

THE BRITISH SOCIETY OF RHEOLOGY

BULLETIN

1997, Vol. 40, No. 1



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STOP PRESS. OBE in New Year Honours for Howard Barnes.

In the recently published New Year Honours List, Professor Howard Anthony Barnes of Unilever Research was awarded an OBE for services to science and technology. Professor Barnes is a senior scientist in the Detergents Processing and Manufacturing Group at Unilever Research's Port Sunlight Laboratory, where his work is in the areas of rheology and fluid mechanics, particularly as they relate to the processing, flow properties and physical stability of liquids, creams and pastes in the areas of Detergents, Personal Products and General Chemicals. He has recently retired as President of the British Society of Rheology.

Our hearty congratulations to Howard!

EDITORIAL

With this issue, we have introduced new look covers to both our publications, the Bulletin and Rheology Abstracts. This new corporate image has been made possible by your Society having taken over the publication and production of the Abstracts from Elsevier. In future we will attempt to post out the two publications at the same time.

You may have noticed that this issue has been numbered Volume 40 # 1 and that you have not yet received Volume 39 # 4, which would normally have come out at this time. This has been done to bring the numbering of the Bulletin and the Abstracts into line. A Volume 39 # 4 will be produced, but I must apologise that copy for it has not yet been submitted to me. It will be a special issue reporting on the Workshop on Dynamics of Complex Fluids held at the Isaac Newton Institute for Mathematical Research, University of Cambridge from January to June 1996.

In this issue we finally publish the BSR Accounts for both 1994/95 and 1995/96. In line with new Charity Commissioners rules, and as approved at the AGM, these accounts have been scrutinised externally by a qualified accountant and approved rather than being audited. There was a very significant jump in the surplus of income over expenditure last year, principally from the publication of the Abstracts. It was noted that we are in danger of being liable for VAT registration once again, and we certainly will have to when we get nearer to 'Rheology 2000'. The run up to this conference will be an expensive period and an operating float to the ESR Executive committee has already been approved.

The ESR Executive committee has also requested that two issues of the BSR Bulletin each year should be expanded into 'European' Bulletins giving coverage of news of national societies and their meetings, etc. It has been agreed that the BSR is prepared to undertake this and I shall be appealing to all European Societies for appropriate news and articles. The first European issue should appear about mid-year. The BSR will of course mail individual copies to all its own members, many of whom also belong to other European Societies. In addition it will send a batch of copies to each Society for onward distribution to their own members. It is likely that the better off Societies will subsidise some of the costs of this operation for the less well off Societies.

I am grateful to Chris Petrie for providing the report on the day in March at the Newton Institute celebrating Anthony Pearson's "retirement"! This meeting took place during the six month long Dynamics of Complex Fluids Workshop, which was held at this Institute. It sounds as though it was quite a nightmare to organise, given Anthony's close involvement with the whole workshop. However it obviously went very well.

I am also very pleased to say that I have been sent another report penned by the famous Dr Watson, describing discussions between himself and Mr Holmes arising out of a visit to the Fourth International Conference on "Flow Processes in Composite Materials" at Aberystwyth. I find these articles very perceptive, as I hope you do, and I hope they will continue to come our way.

COMMENTARY : 287th COUNCIL MEETING

It is a custom that the first Council Meeting of a particular presidency is residential and is hosted by the President concerned. This meeting, in the second week of December, was no exception and was held in the Norton House Hotel in Mumbles, just down the road from Professor Peter Townsend's University. It is almost correct to say *his* University because Peter has recently become Pro-Vice-Chancellor and it emerged in conversation that he has budgetary responsibility for about £75 million. Clearly he now uses his numerical skills in other arenas in addition to the flow of non-Newtonian fluids.

The hotel is clearly often used by the University, since the taxi driver asked if I was a lecturer "because we seem to take a lot of lecturers there". Anyway, when I arrived from the airport nearly everyone was sitting in the lounge with a drink and we just had to wait for Nick to arrive from the station before beginning the meal. The time was spent in discussing which wine to have, since a quorum of the Council seemed to my ears to be very knowledgeable about wine and the wine list was itself quite extensive. At one point Carole was heard to remark, somewhat incautiously, that she looked forward to the next two years as a hedonistic presidency. Peter, in turn, pointed out that the Pro-Vice-Chancellor's job involves a certain amount of entertaining important visitors.

Conversation over dinner seemed to centre on liquid and interface problems: the liquids concerned were predominantly alcoholic and the interfaces seemed to involve the motion under gravity of parallel polished surfaces over a certain white compacted crystalline substance. However, I did hear Russell, Mike, Peter and Ken Walters (who had joined a Council Meeting for the first time in many years, in his capacity as President of the European Society of Rheology) deep in an argument about open channel flow of a viscoelastic fluid of the "Yes it is." "No it isn't." "Oh but I know it is." "No it can't possibly be." sort. I think I heard words like fourth order solution being used so I am sure it was scientific. The evening ended with a walk along the promenade before bed.

The Council Meeting itself started next morning with nine people present and Peter opened by welcoming Ken and proposing that we discussed the International Congress in 2000 and the ESR first as these concerned Ken who had to attend another meeting and would have to leave quite soon. The Congress Committee has reserved accommodation in Cambridge and has made some preliminary decisions but had now started to cost money. We therefore agreed to provide a float of funds to allow deposits to be paid. We also heard that the ESR will have no money for administrative expenses until after the Conference of European Rheologists in Ljubljana in 1998. We agreed to make a one-off grant in support in the hope that other European societies would be able to follow suit. In future the ESR will apply a levy to the European conferences to cover its expenses, although Ken was at pains to point out that the officers of ESR will meet their own travel costs to attend meetings and consequently the expenses will be modest. We also agreed the basis on which two of the four issues of the BSR Bulletin each year would contain European pages and would be mailed to national representatives for distribution within each country.

Ken then left and we returned to the standard agenda items of officers' reports. We were delighted to hear that Mike Webster had finally been able to sort out the accounts and get them scrutinised by an independent accountant. Accordingly the accounts for 1994-5 and 1995-6 are printed in this issue of the Bulletin. Items of note are the considerable surplus which has accrued from taking over publication of Rheology Abstracts from Elsevier. This is clearly good news but is a matter which the Council will have to discuss in the near future, since as a charitable organisation BSR cannot make significant profits without the charity commissioners asking, quite reasonably, to what charitable purposes we apply our funds.

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Nick Hudson reported on the membership situation, which seems to have stabilised with resignations being balanced by recruitment and, he noted with satisfaction, no deletions under rule 4d. Peter Anderson, as Bulletin Editor, is doing a good job but is finding, as lots of editors before him have done, that very few people provide him with material. In particular the conference diary pages, which most people find to be extremely useful, are very difficult to keep full, despite the plethora of meetings taking place. He bemoaned the late appearance of material for the special issue which is to be devoted to a report of the six-month long Isaac Newton Institute which had been held in Cambridge. It will possibly appear after the present issue.

