A Wonderfully Diverse Scientific Life

John Birks

University of Bergen,
University College London,
University of Oxford

12th International Paleolimnology Symposium (IPS 2012)
Glasgow 21-24 August 2012

Honour

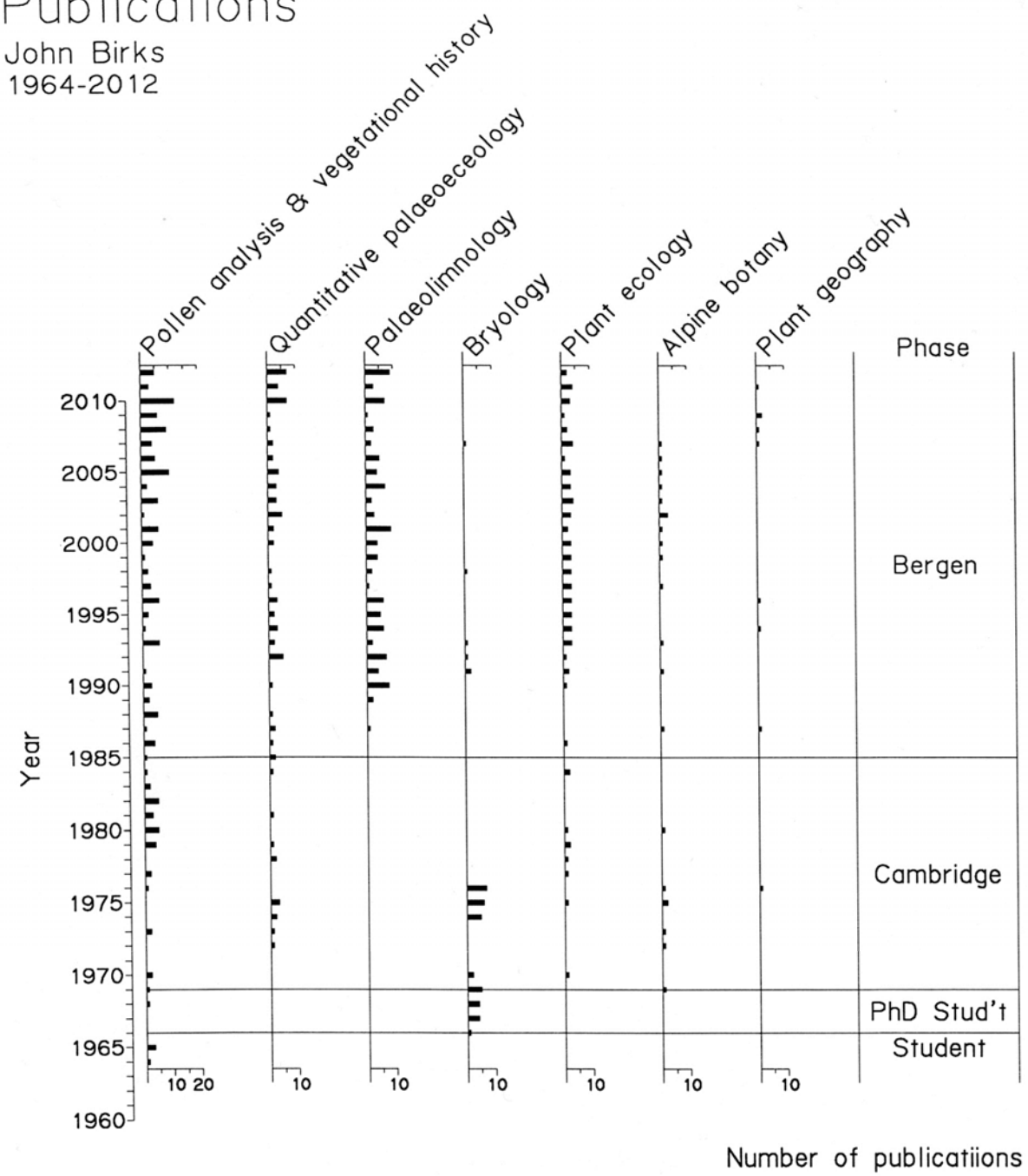
Confession

Despite becoming a pollen analyst and palaeoecologist in 1961, I did not do any real palaeolimnology until 1987, although I paddled in Diss Mere in 1979!

Never counted a diatom, chironomid, or cyst in my life! I only know them as eight-letter codes in CANOCO, WACALIB, C2, etc. (TA003A; AC013S; Chir plu; Cory amb)

Publications

John Birks
1964-2012



Been very fortunate to have had a wonderfully **diverse** and intellectually **rich** and **challenging** scientific life

Pollen analysis, vegetation history & palaeoecology	1961-
Bryology	1963-
Alpine botany	1965-
Plant ecology	1965-
Quantitative palaeoecology	1972-
Plant geography	1976-
Palaeolimnology	1979, 1987-

Try to keep up these interests but increasing age and decreasing memory capacity for further alpine plant names are reducing my **alpine botany**. Lack of time is limiting **bryology**, and **plant geography** and **plant ecology** are increasingly becoming side-lines. Current literature is overwhelming – impossible to keep up

Bryology

Been a keen field botanist since 1961 as schoolboy in Manchester

Quickly ran out of flowering plants and ferns to find in Manchester area so I took up mosses & liverworts. Went in 1963 on a 1-week course in Yorkshire run by Michael Proctor – been interested in bryophytes ever since. By 1969 had seen and photographed almost all British bryophytes. Found several species new to Britain and wrote a bryophyte flora of the Isle of Skye.




Alpine botany

Alpine botany started in 1965 with a 5-person student expedition to Abisko, Swedish Lappland (Hilary, John Dransfield, Ian Campbell†, Andrew Malloch†, myself)

Since then, Hilary and I have been on 67 alpine expeditions around the world. Both keen plant photographers

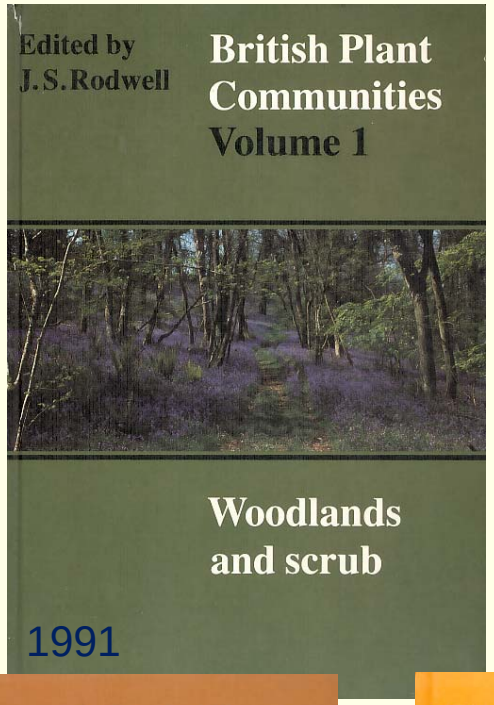


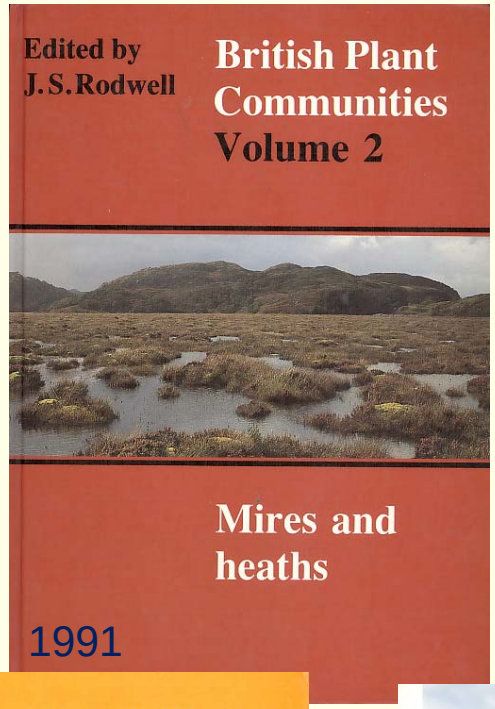


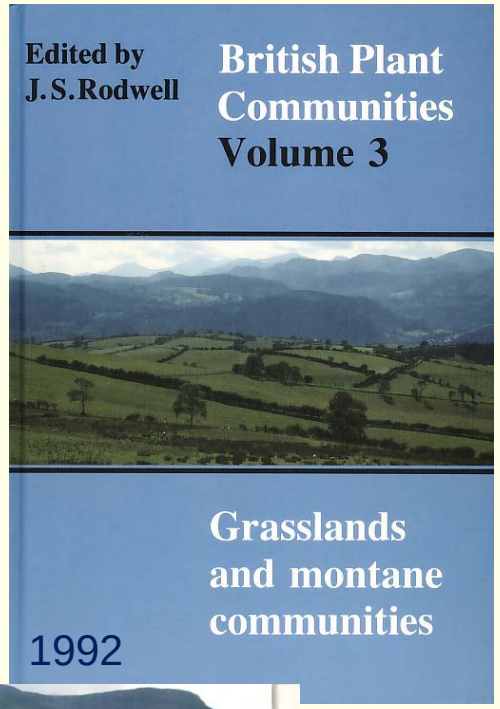

Plant ecology

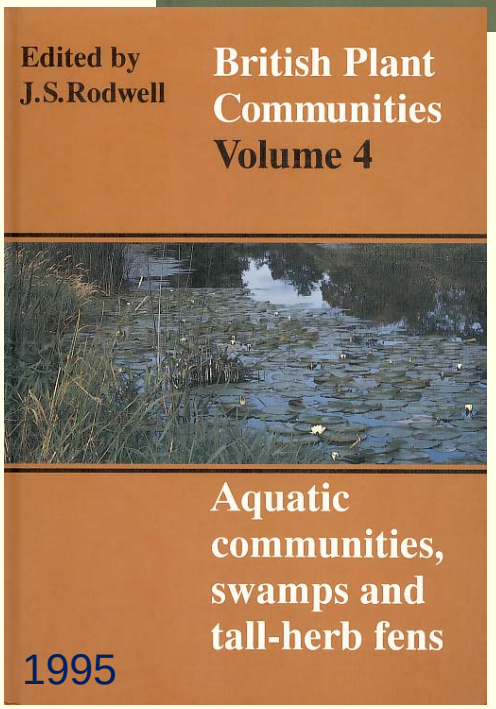
Plant ecology done mainly in conjunction with palaeoecological studies in Scotland, Yukon, or Scandinavia. Primarily descriptive community ecology, usually with a quantitative slant. More recently more on biodiversity patterns in mountains and recent (50-70 yrs) vegetation.

