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PALMER_SCIENCE
SCIENCE SITREP - JUNE 1995

FROM: Corey Peterson, Assistant Supervisor Laboratory Operations

P A L M E R S T A T I O N A N T A R C T I C A

PALMER STATION
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The following science projects were active at Palmer Station during the month:

- S-036 ADAPTATIONS TO COUNTER DIFFUSIONAL CONSTRAINTS IN MUSCLE OF CHANNICHTHYID ICEFISHES. Bruce D. Sidell, University of Maine.

Personnel on-station: Raffaele Acierno, Deena Barry, Zoe Eppley

The R/V POLAR DUKE left Palmer Station on 29 May for Dallman Bay with personnel from S-036. Fishing operations were conducted in cooperation with project S-037 (H.W. Detrich, P.I.). The R/V POLAR DUKE arrived at Dallman Bay and commenced trawling operations in the vicinity of Astrolab Needle that evening. After 2 days and 20 trawls, the efforts yielded 230 fish. Specimens captured included: 63 *Chaenocephalus aceratus*, 134 *Gobionotothen gibberifrons*, 1 *Pseudochaenichthys georgianus*, 4 *Chaenodraco wilsoni*, 10 *Champocephalus gunnari*, 10 *Chionodraco rastrospinosus*, 7 *Notothenia coriiceps*, 1 *Dissostichus mawsoni* and 1 *Cygnodraco mawsoni*. Animals were transported to Palmer Station on 31 May and transferred to the station's aquarium to be held for experimentation. This fishing effort was very successful and yielded a new species for our comparative studies. On 7 June, Polar Duke left Palmer Station for Punta Arenas carrying the remaining S-036 field team members: Acierno, Barry and Eppley. During the month of June, S-036 personnel were on station for 6 days, half of which were spent packing.

Station-based laboratory science activities progressed on several fronts. 1) Activities of key enzymes of energy metabolism in oxidative and glycolytic skeletal muscles of *G. gibberifrons* of a wide range of body sizes: measurements requiring fresh tissue have been completed. Determinations of activities of freeze-stable enzymes will be continued in our CONUS laboratory. 2) Our guest Italian colleague, Dr. Acierno, has finished experiments on the performance of isolated hearts of *C. rastrospinosus* and *G. gibberifrons* in the presence of the myoglobin poison sodium nitrate. His experiments suggest a key role for myoglobin in cardiac function of the Antarctic Notothenioid fishes that express this protein. The experimental chamber built by on-site ASA

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construction personnel (Mr. Bruce Tollefson) was crucial to this work. 3) We have concluded our preparations of nuclei from the heart cells of *C. rastrispinosus*, *C. gunnari* and *C. aceratus* for subsequent nuclear "run-on" assays to be conducted in our CONUS laboratory to ascertain the extent of myoglobin gene transcription in each species. 4) The polymerase chain reaction (PCR) was used to amplify the myoglobin gene of *C. rastrispinosus*, *C. gunnari*, *C. aceratus* and *P. georgianus* using DNA isolated on site and specific primers developed in our CONUS laboratory. These products will be returned to our home institution for sequence analyses at the University of Maine's automated DNA sequencer facility. 5) Tissues were collected from *N. coriiceps* and *C. rastrispinosus* for the purification of the myoglobin protein in our CONUS laboratory. The purified protein will be used in *in vitro* tests for its function at low temperature. In combination, results of our experiments should shed light upon the mechanisms used to maintain cellular function of oxidative muscle tissues at cold body temperature and to determine the physiological significance and control of gene expression for myoglobin which shows very large variance in its expression among the channichthyid icefishes.

Success of our season to date has been greatly enhanced by excellent support from ASA personnel, crew and master of Polar Duke and the support personnel of Palmer Station. They are all gratefully acknowledged.

S-037 ASSEMBLY AND STABILITY OF MICROTUBULES FROM ANTARCTIC FISH AT LOW TEMPERATURES. H. William Detrich, Northeastern University, Boston, MA.

Personnel on-station: Angela Ramsey

During the month of June we concluded our 1995 Palmer-based research program. Ramsey completed her analyses of the ATPase activity of *G. gibberifrons* brain kinesin and performed PCR amplifications to obtain kinesin DNA fragments from several Antarctic fish species. Ramsey also collected additional samples of Antarctic fish tissues to support our CONUS research activities. Finally, Ramsey completed the packing of our lab materials for retrograde to our CONUS laboratory.

On 07 June Project member Ramsey redeployed to CONUS after completion of her research.

