

Kenneth L. Taylor

ISSN 1028-1533

**INTERNATIONAL COMMISSION ON THE
HISTORY OF GEOLOGICAL SCIENCES**

INHIGEO

NEWSLETTER NO. 33 FOR 2000

Issued in 2001



**INHIGEO is
A Commission of the International Union of
Geological Sciences**

**An Affiliate of the International Union of the
History and Philosophy of Sciences**

**Compiled and edited by David R. Oldroyd
INHIGEO Secretary-General**

Printed in Sydney, Australia

CONTENTS

THE INHIGEO BOARD	1
REPORTS	
President's Message	1
Secretary-General's Report	3
Minutes of the INHIGEO Business Meeting, Rio de Janeiro, 2000	5
Geoarchives Progress Reports	6
The European Journal for the History of Geology	8
Report of the Commission for the History of Geophysics..., 2000	8
PROVISIONAL AGENDA FOR BUSINESS MEETING, PORTUGAL, 2001	8
INHIGEO HISTORY	9
EPISODES	10
CONFERENCE REPORTS	
31st International Geological Congress, Rio de Janeiro, 2000	10
'Celebrating the Age of the Earth': The Geological Society, 2000	15
2nd Meeting of the History of Meteorology Group of the German Meteorological Society, 2000	21
Exhibition on Science in Eighteenth-Century Padua	21
Two Centuries of the <i>Real Museo Mineralogico</i> , Naples	22
Walking with Dinosaurs	22
FORTHCOMING MEETINGS	23
AWARDS	
The Sarton Medal, to Dan Yaalon	24
The Sue Tyler Friedman Medal, to James Secord	25
Geological Society of America History of Geology Award, to Hugh Torrens	25
ÉLOGE to John Wennerbom	27
ARTICLES	
'Noah's Flood and Science: A Short Review and Analysis', by Francisco Ayala-Carcedo	27
'The 700th Anniversary of the Royal Mining Law (the <i>Ius Regale Montanorum</i>), Issued by the Czech King Wenceslas II in 1300', by Jan Urban	30
'Ten Years of the Spanish Commission of the History of Geology of Spain, Geological Society of Spain', by Leandro Sequeiros	31
'The Arthur Holmes Archives: A Cautionary Tale', by Cherry Lewis	32
'Empirical Knowledge of Stone during the Slave Period in Armenia', by Edward Malkhassian	32
INTERVIEW of Hugh Torrens by Richard Howarth	34

BOOK REVIEWS	
‘A Savant at Work in the Field’, by Martin Rudwick	38
‘Simpson Synthesised’, by Goulven Laurent	39
‘Dating Gaia’, by David Branagan	40
‘The History of Global Climate Change, as Viewed from the United States’, by Cornelia Lüdecke	41
‘More than a Biography: The History of a Man and an Idea’, by Peter Krüger	42
‘A ‘Divine Strip-Tease’: Removing Twelve Veils of Gaia’ by Endre Dudich	44
‘A Traveller in Hungary’, by David Branagan	44
‘Early Dutch Volcanology: Humanists, Traders, and Theorists’, by Nicolaas Rupke	45
‘The Life-Work of Emil Wiechert: One of the Founders of Modern Physics’, by Jan Kozák	45
‘An Icelander’s Ideas about Volcanos and their History’ by Emil den Tex	47
‘Buffon Available Again’, by Kenneth Taylor	48
‘East Indian Oil’, by Frederik Van Veen	48
‘The Importance of Russian Soil’, by Dan Yaalon	49
‘A Spanish View of Palaeontology and the Darwinian Revolution’, by Rodolfo Gonzalo	50
PUBLICATIONS RECEIVED	50
NOTES AND QUERIES	54
COUNTRY REPORTS	
Australia	58
Bolivia	60
Brazil	60
Canada	61
China	61
Costa Rica	62
Czech Republic (Brno)	62
Czech Republic (Prague)	63
France	64
Germany	65
Hungary (1999)	67
Hungary (2000)	68
Ireland	69
Israel	70
Italy	70
Japan	71
New Zealand	71
Portugal	72
Russia	73
Spain	74
The Netherlands	77
Turkey	77
United Kingdom	77
United States	79
Venezuela	81
Yugoslavia	82
INHIGEO MEMBERSHIP LIST	83

The INHIGEO Board for 2000–2004, as Confirmed by the IUGS Council in Rio de Janeiro, 2000

President

Professor Manuel C. S. Pinto,
Department of Geosciences,
The University of Aveiro,
3810 Aveiro, Portugal.
Phone: 351 2 34 370 744
Fax: 351 2 34 370 605
Email: mpinto@geo.ua.pt

Vice Presidents

Dr Ursula B. Marvin (North America),
Harvard-Smithsonian Center for Astrophysics,
Cambridge (Mass), 02138,
USA.
Phone: 1 617 495 7270
Fax: 1 617 495 7001
Email: umarvin@cfa.harvard.edu

Secretary-General

Professor David R. Oldroyd,
[The University of New South Wales],
28 Cassandra Avenue,
St Ives, NSW, 2075, Australia.
Phone: 61 2 9449 5559
Fax: 61 2 9144 4529
Email: d.oldroyd@unsw.edu.au

Dr Pedro Gonçalves (Latin America),
Department of Geosciences Applied to Education,
State University of Campinas,
13081–970 Campinas, SP, Brazil.
Phone: 55 19 788 4571
Fax: 55 19 239 1562
Email: pedrog@ige.unicamp.br

Past President

Professor Hugh S. Torrens,
Department of Earth Sciences,
Keele University,
Staffordshire, ST5 5BG, U.K.
Phone: 44 1782 75 0689
Fax: 44 1782 75 1357
Email: gga10@keele.ac.uk

Professor Kanenori Suwa (Asia),
1–1020 Umemori-zaka,
Meito-ku,
Nagoya, 465–0065, Japan.
Phone: 81 52 701 0457
Fax: 81 52 701 0457
Email: suwa@handy.n-fukushi.ac.jp

Professor Nicoletta Morello (Europe),
Institute of Modern and Contemporary History,
The University of Genoa,
Via Balbi 6, 16126 Genoa, Italy.
Phone: 39 10 353 8317
Fax: 39 10 209 9826
Email: nicolmo@unige.it

REPORTS

President's Message

- 1. 2000 was marked by the 31st International Geological Congress. INHIGEO was called on to organise General Symposia 27–1 and 27–3 and, after severe communication problems with Rio, the job was carried out, with particular efforts made for Symposium 27–3, convened by David Oldroyd, Hugh Torrens, and Silvia Figueirôa.

Several other important matters were dealt with before and after the election of the new Board of the Commission, in August, during the Congress, as seen below in the Secretary-General's Report and in the Business Meeting's Minutes.

Particularly important for INHIGEO's future activities was the 'Action Plan Revival IUGS 2000–2004' presented by Professor Ed de Mulder to all Congress participants and published in *Brazil 2000—IGC News* of 15 August, after his election as the new IUGS President. Some thoughts have been given to what INHIGEO should be committed to in the following years, in the framework of the ideas expressed in that Action Plan (see Section 2 below).

- 2. 'Improve image and visibility' (from the Action Plan). INHIGEO had 159 members in 36 countries in 2000, having grown steadily from 116 members in 1992. But we should be aware that, so far as the number of countries has been concerned, it was 37 in 1992 and reached a peak (40) in 1996 and that members in European and North American countries have always predominated.

Such figures have of course to do with several aspects of the image and visibility of INHIGEO. In the first place, regarding the 'internal' image and visibility of the Commission, an appeal is made here to all members to pay more attention to it and give it more support in such a way that may be clearly seen in the annual country reports and other materials published in the INHIGEO *Newsletter*.

Another appeal is made to each and every INHIGEO Member regarding the external image and visibility of the Commission: please promote its image among non-members, not only among your countrymen/countrywomen but also among your fellow geoscientists/historians of science abroad. Do you think that putting the INHIGEO *Newsletter* on the Web would help, following the suggestion in Professor de Mulder's Action Plan ('Exploit the Web in a broader fashion')?

Promotion of INHIGEO is particularly important if made among young people interested in the history of geological sciences (HOGS), but whose written production is not sufficient for them to be members of the Commission. Why not consider a new type of INHIGEO membership having such younger people in mind? Would that improve visibility, but perhaps at the expense of image? An appeal is made here to Members to give thought to this question.

The external visibility and image of the Commission will surely improve with the issue of a book by the Geological Society of London, as a Special Publication, containing papers by INHIGEO members (see the Secretary-General's Report below).

'Extend scientific performance of *Episodes*'—the image and visibility of INHIGEO within the IUGS have also to be considered. The Annual Report to the IUGS and the *Newsletter* of the Commission are the normal vehicles for this, but by their very nature their diffusion is limited.

Episodes, although not a HOGS journal, offers a valuable opportunity for INHIGEO Members to increase the number of papers on the subject published in it, thereby improving the image and visibility of the Commission, not only within IUGS but also externally. Happily arrangements were made in 2000 with a view on that, and they seem to be proceeding satisfactorily (see Secretary-General's Report below).

A related matter was discussed in 2000 that probably will continue to crop up in 2001: should INHIGEO be associated with an existing journal on HOGS? Should INHIGEO give assistance to the creation of a new journal of regional character? Should INHIGEO have a journal of its own, promoting the creation of a new, truly international one? Could such journal be an electronic one, so exploiting the Web in a broader fashion than it does now?

'Combine Humanities with Geosciences'—What commission among those of the IUGS is in a better position than INHIGEO to do so, since linking History with Geological Sciences is its very aim? Is not INHIGEO, composed essentially of geoscientists, an affiliate of the International Union of the History and Philosophy of Science (IUHPS)?

Of course, linking History with Geosciences is not always easy and is part of a wider question: how can Humanities and Science work together in a fruitful, harmonious way? It raises, for instance, a problem that may be of interest to historians of the geological sciences in some countries: what panel(s) would better evaluate the qualities of projects in the area of HOGS? One composed only of historians? One composed by historians and geoscientists interested in the history of science and technology? (Definitely not a panel composed only of historians!) No doubt INHIGEO members can contribute to the consideration of such questions and should be called in by decision makers at the appropriate times. But for that to happen, they and their activities need to be known, and so we return again to the question of visibility.

Combining History, Geosciences, and Education should probably be another area for INHIGEO to get involved in. How could and should HOGS be integrated in curricula of postgraduate courses in Earth Sciences or in History of Science? How can higher education institutions become interested in such fields? Are there many INHIGEO members involved in such matters able to contribute to an informed discussion?

'Invest in professionals for media attention and public relations'; 'Focus also on societal problems'; 'Increase impact of IUGS in Science and society'; 'Promote IUGS at relevant events'—It is well known that for a variety of reasons (either good or bad) the geological sciences may be the centre of the media attention, for instance when geological hazards and risks are under the public gaze. Stressing that it is essential to study from an historical perspective both the 'bad' and the 'good' geological processes, related (or not) to human activities, is a role that has been played by INHIGEO through some of its meetings ('Volcanoes and Society' comes at once to mind) and no doubt meetings with such themes attract media attention. And so the image and visibility of the Commission may be externally improved; and consequently the impact of the IUGS in society can be increased.

INHIGEO meetings, being in themselves relevant events for IUGS, one can feel satisfaction that meetings have already been planned for 2001 (Portugal), 2002 (France), 2003 (Ireland), 2004 (Italy), with a variety of themes.

'Initiate new scientific programmes'; 'Direct more IUGS money to Science in the Commissions'—I have a hope that a book on HOGS of Africa could be published under the initiative, and with the assistance, of the Commission, and with the contribution of as many of its Members as possible. Of course such a project would have to have the support of IUGS. A forum of ideas on how such a project should be launched is open to all interested Members, who are encouraged to exchange views with the Commission Board, preferably by e-mail. A programme of English translations of some books on the history of geology by INHIGEO Members could also be considered. We can discuss such ideas at the Business Meeting in Portugal.

3. Apart from the subjects mentioned above, other matters related to the Commission's future activities were also considered by the Board in 2000, one being co-operation with IUHPS, with which INHIGEO is affiliated, and the responsibilities of both parties.

With the IUHPS having its Congress in 2001 in Mexico, the chances of INHIGEO holding a meeting there were discussed, unfortunately with no success for a variety of reasons, chiefly the fact that we have no Members in

Mexico. However, INHIGEO will be represented by some of its members attending the Congress, and Drs Figueirôa and Lüdecke have kindly agreed to act as proxy representatives at the Council Meeting in Mexico City.

INHIGEO is co-operating with the Archives Commission of IUHPS for the preservation of archives of interest for the HOGS. Following an INHIGEO announcement on geoarchives in several periodicals and following contacts of Professor K.S. Murty with several institutions and persons, the response 'has been encouraging'. An appeal to all INHIGEO members to help Professor Murty in his efforts is made again. (On the question of archives, please read the interesting note by Dr Cherry Lewis in the present *Newsletter*.)

4. May I finish this message with (a) my thanks to all Members who voted for the new INHIGEO Board and to Past-President Hugh Torrens for his offer of support, made in Rio immediately after the election; and (b) a salute to Past-President, Hugh Torrens, to the Secretary-General, David Oldroyd, and to Vice-Presidents, Ursula Marvin, Pedro Gonçalves, Kanenori Suwa, and Nicoletta Morello?

Manuel S. Pinto, Aveiro

Secretary-General's Report

Results of the 2000 Ballot

All persons named on the ballot sheet were successfully elected, and they were duly notified in writing. The names of the new Board Members appear on p. 1.

The Rio Congress and Geological Society Book

The Commission's original intention was to make three contributions to the Congress in the form of symposia on 'Some Major Developments in Geology in the Twentieth Century', 'Geology in the Tropics', and 'Geology and End-Millenniumism'. In the event, the third of these attracted little interest, and was abandoned, while the first, which was attracting a lot of interest, was changed to a double symposium. This caused great difficulties with the Congress administration, and protracted correspondence and negotiations ensued, the details of which need not be given here. The eventual outcome was hardly satisfactory to INHIGEO, to the extent that we made an official complaint to the IUGS, in response to which we received a gracious letter of apology from the President, Dr Robin Brett, which we were glad to accept without reservation.

More happily, the Geological Society of London noted the 'Major Developments' item on the Congress Programme and invited us to submit a proposal for a book on that theme as one of the Society's 'Special Publications'. This was done, and the project is presently in hand. Eight papers were delivered at the symposium in Rio, and a further six papers were commissioned. All have now been received, the refereeing process for this publication is now virtually complete, and most revised versions of the papers have been received. We are requested/expected to submit the final edited collection to the Society's publishing house in June, 2001, but as things stand at the moment the delivery may be slightly overdue. I am hopeful, however, that we may see the collection of papers published late in 2000. I am most grateful to all contributors for the extensive amount of work they have done towards this project.

Further in regard to the Rio Congress we should express our thanks to Dr Martina Koefl-Ebert (Germany) for the excellent poster that she provided on behalf of INHIGEO, for the IUGS's booth in the display area at the Rio Congress Centre, in response to the Union's request. Martina's theme was the history of women's contributions to the earth sciences. Her poster attracted considerable attention and was most favourably received.

Ballot in 2000

As Members will be aware, we have held an 'extra' ballot for Membership in 2000, with the particular intention of getting additional Members from Portugal to assist in the organisation of the conference in that country in June. We also looked to increasing membership in Africa and some other parts of the world. In the event, nominations were made from other countries besides Portugal: Argentina, Hungary, Italy, Namibia, New Zealand, Russia, and Yugoslavia. This is most satisfactory, and the ballot papers are coming in at the time of writing. Several people have noted on their ballot papers that they were gratified by the 'quality' of the nominations. It is anticipated that a further ballot will be held in 2001, and thereafter every second year as usual.

Two issues are worth mentioning here. It should be emphasised that Membership is for life, but, with a finite Membership of eleven persons per country, elderly and now inactive Members may possibly be standing in the way of younger scholars obtaining Membership. I therefore venture to suggest that Members who may feel that their active scholarly careers are approaching a close might consider resignation. We should, of course, be happy to continue to send the *Newsletter* to such persons on request, so that they may keep 'in touch', and they would always be welcome at INHIGEO meetings.

There is also the question of the election of 'less-than-fully-qualified' Members from parts of the world where there has been, or is, little activity in the study of the history of geology. There would appear to be four views on this issue, given that we are interesting in promoting geohistorical studies worldwide. First, we could let matters stand as they are at present. Second, we could lower the criterion for Membership (*i.e.*, demonstrated accomplishment of work in the history of geology) in certain appropriate cases. Third, we could establish a kind of associate membership for underqualified persons (which would require a postal ballot and eventual ratification by the IUGS). Fourth, we can place would-be, but presently underqualified, candidates on the *Newsletter* non-Member mailing list, where they would remain until such time as they could appropriately be nominated. This matter should be discussed at our next Business Meeting, in Portugal.

Elections

The proposal that all future elections of the Commission should be conducted by postal ballot without the use of proxy voting was accepted by the IUGS at its Rio meeting. Members may, however, cast their votes in person at a Business Meeting if they so choose.

Expertise Forms

These are extremely useful to us, but at present only about half of our Membership have returned them. I am distributing them again to those who have not yet supplied them, and **strongly urge** people to return them to me, duly completed.

Language(s)

There is a very small number of Members who cannot speak or read English. Since this is the only practical language for communication for nearly all the purposes of the Commission, it is clear that persons who cannot communicate via English are at a severe disadvantage. Notably, they cannot read my messages, and therefore may not even be aware that they will lose their Membership if they fail to vote in an election. (I know of at least two such cases and there are possibly others.) No one would want to suggest that English should be a formal requirement of Membership, so what should be done? Professor Guntau (Germany) has suggested that in such cases communication should take place via some intermediate person—*i.e.* a person in the country concerned who does know English. This seems to me to be a good suggestion. To be carried through, it would require the collaboration of people from countries where it is known that there are some Members *not* able to use English. Such Members would therefore have to be identified for me. I should be grateful if I could be informed of cases where there are severe language problems in respect of English, and we will see what can be done to alleviate the situation. (By contrast, some Members have a remarkable degree of linguistic skill. I understand, for example, that Professor Grubic in Belgrade knows seven languages. I can understand, therefore, why some people may feel scornful of monoglot Australians daring to express any opinion at all on this issue.)

References

This matter is partly connected with the issue of language. I am grateful to Members who have, by now, almost all complied with my repeated requests **not** to use abbreviations in the bibliographies/references supplied to or used in the *Newsletter*. There remains, however, the question of 'style'. **Please follow the style for references shown on the back cover of the Newsletter exactly.** (The system is slightly simplified this year.) The problem is that I have to try to sort things out in quite a number of the Reports, and this can be difficult when I am endeavouring to do it in a language that I cannot read (*i.e.*, all languages except English and French). Sometimes I am not able to distinguish between titles of articles and titles of books, or even (on occasions) the names of publishers, if the requested order is not followed. There would be little difficulty if people follow the requested style faithfully. So **please do this.** I do apologise for any mistakes that may have crept in because of this problem, but I cannot guarantee accuracy unless the styles for the different forms of publication are followed exactly. For journal articles, **only volume numbers are required (not the 'number numbers')**; and the **places of publication for journals are not needed** either. The titles of papers should be capitalised, if written in English. Where appropriate, please specify the language in which the publication is written.

Episodes

Please see my report on this matter (p. 10).

E-mail Addresses and Attachments

If you have new or altered email addresses (or any other address changes, etc.) please let me know.

I use a Macintosh. Unfortunately, I receive quite a large number of messages in the form of Windows/PC attachments, which I cannot read. If in doubt, please send messages, or material for the *Newsletters*, 'pasted in' to ordinary e-mail letters. These can always be read successfully.

The IUGS's Response to our Annual Report—and a Question of Archives

The following paragraph is extracted from Professor Boriani's response in March to our Annual Report for 2000.

The Committee accepted the INHIGEO report, commended the leadership of the Commission, for its attention to critical geological problems and important personalities in geology, and praised its use of *Episodes*. The IUGS Executive Committee also expressed the desire that the Commission should be asked to look at IUGS history and to provide advice on which documents should be preserved for future historical investigations. Please react to this letter and come up with comments and suggestions.

It is gratifying that the work of the Commission has received this stamp of approval. It will be noted, however, that a new issue is now raised, namely that of the IUGS's own archives. I suggest that this matter be set down for discussion at our meeting in Portugal.

Apologies and Agenda Items

It would be appreciated if Members unable to attend the Business Meeting in Portugal this year would send their apologies to the President, Manuel Pinto. If there are any matters that you wish to have set down for discussion, please contact me as soon as possible.

My Thanks

I should like to express my thanks to Silvia Figueirôa (see p. 13), who battled so hard to untangle the tangles that developed in the matter of the Rio Congress. I should further like to express my thanks to the outgoing President, Hugh Torrens (on whom see pp. 25 and 34), for all the work he did for the Commission while President, and likewise to former Board Members Franco Urbani and Wang Hongzhen. Likewise, I must thank Manuel Pinto for his efforts towards the organisation of the meeting in Portugal, which will be a great success, I am sure; to Ursula Marvin for her continuing wise and experienced counsel; and to the new Vice Presidents, Pedro Gonçalves, Kanenori Suwa, and Nicoletta Morello. Thanks also to all those who have supplied contributions to the present *Newsletter*, particularly those who have had the job of compiling the country reports. And thank you for the many interesting 'publications received'.

David Oldroyd, Sydney

Minutes of the INHIGEO Business Meeting, Held in Rio de Janeiro, 10 August, 2000, 4.30–6.00 p.m.