The longest item of the agenda arose from the Council Working Party report on the future role of the Society. This will be discussed in more detail at the next meeting, but some of the issues which need to be addressed are: Accepting that the BSR's objective is to serve rheology in the UK, which means industry and academia, how can we serve industry? How can we serve Universities and students? Does the Society still have a role in organising conferences or has that been taken over by researchers themselves who seek to profit for their own activities? (Peter pointed out that today's agenda referred to only one conference - the International Congress in 2000.) How can the Bulletin be improved? How can BSR be marketed? How can the work of the Council be spread more equitably? In connection with the latter point we noted that pressures of the present day restrict the time which Council members have available to attend meetings and therefore we considered whether it is reasonable to ask those members who find it impossible to attend meetings, and therefore make no contribution, to resign or whether this would mean that we would end up with no Council at all.

This productive and thought provoking meeting ended at 1pm in time for a soup-and-sandwich lunch after which we dispersed to our various activities, including Russell who confidently expected to have an audience of students for a lecture in Aberystwyth at 4pm. I wished him a pleasant journey on such a bright and sunny December afternoon.

Phil Banfill

THE BRITISH SOCIETY OF RHEOLOGY
REVENUE ACCOUNT FOR THE YEAR ENDED 30th JUNE 1995

	<u>1995</u>	<u>1994</u>
	£	£
INCOME		
Annual Subscriptions and Entrance Fees	4,923	5,049
Publisher - Rheology Abstracts	6,709	6,405
Advertising	1,375	2,115
Bulletin Subscriptions	120	300
Book royalties	-	18
Sale of Ties	32	-
Bank Interest	1,431	1,308
Conferences (see below)	120	-
Donation of Biorheology Award	-	500
	<u>£14,710</u>	<u>£15,695</u>
EXPENDITURE		
Council Expenses	3,672	4,643
Bulletin Production Costs	3,936	3,985
Expenditure by Officers:		
Secretary	234	385
Treasurer	5	118
Membership Secretary & Circulation	993	395
	1,232	898
Professional Fees	250	250
Insurance	158	144
Awards	2,454	1,489
Miscellaneous	-	9
Conferences (see below)	-	745
Student Grants	1,000	1,020
Working Groups	-	127
CardNet Charges	207	159
Bank Charges	6	-
Tax paid on Interest (reclaimable)	46	-
Depreciation:		
Printer	96	392
	<u>£13,057</u>	<u>£13,861</u>
EXCESS OF INCOME OVER EXPENDITURE	<u>1,653</u>	<u>1,834</u>
	<u>£14,710</u>	<u>£15,695</u>

CONFERENCES ACCOUNT

Surplus (deficit) after expenses:

Manchester	-	(54)
Cambridge	-	(691)
Young Rheologist's Day	540	-
Aberystwyth	(420)	-
	<u>£120</u>	<u>(£745)</u>

THE BRITISH SOCIETY OF RHEOLOGY
BALANCE SHEET AS AT 30th JUNE 1995

	<u>1995</u>	<u>1994</u>
	£	£
FIXED ASSETS		
Word Processors		
At Cost at 1st July 1994		5,805
Printer at Cost 5/1/95	640	
Depreciation to date	<u>(96)</u>	<u>(5,805)</u>
	544	-
CURRENT ASSETS		
Cash at Bank:		
Premier Interest Account	29,765	31,520
Current Accounts	<u>4,140</u>	<u>1,426</u>
	33,905	32,946
Sundry Debtors and prepaid expenses	<u>7,262</u>	<u>7,112</u>
	41,711	40,058
CURRENT LIABILITIES		
Sundry Creditors	<u>250</u>	<u>250</u>
	41,461	39,808
SCOTT BLAIR LEGACY FUND ASSETS		
Premier Interest Account	12,164	11,691
Owed to General Account	(1,619)	(675)
	<u>10,545</u>	<u>11,016</u>
	<u>52,006</u>	<u>50,824</u>
GENERAL FUND		
At 1st July 1994	39,808	37,974
Excess of Income over Expenditure in the Year	<u>1,653</u>	<u>1,834</u>
	41,461	39,808
SCOTT BLAIR LEGACY FUND		
Balance at 1st July 1994	11,016	11,254
Bank Interest	<u>473</u>	<u>437</u>
	11,489	11,691
Expenses	<u>(944)</u>	<u>(675)</u>
	<u>10,545</u>	<u>11,016</u>
	<u>52,006</u>	<u>50,824</u>

Signed by: M.F. Webster, Hon. Treasurer

I have examined the books of account of the British Society of Rheology and report that to the best of my knowledge the above Revenue Account and Balance Sheet is in agreement therewith.

Signed by: S.B. Warrington, Chartered Accountant

THE BRITISH SOCIETY OF RHEOLOGY
REVENUE ACCOUNT FOR THE YEAR ENDED 30th JUNE 1996

	<u>1996</u>	<u>1995</u>
	£	£
INCOME		
Annual Subscriptions and Entrance Fees	6,350	4,923
Publisher - Rheology Abstracts	28,894	6,709
Advertising	4,708	1,375
Bulletin Subscriptions	240	120
Book royalties	34	-
Sale of Ties	-	32
Bank Interest	1,946	1,431
Conferences (see below)	-	120
	<u>£42,172</u>	<u>£14,710</u>

EXPENDITURE		
Council Expenses	5,015	3,672
Bulletin Production Costs	2,750	3,936
Rheology Abstracts Production Costs	849	-
Expenditure by Officers:		
Secretary	118	234
Treasurer	82	5
Membership Secretary & Circulation	<u>4573</u>	<u>993</u>
	4773	1,232
Professional Fees	388	250
Insurance	164	158
Awards	100	2,454
Miscellaneous (NVQ Cert.)	120	-
Conferences (see below)	942	-
Student Grants	480	1,000
Working Groups	-	-
CardNet Charges	200	207
Bank Charges	2	6
M. Subscriptions refund	211	-
Tax paid on Interest (reclaimable)	1	46
Depreciation:		
Printer 5/1/95	96	96
Printer 17/7/96	39	-
	<u>£16,130</u>	<u>£13,057</u>

EXCESS OF INCOME OVER EXPENDITURE	<u>26,042</u>	<u>1,653</u>
	<u>£42,172</u>	<u>£14,710</u>

CONFERENCES ACCOUNT

Surplus (deficit) after expenses:		
Lancaster	2,058	-
Cambridge NATA Adv. Studies Inst.	(3,000)	-
Young Rheologist's Day	-	540
Aberystwyth	-	(420)
	<u>(£942)</u>	<u>£120</u>