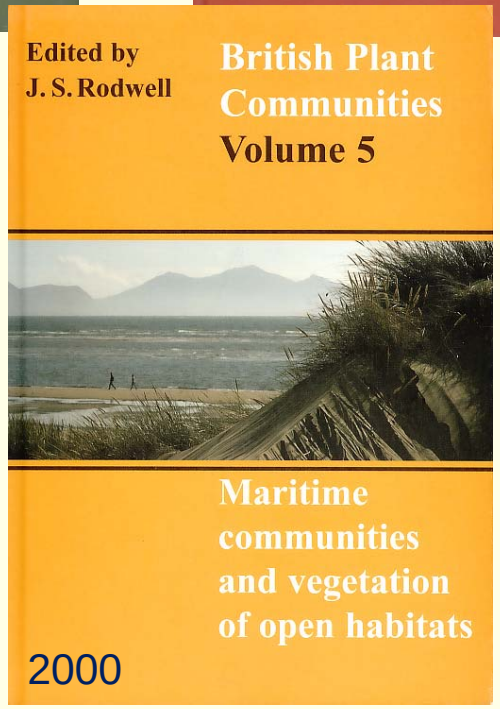


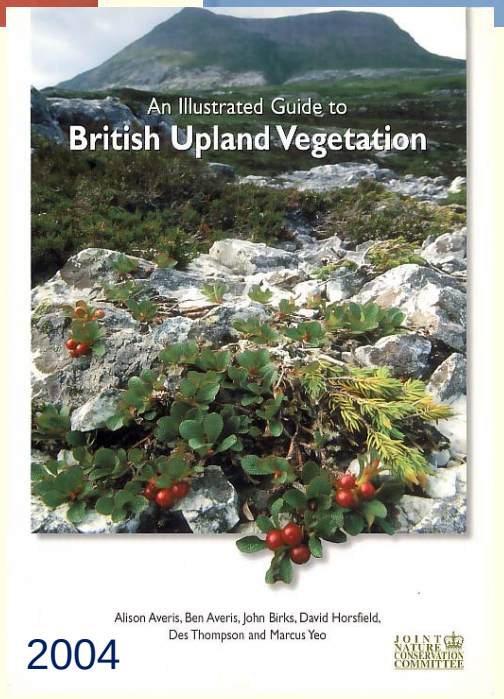

Edited by
J.S.Rodwell
British Plant
Communities
Volume 1
Woodlands
and scrub
1991


Edited by
J.S.Rodwell
British Plant
Communities
Volume 2
Mires and
heaths
1991


Edited by
J.S.Rodwell
British Plant
Communities
Volume 3
Grasslands
and montane
communities
1992


Edited by
J.S.Rodwell
British Plant
Communities
Volume 4
Aquatic
communities,
swamps and
tall-herb fens
1995

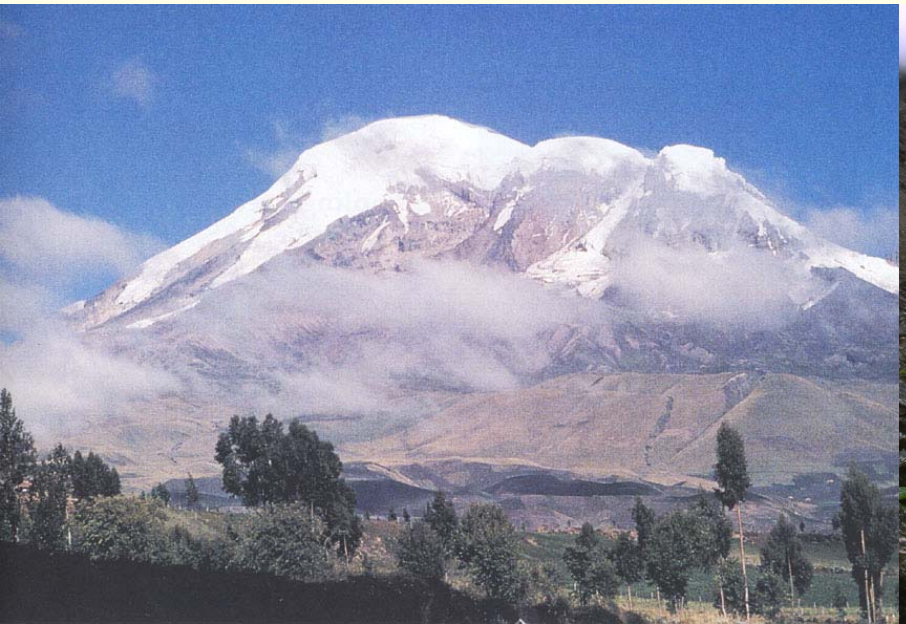

Edited by
J.S.Rodwell
British Plant
Communities
Volume 5
Maritime
communities
and vegetation
of open habitats
2000


An Illustrated Guide to
British Upland Vegetation
Alison Averis, Ben Averis, John Birks, David Horsfield,
Des Thompson and Marcus Yeo
JOINT NATURE CONSERVATION COMMITTEE
2004

Plant geography

Plant geography mainly quantitative descriptive work deriving floristic elements and regions. More recently more analytical, hypothesis-testing on biodiversity patterns along altitudinal gradients.

Chimborazo, Ecuador 6310 m



Rheum nobile

Northern Bhutan, 3800 m

Pollen analysis, vegetation history, palaeoecology

Son of a physicist and mathematician who had studied at Oxford.

Brought up to believe that, as Lord Rutherford pronounced, there are three types of science

- mathematics
- physics
- stamp collecting

My ‘idea’ about pollen analysis

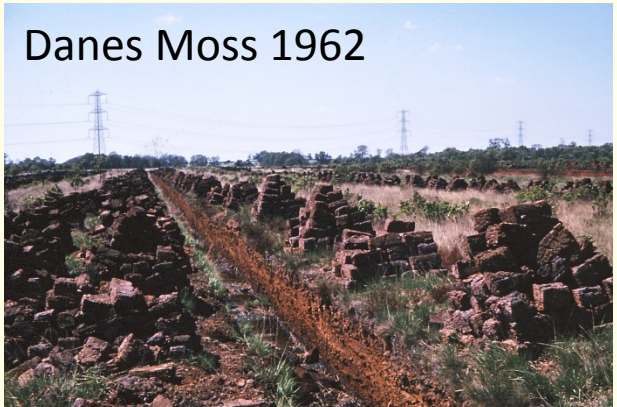
5 September 1961 *New Scientist* – articles about hayfever allergies and pollen, about Danish bog bodies, and about peat bogs.

Put them all together and had 'idea' of pollen analysis.

Chat Moss 8 October 1961 – a damp, cold Saturday.

Chat Moss 1962-63

Holcroft Moss 1962



Danes Moss 1962

Following Monday 10 October 1961 at school, discovered there had been von Post and there were Fægri, Iversen, and Godwin!

Very basic pollen analysis – trees, some NAP only.

Sent first pollen diagram to Harry Godwin† in May 1962.

Frank Oldfield, John Tallis – great help. Arranged for the loan of a Hiller peat borer.

Frank Oldfield

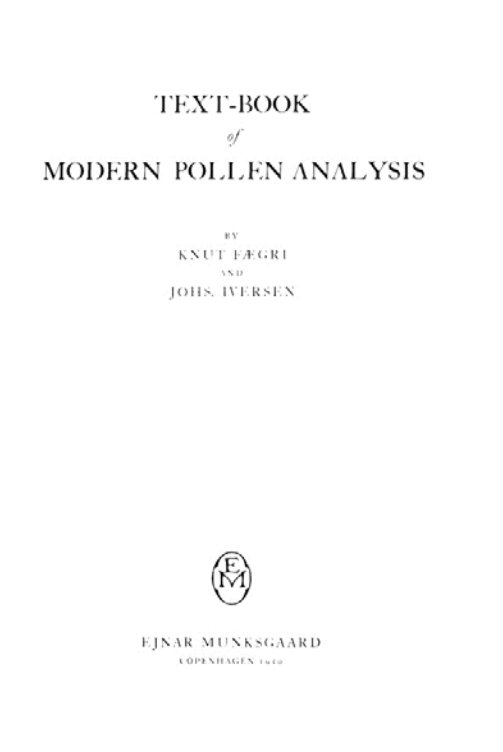
Harry Godwin†

John Tallis

Needed a copy of Fægri and Iversen (1950) *Textbook of Modern Pollen Analysis*.

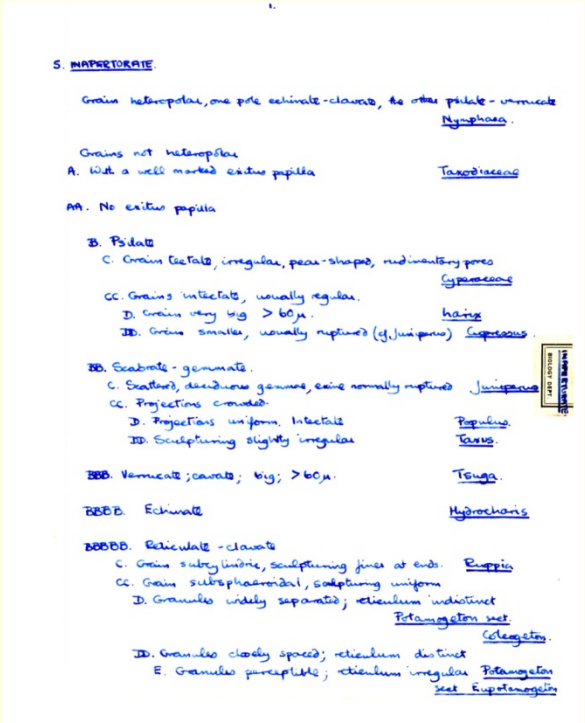
One copy in Manchester – in the **reference** library so not to be removed!

Wrote out after school the pollen identification **key** – no photocopiers then!


TEXT-BOOK
of
MODERN POLLEN ANALYSIS

BY
KNUT FÆGRI
AND
JOHS. IVERSEN

EJNAR MUNKSGAARD
COPENHAGEN


5. INAPERTURATE.

Grains heteropolar, one pole echinate-clavate, the other psilate-verrucate
Nymphaea.

