

## HERPETOLOGY AT THE UNIVERSITY OF CALIFORNIA-BERKELEY

Herpetological research and education at Berkeley date from the first decade of this century. William Ritter conducted life history studies of salamanders and sponsored such students as Loye Miller. When Joseph Grinnell founded the Museum of Vertebrate Zoology in 1908, that unit became the local center for studies of ecology and systematics. Grinnell was principally an ornithologist, but he conducted research on amphibian and reptilian distribution and sponsored a number of students. Tracy Storer, Charles Camp, Jean Linsdale, Henry Fitch, and Tom Rodgers were students who later served in a variety of staff and faculty positions at Berkeley. Camp's interests shifted from living to fossil lower vertebrates, and in time he became Professor of Paleontology and Director of the Museum of Paleontology on this campus.

David Wake, whose duties as Director of the Museum of Vertebrate Zoology keep him from using his microscope.



The Museum of Vertebrate Zoology continues to be the principal center of herpetological research at Berkeley. The collections now include about 150,000 catalogued specimens, with major emphasis on western North America, Mexico, and Central and South America. Robert Stebbins was the first permanent faculty curator of the herpetological collection, and following his appointment the level of research and teaching activity in herpetology increased greatly. A second faculty curator, David Wake, joined the University in 1969 and is now Director of the Museum. A third faculty member associated with the Museum is Marvalee Wake, Associate Research Morphologist. The Museum has a wide variety



Robert Stebbins (wearing hat), Professor of Zoology and Curator in Herpetology, graduate student, Ted Pappenfuss, and Research Associate Nate Cohen barter with local collectors in Baja California for *Bipes*, the subject of Ted's doctoral thesis.

of special collections and research facilities, including a fully developed laboratory for biochemical genetics under the supervision of Curatorial Associate Richard Sage. A special feature of the Museum is a large, fully catalogued frozen tissue collection which is made available to qualified investigators. The Museum operates the Hastings Natural History Reservation, a 2,000 acre reserve with laboratories and residences located in the Upper Carmel Valley near Monterey and Salinas, California. John Davis, an ornithologist who also conducts studies of lizard ecology, is the resident in charge of the Reservation.

Affable Paul Licht must resort to intimidation to earn the respect of his students.



Duncan MacKenzie, a comparative endocrinologist, Martin Feder, who recently completed his doctoral thesis on the physiological ecology of tropical salamanders, and postdoctoral student Antonella Gallo.

Robert Stebbins has conducted studies of the ecology, physiology, systematics and conservation of amphibians and reptiles. Currently, he is deeply involved in conservation efforts associated with off-road vehicle damage to the southwestern deserts. David Wake is studying the evolutionary biology of salamanders, with emphasis on comparative and functional morphology, systematics, and distributional ecology. Marvalee Wake emphasizes morphological studies of the reproductive system in lower vertebrates, and the evolutionary biology of caecilians. O.P.



Marvalee Wake, Associate Professor of Biology and Zoology and Associate Research Morphologist in the Museum, happily contemplates caecilians.

Pearson, retired Director of the Museum, maintains an active research program, including studies of the ecology of South American lizards. Paul Licht, Professor and Chairman of Zoology, is a physiological ecol-

ogist and comparative endocrinologist, currently involved in studies of the pituitary hormones of reptiles and amphibians. Other faculty members in Zoology who conduct research on amphibians and reptiles or sponsor students in these areas, or both, include Richard Eakin (comparative embryology, photoreceptor ultrastructure), Robert Colwell (community ecology), and Howard Bern (comparative endocrinology).

Sam Sweet, who works with spring and cave salamanders of the Edwards Plateau, finds microscopes useful in telling dorsal from ventral sides of snakes. Sam will be Assistant Professor of Biological Sciences at the University of California, Santa Barbara, starting this fall.



Faculty members in other departments who are actively involved in research on lower vertebrates and who sponsor students in certain aspects of herpetology include Allan Wilson in Biochemistry (anuran evolution), Vincent Sarich in Anthropology (lizard evolution), Joseph Gregory in Paleontology (lower vertebrate paleontology), E.R. Lewis in Electrical Engineering and Computer Sciences (structure of anuran inner ear), and Carl Nicoll in Physiology-Anatomy (endocrinology of prolactin).

Ray Huey, basking momentarily, will join the University of Washington this Fall as an Assistant Professor of Zoology.



There is an active post-doctoral program at Berkeley sponsored principally by the Miller Institute for Basic Research in Science. Miller Fellowships are two years in length and offer a generous stipend as well as research support. Ray Huey is a current Miller Fellow, and other recent fellows in this program include such herpetologists as George Gorman, Steve Arnold, and Al Bennett. Other current postdoctoral students in herpetology include Antonella Gallo and Ellen Daniel (both comparative endocrinology) and Craig Gundy (lizard photoreceptors).

Research Associate Anita Pearson applies ultrastructure techniques to the study of endocrine organs. Gloria Wurst studies developmental endocrinology and collaborates with David Wake in studies of evolutionary genetics of salamanders.

Curatorial Associate Gloria Wurst works with the Museum's herpetological collection, but the electrophoresis lab is her first love.