Members Present

Daniel Rubiolo (Argentina), Homer Le Grand (Australia), David Oldroyd (Australia), Silvia Figueirôa (Brazil), Pedro Gonçalves (Brazil), Zhai Yusheng (China), Toshio Kutsukake (Japan), Yasumoto Suzuki (Japan), Manuel Pinto (Portugal), Eugenij Milanovsky (Russia), Nikolai Yushkin (Russia), Richard Howarth (UK), Hugh Torrens (UK), Ursula Marvin (USA).

In Attendance

Gabriela Mangano (Argentina), Martina Kölbl-Ebert (Germany), Cherry Lewis (UK), Shirley Torrens (UK), Vic Baker (USA), Robert Ginsburg (USA), Gregory Good (USA), Thomas Marvin (USA), Davis Young (USA).

1. Apologies were recorded from David Branagan (Australia), Wang Hong-Zhen (China), and Simon Knell (UK).
2. The Minutes of the previous meeting, published in *Newsletter No. 31* (2000 for 1999), were taken as read and no matters were found arising from those minutes.
3. The retiring President, Professor Hugh Torrens, read the following statement from the Minutes of the 46th Executive Committee Meeting of the IUGS, held in Cairo in January, 2000:

Volker, on behalf of Zharikov (commentator), referred to the summary of [INHIGEO's] accomplishments [abstracted from the INHIGEO Report for 1999] . . . and reported that the Commission had broad links to other organizations. The Commission shows itself to be active, creative, and in good standing. He asserted that INHIGEO warrants its status as a Commission, and that there is a lot to accomplish in the field.

Vai spoke on preserving the roots of geology. Speden mentioned the importance that articles come out of its meetings. Some of the articles have been interesting but very specialised, and Speden proposed that the Commission arrange meetings to inform on a more general topic in the future.

"The Committee ACCEPTED the INHIGEO Report, trusting that the Commission will continue to do an excellent job in a worthwhile area. The Committee also reiterated its request for articles on benchmark of geology, with comments, to be occasionally published in *Episodes*."

Professor Torrens stated that the foregoing statement demonstrated the IUGS's approbation of the commission's work, but wondered whether Ian Speden's comment indicated a desire for a greater popularization of INHIGEO activities.

The President then referred briefly to his retirement from Keele University and his expectation that he would now have greater opportunity to pursue his preferred research activities. He also referred to the recent successful William Smith Millennium meeting on 'The Age of the Earth', and thanked Cherry Lewis for organizing it so efficiently. In reviewing INHIGEO's work for 2000 he commented on the claimed role of the Commission in organizing the publication so well edited by Peter Rosza (Debrecan) of essays on *Robert Townson (1762–1827) Polymath*. In fact, this was entirely a Hungarian achievement, also involving Endre Dudich (Budapest), for which we are most grateful.

There were no matters arising from the President's Report.

4. In reporting to the meeting, the Secretary-General (S-G), David Oldroyd, informed Members that he and his co-organisers had experienced very considerable difficulty with the 31st IGC's bureaucracy, but he believed that, in the event, the symposium had proved most successful.

He then referred to the Commission's financial situation, which was reasonably healthy with some reserves in the bank. With the help of a grant from the IUHPS it had been possible to provide financial assistance to three persons towards the cost of their attendance in Rio, but he thought it vital to keep some money in reserve for possible future contingencies.

Regarding the election in 2000, he apologised to the Japanese membership for the regrettable confusion of names on the ballot papers, but hope that the matter had been dealt with adequately by email and postal correction. There had been a significantly better return of votes than in the 1998 election, but there had been three resignations (Trümpy, Regnel, and Portmann) and notification of three deaths (Ellenberger, Thackray, and Dengo). Further Members would lose their membership this year through failure to vote or affirm their wish to remain Members of the Commission. Voting this year had proceeded without the use of proxies and formal ratification of this practice was to be a matter for consideration by the IUGS Council at its meeting later in the Congress.*

Then taking matters out of order from the printed Agenda, the S-G announced that all nominations to office bearers and new Members had been successful, with very few negative votes but a significant number of abstentions.

Next, the S-G referred to the 'expertise' forms and asked that more be returned to him. They were proving exceedingly useful. He invited suggestions for books for review in the *Newsletter*, for which purpose such forms were most useful.

Reference was also made to a forthcoming publication by INHIGEO of a bibliography of Armenian geology compiled by Edward Malkhassian. Offers of similar works for publication by the Commission were invited.**

5. Future meetings of the Commission: the President confirmed that these had been determined for the next three years as Portugal (June 2001); France (2002—in association with the 'd'Orbigny meeting' being organised by Philippe Taquet); and Ireland (2003) on 'geological travellers'. The President-elect, Professor Manuel Pinto, distributed a document outlining the proposed arrangements for the Portugal meeting. Details were to be mailed to all Members of the Commission later in August.

6. On archives, the S-G reported on the results achieved thus far by Professor Murty. A notice would be posted to all INHIGEO Members on this topic.

7. The question of 'benchmark' papers on the history of geology (i.e., 'abstracts', with commentary, of major 'classic papers' that had proven to be turning points in the history of the geosciences) in *Episodes* received extensive discussion. The

* The decision to abandon the use of proxy votes was in fact subsequently ratified by the Council.

** A bibliography for the Canary Islands by Spanish Member Candido Cruz will be published in 2001.

S-G reported that he had had a recent discussion with the journal's managing editor, Dr Hou Hongfei. The series was to be entitled 'Classic Papers', and the anticipated length was to be about 7000 words. The S-G had initiated the series with a contribution on Hutton's 'Theory of the Earth' paper (1788), which was to appear in September, 2000. Professor Alexander Grubic in Belgrade had kindly agreed to produce a paper on Mohorovicic's celebrated paper of 1910. Other contributions were now sought. Ideally *Episodes* could publish four papers per year. Members were requested to nominate papers/topics that they were willing to put together, and the S-G would write to Members to solicit further offers. The Commission's Board would have to work out the details of how the organization of the Series might best be achieved.

8. The question of the proposed new *European Journal for the History of Geology*, the establishment of which had been proposed by Dr Jean Gaudant (France), and which had been discussed at the Freiberg meeting in 1999, was then addressed. From information recently received from Dr Gaudant, Dr Ezio Vaccari had agreed to act as editor of such a journal, if established, but according to responses to Dr Gaudant's questionnaire, received to date, it did not seem likely, in the view of those present at the meeting, that the journal would achieve an initial subscription of much above 75, which seemed insufficient to make the publication viable [but according to information subsequently received, the number had now risen to about 100]. However, there was a suggestion that the already existing journal, *Earth Sciences History*, might be expanded or modified to accommodate many of the goals envisaged by Dr Gaudant's 'steering committee'. Dr Gregory Good, editor of *ESH*, who was in attendance at the meeting, reported that his journal currently had about 150 institutional subscribers and 350 individual subscribers. He said that he was keen to enlarge the editorial board to include several European scholars, to publish papers on occasion in French or German as well as English, and issue three rather than two numbers per year. This proposal seemed to the Members present to offer an attractive 'way forward' and it was agreed that a letter expressing these views should be sent to Dr Gaudant, outlining the idea, in the hope that he would find it an attractive suggestion.

9. There being no business without notice, the President concluded the meeting with a warm vote of thanks to Dr Silvia Figueirôa for her stalwart work in helping to organise the conference from the Brazilian end; to Dr Martina Kölbl-Ebert for her excellent poster on women in geology (which had attracted much favourable mention); and to the S-G for his assistance during four years of enjoyable collaboration. As a personal token of his thanks to his colleague he kindly presented a gift of two CDs by two of the S-G's favourite composers. The S-G responded by saying that it had been a pleasure to work with Hugh Torrens, and that he too had intended to present two CDs to his colleague—but had inadvertently managed to leave them in his hotel [an oversight that was subsequently rectified]. The meeting was thereby concluded.

GEOARCHIVES

Geoarchives: Progress Report 1

Since sending the preliminary report, the following responses have been received:

1. Dr Jean Van Albada, Secretary-General, International Council on Archives, Paris, has informed me that the Council is establishing a committee on scientific and technological archives, and that we would be kept informed of developments.
2. The Department of Atomic Energy, Atomic Minerals Department, Hyderabad, Andhra Pradesh, has sent three publications, one of them being a special volume published to mark the golden jubilee of the Division, and containing selected articles published during the previous fifty years; a catalogue of publications of the Directorate; and another detailing the functions of the AMD.
3. The International Geographical Union's S-G, Dr Enlers, has written that the IGU maintains an archive located in the Royal Society, London. There is a proposal to transfer all these documents to a 'ne archive and study centre' towards the end of the current year [2000], probably in Rome.
4. The Economic and Social Commission for Asia and the Pacific (UN) (ESCAP[UN]) informs me that it is embarking on an international effort to establish a subregional database of all available information in Southeast Asia. This joint project, entitled Southeast Asian Network of a Geological Information System (SANGIS) is a UNESCO initiative, which will endeavor to make generally accessible to participating countries all available geological literature that has been accumulated over the years. There is a similar project in Africa called PANGIS. A copy of the ESCAP letter was sent to the D-G of the Geological Survey of India for information.
5. Dr M. Ramakrishnan, editor of the *Journal of the Geological Society of India* has informed us that the International Heritage Convention has included Siwalik Vertebrate fossil sites and Deccan Trap for inclusion in the World Heritage List. As per his suggestion, a letter has been addressed to the Central Geological Programming Board, Ministry of Mines, Government of India, to consider our announcement at its next meeting, and the D-G, GSI, has been requested to raise the matter.
6. The announcement on geoarchives has been published in *GSA Today* (August, 2000). The Department of Natural Resources, Washington State, USA, has sent a copy of their CD on the bibliography of Washington geology, and also information about the geology library of the Department of Natural Resources. Its library holds field notes from Washington geologists (1930s/1940s), and reports from explorations beginning in the late 1700s, etc.
7. The Ministry of Environment and Water Resources, Mines and Geology Department, Nairobi, has provided the addresses of key geoarchive locations in Kenya. Copies of my notice have been sent to these addresses seeking co-operation.
8. The African Academy of Sciences, Nairobi, has sent a complimentary copy of the Directory of Geoscience Departments in the UK and Ireland.
9. The Geological Society of London has sent a copy of the same publication.

10. INHIGEO Member, Dr W. Schroeder, has sent a copy of *Geomagnetism: Research Past and Present*.

Geoarchives: Progress Report 2

Progress Report on Geoarchives No. 1 was submitted in July 2000 for presentation at the Sessional meeting of INHIGEO, at 31 IGC, Rio de Janeiro, Brazil, August 2000. Since then, the following responses and material have been received.

1. The central geological survey, MOEA, Taipei, Taiwan, Republic of China, sent a copy of the publication, *Bibliography of Taiwan Geology (1849–1990)*, Geology of Taiwan Series no. 3, published in December 1993. The publication has 820 pages and lists of publications by author, and with an Index at the end.
2. Mr. Anthony P. Harvey, formerly of the Natural History Museum, London has collected and sent the following materials:
Progress Report No. 26 of National Cataloguing Unit for the Archives of Contemporary Scientists, 1st October, 1999–31st March, 2000. The report lists the activities of NCUACS during that period, meetings attended by the Unit's archivists, collections completed and collections in progress.
NCUACS Pamphlet on *Preserving Scientific Source Materials: A Guide for Owners*;
IUHPS' Work in Progress 2: Archives of Contemporary Science, edited by R.W. Home, P. Harper, and O. Welfare, *Preserving the Archives of Nature—A Guide for the Owners of Papers on Nature Conservation*, prepared by the Library Committee of the Linnean Society of London;
Directory of Geoscience Departments in the UK and Ireland; NCUACS Progress Report No. 25, 1 April 1999–30 September 1999;
3. Dr. Jan T. Kozak, Prague, gave the addresses of three Institutions, viz., The National Technical Museum, The Geophysical Institute of the Charles University, and Faculty of Natural Sciences of the Charles University who have historical documents related to geo-sciences in their possession. These institutions have been addressed for response to the circular. Besides, he has also sent a rare map—Map of India referring to the General and local observed directions of earthquake shocks, from the 28th Report of the British Association for the Advancement of Science, 1858, Pl. XIV.
4. The Department of Mining, Geological Survey of Papua New Guinea, informs me that they have geoarchives used mainly by the staff of the Department, mining consultants, and mineral exploration companies. They have a bibliographic database of PNG geology and related topics, kept at the Department of Mining headquarters in Konedobu, and updated periodically.
5. The Ministry of Agriculture, Natural Resources and Environment, Geological Survey Department, Nicosia, informs that the Geological Survey Department of Cyprus has an archive including publications (maps, books, bulletins), unpublished reports and also a large interdepartmental files. This material is proposed to be scientifically organised and transferred to the State Archives of Cyprus for permanent preservation.
6. The Geological Survey of Sweden maintains a reference data base on geological documents covering Sweden. The name of the reference data base is 'Georegister' which contains around 32,000 references to published (40%) and unpublished (60%) geological documents covering Sweden. Most of the documents are archives at the Geological Survey (library) but some exploration reports are stored by private exploration companies. GeoRegister's website: <www.sgu.se/databaser/index_e.htm>
7. The United Republic of Tanzania, Ministry of Energy and Minerals, Dodoma informs that they have archival material digitised and the production of CD-Rom is underway.
8. The International Atomic Energy Agency, Vienna, has no activity related to Geoarchives.
9. Professor William A. S. Sarjeant of the University of Saskatchewan, Canada, has informed me, through Dr Merrill Distad, Associate Director of Libraries (Bibliographic Services), University of Alberta, Edmonton, that they have a major collection of books, journals, ephemera, and archival miscellany located at the University of Alberta in the Special Collections division of their Science and Technology Library. Dr Sarjeant is the author of the well-known 10-volume bibliography of the history of geology and geologists. His entire collections will be located in the University of Alberta Library.
10. Dr Fathi Habashi, Department of Mining and Metallurgy, University of Laval, Quebec, Canada, has sent a set of reprints of his papers: *The Chemical heritage foundation: A Model Project for the Canadian Mineral Industry*; his reviews of books; *EIC history & Archives, Working paper 4/1997—History of Activities of Learned Engineering Societies in Canada*, by Chrysler, Habashi and Wilson; *Meteorites: History, Mineralogy, and Metallurgy*; *The Iron Pillar of Delhi—Historical Metallurgy Notes*.
11. Dr. Neil Williams, Chief Executive officer, Australian Geological Survey Organisation, Canberra, has informed me that the AGSO Library has a collection of all AGSO (and its predecessor BMR), Geology and Geophysics materials dating back to the establishment of the then BMR in 1946. Library web page: <www.agso.gov.au/library/>. AGSO Archives are accessible on request at AGSO's Records Management Unit. The AGSO Data Repository is a varied collection of physical samples and digital data, accessible via the Repository's web page: <www.agso.gov.au/information/data_repository.html>. Addresses of various organisations in Australia who have archival materials have been given and they have been addressed for further information.

The Coordinator has attended three international meetings:

1. (i) Map India—February 5 & 6, New Delhi; (ii) GJS, India—February 7, 8 & 9, both organised by CSDMS, Noida, India; (iii) International Conference on Geological Surveys in the New Millennium, 2001, March 5 & 6, 2001, Kolkata, to mark the 150th year of the founding of the Geological Survey of India. Contacts were established with

Indian and foreign delegates for help in the project on Geoarchives. The IUGS Past President, Dr Robin Brett, and the present Treasurer, Dr Werner Janoshek, Vienna, were present at the Kolkata conference. The GSI has brought out a publication on the *Story of GSI, 1851–2001*, by N.P. Chaudhari. This will be reviewed in the next INHIGEO *Newsletter*. It is hoped that future responses to the INHIGEO circular will be more encouraging.

K.S. Murty, Archive Project Co-ordinator, Nagpur, 21 April, 2001

Additional note

I have been informed by Professor Yuri Soloviev that after Professor V.V. Tikhomirov (founding President of INHIGEO; see p. 9) passed away, his library and papers (including presumably INHIGEO documents) became the possession of his widow, Galina Mikhailovna Tikhomirova: Profsoyuznaya 43, bld. 1, apt. 89, Moscow, 117420 Russia. I have written to her twice about this matter, but have received no reply. This information will be passed to the IUGS headquarters in Trondheim. If any Russian Member can inform me of the actual present *location* of the INHIGEO documents, and whether arrangements have been made for their eventual permanent storage I should be most grateful.

David Oldroyd, Sydney

The European Journal for the History of Geology

The attempt to launch a new multi-lingual European history of geology journal has to date only been partly successful, as the number of presubscribers is, at present, only just above a hundred, which is half the expected amount. France, Italy, and Spain have provided about 80% of the pre-subscribers. We regret that the project has not received enough strong support from English and German speaking colleagues. Nevertheless, the project is not yet abandoned, as we are trying to obtain financial support from the European Union, which encourages multilingual initiatives, and to reduce printing costs. A final decision on the proposal is yet to be made.

Jean Gaudant, Paris

Report of the Commission for the History of Geophysics and General Physics for 2000

The Commission has published six books during 2000, including two on an international conference held at Birmingham in 1999. A general theory of the history and philosophy of the geosciences was described by Herbert Höra (philosophy), Wilfried Schröder (case studies in geophysics), Karl-Heinrich Wiederkehr (case study in geomagnetism), Giovanni Gregori, Luci Gregori, and M.R. Valensise (foundations of the history of geophysics). Additionally, and autobiographical study has been provided by G. Dohr (applied geophysics), a biographical note on Julius Bartels by Karl-Heinz and Hannelore Bernhardt, and a bibliography of books in space physics by L. Gianibelli. A book entitled *History and Philosophy of Geophysics* has been edited by Wilfried Schröder. Further books deal with: *Geomagnetism* (from the Birmingham conference of 1999); *Long and Short Term Variability in the Sun's History and Global Change* (Birmingham conference, 1999); and *The Aether in Physics. Causality, Freedom of the Will, and Teleology as a Philosophical Problem* was a discussion book with contributions by Wolfgang Böhme, Karl-Heinz Bernhardt, Herbert Höra, Wilfried Schröder and Hans-Jürgen Treder discussed a fundamental paper by Hans Ertel (1904–1971). The last book, *Pathways to Science*, collected autobiographical and biographical papers by scientists and scholars from all over the world, including S.-T. Akasofu, Sir Ian Axford FRS, Sir Alan Cook FRS, David Oldroyd, and others. A meeting in July, 2000, discussed the problem of the aether in physics under the leadership of Professor Hans-Jürgen Treder. Further details may be found on the Commission's website: <<http://huhu.franken.de/history-geophysics>>.

Wilfried Schröder, Bremen

PROVISIONAL AGENDA FOR THE BUSINESS MEETING OF THE COMMISSION, TO BE HELD IN PORTUGAL, JUNE, 2001

1. Apologies.
2. Arrangement of Agenda.
3. Minutes of the previous Business Meeting (see the present *Newsletter*, pp. 5–6).
4. Matters arising.
5. President's Report.
6. Matters arising.
7. Secretary-General's Report.
8. Matters arising, including criteria for Membership of INHIGEO.
9. Arrangements for future meetings of the Commission, including offers from different countries to host meetings.
10. Archives, including discussion of the IUGS's request that INHIGEO provide advice on the question of the IUGS archives (see pp. 6 and 32).
11. Criteria for admission to Membership of INHIGEO, 'retirements', and the problem of English (see pp. 3 and 4).
12. *Episodes*: a request for offers to take responsibility for administering the Commission's 'Classic Papers' series.
13. INHIGEO translations?
14. A web-site for INHIGEO?
15. A book on the history of geology in Africa and translations of publications by INHIGEO Members.
16. Completion of Ballot for new Members of the Commission.
17. Business without notice.
18. Votes of thanks to Portuguese hosts.

INHIGEO HISTORY

American Member Cecil Schneer has created a web-site that shows photographs of the Members of INHIGEO who attended the inaugural meeting of the Commission at Yerevan (Armenia) in 1967 and its meeting at Montreal in 1972:
<http://unhinfo.unh.edu/esci/Schneerinfo.html>

The first of these pictures is reproduced below. The beginning of Professor Schneer's statement about the early history of the Commission reads:

INHIGEO was inaugurated at a constituent assembly held in 1967 at Yerevan, Armenia (then in the USSR). It was proposed by I.I. Gorsky, a senior figure in Soviet geology . . . to the 22nd International Geological Congress at New Delhi in 1964. On the acceptance of the proposed committee by the nascent International Union of Geological Sciences (IUGS), the Russians had invited the national committees affiliated with the IUGS to send delegates to Yerevan. Two of the three Americans at the meeting had University of New Hampshire connections. George White . . . was elected Vice-President for the Americas. . . .

The names of the persons in the picture (reading from the top-left) are: J.M. de Ascona (Spain), V.A. Eyles (UK), I.I. Gorsky (USSR), T. Kobayashi (Japan), J. Koran (Czechoslovakia), G. Regnell (Sweden), T. Vallance (Australia), R. Hooykaas (The Netherlands: Vice-President), K. Maslankiewicz (Secretary-General), V.V. Tikhomirov (USSR: President), G.H. White (USA: Vice-President), B.C. Roy (India: Vice-President), I.V. Batjushkova (USSR), A. Cailleux (France), S. Czarniecki (Poland)*, J.M. Eyles (UK), D.I. Gordeev (USSR), M. Guntau (DDR)*, G.I. Islamov (USSR), R. Laffitte (France), A. Laszkiewicz (Poland), W.F. Van Leckwijck (Belgium), E. Malkhassian (USSR)*, G.E. Murray (USA), W. Nieuwenkamp (The Netherlands), A.I. Pavikovitch (USSR), C.J. Schneer (USA)*, N. Spjeldnaes (Denmark), T. Watanabe (Japan), J.B. Waterhouse (New Zealand)*, K. Zapletal (Czechoslovakia).