Grains not heteropolar
A. With a well marked exitus papilla — Taxodiaceae

AA. No exitus papilla

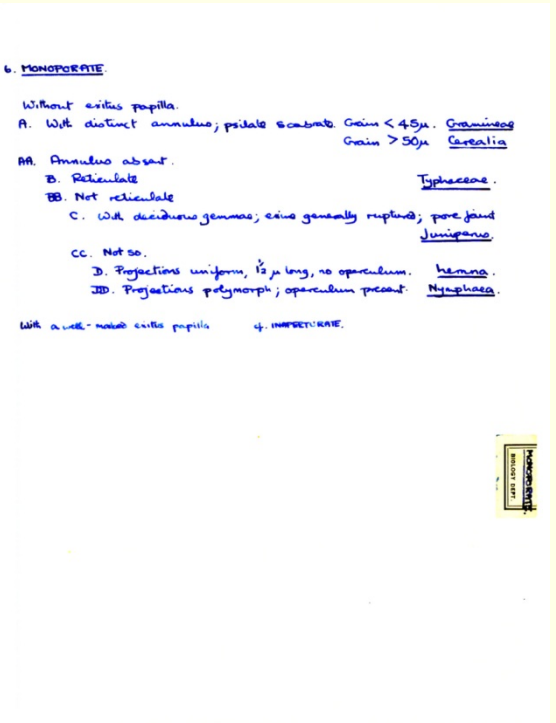
B. Psilate
C. Grains tetrads, irregular, pear-shaped, rudimentary pores — Cyperaceae
CC. Grains intetrads, usually regular.
D. Grains very big >60μ. — Iris
DD. Grains smaller, usually ruptured (cf. Juniperus) — Cupressus

BB. Scabrate-gemmate.
C. Scabrate, deciduous gemmae, exine normally ruptured — Juniperus
CC. Projections conoid.
D. Projections uniform. Intectate — Populus
DD. Sculpturing slightly irregular — Taxus

BBB. Verrucate; cavate; big; >60μ. — Tsuga.

BBBB. Echinate — Hydrocharis

BBBBB. Reticulate-clavate
C. Grain subcylindric, sculpturing finer at ends — Ruppia
CC. Grain subtriaxonal, sculpturing uniform
D. Granules widely separated; reticulum indistinct — Potamogeton pect. Coleogeton.
DD. Granules closely spaced; reticulum distinct
E. Granules perceptible; reticulum irregular — Potamogeton sect. Eupotamogeton

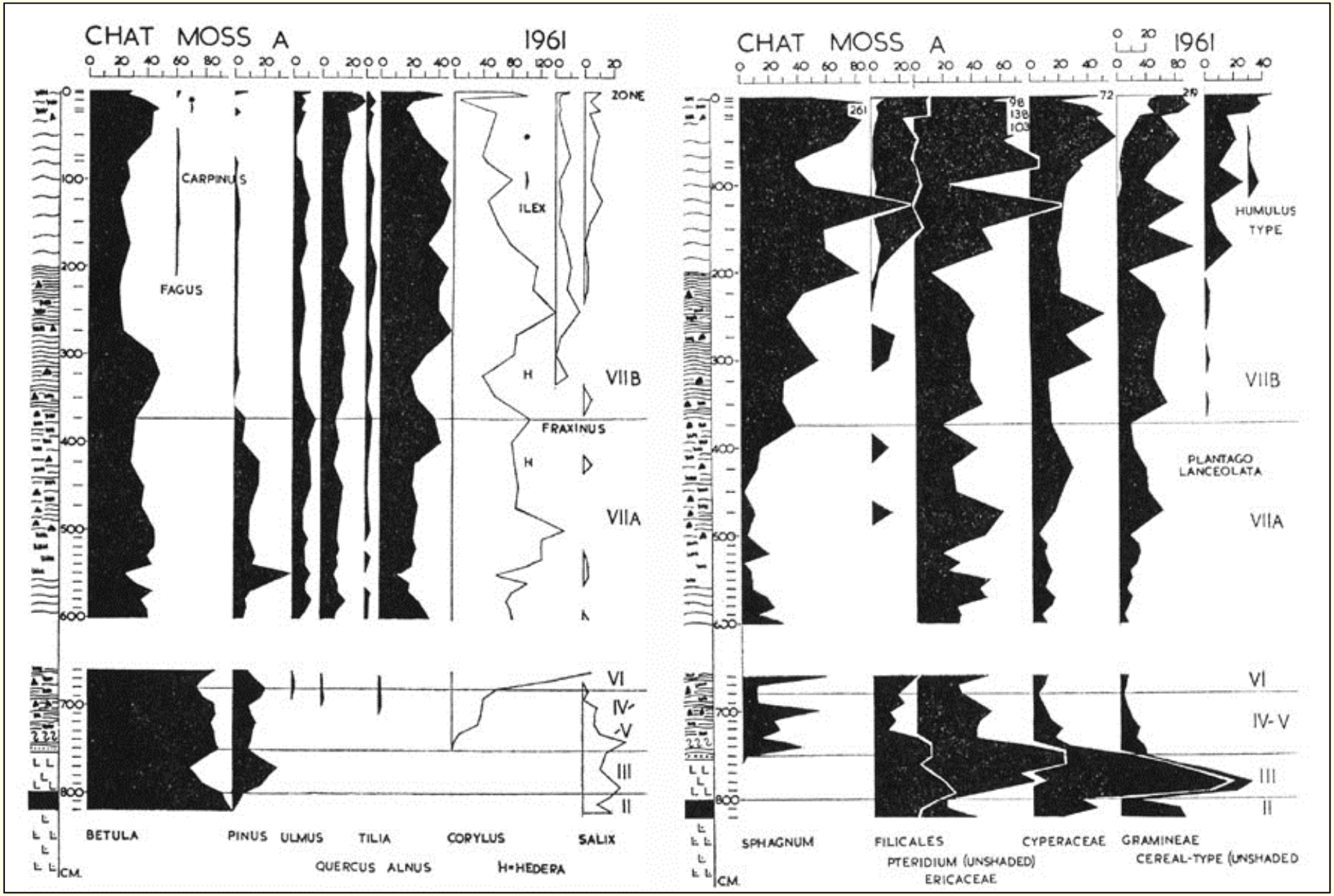

6. MONOPORATE.

Without exitus papilla.
A. With distinct annulus; psilate scabrate. Grain <45μ. — Gramineae
Grain >50μ. — Cerealia

AA. Annulus absent.
B. Reticulate — Typhaceae.
BB. Not reticulate
C. With deciduous gemmae; exine generally ruptured; pore faint — Juniperus.
CC. Not so.
D. Projections uniform, ½μ long, no operculum. — Hemna.
DD. Projections polymorph; operculum present. — Nymphaea.

With a well-marked exitus papilla — 4. INAPERTURATE.

Stimulated my interest in pollen morphology as an essential tool in pollen analysis on Skye, and in Minnesota, Yukon, and Norway

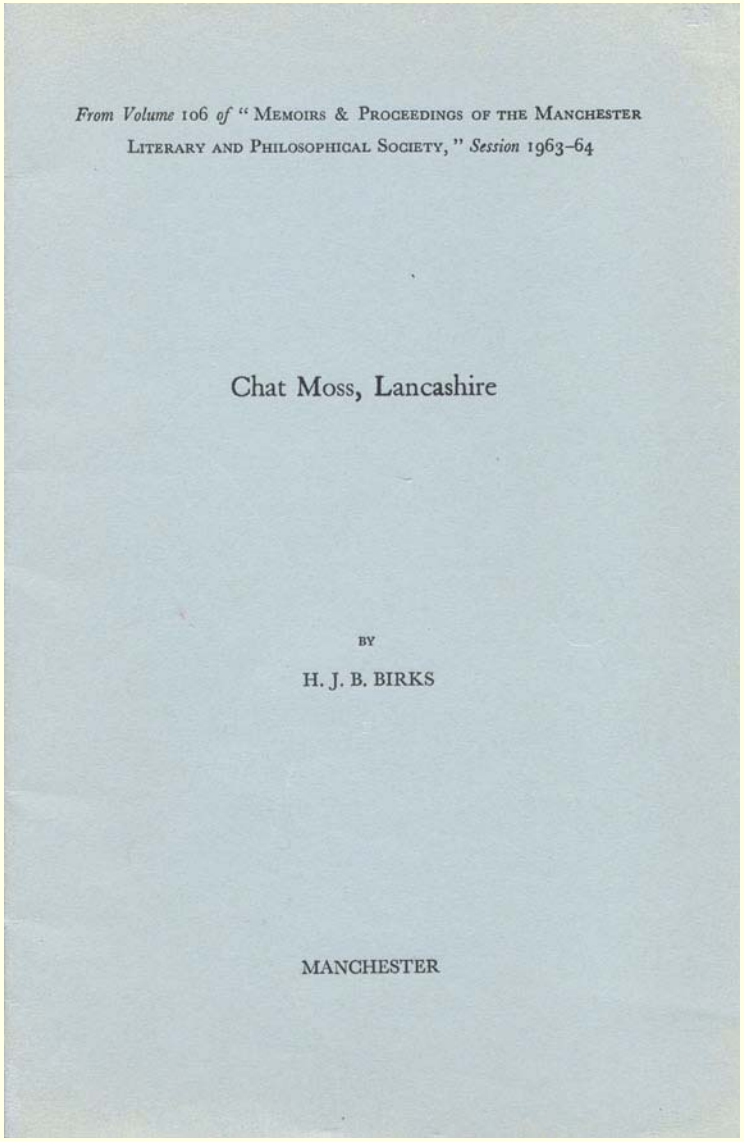


Tree, shrub, and herb pollen diagram

Birks, H.J.B. 1964 Chat Moss, Lancashire. *Memoirs and Proceedings of the Manchester Literary and Philosophical Society* 106: 1-24.

Published October 1964, when I was an undergraduate at Sidney Sussex College, Cambridge (JIF = 0.0!) – 10 citations

Gave my first public lecture at a conference in August 1963 – British Association for the Advancement of Science (Manchester). Learnt lecture by memory! Not so conscientious nowadays.



From Volume 106 *of* "Memoirs & Proceedings of the Manchester Literary and Philosophical Society," *Session* 1963–64

Chat Moss, Lancashire

BY

H. J. B. BIRKS

MANCHESTER

Career progression

1963-66 Undergraduate at Cambridge, studied Botany, Geology, Invertebrate Zoology, & Biochemistry. Final degree in Botany.

