activity in the renal tubule by parathyroid hormone was also reported, a finding which might have importance as a means of determining parathyroid activity in clinical situations.

Although absorption of calcium and phosphate from the gastrointestinal tract has been a favorite topic of investigation for many years no real progress in understanding the mechanisms involved occurred. It was not surprising, therefore, that Wasserman's report of a calcium-binding protein in the intestinal mucosa of chicks was greeted with such interest when it first appeared 2 years ago. Participants were particularly grateful, therefore, to be brought up to date on the most recent developments in this work. This protein appears to constitute 2 percent of the total protein in the soluble supernate of homogenates of isolated mucosal cells. It has a molecular weight of around 28,000, a very high electrophoretic mobility and a high affinity for calcium.

An important physiological role is suggested for it since the amount present seems directly proportional to the amount of vitamin D present in the organism and to the rate of calcium absorption as measured in vitro. Experimental manipulation of calcium absorption by vitamin D deprivation, and by adaptation to diets low and high in calcium content with subsequent measurement of this protein appear to confirm this point of view, as do the relative concentrations to be found in various parts of the small bowel. For example, the highest concentration is in the duodenal mucosa which has been shown by a number of workers to be the site of the greatest active transport of calcium along the gut. A 55-fold purification of the material has permitted a preliminary estimate of amino acid composition. These analyses indicate a high carboxylic acid content which may well be related to its strong chelating action. Finally it was of more than passing interest to learn that the relative binding constant for calcium is higher than that for strontium by a factor of approximately 25 percent, an observation which may provide the explanation for the ion discrimination in gut absorption.

A number of new techniques for examining bone were discussed. The enormous potential for examining the amount and composition of bone mineral at microscopic sites offered by electron probe analysis, and the measurement of skeletal density by absorption of a photon beam both evoked marked interest. The electron probe technique will provide a visual map of the distribution of any element in a thin section of undecalcified bone with a precision of one micron or less. Sensitivity is of a very high order but there are many pitfalls which must be avoided which include errors arising from uneven thickness of the section, irregularities in the surface plane of the section and other factors.

The new technique of photon beam densitometry has been brought to a high level of precision and practicality. Two groups reported on this technique (Nilsson in Malmö, and Cameron *et al.* in Madison). It appears that it is soon to become the standard method for estimating change in skeletal mass in vivo.

The organizing committee reported that it intended to publish the proceedings of the conference. It was announced that the sixth symposium would be held in Lund, Sweden, at the end of August or early September 1968. The seventh symposium was tentatively scheduled for Italy, probably to be held in the spring of 1970.

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Indian Ocean

That oceanography has come of age in recent years is evident from the increasing interest many nations are taking to study the oceans. It is increasingly evident that man's future lies in harnessing the vast food and mineral resources of the world's oceans. The Indian Ocean, which was until recently the least studied and was hence a mare incognito, is by virtue of international expeditions for several years (1960–65) now better understood. In order to assess the results achieved by the International Indian Ocean Expedition a symposium on the Indian Ocean was held in New Delhi, 2–4 March 1967.

A concerted use of marine resources —both food and mineral—were advocated by D. N. Wadia (Indian National Committee of Oceanographic Research), Atama Ram (C.S.I.R.), T. R. Seshadri (National Institute of Sciences of India), and N. K. Panikkar (National Institute of Oceanography, India). Seshadri, while pointing out that the sea was an immense source of food and minerals, remarked that even the seaweeds, now considered useless, could provide valuable materials such as algin and agar.

In the field of physical oceanography the symposium brought out the finding based on the cruises of the I.N.S. *Kistna* that the concentration and the thickness of the oxygen-rich layer were greater in the Arabian Sea than those in the Bay of Bengal. This is noteworthy because there are certain regions in the Arabian Sea where the supply of oxygen is low causing the large-scale death of marine fauna. In the Bay of Bengal the thickness of the oxygen-poor layer appeared to be increasing toward the north.

On the basis of the first cruise of the R. V. *Anton Bruun* in the spring of 1963 and studies by other vessels, E. C. Lafond (U.S. Navy Electronics Laboratory) remarked that the northeasterly and southwesterly monsoon winds largely control the surface circulation, resulting in clockwise or counter-clockwise circulation of the entire bay as well as large gyral circulations in different areas of the bay. Lafond reported occurrence of peripheral upwelling along the Burmese coast when the northeasterly monsoon prevailed. Upwelling developed along the east Indian coast when the southwestern monsoon became strong. These upwellings, though short-lived, affect organic production in the Bay of Bengal.