THE BRITISH SOCIETY OF RHEOLOGY
BALANCE SHEET AS AT 30th JUNE 1996

	<u>1996</u>	<u>1995</u>
	£	£
FIXED ASSETS		
Printer at Cost 5/1/95	640	640
Depreciation to date	<u>(192)</u>	<u>(96)</u>
	448	544
Printer at Cost 17/7/96	520	-
Depreciation to date	<u>(39)</u>	-
	481	-
CURRENT ASSETS		
Cash at Bank:		
Premier Interest Account	35,941	29,765
Current Accounts	<u>31,249</u>	<u>4,140</u>
	67,190	33,905
Sundry Debtors and prepaid expenses	<u>397</u>	<u>7,262</u>
	68,516	41,711
CURRENT LIABILITIES		
Sundry Creditors	<u>1013</u>	<u>250</u>
	67,503	41,461
SCOTT BLAIR LEGACY FUND ASSETS		
Premier Interest Account	11,034	12,164
Owed to General Account	<u>(397)</u>	<u>(1,619)</u>
	<u>10,637</u>	<u>10,545</u>
	<u>78,140</u>	<u>52,006</u>
GENERAL FUND		
At 1st July 1995	41,461	39,808
Excess of Income over Expenditure in the Year	<u>26,042</u>	<u>1,653</u>
	67,503	41,461
SCOTT BLAIR LEGACY FUND		
Balance at 1st July 1995	10,545	11,016
Bank Interest	<u>489</u>	<u>473</u>
	11,034	11,489
Expenses	<u>(397)</u>	<u>(944)</u>
	<u>10,637</u>	<u>10,545</u>
	<u>78,140</u>	<u>52,006</u>

Signed by: M.F. Webster, Hon. Treasurer

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Signed by: S.B. Warrington, Chartered Accountant

EUROPEAN SOCIETY OF RHEOLOGY NEWS

Commentary on the 1st Meeting of the Executive Committee of the European Society of Rheology (ESR), Paris, Oct. 14-15, 1996

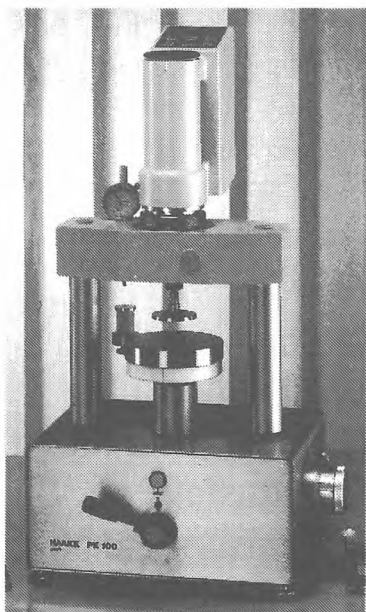
The Executive Committee of the European Society of Rheology (ESR), consisting of Ken Walters (President), Jean-Michel Piau (Vice-President or 'Immediate Past President') Jan Mewis (Treasurer), and Manfred Wagner (Secretary) met at CNRS, rue Michel-Ange (courtesy of Jean-Michel) to discuss the status of the Society, the relations of the Society with other professional organisations, and the activities of the Society. A number of applications of Rheology Groups to join the ESR were approved. The following 12 Groups are now confirmed members of the ESR:

- Austria
- Belgium
- Britain
- Czech Republic
- France
- Germany
- The Netherlands
- Nordic Society of Rheology
- Slovenia
- Spain
- Switzerland
- The Vinogradov Society (Russia)

Three other Groups, the Bulgarian Rheological Society, the Hellenic Society of Rheology and the Italian Group of Rheology, were granted "observer status".

Regarding the position of the European Secretary to the International Committee on Rheology (ICR), it was concluded that with the creation of the ESR, this position has successfully fulfilled its purpose. As far as representation of the ESR at the level of the ICR is required, the ESR will be represented by its President. The ESR expresses its sincere thanks to Chris Petrie for his long-standing services as European Secretary to the ICR. His European Newsletters were an indispensable source of information concerning the status of European rheology. One of the first and key issues of the ESR is the creation of a European Newsletter (see below), thus continuing Chris' efforts. His, as well as Ralph Oliver's proposals for a constitution of the ESR, submitted to the European delegates on the occasion of the Seville meeting in 1994, are acknowledged; many of their ideas have been incorporated into the constitution of the ESR.

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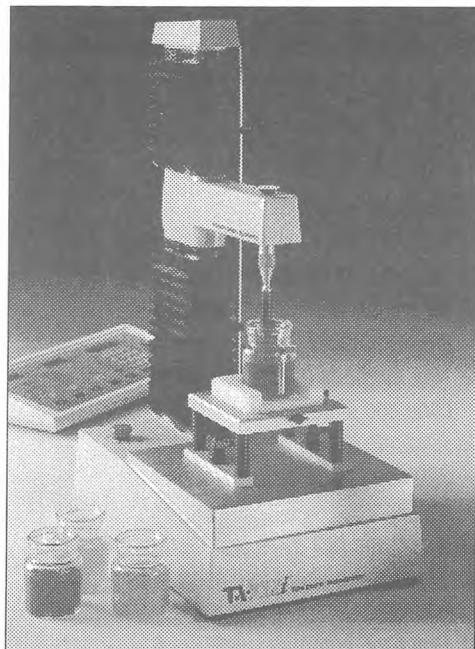
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The role of the ESR in the "restructuring" of the ICR was discussed. It is suggested that the 4-year cycle of the International Congress be preserved, but that it should circulate between the 3 regions (Asia/Pacific, The Americas, and Europe/Africa) starting with Asia/Pacific in 2004. With a 4-year cycle, the International Congress would remain a very special event that will attract all rheologists. To accommodate for the need of more frequent international exchanges, and to coordinate regional meetings, the ESR proposes to use the 3 years in between the International Congresses to organise Regional Rheology Conferences as it is already happening with Melbourne (Asia/Pacific) 1997 and Ljubljana (Europe) 1998. (An Interamerican Rheology Conference in 1999 would close the cycle.)

Concerning the establishment of a European Newsletter to be sent to all individual members of participating Rheology Groups of the ESR, several possibilities were discussed. It was decided to approach the British Society of Rheology (BSR) and to inquire of the possibility of creating a European edition of the Bulletin of the BSR. The benefit to the ESR would be to have a Newsletter in place fast.

Other topics of discussion included the European Rheology Conference, Ljubljana 1998; the International Congress on Rheology, Cambridge 2000, which is organised by the BSR on behalf of the ESR; the question of more frequent European rheology conferences or thematic conferences (similar to IUTAM or Eurotherm: e.g. Eurorheo 1); the establishment of a data base on rheological expertise in Europe; and the possible establishment of a European School of Rheology with good standards, on a permanent basis, and rotating location.