1964 Hilary Lees, 1 year ahead of me. Got married in 1966.

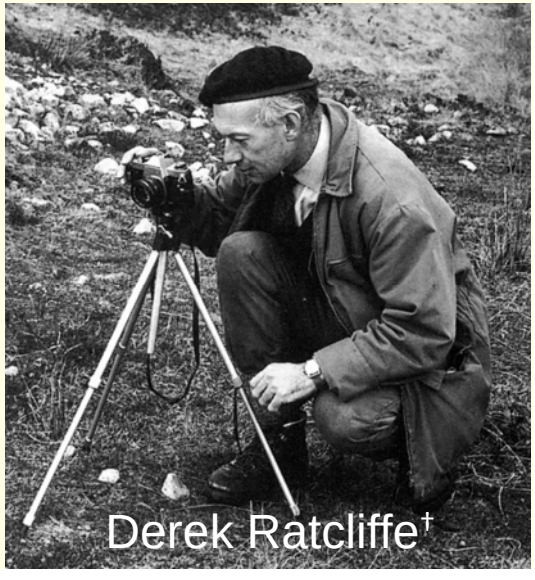
1965 Expedition to Swedish Lapland.

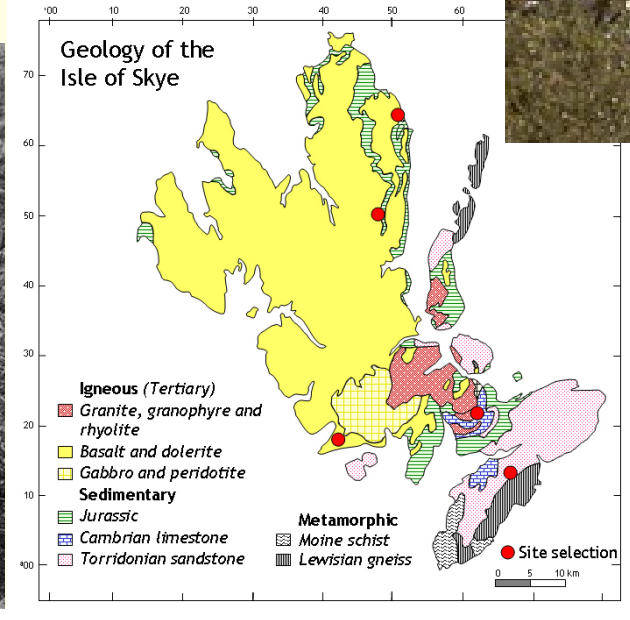
Hilary in 1965

1964 Eilif Dahl†, per-glacial survival, Isle of Skye.

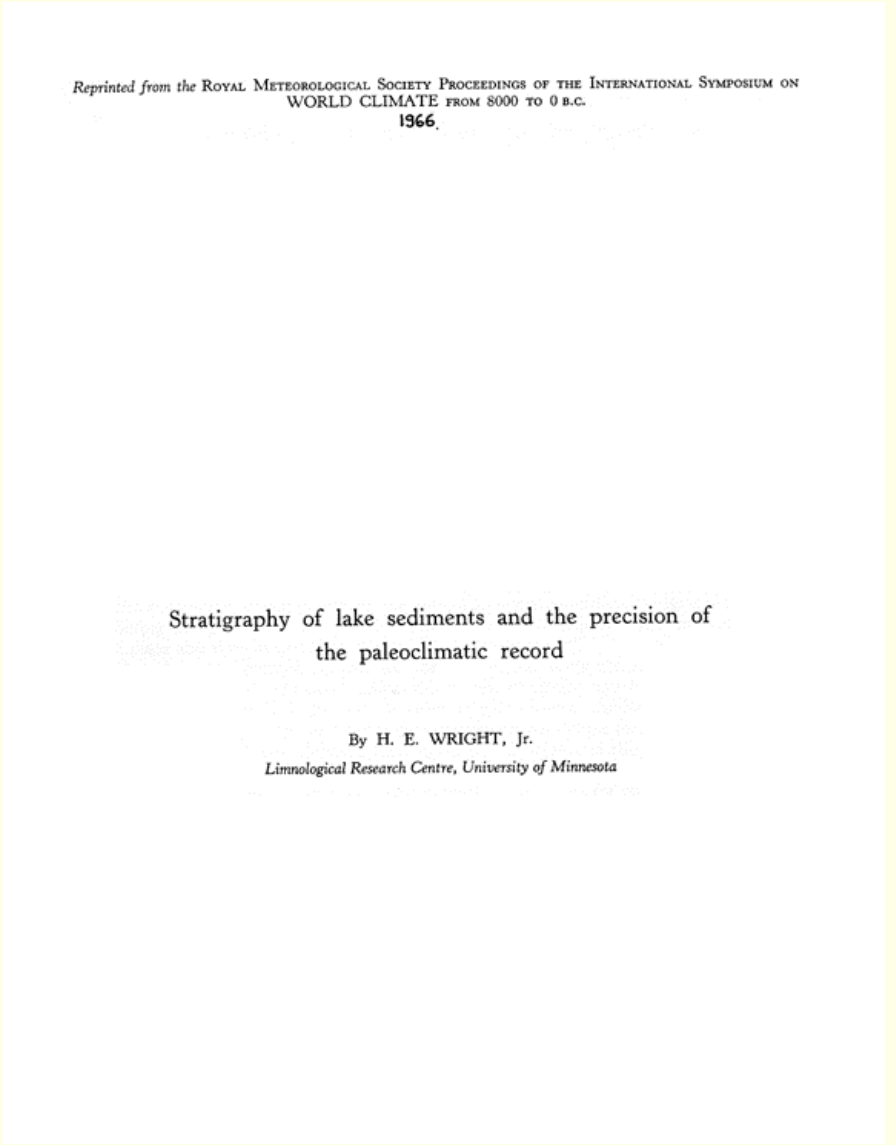
1966-69 PhD about the late-glacial vegetational history of the Isle of Skye and its modern flora and vegetation. Descriptive and narrative, some analytical topics.

1967 Kamil Rybniček, Brno, Czech Republic, continental phytosociology: Derek Ratcliffe†, Monks Wood, upland flora and vegetation, rare plants, adventure botany





1966-67 First heard the word ‘pal(a)eolimnology’ in lecture in London by Herb Wright



Reprinted from the ROYAL METEOROLOGICAL SOCIETY PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON WORLD CLIMATE FROM 8000 TO 0 B.C.
1966

Stratigraphy of lake sediments and the precision of the paleoclimatic record

By H. E. WRIGHT, Jr.
Limnological Research Centre, University of Minnesota

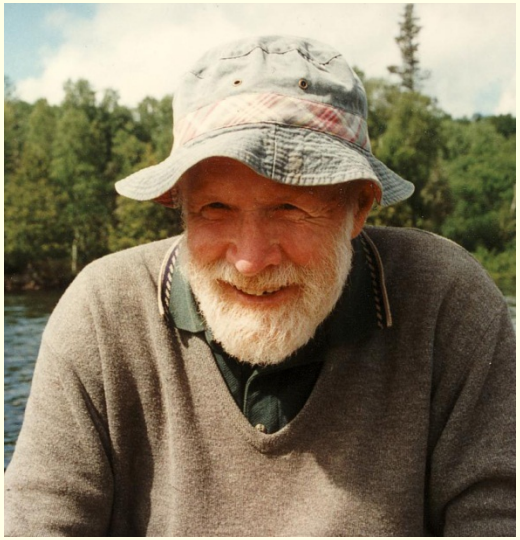
This paper and Herb’s talk and work convinced us to go to Minnesota in 1970.

At that stage in my education, the only function of lakes, according to Harry Godwin, was to collect pollen for pollen analysts to study!

1970 Post-doctoral fellow, University of Minnesota with Herb Wright and Ed Cushing. AMQUA lecture by John Imbrie, developed my interest in quantitative techniques

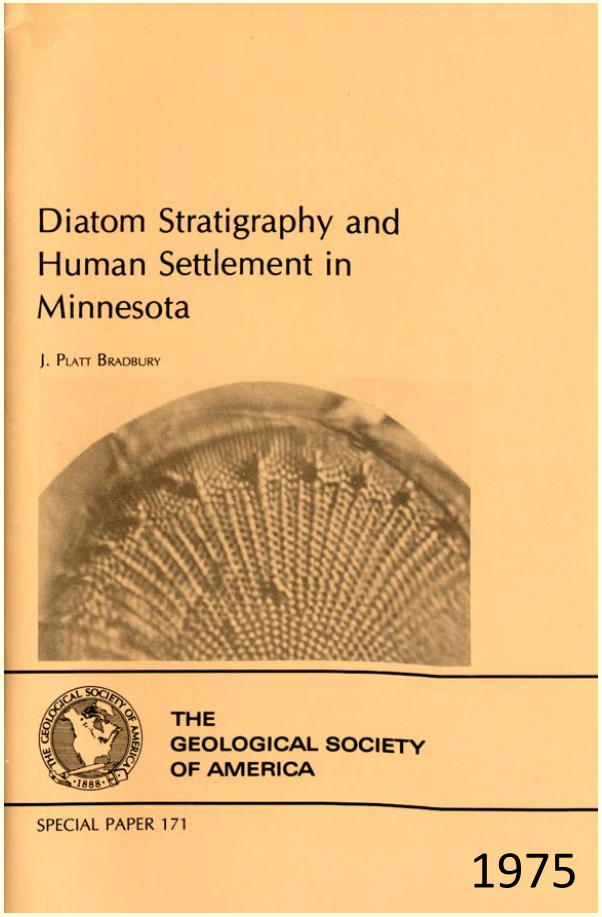
John Imbrie

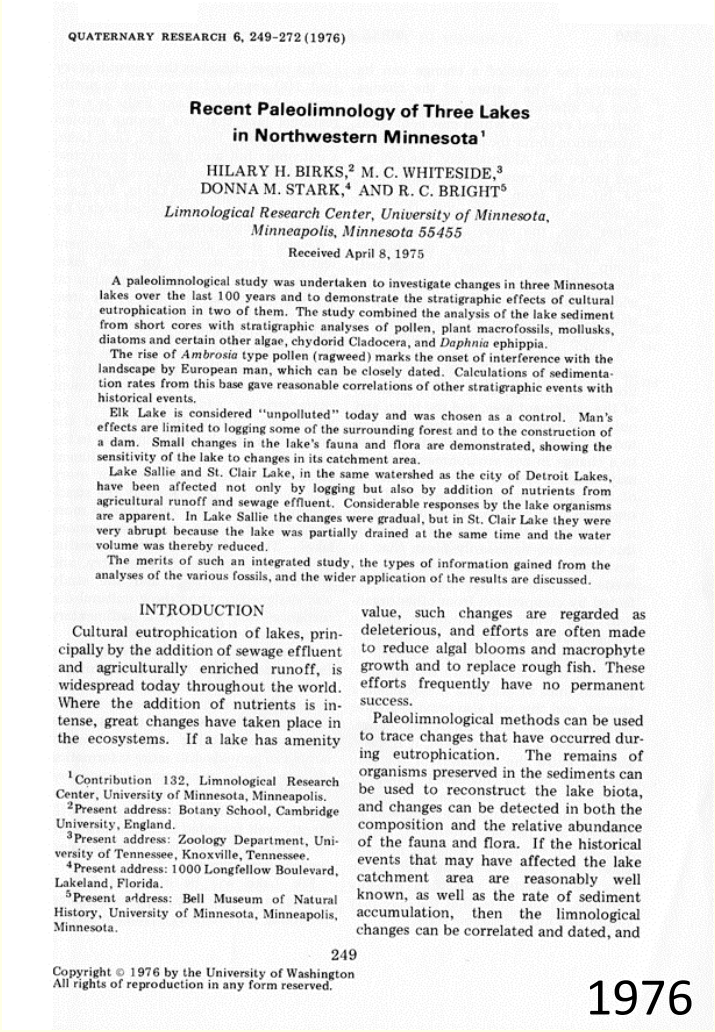
Ed Cushing



Herb Wright

Besides getting interested in quantitative techniques, got acquainted with pal(a)eolimnology through J Platt Bradbury†, Mel Whiteside, Bob Megard, Bob Bright†, and others at LRC.