L. V. Gangadhara Rao and R. Jayaraman (National Institute of Oceanography) reported the existence in the upper 50 meters of the Eastern Bay and the Andaman Sea, a low salinity water mass. The Indian Ocean equatorial water (temperature, 4° to 16°C; salinity, 3.48 to 3.52 percent) was encountered as the major subsurface water mass below 100 to 150 meters in depth. They also detected traces of Persian Gulf water and regions of convergence and divergence in the Bay of Bengal. These authors reported some of the interesting findings such as the core of high salinity water and spreading of thermocline in the region of the equatorial under current where a few sections were worked by the I.N.S. *Kistna.*

Scientists from the Indian Naval Physical Laboratory (Cochin), K. V. Sundararamam, C. K. B. Kurup, and K. V. Sriramamurty, identified various

water masses—Red Sea, Arabian Sea, Persian Gulf, and Gulf of Oman waters—in the upper 500 meters of the Arabian Sea, from the temperature and salinity correlations obtained from the data of the I.N.S. *Kistna* for the period 1962–65.

C. S. Murty, in a paper by himself and V. V. R. Varadachari (both of N.I.O.) spoke about the probable existence of internal waves of long periods and wavelengths in the thermocline region. They based their conclusion on studies of the vertical sections of temperature and sigma-^{t} at different latitudes in the southwestern bay of Bengal during the southwestern monsoon season. Internal waves of short periods were also observed, they reported, during some of the cruises under the Indian Program of the International Indian Ocean Expedition.

Although a number of studies were carried out about the current systems in the upper layers no such study was reported about the deep currents. The study of deep-sea tides and of deep currents should also be studied in any future program.

Speaking about the geological evolution of the Indian coastline, M. S. Krishnan urged undertaking of detailed investigations to study the Pleistocene deposits along the coasts and in the deltas in order to understand the coastal processes. T. C. S. Rao (Indian Naval Physical Laboratory, Cochin) described, on the basis of echograms obtained in various cruises of I.N.S. *Kistna*, the rugged topography of the floor of the Bay of Bengal.

An important finding of the I.I.O.E. concerned the existence of three sets of separate canyons between Cuddalore and Palar River off the Coromandal coast (east coast of India).

Discussing the first results of the Meteor Indian Ocean expedition, Wolfgang Schott (Germany) spoke about studies on recent sedimentation in the Indian Ocean. The sedimentation lies between East Africa and the western coast of India and Pakistan. Schott identified a number of different facies zones running parallel to the coast. Five zones have been found off East Africa; and seven have been found off the Indian-Pakistan coast.

J. Krey (West Germany) discussed the preparation of the atlas on chemical biology of the Indian Ocean as part of the total program of investigations of the Indian Ocean. A preliminary chart of chlorophyll has already been prepared; it is based on available data.

N. K. Velankar (Central Institute of Fisheries Education, Bombay) underlined the importance of the development of marine bacteriology which has not progressed as much as the other marine sciences. He pointed out the intimate role of bacteria in the economy of the ocean.

T. S. Rass (Institute of Oceanology, Moscow) and N. K. Panikkar (National Institute of Oceanography) discussed the fishery potentialities of the Indian Ocean. According to Rass the deep-sea fauna in the Indian Ocean seemed to be poorer and evidently underinvestigated compared to that in other oceans. Concentrations of plankton and fish are found mainly along the meeting zones of the different water masses and currents, and in areas of upwellings. Speaking on the fishery resources of the Indian Ocean, Panikkar (India) estimated that the present yield of 2.5 million tons could be increased to at least 10 million tons in the coming few years and is capable of reaching a yield of 25 million tons towards the close of the century. The importance of the pelagic fisheries, such as elupeoids (sardines) and scombroids (mackerels and tuna) was particularly emphasized. S. N. Dwivedi (N.I.O.) pointed out that the tuna fisheries can be developed to a great extent and urged for a detailed study of the ecology of commercial species and related oceanographic features.

The results of *Anton Bruun,* as illustrated by Prof. Lafond, indicated the high productivity in the northeastern part of the Bay of Bengal, off the coast of East Pakistan and Burma. Over 2000 zooplankton samples collected by 38 participating ships have been deposited at the Indian Biological Center at Cochin where a group of about 25 persons have been engaged in the analysis of the collection. They have worked out the total biomass, the regional and seasonal distribution of several important planktonic groups. The study shows that the areas around the Somali coast, other northeastern parts of the Arabian Sea, part of the west coast of India, and the regions on either side of Ceylon are highly productive. In the Bay of Bengal, areas between Andaman and Malay are productive but the productivity in the Bay of Bengal is less than that in the Arabian Sea.