The Working Party on Industrial Rheology (WPIR) of the European Federation of Chemical Engineering, in a letter from its Chairman Gianni Astarita, is seeking affiliation to the ESR. While direct membership of the WPIR is not possible under the constitution of the ESR, the request of the WPIR was nevertheless greeted with great sympathy. Fragmentation is a threat to rheology, as it leads to a lack of interaction about advances in different subfields and thus hampers general scientific progress in rheology. According to its constitution, the prime aim of the ESR is to encourage European collaboration in all aspects of rheology. The ESR might therefore create a subdivision on Industrial Rheology and invite the WPIR as an important partner in this activity.

It was felt that a meeting of the Committee of the ESR (i.e. the delegates of the Rheology Groups) might be necessary in early spring of 1997 to decide on these and other issues and to approve the membership contribution to the ESR. It was stressed that, according to the constitution of the ESR, contributions from Rheology Groups can only be asked for direct service to their individual members.

The ESR is now ready for take-off!

Manfred H. Wagner
Secretary

Ken Walters FRS
President

CONFERENCE REPORTS

JRA Pearson - Celebration of a Complex Fluid Career - 14th March 1996

At some time during February, notices about a symposium entitled "Theoretical Responses to Experimental Dilemmas in the Dynamics of Complex Fluids" started to appear around the Newton Institute. This is the first time that this reporter has knowingly been party to the advertising of a wholly bogus scientific event - indeed one that was never intended to take place. Of course the reader who has read the title of this report is already in on the secret, but it was satisfying to discover that the deception was as successful as any "This is Your Life" and like that programme, relied heavily on persuading even the victim's wife to deceive him (thank you Emma). The joke was, however, on the organizers when an offer of a paper for the mythical conference arrived from JRA Pearson (with co-author CJS Petrie). A true dilemma (theoretical as well as experimental) - to accept would have seemed like arranging for a man to speak at his own funeral, while to refuse would surely offend and might even lead our intended victim to fill his diary otherwise. The second problem (some might say the first) of a conference organizer is the dinner, and this too was beset with pitfalls. It had to be in Anthony's old college, but once this arrangement was made public in the dummy programme, he was heard to mutter that the organizers would have done much better to let him (as a former Wine Steward) negotiate with the Trinity Hall. In resolving this, the organizers had the effrontery to use the name of Pearson and the College put the Fellows' Wine Cellar and the advice of its present Wine Steward at their disposal.

Fortunately the general momentum of scientific work in the Newton Institute carried us through an exciting month and Anthony Pearson arrived at the Institute on the morning of Thursday, 14th March, to discover the wholly bogus nature of claims that theory had any response to experimental dilemmas. He was faced instead with "A symposium consisting of scientific papers on topics in the dynamics of complex fluids, rheology and non-Newtonian fluid mechanics, arranged as a tribute to Anthony Pearson on the occasion of his alleged retirement." The bare bones of the event are recorded on the World-Wide-Web(1) and will not be reproduced here. Suffice it to say that there were ten papers presented (selected from a longer list of offers) as a tribute to the achievements and inspiration of the maestro, topped off by a performance by the man himself. The friends and colleagues who contributed represented Anthony's work in university - Cambridge (both Applied Mathematics and Chemical Engineering) and Imperial College - and industry - ICI and Schlumberger, spanning approximately four decades.

There were representatives from Europe and America, some of whom flew in specially for this one day and many tributes from absent friends both near and far (of which more was heard at the dinner). The sessions were chaired by Ken Walters, before lunch, and Tom McLeish afterwards and they combined a great deal of science of a fittingly high standard with more personal tributes.

The real stories emerged in the evening, after a very civilised dinner - and speeches by Keith Moffatt (an old friend of Anthony and of the organizers as well as now the Director of the Newton Institute) and Anthony were joined by a tribute from Ken Walters and "best man" style reading (by the author of this report) of greetings in all shapes(2) and sizes from all corners of the globe. Keith recalled Anthony's seminal contributions to fluid mechanics, Newtonian and non-Newtonian, and the incisive nature of his participation in discussion at seminars and conferences over the years. Keith alluded (as had others) to the apprehension that speakers felt on hearing that Anthony was in the audience. In contrast he recalled the deflation of a tent of Anthony's, full of young mathematicians who had stopped by a vineyard on their way to the IUTAM Congress in Munich. That story fitted well with his exhortation to the assembled company to stop talking about complex fluids and start imbibing them.

Tributes were liberally strewn with words like forthright, incisive, frank, provocative, and there was even an allusion to a shotgun which is surely an unnecessary accessory for seminar audiences, even in California. One assumes that a reference to the "Great Bear of Rheology" was to a constellation (not merely a star) in the firmament of rheological thinkers and no reflection on temperament. The way in which one physicist was led into rheology after a meeting organised by Anthony is noteworthy - he mentions the fascinating nature both of the science (a complex mixture of mathematics, physics, engineering and chemistry) and of the people who conduct this science. Anthony's response echoed something of this - of the importance of the parallel development of mathematics, science and engineering in our subject, and the belief that the "Dynamics of Complex Fluids" programme at the Newton Institute was reflecting these three strands in a truly useful way. A judgement on the DCF programme may have to wait for a year or two, but the 14th of March left no doubt that a very positive judgement was made on Anthony Pearson's career (so far).

FOOTNOTES:

(1) See <http://www.ncl.ac.uk/~nengm/dcf/meetings/wk5.html>

(2) Tribute from Bob Bird (reproduced with permission) - left as an exercise for the student:

ACROSS

1	2	3	4
5			
6			
7			
8			
9			
10			

1. ---- porridge hot

5. with the greatest of ---- (like the man on the flying trapeze)

6. mal ---- (vague feeling of physical discomfort)

7. belonging to us

8. Latin for "mnemonic" is pons asinorum (which is "a little bridge for ----")

9. is indebted to

10. make both ---- meet; odds and ----

DOWN

1. Author of *Mechanics of Polymer Processing*, Elsevier (1985) and *Rheollections of a Rheologist* (1998)
2. Nobel laureate who later became Canada's prime minister
3. Author of *Tables of the Incomplete Beta Function* (1934) and *The Grammar of Science* (1892)
4. Anagram of "persona"

(3) Personal note: Many thanks to Mike Sekulla and colleagues at the Newton Institute, to staff at Trinity Hall, to Anthony's fellow DCF organizers, Ken Walters and Tom McLeish, and finally to all the participants and absent friends who made the day a special one in so many ways. I do not believe that my thanks to Anthony and Emma need any further elaboration.

RHOMBUS SHEAR: A CASE OF NATURAL OBSESSION

It came as something of a surprise when Holmes suggested that we might venture, once again, into the Celtic fringe in order to attend the **Fourth International Conference "Flow Processes in Composite Materials" at Aberystwyth (9th - 11th September 1996)**. He pointed out that this series of meetings had been initiated by the British Society of Rheology nearly a decade ago, and he was keen to see what developments had occurred in that time. It is unusual for Holmes to take such interest in scientific meetings, but, as he explained to me on the journey, these composite materials are highly structured. He therefore anticipated that the growing field of "morpho-rheology", that he had identified at Brussels (1), would be much in evidence.

