

THE INDIAN ACADEMY OF SCIENCES : XXXVI ANNUAL MEETING

THE Thirty-Sixth Annual Meeting of the Indian Academy of Sciences was held at the Raman Research Institute, Bangalore, from the 7th to the 12th September 1970. It may be noted that this was the first time, since the inception of the Academy in 1934, that its Annual Meeting was held at the Academy's headquarters itself.

The week long meeting, which was made purposeful, had for its daily programme (i) an invited lecture followed by discussions from 10 a.m. to 12 noon, (ii) group discussions from 2 p.m. to 5 p.m. on a major subject of current interest at which active workers on various aspects of the subject presented their problems and the results of their investigations, and (iii) an evening lecture from 5-30 p.m. to 6-30 p.m. About a hundred scientists including Fellows, Invitees and Delegates attended the meeting.

After the Business Meeting of the Fellows, the plenary session opened at 10 a.m. on Monday, the 7th September 1970 with a general assembly of Fellows, Invitees and Delegates at which the President in an introductory speech welcomed the gathering of scientists. This was followed by informative talks and exchange of ideas on current progress of science in various countries of the world in which a number of speakers took part. Dr. L. A. Ramdas, Emeritus Scientist at the NPL, gave a talk on the possible reclamation of alkali-ridden soils. Dr. P. R. Pisharoty (Physical Research Laboratory, Ahmedabad) recounted his impressions of a recent visit to a Meteorological Observatory in Siberia.

The Council of the Academy were *at-home* to the guests in the evening.

Sir C. V. Raman, President of the Academy and Nobel Laureate, delivered his Presidential Address on "The Origins of Floral Colours".

The invited lecture of the morning session of the second day was given by Dr. S. Chandrasekhar (University of Mysore) on "Liquid Crystals" in which he gave a survey of the latest researches on the subject including the work done by his group at the Mysore University. At his request his co-worker Mr. Madhusudan supplemented the lecture by a short talk on the structure of some organic molecules which exhibit liquid crystal characteristics.

The subject for the group discussions for the afternoon session was "The Brain and its Func-

tions". Dr. R. M. Varma (Director, All-India Institute of Mental Health, Bangalore) took the Chair. Six speakers dealt with different aspects of the subject, each a specialist in his field of study. Dr. Sharma (St. John's Medical College, Bangalore) spoke on "Neurophysiology", Dr. B. K. Bachhawat (Medical Hospital, Vellore) on "Neurochemistry", Dr. M. Sirsi (Indian Institute of Science, Bangalore) on "Neuropharmacology", Dr. S. Kalyanaraman (Government General Hospital, Madras) on "Neurosurgery", Dr. K. S. Mani (All-India Institute of Mental Health, Bangalore) on "Neuromedicine", and Dr. R. L. Kapur (All-India Institute of Mental Health) on "Psychiatry".

The evening lecture on the second day under the Chairmanship of Dr. R. Ananthakrishnan (Director, Institute of Tropical Meteorology, Poona) was delivered by Dr. M. K. Vainu Bappu (Director, Kodaikanal Solar Observatory) on "Solar Eclipses" in which the lecturer made special references to coronal studies and the observations of the solar eclipse of March 7, 1970 by the Indian team which he led to Mexico.

The morning lecture on the third day was by Dr. R. Ramanna (Director, Physics Group, BARC, Bombay) on "Atomic Nuclei" in which he discussed a new mathematical approach to the problem of binding energy in atomic nuclei.

The group discussions on "Earthquakes" in the afternoon were held under the Chairmanship of Dr. K. R. Ramanathan (Director, Physical Research Laboratory, Ahmedabad) who in his introductory speech traced the history and current status of "Seismology in India". Dr. B. P. Radhakrishna (Director, Department of Mines and Geology, Bangalore) spoke on "Indian Geology with reference to Seismology" in which he advanced arguments to show that the Deccan Plateau is not to be regarded as a seismologically quiescent zone. Mr. M. B. Ramachandra Rao (Former Member, Oil and Natural Gas Commission, India) spoke about some significant findings met with during the drilling-for-oil operations in India, which had special reference to the theory of isostasy. Dr. Kaila (NGI, Hyderabad) gave a detailed account of the work being done at the National Geophysical Institute in his talk on "Seismological Studies at Hyderabad". Mr. T. G. Varghese in his talk on "Earthquake Data from Gauribidanur" gave an account of the working