The names of persons who are still Members of the Commission are indicated by asterisks. If any Members wish to obtain copies of the first twenty issues of the INHIGEO Newsletters they are available on microfiche from Professor Martin Guntau (see address at back of the present issue).

INTERNATIONAL COMMITTEE ON THE HISTORY OF GEOLOGICAL SCIENCES



EREVAN 1967 USSR

МЕЖДУНАРОДНЫЙ КОМИТЕТ ПО ИСТОРИИ ГЕОЛОГИЧЕСКИХ НАУК



J.M. de ASCONA
SPAIN

V.A. EYLES
ENGLAND

I.I. GORSKY
USSR

T. KOBAYASHI
JAPAN

J. KORAN
CZECH

G. REGNELL
SWEDEN

T. VALLANCE
AUSTRALIA

VICE-PRESIDENT
R. HOYKAAS NETHERLANDS

SECRETARY-GENERAL
K. MASLANKIEWICZ POLAND

PRESIDENT
V.V. TIKHOMIROV USSR

VICE-PRESIDENT
G.W. WHITE USA

VICE-PRESIDENT
B.C. ROY INDIA

CORRESPONDING MEMBERS



I.V. BATJUSHKOVA
USSR

A. CAILLEUX
FRANCE

S. CZARNIECKI
POLAND

J. M. EYLES
ENGLAND

D.I. GORDEEV
USSR

M. GUNTAU
DDR

G.I. ISLAMOVI
USSR

R. LAFFITTE
FRANCE

A. LASZKIEWICZ
POLAND

W.F. VAN LECKWIJCK
BELGIUM

E. MALKHASSIAN
USSR

G.E. MURRAY
USA

W. NIEUWENKAMP
NETHERLANDS

A.I. PAVIKOVICH
USSR

C.J. SCHNEER
USA

N. SPJELDNAES
DENMARK

T. WATANABE
JAPAN

J.B. WATERHOUSE
NEW ZEALAND

K. ZAPLETAL
CZECHOSLOVAKIA

EPISODES

Members should already know that the IUGS requested INHIGEO to take responsibility for the supply of articles on the history of geology to the quarterly journal *Episodes*. The series, which has already been started, is called 'Classic Papers', and will consist of summaries (in English) of the arguments of, and/or extracts from, major papers (or parts of books), which might be regarded as having been 'benchmarks' or 'turning-points' in the history of the geosciences. The papers, which may be illustrated, will also give background information about the authors of the papers or books, and may discuss also the general historical influence of the papers. The anticipated total length could be of the order of 7000 words. General fields may be surveyed also, if appropriate. For example, Professor Yaalon (Israel) has said that he would like to prepare a paper on the early history of soil science; and Professor Wang Hong Zhen has in mind a paper on Precambrian stratigraphy.

The IUGS sets much store by the project, as do the editors of *Episodes* in Beijing. I have had discussions about the initiative with the Managing Editor, Professor Hou Hongfei, when I had the opportunity to meet him in Rio de Janeiro in 2000, and I started off the series with a contribution on James Hutton's celebrated 'Theory of the Earth' (1788) in September 2000. A paper on Mohorovicic's study of the Balkan earthquake of 1909, which led to his discovery of what later came to be called the Mohorovicic Discontinuity, has recently been published by Professor Alexander Grubic from Belgrade. Other papers currently being edited are a study of Charles Lapworth's stratigraphic work by Dr Beryl Hamilton (Scotland) and of Kiyoo Wadati's work on deep earthquakes by Professor Yasumoto Suzuki (Japan). Several other papers have been offered, and some are in preparation.

This project is of importance to INHIGEO. It is also one of considerable value to the geological community, especially insofar as it can make available ideas from languages other than English. This is where the worldwide expertise and diverse language skills of the INHIGEO membership can be invaluable.

While undertaking the editing for the present, I should be glad to pass it on to some other person, and offers in this regard are invited. The matter will be on the agenda for discussion at the Business Meeting in Lisbon. Meanwhile, further offers of contributions are most welcome.

David Oldroyd, Sydney

CONFERENCE REPORTS

History of Geology, and other Matters of Interest, at the 31st IGC at Rio de Janeiro

The 31st International Geological Congress was held in Rio de Janeiro, Brazil, from 6 to 17 August, in the large convention conference centre, constructed on the outskirts of Rio for the world environmental congress in 1992. About 4000 delegates attended, significantly less than the 6000 that were expected. The general theme was environmental geology, or 'Geology and Sustainable Development: Challenges for the Third Millennium'. Delegates stayed in hotels in Rio, and were bussed to and from the convention centre every day: about an hour's journey each way. Field excursions were held before, during, and after the congress, and there were also special training workshops. But many of the excursions were cancelled.

Brazilian INHIGEO Member, Dr Silvia Figueirôa from Campinas, had organised an historical field excursion for a few days after the conference, but this was among those cancelled, for lack of numbers, without the enrolled participants being informed. This was characteristic of the confused conference administration and it is believed that many persons who planned to attend the meeting voted with their feet because of the administrative problems—notably because they were not informed in good time about the date when they were expected to deliver their papers.

The congress organisers had decided that the vast majority of the papers should be presented as posters. So while there were invited 'keynote' speakers in the mornings, all afternoons were given over to the display and discussion of posters. This practice is already common for large scientific conferences, where everyone wants to give a paper and can only get funding to attend if they do so. In the event, the posters seemed to be more successful than might have been expected, and certainly they provided the opportunity for persons interested in a particular topic to have a good chat with the presenters, who sat like spiders near their webs, and snared passers-by! There was one extraordinary exhibit, put on by a combined Russian and Chinese team, which showed an enormously long cross-section of the earth's crust, all the way from the Arctic through to southern China—about 20 metres long, rolled out like a carpet! This attracted much interest and favourable comment.

However, the poster emphasis was not, I believe, well suited to historical papers, as posters do not facilitate general discussion, and in the event few historical posters were put up, though a considerable number had been offered (mostly unrelated to the proposed historical themes). Cherry Lewis from the UK did report that her poster on the work of Arthur Holmes attracted many favourable remarks, as did Martina Koelbl-Ebert's splendid time-line representation of the history of women in geology. The IUGS had asked its member Commissions each to prepare a poster for display for the whole week in the IUGS booth in the 'commercial' section (see below). Few Commissions in fact responded to this request, and INHIGEO's remit—to present a poster on the general social history of geology—was quite impossible to fulfil. So, following discussion of the matter in Freiberg last year, INHIGEO asked Dr Koelbl-Ebert to produce a poster on just one aspect of the social history of geology, as named above. She did this most effectively, and her work also attracted much favourable comment. It is hoped that the poster may be produced commercially for use in schools, museums, university geology department 'front-doors', etc.

As mentioned, posters are not generally well suited to many historical topics, and INHIGEO had therefore planned to concentrate its efforts on oral presentations. This caused enormous problems, as it was going against the grain of the Congress as a whole. Initially, three themes were chosen for the historical section (27): 'Geology in the tropics'; 'Geology and 'end-millenniumism''; and 'Major contributions to geology in the twentieth century'. And offers of papers for these topics were solicited, but regrettably Topic 2 attracted almost no offers, Topic 1 attracted a few, and a morning of papers was scheduled for 27-1, but some of the speakers for this withdrew rather late in the day (for possible reasons see above and below).

On the other hand, there was an excess of papers available for Topic 3. So back in November, 1999, INHIGEO requested permission to cancel Session 27-2 and make Session 27-3 a 'double meeting'. Permission for this was granted in December, 1999, and planning proceeded on that basis. Eight speakers were organised, requiring either two mornings or a full day to present their papers.

But then it became evident that the Congress organisers either did not understand this simple request, or failed to act on it. There was a constant flurry of emails for over six months (with, for a time, a denial that permission had ever been granted to hold a double session for 27-3!). Eventually, in July 2000, we were informed that we could proceed as planned. HOWEVER, as feared, when we eventually arrived in Rio it was discovered that only one morning had been allocated for eight papers in the final printed programme, on which most people relied to tell them what was on in the Congress! There followed numerous animated discussions (in Portuguese), and we were eventually told that we could continue in the afternoon. Needless to say, it was impossible to advertise this fact adequately, so that whereas everyone agreed that the morning was a great success, and some people said that our session was one of the most interesting parts of the total programme, attendance collapsed in the afternoon, and it was certainly disappointing for those persons who presented papers after lunch.

Nevertheless, the eight papers were delivered, and they will form the basis of a book to be produced by the Geological Society of London as one of its 'Special Publications' in 2001. The collection and refereeing of the papers is currently in progress, with your correspondent acting as editor. The planned list is as follows, the first eight items being those that were presented in Rio.

Hugh Torrens (INHIGEO Member and Past President) (Keele University, U.K.): 'Stratigraphy in the Twentieth Century'

Ursula B. Marvin (INHIGEO Vice President) (Harvard-Smithsonian Center for Astrophysics Cambridge, U.S.A.): 'Geology: From Earth to Planetary Science in the 20th Century'

Richard Howarth (INHIGEO Member) (London University, U.K.): 'From Graphical Display to Dynamic Model: Mathematical Geology in the Earth Sciences in the Nineteenth and Twentieth Centuries'

Simon Knell (INHIGEO Member) (Leicester University, U.K.): 'Palaeontology in Twentieth-Century Cultural Context'

Homer Le Grand (INHIGEO Member) (Monash University, Australia): 'The Plate Tectonics Revolution Thirty Years On: Retrospect and Prospects'

Cherry Lewis (INHIGEO Member) (Keele University, U.K.): 'Arthur Holmes: Father of the Geological Time-Scale'

Davis Young (Calvin College, Michigan, U.S.A.): 'Norman Levi Bowen and Igneous Rock Diversity'

Gregory Good (West Virginia University, U.S.A.): 'From Terrestrial Magnetism to Geomagnetism: Disciplinary Transformation in the Twentieth Century'

Bernhard Fritscher (INHIGEO Member) (University of Munich, Germany): 'The Application of the Phase Rule to Geology in the Twentieth Century'

William A.S. Sarjeant (INHIGEO Member) (University of Saskatchewan, Canada): 'As Chimney-Sweepers, Come to Dust': A Brief History of Palynology to 1970'

Jacques Touret (INHIGEO Member) and Timo Nijland (Free University, The Netherlands): 'Ideas about Metamorphism in the Twentieth Century'

Victor Khain and Anatoly Ryabukhin (INHIGEO Members) (Moscow State University, Russia) 'Russian Geology and the Plate Tectonics Revolution'

Cathy Barton (University of Maryland, U.S.A.): 'Marie Tharp: Oceanographic Cartographer'

Eugen and Ilse Seibold (Freiburg University, Germany): 'From Single Particles to Recent and Past Environments'.

There is not space to summarise all these papers here. It can be said, however, that several of them were excellent. We were most pleased that Homer Le Grand was able to get away from his arduous duties as dean of *two* faculties at Monash University in Melbourne in order to present a paper.

As to the surviving Section 27-1 on 'Geology in the tropics', as mentioned above several speakers dropped out rather late in the proceedings. However, Professor Pinto gave an interesting talk on early mining practices in South America. And the large time-space remaining that morning was agreeably and admirably filled by a biographical account of the work of Alfred Wegener by Russian Member Efgenji Milanovsky, speaking (in English) to the material he had collected for a forthcoming book (in Russian) on Wegener. Professor Milanovsky is a wonderful artist, and his paper was admirably illustrated by his own drawings, as well as photographs of Wegener memorabilia, etc. He has a well-known and deserved reputation for exceeding his time-limits as a speaker at INHIGEO meetings, but on this occasion he had half a morning available to him, and he did not run out of time. Thus we were treated to a fine extended exposition of little-known aspects of Wegener's life and work; and the speaker was happy . . . !'

It was interesting to discover from the discussion that followed Milanovsky's paper that quite opposed basic geological theories are currently being taught in Russia. So in fact there it would appear that there is no agreed geological paradigm in that country—a situation that has apparently persisted for a considerable number of years, according to my reading of the paper by Khain and Ryabukhin (though they inform me that the majority of Russian theorists are plate-tectonics theorists, and that although there are Earth expansionists or pulsationists such as Professor Milanovsky teaching at Moscow State University they are in the minority).

Reference was made above to the 'commercial' section of the Congress. This was held in a vast hall, the size of an aircraft hangar, and resembling one too in its architecture. There were dozens of displays, mostly very lavish. Individual geological surveys were prominent in displaying their wares, as were companies showing off their latest technological

* We are pleased to inform readers that Professor Milanovsky's book on Wegener was published late in 2000 (see p. 000).
42

devices, publishers displaying their books, and so on. Jewellers sought to entice one to their showrooms in Rio with baits of free gems (but when one visited the showrooms in town the actual gifts did not match the baits—but beautiful jewels can be purchased moderately cheaply in Brazil). There was a large enclosure showing excellent replicas of South American megafauna; a philatelic display showing many hundreds of stamps relating to geological topics; a booth for the IUGS and its journal 'Episodes'; and so on.

It was interesting that two useful plastic-coated stratigraphic columns were made available to the persons attending the Congress: one from the IUGS/UNESCO (compiled by Jürgen Remane) and one from the petroleum company REPSOL–YPF. They were markedly different in a number of respects, especially for the more ancient rocks. Our speaker, INHIGEO Vice-President Dr Ursula Marvin, was pleased to note that the REPSOL–YPF scheme (which otherwise followed the well-known Harland time-scale fairly closely) contained periods for the lower parts of the Precambrian (Hadean, etc.) based upon information derived from extra-terrestrial sources. But these subdivisions bore no resemblance to those favoured in the other chart. It all still seems to be a muddle down in Hades; or there must be some bickering in hell!

During the congress a hot topic was the question of where the next meeting was to be held: Vienna or Florence? To further the rival charms of these two admirable cities, the Austrians and Italians had prepared two extraordinarily lavish exhibits (with the Italian camp making available gratis some useful publications on the history of Italian geology). The Austrians chose to present themselves within a kind of inflatable tent in the country's national colours, which, however, unfortunately collapsed every now and then—as, we regretfully have to say, did the Austrian bid itself! It may be that the right team won, however, as it was the Italians who bestowed historical publications to all and sundry. So INHIGEO can look forward to meeting in Italy again in 2004, where by good fortune the new European Vice-President is domiciled.

A few words may be said about Rio itself. As is well known, it has perhaps the finest site for a city in the world, it being a place of quite outstanding natural beauty. The rocks there are magnificent, and I was able to participate in a one-day field excursion to localities of great geological interest, guided by two first-rate geologists, who had recently been preparing a new tectonic map of the area. The gneiss was not just nice: it was outstandingly excellent, as was the exposition of its mysteries.

But Rio itself (apart from its splendid food) is not an entirely savoury place. There are slums ('favelas') that penetrate the centre of the city, and danger lurks everywhere. As I heard, the Russian delegation (many of whom arrived by and stayed on a ship) were attacked, but beat off the assailants with their umbrellas! Some Chinese geologists were likewise attacked and had money stolen. A German man was dispossessed of 3000 marks at knife-point. And a man returning from a field excursion and dropped by the bus driver in the city to look for a taxi was promptly mugged. For several months I was owed some \$A1200 for a cancelled field excursion, though it was eventually refunded. Professor Torrens was in a like position; or worse, as he had paid for both himself and his wife. An INHIGEO Member from Italy, who was unable to attend but had paid for everything in advance, lost a large sum. I am gratified, though, that Dr Robin Brett, past President of the IUGS, offered his sincere apologies to INHIGEO on behalf of the International Union for the inconveniences that we suffered in the organisation of our programme, which apology was gratefully accepted.

Within Rio, I and three friends visited a place of great interest to historians of science: the 'Positivist Temple'. Positivism as a religion—the 'Religion of Humanity'—was 'devised' by the French philosopher Auguste Comte in the mid-nineteenth century. The idea was that one should not worship some transcendental being(s), but the persons who had made the outstanding contributions to civilisation. For some reason, this secular religion caught on in Brazil, one of the Brazilian presidents having been a positivist. A Grecian-style temple was constructed in the city, according to Comte's design, and we had the great pleasure of visiting it. The Brazilian flag was apparently designed there. Inside the fine old building, which, however, only has about fifteen remaining worshippers, we admired fourteen columns, with a bust of some notable such as Dante, Gutenberg, or Shakespeare atop each. Modern science was represented by the French physiologist Bichat. Comte *lui-même* was the high priest of the religion; and thus a bust of him was to be found on the altar behind an elegant lectern. He thought that science would reach certain knowledge when its various branches each reached its 'positive' stage—when the 'laws' of that science were known correctly. (Thus Newton had done the necessary work for mechanics; and the future developments of, say, Einstein were not foreseen.)

The point of special interest to us, and one that is not widely known, is that the emergence of the history of science as a professional/academic discipline had its origins in Comteanism. Thus the first chair in the field was in Paris in the late nineteenth century, established under the influence of Comte's ideas. George Sarton, the founder of the principal history of science journal *ISIS*, was a positivist. Thus, the initial motivation for the serious study of the history of science was that it provided the means for studying and understanding some of the great achievements of humanity. In a sense that motivation still exists, though Comte is largely forgotten except for his role as one of the founding-fathers of sociology.

Comte's philosophy was developed in France in the 1830s, elaborated into a religion in the 1850s, and exported to Brazil (where, as I understand, all students formerly had to study history of science). The religion died in France, but was subsequently back-exported from Brazil to its country of origin. Whether it still exists in France I do not know, but it is evidently dying in Brazil now. If any readers have further information on this interesting topic, we should be glad to hear from them.

In conclusion, I should mention that the sharp-eyed Madame Torrens discovered in a second-hand book-shop a copy of Comte's *Catéchisme positiviste*, published in Brazil in 1957 as a centenary reprint of the first Paris edition. This interesting volume showed the design plan by Comte for his ideal temple, which was faithfully followed in the building in Rio, though sadly the intended surrounding park is not there, the space around the old temple being covered with flats, shops, tarmac, etc. A further interesting feature of the Brazilian edition is that it is expurgated! During his mid-life crisis Comte very sensibly started worshipping women in general, and his mistress Clothilde de Vaux (who supported him, so legend has it, by

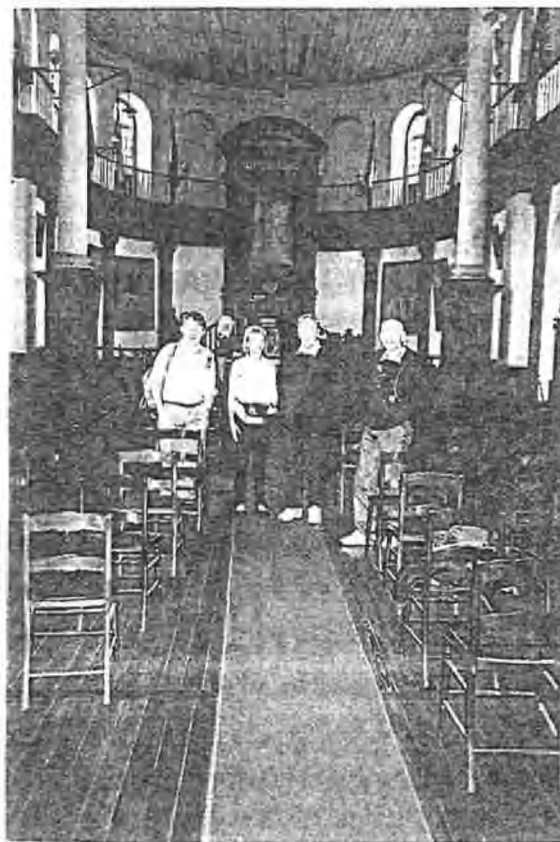
immoral earnings) in particular. Comte placed a woman (the wondrous self-sacrificing Mediaeval heroine, Héloïse) on the pillar closest to himself. But what, I imagine, was an embarrassing panegyric to Ms Clothilde is omitted from the 1957 edition, its original presence only detectable by the pagination of a section on Comte's beloved and by the attendant footnotes, which the Brazilian thought-police omitted to excise. Thank you Shirley Torrens for the most interesting addition to my library!

