faculty members. He had a lifelong distrust of complex mathematical operations, believing that just because it was possible to perform statistical operations did not mean one should do so. It was a third faculty member, Karl Lashley, a notoriously poor classroom teacher, who exerted a lasting influence on Beach. Lashley allowed students to work on their own, and Beach found the laboratory environment and the problems of physiological analysis in which Lashley was interested to be irresistible. Outside of psychology, courses with Paul Weiss and C. Judson Herrick also made an impact.

As he experienced financial difficulties and a job teaching high school English finally opened up, Beach took off

a year to teach junior and senior English at Yates Center, Kansas. It was an active year, during which he directed plays, supervised the student newspaper, and performed other routine duties of a high school English teacher. He even conducted psychological research on the rate of learning of a stylus maze by his students.

The lure of psychology was great, however, and a university fellowship enabled Beach to return to Chicago after one year of teaching. By now, Lashley had moved to Harvard, but Carr was receptive to a dissertation proposal for a study in Lashley's field—on the effects of lesions to the cerebral cortex on maternal behavior in rats. With Lashley gone, Beach again had to rely on his own skills and on fellow students for help, but he was able to complete his Ph.D. candidacy examination and his dissertation research in one year, only his second at Chicago. Among his important associates at Chicago were David Krech and Leon Pennington. Beach sought employment while he wrote the dissertation and completed his language requirements. Lashley came to the rescue, offering Beach an assistantship in neuropsychology at Harvard.

In March 1936 Beach married Anna Beth Odenweller, a fellow Kansan, who had been studying at the Goodman School of Theater at the Chicago Art Institute and whom Beach met in the choir. They would have two children, Frank A. Beach III born in 1937 and Susan Elizabeth Beach born in 1942.

At Harvard during 1936-37, Beach studied the effects of similar brain lesions on another instinctive behavior in rats, copulation. He would come to spend more time during his career studying copulatory behavior than any other problem. He later called this a halcyon year, with much time available for research but little time for language study. While at Harvard, he formed lifelong friendships with

Donald Hebb, Edwin Ghiselli, George Drew, and Andre Ray.

After a year at Harvard, Lashley "kicked him out of the nest," recommending Beach for a position as an assistant curator in the Department of Experimental Biology of the American Museum of Natural History in New York. The museum position allowed Beach an opportunity—both time and facilities—for full-time research. The chance to interact closely with diverse biologists in fields such as mammalogy, herpetology, and ornithology had a broadening effect and helped shape the expansive biological perspective that so characterized his later work. The only problem was in getting along with department chair G. Kingsley Noble.

By 1940 Beach had finally learned sufficient German and French to pass his language exams at Chicago, and he returned to the university for his oral examination. Carr came out of retirement to conduct the examination, and Beach received his Ph.D. degree in 1940.

A colleague at Harvard had suggested that the loss of copulatory behavior that followed the cortical lesions Beach had given to rats might be due to indirect effects of the lesions on the endocrine system. To learn more about endocrinology, Beach audited a course with Robert Gaunt at New York University. When he found that there was little on endocrinological effects on behavior, he began library research for a term paper that he eventually developed into his first book, *Hormones and Behavior*, published in 1948.

When Noble died in December 1940, museum director Roy Chapman Andrews was prepared to shut down the Department of Experimental Biology. Beach, however, lobbied various scientists around the country to intervene, with the result that Beach became the new chairman with

the rank of full curator. He changed the name to the Department of Animal Behavior. The department provided a home for numerous very active comparative psychologists for many years. It was during this period, however, that Beach acquired his lifelong aversion to academic administration.

In 1946 Beach left the museum for a position in the Department of Psychology at Yale University. He later claimed that he had done a poor job at that point in his career in teaching lecture classes, but he was allowed to teach mainly smaller seminars and to supervise graduate students. In 1952 Beach was named a Sterling professor of psychology at Yale.

Beach valued science and believed himself responsible for communicating his results to his colleagues, but during most of his career he was not especially active in popularizing science. An exception appeared during the early Yale years with a series of articles that dealt with learned behavioral patterns, which he published in *Natural History* magazine. His rhetorical strategies in these articles focused on the importance of hard-nosed science in understanding even the most complex behavior.