Having devoured the bound copy of the Proceedings, Holmes disappeared about his own business - he said something about watching the Kites at Hafod to give him inspiration for his design of the next generation of flying machines which, he assured me, must undoubtedly incorporate the principle of the manoeuvrable tailplane. Apparently he also spent long hours in the bar each night eavesdropping on the discussions, which extended into the small hours. This latter habit gave rise to a minor crisis when the bar ran out of his favoured Orkney malt - but a veil is better drawn over those events. For myself, I attended as much of the meeting as I could, though I must confess that excessive indulgence in the local cuisine did cause me to oversleep one morning and, on another occasion, I acted indecisively during the parallel sessions.

Holmes was unusually silent on our return journey. I feared a return of the dreaded melancholy and its consequent result in musical extreme, which I feared more than his ill-temper when he was unable to locate a supply of the chewing gum that he now favoured, having at last accepted my medical advice and given up his pipe. To jolly him along, I observed: "I was pleased to note that some of your suggestions (2) had been acted upon by the organizers. The meeting ended at lunchtime and the final morning session was moderately well attended, although I fear that you might have been irritated by the final contribution entitled 'Envoy'."

Holmes immediately perked up. "That was not in the bound proceedings was it Watson - tell me more?" Some wheezy old buffer, who should have been put out to grass long ago, spent half an hour burbling on about doing numerical analysis backwards, ladies knickers and sun hats," I responded.

"It was rather embarrassing really, although it did give rise to a lively discussion as the audience tried to apprise him of the realities of the late twentieth century."

Holmes shifted uncomfortably in his chair at my description. "What a pity," he murmured, "but I am glad that that at least they tried the experiment - we shall have to see if it is repeated."

"Tell me Watson," he continued, "did you perceive any significant differences in the general tone of the matter that was discussed now and ten years ago."

"Oh yes!" I replied. "The earlier meetings had been dominated by discussion of the then emergent thermoplastic technologies. The present meeting was much more balanced - although thermoplastic composites still received a more than fair share of attention. You will probably have noticed that as well from your reading of the papers."

"Indeed so," replied my colleague, "but I was more interested in the subtle change of emphasis from 'Can you make shapes?' to 'How good are the shapes that you make?'"

I must have looked bemused, because Holmes continued: "While more than a third of the papers addressed what you would consider to be significant rheological issues, more than half focussed their attention on the microstructure of the material and how it evolved during processing. This I found to be most encouraging."

Anxious to head off Holmes from what I suspected would be a protracted lecture on 'morpho-rheology'. I ventured: "Could we first consider the purely rheological issues? There appeared to me to be two lines of evidence."

Holmes sat bolt upright. "Indeed we can Watson. I detected but one single line of enquiry, so I am anxious to hear what I obviously missed."

It is seldom that my powers of observation outshine those of the great detective; naturally I was delighted to have the opportunity to show him what he had missed. "The two main lines of investigation are rheological characterisation of thermoplastic composites and permeability of preforms for liquid moulding technologies."

"In the case of rheological characterisation." I continued, "shear is the dominant mode of deformation in these inextensible materials, but there is a debate raging about the relative importance in inter- and intra- ply shear. In particular, practical deformations appear to require significantly greater work input than small scale rheological tests would indicate."

Well into my stride, I pressed on. "With respect to permeability, there are similar issues of macro-permeability (flow round fibre bundles - usually pressure driven) and micro-permeability (flow into the fibre bundles - usually dependent upon capillary forces)."

"These," I summarized for my colleague, "are the two distinct lines of enquiry. I have no doubt that you will be pleased to see that they both fall into the field that you are pleased to call 'morpho-rheology' in that they are microstructure dependent, but otherwise they are entirely separate evidential leads."

Delighted by my own discourse, I was now anxious to see where the methods of my colleague had failed him. "Tell me Holmes, I pray you, which line of enquiry had you overlooked."

Holmes removed his chewing gum, carefully secreted it in a stoppered jar, and searched silently amongst the bottles on the sideboard. Eventually he returned with a 26 year old bottle of Laphraoig and two glasses. Pouring a measure and handing it to me he observed: "You have done well Watson." My chest swelled in pride as I savoured the delicate smokiness of this magnificent beverage. "As to your question about which line of enquiry I had overlooked, it had simply not occurred to me these would have been regarded as distinct fields; it was the fundamental question common to both that interested me - because nobody seemed to address it directly."

"Now see here Holmes . . ." I spluttered, narrowly avoiding spilling the golden liquid from my glass, " . . . what on earth could thermoplastic sheet stamping and liquid moulding have in common?"

"Rhombus shear," replied my friend. "Surely, Watson, you had noticed that this is the dominant mode of deformation in both cases." Rapidly he flicked through the proceedings showing me picture after picture of squares deforming into diamond shapes in a scissors motion. "It is also the place where the problem lies."

"Problem!" I exploded. "What problem? I can tell you we would be in very poor shape indeed without rhombus shear, it is an exceedingly useful form of deformation."

"Easy Watson. I had not meant to upset you." In earnest of which sentiment, Holmes refilled my glass and switched off the tape recorder, that I now used instead of my notebook, until I had finished coughing.

Once I had recovered my composure, Holmes explained what he meant by the problem of rhombus shear. With all the sides remaining the same length, as you deform a square into a diamond, the cross-sectional area diminishes. For an incompressible material, like a thermoplastic composite, this means the material is increasing in thickness as a result of lateral compression forces which ultimately induce instability and cause buckling. For a dry fabric material constrained to a given thickness, the rhombus shear deformation results in a dramatic reduction in permeability. "What fascinates me," observed Holmes, "is that the classic paper on this problem is not cited in any of the references."

"Which classic paper?" I enquired, feeding all the relevant information into the literature search programme of my laptop PC and coming up with a blank screen.

"Well, it must have been written a very long time ago to have been missed by your data base," observed Holmes, "or else . . ."

"Fibre Reinforced Bouncing Putty!" I expostulated. "Holmes, do you think that this classic paper has not yet been written."

"I rather suspect," observed Holmes, savouring the last of his drink before pouring Islay water into his glass, swilling it round and drinking the contents before polishing the container with a silk handkerchief and placing it on the side, "that it is both too trivial and too complex a matter to interest theoreticians - but I would like to hear their opinions on the matter."

Sadly, I looked at my own empty glass. "Now Watson," Holmes' voice took on a firmer tone, "let us get down to the real business." So saying he drew out a bottle of 40 year old Talisker. My taste buds leapt in anticipation.

