SCIENCE NEWS

Extracts of address by *Prof.* Hanbury Brown, President, International Astronomical Union at the Inauguration of the XIX General Assembly of IAU New Delhi, 19 November 1985

I would like to convey to all those concerned our very real gratitude for the invitation to meet in this country and for the generous facilities which you have provided for our meeting. We are indeed happy to be here – happy to be with people who are so welcoming and to meet in a city which is so handsome and so historic.

Our Union has been bringing its members together in General Assemblies ever since 1922; in fact it is one of the oldest of the scientific unions. Its broad aim is to develop astronomy through international co-operation and these General Assemblies are intended to serve that aim in three main ways. Firstly they have the straightforward scientific function of exchanging and reviewing the latest scientific results and of planning the international co-operation in research which is so essential to astronomy – no matter what our nationality may be, we all work on the same sky.

Secondly these Assemblies help to make individuals feel that they are part of a real, live, world-wide community of astronomers. For a short while they make visible the invisible community to which all true scientists belong, the invisible college of science. To know that they are part of that great community is particularly valuable to young astronomers who may have little, if any, opportunity of attending international meetings. I am glad to say that in planning this meeting considerable efforts have been made to help young astronomers to attend.

Thirdly, it has been our experience that these Assemblies help to promote a public interest in astronomy in the country in which they are held; I hope that will prove to be true in India.

Many members of our Union will, I feel sure, already know something about India. If they were lucky they could have learned it from our late President, Vainu Bappu whose death was such a grievous loss to Astronomy, especially to Indian Astronomy and to our Union. He was an excellent ambassador for Indian Science – courteous, charming and, moreover, extremely good at the task which he had undertaken – the modernising of Indian Optical Astronomy. We all miss him greatly at this meeting; I know how much he valued the prospect of our Union meeting in India.

Many members will, no doubt, have learned something about India from those guide books which we all buy and promise ourselves that we will read, and often end up reading on the plane. From those books we can learn quite a lot about Indian history and culture. The word culture as it is commonly used includes, literature, architecture, painting, music, dancing, sculpture, religion and so on; but it never includes science. Astronomy is an integral part of Science and the persuit of science should be, an integral part of any worthwhile conception of modern culture and vision of progress. Maybe the more serious guide books have something to say about India's extensive and distinguished scientific past – perhaps they tell us something about India's contributions to algebra or to astronomy in the 5th century, or more likely they tell us about the magnificent medieval Observatories such as the one at Jaipur. But what they do not tell us, unlike Professor Bappu, is anything much about what Indian Science is like to-day. To take a very few example, from my own experience of this great country, I could tell you about the fine optical observatory at Kavalur, the impressive Radio-astronomical installation at Ootacamund or about the excellent work on radio-astronomy at the Raman Institute in Bangalore. But I hope that some of you will see these things for yourselves.

One of the best ways of getting to know an unfamiliar country in a short time is to meet your opposite numbers in that country. I hope that you will meet some of the very man Indian astronomers and other Indian scientists at this General Assembly. If you do, you will discover something which cannot be discovered from a guide book, that the tradition of scientific excellence which we find in Indian history is still very much alive to-day.

MICELLES AND MICROEMULSIONS–A MEETING REPORT

What are the current theoretical and experimental models of chain packing in the aggregates of surface-active molecules, *i.e.*, micelles? What are the accepted modes of molecular assembly here and in related aggregates such as bilayers and liposomes? What are the microstructural features of microemulsions (swollen micelles and inverted micelles); and when a system displays a phase transition from oil-in-water (o/w) microemulsions phase to the water-in-oil (w/o) type, are there bicontinuous phases at intermediate ranges of the oil: water ratio? These were some of the basic questions, answers to which were sought at the recent 5-day International Symposium on Magnetic Resonance and Scattering in Surfactant Systems, organised by the Division of Colloid and Surface Chemistry of the American Chemical Society at the 189th ACS Meeting at Miami Beach during April 28–May 3, 1985.

Micelles: The recent controversy in literature about the penetration of water into micellar interiors has been set to rest, and the consensus is that of a micelle which is hydrated only in the headgroup region. Most of the probes that are used to monitor water penetration have been seen to be located near the headgroup region of the host micelles. Though Fromherz presented further details of his 'surfactant block model' of micelles, the widely accepted picture of a surfactant micelle appears to keep the Hartley model of an anhydrous interior, but as a more dynamic one that lets the monomer units bend, coil, occasionally surface out and yet to be closely packed. The Gruen and the Dill models appear to be consistent with experimental results, and are extendable to rods and bilayers. A detailed account of the Gruen calculations has also since appeared in *J. Phys. Chem. 1985, 89, 146*. A considerable number of small angle neutron and x-ray scattering (SANS, SAXS) results were reported on micellar and microemulsion systems, notably by Hayter, Magid, Zemb, Nicoli, Robinson, Triolo, Thompson, Kaler, Candau, Ward and others. Similar and concordant results using NMR spectroscopy were also described by Cabane, Raux, Chan, Reeves, Stilbs, Henriksson, Blum, Lindman, Chachaty, Canet, Wayslishen, Hoffmann, Hendrikx and Kilpatrick. The use of electron spin echo modulation spectroscopy in studying the structure of these assemblies was highlighted by Kevan. *Microemulsions*: A unified and self-consistent theory for the structures and phase transitions in microemulsion systems appears to be coming about from the groups of Safran, Ninham, Scriven, Gelbart and others, and the theory for bicontinuous phases particularly from the Minnesota group. SAXS and SANS as well as quasielastic light scattering (QELS) results on microemulsions were presented by Kaler and others mentioned earlier and the critical phenomena in surfactants and microemulsions were discussed by Huang, Langevin, Roux, Kim, Degiorgio Blankschtein and Gelbart.