David Oldroyd, Sydney

Silvia Figueiróa and David Oldroyd at the Rio Congress



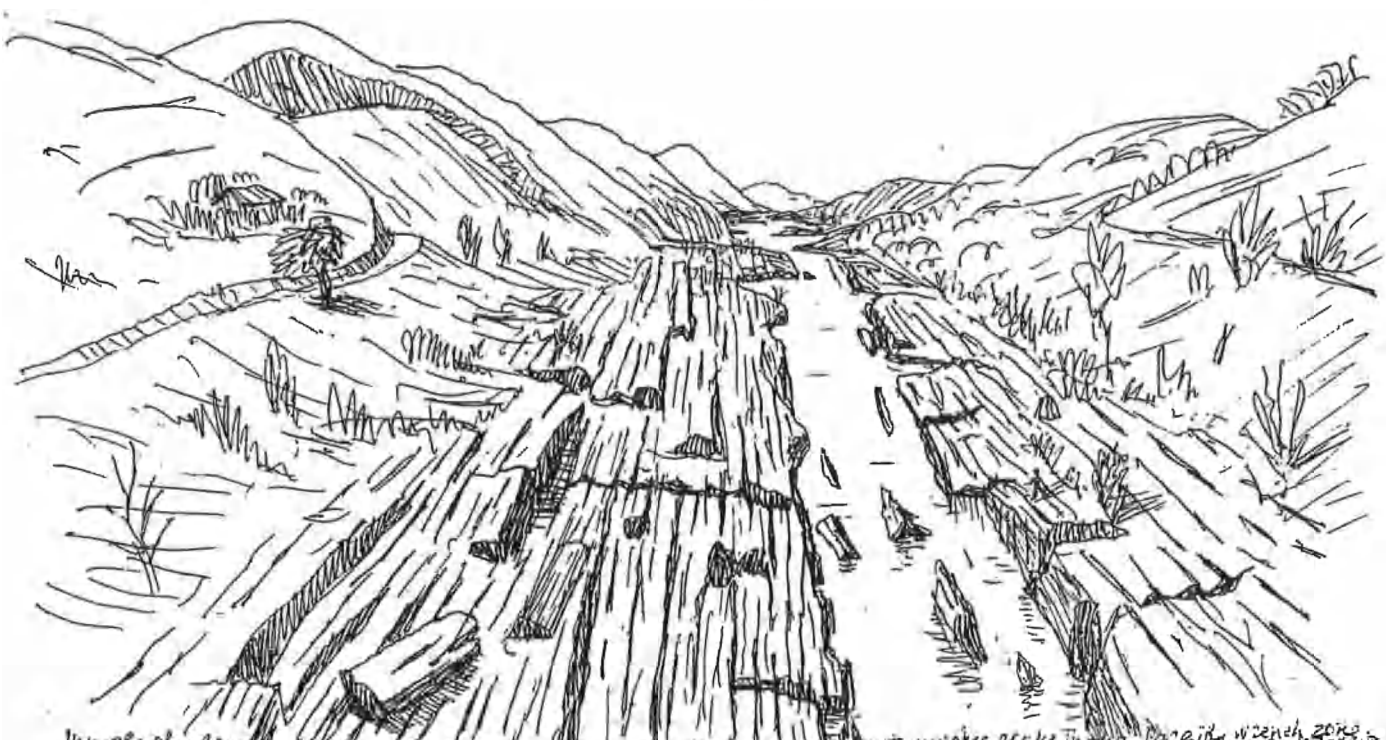
Hugh Torrens, Shirley Torrens, David Oldroyd, and Richard Howarth at the Positivist Temple in Rio de Janeiro



Views of Rio de Janeiro by Evgenij Milanovsky



10.8. 1955 ^{11.11.1955} ~~View of Rio de Janeiro~~ Beach of Espinosa - Two Brothers mountain on the background Rio de Janeiro, 10.8.2000



11.11.1955 ^{11.11.1955} ~~View of Rio de Janeiro~~ View from the bridge of the Rio Paraíba river - 1950 km to the North from Rio de Janeiro

Celebrating the Age of the Earth: Report on a Symposium on Geological Time, Organised by the History of Geology Group, The Geological Society of London, 28–30 June, 2000

One of the great gifts of the geosciences is an appreciation of the exceptional magnitude of geological time, taking us back some 4.6 thousand million years to the birth of our planet. A few naysayers may still yearn for an Earth just 6,000 years old, but most people recognise how Deep Time has made it possible to understand important aspects of the evolution of stars, mountains, and life on Earth. In late June 2000, the Geological Society of London conducted a symposium, 'Celebrating the Age of the Earth,' that addressed many of the basic issues associated with the development of ideas leading to our contemporary awareness of the power and beauty of geotime. This 'William Smith Millennium Meeting' honoured the practical canal builder and surveyor, William Smith (1769–1839), who gave us the key concept of what we now call 'Biotic Succession' and generated geological maps that represent, in colourful two-dimensional array, the distribution and age of strata. First conceived by the late John Thackray (1948–1999), the meeting came to fruition under the guidance and hard work of Cherry Lewis and the History of Geology Group of the Geological Society of London.

Understanding time is a quintessentially interdisciplinary endeavour, and the seventeen speakers represented a wide spectrum of backgrounds: history, palaeontology, geology, physics, geochronology, biology, geochemistry, human evolution, and astronomy. Distinct differences of approach and subject matter could be discerned, with much healthy interchange and overlap. Historians of science and scientists offered mutually informative commentaries. One recurring topic concerned the ordering and sequencing of events in geotime ('relative dating'), while another focus involved methods for measuring actual dates before the present ('absolute dating'). The Symposium attendees profited from hearing both formal statements and informal interchanges among some of the major figures in contemporary science and the study of the history of the geosciences. Papers and discussions covered more than two centuries, treating not just history of science but also history of our own everyday concept of time, and providing a state-of-the-art review of events in our Universe, starting with the Big Bang, the likely beginning of our space-time continuum.

As Professor Sir Martin Rees, the Astronomer Royal (University of Cambridge), pointed out in his closing Keynote Address, the Hubble Space Telescope gives us not only a glimpse into deep space but also a look back in time, to about 80 to 90% of the history of the Universe, thought to have originated some 15 Ga ago. At that time, the universe was utterly unlike what we know today. There were only lighter atoms such as hydrogen and helium, the heavier elements so familiar to us only being synthesised late in the 'life cycle' of stars and expelled in violent explosions of supernovae. Earth and other earth-like planets, in this or any other solar system, did not exist before the second generation of stars evolved. Thus, our planet and everything that lives on it can be regarded as either 'star-dust' or the 'nuclear waste' of long-dead stars.

The age of the Earth is, we think today, about 4.55 Ga. Giving an exact date is still difficult, and may be even impossible, since nothing of the original Earth's surface has survived the continuous tectonic activity and meteoritic bombardment of our planet. Dating the Earth's oldest known rocks is a difficult task, as Professor Albrecht Hofmann (Max-Planck-Institute for Chemistry, Mainz, Germany) and Professor Stephen Moorbath (University of Oxford) showed. And the beginning of the Earth can only be bracketed between the age of the oldest known zircons (4.2 Ga) and the age of meteorites (4.6+ Ga).

The first supracrustal (volcanic or sedimentary) rocks—remnants of which are still preserved in West Greenland—were formed 3.7 to 3.8 Ga ago. There is some geochemical evidence for life on Earth even at that distant time. Professor Aubrey Manning (University of Edinburgh, opening Keynote Address) is convinced, from biochemical evidence such as the universality of RNA/DNA, that life on Earth must all have had one common origin. He thinks that present-day thermophilic protists give a good likeness for what this earliest life might have resembled. Slowly the life-forms became more complex, different prokaryotes came together as symbiotic composite organisms, which were (just as lichen today) more than their individual parts. The resulting eukaryotes contained organelles (such as mitochondria or chloroplasts) traceable in function to the original free-living prokaryotes. Around the end of the Precambrian, about 600+ million years ago, something startlingly new happened. Multicellular life-forms appeared on stage, shaping ecosystems which henceforth followed the familiar rules of our present world. It is important to note that the vast amount of Precambrian time, when things were not as we take them for granted today, remains little appreciated or understood, even in some textbooks.

After the Cambrian explosion, life became so diverse and varied, with rapidly changing taxa and shapes, that stratigraphers, beginning about 1800, could put rock strata in sequence by consulting 'guide fossils'. Such ancient morphologies and two-century-old methodologies will probably serve 'relative dating' as long as there is a science called geology. Fossils are sequencing 'calendars,' not time-telling 'clocks,' but their stratigraphic power can be impressive. Probably the best resolution achieved by this method is in the Middle Jurassic, as demonstrated by Professor John Callomon (University College London), where faunal horizons of ammonites change on the average every 130,000 years.

The fact that different strata contain distinguishable fossils was recognised in the late 18th century by William Smith, land-surveyor and canal builder, and renowned figure in the history of geology (Professor Hugh Torrens, Keele University; in the 'William Smith Evening Lecture' on 'Timeless Order: William Smith and the Search for Raw Materials'). Although Smith did not attribute a time dimension to his insight, he used it to predict where coal would be found. But such practical and useful contributions were not fully appreciated or applauded by some of Smith's upper-class contemporaries. Even today, Torrens suggested, historians do not typically concern themselves with the contributions of 'practical' people, an ironic situation in the country that initiated the Industrial Revolution.

Although extensively used, fossils are by no means the only way to give a time estimate. Sophisticated physical methods, such as improved Carbon-14 tests, thermoluminescence, and electron-spin resonance techniques, provide powerful tools for dating in the geologically recent past. Those tools, combined with new methods of dating based on genetics, are helping to clarify perceptions of the complex history of our own species, as Professor Christopher Stringer (Natural History

Museum, London) showed, using examples from the Neander Valley (Germany), the caves of Mount Carmel (Israel), and studies of hominid movement out of Africa.

Only little more than a century ago, the incomprehensibly vast time-scale of astronomy and geology would have been at odds with established scientific knowledge, which put the age of the Earth somewhere between 50 and 20 Ma. Still another hundred years earlier, people—at least those with a European cultural background—would have argued that the creation of the world happened some 6,000 years ago. In the context of their era there were sound reasons for their opinion. At that time, basic geological questions concerned how old the Earth was, whether it was a dynamic system, subject to cyclical action, or whether it was static, with the 'building' essentially completed. The latter opinion was backed up by Christian belief, which supposed that the Earth had not changed much since the last day of creation, the changes wrought by Noah's Flood excepted. Mountains were essentially as God had created them, and hints of dynamic processes, such as inclined strata, transgression of the ocean, or extinctions, were thought to be evidences of catastrophic events such as the Deluge.

There have been about 150 calculations of the age of the Earth by means of biblical chronologies, which placed the creation between about 6500 and 3500 BC. The date 4004 BC, which the Archbishop of Armagh, James Ussher (1581–1656), gave as the date of planetary creation, was arrived at only after meticulous studies of the bible and of ancient calendars. Its indelible imprint on the minds of many in the English-speaking world came about only because it was included in the margin of the Oxford Press edition (1701) of the King James Bible, thereby giving the date a 'godly' authority (Dr John Fuller, Kent). Although this restricted temporal view of the world continued to be the norm well into the nineteenth century, there have also been traditions of a vast time-scale, originating in the thinking of ancient scholars such as Aristotle, and appearing in the work of eighteenth-century authors such as Benoît de Maillet (Dr Ezio Vaccari, Centro di Studio sulla Storia della Tecnica, Genoa, Italy). Vaccari also 'synopsised' the temporal visions of Descartes, Steno, Leibniz, and the 'natural theologians' of Britain and Francophone Switzerland.

Doubts regarding a short-duration universe are often associated with the name of James Hutton (1726–1797). He developed the vision of an eternal cycle in his 'Theory of the Earth'. Destructive phases of weathering and erosion interchanged with constructive phases, during which marine deposits were altered by force of the heat within the globe and gradually built up into mountainous continents. Hutton's Earth resembled a perpetual-motion machine, such that he found no 'vestige of a beginning' and 'no prospect of an end'. His idea of 'endless' time-spans enabled future geological thinking to dispense with catastrophes, which are necessary tools of interpretation if you do not have enough time for gradual development.

Jean-André de Luc (1727–1817), who coined the term 'geology,' was a persistent critic of Hutton. He claimed that only the time since the last 'revolution' could be figured out. What happened before was mere speculation. And indeed he endeavoured to pin down an age estimate of several thousand years for this major revolution, which he correlated to the Deluge, but which in the modern view is the end of the last ice-age. He did it by studying *causes actuelles*, calculating correctly how long it took for a delta to build out or a lake bed to silt up. He called the localities where this could be done 'nature's hour-glasses' or 'nature's chronometers,' thereby inventing useful tools for geological investigation (Professor Martin Rudwick, Cambridge University). Charles Lyell (1797–1875) claimed this principle of uniformity to be the only valid method to interpret geological phenomena. He, like Hutton, had a cyclical view of Earth history, with a near endless time-span available for gradual geological processes. Although most geologists of Lyell's time had a linear view of the history of the Earth, many subscribed to a vast time-scale. But there were problems: in 1866, William Thomson (1824–1907), better known as Lord Kelvin, published a short paper, 'The 'Doctrine of Uniformity' in Geology Briefly Refuted'. Thomson was then known as one of the greatest physicists of his time and he possessed the authority of his exact science. His premise was that the temperature of the Earth represented a remnant of an initially hot, molten body, which had cooled slowly and steadily since its formation. From the mass of the globe and the current heat flow, Thomson calculated how much time must have elapsed since the original glowing conditions. He concluded that the Earth could not be older than perhaps 100 Ma. During the following years, he revised this figure downward, to 20 Ma. As Professor Joe Burchfield (Northern Illinois University) stressed in his talk, Thomson's numbers are correct in view of the database available in his time. Moreover, the gradual cooling of the Earth showed definitely that Earth's history was not cyclic but had a direction.

This physical approach was not new. Georges Louis Leclerc, Comte de Buffon (1707–1788), had already calculated an age of the Earth of about 75,000 years, using cooling rates from glowing liquid spheres of iron (Professor Kenneth Taylor, University of Oklahoma). Most geologists and palaeontologists of the 19th century could live comfortably with Thomson's 100 Ma estimate. The time limit granted by physics was generally accepted as the frame in which the empirical data of geology had to fit. John Phillips (1800–1874), a nephew of William Smith and a President of the Geological Society (1858–1860), is perhaps best known as the originator (1841) of our terms for geologic eras: Palaeozoic, Mesozoic, and Cenozoic/Cainozoic. He acted as geological adviser to Thomson. He constructed a thermometer for measuring temperatures at the bottom of boreholes, to provide Thomson with the necessary data for his calculations. Phillips stressed that geology needed the aid of the exact sciences (Jack Morrell, Bradford University).

However, each lowering of the age of the Earth by Kelvin increased the problems of the promoters of a steady-state Earth. The most ardent opponent of Thomson was probably Charles Darwin (1809–1882), who needed great spans of time for his theory of evolution. But Thomson argued, over the last forty years of the nineteenth century, that no known phenomenon of physics could provide the Earth with sufficient energy to keep surface temperature more or less constant over the hundreds of millions of years that geology postulated. The Irish geologist John Joly (1857–1933) also tried to give an exact figure for the age of the Earth. His idea was that the oceans had initially contained fresh water. So Joly calculated, in a quite sophisticated manner, how much time was needed for oceans to reach their present level of salinity. Ironically, his figures had the same order of magnitude as Thomson's estimates. Although Joly worked later in his life on radioactive phenomena, he never could

reconcile himself with the implications of radioactive decay for a much greater age of the Earth (Dr Patrick Wyse Jackson, Trinity College, Dublin).

In 1896, Henri Becquerel discovered a hitherto unknown physical phenomenon, later called radioactivity. Pierre and Marie Curie subsequently showed that radioactive decay produced heat. Thus, a phenomenal source of energy, unknown to Thomson and other physicists of his era, existed in the Earth's interior. Assumptions of monotonic cooling for the planet had to be drastically revised.

Soon radioactivity permitted the dating of rocks, and the work of 20th-century geochronologists supplied powerful tools and multiple methodologies for refining the dates of significant events in Earth history. Some of the pivotal steps in the evolution of these dating techniques were recollecting by Professor G.J. Wasserburg (California Institute of Technology), a participant in the geochronological revolution. Initially, some geologists had little use for the achievement, since they were perfectly happy thinking in terms of relative time. However, it was the absolute numbers which provided, and still provide, a link between various scientific disciplines, thereby giving rise to interdisciplinary discussion and occasional confrontation (Professor Stephen Brush, University of Maryland). Geology and physics collided in the late nineteenth century (although some participants characterised versions of the debate as 'mythical'), and when astronomers in the 1930s were arriving at an age of the Universe less than the age of the Earth (!), they decided to treat the geologists' radiometric dates with genuine respect. It was Arthur Holmes (1890–1965) who first combined radiometric ages with the geological formations to create a geological time scale. His book on *The Age of the Earth* (1913), written when he was only 22, had a major impact on those interested in geochronology, but the high values he assigned to many Earth events (for example, 1.6 Ga for planetary origin) were initially disbelieved by colleagues who had lived comfortably within Thomson's 100 Ma time-frame (Dr Cherry Lewis, Keele University).

This brief glimpse into the history of cosmic and planetary time shows quite clearly that the ideas did not evolve along straight lines but in 'braided' streams of thought, influenced by neighbouring disciplines as well as by people's disposition, by their background of experience and by a general social and historical setting. Happily, given this necessarily abbreviated sprint through some very rich material, the Geological Society plans to generate a Special Publication incorporating material presented, plus a few supplementary papers. The target date for publication is late in 2001.

Further Reading

Brush, Stephen, *A History of Modern Planetary Physics in 3 volumes*, Cambridge University Press, Cambridge, New York and Melbourne, 1996.

Burchfield, Joe D., *Lord Kelvin and the Age of the Earth*, Science History Publications, New York, 1975.

Hallam, A., *Great Geological Controversies*, Oxford University Press, London, 1989 (Chapter 5, 'The Age of the Earth').

Gould, Stephen J., *Time's Arrow, Time's Cycle. Myth and Metaphor in the Discovery of Geological Time*, Harvard University Press, Cambridge (Mass), 1987.

Lewis, Cherry, *The Dating Game—One Man's Search for the Age of the Earth*, Cambridge University Press, Cambridge, New York, and Melbourne, 2000.

Oldroyd, David, 1996, *Thinking about the Earth: A History of Ideas in Geology*, Athlone Press, London; Harvard University Press, Cambridge (Mass) (Chapter 6, 'Geological Time and the Tempo of Geological Change').

Martina Kölbl-Ebert, Munich, and Kennard B. Bork, Granville, Ohio

Abstracts

Aubrey Manning, 'Time, Life, and the Earth', Aubrey Manning

Modern developments in the earth sciences have revealed, for the first time, how our planet actually 'works'. For biologists, it has meant a new understanding of the interwoven histories of the physical and the living worlds. New biological discoveries show how early in Earth's history life arose and how it was able to flourish under the hostile conditions of the young solar system. From the first generation of free oxygen into the atmosphere, life has had major effects on the Earth's progress. Reciprocally, the dynamic nature of the planet has repeatedly challenged life but—so far—it has survived to find new opportunities in changed environments. As we celebrate the age of the Earth, we ourselves have fresh opportunities to unify once more the biological and the earth sciences, to recreate a true 'Natural History'.

John Fuller, 'Before the Hills in Order Stood: The Beginning of the Geology of Time in England'

That order should govern the nature of the world is an idea not confined to England, though the history of science in this country demonstrates again and again that a conception of Divine order lay at its heart. To people of the earlier days, want of order implied confusion, displacement, derangement, the time out of joint, even the presence of malevolent power—when the planets in evil mixture to disorder wander. The Divine scheme revealed by 'Scripture' was frame and support for earth science. It told an indisputable story of an ordered beginning, a diluvial reordering, and a future end in dissolution. It was a story backed by secular law, and no thinking person could have been unaware of it. Yet when and how were legitimate questions, answered in detail by hexaemeron writers. It is an educational curiosity in England that a particular biblical chronology drawn up in 1650 accompanied Scriptures printed for use in schools until 1885—a matter of consequence to the history of all geological thought in this country.

Ezio Vaccari, 'The Time of Genesis and the Time of the Rocks: European View'

During the first decades of the 18th century the Theories of the Earth formulated by the English scholars Burnet, Whiston and Woodward at the end of the 17th century circulated widely within the continent of Europe. These theories established a sequence of physical states of the Earth according to the chronology outlined in the Book of Genesis, which emphasised two main stages: the Creation and the Deluge. Although the authority of the Biblical account on the age and early history of the Earth was normally accepted at the beginning of the 18th century, the continental reception of the English Theories of the Earth varied. This was due to the complexity of the European context which had produced since the 1660s the theories of Descartes,

Leibniz and Kircher, as well as Steno's dynamic view on the development of the Earth's surface. Steno emphasised the importance of the interpretation of rock strata in the field for the reconstruction of the History of the Earth. On the other hand he had also carefully avoided to supersede the Biblical account and had associated the Deluge to one of the geological stages identified in his history. Nevertheless, the Stenonian heritage stimulated some Italian scientists—such as Vallisneri, Marsili and later Targioni Tozzetti and Arduino—to carefully suppose, within the results of their researches, a great indefinite antiquity of the Earth. Theoretical models linked to the Biblical chronology were those, for example, of Swedenborg and Scheuchzer (the latter also translated Woodward's theory of the Earth in Latin): similar models were still adopted in Germany and Sweden around the middle of the 18th century, when scientists such as Lehmann or Bergman showed difficulty in emancipating themselves from the chronological account of the Genesis, in spite of their accurate lithological analyses. Instead, in France, De Maillet proposed a Theory of the Earth which was censured by the Church because of its possible implications on the eternity of matter. Among the European scholars of the first decades of the 18th century, the Stenonian heritage (the necessity of fieldwork in a regional context) and the global Theories of the Earth were equally influential. The aim of this paper is to evaluate the different views on the age of the Earth during a phase of transition in geological scholarship, from a stage dominated by theoretical models to a period gradually more based on field research.

Kenneth L. Taylor, 'Nature's Own Chronology'

During the 18th century many naturalists and philosophers became persuaded of the great antiquity of the Earth, and of the promise that knowledge of the Earth's past and development could be built up through investigations of natural terrestrial features. In common with most geological issues of the time, these opinions rose to prominence to a considerable degree in connection with the so-called Theories of the Earth. In this paper I discuss some of the interconnections between Theories of the Earth and the emerging enterprise of geological field investigation, as they related to questions about the Earth's history and age. In particular, I focus on the two rather different Theories of the Earth offered by Buffon in 1749 and 1778, respectively. While the earlier one (*Théorie de la Terre*) emphasised principles for extracting physical knowledge of the Earth's configuration through empirical investigation, the latter theory (*Époques de la Nature*) drew attention to the project of organising knowledge about the Earth around a directional sequence of periods. The central impulses of Buffon's two conceptions of the Earth appear to have been combined in some actualistic field investigations by geologists of the late 18th century, which contributed significantly to the establishment of methods for determining distinct stages or sequences of the Earth's past.

