

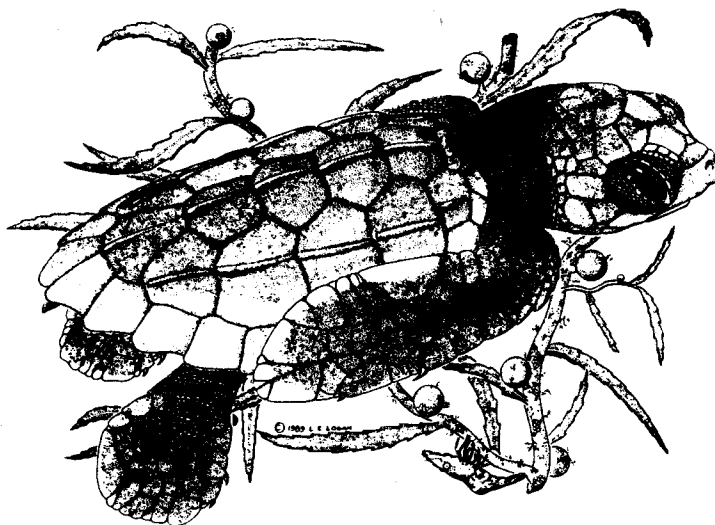
NOAA Technical Memorandum NMFS-SEFC-232

PROCEEDINGS OF THE NINTH ANNUAL WORKSHOP ON SEA TURTLE CONSERVATION AND BIOLOGY

7-11 February 1989
Jekyll Island, Georgia

Compilers:
Scott A. Eckert
Karen L. Eckert
Thelma H. Richardson

August 1989



U.S. Department of Commerce
National Oceanographic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Center
75 Virginia Beach Drive
Miami, FL 33149



ULTRASONIC IMAGING OF OVARIES AND EGGS IN SEA TURTLES

David Rostal¹

Todd Robuck²

David Owens¹

Edward Louis³

Duane Kraemer²

¹Department of Biology, Texas A & M University, College Station, Texas 77843 USA

²Department of Veterinary Physiology and Pharmacology, Texas A & M University, College Station, Texas 77843 USA

³Sea Arama Marineworld, Galveston, Texas 77551 USA

INTRODUCTION

The development of non-invasive and low risk techniques for studying the reproductive biology of sea turtles as well as other endangered species is a high priority. Radioimmunoassay techniques for measuring circulating hormone levels provide only part of the overall picture required to properly understand the reproductive systems of marine turtles. X-ray has long been available to detect the presence of eggs in turtles but it is cumbersome and ineffective for studying ovarian structures. The most effective technique to date for studying ovarian morphology has been laparoscopy. Laparoscopy, although very useful, does involve risk of injury or death to the animal and is considered an invasive technique. We have been developing the use of ultrasound techniques to improve our ability to monitor follicular development more accurately and at more frequent intervals, as well as for the detection of oviducal eggs. Ultrasound also reduces risk of injury to the turtles and has application towards monitoring general health of both captive and wild populations.

METHODOLOGY

Ultrasound units vary in their specific modifications but overall function is similar. The most important factors involved are the type of transducer and magnification capabilities of the unit itself. Transducers are available in varying wavelengths (2.5 to 7.5 MHz) and types (i.e., sector scanner). Depth of penetration is inversely related to the quality of resolution (i.e., 7.5 MHz probes have higher resolution quality but less penetration depth than a 2.5 MHz which has significantly greater penetration depth but less resolution). Lower wavelengths (2.5-3.5 MHz) are more suitable for larger species, such as green turtles and loggerheads, while higher wavelengths (5 MHz) are very effective for smaller species, such as Kemp's ridleys and hawksbills. The procedure involves turning the turtle over on its back and placing the probe tip against the inguinal region anterior to the hindlimb and scanning the available region. The ultrasound waves are unable to penetrate heavily keratinized shell or bone.