Spent much of 1970 struggling to understand

- PCA
- Factor analysis
- Multiple regression
- Transfer functions, etc.

following John Imbrie's brilliant lecture.

No textbook for non-statisticians – hard going!

My palaeoecological work there was descriptive and narrative

1971 Expedition to Yukon to find possible modern analogues for the Minnesota lake-glacial.

Combination of modern ecology, floristics, successional studies, pollen analysis, palaeolimnology, numerical methods, limnology, and philosophy

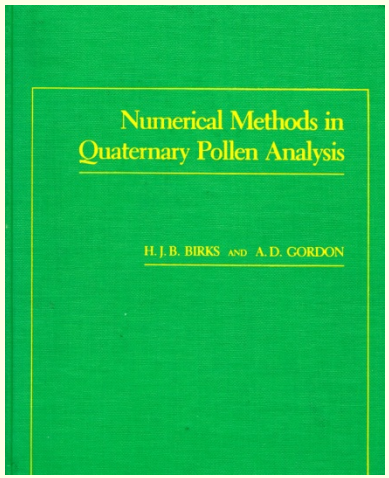
Descriptive, narrative, and analytical

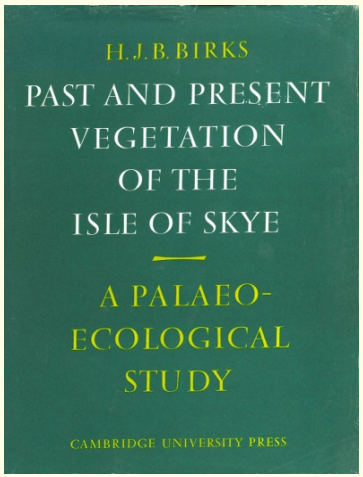
Reinforced the ‘expedition bug’ that started in 1965.

1972-85 Collaboration with Allan Gordon, a statistics PhD student in Cambridge, on numerical methods in Quaternary pollen analysis. Clustering and partitioning and ordination of stratigraphical data; sequence slotting; biplots; mixture decomposition; etc. Wrote book in 1985.
Descriptive and narrative research.

1973 Isle of Skye book – past and present vegetation, pollen analysis.
Descriptive, narrative, and partly analytical.

Allan Gordon



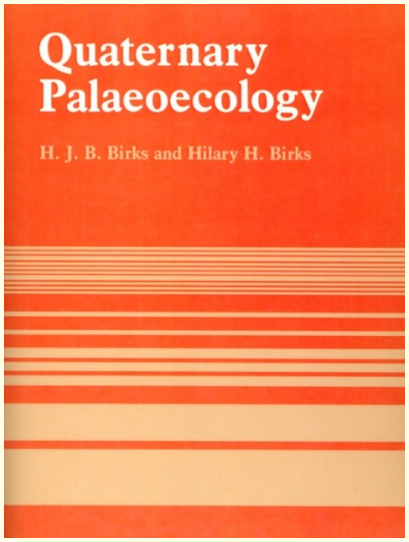


1974-84 Vegetation history of Scotland and Minnesota, numerical methods, broad-scale syntheses and pollen maps, tree spreading; National Vegetation Classification (NVC); numerical plant ecology.
PhD students – Brian Huntley, Mary Edwards, Colin Prentice, Richard Bradshaw, Henry Lamb, Keith Bennett, Willie Williams, Paul Kerslake, Leslie Rymer, Peter Beales.
Descriptive and narrative research.

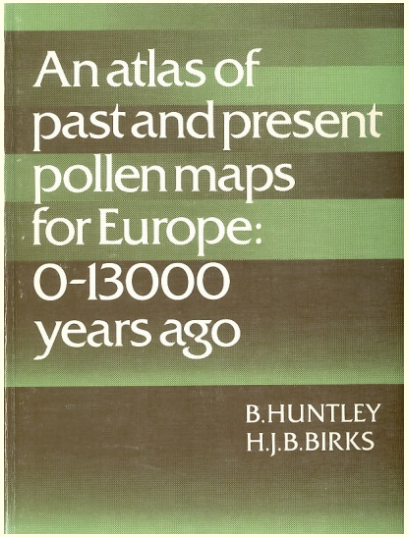
1979-93 Diss Mere project – Sylvia Peglar, Sheri Fritz, Herb Wright, et al.
Introduction to palaeolimnology

Sheri Fritz

1980 Hilary and I wrote textbook on *Quaternary Palaeoecology* with a very dated chapter on palaeolimnology!



1983 Brian Huntley and I *An Atlas of Past and Present Pollen Maps for Europe: 0-13000 Years Ago*.



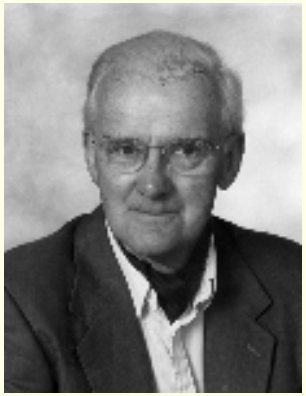
Influential people at this stage of my learning

Tom Webb

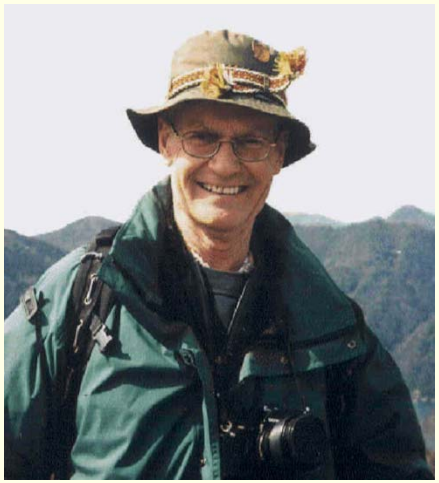
Svend Th. Andersen†

Bill Watts†

Roel Janssen

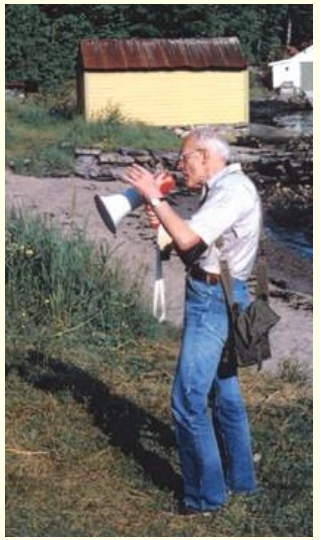


Jim Ritchie



Björn Berglund

1984 Moved to University of Bergen at invitation of Knut Fægri† and Peter Emil Kaland

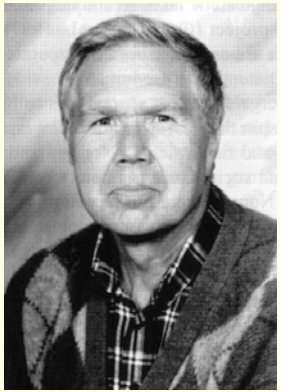


1985 IGCP meeting in Switzerland, 'Swiss Connection' with Andy Lotter and Birgitta Ammann. Heard about multi-proxy studies at Lobsigensee. Met John Smol.

1986 Acid-rain debate in Norway; Knut Fægri ordered me to be involved with SWAP; Peter Emil Kaland and our proposal!

1986-95 Visits to Lund, 'Swedish Connection' with Björn Berglund and Marie-José Gaillard.
Talked with Rick Battarbee about SWAP and suggested diatom-pH transfer functions could be improved.

1987-91 SWAP acid-rain palaeolimnology with Frode Berge† and John Boyle.
Analytical hypothesis-testing.



1987 Visit to Wageningen, 'Dutch Connection' Cajo ter Braak thesis defence

1987 Worked with Cajo, Steve Juggins, and John Line on SWAP two-way weighted averaging and maximum-likelihood regression and calibration (bug in WACALIB!), sample-specific errors of prediction by bootstrapping or bagging (bootstrap aggregating). Pre-dated Breiman (1996) on bagging by 6 years!

WACALIB version 3.3 - a computer program to reconstruct environmental variables from fossil assemblages by weighted averaging and to derive sample-specific errors of prediction

J.M. Line[1], Cajo J.F. ter Braak[2] & H.J.B. Birks[3*]

1988 Palaeolimnology, ‘London Connection’ University College London – Rick Battarbee, Steve Juggins, Viv Jones, Roger Flower, Neil Rose, Gavin Simpson, Anson Mackay, Don Monteith, Nigel Cameron, Carl Sayer, et al.





1989 Palaeolimnology, ‘Kingston Connection’ Queen’s University – John Smol, Brian Cumming, John Kingston†, Roland Hall, John Glew, Reinhard Pienitz, et al.





1990 First paper in Journal of Paleolimnology

Journal of Paleolimnology **4**: 69–85, 1990.

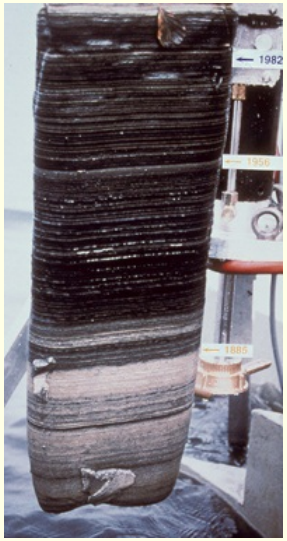
A palaeoecological test of the land-use hypothesis for recent lake acidification in South-West Norway using hill-top lakes

H. J. B. Birks[1], Frode Berge[1,2], J. F. Boyle[1] & B. F. Cumming[3]

1991 Chironomids – Steve Brooks, Oliver Heiri

1993 Through collaboration with Cajo ter Braak and development of constrained ordination methods and associated permutation tests, could now test specific hypotheses about driving factors on long-term dynamics (e.g. volcanic tephra impacts, Sägistalsee, Baldeggersee, Gerzensee, etc.)

