

HISTORY
NOT TO BE REMOVED
FROM
FILE.

THE
BRITISH SOCIETY
OF RHEOLOGY

BULLETIN — No. 2, 1962

Hon. Secretary :

DR. M. F. CULPIN,
8 The Broadway,
Pontypool,
Monmouthshire.

Hon. Editor (Bulletin) :

MR. J. F. HUTTON,
"Shell " Research Ltd.,
P.O. Box No. 1,
Chester.

THE BRITISH SOCIETY OF RHEOLOGY



New Members

Elected 13th April, 1962

Victoria Branch

NAME AND ADDRESS	INTERESTS
Mr. B. D. Dixon, School of Dairy Technology, Box 111, Werribee, Victoria, Australia.	
Prof. J. N. Greenwood, University of Melbourne, Parkville, Victoria, Australia.	General.
Dr. D. R. Mills, Physical Metallurgy Section, Metallurgy Department, C.S.I.R.O., University of Melbourne, Victoria, Australia.	Plastic deformation, creep, metals.
Dr. D. H. Trollope, Dept. of Civil Engineering, University of Melbourne, Victoria, Australia.	

Home Branch

Dr. J. E. Carless, 36 Carlton Road, Redhill, Surrey.	Suspensions, emulsions, cone and plate viscometers.
Mr. J. A. Hull, Mullard Simonstone Works, Simonstone, Burnley, Lancs.	Graphite suspensions, polymer solutions.
Dr. J. F. Johnson, 576 Standard Avenue, Richmond, California, U.S.A.	Rotational viscometry, viscoelasticity.
Mr. T. H. Lawrence Phillips, 130 Ware Road, Hoddesdon, Herts.	Rheology in the building industry.
Mr. K. Wibberley, Department of Pharmaceutics, School of Pharmacy, Brunswick Square, London, W.C.1.	Emulsions, suspensions.

Notes

1. Rheologists are aware of the fact that the name of their science is relatively unknown in the outside world. It is therefore heartening to know that this state of affairs may not long persist, for at least one crossword puzzle maker has heard of it. Since compilers of puzzles are not averse to cribbing from each other we may be sure that others will make use of the word. The work of the enterprising and original puzzler appeared in *The Guardian* on 11th April, 1962, and his clue was: "Current study: he gets love in exchange for glory (8)".

2. At a meeting of the Cambridge Rheology Club on Monday, 7th May, 1962, Mr. R. G. King of Farol Research Engineers Ltd., Bognor Regis, gave a talk on "Viscoelasticity and the Weissenberg Rheogoniometer".

3. The Geological Society of America has set up a Committee on Rock Mechanics which met for the first time in February, 1962. The Chairman is Mr. W. R. Judd of The Rand Corporation, 1700 Main, Santa Monica, California. Rock Mechanics has been defined by the Committee as "the study of the rheology of geological materials with emphasis on those materials that, in practice, are regarded as rock rather than soil". The new Committee is enquiring into the possibility of publishing a journal and starting an abstracting service in the field of rock mechanics. It is intended to hold an international conference on "The state of Stress in the Earth's Crust" in the Spring of 1963.

4. A course of ten lectures on "Rheological Techniques" will be given by Mr. R. W. Whorlow at Battersea College of Technology, London, S.W.11, commencing 9th October, 1962. The lectures will be held on Tuesdays from 6.30 to 8.30 p.m. The emphasis throughout the course will be on the theory of experimental methods leading to absolute measurements of stress and strain. Examples will be drawn from a wide range of industries.

At the same College, Dr. A. G. Crocker will give a course of ten lectures on "Dislocation Theory", on Thursdays at 6.30 p.m. commencing 11th October, 1962. This course will survey the basic ideas of dislocation theory; a more advanced course will be held next Spring.

Both courses are organised in the Physics Department of the College and the enrolment fee for each is £3.

5. The address of Dr. L. Dintenfass, Hon. Secretary of the New South Wales Branch, is now, Surgical Research Unit, Prince of Wales Hospital, Randwick, N.S.W., Australia.

6. At a meeting of the N.S.W. Branch on 9th April, 1962, Dr. B. J. Rigby (Division of Textile Physics, C.S.I.R.O.) talked on "The Elasticity of Collagen". He discussed the stress-strain curve, stress relaxation behaviour and contraction phenomena, and their relevance to the physiological role of collagen. On 4th June, 1962, Dr. L. Dintenfass spoke on "Thixotropy of blood and the proneness to thrombus

formation". Following a description of his recent work on viscosity of blood and the aggregation and structure of red cells, the author proposed the thesis that thrombus formation may be related to the size of aggregates of red cells at low rates of shear.