During his tenure at Yale, Beach became progressively more active in the affairs of various scientific organizations. He regarded this as a responsibility of scientists, but as a finite one. He was elected president of the Eastern Psychological Association and was selected as a charter member of the psychobiology panel of the National Science Foundation. In 1955 he became a member of the National Research Council's Committee for the Study of Problems of Sex, and two years later was made chairman. Years later, he would pride himself in having closed down the committee. Federal funding had come to dwarf that of the committee, and Beach believed that committees often

search for functions long after their useful purpose has been achieved. He was determined not to let this happen. He also served on the Publications Board and Policy and Planning Board of the American Psychological Association, the Advisory Board of the Marine Studios and Marine Research Laboratory in St. Augustine, Florida, and on the Board of Scientific Directions of the Roscoe B. Jackson Memorial Laboratory in Bar Harbor, Maine.

Beach also was invited to several prestigious lectureships, including the William James Lectures at Harvard, the Smith College Lectures, and the Jake Gimbel Lectures on the Psychology of Sex at the University of California, Berkeley, and Stanford University.

While at Yale, Beach became more interested in human sexual behavior and teamed up with anthropologist Clellan S. Ford to write a book, *Patterns of Sexual Behavior*, which surveyed that field in broad perspective.

Prior to 1948 Beach worked with rats, hamsters, cats, and pigeons, but he then instituted a program of work with dogs that would last much of the rest of his career. Beach valued his Yale years for the opportunity to work with bright students and colleagues under ideal conditions and to experience life in a first-rate university.

Beach spent the 1957-58 year as a fellow at the Center for Advanced Study in the Behavioral Sciences in Stanford, California. His primary endeavor while there was to write a textbook on comparative psychology, but after writing numerous chapters he finally gave up in frustration.

During his stay in Stanford, he was approached regarding the possibility of a permanent move to the University of California, Berkeley. He accepted the position partially because he had come to learn that with each such move he had become acquainted with a new set of colleagues from whom he could learn and enrich his own research pro-

gram. He also was attracted to the warmer climate and the easy-going atmosphere. Beach accepted the position on the conditions that he would determine his own teaching assignments, have ample research space, be given a full-time secretary, and never be asked to serve as department chairman.

Beach continued to flourish in the Berkeley climate. He liked the California graduate students and the fact that the department was not dominated by learning theory as had been Yale in the heyday of Clark Hull. A major accomplishment in Berkeley was Beach's founding of the Field Station for Behavioral Research on a beautiful site overlooking the campus and San Francisco Bay. There Beach could continue his program of research on dogs in a more open environment. The site later became the location of a major program of research on hyenas in which Beach participated on a part-time basis after his retirement.

In 1961 and 1962 Beach hosted conferences under the sponsorships of the Committee for Research in Problems of Sex, the National Science Foundation, and the National Institute of Mental Health. These conferences brought together students of sexual behavior with very diverse perspectives and resulted in the edited volume *Sex and Behavior* in 1965.

On the occasion of his sixty-fifth birthday, his former students and postdoctoral fellows held a working conference in Berkeley in his honor. Beach regarded it as a highlight of his academic life. This conference resulted in another book, *Sex and Behavior: Status and Prospectus*.[2]

Beach was a splendid mentor for graduate students and postdoctoral fellows. Indeed, he provided a role model for many. He knew exactly when to turn a sympathetic ear and when to deliver a swift kick in the pants. His work with students was so strong that he received the American

Psychological Foundation's award for distinguished teaching in biopsychology in 1985. He was cordial, yet maintained distance; graduate students did not call him Frank. Beach thought the roles of father figure and buddy incompatible.

Through much of his career, he limited his teaching to graduate students and small groups. In a remarkable reversal of his earlier career pattern, Beach became motivated for undergraduate teaching late in his career. He taught large undergraduate classes in comparative psychology and introduced an experimental class in human sexuality. The latter effort led him to edit another book, *Human Sexuality in Four Perspectives* (1976). He was not satisfied with his first efforts at these courses, but he felt he improved with experience.