The session on maritime meteorology drew controversy about the origin of monsoon current. B. N. Desai argued that the characteristic air mass stratification over the Arabian Sea (moist-deflected trades in the lower levels and drier, unstable air from Arabia and neighboring areas in the upper levels) is very favorable for active to vigorous monsoons on the west coast of India. The larger the strength of the deflected trades and their normal component to the western Ghats the greater will be the amount of rainfall. On the other hand, on the basis of measurements of concentrations of radon and lead-212, Rama (Tata Institute of Fundamental Research, Bombay) argued that it is the continental air from Africa and Arabia or the air that has traveled on its path through continental land that picks up moisture while traversing the Arabian Sea, thus causing rainfall on the west coast of India. The measurements by Rama are preliminary; he expressed hope to do further study on this problem.

On the other hand, P. R. Pisharoty (Physical Research Laboratory) remarked on the basis of observed, spacially scanty, humidity and wind data that the cross-equatorial flux from the Southern to the Northern Hemisphere is transported eastward mostly south of 10°N. Thus a significant part of the monsoon water-vapor flux across peninsular India, according to him, consists largely of water vapor evaporated from the Arabian Sea itself.

P. R. Pisharoty and B. N. Sreenivasiah (both of Physical Research Laboratory, Ahmedabad) pointed out from the upper-air flow patterns over the Indian Ocean and the adjoining lands, the existence of two wind troughs on either side of the equator. The first is the well-known trough extending from the Persian Gulf to Bengal and North Burma across Baluchistan; the other less known trough, just south of the equator, extends from Seychelles to South Borneo. The global cloud patterns deduced from the TIROS, NIMBUS, and ESSA weather satellites exhibit cloud maxima in the neighborhood of these troughs; the maximum in the summer hemisphere is more marked than the one in the winter hemisphere.

The program of the newly established National Institute of Oceanography of India is to continue detailed study on the Indian Ocean as a regular scientific activity in India. Plans are underway for a systematic investigation of the Arabian Sea and the Bay of Bengal embrac-

ing the physical, chemical, biological, geological and the meteorological disciplines of scientific work.

The meeting was sponsored jointly by the Indian National Committee on Oceanic Research and the National Institute of Sciences of India.

SHIBDAS BURMAN
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Calendar of Events

National Meetings

August

28–2. **Alaska Science** Conf., 18th, College. (P. Morrison, Inst. of Arctic Biology, Univ. of Alaska, College 99735)

29–31. Association for **Computing Machinery**, 22nd natl. conf., Washington, D.C. (T. Willette, Box 6, Annandale, Va.)

29–1. **Electron Microscopy** Soc. of America, annual mtg., Chicago, Ill. (A. V. Loud, Pathology Dept., College of Physicians and Surgeons, Columbia Univ., 630 W. 168 St., New York 10032)

31–2. American **Physical Soc.**, Seattle, Wash. (Executive Secretary, 538 W. 120 St., New York 10027)

31–6. American **Psychological** Assoc., annual mtg., Washington, D.C. (APA, 1200 17th St., NW, Washington 20036)

September

1–5. American **Psychological** Assoc., 75th annual mtg., Washington, D.C. (A. Edwards, APA, 1200 17th St., Washington, D.C. 20036)

5–9. American **Political Science** Assoc., annual mtg., Chicago, Ill. (E. M. Kirkpatrick, APSA, 1527 New Hampshire Ave., NW, Washington, D.C. 20036)

5–9. **Molecular Structure and Spectroscopy**, Columbus, Ohio. (K. Narahari Rao, Dept. of Physics, Ohio State Univ., Columbus)

6–8. **Civil Engineering in the Oceans**, conf., San Francisco, Calif. (C. E. Lent, Jr., ASCE, 345 E. 47 St., New York 10017)

6–8. IEEE **Computer**, 1st annual conf., Chicago, Ill. (S. S. Yau, Dept. of Electrical Engineering, Technical Inst., Northwestern Univ., Evanston, Ill. 60201)

6–8. Mechanical **Behavior of Materials under Dynamic Loads**, San Antonio, Tex. (D. Black, Southwest Research Inst., 8500 Culebra Rd., San Antonio, Tex.)

6–8. Society of **Mining Engineers**, fall mtg., Las Vegas, Nev. (C. Hopkins, AIME, 345 E. 47 St., New York 10017)

7–8. **Fiber** Soc., annual mtg., Princeton, N.J. (L. Rebenfeld, TFS, Box 625, Princeton)

7–9. American Assoc. of **Obstetricians and Gynecologists**, annual mtg., Hot Springs, Va. (R. B. Wilson, AAOG, 200 First St., SW, Rochester, Minn.)

10–13. **Mining**, conv., Denver, Colo. (R. W. Van Evera, AMC, Ring Bldg., Washington, D.C. 20036)

10–15. American **Chemical** Soc., 154 annual mtg., Chicago, Ill. (A. T. Win-