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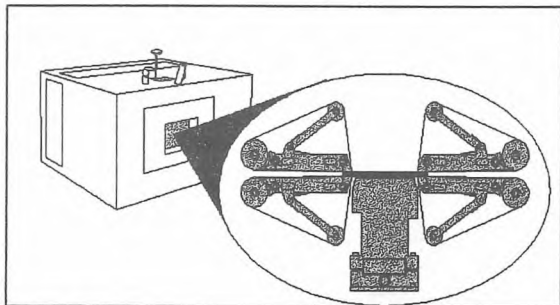
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"The issue to which I would like you to direct your attention," announced Holmes in his schoolroom manner, "is the pre-occupation with microstructure demonstrated in more than half the papers. This emphasises the real question: 'How good is the shape that you make?'"

Knowing his obsession with this field, I had prepared myself. "In respect of microstructure," I ventured, "there are four themes: fibre architecture, fibre/matrix distribution, faults such as voids, and internal stress."

"Excellent Watson," responded Holmes. "Let us look at each area in detail."

"For fibre architecture, the conventional wisdom is that the optimum is provided by continuous collimated systems." I paused to reflect. "However, in reality there is always some degree of fibre misalignment, and sometimes that may seem to have beneficial effects - particularly in properties like toughness."

"Indeed so," agreed Holmes, who was now glowing from the effects of the succulent malt. "The challenge for the future is to define the optimum level and degree of misalignment to maximize performance." "Now," continued the master, "what about internal stress."

"Conventionally," I replied, "internal stress is seen as inescapable bad news in a composite material made from elements differing in thermal expansion. The good news, which came out in discussion, is that some workers are now able so to programme the cooling cycles during processing so as to control some of the consequences of internal stress such as the 'spring-forward' phenomenon."

"What wonderful news!" exclaimed the positively beaming Holmes. "Now we can look forward to a future of designed pre-stressed composite structures."

"Voids, I suspect," he continued in more sober mood, "are likely to be another matter. Leaving aside the reduction of density, I do not suppose that anyone had a good word to say about them." Sadly I nodded in agreement. "Well then," exclaimed my friend, "surely that is challenge enough!"

"But tell me Watson," he continued, refilling my glass once more, "what about the issue of fibre/matrix distribution?"

Taking a sip of water from a separate glass to try to clear my head, I replied: "We tend to assume that regular hexagonal packing is the ideal, but, for practical purposes, the presumption is that random dispersion is probably the best that can be achieved. The reality is that we usually take what we can get." Holmes seemed unimpressed, so I combed my memory for something that I had missed. "There was speculation," I ventured, "that non-uniform distribution enhances toughness, and, if we accept the precept that all the practical flows take place in resin rich regions, non-uniform matrix distribution may be an essential requirement for, or consequence of, all processing deformations."

"The challenge then," observed Holmes, "is to define what is really wanted; but, before we can do so, I suspect that it may be that we need a system of mathematically describing this vital characteristic of the microstructure of materials. Is it not surprising, Watson, that there appears to be no systematic method of quantifying the elegant micrographs that abounded in the presentations - perhaps the field of fractals will help." "Possibly the greatest challenge to be resolved," mused Holmes, moving on and gently rotating his glass beneath his nose, "lies in the question of the preforms that are used in the processes."

This was an area where I could speak with confidence. "In all the work presented," I announced, "the starting material was either a fabric, that was draped over a tool, or a flat, pre-consolidated 'blank' that was subsequently formed. The conventional wisdom is to start from some well defined orientation - uniaxial, bi-axial or quasi-isotropic - and see what happens during moulding. Some of the high points of the conference focused on the extraordinary predictive capacity now available through various numerical design codes. In liquid moulding, these computer models simulate how the resin flows into the mould with all the subtleties of differential permeability and their unhappy consequences. For thermoplastic forming, the programmes follow the reorientation of the fibres and even the onset of buckling. Such predictive capacity! Holmes, it is truly wonderful."

A shadow crossed my friends brow. "What I do not understand, Watson, is why the programmes are used that way round? For liquid moulding, the challenge lies in defining the way in which the mould should fill to completion without faults and then reverse the programme to show where the mould should be gated. For thermoplastic sheet stamping, the fibre orientation that is required in the final shape should be defined and then the programme run backwards to tell what the orientation should have been in the 'blank'."

"Life is not like that, Holmes," I retorted. "Reality is that you must start from some predetermined 'proper' orientation pattern."

But Holmes would not let the matter rest. "Such concerns cannot be permitted to straight-jacket the industry," he announced whilst rummaging in the cupboard before emerging triumphantly with a bottle of Black Bowmore. "The advances in fibre-placement technology, demonstrated at the meeting, will soon make controlled mis-orientation of the fibres a practicable starting point." He paused, took two clean glasses and slowly poured two measures of the precious water of life. "Whatever the future holds, IF your friends continue to insist on forming shapes from flat starting materials, they must certainly achieve a fundamental understanding of the problem of rhombus shear."

Even the anticipation of tasting the nectar in my fresh glass had not dulled my recognition of the stress that Holmes had laid. "You said IF we continue to insist on starting from flat shapes. Is there any alternative?"

"I rather doubt it," responded my friend. "You see Watson, it is all a case of a rather natural obsession with lingerie - boys, after all, will be boys."

I could see where his thoughts were leading. Hesitantly, I offered: "You mean we place an over-reliance on textile technology - but surely, Holmes, you are not going to decry the achievements of the bias cut in forming complex curvatures."

"Not at all Watson," he replied. "Even I am not insensitive to how it can subtly reveal the beauties of the female form." He paused to reflect, and then continued: "I know, Watson, that you have always been rather more of a ladies' man than myself. Your collection of Austrian phonecards indicates a very keen perception of the subject." He waved aside my embarrassed protest that these were the antiques of tomorrow and continued: "But surely Watson, the 'sikken' stiffener panels that were demonstrated at the meeting look more like a Panama hat than Cindy Crawford. Rather than lingerie, is it not time to look to the millinery profession for pre-form inspiration?"

1. "The Case of the Missing Industrialists, Part 2: The Waterloo Syndrome" Bulletin of the British Society of Rheology 35, 3, 80-83 (1992)
2. "The Case of the Missing Industrialists, Part 3: Parkinson's Law" Bulletin of the British Society of Rheology 38, 3, 88-96 (1995)

MEETING REPORT
EUROPEAN FEDERATION OF CHEMICAL ENGINEERS
WORKING PARTY ON INDUSTRIAL RHEOLOGY
MEETING AT BISCHOFFSHEIM
Nr STRASBOURG, FRANCE, SEPT 26 - 27 1996

The meeting was organised locally by Prof Lionel Choplin, Directeur du GEMICO, ENSIC, University of Nancy. It was the first meeting where people outside the working party were invited and about twenty people attended. The industry/academia ratio of attendees was about 50:50. Four topics were discussed:

Rheology of Adhesive Pastes was presented by A. Collina, Technical Director MAPEI, Italy;

Rheological Problems associated with Plastisol Production by B. Emst, Elf-Atochem, France;

Modelling of melt spinning of Polyethylene by M. van Gurp, DSM, The Netherlands and

Rheology of dispersions and emulsions by H.A. Barnes, Unilever Research, UK.

