

Facing the Facts My summer as the Society of heology **History Intern**

Megan Anderson 02 August 2019



What is Rheology? The study of things that flow



Rhemist

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Rhe'mist (rē'mīst), n. One concerned in translation of, or commentary on, the New Testament produced in Reims. Rhen'fsh (rén'fsh), adj. [L. Rhenus the Rhine, fr. Gaul-ish; cf. C. rheinisch. See RISE.] Of or pertaining to the river Rhine or the region on or near it; as, Rhenish wine. — n. Rhine wine.

- n. Knine wine. **Rhenish architecture**. The architecture of the Rhine valley; specif., the German Romanesque architecture of the Rhine [Valley, combining native elements with others de-Rhine [Valley, combining native elements with others de-Architection Byzantine and esp. Lombard architecture. See

Rhemish Confederation. The Confederation of the Rhine. The'ni.um (re'ni.um), n. [L. Rhenus the Rhine + -ium.] r. Chem. A rare element discovered in 1925 in columbic, gadolinite, etc., and obtained as a loose black powder or a silver-white, very hard metal. Symbol, Re; at. no., 75; at. wt., 186,31. It is heavier than gold and is the least fusible of metals except perhaps tungsten. It resembles man-ganese chemically. The'o. (re'o.). A combining form from Greek rheos, current, as in rheotaxis; — used chiefly in Elec., as in rheostat. The'o.base (re'o.bas), n. [rheo. + base.] Physiol. The minimal electrical current required to excite a tissue, as and the state of the state and the state as the state of the state as the state. Rhenish Confederation. The Confederation of the Rhine.

Elec. A kind of motor speed controller.

rhe.ol'o.gy (rē.ŏl'ō.ji), n. [rheo-+-logy.] The science treating of the deformation and flow of matter. - rhe-ol'o-

rhe.om'e.ter (re.om'e.ter), n. [rheo- + -meter.] An instrument for measuring or regulating currents; specif.: a Elec. Formerly, a galvanometer. b Physiol. A hema-tachometer. c A kind of volumetric gas governor. rhe.om/e.try (re.om/e.tri), n. Formerly, the measurement |

of electric currents. **he'o-phile** (rē'ô-fīl;-fīl), **-phil** (-fīl), adj. [rheo-+-phile.] Biol. Living in rivers and streams.

Biot. Living in rivers and streams. rhe'o-phore (re'o-for; 181), n. [rheo-+-phore.] Elec. a A connecting wire of an electric apparatus, traversed by a current. b A pole of a voltaic battery; an electrode. — rhe'o-phoric (-for'fk), adj. Both Rare. rhe'o-phor'ic (-tor'ik), aaj. Both hare. rhe'o-phank'ton (-plangk'tŏn), n. [rheo- + plankton.] Plankton of running waters, as streams and rivers. **rhe'o-scope** (rē'ō-skop), n. [rheo- + -scope.] Physics. A galvanoscope.—rhe'o-scop'ic (-skop'ik), adj.

A gaivanoscope. — The orscop is (Skop is), dug. **rhe**'o-stat (rē'o-stăț), n. [rheo. + Gr. statos standing still.] Elec. A resistor for regulating a current by means of variable resistances. See RESISTANCE Box. rhe'o.stat'ic (-stat'Ik), adj. Of or pertaining to a rheostat. rhe'o-stat'ics (re'o-stat'iks), n. Hydrostatice

answer, but inserted i love his country?) rhe-tor'i-cals (rë-tor')

public exercises cons tions, etc. U.S. rhet'o-ri'cian (rĕt'ō, teacher or master of 2. An eloquent writ writes or speaks in a rhet'o.ri'cian (ret'o.

of rhetoric. rhet'o.rize (ret'o.riz rheum (room; 242), a, cold (F. rhume rheuma; akin to (HEMORRHOIDS, RHF from the mucous m when due to a cold Rhe'um (rē'ŭm), r RHUBARB.] Bot. gonaceae) with la

Theum'ar. thrit tism + arthrit rheumatism in rheu/ma.tal/gi MATIC; -ALGIA.

rheu-mat'ic (ro matique), fr. 1 rheumannan

2. Inducing tea 3. Med. Of, pettending or caus jerks; affected causing the causing rheuma rheu-mat'ic, n. 2. pl. Rheum rheu-mat'i-cal rheu-mat'i-cal-

rheumatic feve occurring chief terized by feve joints, inflamm valves of the h flammatory no the heart.



