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Liquid Crystals

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Liquid crystals Present, past and future Symposium held in honour of George W. Gray, FRS

Hotel Palatium,
Capri

11-14 September, 1996

Foreword

Just the fact that a prominent member of the scientific community approaches some date marking a particular jubilee may make friends and admirers want to congratulate the celebrity by way of a 'Festschrift' or some candle lit dinner at his club. However, that same fact would not be quite reason enough to make people take the trouble to meet on an island, pleasant as it might be, in the Gulf of Naples, unless of course, at the same time, a great need was felt to sum up the past, to consider what is new, and to discuss how we can proceed on the basis of where we stand today.

Let me say, in order not to be misunderstood, that I myself along with numerous fellow admirers of Professor George W. Gray, great scientist and human being, would gladly have travelled to the most desolate and unpleasant place to celebrate his 70th birthday. But, I would not have felt the need to make that occasion a symposium or to publish any proceedings from that event, had not the achievements of G. W. G. been of such calibre in the past, and of such importance for today's and tomorrow's further development of the science and technology of liquid crystals, and had not simultaneously the need expressed at recent larger conferences made it extremely timely to look back, to sum up, and to discuss how we may proceed from where we are now.

The parallel rapid developments of the materials and information sciences have demonstrated the intrinsic power of liquid crystals. This still fairly fresh branch of chemical, physical and technical science has already had its successes: the triumphant arrival of reliable, cost- and energy-efficient alphanumeric and matrix displays, thanks not least to G. W. G.'s synthetic innovations and elucidation of novel liquid crystal materials, and lately, the advances in the technology of high resolution, video-rate, colour displays, involving nematics, as well as smectics, many connected to G. W. G.'s pioneering work. This issue of the journal *Liquid Crystals* constitutes part

of the Proceedings of the 1996 Capri Conference, in honour of George Gray, on 'Liquid Crystals—Present, Past and Future'. It consists of a number of the articles presented at the conference, and one by Professor Trebin who was unable to attend the meeting, but wanted to pay tribute to G. W. G. More of the papers presented will follow through publication in this journal.

The symposium was held at the Palatium Hotel, Capri, Italy during three full days with a scientific programme running from early morning through to supper time. The oral presentations by the distinguished contributors attending by special invitation and also the Historic Discussion Panel provoked lively discussions continuing, in small groups, late into the night.

One evening the participants attended a concert at Dr Axel Munthe's Villa San Michele at Anacapri, overlooking Capri and the Gulf of Naples. A late birthday party for G. W. G., in the form of an open air conference banquet with G. W. G. himself conducting the 'choir' singing the International Liquid Crystal Song, rounded off the social part of the programme.

An unexpected homage to the distinguished guest visiting the island came on the last evening after the closing of the symposium, when the participants were leaning against the terrace railing, looking towards the sea and contemplating the three days. Suddenly, in the dark, the most splendid display of fireworks, directed towards the Hotel Palatium, erupted from a boat moored far below. It marked the end point of some unusually intense days filled with critical science, discussions, personal warmth and cordiality.

It is a pleasure for my colleague Bengt Stabler and I to thank Professor Eugenio Amendola for his invaluable help in making many of the arrangements. We further wish to acknowledge financial support from Taylor & Francis Ltd, London; E. Merck, Darmstadt; Hoechst AG, Frankfurt; Sharp Laboratories of Oxford Ltd;

Chalmers University of Technology, Goteborg and an anonymous donor.

Sven T. Lagerwall
Goteborg

Preface

As Sven Lagerwall has said in his Foreword, the need has been felt for some time by those who think widely about liquid crystals for a small, select meeting to consider what has been achieved in the field, where we are now and how we move on from this position. This perceived need stems of course from the high rate at which enormous advances have occurred in the subject in chemistry, physics, theory and technological applications over the last 20 years—a need to stand aside from the torrent of new information, to take breath if you like and consider future prospects.

Looking constructively to the future is of course most effective if you are preconditioned by experience of the past, or as put more eloquently by Winston Churchill—‘the farther backward you can look, the farther forward you are likely to see’.