After an introduction by an industrial representative - *it has been decided that most presentations in meetings will be* - a round-table discussion was held on each general area, and a challenge to academics was worked out for each.

The officers of the Working Party (Chairman Prof G. Astarita, Naples; Vice-Chairman Prof H.A. Barnes, UK.; Joint Treasurers Drs R. Occone (Nottingham University) and P. Shamlou (University College) UK; Secretary Ing A. D'Amore, Italy and Meetings Secretary Prof L. Choplin, France) met on the evening of the 27th to discuss future meetings, etc. They decided to arrange for industrial rheology contributions for the First European Congress on Chemical Engineering at Florence in May 1997 and to hold a larger meeting in conjunction with the European Society of Rheology's meeting at Ljubljana in 1998. A one-day meeting was also planned for Seville in March 1998. The long-term aims of the Working Party were again mentioned - to collect a list of industrial rheology problems and academic expertise in each country.

The industry/academia list of representatives from each European country on the working party was almost complete, as follows:

UK - Barnes/Shamlou;	Belgium - Moldenaars/Vancoppenoll
France - Choplin/El-Bounia;	Spain - Gallegos/Munoz-Escalona;
Germany - Laun/Wagner;	Netherlands - Overdiep/Hamersma
and Italy - Collina/Astarita.	

Howard Barnes, Nov 1996



Members of the European Federation of Chemical Engineers
at their meeting in Bicchoffsheim

NEW AND RECENT BOOKS IN FLUID MECHANICS

Information on recent books is given here for the benefit of members, but the Society cannot answer queries about the availability of particular titles. Place orders for books with publishers through booksellers and agents. The summaries are based on those of the publishers. The editor takes no responsibility for their accuracy.

Fluid Dynamics for Physicists. T.E.Faber.

Cambridge University Press. 466 pp. 1995. ISBN 0-521-41943-3.

Hardback, £50.00 ISBN 0-521-42969-2. Paperback, £22.95

This book provides an accessible and comprehensive account of fluid dynamics, emphasising throughout the fundamental physical principles involved. In addition to the introductory material, many advanced topics are covered, such as turbulence, vorticity and the behaviour of non-Newtonian fluids.

Viscous Flow. Hilary Ockendon and John Ockendon.

Cambridge University Press. 121 pp. 1995. ISBN 0-521-45244-9.

Hardback, £35.00. ISBN 0-521-45881-1. Paperback, £12.95

Cambridge Texts in Applied Mathematics, 13

This book provides senior undergraduates who are already familiar with inviscid fluid dynamics with some of the basic facts about the modelling and analysis of viscous flows.

Transport Properties of Fluids.

Their Correlation, Prediction and Estimation.

Edited by Jürgen Millat, J.H. Dymond and C.A. Nieto de Castro.

Cambridge University Press. 496 pp. 1996.

ISBN 0-521-46178-2. Hardback, £60.00

This book describes the most reliable methods available for evaluating the transport properties, such as viscosity, thermal conductivity and diffusion, of pure gases and fluid mixtures. Particular emphasis is placed on theoretical advances in our understanding of fluid transport properties for all temperatures and pressures.

Rheological Techniques - A Further Chance for a Bargain

Rheological Techniques by R.W.Whorlow, 2nd Edition, (Ellis Horwood, 1992, 460pp., £79.95) is now out of print. The author has, however, been able to obtain rather more copies than originally anticipated and is able to offer them at only £15 (including postage and packing in the U.K.). For overseas surface mail the cost is £18, paid in Sterling, or the equivalent of £25 in another currency. Please send orders, with cheques, to:

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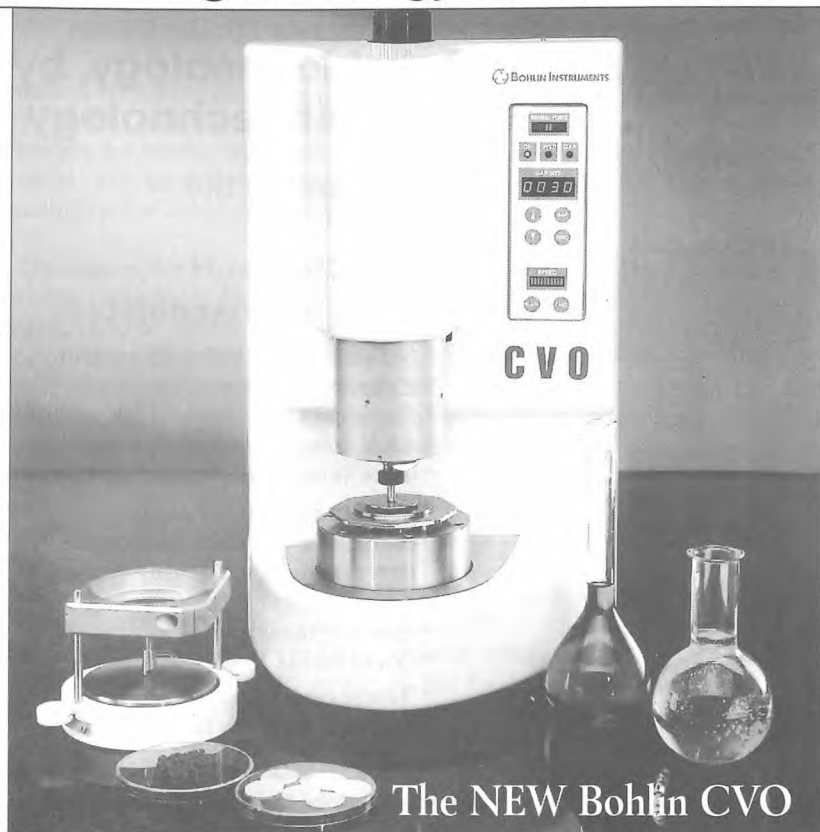
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CONFERENCE DIARY