A Hitchhiker's Guide to Complex Fluids

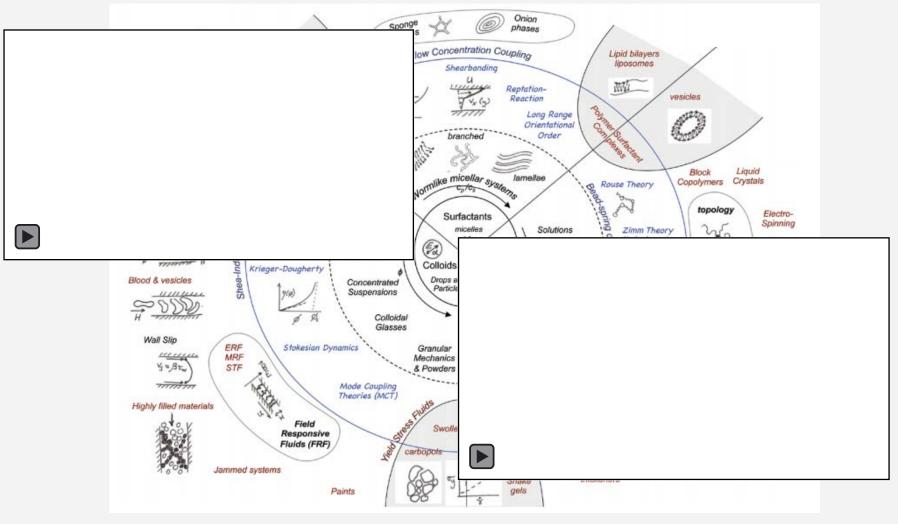
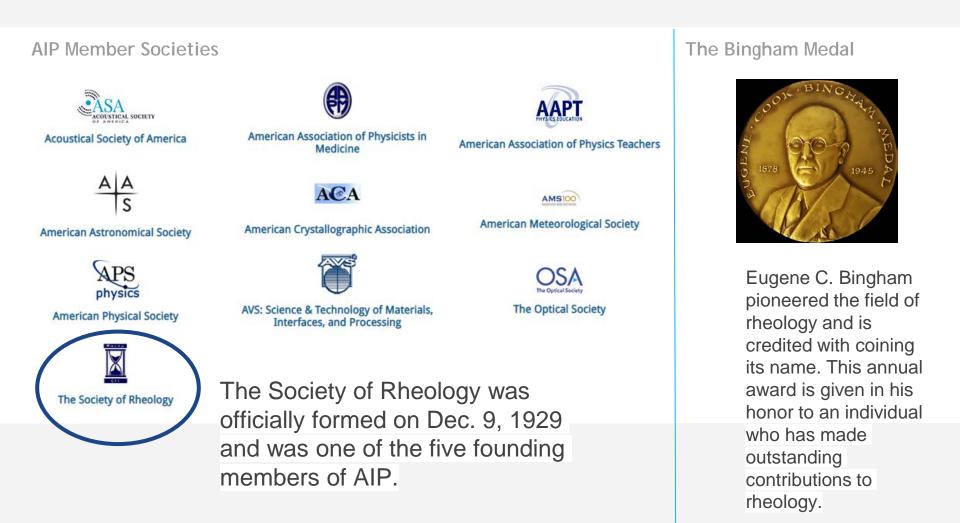


Diagram credit to Dr. Gareth McKinley https://www.rheology.org/sor/Publications/RheoBulletin/RB2015Jan.pdf



Background

The Society of Rheology





What does it look like to preserve the Society of Rheology's history?

→ Preserve knowledge along with artifacts

→ Physical and electronic locations

→ Bingham Medalist research



Results

Meet the Rheologists





Julia A. Kornfield 2017 Medalist Devised a pliable silicone

polymer

material for

eye surgeries

Gregory B. McKenna 2009 Medalist Member of the AIP Governing Board & Society of Rheology President



H. Henning Winter 1996 Medalist

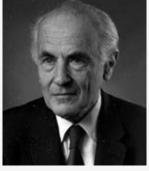
Co-wrote the most cited paper in the Journal of Rheology's history

1,561 citations and counting!



Roger S. Porter 1985 Medalist

Developed oriented polymer fiber strands that are ten times stronger than steel yet more flexible



Frederick R. Eirich 1983 Medalist Researched on

three different continents



Lawrence E. Nielsen 1976 Medalist

Analyzed the flow properties of glaciers on 19 expeditions!