RESULTS AND DISCUSSION

We have so far been able to detect follicles in the three sea turtle species tested (Kemp's ridleys, hawksbills, and green turtles). In female Kemp's ridleys, we have been able to observe not only varying diameters of follicles (10-30 mm), but also eggs in the oviduct (Figures 1, 2). These observations have been validated through the use of laparoscopy and water bath comparison of fresh tissues.

The advantages of ultrasound over other techniques (i.e., laparoscopy) are numerous.

- 1) It is totally non-invasive and significantly lowers the risk to the turtles.
- 2) It allows accurate measurement of structures observed (i.e., follicles and eggs) and makes possible monitoring the turtles' condition at more frequent intervals without increasing the stress factor.

3) The procedure also is relatively quick (5-10 minutes per turtle, including handling) and requires no anesthesia of any sort.

ACKNOWLEDGEMENTS

We would like to thank Fred Chavez of Equisonic Inc. for his assistance. Our thanks are also extended to the Cayman Turtle Farm Ltd., Grand Cayman, Cayman Islands. Support was provided by Sea Grant College Program NA85AA-D-SG128 and Sea Turtles Inc.

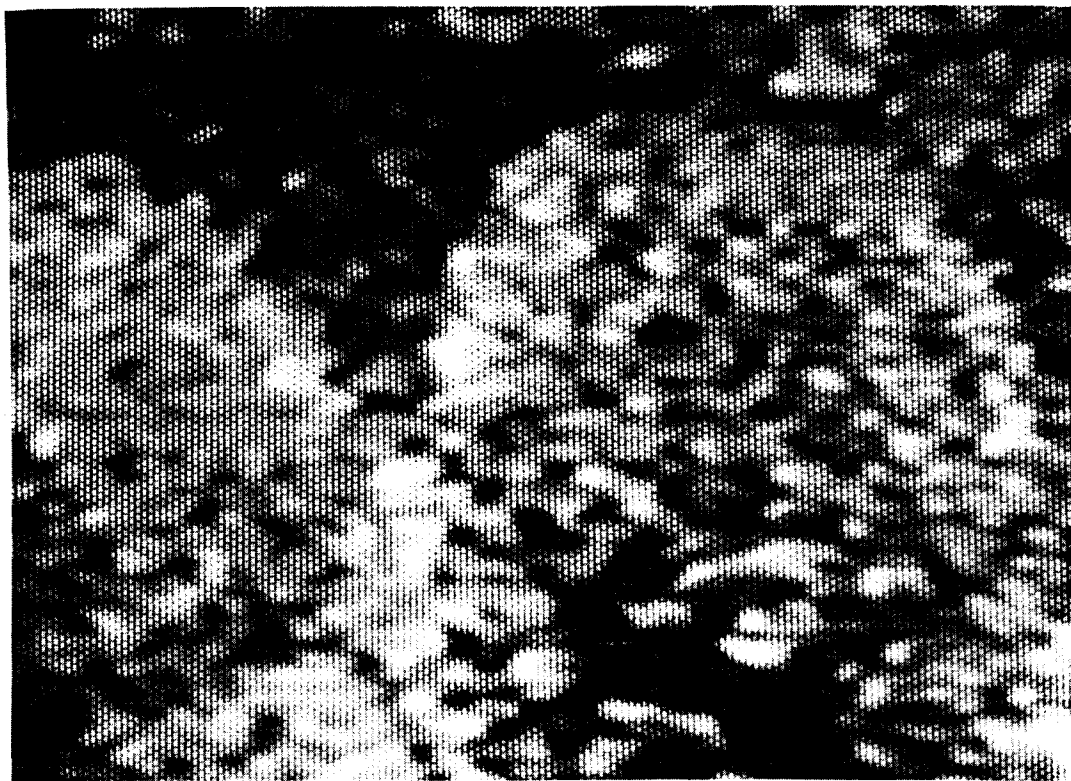


Figure 1. Ultrasonic image of a vitellogenic follicle (21 mm dia.) in situ from a Kemp's ridley.



Figure 2. Ultrasonic image of an egg (38 mm dia.) in situ from a Kemp's ridley.