DATE	PLACE	DETAILS
16-20/2/1997	Galveston, TX, USA	'68th Annual Meeting of the Society of Rheology.'
11-13/3/1997	Chemnitz, Germany	'Rheologentagung 1997' Annual Meeting of the German Rheological Society in cooperation with the Section Rheology of the Czech Chemical Society. Contact: Dr Werner Mielke, Secretary, Deutsche Rheologische Gesellschaft, Unter den Eichen 87, D-12205 Berlin, Germany Tel: +49 30 8104 1610 Fax: +49 30 8104 1617 E-mail: DRG@bam-berlin.de
19-21/3/1997	University of Hull UK	'Emulsions' , Royal Society of Chemistry, Faraday Division, Colloid and Interface Science Group. Contact: Dr B.P.Binks, Surfactant Science Group, School of Chemistry, University of Hull, Hull, HU6 7RX, UK. Tel: 01482-465450 Fax: 01482-466410
16-21/3/1997	Zurich, Switzerland	'1st Int. Symposium on Food Rheology and Structure.' Contact: Congress Secretary, Applied Rheology, Vincentz Verlag, Schiffgraben 43, D- 30175, Hannover, Germany. Tel: +49 511 99 10-375 Fax: +49 511 99 10-399
24-26/3/1997	Powys, Mid-Wales UK	'Food Processing, Experimentation and Simulation' University of Wales, Institute of Non-Newtonian Fluid Mechanics. Contact: Dr G.W. Roberts, Institute of Non-Newtonian Fluid Mechanics., School of Maths, University of Wales, Bangor, Gwynedd, LL57 1UT Tel: 01248 382480 / 382475 Fax: 01248 355881 E-mail: G.W.Roberts@bangor.ac.uk
7-10/5/1997	Capri, Italy	The Second International Conference on 'The Dynamics of Polymeric Liquids' Hotel Residenza, Capri. Contact: Prof. K.Walters, Dept of Mathematics, University of Wales, Aberystwyth, Ceredigion, SY23 3BZ, UK Tel: +44(0) 1970 622750 Fax: +44(0) 1970 622777
27-31/7/1997	Melbourne, Australia	'Second Pacific Rim Conference on Rheology' Conference Organiser: David V. Boger, Univ of Melbourne. Conference Secretary: Leong Yeow, Univ of Melbourne. Technical Programme: Carlos Tiu, Monash University. Local Arrangements: Sati Bhattacharya, RMIT. Contact: Christine Collis, Dept of Chemical Engineering, The University of Melbourne, Parkville, Victoria 3052, Australia. Tel: 61 3 9344 7440 Fax: 61 3 9344 4153 E-mail: prcr2@unimelb.edu.au

8-10/9/1997

Wrexham, UK.

'Polymers and Surfactants: Association, Segregation, Competition at Interfaces', Royal Society of Chemistry, Faraday Division, Colloid and Interface Science Group. & Society of Chemical Industry, Colloid & Surface Chem. Group.
Contact: Prof. P.A. Williams, Centre for Water Soluble Polymers, The North East Wales Institute, Plas Coch, Mold Road, Wrexham, LL11 2AW, UK
Tel: +44 (1978) 290666 Fax: +44 (1978) 290008

19-23/10/1997

Columbus, OH, USA

'69th Annual Meeting of the Society of Rheology.'

1-4/3/1998

Pasadena
California, USA

'2nd International Conference on Mechanics of Time Dependent Materials'

The Society for Experimental Mechanics
Contact: Kathy Ramsay, Conference Manager, SEM,
7 School Street, Bethel, CT 06801, USA
Tel: (+1-203) 790-6373 Fax: (+1-203) 790-4472
E-mail: sem@sem1.com
or Mateja Bourke, Secretary, SEM - European office
Cesta na Brdo 49, SI-1000 Ljubljana, Slovenia
Tel: (+386) 61 123 2247 Fax: (+386) 61 123 2471
E-mail: mateja.bourke@ki.si

6-11/9/1998

Ljubljana
Slovenia

'5th European Rheology Conference'

Contact for Scientific Information: Prof. Igor Emri,
Center for Experimental Mechanics, University of Ljubljana,
Cesta na Brdo 49, SI-1000 Ljubljana, Slovenia
Tel: (+386) 61 123 2247 FAX: (+386) 61 123 2471
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Presemova 10, SI-1000 Ljubljana, Slovenia
Tel: (+386) 61 210956 FAX: (+386) 61 217 431
E-mail: cankarjev.dom@k2.net

21-26/8/ 2000

Cambridge, UK

'Rheology 2000 - XIIIth International Congress on Rheology'

To be organised by the British Society of Rheology with the assistance of the European Society of Rheology.
Contact: Chairman of the Executive Committee,
Prof. K. Walters FRS., University of Wales,
Dept of Mathematics, Penglais, Aberystwyth, Dyfed, SY23 3BZ,
Wales, UK. Tel: (+44) 1970 622750 Fax: (+44) 1970 622777

Travel grants are available to help students attend any of these meetings.
Applications to the BSR Secretary supported by a letter from supervisor.

MEMBERSHIP NEWS

The following applications for membership, omitted from the list in the last issue, were approved at the Council meeting on September 4th, 1996.

Dr A. Magnin,
Laboratoire de Rheologie,
BP 53,
38041 Grenoble Cedex,
France

(fetsa FGJLO)

Mr W-K. Wee,
Dept. of Chemical Engineering,
University of Cambridge,
Pembroke St.,
Cambridge,
CB2 3RA
(fetsa CDEGM)

The following applications for membership were approved at the Council meeting on December 13th, 1996.

Mr R.A. Bailey,
Dept. of Process & Chem. Eng.,
University of Newcastle,
Newcastle upon Tyne,
NE1 7RU
(fetsa GL)

Dr J.A.C.G. Covas,
Dept. of Polymer Engineering,
Universidade do Minho,
4719 Braga Codex,
Portugal
(pea CDH)

Prof. Dr I. Emri,
Center for Expt. Mechanics,
University of Ljubljana,
Cesta na Brdo 49,
61000 Ljubljana,
Slovenia
(petsa BC)

Prof. A.F. Guerrero,
Dept. de Ingenieria Quimica,
Facultad de Quimica,
Universidad de Sevilla,
c/P Garcia Gonzalez s/n,
41012 Sevilla, Spain
(feta FGJL)

Mrs X. Huang,
The IRC in Materials,
PO Box 363,
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Mr P.A. Husband
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University of Cambridge,
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(fetsa D)

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Dr Alan Kaye, now retired from UMIST, and a member since 1957, has accepted Council's offer of Honorary membership.

With these changes, the membership stands at 618, including 55 honorary members.

Classification of abbreviations for Members' Rheological Interests

- | | | | |
|---|--|---|-----------------------------|
| f | Member's main interest is rheology (ie. full-time) | | |
| p | rheology is secondary interest (ie. part-time) | | |
| e | approach is experimental | t | approach is theoretical |
| s | area of work is pure science | a | area of work is technology |
| A | metals | I | glasses, ceramics |
| B | composites | J | oils, greases |
| C | solid polymers | K | building and road materials |
| D | molten or dissolved polymers | L | foodstuffs |
| E | natural fibres | M | biological materials |
| F | liquid-liquid systems | N | theoretical models |
| G | liquid-solid systems | O | other systems |
| H | particulate systems | | |