Winter, H. H.; Chambon, F. Analysis of Linear Viscoelasticity of a Crosslinking Polymer at the Gel Point. Journal of Rheology 1986, 30(2), 367-382

Outreach - Rheology Spotlights



Hiroshi Watanabe





- 検社団法人 日本レオロジー学会

POLYMER SCIENTIST AND 2015 BINGHAM MEDALIST

https://www.rheology.org/sor/Awards/Bingham/WatanabeH

RHEOLOGIST SPOTLIGHT

Results

Norman J. Wagner

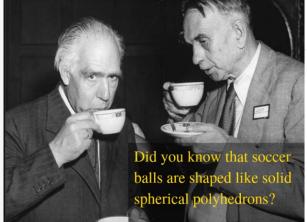




POLYMER SCIENTIST AND 2015 BINGHAM MEDALIST https://www.rheology.org/sor/Awards/Bingham/WagnerN

Outreach - Niels Bohr Library & Archives

Pictured: Niels Bohr and Richard Tolman attend the opening of the Bicentennial Conference on 'The Future of Nuclear Science', circa 1947



Niels Bohr Library & Archives

Did you know that a soccer ball is in the shape of a solid spherical polyhedron? The Women's World Cup inspired us to find this fact in Deji Badiru's book, "The Physics of Soccer."



Niels Bohr Library & Archives July 20 at 10:10 AM

What was @NASA like in its early days? Read Henry Dorman's account of working with the organization and analyzing Apollo 11 data in his full oral history. https://buff.ly/2Jyik1h



"NASA in the days when I knew them had the finest people. . . Some of the best people that could be found, I guess wanted to work on the moon program. . . There was intense national interest in this whole thing, and they were the focus of attention. They were under pressure, I'm

(1) 34

Niels Bohr Library @AlPhiston

What do quantum mechanics and headstands have in common?

They make you see the world in a different way! Learn more about what these young physicists were studying in the following 1967 @PhysicsToday article: buff.ly/2XsgCD1 #quantumphysics #beach

Pictured (left to right): Norton Hintz, Harry Gove, and Ben Mottelson in 'spin down state' after lectures at Brookhaven Summer School in 1965.

spin down:



A STATE OF MIND AND A STATE OF SOME ELEMENTARY PARTICLES IN QUANTUM MECHANICS

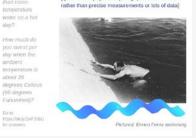
These three young men went on to become highly respected nuclear physicists. Read about the newest nuclear developments of their time at FERMI **QUESTIONS**

[questions in physics requiring quick estimations

Examples:

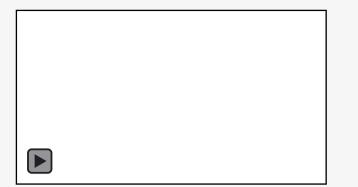
do you get

dav?



sure, and they did a great job." HENRY DORMAN. GEOPHYSICIST 4 Shares A Share

Outreach - PhysCon Workshops



Results

The Society of Rheology is sponsoring the following sessions at PhysCon...

Thermodynamics of Cooking and Our Food System & Our Food System Link to Climate Change

Stay tuned!



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Source: https://www.youtube.com/watch?v=0fnWf5BvXac; https://www.youtube.com/watch?v=DPZzrIFCD_I&t=614s





Summary

Society of Rheology collaborations



Social Media features for the Society of Rheology and the Niels Bohr Library & Archives



Bingham Medalist Biographies

hanks.







Special thanks to:

- Gareth McKinley, my mentor & the Society of Rheology Past President
- The Niels Bohr Library & Archives staff—especially Melanie Mueller and Chip Calhoun
- The American Institute of Physics and Society of Rheology
- My fellow **interns**
- The Society of Physics Students—especially Brad and Kayla

Video credit: William Jewell College Fluids Lab; Slide design credit: Slides Carnival 12



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Bingham Medalists



Donald J. Plazek University of Pittsburgh 1995 Bingham Medalist Read More

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City

1994



🔀 The Society of Rheology



Melvin Mooney

United States Rubber Company 1893 – 1968

Show 8 per page \$

Industrial Polymer Rheologist Awarded Bingham Medal 1948 President 1936-1939

Dr. Melvin Mooney received his BA in 1917 from the University of Missouri and his PhD in physics from the University of Chicago in 1923. He was an Industrial Polymer Rheologist who laid the foundations for studying wall slip in polymer melts and rubbers, local velocity measurements, vulcanized rubber elasticity, and the instrumentation necessary for determining quality control. He was the first person from the rubber industry to join The Society of Rheology (being listed as a member since 1930) and was eventually elected President of the Society.