7. Members are reminded that binders are available for *Rheology Abstracts*. The Society cannot hold a stock of these binders, and members who require them are asked to obtain them individually. The recommended binder will hold 12 issues (three complete years) and is made of stiff board, covered with leathercloth and milskin; the Abstracts are retained by wires. The title and years are gold blocked on the spine. The suppliers are:

Easibind Limited,
84 Newman Street,
London, W.1

Members should write direct to the suppliers, asking for a binder for *Rheology Abstracts* and giving the year or years concerned. The cost is 14s. plus postage etc.; the price for postage, packing and insurance for a single binder is 2s. It is essential to have a gold title, otherwise purchase tax is payable and the cost is higher.

Rheology Abstracts

It is pleasant to report that ten members responded to the appeal for honorary abstractors in the third *Bulletin* last year. All but one of the journals listed then, and several others, are now covered, but the Honorary Editor will always be pleased to hear from other members who are willing to assist the Society in this way.

In particular, members who have access to any of the following journals and are willing to provide abstracts are asked to write to the Honorary Editor at the address below.

Translations of Russian journals:—

Bull. Akad. Sci. U.S.S.R.
J. Appl. Chem. U.S.S.R.
Polymer Sci. U.S.S.R.
Proc. Acad. Sci. U.S.S.R. (Various sections)
Soviet Physics—Doklady

Other journals:—

Chem. Eng. Sci.	Materials Research
Erdöl u. Kohle	Phil. Trans.
Inst. Rub. Ind. Trans.	Plastics Tech.
J. Mech. Phys. Solids	Rev. de l'Inst. Pétrole.
Kolloid Zeitschrift	

R. W. Whorlow, Physics Department,
Battersea College of Technology, London, S.W.11.

Recent Meetings

The Spring Meeting of the British Society of Rheology was held for the first time in many years in London. For this meeting the Society were the guests of the Battersea College of Technology. The technical sessions were held in the Physics Department by kind permission of the Head of Department, Dr. L. R. B. Elton, and overnight accommodation was provided at the Ralph West Hostel, an imposing modern structure.

About 50 members and visitors attended to hear a varied selection of papers on the general subject of temperature effects in Newtonian and near-Newtonian materials. Particularly well-received was an excellent introductory paper "Liquid viscosity and temperature" by Dr. A. Suddaby (Sir John Cass College) very kindly deputising for Prof. R. K. Eisenschitz who could not be present. Sharing the duties of chairman were the President, Prof. R. W. Douglas and Past-President, Prof. A. G. Ward whom we were pleased to see again.

An enjoyable conference dinner was held at the Horseshoe, Tottenham Court Road. It was not as well attended as recent conference dinners, but perhaps that is only to be expected in a city which has so many counter-attractions.

At the West Coast Regional meeting of the U.S. Society of Rheology on 1st-2nd February, 1962, at the California Institute of Technology, Pasadena, the following papers were read:

- "Phenomenological theory of linear viscoelastic behaviour of polymers, with applications", H. Leaderman (National Bureau of Standards, Washington, D.C.)
- "Dilatometric relations in the neighbourhood of a glass transition", T. F. Schatzki (Shell Development Co., Emeryville, California)
- "Time dependent rheological properties of whole polymers", W. L. Peticolas (International Business Machines Corp., San Jose, California)
- "Description of a dynamic shear modulus tester", W. G. Gottenberg (Space Technology Laboratories Inc., Los Angeles, California)
- "Mechanical damping, molecular motions and birefringence effects in solid polymers", R. D. Andrews (Plastics Research Lab., Massachusetts Institute of Technology, Mass.)
- "Dynamic properties of homo and copolymers of 4-methyl-1-pentene", W. A. Hewett and F. E. Weir (Shell Development Co., Emeryville, California)
- "The effect of finite time of loading on creep and relaxation response of a linear viscoelastic material", R. P. Felgar (Space Technology Laboratories Inc., Los Angeles, California)

