OBITUARY:

John Roscoe Hendrickson 1921-2002

JRH was brilliant, he was confident and he was not very tall. He grew up in Tipton, Iowa (pop. 2, 998), in the middle of the American great plains. These brief facts may help us understand why he loved the desert, the ocean, the tropics and Senorita Lupe Perez so passionately. He was the second son of Hattie Claire Dean and Louie Ole Hendrickson. His father died when JRH was 12, so he moved in with his aunt Polly and uncle, Dr. Archie Dean, dentist, also of Tipton. After high school he migrated to the desert of Tucson where he graduated with distinction and a B.S. in Zoology from the University of Arizona in 1944. He then did a stint in the US Navy Hospital Corps in WW II. In June 1946 he married Lupe (his former student while he was an undergraduate teaching assistant at the UofA) and was honorably discharged from service in November of the same year. He then returned to the University of California at Berkeley were he had matriculated for one semester before his service in the USN and earned his M.S. (1949) and Ph.D. (1951) under the distinguished herpetologist Dr. Robert Stebbins. Using Berkeley as a base, he travelled far and wide along the west coast of the Americas becoming an authority on the ecology and systematics of the diminutive lungless *Batrachoceps* salamanders (Hendrickson 1954).

John's first academic position was at the University of Malaya in Singapore (1951-1959), where he first became fascinated with sea turtles. Like his contemporary and correspondent Dr. Archie Carr, JRH was a talented observer of nature. He was a true classical field biologist. To this day I still tell my students that if you want to study one paper to help you understand both sea turtles as well as the methods of quality field research, then JRH's "The Green Sea Turtle, *Chelonia mydas* (Linn) in Malaya and Sarawak" is required reading (Hendrickson 1958). This paper includes extensive field notes on nesting and mating behavior, clutch development, hatchling dispersal, predation, breeding intervals, tagging and thermal biology, just to list a few. The paper also documents and shows amazing sensitivity to local Muslim cultural practices as they relate to conservation and utilization of this "the most valuable reptile in the world" as JRH liked to quote Archie Carr from his seminal "Handbook of Turtles". The other thing I tell my students is that if you can not think of a project, go read Hendrickson's publications, as they are chocked full of observations and "new ideas" that still need testing.

From Singapore, JRH moved to Kuala Lumpur in 1959, having been appointed first Professor and Chair of Zoology at the newly created University of Malaya in the Federation of Malaya (a country from 1957-1963). He helped design the buildings and planned the new department from the beginning. By this time he had shown an amazing diversity of research interests with publications on hummingbirds, commensal hydroids, tree shrews, bats, otters, *Peripatus*, frogs, leatherbacks and the new field of mariculture. In 1963 just prior to the formation of the new country of Malaysia, the Hendricksons (there were now four F-1s) left Malaya so that JRH could assume the position of first Vice-Chancellor for Student Interchange at the University of Hawaii's renowned East-West Center. This full time "Administrative" position lasted from 1963-1967 and was followed by two years in mariculture development as Director of the Oceanic Institute in Waimanalo, Hawaii. By this time, JRH confided to me many years later, he had pretty much "had it" with administrative jobs and wanted back in the lab and the classroom. As a consequence, in 1969, he moved back to the U. of Arizona where he assumed a professorship and Director of the Marine Biology Program (working primarily in Mexico's Gulf of California). There he trained students who worked on the endangered totoaba fish, the blue crab, oceanography of the Gulf of California, the endangered Bolson tortoise in addition to various sea turtle projects.

In particular, a young Mexican biologist named Rene Marquez was really struggling in the early 1970s to obtain additional protection for the beach at Rancho Nuevo where the remnant population of Kemp's ridleys was still nesting. Working with Jack Woody of the US Fish and Wildlife Service and the Defenders of Wildlife, JRH secured grants to purchase and send some Jeeps to that important beach in the western Gulf of Mexico. Jim Wood, one of Hendrickson's young Ph.D. students from Amarillo, Texas, delivered those Jeeps to Rancho Nuevo where Rene and his collaborator P.C.H. Pritchard put them to good use. In 1973 JRH wrote a popular article "In Defense of Mexican Sea Turtles" which appeared in *Defenders of Wildlife News* and was surely important in convincing Woody with the help of Archie Carr to get the US involved in an elaborate scheme to bring this species back from the brink of extinction. In 1978 the joint conservation venture between Mexico, Texas, The National Park

Service, the National Marine Fisheries Service and the US Fish and Wildlife Service finally got underway with thorough beach protection, and experiments in head starting and artificial imprinting as their thrusts.