The resulting meeting which occurred in Capri therefore purposely and unashamedly did its share of looking back, thereby providing both a suitable basis for looking forward and a suitable occasion to honour the writer who after 50 years of research in the field is still active in it. But the presentations that looked back always had an eye on or a message for the future of the subject, and these combined constructively with those by delegates who were prepared to look adventurously forward, untrammelled by the constraints which operate at bigger meetings. The meeting therefore contained exciting papers addressing problems such as: are nematics really able to be biaxial; where have we got to with cubic liquid crystal systems; what has been achieved with liquid crystal displays and what can we anticipate in the future; where are the new application areas for liquid crystals (in tribology, in auxetic systems, in sensors and piezoelectric devices, in gels and networks, in non-linear optics, in pattern formation), what are the connections between self-organized liquid crystals and the life processes of biology (supermolecules and supramolecular assemblies) and this subject’s connections with organized mono- and multi-layer systems and with fluid self-organized machines; do we understand the full role of chirality in liquid crystal systems; what do we really know about the fundamental self-organizing process—the packing of mesogens and achievement of orientational order; what are we learning about molecular design features for ferroelectrics, antiferroelectrics and piezoelectrics?

A further outcome of the meeting was that agreement

was reached on final recommendations on liquid crystal nomenclature for adoption by IUPAC.

It was therefore an excellent, stimulating scientific meeting, and that it was held in my honour has been a matter of great personal satisfaction. It has also made me feel very proud that so many talented friends and colleagues from over the years—distinguished scientists who have contributed so very much to the field—were prepared to take time out from busy lives to be with me in Capri. I am most grateful to them all, but particularly of course to Sven Lagerwall who conceived the meeting and his colleague Bengt Stebler from Goteborg who helped him greatly in the organizing process. My thanks go also to Professors Simoni (Ancona) and Amendola (Naples) who did much to smooth the way locally.

Drinking in good science (and good wine) in the ambience of a fine hotel, in the beautiful environment of Capri, and in the company of good friends was a great experience, rendered the more pleasant by the presence of so many of the delegates’ wives exercising their customary civilizing influence, but not denying us many discussions into the wee small hours following each day’s scientific proceedings. I suspect however that another Lady was involved in the spectacular firework display referred to by Sven, namely the Virgin Mary, one of whose feast days happened to coincide with the last day of the conference.

I hope that the selection of available presentations made at the Capri Meeting and put together by me, with the kind agreement and backing of Taylor & Francis Ltd, London into this issue of the journal *Liquid Crystals* will convey to the readership something of the good science and perspectives of the meeting.

George Gray

Other presentations

T. Carlsson—Chalmers University of Technology, Goteborg, Sweden

The beginnings of liquid crystal hydrodynamics

N. A. Clark—Physics Department, University of Colorado, USA

The molecular design of ferroelectric liquid crystals

H. Coles—Southampton Liquid Crystal Institute (Physics), UK

From cyanobiphenyls to organosiloxanes: linear to non-linear optics

D. Demus—ISCO, Halle, Germany

Defects and textures in relation to life

G. Durand—Université Paris Sud, Orsay, France

Surface transitions and texture switching in nematics

A. C. Griffin—University of Southern Mississippi, USA
To get fatter when stretched—liquid crystalline polymers
as auxetic materials

T. Inukai—Chisso Corporation, Yokohama, Japan
The conformation and other properties of nematics from
ab initio molecular orbital theory

W. H. de Jeu—FOM Institute, Amsterdam, Netherlands
What do we understand about the packing of mesogens?

S. T. Lagerwall—Chalmers University of Technology,
Goteborg, Sweden
Polar and piezoelectric liquid crystals

J. D. Litster—Massachusetts Institute of Technology
(MIT), USA
Marginal dimensional behaviour in smectic A liquid
crystals

G. R. Luckhurst—Southampton Liquid Crystal Institute
(Chemistry), UK
Orientational order in liquid crystals

P. Palfy-Muhoray—Liquid Crystal Institute, Kent,
USA
Pattern formation in liquid crystals

A. Saupe—Max Planck Research Group, Halle
Germany
The development of elasticity theory in liquid crystals

J. Wahl—Optrex Europe GmbH, Babenhausen,
Germany
The evolution of liquid crystal displays

D. M. Walba—Chemistry Department, University of
Colorado, USA
Ferroelectric liquid crystals for NLO