Close

Biography Examples

Rubinstein is 2018 Bingham Medalist

Ralph Colby

Pennsylvania State University

Michael Rubinstein is the recipient of the 2018 Bingham Medal for his seminal contributions to our understanding of polymer dynamics. Michael was trained in Physics (B.S. at CalTech in 1979 and Ph.D. at Harvard in 1983) and worked in industry for 12 years, first at AT&T Bell Laboratories and then at Eastman Kodak, before moving in 1995 to the University of North Carolina, where he stayed for more than 20 years, and then to Dake University in 2018.

Michael has made many contributions to polymer physics with a total of 20,000 citations and an h-index = 68! Forty-eight of his publications have more than 100 citations. His 2005 review article with Andrey Dobrynin on theory of polyelectrolytes in solutions and at surfaces currently has over 1100 citations.

Michael's ideas have had profound impacts on the way rheologists think

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about their data in the studies of polyampholytes, polyetecrityle solutions, polyelectrolyte gels, neutral polymer solutions, associating polymers, linear and branched polymer melts, polymer gelation, polymer networks with and without fractal fillers, block copolymers, ring polymers, bottlebrush polymers and polymer nanocomposites.

I met Michael when I started working at Eastman Kodak in July of 1985 (Michael had started working there two weeks earlier). We had offices next door to each other and worked together extensively for our ten years at Kodak. Those were great years, as we always had the time to think until a given problem was solved, without distractions such as proposal writing. We were fortunate to have forward-minded managers that valued research; Jack Chang and John Pochan protected us well from the pressures that many industrial research managers would try to apply. We were in the Polymer Science Lab, a merry band of mostly chemists. Michael was viewed as a messiah, as whatever the problem. Michael could give each person a fresh way to think about the problem they were struggling with. He and I learned a great deal about polymers from this group and owe them a debt of gratitude.

In 1990 Michael and I taught a polymer course in the Physics Department at the

In 2011 Michael Rubinstein's research group included (front row, from left to right): Sergey Panyukov, Yanchun Ling, Yanqian Wang, Ozan S. Saryer, Evgeny B. Stukalin, Zouwei Wang; Back row: Rubinstein, James Brock, Li-Heng Cai.

Rheology Bulletin, 87(2) July 2018



Bernard D. Coleman

July 5, 1930-Present

Physical Chemist, Mathematician.

Awarded Bingham Medal 1984.

Bernard David Coleman was born on July 5, 1930 in New York City. Coleman received his B.S. in Chemistry from the University of Indiana in 1951, after which he attended Yale University where he received his M.S. in 1952 and Ph.D. in 1954, both in Physical Chemistry. After graduating with his doctorate, he went to work for the Du Pont Company at the Carothers Research Laboratory conducting basic studies on the tensile trength of fibers. He left the company after three years to take the position of senior fellow at the Mellon Institute, and he remained there from 1957 to 1988. During this time, he was also a professor of mathematics (1967-1988), professor of biology (1974-1988), and professor of chemistry (1984-1988) at Carnegie Mellon University. In 1988 he moved to Rutgers University to become the J. Willard Gibbs Professor of Thermomechanics. He also served as a professor of mathematics and director of the graduate program in mechanics.

The basic and varied contributions to rheology made by Professor Coleman and his collaborators include theoretical studies of viscometric flows of non-Newtonian fluids, linear and nonlinear viscoelasticity, thermodynamics of deforming materials, wave propagation in nonlinear viscoelastic materials, stability of various types of flows and deformations, and the birefringence of flowing and deforming materials. His work is noted for its mathematical rigor, whilst also focusing on key results that can be compared with appropriate experimental data. He coauthored a ground-breaking book <u>Viscometric Flows on Non-Newtonian Fluids</u>, written in collaboration with H. Markowitz and W. Noll, that received wide recognition. Besides its noteworthy theoretical content, the book still stands as a landmark reference on viscometry and the measurement of clastic normal-stress differences.

Dr. Coleman has been a visiting professor at numerous universities in this country and abroad. He also served on various university committees and on the editorial board of journals on rational mechanics and mathematical biology. He was a member of the board of directors of the Renaissance and Baroque Society in Pittsburgh from 1974 to 1979, served as the American chairman at the Venice Symposium of the United States-Italy Cooperative Science Program in 1978, and served as the Society for Natural Philosophy Treasurer from 1967 to 1968 then Chairman from 1971 to 1972. It is because of his mathematically-rigorous and experimentallyverifiable research in rheology that Coleman was awarded the Bingham Medai in 1984.

Sources:

"Bernard D. Coleman." Prabook.com. Accessed July 25, 2019.

https://prabook.com/web/bernard_d.coleman/69029.

Coleman, Bernard D. Vita_BDC.