In the mean time Hendrickson and many turtle biologists were becoming more and more alarmed at the precipitous declines in numbers of many of the world's sea turtle populations. Captive culture and captive breeding of sea turtles and the endangered scianid fish totoaba (Hendrickson 1979), on which JRH was also working, seemed to many of us at the time as if they might be essential strategies for saving these over harvested species. JRH had already prepared a working paper (Hendrickson 1971) on sea turtle captive nutrition for the IUCN Marine Turtle Specialist Group on which he served from 1968-1978, so when a group of American and English mariculture businessmen asked Hendrickson if he could help with some of their nutrition and reproduction problems, he was quick to agree, with the understanding that he was not interested in their money and they would provide animals and tanks for graduate student projects. The company was then called Mariculture Ltd. and their business was raising the green sea turtle in the Cayman Islands. He subsequently obtained grants from several organizations including the Janss foundation, USFWS and the NSF for his students to study sea turtle nutrition (J. Wood) and reproduction (D. Owens) with the turtle farmers.

In 1979 JRH was invited to prepare a general comparison of Sea Turtle life history strategies for a symposium at the American Society of Zoologist's meeting in Tampa, Florida (Hendrickson 1980). Despite his hating the assigned term "strategy" for his paper, this publication is probably his second most often cited work, as many turtle students have used his thoughts to both inspire and provide the "straw man" concepts for their own grants and publications. As an example, his provocative suggestion that oceanographic changes in the Gulf of Mexico during the Pleiocene might have resulted in a "gigantic "leak" of hatchling Kemp's ridleys into the Atlantic Gyre", caused a tremendous stir. He questioned, with tongue in cheek, if the hundreds of immature ridleys seen on the Atlantic coasts of the US and Europe were possibly "waifs, and reproductively speaking, "dead" to the species?" Several turtle students took issue with this suggestion and only a few years ago his trick finally worked and someone proved him wrong.

In the 1980s with the help of USFWS, JRH and Lupe put together a series of clever studies to try to develop a living tag for sea turtles in order, once and for all, to answer the question of natal beach fidelity. This was prior to the development of powerful genetic and micro tagging techniques. Anyway, with the Hendricksons' relatively simple surgical technique (Hendrickson & Hendrickson 1981), applied to hundreds of turtles, other researchers have now proven the technique to work on natural, head started and artificially imprinted turtles.

In 1988, Hendrickson, together with Rainer Zangerl and Mrs. Hendrickson, published his last sea turtle paper " A Redescription of the Australian Flatback Sea Turtle, *Natator depressus*" (Hendrickson 1988). Published at the same time as an article by Limpus and colleagues, the two excellent pieces of scholarship used very different data sets to prove together and convincingly that the flatback is indeed a distinct genus of sea turtle.

Upon his retirement JRH and Mrs. Hendrickson gave their extensive collection of sea turtle papers, compiled during 35 years of study, to the Archie Carr Center for Sea Turtle Research at the University of Florida. The Hendrickson family continues to be a family, refreshingly rich in tradition and love. JRH is survived by his wife Lupe, daughters Sharon, Leslie, and Carla, son Mark, two foster children Michael and Diane, nine grandchildren and three great grandchildren. Dr. Hendrickson wished to endow a scholarship fund for outstanding young naturalists in Malaysia, to encourage and promote excellence in the study of biological sciences by the youth of the country that gave him so much in his early career. Contributions may be sent to: The John R. Hendrickson Scholarship Fund, C/O The Malaysian United States Foundation, 226 Airport Parkway, Suite 480, San Jose, CA 95110 or for non-U.S. readers: The John R. Hendrickson Scholarship Fund c/o The Malaysian Nature Society, JKR 641, Jalan Kelantan, Bukit Persekutuan, 50480 Kuala Lumpur, Malaysia.