Analytical phase at last in palaeolimnology



Now a quantitative palaeolimnologist!

1993-2008 Palaeolimnology and palaeoecology, Kråkenes project with Hilary Birks et al.

1993 Vegetational and climatic history of Fennoscandia with Sylvia Peglar, Anne Bjune, Heikki Seppä.

KILO, Setesdal, OTT

1995-2004 Recent palaeolimnology, Svalbard – Viv Jones, Neil Rose, Don Monteith et al.

1995 Quantitative ecology with Einar Heegaard, John-Arvid Grytnes, et al.

1999-2009 NORPEC SUP Botany, Zoology, Geology – Anne Bjune, Wenche Eide, Gaute Velle, et al.

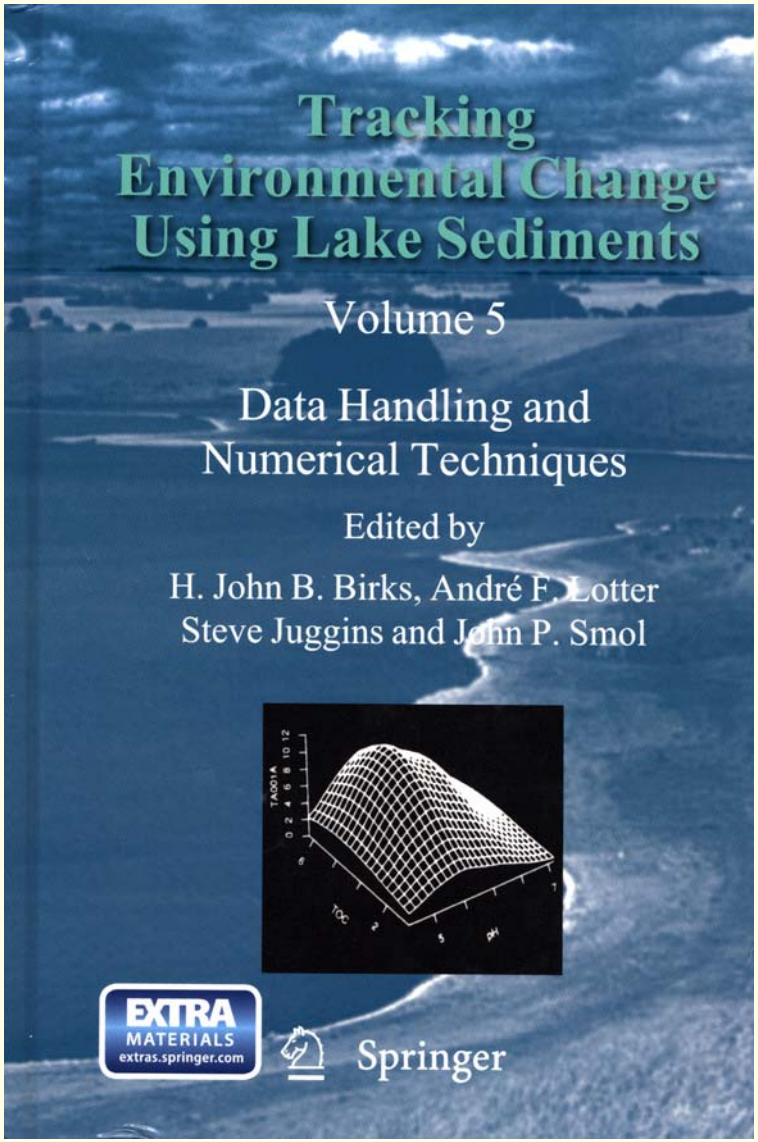
2003 More quantitative palaeoecology and palaeo-limnology – Richard Telford, Gavin Simpson, Steve Juggins, et al.

2004-09 Tibet pollen analysis and environmental history – La Duo, Ulrike Herzschuh

2007 Sabbatical, 'Oxford Connection' conservation biology, UV-B studies, etc. – Kathy Willis et al.

2011- Classifynder approach to automated pollen location and counting – Arild Breistøl, Kat Holt, John Flenley.

2012 Publication of DPER Volume 5 on *Data Handling and Numerical Techniques* (at long last!)



Reflections – Past, Present, Future

Past 'high points'

1. Alpine botany expeditions and adventure botany
2. Linking palaeoecology, ecology, and more recently, conservation biology
3. Helping to develop quantitative palaeoecology and quantitative palaeolimnology
4. SWAP
5. Yukon expedition 1971
6. Helping to develop an analytical hypothesis-testing phase in palaeoecology and palaeolimnology

7. Collaboration with many wonderful and talented people in many different fields and in many different countries

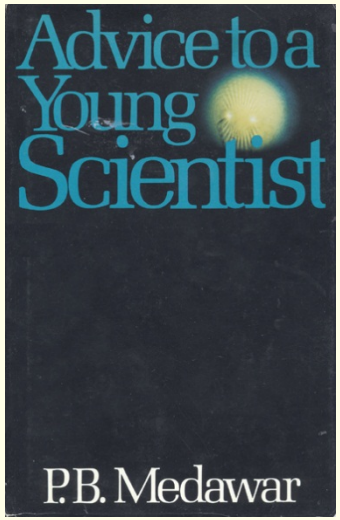
Alpine botanists
Plant taxonomists
Bryologists
Plant ecologists
Biogeographers
Quaternary geologists

Applied statisticians
Conservation biologists
Computer programmers
Population ecologists
Ancient DNA types
Pollen analysts

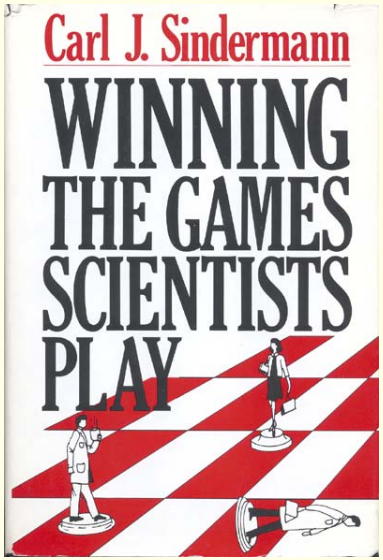
And, of course,
palaeolimnologists!

Present

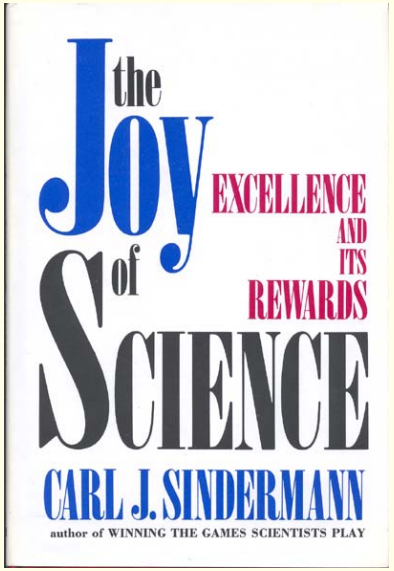
1. In early 1970s, developed a keen interest in philosophy of science through Richard ‘Red’ Watson during our Yukon expedition