Martin Rudwick, 'Time, Geology and Fossils in the Age of Cuvier and Lyell'

Two phrases became crucial in debates in the earth sciences around 1800, as a result of their invention and use by the Genevan naturalist, Jean-André de Luc (1727–1817), James Hutton's most important and persistent critic. It was de Luc, not Hutton who insisted on the careful observation of the rates of present geological processes, which he called actual causes. He used them to construct natural chronometers that would fix an approximate date for a putative major 'revolution' in the geologically recent past. This event, he argued, had marked the start of the 'present world'; the preceding 'former world' had been far more lengthy, but was immeasurable. It was de Luc who first defined the term 'geology' in its modern sense: his influential work upsets many of the comfortable platitudes of the traditional history of our science. This paper will trace its legacy in the age of Cuvier and Lyell in the early nineteenth century.

Jack Morrell, 'Genesis and Geochronology: The Case of John Phillips (1800–1874)'

In 1841 John Phillips proposed that there were three great periods of past life on the Earth, namely, the Palaeozoic, the Mesozoic and the Cainozoic, terms which are still used today. This was by no means Phillips' sole contribution to geochronology and this paper will examine his evolving views on this subject over a span of forty years. In the 1820s he adopted the Deluge as a notion which reconciled Genesis and geology. From the 1830s he adopted a liberal Anglican position, which saw attempts at such reconciliation as futile and dangerous, and incurred the wrath of so-called scriptural geologists. From 1853 to his death, Phillips was a public figure as, successively, deputy reader, reader and professor of geology in the University of Oxford. He was also President of the Geological Society 1858 to 1860.

The publication of Darwin's *Origin* (1859) and of Lyell's *Antiquity of Man* (1863) not only provoked him to re-affirm his liberal Anglicanism but also induced him to give greater attention to geochronology as a weapon to be used against Darwinian evolution.

Joe Burchfield, 'Measuring Geological Time: Quantification and Geology in the Late 19th Century'

During the late nineteenth century, geologists and physicists proposed a remarkable variety of methods for determining the Earth's age and the durations of lesser segments of the geological time scale. That effort to quantify the geological time scale affected both the theory and practice of geology during a period when it was maturing into an increasingly specialised professional scientific discipline. This paper examines a few episodes in the quest to devise reliable methods for measuring geological time, episodes chosen to illustrate both the variety of the methods proposed and some of the conceptual consequences of the results obtained.

Patrick N. Wyse Jackson, 'John Joly (1857–1933) and his Determinations of the Age of the Earth'

John Joly, Professor of Geology and Mineralogy at Trinity College, Dublin from 1897 until his death in 1933 was perhaps Ireland's finest scientist of the early part of the twentieth century. An inventor, physicist, and geologist, he published many important papers on geochronology, a topic that had taxed the minds of some earlier Irish academics. In 1899 Joly published his seminal paper on the subject, which revisited the work of Edmond Halley some two centuries earlier. Joly estimated the amount of sodium in the oceans, and based on the assumption that the oceans were originally fresh, he calculated the time it would have taken for the oceans to obtain their present sodium levels by denudation. This suggested the Earth was a minimum of 90–100 million years old. While this work was important in challenging earlier chronologies, particularly those of Kelvin, Joly's determinations were later questioned by others, and in the light of other methods were found to be low. Joly's interest in

radioactivity led him to develop new research, both in geology and in medicine. He recognised that decay of radioactive elements were responsible for the internal heat of the Earth. His identification of pleochroic halos found in micas in granites, as products of radioactive inclusions, allowed him and Ernest Rutherford in 1913 to calculate that the Devonian occurred 400 million years ago. This appeared to confirm Arthur Holmes' earlier and similar age determinations for that geological period. However, Joly viewed radiometric dating methods with some scepticism, and argued that radioactive decay rates may not have been constant throughout geological time. Late in life he continued to hold to the view that his sodium method was more accurate.

Hugh S. Torrens, 'Timeless Order: William Smith and the Search for Raw Materials'

The history of geology cannot merely be concerned with its academic study. It must include its practice, finding the materials on which mankind depends. For this reason, a fresh look at William Smith (1769-1839) is badly needed. We should first think of him as a man who did things (technology) rather than one who knew things (science). He was canal surveyor and engineer, land drainer and irrigator, sea erosion and harbour engineer and mineral prospector and surveyor all the time he was most active in geology. This was before there were any journals for, or chairs in, English geology. Smith's geological knowledge grew from the small region round Bath and the Somerset Coalfield until it encompassed nearly the whole of England & much of Wales. His stratigraphic grasp was even more complete, from the London Clay down to the, then vital, Coal Measures, leaving us a legacy reflected in many of the names in use today, like Callovian. His greatest achievements range from his early ordering, and identification, of Bath strata 1794-1799 to his great and single handed (and minded!) map of much of Britain of 1815. He duly passed his skills on to his few pupils. If the charge is made that no one could have achieved so much in a country with so slight a tradition in geology, it needs to be pointed out, how badly such practical geology is recorded in history, particularly in the country which first underwent its 'Industrial Revolution'. Smith should be seen as the man who first brought science to the clandestine world of mineral prospecting. It was he who first used this to urge against an expensive and abortive trial for coal (in 1805 in Somerset where his freely given advice was ignored) and who first tried, on properly informed stratigraphic grounds, to find new coal supplies near Bath (although he was unsuccessful). He deserves above all to be thought of as having pioneered the practice of geology. Much of this will be described in this lecture, as will his treatment by the new Geological Society of 1807 (whose leaders at first did not believe he had uncovered anything of significance and then simply stole it), and his treatment of geological time.

Stephen G. Brush, 'Is the Earth Too Old?'

What's in a number? Estimates of the Earth's age can sometimes affect the relations between disciplines and encourage the development of unorthodox theories. These theories may resolve a dispute between fields but create a new one within a field. In the late 19th century the thermal physicists' Earth was too young for evolutionary biologists; a revival of Lamarckism was one response to the problem. In the middle of the 20th century the nuclear physicists' Earth was too old for cosmologists; the Steady State universe offered a way out of the difficulty. In late-20th century America, the scientists' Earth was too old for biblical creationists, leading some of them to posit a deceptive Creator who made 103 years look like 109. But within science the 1950s age of the Earth is still accepted, having survived the 'Revolution in the Earth Sciences'. A more recent controversy (almost settled) is whether some stars are too old for a (relatively) young universe.

Cherry Lewis, 'The Dating Game: Arthur Holmes' Vision of a Geological Time Scale'

Arthur Holmes (1890-1965) was a man of vision. A pioneer in the development of radiometric dating techniques, in 1913 he predicted that: '[w]ith the acceptance of a reliable time-scale, geology will have gained an invaluable key to further discovery. In every branch of the science its mission will be to unify and correlate, and with its help a fresh light will be thrown on the more fascinating problems of the Earth and its Past'. For the next fifty years he worked almost single-handedly at realising this dream. In the late 1920s his profound understanding of the effects of radioactivity on the Earth's internal processes placed him in a unique position to formulate the now accepted mechanism for the then highly controversial theory of continental drift. But at the time his ideas for this 'all-embracing theory' were ridiculed and ignored. Twenty years later a handful of crude radiometric dates was still all that was available, yet based on some of those values, at the International Geological Congress held in London in 1948, Holmes turned the geology of Africa upside down: '[n]o one could be more aware than I am how unsatisfactory are most of the age determinations already available. Nevertheless, poor and few though they be, they serve to show what far-reaching conclusions can be drawn'. Perhaps for the first time geologists realised just how important radiometric dating was in revealing the relationship of one rock to another, thereby illuminating geological processes. By 1956 the currently accepted age of the Earth had been established, and in the early 1960s a 'revolution' occurred in the earth sciences such that, by the end of that decade, only a few geologists still did not accept the 'new' ideas about sea-floor spreading and continental drift; precursors to the great unifying theory of 'Plate Tectonics'. Central to those ideas was a geological time scale.

G.J. Wasserburg, 'Stones and the Voices of Time'

Stephen Moorbath, 'The Oldest Rocks on Earth: Time Constraints and Geological Controversies'

Ages in the range ca. 4.0-3.6 Ga have been reported world-wide for the oldest calc-alkaline, granitoid (magmatic) orthogneisses, considered characteristic of continental crust, and probably formed by partial melting or differentiation from a mafic, mantle-derived source.

The oldest known, extensive supracrustal (i.e. volcanic and sedimentary) rocks, of which the best-studied examples occur in West Greenland, yield ages in the range ca. 3.8-3.7 Ga. Despite amphibolite-facies metamorphism, strong (but variable) deformation and locally intense metasomatism, much information can be obtained on their predominantly marine depositional environment from the wide range of volcanic and sedimentary rock lithologies. Several of the metasedimentary horizons in West Greenland contain ¹³C-depleted micro-particles, regarded by some workers as biologically mediated. Some of the oldest known, in-situ orthogneisses and sediments in Greenland and elsewhere contain complexly-zoned zircon grains dated by the U-

Pb method in the range ca. 4.2–3.8 Ga, inherited or recycled from older, chemically evolved rocks of unspecified petrogenetic affinity which are no longer exposed or have not yet been discovered. Confusion has arisen, especially in granitoid orthogneisses, when inherited zircon dates were sometimes regarded as the true age of their host rock. In such cases, detailed imaging studies, in combination with the use of other decay schemes (especially Sm–Nd, Lu–Hf, Pb–Pb), are essential for deciding whether individual zircon grains are either inherited or cogenetic with their host rock, or both (i.e. in the case of zoned grains with multiple age histories). No direct geological evidence has yet been found for terrestrial events pre-dating the oldest, in-situ rocks as far back as 4.45 Ga, regarded as a minimum age for the Earth on the basis of combined U–Pb, Pb–Pb and extinct radionuclide studies. By analogy with the moon, massive bolide impacts had probably terminated on Earth by 3.85–3.80 Ga, although no evidence for them has yet been reported. Soon after this time, however, global tectonic and petrogenetic regimes increasingly resembled those of later epochs, and the production of continental crust commenced.

John H Callomon, 'Fossils as Geological Clocks'

To reconstruct the history of the Earth we need to know what happened and when—events and their dates—and we should like to know how it happened and why—processes and their rates. To date a historical event we need a time-scale for reference—a calendar—and a means of placing events in this time-scale—a clock. Direct access to the primary physical calendar, of time measured in years by means of elemental radiometry as clock, is possible in only a minority of geological problems. By far the richest historical source in the Phanerozoic Eon has been the stratigraphical analysis of sedimentary rocks by means of fossils, the approach pioneered by William Smith. The succession of fossil biotae is used to construct the calendar of relative time, the familiar standard chronostratigraphic time-scale still in process of refinement today. Rocks are then dated through time-correlations with this scale by means of their guide-fossils (von Buch) as clocks. The power to measure the rates of geological processes then depends on the time-resolution achievable by means of fossils, the time-intervals between distinguishable events. The present-day state of play will be illustrated by examples taken from the Jurassic Period (150 Ma) and using ammonites as the clocks.

Albrecht Hofmann, 'Tracing Earth's Age and Evolution'

The idea that one could measure the age of the Earth originated from the conviction that our sun and planetary system was created essentially simultaneously. This idea was reinforced by the discovery that meteorites and Earth have (at least isotopically) very similar, and in most cases identical, compositions. Patterson's discovery that the Pb isotopic compositions of rocks, which he believed to represent an average of terrestrial lead, fall on the meteoritic Pb–Pb isochron of 4.5 Ga thus fixing the age of the Earth at roughly the same value. Today we know that the Earth has been differentiated and that there is no particular rock or group of rocks that are truly representative of the entire Earth. The fact that the average composition of lead of the continental crust lies close to the Pb–Pb 'geochron' is a fortuitous consequence of the process which extracted U and Pb from the mantle with very similar efficiency. So in this sense, Patterson was lucky. Contrary to the views pronounced by creationists, the great antiquity of the Earth is not subject to scientific doubt. The current issue of the exact "age of the earth" is connected with slow accretion and the age of core formation. A new consensus is developing that the Pb-isotope clock of the Earth may have been set by core formation as late as 4.50 Ga ago, which is significantly younger than the age of most meteorites, which is about 4.56 Ga. During core formation, the U/Pb ratio of the silicate portion of the Earth increased several fold, and this effectively reset the U–Pb clock. The subsequent evolution of the crust-mantle system remains a subject of some controversy. The oldest preserved pieces of continental crust are about 4 Ga old, but one view holds that the same volume of continental crust as today existed even 4 Ga ago or earlier. The older crust was therefore lost by erosion and recycling back into the mantle. A more widely held view is that the crust grew more or less irreversibly from small beginnings about 4 Ga ago. Age measurements of detrital zircons may potentially resolve the issue.

Chris Stringer, 'Dating Modern Human Origins'

One of the most serious past difficulties facing any realistic tests of evolutionary models concerning the origins of modern humans was the lack of widely-applicable dating procedures which could reach beyond the practical limits of radiocarbon dating. In addition, the amount of fossil material which had to be sacrificed to obtain a conventional radiocarbon date meant that human fossils could only be indirectly dated through supposedly associated materials. Because of these limitations, the transition from Neanderthals to modern humans in Europe was believed to have occurred about 35,000 radiocarbon years ago, but detailed reconstruction of the processes involved (for example evolution or population replacement) was not practicable. In the Levant, the transition period from Neanderthals to modern humans was believed to lie only slightly beyond this 35,000 year old watershed. Elsewhere, in Africa, Asia and Australasia, the chronology for modern human origins was even more difficult to establish. However, over the last fifteen years, radiocarbon and non-radiocarbon physical dating techniques such as Luminescence and Electron Spin Resonance have been increasingly refined, leading to a revolution in our understanding of the time-scale for human evolution, particularly for the last 300,000 years. Although each dating technique has its own strengths and weaknesses, the picture that now emerges is one of a gradual evolution of Neanderthal morphology in Europe, in parallel with a similar evolution of modern humans in Africa. Modern humans also appear surprisingly early in the Levant (ca. 100 ka) and Australia (ca. 60 ka). However, the complexity of the process which led to the establishment of our species in regions such as Europe and the Far East is only now becoming apparent.

Martin Rees, 'Understanding the Beginning and the End'

Astronomers aim to set our Earth—indeed, our entire Solar System—in a broader cosmic context. Ideas on the formation of the Earth and other planets, previously highly speculative, now have a firmer basis, owing to enhanced data and improved modelling. The cosmogenic processes have been clarified by the discovery of cool dusty discs around protostars: even more remarkable is the recent evidence for dozens of Jupiter-mass planets orbiting other stars, which may be the largest members of planetary systems that also contain (as yet undetectable) Earth-mass bodies. Astrophysicists now understand, at least in

outline, the life-cycle of our Sun and other stars. They are starting to delineate how, over the entire course of Galactic evolution, pristine hydrogen has been fused into the elements of the periodic table.

Report on the Second Meeting of the History of Meteorology Specialist Group of the German Meteorological Society: Garmisch-Partenkirchen, 19–20 July, 2000

The History of Meteorology Specialist Group of the German Meteorological Society had organised its second meeting atop the Zugspitz on the occasion of the centennial of its weather station (formerly observatory). The main subject for discussion was the importance of observatories on high mountains and at low altitudes in relation to the development of meteorology as a science from 1900 to the present.

The President of the German Meteorological Society, Werner Wehry (Berlin) opened the meeting, introducing different aspects of the Zugspitz Observatory. Then Cornelia Lüdecke (Munich) described the circumstances of the establishment of the mountain station at the summit of the Zugspitze (2962 metres)—Germany's highest point—which can be traced back to an initiative of the German and Austrian Alpine Club.

Joachim Kuettner (Boulder, USA) and Ludwig Weickmann (Starnberg, Germany) displayed their flair for 'personal' history. Kuettner gave a vivid account of the period after World War II, when he reconstructed the observatory between 1945 and 1948. A lively description of different meteorological phenomena observed from the Zugspitze, such as lightning or mountain clouds, followed. Weickmann introduced an historical documentary movie from the 1950s on *Wetterwart auf Deutschlands höchstem Gipfel* ('Meteorologist on Germany's Highest Mountain Peak'), showing him during his daily routine, before making some remarks on the special meteorological problems that occurred during his period at the observatory.

Klaus Wege (Hohenpeifenberg, Germany) showed the contribution of mountain observatories like Zugspitze and Hohenpeifenberg to the international meteorological programmes 'World Weather Watch' and 'Global Atmospheric Watch'.

The second day was devoted to further important observatories in the Alps and the Berlin region. Thomas Gutermann (Zürich) presented the observatory at the top of the Säntis in northeastern Switzerland, which has been a permanent challenge for the constructors of meteorological instruments since 1882. He also mentioned the observers and their wives, who worked most of their time at 2500 metres for more than decades. Wolfgang Schöner (Vienna) described the long tradition of 115 years of meteorological research at the Austrian Sonnblick Observatory, at 3106 metres. It followed from the discussion that high mountain observatories have increased in importance by the performance of continuous chemical investigations of the atmosphere.

Dietrich Spänkuch (Potsdam) considered the changing role of meteorological observatories, starting with different definitions of observatories from 1892 until the 1990s and applying them to the Meteorological Observatory at Potsdam southeast of Berlin. None of the participants could understand why this observatory, with its long tradition of 107 years of excellent work, was to be closed at the end of 2000 due to economy measures at the German Weather Service. Some of the routine measurements were taken over by the Meteorological Observatory at Lindenberg northeast of Berlin. The meeting finished with Joachim Neisser (Lindenberg), who gave a paper on the past and future tasks of the Lindenberg Observatory.

Besides the meeting the philately club of Garmisch-Partenkirchen presented a poster exhibition on 'Important Mountain Observatories'. There was the possibility of a special postmark for the special stamp issued for the centennial of the Zugspitz Observatory.

Extended abstracts of the papers were published in *Mitteilungen der Meteorologischen Gesellschaft* (3/ 2000 and 4/2000) and can also be found on the web at:

<http://www.met.fu-berlin.de/dmg/dmg_home/fagem/observatorien2000.html>.

Cornelia Lüdecke, Munich

Exhibition on Science in 18th-Century Padua.

In March, 2000 an exhibition was staged in Padua, which lasted until the end of the year. Its title was 'Curiosity and Ingenuity' (*La curiosità e l'ingegno*), the topic being scientific collections and experimental method in eighteenth-century Padua. It was devoted particularly to two professors in Padua University: the Tuscan, Antonio Vallisneri Senior, and the Venetian, Giovanni Poleni; and to the Venetian pharmacist, Giovanni Girolamo Zannichelli.

Antonio Vallisneri (or Vallisneri—he used both names) Senior was born in Trassilico (Lucca, Tuscany) in 1661 and was professor in the University of Padua, where he taught 'Practical Medicine' from 1700 to 1709 and 'Theoretical Medicine' from 1710 until his death in 1730. He established a large collection of antiquities, natural objects, anatomical bodies, and rare objects to satisfy his 'philosophical curiosity' (*filosofica curiosità*, as he described it), as a means of getting to know nature. In this manner, the transition from the *Wunderkammern* ('Rooms of Wonders') of the previous century to the naturalistic observation of the eighteenth century was accomplished. So far as geology was concerned, there were samples of minerals, rocks, and fossils by the hundred.

Vallisneri's son, Antonio Vallisneri Junior, born in Padua in 1709, donated his father's collection to the University in 1733. The gift was accepted by the Senate of the Republic of Venice and the following year the son was appointed to the new chair for the illustration of *Semplici non vegetabili* (non-vegetable therapeutic substances, or 'simples'). Antonio Vallisneri Senior's dream to use his collection for the training of the students was thus realised. The son completed the publication of his father's writings (*Physico-Medical Works*) in 1733 and enriched and enlarged the collection. Antonio Vallisneri Junior's teaching represented the beginning of natural science among the university subjects at Padua.

The name was, however, soon changed to 'Natural History' (*Storia Naturale*), with a three-year course, in rotation, of mineralogy and geology, zoology, and general botany, while at the same time other teachers (Giulio Pontedera and then Giovanni Marsili) undertook the illustration of the medicinal plants in the University Botanical Garden (founded by Francesco

Bonafede in 1545, the oldest amongst the Italian universities). Vallisneri Junior continued his teaching of Natural History until his death in 1777. He bequeathed his father's library to the University, with thousands of volumes. Among the geological contributions of Antonio Vallisneri Senior we should remember his correct interpretation of the water cycle, in 1714: *Lezione accademica sull'origine delle fontane* ('Academic Lecture on the Origin of Springs'), held at the Accademia dei Ricovrati, an institution founded in Padua by Galileo Galilei. Vallisneri rejected the analogy of the alembic, according to which the spring water originates from the underground by evaporation of sea water coming in contact in the depths with the internal fire of the Earth. He showed, rather, that it derives from the rains, falling from the clouds, which originated by condensation of the evaporation from surface of the sea. He visited numerous caves and observed that the water descends from the roof or from the sides, rather than rising from the floor. Moreover, the discharge of the springs varies according to the seasonal rain. He also correctly interpreted the origin of fossils (advocated in Padua since 1540 by another professor of medicine, Girolamo Fracastoro) and dissociated them from the Universal Deluge. This position was reaffirmed in 1740 by the abbot, Anton Lazzaro Moro, with the approval of the Catholic Church.