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EDITORIAL:

Living Tag, Living Reputation

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Those who undertake research that is unlikely to yield answers in their own lifetime surely deserve some mention, especially if the results are revealing. Such is the case with the work of the Hendricksons in the 1980s on the development of the living tag method for green turtles (Hendrickson & Hendrickson 1981). The procedure is to take a sliver of tissue from the white underside (plastron) of the turtle and implant it into one of the darker scutes on the carapace on the top; the particular scute selected codes for year of release. As this is an autograft, there is no immune response. Conventional tags on hatchlings are ineffective because either they corrode away or they slough off or are incorporated as the animal grows from a carapace length of a few cm to over 100 cm in the case of green turtles. Internal transponder tags migrate from the site of injection, making it hard to pick them up years later with a scanner.

Living tags have been applied to several species of sea turtles, in several locations (Hendrickson & Hendrickson 1981). But those for green turtles released by the Cayman Farm have provided the exciting new data because turtles bearing those tags have now returned to nest on nearby beaches (Bell & Parsons 2002). Sadly, John Hendrickson died this year before the report of these findings appeared.

These events are notable not simply as a validation of the living tag method; they also provide insights on turtle demography. An important variable is age at maturity (Crouse *et al.* 1987). This has featured prominently in debates about the degree to which sea turtles should be considered threatened, and to what extent conservation should be focused on hatchlings or sub-adults.

Because hatchling sea turtles disappear into pelagic habitats and are not regularly seen until they have re-entered inshore habitats as juveniles, growth curves are almost exclusively based on mark-recapture investigations with juveniles and sub-adults. Until now, the estimated age at maturity has depended on extrapolations beyond the range of values for which growth data exist, and is therefore tentative (Frazer & Ladner 1986; Zug & Glor 1998).

The data from the turtles with living tags, however, include information on all life stages. One of the turtles released as a hatchling with a living tag in 1985 has been seen nesting in 2002, giving a maximum maturation period for this individual of only 17 years. No models or estimates were involved: the tag and the turtle were seen and were photographed (Bell & Parsons 2002). Also, an adult male, released as a hatchling in 1983, was captured while mating in 2002, that is 19 years later. In addition, 5 adult turtles with living tags were seen 14 years after release as yearlings. Adding one year for the time before release, and then arbitrarily but probably generously another 4 years to allow for faster growth in captivity during the first year than might have occurred in the wild, gives 19 years to mature for these 5 individuals.

Of course, larger samples are required, and various

questions remain to be resolved. Is the appropriate measure the minimum maturation time or that of average sized turtles on a nesting beach? Any growth of turtles after first nesting will introduce errors into the use of average size of nesting turtles. Turtles nesting unobserved in years previous to when they were recorded could introduce errors into use of the minimum sizes.

Nevertheless, it would now appear that, in round figures, maturation in less than 20 years may not be uncommon for green turtles and that is faster than has been supposed. Although the range of past estimates for Florida and Caribbean green turtles has included values below 20 years, it has been thought that longer values were more likely, for example, 27 years (Frazer & Ehrhart 1985) or 34 years (Zug & Glor 1998). Whatever the final mean values for age at maturity turn out to be, hard data from living tags experiments should replace estimates from partial growth curves.

The data from the animals released as yearlings show that green turtles head-started in captivity can return to nest in the area where they were released. It does not prove that head-starting is superior to other conservation measures (Mrosovsky 1983) but it does provide a method with which comparisons could be made — if anyone wished to initiate such a long-term endeavour. Nevertheless, because turtles nesting on the Cayman Islands have been almost wiped out in the past, any augmentation there is to be welcomed.

The research contributions and conservation potentials of the Cayman Farm have been frequently discounted (Fosdick & Fosdick 1994; Mrosovsky 1983). The new data from the living tags may perhaps cause this too to be re-evaluated, as well as providing a tribute to John Hendrickson, who published his classic paper on green turtles more than forty years ago (Hendrickson 1958).

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