Since 1970 a number of students have been awarded Ph.D. degrees in some aspect of herpetology, including Kristin Berry, Charles Brown, Allan Brown, Dennis Bramble, Pille Bunnell, Bruce Bury, Susan Case, James Edwards, Eduardo Fuentes, Joseph Crim, James Lynch, Linda Maxson, Virginia Maiorana, Charles Muller, John Ruben, Judy Tsai, James Stewart, and Hing Wo Tsui.



Pedro Alberch, second year graduate student from Barcelona, is enthralled with X-rays of South American salamanders.

Graduate students who have just completed their degree work include Martin Feder, Steve Ruth (comparative lizard demography), Lynne Houck (reproductive biology of tropical salamanders), and Sam Sweet. Current graduate students include Pedro Alberch, Kay Yanev, Julie Feder (hybridization of *Bufo*), Tom Hetherington (salamander photoreception),

Kay Yanev has lost part of her head over her computer output. She is presently completing her doctoral thesis on genetic and morphological diversification of *Batrachoseps*.



Ted Pappenfuss, Kristine Tollestrup, Duncan MacKenzie, Ron Marlow, John Cadle (salamander evolutionary genetics and snake systematics), Jim Hanken (genetic and morphological studies of *Thurius*), David Dobkin (lizard ecology), Bill Rainey (sea turtle evolution and biology), Jacques Gauthier (anguinomorphic lizard paleontology, comparative anatomy and evolution). Undergraduates

often are involved in various research projects, and currently Brad Shaffer (who will be a graduate student at the University of Chicago this fall) and Paul Elias, both working with Guatemalan salamander biology, are the most actively involved.



Curatorial Associate Dick Sage, on right, and graduate students Kristine Tollestrup and Ron Marlow are studying the Santa Cruz Long-toed Salamander. Their main interests are the evolutionary genetics of the *Rana pipiens* complex, ecological studies of *Crotaphytus*, and the biology of desert tortoises, respectively.

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### A CASE OF GONADAL ATROPHY IN *LISSEMYIS PUNCTATA PUNCTATA* (BONNT.) (REPTILIA, TESTUDINES, TRIONYCHIDAE)

During our studies on gonadal cycles in some fresh water turtles, we captured a normal-appearing adult female *Lissemys punctata punctata* (Cat. No. JUBR-57, deposited in the Museum of the Department of Bio-Sciences, University of Jammu) on 2 March 1976 from a shallow pond near Ranbirsingh Para, Jammu (India). The turtle was measured, weighed and cut open (measurements and other data are provided in Table 1). Based on our observations of gonads in this species, this specimen's gonads presented an appearance entirely different from normal ovaries. The structures did not resemble normal testes either. The specimen was definitely a female. The literature available on gonadal abnormality in chelonians (Cagle, 1950; Hansen, 1943; Risley, 1941) makes no mention of the gonadal condition observed here.

The gonads, along with their ducts, were excised, measured and weighed (see Table 1). They were washed in physiological saline and fixed in dichromate-formalin-acetic

acid fixative. A small piece of the fixed material from gonads and associated ducts was processed for sectioning and staining. Sections were cut at 7 micra, stained with Mallory's trichrome stain and microphotographed.

In all its external features, the turtle appeared a normal, mature female. The gonads, here considered "ovaries", occupied the normal position in the abdominal cavity and were whitish in color and spongy in consistency. These ovaries were lobulated with deep interlobular grooves and sharp marginal notches (Fig. 1). Normal ovaries in females of comparable measurements are yellowish in color and blistered in appearance due to numerous developing follicles of varying diameters. No follicles of any size were to be seen in these structures in our specimen. Moreover, in this specimen, these ovaries were considerably lighter in weight than normal ones.

The ducts associated with these ovaries, here considered "oviducts" (Fig. 1), were not fully developed, and were shorter and lighter in weight than normal oviducts in specimens of comparable size and weight. The anterior portion of each oviduct was attached to its gonad, which is also abnormal. Not only are normal oviducts free from the ovaries and open into the abdominal cavity anteriorly, but they also show an external demarcation into 4 regions, viz., the infundibulum, the tuber, the uterus and the vagina. Such an external differentiation in the oviducts of our specimen is completely lacking.

Histologically, the ovaries in the specimen were made up of numerous large and distended lacunae of varying shapes and sizes (Fig. 2). Most of these lacunae were partially filled with sparse, light-blue staining, non-cellular debris and a few darkly stained particulate in-

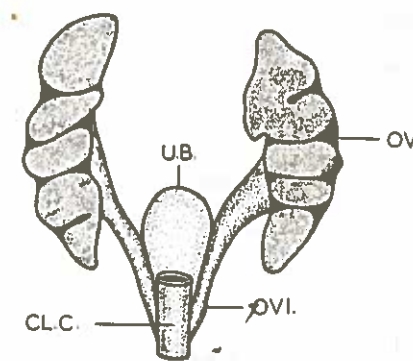


Figure 1. *Lissemys punctata punctata*, showing the general appearance of the abnormal ovary and the unusual connection between it and its oviduct. OV, ovary; OVI, oviduct; U.B., urinary bladder; and CL.C., cloacal chamber.