- "Experimental observations on the stress relaxation behaviour of filled polymeric propellants", J. R. Bohn (Space Technology Laboratories Inc., Los Angeles, California)
- "Thermoelastic behaviour of continuous media", P. J. Blatz (Guggenheim Aeronautical Lab., California Institute of Technology, Pasadena, California)
- "Some applications of a new stress relaxation function", Emory Menefee (Western Regional Research Lab., U.S. Dept. of Agriculture, Albany, California)
- "Degradation of polymer molecules by shear in dilute solution", R. E. Harrington and B. H. Zimm (University of California, La Jolla, California)
- "Bubble growth in viscous media", W. E. Langlois and E. J. Barlow (International Business Machines Corp., San Jose, California)
- "The rheology of suspensions. Part II. The effect of particle size distribution on viscosity", K. H. Sweeny (Aerojet-General Corp, Azusa, California)
- "An approximate stored energy function for amorphous elastomers", R. F. Landel (Jet Propulsion Laboratory, Pasadena, California)
- "A microscopic study of the dewetting of solid particles in filled polymer systems", K. W. Bills, W. D. Hart and R. A. Smith (Aerojet-General Corp., Sacramento, California)
- "The effect of specimen size upon the mechanical behaviour of solid propellant", K. W. Bills, W. D. Hart and W. E. Holland (Aerojet-General Corp., Sacramento, California)
- "Failure criteria for some polyurethane propellants", W. T. Milloway and J. H. Wiegand (Aerojet-General Corp., Sacramento, California)
- "Streaming birefringence as a rheological tool", J. H. Wayland (California Institute of Technology, Pasadena, California).

The 1962 joint meeting of the Deutsche Rheologische Gesellschaft and the Deutsche Rheologen Vereinigung was held in May at the Bundesanstalt für Materialprüfung, Berlin-Dahlem. The following papers were read:

- "Importance of energy absorption for the plastic deformation of metals", E. Schmid (Physikalisches Inst. Universität, Vienna)
- "Large plastic deformations and the hardening of materials", Th. Lehmann (Technische Hochschule, Hannover)
- "Plastic behaviour of pure multicrystalline aluminium", R. J. Hartmann (Max-Planck Inst. für Metallforschung, Stuttgart)

- "Flow behaviour of multicrystalline metals in large deformations",
H. P. Stüwe (Technische Hochschule, Aachen)
- "Stationary creep of a solid specimen in tension and torsion",
M. Wnuk (Technische Hochschule, Cracow)
- "A new creep testing machine", W. Späth (Lustadt/Pfalz)
- "Investigation of structural processes in metals using damping
measurements", M. Siol (Universität Saarland, Saarbrücken)
- "Damping of α -iron in static pre-stressing", H. Schlüter and
W. Hofmann (Technische Hochschule, Brunswick)
- "Damping of steel in relation to the tendency to brittle fracture",
G. Müller-Vogt (G. Schäfer and Co., Schweinfurt)
- "Problems of sliding friction in the plasticisation of materials",
H. Wiegand and K. H. Kloos (Technische Hochschule, Darm-
stadt)
- "Influence of lubricants on the deformation process in cold
rolling", O. Pawelski (Max-Planck Inst. für Eisenforschung
Düsseldorf)
- "Influence of surface roughness on the friction of low draw tin",
M. Reihle (L. Schuler A.G., Güppingen)
- "Creep properties of steel wires at temperatures between 20 and
50°C", S. Wintergerst (Technische Hochschule, Munich)
- "Creep properties of fire-resistant materials", W. Späth (Lustadt/
Pfalz)
- "On the rheological properties of beech woods of different moisture
content by pressure tests along the grain", F. Kollmann
(Universität, Munich)
- "Time dependent mechanical deformation of porous inhomogeneous
materials exemplified by wood and wood products",
H. Kühne (E.M.P.A., Zürich)
- "Rheological properties of flexible beams under long term
loading", L. Cizek (Technische Hochschule, Prague)
- "The elasticity modulus and the elasto-plastic properties of stone
and building materials", K. Hesselbarth (Wintershall A.G.,
Barstorf Bez. Bremen)
- "A principle of gross specific entropy production and its relation
to rheology", H. Ziegler (Technische Hochschule, Zürich)
- "The equation of state of a thixotropic body", P. R. Paslay and
A. Slibar (Technische Hochschule, Stuttgart)
- "New investigations into the structure of thixotropic gels", A.
Weiss (Universität, Heidelberg)
- "Rheological measurements on thixotropic paints", W. Götze
(Schering A.G., Werk Bergkamen)