For the interpretation of the thermal waters of the Euganean Hills near Padua, Vallisneri Senior performed many thermometric and salinity determinations at different seasons of the year, showing their almost complete independence of the local rainfall. He also discovered the marine ingressions along parts of the Italian coast (now regarded as having occurred in the Pliocene). In the exhibition, 45 samples of minerals and rocks and 55 of fossils were displayed, accompanied by the original descriptions of Vallisneri (who used Italian rather than Latin in his writings) and by the modern classifications. In several cases, the exhibited objects are shown to have belonged to the original Vallisnerian collection. In other cases, they agree with the descriptions in the catalogues, but could have been equivalent objects, subsequently added. The Curator of the Padua University Museums of Mineralogy and Petrology, Dr Claudio Brogiato, and of Geology and Paleontology, Dr Mariagabriella Fornasiero, arranged and described the respective sections. The same was done by the curators of the various sections for archaeology, zoology, anatomy, herbariums (of Zannichelli), and physical instruments (of Poleni, who called his laboratory of physics *Teatro di filosofia sperimentale*, or 'Theatre of Experimental Philosophy').

Giuliano Piccoli, Padua

Two Centuries of the *Real Museo Mineralogico*

At the beginning of April the bicentenary of the *Real Museo Mineralogico* of the University Federico II in Naples was celebrated. This museum was officially opened by Ferdinando IV di Borbone, probably on March 28, 1801. The Borbone wanted this museum in order to collect minerals from the European mineralogical deposits. In 1789, Ferdinando IV and his wife Maria Carolina, with the far-sighted and innovative purpose of creating experts who would value and exploit the mineral resources of the *Regno di Napoli*, published a competition for mineralogy scholars. The winners attended European mineralogy schools and visited mines and metallurgic plants. The samples they collected in Transylvania, Galicia, Bohemia, Germany, the British Isles, the Orkney Islands, and Iceland, are the heart of today's mineralogical collection.

The *Real Museo Mineralogico* is located inside the beautiful eighteenth-century library of the *Collegio Massimo dei Gesuiti* (Jesuits). The library, which was built to house the books written by members of the *Compagnia del Gesù*, was started in 1688 and finished in 1700. It is on two levels: the lower is characterised by wall-to-wall showcases and Doric columns. The upper level is a platform where you find a row of Corinthian columns and frescos, which give a majestic touch to the room. In 1767, the Jesuits were expelled from the *Regno di Napoli* by Ferdinando IV and with a decree of 1777 the *Collegio Massimo* became the seat of the university. The Library was assigned to the Academy of Sciences and the Museum of Mineralogy, but its structure was not changed, except for four wood sculptures covered in pure gold placed in the four corners of the room. These represent geodetic and mineralogy instruments of the 19th century.

The *Real Museo Mineralogico* became a prestigious scientific institution, both in Europe and worldwide and played a key role also in the history of the city. In 1848, after the granting of the Constitution by Ferdinando, the *Camera dei Deputati* gathered in the 'Monumental Room'. In 1860, it was one of the twelve polling stations for voting on the question of the union of the Kingdom with Italy.

To celebrate the origin of this museum, a meeting about mineralogy and science history was held in the Monumental Room on 4 and 5 April, 2000. The principal topics were the evolution of mineralogy and Earth science in last two centuries, particularly in Naples. During a video-conference with the *Muséum National d'Histoire Naturelle* of Paris they discussed Vesuvius, Arcangelo Scacchi (the most famous director of the *Real Museo Mineralogico*), the influence of the French mineralogical school, the cultural exchanges between the *Muséum National* and the *Real Museo*, and about the Vesuvian collections of William Hamilton and Teodoro Monticelli in the British Museum.

The celebrations included concerts and concluded with an excursion in the beautiful Gulf of Naples.

Imma Menditti, Naples

Walking with Dinosaurs

In a closed quarry of Altamura in Apulia region (Southern Italy) there is the most important Italian layer of dinosaurs footprints, one of the biggest in Europe, with about 30,000 footprints on a surface of 15,000 square metres. There are both isolated footprints and footprints organised in trails, one of which was named *Apulosauripes federicianus*. The area is presently being studied by paleontologists of the Roman university "La Sapienza". Researches are only beginning, but they have already singled out five different species of dinosaurs living on this site. The dimensions of the footprints vary from 5-6 to 40-45 cm so the animals could have been about 10 metres high. The footprints date back to about 70,000,000 years ago (Upper Cretaceous), when the Apulia region resembled the present Bahamas Archipelago. The substratum on which dinosaurs moved was marshy, with a mud bottom and carpets of algae: that allowed the preservation of footprints.

At present, the investigators are preparing a census of all the footprints. In the future they intend to reconstruct the environment of the area of the quarry where the dinosaurs formerly lived (a 'Cretaceous Park'), so that visitors will be able to 'breathe prehistoric air'.

Recently, researchers from the University of Ferrara have discovered some further dinosaur footprints on the Gargano Promontory (another area of Apulia region), dated to about 125,000,000 years BP, so that this part of Italy is considered one of the most important Italian sites for dinosaur ichnology.

Imma Menditti, Naples

FORTHCOMING MEETINGS

'Earth System Processes', 24 June–28 June, 2001, Edinburgh

A global meeting presented by the Geological Society of London and the Geological Society of America. For more information on this broad interdisciplinary meeting, or to register, please go to:

http://www.geolsoc.org.uk/template.cfm?name=gsa_edinburgh.

Joint Meeting on the History of Science in Museums, 30 June–1 July, 2001. Musée des Arts et Métiers, Paris

Information from: British Society for the History of Science, 31 High Street, Stanford in the Vale, Faringdon, Oxfordshire SN7 8LH, UK. BSHS full members: £20; Non-members: £22

Challenges of a Challenging Earth, 10 July–13 July, 2001, Amsterdam. An environmental sciences conference: <www.sciconf.igbp.kva.se>

21st History of Science Congress, Mexico City, 8–14 July, 2001

The theme of the Congress will be 'Science and Cultural Diversity'. For further information, contact: Apartado Postal 21–873, 04000 México, D.F., México (E-mail: <xxiichs@servidor.unam.mx>; or <www.smhct.org>). Drs Cornelia Lüdecke and Silvia Figueirôa will act as delegates on behalf of INHIGEO.

The Commission of Oceanography and the Pacific Circle are organising a joint symposium at the Congress: 'From the Pacific to the Atlantic: Oceans, Peoples, and the Pursuit of Natural Knowledge'.

The International Union of Geodesy and Geophysics is holding an International Congress in Hanoi, Vietnam, 19–31 August, 2001. The programme will include an historical section organised by INHIGEO Member, Wilfried Schroeder. For further information, contact: <iaga-iaspei@fpt.vn>; or visit: <<http://www.IASPEI.org>>.

The Society for the History of Technology will hold its annual meeting in San Jose, CA, 4–7 October, 2001.

Contact information: Division of Technology, Culture and Communication, School of Engineering and Applied Science, Thornton Hall A-216, University of Virginia, VA 22903. Phone: (804) 924-6177. Email: <shot2001@virginia.edu>.

The History of Science Society will hold its 2001 meeting in Denver, Colorado, from November 8 to November 11, in conjunction with the International History and Philosophy of Science Teaching Group. For additional information, visit the HSS web-site at: <<http://depts.washington/hsex/>> or contact Jay Malone, HSS, Box 351330, University of Washington, Seattle, WA 98195, USA.

For Volcanologists: The Mont Pelée Eruption. Meeting in 2002

A meeting on volcanism and the history of volcanism, recalling the famous eruption of Mont Pelée, Martinique, in 1902, which destroyed Saint-Pierre-de-la-Martinique and killed around 30 000 people, will be held in Martinique in 2002. For further information, contact: Dr Gaston Godard, Laboratoire de Pétrologie, UPRESA–7058, Tour 26–00 Etage 3, 4 place Jussieu, 75252–Paris Cedex 05. Tel.: 33 1 44 27 51 91; Fax: 33 1 44 27 39 11. E-mail: <gg@ccr.jussieu.fr>

Bicentennial Celebrations of the Birth of Alcide d'Orbigny: La Rochelle, France, Spring 2002; Paris, July 2002; Santa Cruz, Bolivia, August 2002

This major 'celebratory' series of events will be held with the strong support of numerous government and private organisations. The meeting in La Rochelle will be concerned with d'Orbigny the man and his family, and the society and scientific culture of the region of his birth. The meeting in Paris will examine d'Orbigny's scientific work and its implications for the development of modern science. His South American investigations and their part in the development of South American palaeontology will be explored in Bolivia. A special itinerant exhibition on d'Orbigny and his collections will be set up successively in Paris, La Rochelle, and La Paz. A new biography, a new edition of his *Voyage dans l'Amérique Méridionale*, and his hitherto unpublished plates on foraminifera will be published. There will be a CDROM prepared on his voyage, a specially issued stamp, a medal, various plates, casts, etc., and a 52-minute documentary telefilm. Field excursions will follow each of the three meetings, allowing participants to follow in the traveller's footsteps and visit some of the stratotypes that he defined.

For further information, contact The Alcide d'Orbigny Association, 28 rue Albert 1er, 17000 La Rochelle, France (<museum.la.rochelle.alienor@wanadoo.fr>), the Muséum National d'Histoire Naturelle, Paris (<boulinie@mnhn.fr>), or <<http://www.orbigny.org>>.

THE MEETING IN PARIS WILL FORM THE MAIN ACTIVITY FOR INHIGEO IN 2002.

The 6th International Symposium: Cultural Heritage in Geosciences, Mining and Metallurgy, Libraries, Archives, and Museums, Idrija, Slovenia, June 17–21, 2002

This meeting, to be held in Slovenia's oldest mining town, Idrija, is sponsored by the Idrija Mercury Mine and the Idrija Municipal Council. The announced themes are: 'History and occupational health in mining history', 'Sociability in mining history', 'Ecology in the history of mining', 'The Idrija Mercury Mine in foreign archives', 'Handicrafts in Mining Towns', and 'Miscellaneous Topics'. There will be two mid-symposium excursions (US\$20 and US\$50). Conference fee: US\$210.

Accommodation US\$30 per night. Official language: English. Abstracts are required by January 15, 2002. For further information, contact: Tatjana Dizdarevic (tatjana.rzs.idrija@s5.net) or Martina Pisljar (martina.pisljar@siol.net), Idrija Mercury Mine, Arkova 43, SI-5280 Idrija, Slovenia. See also <www.rzs-idrija.si>.

Conference on Biography/Scientific Biography, Melbourne, July 15–17, 2002

The Third International Conference in this field will be held at La Trobe University under the auspices of the International Auto/Biography Association. For further information, contact Dr John Jenkin, Room 306, Humanities 2 Building, La Trobe University, Victoria 3086, Australia <J.Jenkin@latrobe.edu.au>

The 18th General Meeting of the International Mineralogical Association, Edinburgh, September, 2002

This conference, organised by the Department of Geology and Geophysics, Edinburgh University, and the Mineralogical Society of Great Britain & Ireland, will be held from 1–6 September, 2002. The content will be mainly technical, but will provide persons attending to see areas of great interest in the history of geology such as Salisbury Crags, Hutton's Unconformity, etc. Field excursions will include localities of great geohistorical interest such as the Assynt Region, Skye, Rum, the Highland Border Fault, and the area where 'Barrovian' Zones were proposed by George Barrow. For further information, contact <ima2002@ed.ac.uk> or <www.mineralogical.org/IMA2002>.

AWARDS

The Sarton Medal, 2000

Citation for Dan H. Yaalon (reproduced from: *Sartoniana*, 2000, 13, 143–144).*

We can call Prof. Dan Yaalon 'a young historian' and, although he has several grandchildren, he still has one young child: 'the history of soil science', a rather new branch on the tree of sciences.

What is the age of the soil? As old as the earth and hence not precisely known? Does soil differ from earth, ground or land? Is subsoil the same as underground? What is a 'new' soil and what is an old 'soil'? Does soil contain the four elements of nature: earth, water, air, and fire? Is soil part of the earth, its source of life?

Who can better respond to these questions than Dan Yaalon? Most of the answers can be found in his book *History of Soil Science*, a product of his long-term interest and activities in the field of soil science and more in particular its history. For these efforts he deserves the nomination and now the honour of receiving the Sarton Medal.

But not only for writing a book is he winning a medal. Dan Yaalon's life was and still is devoted to soils, soil science and the history of soil science. Born in the former Czechoslovakia in 1924 and after studying at the Agricultural Universities in Copenhagen and Uppsala, he became a citizen of the new state of Israel in 1948, a new state with 'new' promised land (a territory, a surface, square metres, . . .), with 'new' soil (a volume, cubic metres, . . .) . . . it's a matter of dimension.

At the Hebrew University of Jerusalem he got his PhD in Soil Science. He specialised and taught courses in clay mineralogy, soil salinity, pedology, soil survey, erosion and sedimentation, geochemistry.

He was a postdoctoral fellow at the Rothampstead Experimental Station in England and a UNESCO Fellow in Tashkent in the former USSR. He was a lecturer and a professor at the Hebrew University in Jerusalem, the University of Melbourne in Australia, the Johns Hopkins University at Baltimore, USA, the University of California at Davis and at Berkeley, the University of Arizona, Tucson, USA, the Australian National University at Canberra, the Universities of Oxford and Cambridge, U.K., the Ben Gurion University of the Negev, Beersheba, Israel. He was a Visiting Professor of our Ghent University in 1993. This is the history of his academic highlights and appointments.

Although we cannot live with the past we can learn from it. Science can help us in this endeavour and we owe our predecessors in soil science that their achievements should be recognised.

It is Dan Yaalon who took the initiative and founded in 1982 the Committee on the History, Philosophy and Sociology of Soil Science within the International Society of Soil Science (ISSS) and in 1997 of the International Union of the History and Philosophy of Science. Through Newsletters the study of the history of soil science is encouraged. During the congresses of the ISSS in 1990, 1994, and 1998, symposia have been organised and chaired by Dan Yaalon. In 1990 in Kyoto (Japan) there was a symposium on historical, philosophical, and sociological aspects of development in soil science. In 1994 in Acapulco (Mexico) the theme was: 'Origin and transmission of ideas in soil science' and in 1998 in Montpellier (France): 'Attitudes to soil care and land use through human history'. His lectures on 'Paradigm shifts in the history of soil science' are now being published. Those shifts were identified as Liebig's numeral theory of plant nutrition of the 1840s; the recognition of the soil profile as an organised body subject to the influence of largely independent soil forming factors in the 1880s by Dokuchaev, Hilgard, and later Jenny, and the acceptance of the deterministic process-response model for soil reconstruction in the 1960s and 1970s.

The past has passed away, the present does not exist and the future never begins. If future could start then it becomes immediately part of history. Only history can exist . . . in fact everything is history.

We are privileged that at our Faculty of Agricultural and Applied Biological Sciences with its history in soil science we can honour Dan Yaalon as soil scientist with the Sarton Medal. Soil Science has no age but will always be remembered through its history.

Donald Gabriels (Professor of Soil Physics, The University of Ghent), February 17, 2000.

* Inspired by positivist ideals, George Sarton, the first editor of *Isis*, is regarded by many as the founder of history of science as a profession. The University of Ghent was his alma mater and the Sarton awards were established in 1984–1985 to commemorate his 100th birthday.

Sue Tyler Friedman Medal, Geological Society, Awarded to James E. Secord

Citation by L.R.M. Cocks

This medal is awarded to those who have achieved distinction in their work on the history of geology. Jim Secord, you have published a large amount on a variety of historical Earth science topics and are fully worthy of this award.

You were born in Wisconsin and graduated in geology from Pomona College, California in 1975. You then moved on to Princeton for your Doctorate in the Department of History. Since then, you have had postgraduate fellowships at University College London and at Churchill College, and you were appointed as Lecturer in the History of Science at Imperial College in 1985. In 1992, you moved to Cambridge as an Assistant University Lecturer and subsequently Lecturer and Reader in the History of Science, where you remain.

Your historical writings have covered a multitude of themes but have concentrated on the nineteenth century. Your book on the Cambrian–Silurian dispute charting the famous argument between Sedgwick and Murchison was published in 1986 and has become a classic. You reconstructed and analysed in detail their famous arguments, not only in the field, in their correspondence and in the Geological Society's meeting room, but also in the broader context of Victorian society. Your abridged edition, with a long introduction by yourself, of Lyell's *Principles of Geology* has made that classic work far more accessible than it has been for more than a hundred years. You have also written on Charles Darwin, Robert Chambers, and other worthies, and a host of lesser known figures for whom your eloquent characterisations have brought into sharp focus. You gave a keynote address on De la Beche on the 150th anniversary celebration of his foundations which was jointly organised by this Society and others. Your latest book, *Victorian Sensation*, is an in-depth study of Chambers's notoriously anonymous work and of its reception at all levels of Victorian society, and analyses in a fresh way how expert and popular understandings of science were related at a period when that relationship was as fraught then as it often is in the modern world.

Response by James Secord

It is a great pleasure to thank the Geological Society for awarding me the Sue Tyler Friedman Medal.

As an undergraduate in the early 1970s, my interest in the Earth sciences was sparked by the remarkable landscapes of Southern California, the outstanding teaching of Pomona College's geology department, and the collection of classic books assembled by its founder, A.O. Woodford, who was then still alive. I was particularly fortunate that Donald McIntyre was head of department; he encouraged my historical interests and soon after my graduation took me on a memorable tour of field sites associated with James Hutton and other pioneers of Scottish geology. This was the first time I saw the classic unconformity at Siccar Point, so for me it is particularly appropriate to have this depicted on the medal itself. At that time too, I remember the warm welcome extended to me at the library of the Geological Society, where I spent many months exploring the archival treasures during the research that later led to my first book. It was through that experience that I began to appreciate why Charles Lyell had quoted an historian to explain the fascination of understanding the world's past. As Lyell said: "the charm of first discovery is our own, and as we explore this magnificent field of inquiry, the sentiment of a great historian . . . may continually be present to our minds, that 'he who calls what has vanished back into being, enjoys a bliss like that of creating'."

At the first Charles Lyell Symposium in 1975 I made new friends with interests in the history of the Earth sciences, including Martin Rudwick, Jack Morrell, Gordon Herries Davies, and many others. That meeting, like so much else in this field during the last twenty-five years, was organised by John Thackray, whose early death last year was a great tragedy. I want especially in accepting this award to pay tribute to John, who generously assisted me and everyone else with his superb knowledge of the source materials for the history of British geology. That the Geological Society's great legacy is now properly catalogued and preserved is largely due to the time he gave as Honorary Archivist over many years.

It is sometimes felt—perhaps especially in the Earth sciences—that the past is a burden: archives and collections take up space; students would be better advised to learn only about the latest discoveries. But that is an impoverished view. Having taught at Imperial College and at Cambridge, I have been surprised at how many students seem to have lost their enthusiasm for science, an impression borne out by recent statistics about career choice. Among other things, it seems clear that they are looking for a sense of the wider significance of what they are studying. Students, not to mention the wider public, want to understand the Earth sciences as part of our rapidly changing and historically based society—in relation to developments in economics, politics, religion, literature, and communication. When seen from that perspective, history can become not just an optional extra or harmless pastime, but part of the essential fabric of the science itself. As Adam Sedgwick put it so well in his lectures at Cambridge a hundred and fifty years ago, "I cannot promise to each you all geology—I can only fire your imaginations."

Geological Society of America, History of Geology Division Award, Presented to Hugh S. Torrens

Citation by William Brice

With this award, we honour Hugh S. Torrens for his long and outstanding contribution to the field of history of geology. Somehow it seems natural that palaeontology should have been his first professional love, as it is such a historical science. He especially loved working with those beautiful, coiled ammonites of the Mesozoic. The fact that he is the generic and specific dedicatee of several ammonites speaks to his prominence in that field. But it is for his dedication to and passion for the history of geology that we honour him now.

Hugh completed his BA at Oxford and his PhD at the University of Leicester. Since October 1967, he has been a member of the faculty at Keele University, where he attained his professorship in May 1998. He also served as a visiting professor at the University of California, Santa Cruz (1996); Eötvös Loránd University, Budapest, Hungary (1997); and the University of

Saskatchewan, Saskatoon, Canada (1998). In September 2000, Hugh obtained a goal that many of us in this room are seeking, whether we know it or not, for he retired and became professor emeritus.

Hugh has produced more than 200 books, papers, and articles on a broad range of subjects. He has held various offices in such historically oriented organisations as: the Geological Curators' Group (Geological Society of London); the British Society for the History of Science; the International Commission on the History of Geological Sciences; the History of Earth Sciences Society; and the Comité Français d'Histoire de la Géologie; just to mention a few.

One area of his research that deserves special mention is his work on the life of Mary Anning. All of us have thought we know the story of Mary Anning; telling our classes that she collected fossils and that she was the subject of the old rhyme 'She sells sea shells down by the sea shore'. But generally, there it would end, and a giant in the field of palaeontology would be reduced to the subject of a tongue-twisting rhyme. With the tenacity of a bloodhound and a marvellous instinct for the historical trail, Hugh reconstructed the life of this extraordinary woman, who was a major figure in early palaeontology, especially of Ichthyosaurs and Plesiosaurs. She was one of the few people of her age, other than perhaps William Smith, also one of Hugh's subjects, who actually made her living with her geology.

A few years ago, my wife, Heather, and I went to the small town of Lyme Regis, the home of Mary Anning, with Hugh as our guide. We visited the site of her fossil shop, now, thanks to Hugh's involvement, a museum to her work. Hugh told the story of her death at age 48 in 1847 and of the many inaccurate historical accounts of the last few years of her life. There are reports that she became a drunk and spent many of her last years 'in her cups'. However, Hugh discovered that Anning suffered from a form of very painful breast cancer, and the only release from the pain was laudanum, a narcotic containing opium. No wonder she gave the impression of being 'in her cups'. Hugh made the story of her death so real that we had tears in our eyes. We stood silently before her grave, each of us feeling as though we had lost a friend, for Hugh's insightful scholarship had made her live again in our minds and hearts. The full irony of her life struck us as we gazed at the beautiful stained glass window presented to the Lyme Regis church by the Geological Society and dedicated to her memory. It has a wonderful inscription across the bottom filled with laudatory words about her contribution to the betterment of society and her concern for the poor, but not one word about her contribution to geology and palaeontology. Thanks to Hugh's work, we now know how much she contributed to our science.