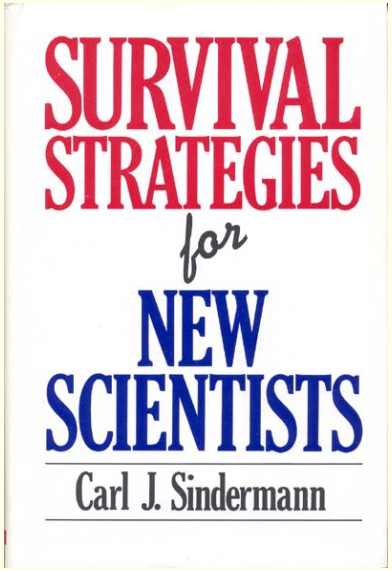
1979



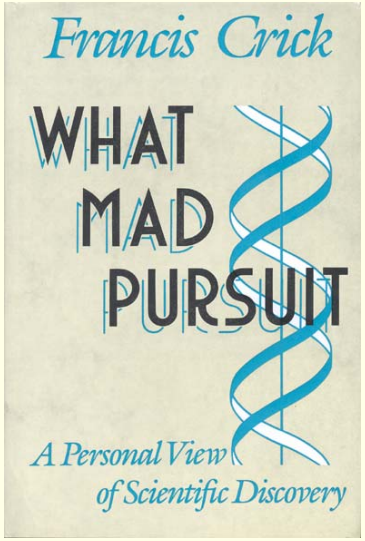
1982



1985

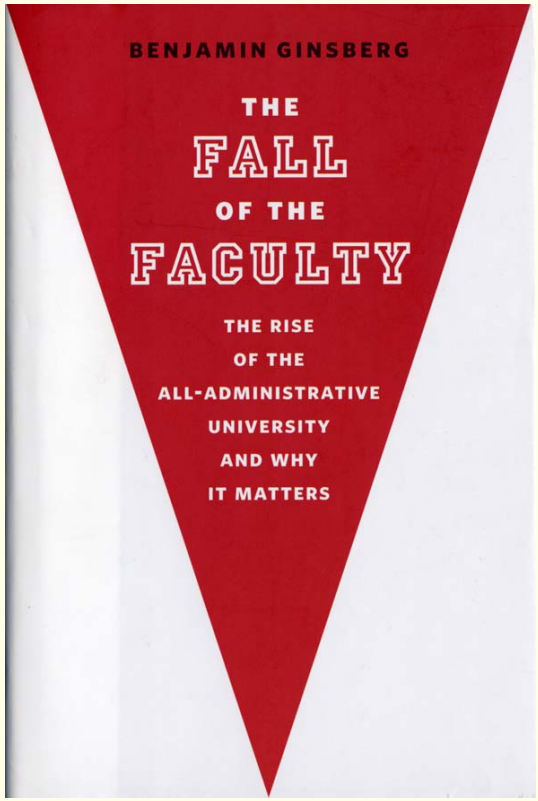


1987

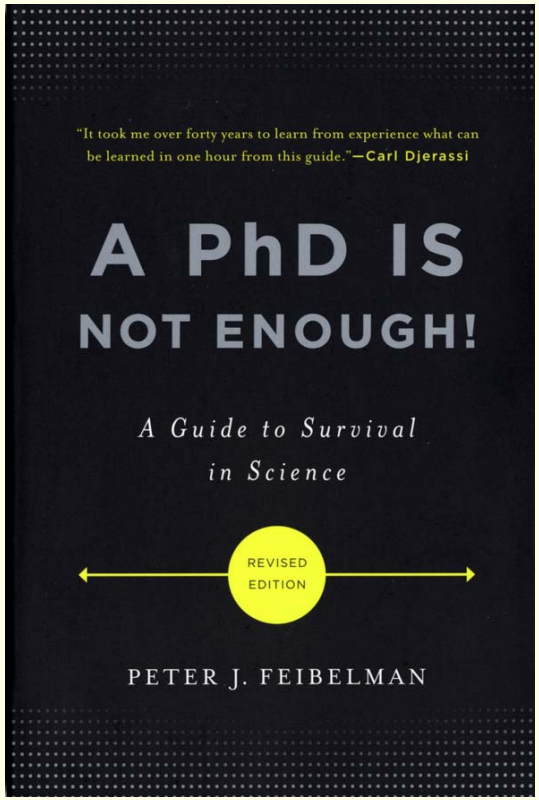


1988

Sad contrast with state of universities and job market in 2012



2011

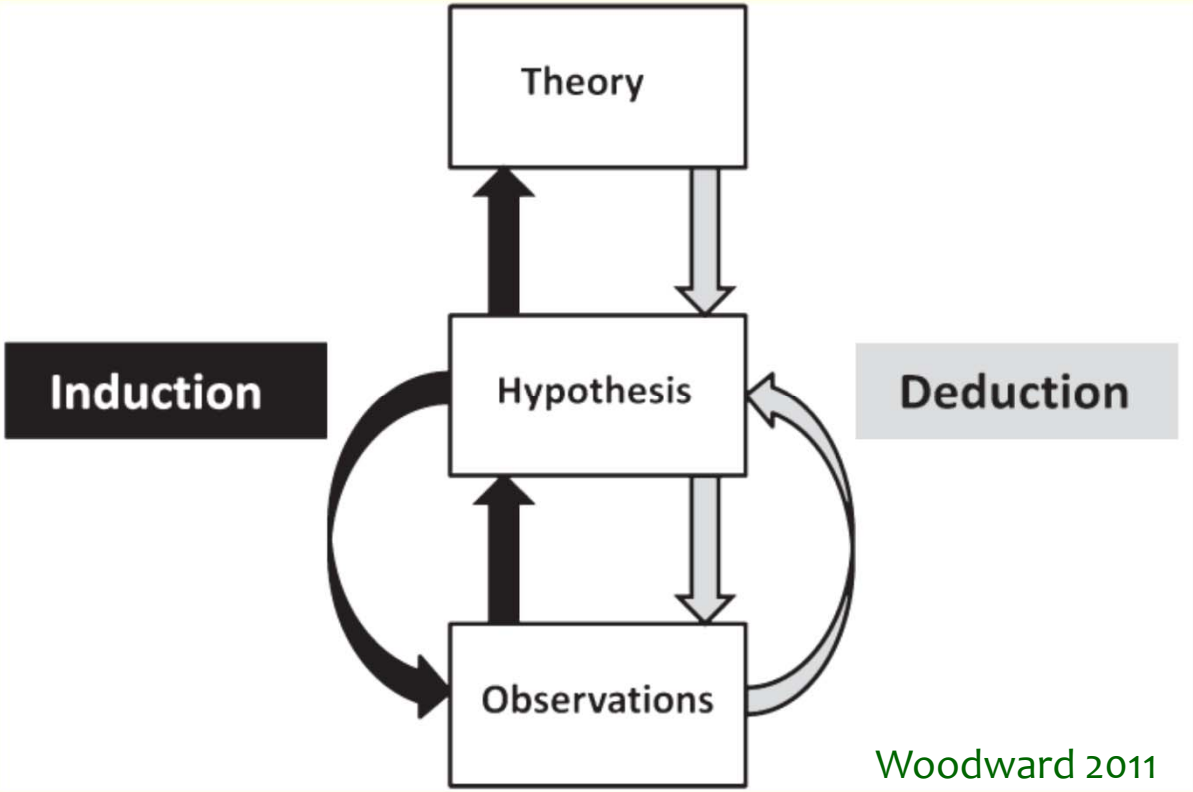


2011

Future

Palaeoecology, as a whole, has remained strongly in the **descriptive** or **narrative** phases

Striking **lack of theory** – very centred on inductive reasoning rather than deductive reasoning

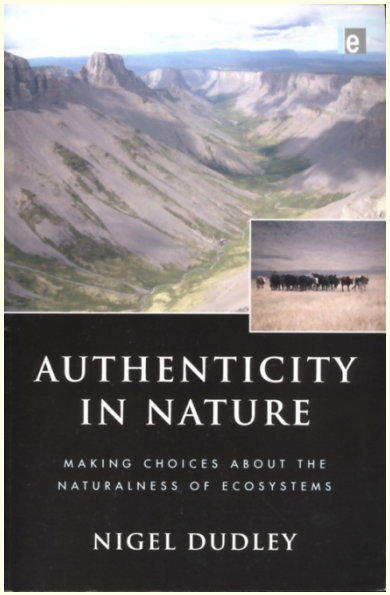


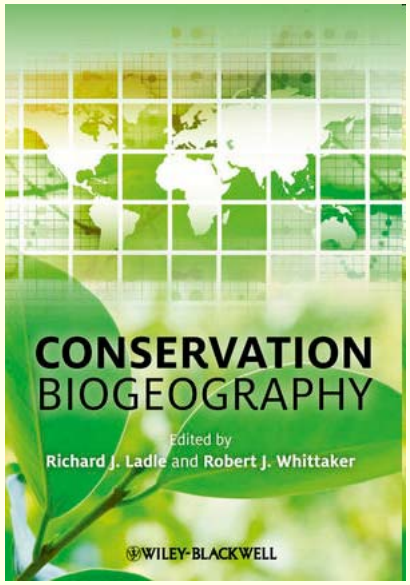
Methodological theory (e.g. representation, counting, data analysis and synthesis) - **Pretty good** but not good enough (cf. Deep-time palaeobiology)

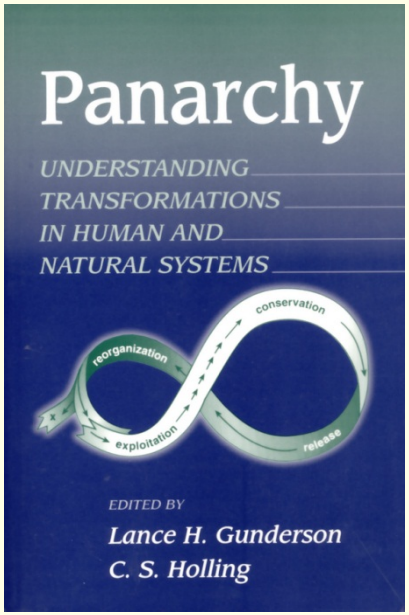
Mechanistic theory (e.g. scaling up patterns form fine-scale to regional-scale, considering different drivers at different scales and their interactions) – **Fair** and getting better (cf. landscape ecology, ecological biogeography)

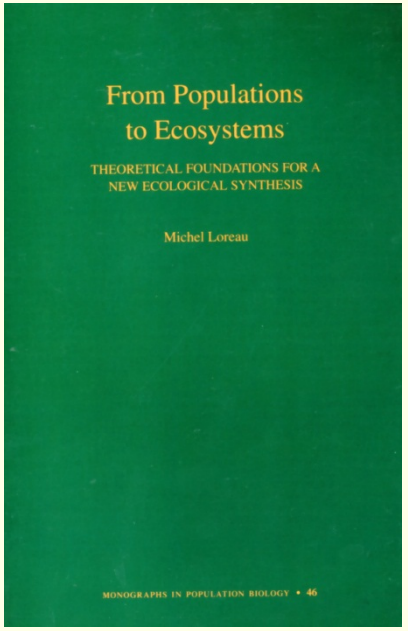
Conceptual theory – palaeoecology lacks conceptual models and metaphors. Poor links with other disciplines such as limnology, landscape ecology, and ecological dynamics, with their own terminology and concepts – **Not good**

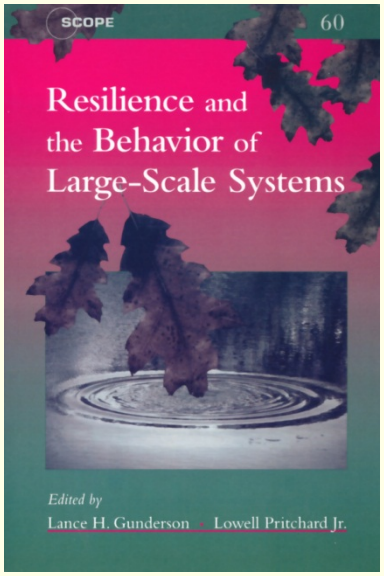
Long way to go!

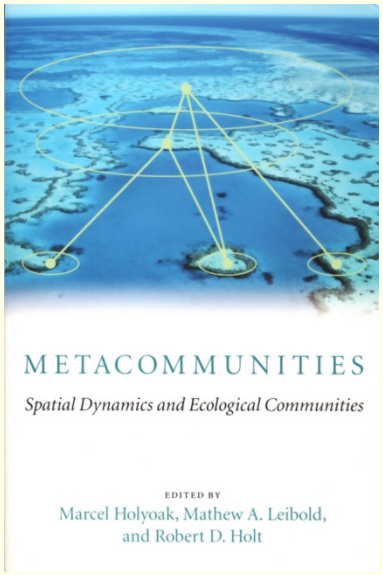

AUTHENTICITY
IN NATURE
MAKING CHOICES ABOUT THE
NATURALNESS OF ECOSYSTEMS
NIGEL DUDLEY

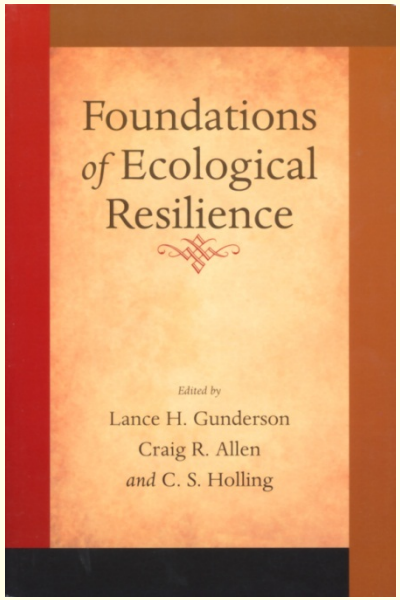

CONSERVATION
BIOGEOGRAPHY
Edited by
Richard J. Ladle and Robert J. Whittaker
WILEY-BLACKWELL