Throughout our field season we have been greatly assisted in our work by the ASA personnel of Palmer Station and the captain, crew, and ASA personnel of R/V Polar Duke. We gratefully acknowledge all of their efforts.

S-045R LONG-TERM ECOLOGICAL RESEARCH ON THE ANTARCTIC MARINE ECOSYSTEM: AN ICE-DOMINATED SYSTEM. Robin M. Ross and Langdon B. Quetin, University of California, Marine Science Institute, Santa Barbara, California 93106.

No personnel were on station

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Cultures were maintained winter by the winter Assistant Supervisor Laboratory Operations (ASLO) and the ASA Data Entry Clerk (DEC), Victoria Hogue, a past member of the S-028 (S-045R) winter field team.

- S-091 PALMER IRIS SEISMOLOGY. R. Butler/G. Holcomb, U.S. Geological Survey, Albuquerque, NM.

No personnel were on station.

The system has been operated by the station Science Technician. Seismic events throughout the month were recorded. On 27 June, an unplanned power outage forced an automated tape change. No data was lost.

- S-106 VERY LOW FREQUENCY (VLF) REMOTE SENSING OF THUNDERSTORM AND RADIATION BELT COUPLING TO THE IONOSPHERE. U. Inan, Stanford University.

No personnel were on station.

The system has been operated by the station Science Technician. Synoptic, narrow band and broad band recordings of VLF signals were made on a daily basis.

On 29 May, the cause of spurious N/S channel VLF noise was determined to be a grounding problem, and has been corrected. During the month of June, the narrow band Exabyte recorder occasionally rejected new tapes for unknown reasons. On 27 June an unplanned power outage resulted in approximately 10 minutes of lost data.

- S-254 CHLORINE- AND BROMINE-CONTAINING TRACE GASES IN THE ANTARCTIC. R.A. Rasmussen, Oregon Graduate Institute of Science and Technology, Portland, Oregon.

No personnel were on station.

Six samples were collected in stainless steel canisters, behind the clean air facility by the station physician. The samples were labeled with the date and stored for retrograding.

- S-257C COLLECTION OF ATMOSPHERIC AIR FOR THE NOAA/CMDL WORLDWIDE FLASK SAMPLING NETWORK. J.T. Peterson, NOAA, Boulder

No personnel were on station.

Four air samples were collected in glass flasks from a site behind the Clean Air Facility, by the station physician, using the MAK5 sampler.

- S-275 UM/DOE-EML REMOTE ATMOSPHERIC MEASUREMENTS PROGRAM. J. Prospero/T. Snowdon, University of Miami; C. Sanderson/N. Chui, EML/DOE N.Y.

No personnel were on station.

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The system has been operated by the station Science Technician. One sample filter was exposed for the duration of each week, and a weekly schedule of calibration, background, and sample counts was maintained.

On 27 June an unplanned power outage caused sample counting to cease and the multichannel analyzer to malfunction. Roughly one hour of sample count time was lost until the MCA could be reset, and the air pump for the current week's filter was disabled for approximately one half hour.

S-283 AUTOMATED WEATHER STATIONS. C. Stearns, University of Wisconsin at Madison.

No personnel were on station.

The malfunctioning Bonaparte Point Automated Weather Station (AWS) was serviced by the station Science Technician and the station Communications Technician. New batteries were installed, and on 15 June a faulty power cable was repaired, and the weather station became operational again.

T-312 TERASCAN SATELLITE IMAGING SYSTEM. R. Whritner, Scripps Institute of Oceanography, La Jolla, CA.

No personnel were on station.

The system has been operated by the station Science Technician. The TeraScan system collected, archived, and processed DMSP and NOAA telemetry, maintaining a schedule of 15 passes per day.

AWS data was collected from the Bonaparte Point and Hugo Island AWSs in support of the LTER project.

The TeraScan Sun workstation required rebooting three times during June due to system hangs, resulting in a loss of ten satellite passes. Tape drive ncht1 required one unscheduled cleaning. The TeraScan software was upgraded to collect data from the recently-launched DMSP F-13 satellite.

T-513 UV MONITORING EXPERIMENT. C. Booth, Biospherical Instruments, Inc.

No personnel were on station.

The system has been operated by the station Science Technician. Throughout the month, raw irradiance data were collected daily and transmitted to BSI. Preliminary irradiance data and inferred ozone abundances were produced in support of Science.

An absolute calibration of the UV monitor was performed on 15 June.