

UNIVERSITY OF CALIFORNIA
GRADUATE DIVISION, SOUTHERN SECTION

ANNOUNCEMENT OF THE FINAL EXAMINATION FOR
THE DEGREE OF DOCTOR OF PHILOSOPHY

of

DALE FREDERICK LEIPPER

B.S. in Education, Wittenberg College
M.A., Ohio State University

MONDAY, AUGUST 22, 1949, AT 1:00 P.M., IN THE SEMINAR ROOM
SCRIPPS BUILDING, LA JOLLA CAMPUS

COMMITTEE IN CHARGE:

PROFESSOR GEORGE F. McEWEN, *Chairman*
PROFESSOR CARL ECKART
PROFESSOR MARTIN W. JOHNSON
PROFESSOR J. BJERKNES
PROFESSOR J. HOLMBOE
PROFESSOR H. U. SVERDRUP (in absentia)

FIELDS OF STUDY

Major Field: Physical Oceanography

Studies in Physical Oceanography

PROFESSOR GEORGE F. McEWEN

PROFESSOR H. U. SVERDRUP

Studies in Chemical Oceanography

PROFESSOR NORRIS W. RAKESTRAW

Studies in Marine Biology

PROFESSOR MARTIN W. JOHNSON

Studies in Submarine Geology

PROFESSOR FRANCIS P. SHEPARD

Studies in Meteorology

PROFESSOR J. BJERKNES

PROFESSOR J. HOLMBOE

ASSOCIATE PROFESSOR M. NEIBURGER

PROFESSOR GEORGE F. McEWEN

ABSTRACT OF THE DISSERTATION

Sea Temperatures in Shallow Water

(Results from 75,000 observations along the California coast, with relations between temperatures, bottom topographies, tidal currents, and winds)

Sea temperature data collected in shallow water along the California coast under the direction of G. F. McEwen show marked local variations in temperature which have not previously been examined. The monthly average range of the daily variations is more than 4 degrees centigrade in the summer months. Such changes in sea temperature are far greater than would be expected from ordinary diurnal effects. Also, the largest changes occur below the surface. These facts indicate that some factor, other than the ones which are usually considered significant in sea temperature studies, plays an important role.

The present study was initiated to describe the observed temperature variations as fully as the available data permit, to demonstrate some of the implications of these variations, to develop a theory to account for them, and to make further observations of special types for the purpose of substantiating or disproving the theory.

The dissertation is in five sections. The first describes the diurnal and day-to-day variations and presents a model to account for the largest variations. This model consists of an area where, because of certain bottom characteristics, tidal currents have widely different velocities in adjacent parts of the area. These differences cause stirring of the surface water layers with deeper layers which are extremely cold. Thus, cold mixed waters are present adjacent to warm unmixed waters. The oscillating tidal movements then lead to large temperature changes at localities where one water type is present part of the time but is replaced often by water of the other type.

The second section considers the year-to-year trends and shows that the observed 32-year variation may be approximately described by an equation involving three simple harmonic curves. Section three gives monthly frequency distributions of temperature, shows the relationship between them, compares the distributions with those which might be expected from the variation theory of section one, and makes use of the frequency distribution curves to prepare charts showing the probability of occurrence of different temperatures on different dates.

Section four is a temperature study in the surf zone at some 75 different beaches. Section five shows daily sea temperatures for 1948 in comparison to mean and extreme values for the period of record.

Observational data used in the dissertation include 14,000 readings at 2-hourly intervals from sea thermographs at Scripps Pier, 12,000 each of daily bottom and sea-surface bucket temperatures, 30,000 daily bucket sea-surface

temperatures from Balboa, Hueneme, and Pacific Grove, 2,800 bucket temperatures in the surf zone from various beaches, 4,000 temperatures at depths to 400 feet obtained from 19 east-west bathythermograph cruises, 1,000 temperatures from bathythermograms made in the vicinity of Scripps Pier, and 100 hydrographic observations at stations located 5 and 11 miles west of Scripps Pier.



V I T A

September 8, 1914—Born in Salem, Ohio.

June, 1937—B.S. in Education, Wittenberg College.

June, 1939—M.A., Ohio State University.

February, 1940—General Secondary Teaching Credential, University of California, Los Angeles.

February-September, 1940—Weights and Balance Engineer, Consolidated Aircraft Corporation, San Diego, California.

September, 1940-September, 1941—Teacher, San Diego City Schools, San Diego, California.

September, 1941-December, 1945—U. S. Army Infantry, Signal Corps, and Air Forces. Oceanographer and Meteorologist, research and forecasting in Alaska. Captain.

January, 1946-August, 1949—Oceanographer, Scripps Institution of Oceanography, University of California, La Jolla, California. Research and teaching.

September, 1949—Associate Professor and Acting Head of the Department of Oceanography, School of Arts and Sciences, Agricultural and Mechanical College of Texas, College Station, Texas.

P U B L I C A T I O N S

"On the Representation of Equations Occurring in Geometry, Engineering, Physics and Other Fields." Thesis presented for the Degree of Master of Arts, Ohio State University.

"A Local Geostrophic-Wind Surface-Wind Diagram to Aid in Terminal Forecasting," with D. D. Miller. Bulletin of the American Meteorological Society, June, 1946.

"California Stratus Forecasting Correlations, 1935 and Other Years," Bulletin of the American Meteorological Society, June, 1948.

"Fog Development at San Diego, California," Journal of Marine Research, Sverdrup Sixtieth Anniversary Volume, Volume VII, Number 3, 1948.

"Sea Temperatures, Hawaiian Island Area," with E. R. Anderson. Pacific Science (in press).