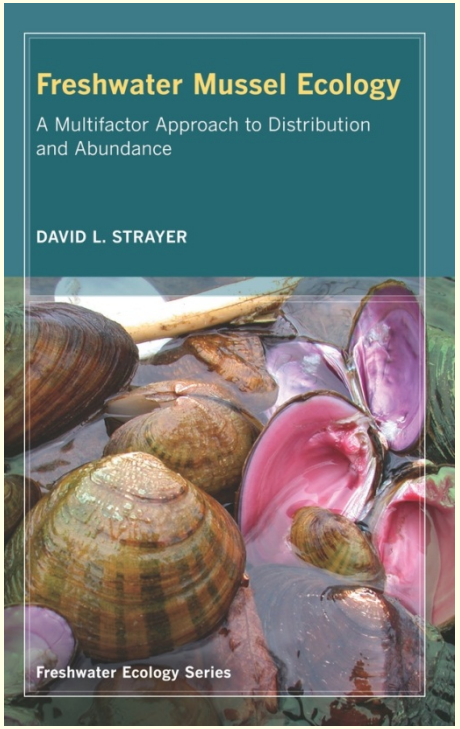

Panarchy
UNDERSTANDING
TRANSFORMATIONS
IN HUMAN AND
NATURAL SYSTEMS
conservation
reorganization
exploitation
release
EDITED BY
Lance H. Gunderson
C. S. Holling

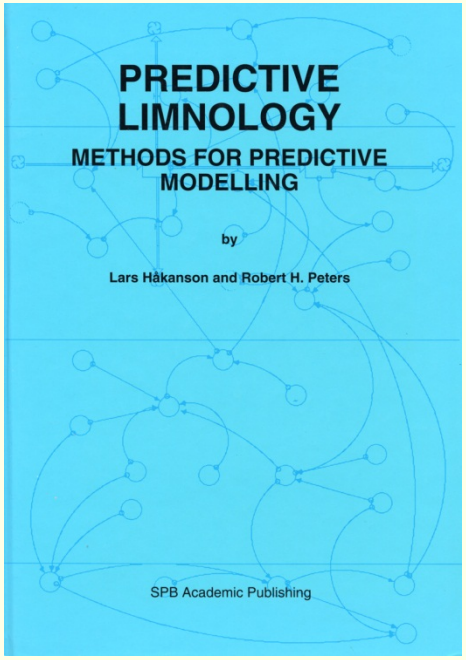

From Populations
to Ecosystems
THEORETICAL FOUNDATIONS FOR A
NEW ECOLOGICAL SYNTHESIS
Michel Loreau
MONOGRAPHS IN POPULATION BIOLOGY • 46

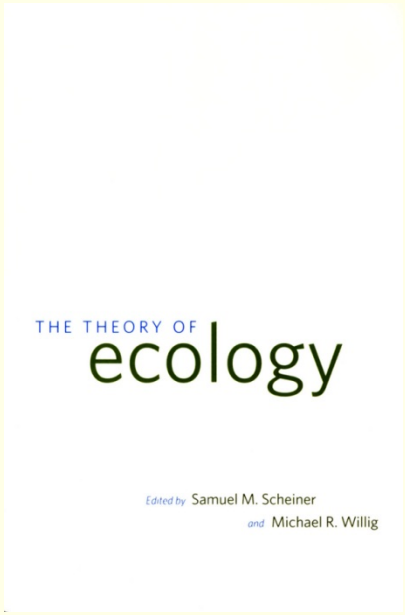

SCOPE
60
Resilience and
the Behavior of
Large-Scale Systems
Edited by
Lance H. Gunderson Lowell Pritchard Jr.

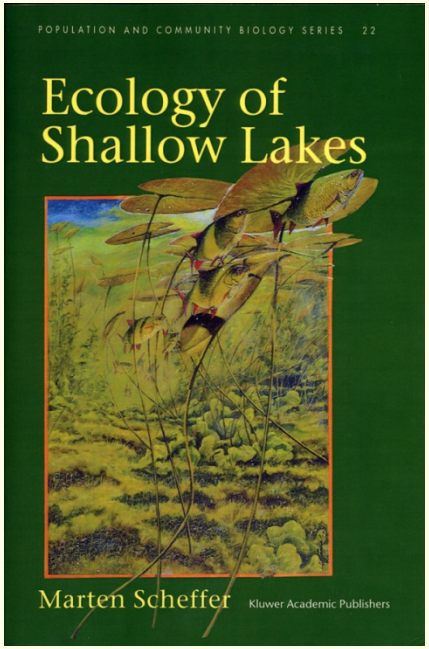

METACOMMUNITIES
Spatial Dynamics and Ecological Communities
EDITED BY
Marcel Holyoak, Mathew A. Leibold,
and Robert D. Holt

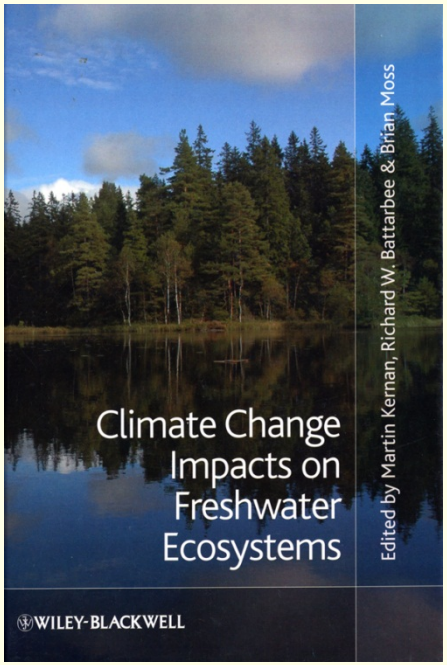

Foundations
of Ecological
Resilience
Edited by
Lance H. Gunderson
Craig R. Allen
and C. S. Holling

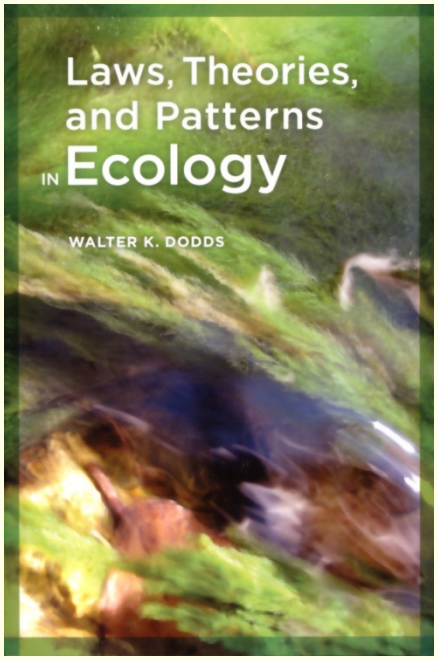

Freshwater Mussel Ecology
A Multifactor Approach to Distribution
and Abundance
DAVID L. STRAYER
Freshwater Ecology Series

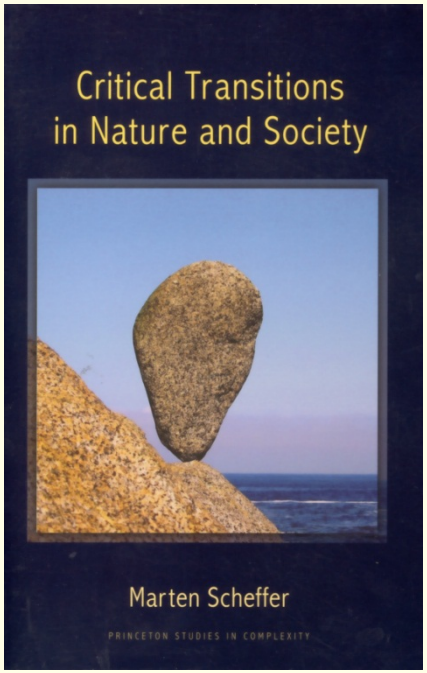

PREDICTIVE LIMNOLOGY
METHODS FOR PREDICTIVE MODELLING
by
Lars Håkanson and Robert H. Peters
SPB Academic Publishing


THE THEORY OF
ecology
Edited by Samuel M. Scheiner
and Michael R. Willig


POPULATION AND COMMUNITY BIOLOGY SERIES 22
Ecology of Shallow Lakes
Marten Scheffer
Kluwer Academic Publishers


Climate Change Impacts on Freshwater Ecosystems
Edited by Martin Kernan, Richard W. Battarbee & Brian Moss
WILEY-BLACKWELL


Laws, Theories, and Patterns in Ecology
WALTER K. DODDS


Critical Transitions in Nature and Society
Marten Scheffer
PRINCETON STUDIES IN COMPLEXITY

Notable exceptions in linking ecological theory and palaeoecology and palaeolimnology include

John Dearing

Steve Jackson

Lizzie Jeffers

Delighted that there will soon be a workshop on

"50 Pressing Questions in Palaeoecology"

in Oxford, December 2012 (PAGES, BES, QRA, University of Oxford)

Really needed; long overdue; potentially very exciting

Anson Mackay

Alistair Seddon

Ambroise Baker

Final comments

"In science, progress is made by climbing on the shoulders of others" G. Clifford Evans (1983)

I have been fortunate to have had many, many strong shoulders to climb on in the last 50 years!

In addition to those already mentioned, other important shoulders include

Solveig Aasheim
Paul Adam
Robin Andrew†
Svante Björck
Maarten Blaauw
Don Charles
Clifford Evans†
Francis Gilbert
Jarl Giske
Eric Grimm
Mark Hill
Norman Hughes†
Atte Korhola
Jock McAndrews
Francis Minns†
Martin Munro
Catriona Murray
Arvid Odland
Simon Patrick
Oliver Rackham
Richard Reyment
Magne Sætersdal
Nick Shackleton†
Robin Sibson
Petr Šmilauer
Des Thompson
Ørjan Totland
Vigdis Vandvik
Donald Walker
Ian Walker
Harold Whitehouse†
Harry Whittington†

Also been fortunate to have many ‘invisible’ behind-the-scenes helpers

Anthea Ansell	Kari Eeg	John Line
Gill Battarbee	John Glew	Don Monteith
Jan Berge	Anne Birgit Hage	Sylvia Peglar
Chris Birks	Mike Hughes	Mary Pettit
Arild Breistøl	Cathy Jenks	Ewan Shilland

and, of course

Hilary Birks

Share this IPS Lifetime Achievement Award with Hilary because very much of what I have done in my scientific life has been done together with Hilary, from -40° C/F in Minnesota to 5800 m in Tibet!

Thank you for this award