One need look no farther than Hugh's own family to see the inspiration for his exploration into the contributions of women, for with him all these years has been his wife, Shirley, who has made her own special contribution to the Red Cross of Great Britain. We very much appreciate her understanding and acceptance of the fact that many times he was preoccupied with other women, even though they had been dead for many years.

In recognition of his many contributions to the history of geology, it is with great personal honour and pride that I present my friend and colleague, Hugh Torrens, the winner of the History of Geology Division Award for the year 2000.

Response by Hugh S. Torrens

I heard the glad tidings of my receiving this award while listening to Elgar's rarely performed First World War cantata 'For the Fallen', on the BBC. I remembered his wife had been assistant to the geologist W. S. Symonds and how very vital wives are, particularly mine! Then I recalled Benjamin Britten's opinion of this music; tender, grieving, agonised, splendid. My presence at the first performance of Britten's 'War Requiem' will remain, like today, never-to-be-forgotten. Britten also owed much to Americans. One, in a 1941 Californian bookstore, sold him the book through which he rediscovered his roots; George Crabbe's Poems. These inspired his return to England (and Peter Grimes). Crabbe, too, had deep interests in geology. But why discuss music? Because music needs to be composed (or sometimes elaborated like Anthony Payne's reconstruction of Elgar's 'Third Symphony') and, like history, published. But music also must be performed. Rutland Boughton only heard his fine, still unpublished, 'Third Symphony' (1937) once (privately!). Its only recording drew the comment, "For a symphony as beautiful as this to be unknown, doesn't say much for promoters of music". We historians of geology might ponder how we better promote what we do.

Because there is a paradox. Academic interest in the history of geology is minimal back home (as no sane person plays cricket in Reno?). The all-pervading bureaucracy in our universities demands only 'Impact Factors' (to three decimal places!) and 'Research Quality Assessment' of 'Groups'. 'One-Person Groups' are as undesirable as attempts to be both scientist and historian, supposedly diminishing both. Those who try, become marginal, moving in more than one world, but not at home in, or of interest to, either. I hoped for better at my former University, set up in 1949 to encourage breadth in education, through its Joint Honours Degree programs (why aren't joint honours graduates equally diminished?) and—abandoned—Foundation Year. But that university demonstrated its indifference to the history of science by the secret sale of its precious Turner Collection of rare books in 1998 (*Physics Today*, April 1999, 64).

My greatest feeling is of gratitude, both for this award from friends, and the help I received to get here. To receive it in 2000 was a particular delight, as this year has slightly involved me in three fine new books; Simon Knell's *Culture of English Geology*, Cherry Lewis' *The Dating Game: One Man's Search for the Age of the Earth*, and Debbie Cadbury's *Dinosaur Hunters*. We might see that these are now read, used and quoted (i.e., performed). It is only through such scholarship that we can render justice to those who preceded us in studying our unique planet. Henry Ford was right about the importance of such history. But how we urge it, and its fascination, more, whether in the academy or on geologists (who should be the most historical of scientists), remain intractable problems. Peter Medawar was equally right to assert that "The history of science bores most scientists stiff". But here is another paradox. According to a 1995 Roper poll for the American History Channel, 'The item of greatest interest to the public is the History of Science and Technology'. What are we to make of these different perceptions?

ÉLOGE

Vale John Wennerbom (1934–2000)

INHIGEO, and particularly its Australian members, suffered a great loss with the recent death of John Wennerbom after a long struggle with cancer.

Born in South Australia, John showed considerable ability in athletic pursuits in his early days: skills inherited from his father and genetically passed on to descendants. After early schooling in Mt Barker and Clare (South Australia), where a sympathetic headmaster gave him the opportunity to do special study in chemistry and physics, he matriculated from Adelaide High School. He graduated in Geology from the University of Adelaide in 1955. After a brief stint in secondary school teaching he joined Mobil Oil and spent some years in Papua as Petroleum Geologist and then went into the production, sales, and corporate planning side of the company, building experience in this last field that would stand him in good stead in future years. In 1966 he joined the P.E. Consulting Group, advising major mineral companies in Australia and New Zealand, and then moved to International Technical Services (a joint company set up by the Battelle Memorial Institute of the USA and major Australian mineral resource companies) as Manager of the consulting section, in 1969.

At this time he also became, by invitation, an Honorary Lecturer in Mineral Economics at Macquarie University, Sydney. In 1972 his experience in, knowledge of, and enthusiasm for, industrial minerals saw him become Managing Director of the Minerals Group of Steetley Industries, a major producer of industrial minerals. He remained in this position for ten years.

In 1980, John was one of only a handful of Australians at the last Harvard Graduate School of Business Administration Senior Management Program held near Lucerne, Switzerland. From 1983 to 1989 he was Managing Director successively of Lydgate Holdings and David Mitchell Ltd, until his retirement at the end of 1989.

It was time for John to spend his life in his areas of interest—family, mineral collections, philosophy and history of science, not forgetting good food, good wines, and stimulating company. In 1992, he took the opportunity to return to university for post-graduate studies, enrolling at the University of Sydney for a Master's Qualifying Programme in the History and Philosophy of Science, concentrating, naturally, on geological matters.

In 1993–1994 John played an important part in the preparations for the INHIGEO meeting in Sydney, concentrating on matters concerned with entertainment and catering. Members and visitors will remember his success with the dinner at St John's College at the University. In 1995, John began his study for a doctorate. He had found an interesting topic: a comparative study of the careers of Charles Lyell and Gideon Mantell, based largely on an analysis of the correspondence between Lyell and Mantell between 1821 and 1852, held in the Turnbull Library, Wellington, New Zealand. In the process, he developed a simple and original prosopographic technique for identifying the elite members of the geological community in Britain in the nineteenth century and then examined the social factors that made it possible for a geologist to become a member of the elite group.

John presented preliminary results of his thesis at the Melbourne meeting of the Earth Sciences History Group (ESHG) of the Geological Society of Australia in 1996 and completed it in 1999, being awarded the degree with commendation by the examiners.

Sadly, however, John was unable to present his final thesis results at the Earth Sciences History Group's meeting in Adelaide in 2000, and his proposed papers for publication were not completed when he died late June that year. Thankfully, a colleague, Julian Holland, has undertaken the task of editing the material for publication.

I was unfortunate in knowing John only during the last ten years or so. Would that it had been much longer. However, in that time I was impressed by his joy of life, his friendliness, courtesy, his enthusiasm for hard work and his knowledge, both wide and deep. I remember with pleasure John's joy at visiting the famous Mantell and Lyell localities in England (and Scotland), and a particular stop in the South Downs when he and Lyell's biographer, Leonard Wilson, stood together discussing their heroes.

John, nominated early in 2000, was posthumously elected to membership of INHIGEO at the meeting held at the International Geological Congress in Rio, Brazil in August 2000.

A crowded memorial get-together at St Paul's College, University of Sydney, paid tribute to John's friendship and wide achievements, and his love of life.

INHIGEO and ESHG have lost a member who was just about to devote his great abilities to its interests. We extend our sympathy to John's wife, Joy, and to his family.

David Branagan, Sydney, 31 October, 2000

ARTICLES

Noah's Flood and Science: A Short Review and Analysis

Francisco J. Ayala-Carcedo, Polytechnic University of Madrid, and Geological and Mining Institute of Spain

Introduction

Natural catastrophes as great floods have an important impact today, particularly in undeveloped communities, as we have seen during the last decade (*e.g.*, the cyclone of 1991 in Bangladesh, which caused 133,000 deaths) or the Limpopo floods of 2000 in Mozambique. Today, we understand the processes involved; we have forecasting and warning systems, and there is international aid for the sufferers. In ancient times, agrarian peoples didn't understand the causes of such events, didn't know the world as a whole, and didn't receive external aid after disasters. But just as we need today to know the reasons why catastrophic events occur, they had to try to explain such events (Eliade, 1951). Often, stunned by the catastrophes and remembering them by oral traditions, they anthropomorphised Nature's forces, as their way of seeking to understand and

overcome them. This was one of the sources of myths, as the 'nature-mythological' school of religion/science (Volney, Grimm brothers, *etc.*) showed during the 18th and 19th centuries. In the 20th century, Dorothy Vitaliano (1973) has used the term 'geomythology' for scientific approaches to the study of ancient myths; and David Oldroyd has suggested the term 'physico-mythology' (cf. 'physico-theology') for cases where we see an interweaving of science with studies of myth (Birkett & Oldroyd, 1991; Oldroyd, 1996).

Besides the Noachian flood, which I analyse below, other myths with a probable historical core are the one of Sodom and Gomorrah (Whitaker, 1997), the plagues of Egypt, and the destruction of Atlantis. Possible scientific explanations were made during the 19th century and are discussed in Vitaliano (1973) and Ayala-Carcedo (2001). The myth of the Noachian flood occurs in three religions—Judaism, Christianity, and Islam—to persuade believers to follow the priests' teachings to avoid God's wrath. Additionally, this myth, combined with the Atlantis one, was one of the bases of Nazi beliefs: the Aryans, the 'pure and superior race', were thought to be the survivors of Atlantis after the Universal Flood. Today, the discovery of the remains of ancient populations flooded by the filling of Black Sea from the Mediterranean, as described by Ryan and Pitman (1998), has renewed interest in this ancient myth because these two scientists claim that they can provide a physical explanation of it. The aims of an approach from science may be: (a) scientific possibility; (b) alternative scientific explanations based on some historical core. Social sciences, specially anthropology and history, are needed to provide a global approach.

'Universal' Floods and Noah's Flood: The Myths

In the ancient agrarian societies, nobody knew the world as a whole and only a few people knew even their own country. So the ancient concept of 'universal' was very different from what it is today. A flood in a broad flood-plain, like those in the low-lying areas of Mesopotamia, might well have been thought of as 'universal'. Andrée, in 1891, recorded 85 'universal' floods in different countries and times (see Henning, 1950). The Noachian Flood became the flood myth of both Western and Islamic cultures, being derived from the Jewish Scriptures. (Noah's Flood is cited in the Koran [Surah 11, Section 4; Surah 54, Section 1; Surah 69, Section 1].)

Noah's flood was not, however, originally a Jewish myth. The epic poem of Gilgamesh, found in Niniveh in the Assurbanipal (668–633) library, is very similar to the Bible's version, probably brought by the Jewish patriarchs from Mesopotamia, mentioning both the raven and the ark. Both versions come from an older one, Sumerian, of ca 3400 B.C., where the hero's name is Xisuthrus (Vitaliano, 1973). As we know (Friedman, 1987), the Bible was written in the first millennium from 722 B.C. by several authors identified as sources 'J', 'E', 'D', and 'P'; and this multiplicity of authorship accounts for the substantial contradictions found therein.

In Genesis (6: 7), Jehovah, the Jewish and Christian god (with two other persons in a 'trinity-unity' in the latter case), said, according to the New International Version of the Bible (International Bible Society, 1984): 'I will wipe mankind, whom I have created, from the face of the earth—men and animals, and creatures that move along the ground, and birds of the air'. At 7: 4, Jehovah said: 'I will send rain on the earth for forty days and forty nights'; and the source of this heavy rain is given at 8: 2 as: 'the fountains of the deep and the floodgates of the heavens' (the Jews believed that Earth was encircled by the deep, with springs and floodgates). Then, at 7: 17, we read: '[f]or forty days the flood kept coming on the earth, and as the waters increased they lifted the ark [of Noah] high above the earth'; and at 7: 19: '[t]hey [the waters] rose greatly on the earth, and all the high mountains under the entire heavens were covered'. At 7: 21 we hear about the harsh fate of 'sinful' mankind: '[e]very living thing that moved on the earth perished'. Later, at 8: 3, one may notice one of the major contradictions in the Bible: '[a]t the end of the hundred and fifty days the water had gone down' (in 7: 17, as cited above, it was forty days). Such contradictions are explained by Biblical experts by the conflation of several authors' accounts in the generally accepted version. There is another contradiction between 8: 7 (when Noah 'sent out a raven'), and 8: 8, when 'he sent out a dove'. In 8: 1, we read about the cause of termination of the flood: 'He [Jehovah] sent a wind over the earth, and the waters receded'.

Is it possible for there to have been a Universal Flood like that of Noah's?

Before trying to test the truth of the Noachian myth in comparison with what may have happened in reality it is interesting to offer a brief reflection about the physical possibility of a flood such as that described in the legend.

From data on world water balance, the quantity of water in the atmosphere is about 13,000 km³. If the whole of this were to fall as rain (which would be impossible because the air always retains a certain quantity in the form of water vapour, the amount depending on the temperature), simple calculation shows that sea-level would increase by less than 1 metre, which would be wholly insufficient to overtop Everest (which would be covered according to a literal reading of the Bible).

If, with the intention of giving every opportunity to the Biblical text rather than to scientific knowledge, we assume there was some process allowing the sea water to evaporate continuously, to maintain continuous rain so as to flood the higher mountains, the oceans would be emptied—but refilled with water flowing therein again—and the higher mountains would still not be flooded, as Vitaliano (1973) has pointed out. If we assumed that all the ice trapped inland were to melt (a process very different from the Bible's), a quantity of water more than 2,000 times greater than that in atmosphere, the sea level would still only rise about 200 metres. And there is no event like this recorded by Quaternary palaeoclimatology.

Another possibility might be the impact of a great extraterrestrial object on the seas. But this hypothesis is very different from that of the Sumerian-Biblical-Islamic legends, and had such an event occurred it would have left several records, such as a great explosion felt all around the world, or a thick veil in the atmosphere and an abnormally long winter, which would presumably have been reported by the Sumerian or Biblical writers.

Thus, from our current scientific knowledge, there could have been no possibility of a flood like that of Noah occurring as described in the Bible or the Koran.

A scientific approach to the Noachian myth

A universal flood like Noah's would have left a double trace: geological and biological. What about this? If all the Earth had been covered by the flood, geologists would find a sedimentary alluvial and aeolian formation (remember the drying process of the flood by wind) spread all round the world. Lyell noted the absence of such a formation and thus doubted the truthfulness of the Biblical text. As it is well known, the word 'diluvium' was employed in the nineteenth century for what we refer to as the Quaternary sediments not directly linked to present-day alluvions. But these sediments do not cover the whole world in the way required by a universal flood, and they don't correspond to a single event but many, occurring over more than 1,600,000 years. Thus there is no geological trace such as might be expected from a universal flood.

If a universal flood occurred during the Holocene, the last 10,000 years, all terrestrial animals and plants, and probably many marine animals and plants also, would have been extinguished. Yet there is no evidence of this general extinction. In fact, all present-day animals and plants, both continental and marine, exhibit continuity with pre-Holocene animals and plants, demonstrating that there was no general extinction such as we would predict if Noah's Flood had been a real event. The Biblical author took this argument into account; so, Yahveh said to Noah (6: 19): '[y]ou are to bring into the ark two of all living creatures, male and female, to keep them alive with you' (it seems that hermaphrodite animals like snails, and ones with non-sexual reproduction, were unknown to Yahveh or his inspired writers, who also forgot to save the plants, necessary to guarantee the survival of animals after the Flood). It is necessary to have a really great act of faith to believe that it was possible to gather together all the worlds' animals in the ark, with its approximate 4,500 m² of surface (and how would they have been transported to Mesopotamia?) and for there to have been food for 40 (or 150) days. The presence of fossils spread over plains and mountains was pointed out by St Eusebius, Apuley and Scheuchzer as a biological demonstration of the universal flood. However, fossils don't come from a single and recent event but from innumerable events, spread over more than a billion years. And there is another biological problem with the Biblical story. When Spaniards explored America they discovered a varied fauna and flora, quite different from that known in Europe. America is separated by oceans from Eurasia, where Noah's disembarked the animals. How did they arrive in America? And why are the animals and plants of America different of the ones of Eurasia? Why were there humans in America? These problems were the subject of heated discussions during the 17th century, in an attempt to reconcile faith and reason. For us, sceptic scientists, there is no biological trace of Noah's Flood.

So, from a scientific point of view, there is no evidence of either geological or biological traces of a universal flood like the one of the Bible's story, and Noah's story must be classified as a myth derived from several prescientific cultures. But, may it be a myth with an historical core? As we saw, there was no universal flood, but floods are an almost universal process. Is it possible that a great flood might lie at the heart of the Xisuthrus-Gilgamesh-Noah's myth?

In the 1920s, Leonard Woolley found a 7-metre thick silt bed at Ur, archaeologically dated as belonging to the fourth millennium BC, obviously deposited by a great flood. This was coherent with the Xisuthrus story. But what process might trigger the heavy rains necessary to produce such a flood in a region that is nowadays arid (100–300 mm of rain per year)? According to Lamb (1995), the climate in the area during the Climatic Great Optimum, 5,000–6,000 years BP, was more humid, and cyclones and monsoons exceptionally arrived in the Tigris and Euphrates valley. The silt beds are geological evidence of this previously wetter climate. Cyclones are usually accompanied by storm surges, due to a combination of barometric depression and severe winds, and this surge may obstruct the flood's drainage, thereby increasing its severity and duration. Sir William Wilcocks (in Henning, 1950) pointed out the 'domino-effect' of the breaking of dams, but it seems difficult to explain a so-great flood in this way, despite the probability that in periods of heavy rain a dam breaking is a real possibility, as the earth-dam break of Tous (Spain) showed in 1982. An old man (according to the Bible [7: 6], Noah was 600 years old at the time of the Flood) perhaps remembered an exceptional flood in these broad flood-plains where the duration of great floods could have been measured in weeks (as in the case of the Limpopo River in Mozambique in January 2000), and built an ark as a means of saving himself, his family, and his animals. Then a combination of an exceptional cyclone or monsoon with a 'domino process' of dam breaking might be a reasonable naturalistic explanation. The Austrian geologist Suess, in 1883, proposed the hypothesis of a coincidence of a cyclone with a tsunami. In that time the theory of triggering of earthquakes by barometric depressions like the ones accompanying a cyclone, was current, and an earthquake might explain—through a liquefaction process—the phrase: 'all the springs of the great deep burst forth' (7: 11). The probability of the occurrence of three exceptional events at the same time (cyclone + earthquake + tsunami) is the product of three small quantities and is much less than the probability of a single event such as a cyclone or a monsoon. Besides, earthquakes are not in fact triggered by barometric depressions, and the Biblical authors did not place the 'great deep' inside the earth but in the skies. For these reasons, I think that an exceptional cyclone or monsoon, or perhaps heavy rains in the high basin of Tigris and Euphrates valley, might be the cause of Xisuthrus-Gilgamesh-Noah Flood. Probably we shall never know the truth, but it is a reasonable alternative to the belief in the myth—a physically impossible event, as discussed above.

Meanwhile, Christian fundamentalists, the self-styled 'scientific creationists', still write thick books like the one of Whitcomb and Morris (1989), to 'demonstrate' that there really was a universal flood. Others, continue looking for the ark, which beached according to Islamic tradition on a small low hill, Al-Djudi or Mount Judi (footnote to Suruh 11, Section 46 in the Spanish translation of the Koran). An Australian explorer, Alan Roberts, recently found what he thought were the ark remains near Mount Ararat (Armenia), a name given later than Biblical times. In fact, he found a rare thing: a 'hanging' geological syncline with an outcrop having the shape of a boat's hull (Fortey, 2000)—evidence that scientific knowledge is scarce among 'scientific' creationists. Other Christians, like Hans Eisele (1979), conscious of the manifest contradictions in the Scriptures, say that these stories 'don't serve to increase our knowledge, but to strengthen the will to live a truly religious life'. However, this does not recognise the credulity of the Bible's writers. I think it is more appropriate to see these texts as the myths of a prescientific culture, with an historical core distorted by the oral transmission. The actions of an intelligent and

far-sighted man, living on a broad flood-plain, to save himself, his family, and his animals could have been transformed by a priestly caste into an event that displayed the power of an uncompromising god, if people did not follow the priests' edicts or teachings.

Ryan and Pitman (1998), however, propose a different hypothesis about the historical core of Noah's myth. Following several oceanographic campaigns during the last decade, they found that until about 7,500 BP the Black Sea was a fresh-water lake; then a progressive flood from the Mediterranean Sea filled the basin. They found some slight indications of flooded human settlements. This flood is dated about 2,000 years before the age of alluvial silt beds in Sumer and the flood myth of Xisuthrus. Moreover, the origin of the flood in the Noachian myth and its precursors is different: rain, not a marine flood. Therefore, I think that the alternative proposed above—a cyclone, a monsoon, or heavy rains in the high country—is probably a better explanation of the historical core of the myth. The marine flood of the Black Sea, and the consecutive appearance of a linear ceramic around the Black Sea, is certainly an interesting discovery, which may help explain the common origin of the Indo-European languages. It is necessary to wait for new discoveries in the Black Sea area before we can reach a scientific consensus on this issue. The Black Sea theory could perhaps accord with the mention in Genesis 7(11) of the fountains of the deep being broken.

Acknowledgment: To David Oldroyd for his suggestions and kind revision of the English.