Biological surfactants and membranes: The NMR of phospholipids and nonionic surfactants in micelles and membranes was discussed by Dennis, while the use of short chain lecithins to form model lipoproteins was suggested by Mary Roberts. NMR and kinetic studies on novel mixed-micelle substrates for lipolytic enzymes were presented by Ruth Stark, while NMR studies on peptides, some signal peptides in particular, in membrane bilayers were presented by Leila Gierasch. Balasubramanian presented his recent joint work with Mitra, Sankaram and Easwaran on the calcium-induced phase changes of cardiolipin in bilayer membranes, as monitored by proton and phosphorus NMR and also the cardiolipin-modulated transvesicular entry of Pr^{3+} ions. Such non-bilayer arrangements of cardiolipin and of digalactosyldiglyceride in host bilayers appear to be of bioenergetic interest.

Aggregation in nonaqueous media: While inverted micelles or reverse micelles of several surfactants, notably sodium dioctyl sufosuccinate (Aerosol OT) and lecithin, are known and characterized in apolar organic solvents for some time now, the formation of regular micelles (polar out, nonpolar in type) has been largely studied in water as the bulk medium. While this is not surprising since micellar aggregation occurs to a large extent due to the hydrophobic effect, in the aqueous medium, there have been earlier reports by Ashoka Ray and by H N Singh of micellar aggregation of surfactants in other protic and polar nonaqueous media such as glycols, dimethylsulfoxide, formamide and dimethylformamide. Lumry, Evans and Ramadan have recently pointed out the remarkable similarities between the properties of liquid water and of liquid hydrazine (N_2H_4) and have shown that the several common surfactants (such as sodium dodecyl sulfate) indeed aggregate to produce micelles in hydrazine solutions, with critical micelle concentrations and aggregation properties similar to those in water.

This would lead us to believe that the 'solvophobic' interactions in hydrazine would be similar to the hydrophobic forces in water – and it would be of interest to see whether globular proteins maintain their native conformations in hydrazines or whether lipids like lecithin would vesiculate in this solvent.

The proceedings of the meeting will be published shortly by Plenum Press.

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NEWS

THE WALLS HAVE EARS. . . AND THE HOUSE A BRAIN

. . . Although "nothing that today's home control systems offer has proved especially compelling to the consumer. . . the next generation of home control will offer more interesting capabilities, such as two-way communication. Appliances will be able to send signals to the command unit and to each other—not simply receive orders. . . . More futuristic visions of home control come from the NAHB Research Foundation (Rockville, Md.), an arm of the Natl. Assn. of Home Builders. NAHB's proposed Smart House would . . . combine all of a dwelling's various electrical transmissions—power, telephone, cable TV, security, control signals for lights and appliances, and even the doorbell—onto the same cables. A microprocessor would monitor and direct the flow of power and information. . . . New semiconductor devices will help make Smart House feasible. The key: integrated circuits that combine logic and power switching—brain and brawn—on the same chip. These devices could respond to low-voltage signals (say, from the central computer) to turn the flow of household line current on and off."

[(Herb Brody in *High Technology* 5(5):60–4, May 85). Reproduced with permission from Press Digest, *Current Contents*®, No. 29, July 22, 1985, p. 13. (Published by the Institute for Scientific Information®, Philadelphia, PA, USA.)]

KEEP AN EYE OUT FOR SKIN CANCER

. . ."A five-minute monthly self-examination can help fight a deadly skin cancer whose rate has more than doubled in 10 years, an expert in the disease says. The examination can reveal a malignancy early enough that a cure is virtually guaranteed, said Darrell Rigel [New York U. Medical Ctr.]. He said that in addition to an annual skin examination by a doctor, people should be examining their skin themselves every month. 'It takes five minutes of your time to do it effectively,' he said. . . . Early melanomas [skin cancer tumors] can be distinguished from harmless moles by remembering an 'ABCD' rule, Rigel said. The letters stand for asymmetry, border, color and diameter. Unlike common moles, melanomas may be asymmetrical, meaning they cannot be divided into matching halves with an imaginary line. Their borders are often uneven or notched, rather than smooth. They show mixed shades of color rather than a uniform hue. And they tend to be wider than a pencil eraser, Rigel said."

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