and performance of the precision instruments installed in Gauribidanur near Bangalore for the detection and supply of data on earthquakes and underground nuclear tests which may be carried out at any part of the world. Dr. R. Ramanna showed some slides of recent measurements carried out on skyscraper buildings in America to study the effects of underground nuclear explosions. Dr. S. K. Chakrabarty (Department of Applied Mathematics, University College of Science, Calcutta) spoke on "Theoretical Seismology" and Prof. V. R. Thiruvengkatachar on "Mathematical Models in Seismology".

The evening lecture was on "Modern Meteorology" by Miss Anna Mani (Deputy Director-General of Observatories, New Delhi) in which she dealt chiefly with satellite meteorology. The lecture concluded with a 15-minute film show of cloud photographs depicting 10-day, 5-day, and daily changes of cloud patterns over the globe, as transmitted by the meteorological satellites circling the earth.

The invited lecture on the morning of the fourth day was on "Molecular Structure" by Dr. C. N. R. Rao (Indian Institute of Technology, Kanpur). Dr. Rao in his lecture gave a clear exposition of our present state of knowledge on the structure of H₂O, the water molecule, as revealed by latest techniques by chemical, physical, and spectroscopic methods.

The topic for the group discussions for this day's afternoon session was "Plant Diseases". Eleven speakers presented their subjects each in a 15-minute talk followed by discussions. Prof. T. S. Sadasivan (Director, University Botany Laboratory, Madras), who chaired the meeting, in his introductory talk made special reference to experiments with isolated protoplasts. Dr. S. Suryanarayana (Department of Botany, University of Madras) spoke on "Environment and Disease"; Dr. R. Kalyanasundaram (University of Madras) on "Plant Immunity and Resistance"; Dr. D. Subramanian (Department of Botany, University of Madras) on "Phytoallergins"; and Dr. V. Agnihothrudu (Technical Adviser, Rallis India, Ltd.) on "Chemical Control of Fungal Diseases". These were followed by the Coimbatore Agricultural College Research group headed by Dr. K. Ramakrishnan who spoke on "General Virology", Dr. K. K. N. Nambiar on "Patho-physiology of Virus Diseases", Mr. A. Anjaneyulu on "Mycoplasma/PPLO-induced Pathogenesis in Plants", and Mr. T. K. Kandaswami on "Control of Virus

Diseases". Finally, Dr. G. Rangaswami (Dean, University of Agricultural Sciences, Bangalore) spoke on "Bacteriology and Soil Microbiology", and Dr. S. Y. Padmanabhan (Director, Rice Research Institute, Cuttack) on "Breeding for Disease Resistance in Rice".

The evening lecture on the fourth day was delivered by Dr. R. M. Varma (Director, All-India Institute of Mental Health, Bangalore) on "Brain and Mind".

The proceedings of the fifth day of the session started with the lecture on "Radio Astronomy" by Dr. Govind Swarup, (Radio Astronomy Division, TIFR, Ooty). The lecturer in his survey of the subject spoke on Radio-Sources, Moon's Occultation, Inter-planetary Medium, and Pulsars, and made special reference to the potentialities of the newly installed Radio Telescope at Ooty which has gone into action.

The group discussions in the afternoon was on "Aeronautics" in which four experts took part. Dr. V. M. Ghatage (General Manager, Hindustan Aeronautics Ltd., Bangalore) who chaired the meeting spoke on "Some Specific Problems in the Design of an Aircraft". Among the problems he discussed were Static Pressure Measurements, After Body Drag, and Interference. This was followed by a talk by Prof. Satish Dhawan (Director, Indian Institute of Science, Bangalore) on "Breakdown of Laminar Motion". Prof. R. Narasimha (Indian Institute of Science, Bangalore) spoke on "Shock Wave Structure". The last speaker was Dr. S. R. Valluri (Director, National Aeronautical Laboratory, Bangalore) who spoke on "Some Aspects of Fatigue Failure".

The evening lecture of the day was on "Our Mineral Resources" by Dr. B. P. Radhakrishna (Director, Department of Mines and Geology, Bangalore).