- "A Method for the measurement of inner damping of solids and liquids", H. Thurn (B.A.S.F., Ludwigshafen/Rhein)
- "Importance of the time dependent phase difference between force and extension in the deformation of high polymers", G. Kemnitz (Glanzstoff-Courtaulds GmbH Köln-Weidenpesch)
- "Extension and strength properties of plastics in steady pull", K. Oberbach and H. W. Paffrath (Farbenfabriken Bayer A.G., Leverkusen)
- "Some data and measuring techniques for the viscometry of glass melts", G. Meerlander (Physikalisch-Technische Bundesanstalt, Brunswick)
- "Temperature control in continuous viscosity measurement", H. Kulewein (Dr. H. Kulewein oHG, Bad Wiessee)
- "Streaming investigations on plates in cohesionless and cohesive materials", D. Schüring (Battelle Inst., Frankfurt)

The Nederlandse Reologische Vereniging held a meeting in Rotterdam on 16th May, 1962, on the subject rheology of inhomogeneous systems. The papers were:

- "General stress equations for a porous system", G. Mandl (Laboratorium Koninklijke/Shell, Rijswijk)
- "Rheological behaviour of porous stone made from small grains", W. W. van der Knaap (Laboratorium Koninklijke/Shell Rijswijk)
- "Unilateral compression of disperse systems", M. van den Tempel (Unilever Research Laboratorium, Vlaardingen)
- "Vibration measurements on disperse systems", C. J. Nederveen (Centraal Laboratorium T.N.O., Delft)

The Swedish society conference on 28th May, 1962, in Stockholm had the following programme:

- "Progress in industrial rheology", G. W. Scott Blair (University, Reading U.K.)
- "Polymerers mekaniska egenskaper som funktion av molekylstrukturen", B. G. Rånby (Kungl. Techniska Högskolan)
- "Visco-elasticity of fibre suspensions", D. Wahren (Träforskningscentrum)
- "Progress in biorheology", G. W. Scott Blair,
- "Kohesionära jordarters flytegenskaper", R. Carlsson (Statens Geotekniska Institut)
- "Reologiska egenskaper hos plastikut", A. Magnusson

Future Meetings

The Autumn Meeting of B.S.R. will be held at the Hotel St. George, Harrogate, on 1st-3rd October, 1962. This will be the occasion of the Annual General Meeting, a symposium on *Emulsion Rheology* and visits to the Research Department of I.C.I. Ltd., Fibres Division and Dunlopillo Division of Dunlop Rubber Co. A ladies' programme is also being arranged. The conference secretary is Mr. P. E. Knapp, 20 Wayside Avenue, Harrogate. Contributors to the symposium include visitors from U.S.A., Canada, France, Netherlands and Japan. Members are reminded that *bona fide* students known to them, and who wish to attend the meeting, may obtain financial assistance upon application to the conference secretary.

The Council of the Society of Glass Technology has agreed to a suggestion from B.S.R. that the societies should hold a joint meeting on *Viscosity and viscoelasticity of glasses, both inorganic and organic*. It has been arranged that the meeting will be held at Sheffield on 8th-10th January, 1963. Members who wish to present papers should contact Dr. M. F. Culpin, 8 The Broadway, Pontypool, Monmouthshire. Titles and abstracts should reach Dr. Culpin before 10th September, 1962.

A few more papers can be accepted for the Spring, 1963, Meeting of B.S.R. on the subject *The Rheology of Metals*. Intending contributors should write to Dr. D. W. Saunders, College of Aeronautics, Cranfield, Bucks. The Autumn Meeting for 1963 will be on *The Rheology of Clays* and will take place in September, possibly at Keele. Offers of papers for this meeting should be addressed to Mr. G. K. Jones, The Copyhold, Nutfield Road, Redhill, Surrey.

The Thirty-Third Annual Meeting of the U.S. Society of Rheology will be held at The Johns Hopkins University, Baltimore, Maryland, on 29th-31st October, 1962. About thirty papers are expected and attempts are being made to organize special symposia on *Molecular and Particulate Rheology*, *Polymer Chain Entanglement* and *Blood Rheology*. Intending participants should notify Dr. E. A. Collins, B. F. Goodrich Chemical Co., P.O. Box 122, Avon Lake, Ohio.

