2:30–2:45 Break

2:45

2pAB5. Hyperbolic location errors due to insufficient numbers of receivers. John L. Spiesberger (Dept. of Earth and Environ. Sci., Univ. of Pennsylvania, 240 S. 33rd St., Philadelphia, PA 19104-6316)

Animal locations are sometimes estimated by measuring the difference in travel times of their sounds at pairs of receivers. Ideally, each difference specifies the animal's location to a hyperboloid, and sufficient numbers of intersecting hyperboloids specify the location. Most bioacoustic publications state that one needs three receivers to locate animals in two spatial dimensions and four receivers in three spatial dimensions. However the actual numbers of receivers required for locations in two and three dimensions are four and five, respectively. Significant location errors can result from using insufficient numbers of receivers. Methods are provided for determining locations of ambiguous source-location regions.

3:00

2pAB6. Songlike vocalizations and infrasound from the Sumatran rhinoceros. Elizabeth von Muggenthaler (Fauna Commun. Res. Inst., P.O. Box 1126, Hillsborough, NC 27278), Paul Reinhart (Cincinnati Zoo, 3400 Vine St., Cincinnati, OH 45220), and Brad Lympany (Asheboro, NC)

Within the last ten years the Sumatran rhino (*Dicermoceros sumatrensis*) population has dropped 50%, and only 200–300 individuals are left in the world. The oldest living species of rhino in evolutionary terms, Sumatran rhinos are solitary, although males and females are seen together during courtship. Their native habitat is dense tropical forest and mountain moss forest. They are the smallest living rhino, standing 0.09–1.5 m tall, and are covered in course, reddish-brown hair. Three Sumatran rhinos, housed at the Cincinnati Zoo, were recorded from 1–3 m. Two Statham Radio microphones, and two Sony TCD-D8 DAT recorders recorded from 9 Hz to 22 KHz. Analysis, including FFTs, spectrographs, and filtering, were performed using National Instrument's Polynesia. The rhinos proved to be extremely vocal, producing signals almost constantly. Distinct calls, including several types of ''eeps,'' 70 Hz–4 kHz (57–92 dB); ''whales,'' 100 Hz–3.2 kHz (87 dB); and ''whistle-blows,'' 17 Hz–8 kHz (100 dB) were discovered. The ''whistle-blow'' has high dB infrasound that would be advantageous for use in the rhino's forest habitat. Some Sumatran rhino vocalizations sound similar to and resemble (under analysis) some humpback whale signals.

3:15

2pAB7. The felid purr: A healing mechanism? Elizabeth von Muggenthaler (Fauna Commun. Res. Inst., P.O. Box 1126, Hillsborough, NC 27278, L@animalvoice.com)

A current hypothesis suggests the purr indicates contentment, however, cats purr when they are severely injured or frightened. Forty-four felids were recorded including cheetahs, ocelots, pumas, domestic cats, and servals. A Sony TCD-D8 Digital Audio Recorder (DAT) and Statham Radio microphones recorded the purrs. FFTs and spectrographs were performed using National Instrument's Polynesia. An accelerometer was also used to measure domestic cat purrs. Every felid in the study generated strong frequencies between 25 and 150 Hz. Purr frequencies correspond to vibrational/electrical frequencies used in treatment for bone growth/fractures, pain, edema, muscle growth/strain, joint flexibility, dyspnea, and wounds. Domestic cats, servals, ocelots, and pumas produce fundamental, dominant, or strong frequencies at exactly 25 Hz and 50 Hz, the two low frequencies that best promote bone growth/fracture healing [Chen *et al.*, Zhong. Wai Ke Za Zhi. **32**, 217–219 (1994)]. These four species have a strong harmonic exactly at, or within 2 Hz of 100 Hz, a frequency used therapeutically for pain, edema, wounds, and dyspnea. An internal healing mechanism would be advantageous, increasing recovery time and keeping muscles and bone strong when sedentary. [Published with permission from the *New Zealand Veterinary Journal*; work supported by Endevco.]

TUESDAY AFTERNOON, 4 DECEMBER 2001 ROOM 305, 1:00 TO 5:00 P.M.

Session 2pAO

Acoustical Oceanography and Physical Acoustics: Turbulence and Finestructure Studies I: Surface and Bottom Boundary Layer Turbulence

James F. Lynch, Chair

Woods Hole Oceanographic Institution, 203 Bigelow Building, Woods Hole, Massachusetts 02543

Invited Papers

1:00

2pAO1. Dynamics of bottom boundary layers in the coastal ocean. John Trowbridge (Woods Hole Oceanogr. Inst., Woods Hole, MA 02543, jtrowbridge@whoi.edu)

The bottom boundary layer is the region adjacent to the sea floor, with a thickness typically on the order of meters to tens of meters, where turbulence generated by bottom drag produces vertical mixing of mass, heat, and momentum. Oceanic boundary layers are influenced not only by turbulent mixing, but also by planetary rotation, stratification, topography, surface waves, internal waves, and interaction with the erodible sea floor. Historically, understanding of the oceanic bottom boundary layer has been based on classical results in engineering and meteorology. However, recent theory and measurements have revealed unique features of oceanic boundary layers. Outstanding problems include measuring the interaction of the flow with the erodible sea floor; measuring the spatial scales of turbulent motions that accomplish vertical transport of mass, heat, and momentum; and understanding the processes that control the intensity and scale of boundary layer turbulence, particularly in stable stratification.