Beach formally retired in 1978, but he remained active in research. His first wife having died in 1971, Beach married Noel Gaustad, who was especially important to him as his health declined. Beach died in Berkeley in 1988 at the age of seventy-seven. In the hospital the week before his death, Beach was still reading literature and working with a co-author on one more article.

Among his honors were honorary doctorates from McGill University, Williams College, and Emporia State University; the Warren Medal of the Society of Experimental Psychologists; and the Distinguished Scientific Contribution Award of the American Psychological Association. He was elected to the National Academy of Sciences (at age thirty-eight), the American Philosophical Society, and the American Academy of Arts and Sciences. The Frank A. Beach Award and Lectureship were established in 1990 as a means of encouraging and rewarding young researchers in behavioral endocrinology. The lectures are published annually in *Hormones and Behavior*.

Frank Beach was an extrovert—at ease with people and able to get along well with almost everyone. He could live hard at times. He knew how to party. He was as comfortable at the poker table as he was in the laboratory. At the same time, he had an exquisite sensitivity for the English language and its use, along with a deep respect for learning of all sorts and for the culture in which he lived. He was possessed of great wit, eager to deflate pomposity, and was not afraid to ask questions others would regard as naïve. When he left the room, however, he understood fully what had transpired. Beach knew well how to use his rich sense of humor in the interest of making and dramatizing salient points of a serious academic nature.

Beach was a conservative in many senses of the word. His academic values were old-fashioned, as were his political views. He was proud that he did not let me spend all of the funds in my National Science Foundation stipend; we returned some money to the federal government. This is unusual! He did not support the activism rampant on the Berkeley campus during the 1960s.

PROFESSIONAL HISTORY

Beach's primary contributions lay more in programmatic accomplishments and in directing the field than in any single discovery. Nevertheless, his achievements in some areas can be summarized in approximate topical and chronological order.

EARLY RESEARCH

In his early work, Beach explored the effects of various interventions on instinctive behavior, primarily in rats. He started out with brain lesions and such behavioral patterns as copulation, parental behavior, and activity patterns. Themes that would be prevalent in his work emerged early.

The first study of the effects of hormones on mating behavior and the first developmental study came in 1941; the first study of stimulus control of mating was in 1942.

Beach's first synthetic review dealt with the central nervous mechanisms of reproductive behavior in vertebrates and came in 1942; others would follow. He concluded that both hormones and sensory input were needed to act on neural mechanisms for the display of copulatory behavior. Among his views was the belief that hormones have a more important effect in the lower vertebrates; the sexual activity of higher vertebrates is more dependent on cortical mechanisms. He also believed that the activity of males is less hormone-bound and more dependent on cortex than is that of females. Beach considered the stimulus arousal of behavior to be multi-sensory, including olfactory, tactile, auditory, and visual. None is critical; rather, they sum in the brain to activate a sexual arousal mechanism essential for the initiation of behavior. The arousal mechanism, he thought, is independent of a hypothetical sub-cortical copulatory mechanism that is responsible for the execution of the behavior once an arousal threshold is reached—as a result of hormonal and sensory activity—and the behavior occurs. Because hormones and sensory input from different modalities sum, Beach proposed that activity in one component could compensate for the inactivity elsewhere in the initiation of behavior.

Beach viewed the development of behavior as a complex interaction of genes and environment, but he thought that early play and other early experience were more important in primates than in the lower vertebrates. He argued that once there has been a proper study of the impact of genes and the environment the very necessity of a category of "instinctive behavior" would become unnecessary. These themes of the complex development and control of behav-

ior, which emerged early in his career, were explored throughout his tenure as a leading psychobiologist.