The Eleventh Annual Rheology Symposium of Japan will be held in Osaka at the Chamber of Commerce and Industry, from 15th to 17th October, 1962, under the joint auspices of the Chemical Society of Japan, The Physical Society of Japan, the Society for Polymer Science, the Japan Society for Testing Materials, the Japan Society of Mechanical Engineers, the Japan Society of Metallurgy and the Japan Society of Civil Engineers. The topics for discussion will be (1) *The rheology of metals*, (2) *The rheology of soils, rocks and concrete*, (3) *The rheology of polymers and dispersed systems*. A general lecture will be prepared for each main discussion subject. Contributions from other countries are cordially invited. Any inquiries about the symposium should be directed to Professor M. Horio, Kyoto University, Faculty of Engineering, Kyoto, Japan.

A conference on *Advances in polymer science and technology* organised jointly by the Plastics Institute, the Plastics and Polymer Group of the Society of Chemical Industry and the Institute of the Rubber Industry, will be held on 1st and 2nd May, 1963, at the Institution of Electrical Engineers, London W.C.2. Papers by invited speakers will be given on the first day and contributions from others on the second day. Contributions are requested particularly on the structure of polymers in relation to physical properties and processing characteristics, melt-flow properties and the degradation and stabilisation of polymers. Summaries should be sent as soon as possible to The Secretary, The Plastics Institute, 6 Mandeville Place, London W.1. Complete manuscripts will be required by 31st January, 1963. They will be preprinted and presented in summary form by the authors at the conference.

The Fourth International Conference on Non-Destructive Testing will take place in London from 9th–13th September, 1963. The scope of the conference will include all aspects of non-destructive testing and some 45 to 50 papers will be admitted. Papers will be presented by rapporteurs and authors will have opportunities to reply during the discussions. All enquiries should be addressed to the Secretariat at The Institution of Mechanical Engineers, 1 Birdcage Walk, London S.W.1.

Fourth International Congress on Rheology 1963

The Fourth International Congress on Rheology will take place from 26th to 30th August, 1963, at Brown University, Providence, Rhode Island, U.S.A., under the auspices of the International Committee on Rheology with the U.S. Society of Rheology as the host society. Rheologists who wish to present papers at the Congress are invited to submit, by 30th March, 1963, abstracts of not more than 500 words, in a form suitable for publication to:

Professor E. H. Lee,
Editor of the Proceedings of The
Fourth International Congress on Rheology,
Brown University,
Providence 12, R.I.,
U.S.A.

It is intended that twenty minutes will be allotted for the presentation and ten minutes for the discussion of each contributed paper.

In addition to contributed papers, the program of the Congress will include lectures of longer duration on fields of rheology of especial current interest and social occasions on which rheologists from the various countries represented may exchange views.

Accommodation for those attending the Congress and their wives, consisting of single and double rooms, will be available in the dormitories of Brown University. Meals will also be available in the University.

Dr. R. S. Marvin and Professor R. S. Rivlin are Co-Chairmen of the Congress. All enquiries regarding it should be addressed to:

Professor R. S. Rivlin,
Co-Chairman, Fourth International Congress
on Rheology,
Brown University,
Providence 12, R.I., U.S.A.

The use of the term Rheopexy

In *Bulletin* No. 1, 1962, we published Dr. Scott Blair's note and queries on the use of the term *rheopexy* and its close associate *thixotropy*. Dr. Hershel Markovitz has been good enough to start the discussion and his letter is given in full below. Are there any more comments?

Hon. Editor (*Bulletin*)

Dear Sir,

I am responding to the invitation issued in the *Bulletin*, No. 1, 1962, to comment on the use of the terms *thixotropy* and *rheopexy*. I am in favour of retaining the original definitions as given by Freundlich and his coworkers as quoted in Dr. Scott Blair's letter.

For one thing, these phenomena need names. Why not keep those which were originally applied to them?

Mere hysteresis in an experiment should not be the criterion for *thixotropy*. Such an experimental result could be obtained for a material whose time behaviour can be represented by linear viscoelasticity. I think that *thixotropy* should be reserved for the more complicated dependence on time and history deformation.

Certainly *thixotropy* ought not to be used to indicate a decrease of the effective viscosity with increasing rate of shear in steady state flow. There are enough terms already in use for that phenomenon.

Sincerely yours,
Hershel Markowitz,
Mellon Institute,
4400 Fifth Avenue,
Pittsburg 13, Pennsylvania.