On the sixth and last day of the meeting the morning invited lecture was given under the Chairmanship of Dr. S. Dhawan, by Dr. S. Ramaseshan (National Aeronautical Laboratory, Bangalore) on "Materials Science". The lecturer reviewed the current progress in the field of Stress/Strain relations in alloys and composite materials, and discussed the problems his group is tackling at the NAL on fibre reinforcement technique and the new technique of electrolytic deposition of thin layers in matrix materials. At his request his collaborator Mr. Rangarajan supplemented the lecture

by a short talk on the mathematics involved in the above technique.

The afternoon group discussions were on "The Structure of the Galaxy" in which the following specialists spoke on the subject mentioned against each: Dr. K. D. Abhyanker (Nizam's Observatory, Hyderabad) on "Kinematical Features of the Galaxy"; Dr. J. C. Bhattacharyya (Kodaikanal Observatory) on "Brightness Distribution of the Milky Way in the UV, Visual and Infrared Regions"; Dr. G. Swarup on "Radio Continuum and Line Radiation Characteristic of the Galaxy"; Dr. M. K. Vainu Bappu on "Optical Aspects of Spiral Structure of the Galaxy"; Mr. Ch. V. Sastry

on "Low Frequency Detection of Ionized Hydrogen Regions"; Dr. B. V. Sreekantan (Tata Institute of Fundamental Research, Bombay) on "Gamma-rays, X-rays and the Galaxy"; and Dr. R. R. Daniel (TIFR, Bombay) on "Cosmic Rays and the Structure of the Galaxy".

The evening lecture was given by Dr. V. Prabhakar Rao (Entomologist-in-Charge, Commonwealth Institute of Biological Control, Bangalore) on "Insect Control".

The Session concluded with an expression of thanks by the President Sir C. V. Raman, to all the Fellows, Invitees and Delegates who by making this "contact of minds" possible contributed to the success of the meeting.

DIFFERENTIAL INTERACTION OF MARINE HUMIC AND FULVIC ACIDS WITH ALKALINE EARTH AND RARE EARTH ELEMENTS

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ABSTRACT

Alkaline earth sulphates such as of Ba and Ra and rare earth hydroxides such as of Y, La and Ac were solubilized significantly by marine humic and fulvic acids in ammoniacal medium. Alkaline earth elements were associated with humic and fulvic acids as exchangeable cationic and/or cationic complexes whereas rare earth elements formed non-cationic complexes. Major fraction of humic acid precipitates in sea-water and this settling humic acid picks up only rare earth elements from alkaline earth-rare earth radioactive pairs. These rare earths were associated with humic acid as non-cationic complexes. The dissolved fraction of humic acid in sea-water also had the rare earths in non-cationic complex forms.

INTRODUCTION

HUMIC ACID (in ammoniacal medium) solubilises a large number of elements.¹ Solubilized Ba was found to be associated with the cation exchange sites of humic acid and the total solubilization of BaSO₄ was observed to be equivalent to the exchange capacity.¹ Solubilized transition and trivalent elements such as Zn, Mn, Cu, Co, Fe and Y are bound with the humic acid mostly as non-cationic complexes and small fractions were observed to be exchangeable on a cation column.

Humic acid precipitates in sea-water and picks up in the process a variety of major and trace elements present in the medium. In the light of the above observations and the presence of high concentrations of Mg and Ca, other alkaline earth elements are not expected to be significantly picked up by the settling humic acid. Results presented in Table I also support this contention. However, it has been observed that Y is almost quantitatively picked

up by the settling humic acid under similar conditions.¹

TABLE I*

Pick-up of ⁸⁵⁻⁸⁹Sr by humic acid (sea-water medium)

Time (days)	Activity in cpm per ml. in filtrate	
	Blank	Sample
0.17	1643	1633
7	1415	1370
15	1306	1293
22	1238	1230
33	1083	1074

* Humic acid sol.—12.8 mg. (exchange capacity 383 meq per 100 g.) in 100 ml ⁸⁵⁻⁸⁹ Sr (carrier content—1.86 mg.), spiked sea-water was left with intermittent shaking. Aliquots filtered from time to time, filtrate counts compared with that of the blank.

In this paper, further results are presented on the nature of this differential interaction of humic and fulvic acids with alkaline earth and rare earth elements. Discussions follow each of the experiments.