BEHAVIOR

Although much of Beach's work was with laboratory rats and dogs, he published a study of the pouchless marsupial *Marmosa cinera* in 1939 and added hamsters, pigeons, alligators, pigeons, and other species over the years. It is not clear who first labeled Beach "the conscience of comparative psychology," but he was noted for urging a more comparative focus than had most psychologists studying animals, especially in his 1950 article "The Snark Was a Boojum." Beach called on psychologists to expand the range of species they study and the range of behavioral patterns and problem areas they investigate. Beach wrote various articles advocating the study of instinctive behavior, or what was more often termed species-specific behavior.

It was shortly after World War II that the European ethologists, especially later Nobel Prize winners Konrad Lorenz and Nikolaas Tinbergen, began to become truly visible in North America. Beach was a leader in calling attention to this approach and to encouraging productive interaction between North American comparative psychologists and European ethologists. He served on the first editorial board to the ethological journal *Behaviour*.

Beach believed in the careful description of behavior in objective terms that could be understood and used by different investigators. He hesitated to label behavior as sexual or aggressive because so many motor patterns could appear in different functional contexts. The description of what occurred was to be objective and kept separate from the functional interpretation given the behavior by the observer.

During the 1950s and 1960s, Beach and his students conducted a long series of studies in rats of the determi-

nants of the complex pattern of mounts, intromissions, and ejaculations, which are displayed during copulation. Many of these were related to a conceptual model carrying forward the theme of independent sexual arousal and copulatory mechanisms. By manipulating various temporal parameters and stimulus situations, they probed the manner in which these mechanisms worked first to bring the animal to the threshold of sexual activity and then to bring the hypothetical copulatory mechanism to the point of ejaculation. After that, attention was addressed to the problems of the recovery of sexual motivation, both during and between multiple-ejaculation sessions.

As noted, Beach tended early in his career to believe male behavior more complex than female behavior. In a changing cultural climate, he later realized the previously unrecognized complexity of female behavior. In 1976 he wrote the definitive article delineating the differences among receptivity (to the male), attractivity (to the male), and proceptivity (the active solicitation of the male) in female sexual behavior. As always, his careful descriptions and his timing were well tuned.

BEHAVIORAL ENDOCRINOLOGY

Throughout this whole period, Beach's interest in hormone-behavior interactions was growing. His early book *Hormones and Behavior*, along with some writings of W. C. Young, had first crystallized the area. Beach continued to do research and to write synthetic articles outlining and promulgating what came to be known as behavioral endocrinology. But Beach understood that an emerging discipline needs the accouterments. In 1975 he provided an integrative article in *American Scientist*. Six years later he wrote a scholarly history of the field. In 1979 Beach, along with Julian Davidson and Richard Whalen, founded the field's first journal, *Hormones and Behavior*.

One of the important developments in psychobiology during the 1960s was the realization of the important effects of early hormone action on later behavior. Beach with others conducted much research on such early hormone effects. The dominant view was that, whereas the effects of hormones in adults were activational, the effects early in life were in the organization of neural tissue. Beach was skeptical of these conclusions and wrote several articles questioning the evidence. Although the conclusions appear to have been largely correct, Beach's skepticism helped focus research and thinking on the clarification of the concepts and on the development of sufficient evidence to warrant general conclusions.

It is important to remember that for Beach hormone-behavior interactions were a two-way street. Hormones not only affect behavior, they also are affected by behavior. Beach devoted much effort to writing a textbook on behavioral endocrinology, but like the textbook on comparative psychology, it lay incomplete at his death.

In his series of studies of dogs, conducted at the Berkeley field station, Beach could fully explore the hormonal and environmental interactions in the regulation of sexual behavior in dogs. Here he could breed his own animals and study them year round out of doors. In this context he found that individuals have distinct, if somewhat idiosyncratic, preferences for mating partners. When copulating, dogs achieve a lock, or mechanical tie, that makes separation of the male from the female mechanically difficult. Always gifted with the ability to turn a phrase and create a colorful title, he summarized the work in his 1969 article "Locks and Beagles." The work continued for many years, and Beach later embraced with characteristic enthusiasm the research by his successors at the field station on hormonal and developmental factors in hyena behavior.

HUMANS

The topic of human sexuality emerged early in Beach's career. It is worth noting that investigation of this topic required more courage in the climate of the 1940s than it did in the 1990s. Beach returned to questions of human sexuality repeatedly throughout his career. Many psychologists studying nonhuman animals study them in order to understand humans and often to enable social interventions. For Beach, by contrast, an interest in humans was more a matter of intellectual challenge. Humans are complex, and unraveling their behavior presents a special challenge for which all methods and disciplines are important. His 1977 book *Human Sexuality in Four Perspectives* dealt with developmental, sociological, physiological, and evolutionary perspectives. Beach believed that the way to understand humans lay not in generalizing from animals to humans but rather by studying humans the same way as other species and looking for similarities and differences.

He was especially cautious in generalizing across species. There are many descriptions of homosexual and masturbatory activity in nonhuman animals, for example. Beach stressed, however, that the male-male or female-female mounting that can be seen in laboratory rats or monkeys were quite different from the culturally complex processes of gender preferences in humans. Beach cautioned that "surface similitude by itself does not justify theoretical inferences."[3] He stressed the importance of understanding underlying mechanisms and only generalizing across patterns with true functional and causal similarity.

In conclusion, Frank Beach was a firm believer in basic research for the sake of knowledge, with practical application a secondary concern. Science is not technology. He recognized, however, that if one accepts the support of society in these endeavors, one has the responsibility to

conduct the work with integrity and to record the results in the public record. Students were taught that experiments are not complete until they are reported for the scientific public. Science is serious—but it should still be fun.

Beach believed in careful and precise behavioral measurement, but the mere gathering of facts through what he called "ant-like industry" was of little value unless integrated into a theoretical concept. His work shows the effects of attention to the forest and the trees. Beach believed that much of the research in journals was not worth doing because it lacked a clear focus. He believed that if research is not worth doing, it is not worth doing well and that the last thing most scientists seem to understand are the fundamental questions with which they are dealing.

Beach was a true believer in the progress of science. He conducted many experiments and developed various theoretical models. He genuinely believed, as should all scientists, that his work was the best effort possible at the time but that it was likely to be surpassed by later research. It was important to him that his successors understand that what he did was reasonable in the context of his time and of what he could have been expected to know when he conducted the research. It did not matter that his work would be superseded; indeed, he encouraged it. As long as his work moved the field in the right direction, the work itself could fade. He wanted to contribute to scientific progress and to help shape the field in a way he felt would maximize long-term scientific understanding.

He succeeded—and he had fun doing so.

I THANK Stephen E. Glickman, Benjamin D. Sachs, and Irving Zucker for comments on an earlier draft of this biographical memoir.

NOTES

1. There are numerous sources on Beach. He wrote three autobiographical chapters: Frank A. Beach. In *A History of Psychology in Autobiography*, vol. 7, ed. G. Lindzey, pp. 31-58. Englewood Cliffs, N.J.: Prentice-Hall, 1974; Confessions of an imposter. In *Pioneers in Neuroendocrinology*, vol. 2, eds. J. Meites, B. T. Donovan, and S. M. McCann, pp. 19-35. New York: Plenum, 1978; Conceptual issues in behavioral endocrinology. In *Autobiographies in Experimental Psychology*, ed. R. Gandelman, pp. 1-17. Hillsdale, N.J.: Erlbaum, 1985.

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Also useful is a set of recollections by former students and colleagues: In Memoriam: Frank A. Beach (April 13, 1911-June 15, 1988). *Horm. Behav.* 22(1988):419-43.

There is also an especially insightful interview: J. D. Fleming and D. Maxey. The drive of the pure researcher: Pursuit of intellectual orgasm. *Psychol. Today* 8(1975):68-77.

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A selection of Beach's academic papers can be found in the Archives of the History of American Psychology at the University of Akron (Ohio).

2. T. E. McGill, D. A. Dewsbury, and B. D. Sachs, eds. *Sex and Behavior: Status and Prospectus*. New York: Plenum, 1978.

3. F. A. Beach. Cross-species comparisons and the human heritage. *Arch. Sex. Behav.* (1976):469.

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