Bibliography

- Ayala-Carcedo, F.J., 'Catástrofes naturales, mitos, religiones e historia', in: Ayala-Carcedo & Olcina (eds), *Riesgos Naturales: Una Aproximación Global*, Ariel, Barcelona, in press (2001).
- Birkett, K.R. and Oldroyd, D.R., 'Robert Hooke, Physico-mythology, Knowledge of the World of the Ancients, and Knowledge of the Ancient World', in: Gaukroger, S. (ed.), *The Uses of Antiquity in the Scientific Revolution*, Kluwer Academic Publishers, Dordrecht, 1991, 145–170.
- Einsle, H., *Das Abenteuer der biblischen Forschung*, Paul Pattloch Verlag, Aschaffenburg, 1979.
- Eliade, M., *Le mythe de l'éternel retour. Archétypes et répétitions*, Gallimard, Paris, 1951.
- Fortey, R., 'El Mar Negro ¿Hijo del Diluvio?', *Mundo Científico-La Recherche*, RBA, Barcelona, 2000, 210, 56–59.
- Friedman, R.E., *Who Wrote the Bible?* Spanish translation of 1989 in Martínez Roca, Barcelona, 1987.
- Henning, R., *Wo lag das Paradies?*, Verlag des Druckhauses, Berlin, 1950.
- International Bible Society, *The Bible, New International Version*, 1984, <<http://bible.gospelcom.net>>.
- Lamb, H.H., *Climate, History and the Modern World*, Routledge, London, 2nd edn., 1995.
- Lyell, C., *Principles of Geology*, 3 vols, John Murray, London, 1830–1833.
- Oldroyd, D.R., *Thinking About the Earth: A History of Ideas in Geology*, Athlone Press, London, and Harvard University Press, Cambridge (Mass), 1996.
- Ryan, W. and Pitman, W., *Noah's Flood: The New Scientific Discoveries about the Event that Changed History*, Simon & Schuster, New York, 1998.
- Suess, E., *Das Antlitz der Erde*. Prague, 1883–1901; Spanish translation of 1925, 2 vols, Vol. 1.
- Vitaliano, D., *Legends of the Earth: Their Geologic Origins*, Indiana University Press, 1973.
- Whitaker, J.H.McD., 'The Geology of Sodom and Gomorrah, Jericho and Lot's Wife', *Geology Today*, September–October, 1997, 193–197.
- Whitcomb, J.C. & Morris, H.M., *The Genesis Flood: The Biblical Record and its Scientific Implications*, Presbyterian & Reformed Publishing Co., 1989.
- Woolley, L., *Ur und die Sintflut*, Leipzig, 1930 (in Henning [1950]).

The 700th Anniversary of the Proclamation of the Royal Mining Law (the *Ius Regale Montanorum*), Issued by the Czech King Wenzeslaus II in 1300

Jan Urban, Kutná Hora

Kutná Hora is a picturesque Mediaeval town, 60 km east of Prague. The sources of its splendour and wealth were the silver ores that were formerly worked there. Kutná Hora silver mining reached its peak during the fourteenth and fifteenth centuries, when the town was one of the richest European localities for silver. It was then the cultural, political, and economic centre of Bohemia, competing even with Prague.

In 1300, Kutná Hora was granted the 'Royal Mining Law' (*Ius Regale Montanorum*) from the hands of the Czech King Wenzeslaus II, with application to all mines of the Czech Kingdom. Thus in 2000 the town celebrated the 700th anniversary of the proclamation of this Law, an event listed by UNESCO as one of the important anniversaries for that year.

Stemming from its illustrious past, Kutná Hora has numerous cultural and architectural items of great significance, of which St Barbara Cathedral, consecrated to St Barbara the patron saint of miners, is the most notable. The unique interior shows Mediaeval frescoes depicting scenes related to the secular life of the ancient mining town. There is also the fine Early Baroque Jesuit College, adjoining the cathedral. Among other remarkable buildings we find The Hradek or Little Castle, at present the District Museum, which contains an exhibition on the history of silver mining and the origin of modern financing. One may also visit one of the Mediaeval mines.

Another interesting sight is the Italian Court, formerly the Mint of the Czech State and also the Royal Residence. In addition to the above mentioned, Kutná Hora offers visitors the atmosphere of a prosperous mediaeval town, with its numerous patrician houses and a labyrinth of narrow lanes and irregular squares. Other architectural jewels are, for example, the Gothic Stone Fountain, the Arch-Deanery Church of St Jakob, the beautiful Gothic Stone House, and the Baroque Ursuline Convent.

Besides its Mediaeval mines, Kutná Hora is also remarkable for its several levels of vaulted cellars, under the patrician houses. There is also the Sedlac Quarter, the oldest part of the town, which offers visitors further architectural gems. There are

the large grounds of the Cistercian Monastery. The dominant sight is the monumental Gothic Cathedral of the Assumption of Our Lady. In addition, there is the All Saints Church, located near the Cathedral, which houses the well-known ossuary with its interior decoration of human bones, dating from the Thirty-Years War.

Two other extraordinary architectural jewels were restored for the 700th anniversary of the *Ius Regale Montanorum*: the Church of St John of Nepomuk, located at the town centre and for long inaccessible to the public; and the Corpus Christi Chapel, a former cemetery with an ossuary, located by St Barbara Cathedral.

Kutná Hora lives not only on its history. Its buildings are not dead memorials of the past, but are full of music, exhibitions, and other cultural events. We are delighted to see them fulfilling their role in the spiritual life of both the inhabitants of the town and its numerous visitors.

Ten Years of the Spanish Commission of the History of Geology of Spain, Geological Society of Spain

Leandro Sequeiros, Editor, *Boletín de la Comisión de Historia de la Geología de España*

In 1990, the *Comisión de Historia de la Geología de España* was established by the Geological Society of Spain (*Sociedad Geológica de España*, SGE). That is, on 2 February, 1989, the SGE Board created the Working Commission and recommended its general coordination to Drs Jaime Truyols (Professor of Palaeontology, Oviedo University), Salvador Ordóñez (Professor of Stratigraphy, Alicante University), and Juan José Durán Valsero (Geological Institute, Madrid). A general programme of work was published in *Geogaceta* (1990, 8, 147–148). All persons interested in the history of Spanish Geology were invited to become involved.

In 2000, the Working Commission of History of Geology of Spain involved a group of more than 150 members, connected periodically by the *Bulletin* of the Working Group.

The *Boletín de la Comisión de Historia de la Geología de España* was founded in 1993. It is published twice a year, and contains information on the activities of the Commission, historical data, and short papers about the rich and little-known history of Spanish geology.

Activities of the Working Commission (Comisión de Historia de la Geología de España, SGE)

Chief initiatives and activities of the Commission since its foundation:

- * Co-operation with INHIGEO and dissemination of information about its activities through the *Boletín*.
- * Participation of the Commission in the XIXth International Congress of the History of Science, held in Zaragoza, Spain (August, 22–29th), being responsible for the History of Geology Session presided over by Dr Jaime Truyols.
- * The Working Commission on the History of Geology of Spain (SGE) played an important part in the commemoration of Professor Dr Juan Vilanova y Piera (Valencia, Spain, 25–27 November, 1993) on the occasion of the first centennial of his death.
- * The Working Commission participated in the Vth Symposium on the History and Teaching of Science held in Vigo (Galizia), 13–16 September, 1995.
- * In 1995, the Working Commission organised, in Madrid and Castellón, a national commemoration of the palaeontologist Dr José Royo Gómez, on the hundredth year of his birth, and the *Boletín de la Comisión* (Nos 3 and 4, 1995) reported on the events. Similarly, the Geological Society of Spain (SGE, *Sociedad Geológica de España*) celebrated its 20th Scientific Session at the University Jaime I in Castellón (20 October, 1995) with a special section on 'Professor Royo Gómez'. The event was regarded as the first general meeting of the Working Commission (*Reunión de la Comisión de Historia de la Geología de España de la SGE*). More than a dozen scientific communications were presented and published in *Geogaceta*, No. 19 (1996). A summary of these was also published in our *Boletín* in 1996.
- * The Working Commission also paid homage to geologist and palaeontologist, Dr Jaime Almera y Comas (celebrated in Barcelona), on the 150th anniversary of his birth (*Boletín*, No. 4, 1995).
- * Contribution to the 125th anniversary celebration of the *Real Sociedad Española de Historia Natural* (Royal Spanish Society of Natural History) (Madrid, 11–15 March, 1996) (*Boletín*, No. 5, 1996).
- * Participation in the IVth Spanish Geological Congress (held in the old university city of Alcalá de Henares, 1–5 July, 1996), with organisation of the Session on 'Historia de la Geología'. Six communications were published in the *Proceedings*.
- * The Working Commission paid tribute to the memory of the geologist Casiano de Prado (1797–1866) on the 200 anniversary of his birth. The 23rd Scientific Session of the SGE (Madrid, School of Mines, 28 November, 1997) was celebrated with a lecture by professor Dr Jaime Truyols. Nine other scientific communications were presented and published in the journal *Geogaceta* (No. 23, 1998). Summaries were also published in *Boletín* No. 10, 1998).
- * A short biography and a bibliography of the Spanish geologist and palaeontologist Casiano de Prado were published in *Boletín* No. 7, 1997. Also, a tribute was made to him during the Palaeontological Annual Meeting the *Jornadas de Paleontología*, organised by the Spanish Palaeontological Society, held in La Coruña in October, 1997, in the form of a lecture by Dr Truyols (*Boletín* No. 10, 1998).
- * The Working Commission also organised a commemoration of the eighteenth-century Spanish naturalist José Torrubia (1698–1761), author of *Aparato para la Historia Natural de España*, during the 300th year of his birth. It was held in Zaragoza, on 22 May, 1998, during the 24th Scientific Session of the *Sociedad Geológica de España*. Five scientific communication were presented. (See *Boletín*, Nos 10 and 11, 1998.)
- * In 1999, we celebrated the 150th year of the creation of the Spanish Geological Institute (now *Instituto Geológico Geominero de España*). Related to this event, the Annual Meeting of Spanish Society of Palaeontology (the XVth

Jornadas de Paleontología de la Sociedad Española de Paleontología) was held in Madrid, 28–30 October, 1999, with the theme: 'The History of Spanish Palaeontology'. The opening address and the scientific communications were published in *Temas Geomineros* (1999). On the last day of the meeting, the congress participants visited the region where Torrubia studied fossils, 250 years previously. (See *Boletín*, No. 13, 1999.)

It will be seen that many initiatives have been made and accomplished by the Commission.

The Arthur Holmes Archives: A Cautionary Tale

Cherry Lewis, Keele University

When I first decided to write about Arthur Holmes (1890–1965), I somehow thought that somewhere there must be a collection of material relating to such an important figure in geological history. But after months of fruitless searching in the obvious places, someone suggested I contact Gordon Craig at Edinburgh University from where Holmes had retired. In an obituary of Holmes' written by his wife, Doris Reynolds, herself a geologist, I had seen a one-line reference to a diary kept by Holmes. Did Gordon know the whereabouts of any diaries? No idea, but he would ask around. However, he was aware of other material, so perhaps I should come and see him.

The papers Gordon showed me were related to the death of Reynolds, and they led me down an interesting path. It transpired that a couple of years after Holmes retired from Edinburgh, he and Reynolds moved to a flat in London where Holmes subsequently died. I suspect that during that move, much material was thrown out. Some years later Reynolds moved to a house in Hove on the south coast where she stored the remaining materials that related to her husband, and their reference collections, in two sheds in the garden. Apparently they had to have separate collections because they ordered them differently—one by author, the other by subject!

Reynolds had no immediate family, so when she died (1985), she left her house and its contents to a Mrs May Hopper, a neighbour who had looked after her in her last years. Mrs Hopper became concerned about the contents of the sheds which she realised might contain material of historic value, and her son wrote to several universities trying to elicit their interest. None of them seem to have shown any interest until eventually a couple of Reynolds's former students from Edinburgh University agreed to come with a van and remove what they thought might be of value. The story now gets hazy, but what I think happened is this.

The material was divided into 'his' and 'hers'. 'Hers' (which incidentally also included a lot of 'his') went to Royal Holloway New Bedford College, where Reynolds had been taught when it was Bedford College. 'His' went to Edinburgh where, I understand, it was supposed to have been archived in the library. Some things, like Holmes's medals and a couple of books in which he kept geological quotations, did reach the library safely, but for some reason the rest, including two diaries, copies of letters Holmes sent from Mozambique, plus the material he was working on when he died, remained in a draw in Holmes' old room. Thirteen years later, when I turned up, the current occupant of that room produced a box of material that he was about to throw out because he himself was retiring. He happily gave it all to me, although it transpires that some years earlier he had already 'weeded' it.

One diary covered Holmes' trip to Mozambique in 1911, while the other one documented the second year he was in Burma: 1922. These were invaluable documents that have since provided me with insights into the man that I would never have got otherwise. I discovered, for example, that his first son had died in Burma. I had not known that he had had two sons. Why there were only two diaries I do not know. Maybe there were others, maybe not.

Since that time I have found Holmes-related material in many parts of the world, and I have heard of much that has been lost—twenty-five years worth of correspondence with Warren Carey in Australia, for example, thrown out when the University needed the space. But some has turned up in the most unexpected ways. After many blind alleys I eventually discovered that Holmes' daughter-in-law had last been heard of in Vienna. It was worth a call to international directory enquiries where I got a list of six possible numbers. At the third or fourth attempt, I asked the young man who answered if his name was Holmes. An American voice replied in the affirmative. I asked if his mother was called Karla Holmes. 'Oh no', he said, 'she is not my mother, but my landlady'. Coincidentally, they both had the same name but he was listed and she was not. Would I have ever found her otherwise?

I am now forming an Arthur Holmes Collection, which will be housed at the Geological Society of London and where everything I have collected, or copies of it, will eventually reside. Despite the anecdotes above, much of what I have found has been in archives relating to people with whom Holmes corresponded. As a resource they are an inestimable treasure. Although we should be eternally grateful for Mrs Hopper's prudence, had an archive been formed at the time of Holmes' death, perhaps much more would have been saved. May I put in a plea for archives?

Empirical Knowledge of Stone during the Slave Period in Armenia

Edward G. Malkhassian and Konstantin Karapetian, Institute of Geology, Yerevan, Armenia

Slavery in the Armenian highlands in the 9th to 6th Centuries BC flourished among strong states that played a significant role in the economical, political, and cultural life of the region. Older, traditional production forms, and the formation of new ones, had not led to new areas for the application of stone. In the Slave Period, however, stone applications in construction and architecture became common, the main trends being determined by the properties of the stone that was available as a construction material.

According to the available information (Arakelyan, 1970; Piotrovsky, 1944; Martirosyan, 1958; and others), grain grinders, mortars, bearings for beating boards, hones, polishers, etc., were made, usually of the same materials and of similar shapes. Quartz was the primary, if not the sole, source material for glass production. Direct information concerning the applications of obsidian is not as yet available. There are, however, several flint and obsidian compound sickles. At the end of

the Slave Period, simple grain grinders went out of use: they were replaced by manually powered turning (or rotary) mills. The millstones of manual and water mills (Piotrovsky, 1959 acknowledges that the latest were invented in Urartian time: 9th to 6th centuries BC) were made from massive volcanic rocks. The optimum porosity determined the choice of stone. The commonly used local raw materials were frequently intrusive or massive effusive rocks.

Stone was also employed in the production of other kinds of food besides flour. Funnels and cups made from the tuff utilised in cheese making and tubs used for sesame-oil production are known (Piotrovsky, 1959). Starting from the Urartian Period, meticulously finished and polished dishes, vases, various vessels, plaques and so on were made from basalt, andesite-basalt, andesite, porphyry, serpentinite, limestone, and marble, and appeared in household items. In sculptures, preference was given to the 'soft' rocks, principally tuffs. Artefacts made from limestone, marble, andesite, basalt, *etc.* are rarely encountered. The vast majority of artefacts were made from the rocks found in the monuments' vicinities.* Local stone (agate, chalcedony, jasper, serpentinite, steatite, talc, sard, *etc.*) was utilised to a significant extent for beads, pendants, amulets, stamps, and other glyptic products. Mosaic compositions were created from local stones (Arakelyan, 1976).

Monuments from the Slave Period in Armenia indicate that stone in general, and processed stone in particular, were used extensively in construction and architecture. This was motivated by the urban development from the time of the Kingdom of Van (9th to 3rd century BC—Lake Van being situated in what is now Turkey). New urban-type dwellings with reinforced castle walls, citadels, palaces, temples, memorial buildings, bridges, canals, aqueducts, *etc.* were created. Wall construction was traditional and double layered, masonry walls being largely used, as in the construction of castles.

Fundamental differences, as compared with the preceding period, were based on the methods of stone processing. Together with the former crude processing, the use of precision-cut stones becoming more common. Occasionally these were used for the facings of castles and citadels for their entire height. Finally, after the Urartian period a 'rustic' method for stone processing was devised.

Dry-stone walling with fine-cut stones started from the 3rd century BC and was used to construct temples, palaces, aqueducts, and permanent bridges. Mortar was seldom used and at this stage it served as filler for fissures in the laying, spaces between slabs, *etc.* (Sainyan, 1978). Mortar grout or clay were used more frequently for mass construction (dwellings, household structures, *etc.*), where crudely broken and unshaped stones, or sometimes even boulders, were used.

The requirements for the stone as a construction material were in general the same and local stone was used. Even when bigger blocks were required, outcrops (basalt, andesite-basalt, limestone, *etc.*) were always found somewhere in the vicinity and pieces were cut to the right size. Blocks' forced cutting down to smaller dimensions (due to cracks, *etc.*) were the exception rather than the rule. Stone was evidently mined by open quarrying, *i.e.* the stone used in the constructions lay at the surface. However, the use of tuff was comparatively rare. Some parts of a structure that required more precise hacking (pads for timber columns, mats for timber shafts, *etc.*) were made from tuff. Stone water-pipes were soon replaced by ceramic ones and wall-bricks were made from tuff as well. In the Hellenistic epoch (3rd to 1st century BC), squares, streets and roads were paved with cobblestones, boulders, pebbles, tuffs, slates, pieces of basalt, and crudely cut tablets. The high level of skill in the use of stone was already manifest in Urartian times by the carvings on the rocks of cave galleries (*e.g.*, Van's Cliff), tunnels, canals, and roads.

In the Hellenistic epoch, monumental stone structures and stone ornamentation became common, especially for temples, and Armenian craftsmen accomplished astonishing results. The splendid decoration of the Hellenistic Temple of Garni (2nd century BC, located about 20 km from the present Armenian capital, Yerevan)—particularly the entablature as well as numerous fragments of other temples and structures— provide fine examples. But these 'pagan' buildings were destroyed after the adoption of Christianity (301 AD).

It is worth noting that the carving was applied not only to tuffs and marble, but also to hard, volcanic rocks. The ornamentation of the Temple of Garni, which used the local andesite-basalt, is particularly remarkable. Perhaps the craftsmen's profound mastery of hard-stone carving techniques was mandatory, in that decorations were carved on structural segments that had essential weight-bearing functions, so that the stone was not selected for the purpose by the carver but by the architect.

In all this, it is a nice question whether the social system was a product, or outcome, of the state of development of the technology of stone; or *vice versa*. Or were the two in a dialectical relationship?

References

- Arakelyan, B.N., 'The History of Stone Applications and its Significance in the Economy and Culture of Armenia', in: *The History of Geology*, Academy of Science of Armenian SSR, Yerevan, 1970.
- Arakelyan, B.N., *Essays on the History of the Ancient Armenia Arts*, Yerevan 1976.
- Martirosyan, A.A., 'Idols from the Excavations of %armir□Blur', *Historical Philological Journal*, 1958, 2.
- Oganesyan, K.L., 'Architecture from the Beginning of Historical Times to the 6th Century BC', in: *Essays on the History of Armenian Ancient and Mediaeval Architecture*, Yerevan, 1978.
- Piotrovsky, B.B., *The History and Culture of Urartu*, Yerevan, 1944.
- Piotrovsky, B.B., *The Kingdom of Van*, Moscow, 1959.
- Sainyan, A.A., 'Architecture of the 6th–3rd Centuries BC', in: *Essays on the History of Armenian Ancient and Mediaeval Architecture*, Yerevan, 1978.

* Arakelyan considers that all Hellenistic and older artefacts made from marble were imported. There is little evidence for such claims. Armenia has plentiful marble deposits and at least half the artefacts must have been made from the local types. Laying was dry and massive blocks (up to 6 m in length) were cramped horizontally with steel cramps. The spaces between facing walls over 3 m apart were filled with crushed stone (Oganesyan, 1978).

INTERVIEW

E-mail 'Interview' with Professor Hugh S. Torrens, October 2000–January 2001

Richard Howarth*

Hugh, may I first thank you for agreeing to take part in this first 'e-mail interview' experiment for the INHIGEO Newsletter. I'd like to begin by asking you to tell me something of your family background.

Hugh Torrens

My parents were people of much wisdom. My father was Irish (a Trinity College Dublin graduate in medicine and dental science) who came as a refugee to England in the 1920s and settled in Bournemouth, in the south of England. Here he practised as a dentist, becoming a hospital consultant who pioneered facial reconstruction work (his worst cases were from cricket balls in eye sockets!). He was also involved in plastic surgery and anaesthesia in and after the Second World War. My mother was a librarian in Bournemouth. When my father retired, he re-discovered a great interest in family history and published a number of books on comparative religion and the occult. So a love of books was instilled into me early.

Was it this background that led to your first interest in geology?

No! This arose from my discovery in about 1952 of a fine internal flint mold of a rust-coloured *Micraster* in gravels near where I then lived, at Wick near Christchurch, Hampshire. This so intrigued Chris Pellant—a later student of mine—that it was illustrated in his *Pan Book of Rocks, Minerals and Fossils* (1990, p. 140). I then went with my privileged background to 'public' school at Sherborne, Dorset. This was a school sadly both traditional and conformist in outlook. But there I soon met a remarkable retired clergyman–geologist, Joseph Fowler (1872–1958), who took me under his wing and walked me off my teenage feet in his eighties! He showed me how rich the area was in fossils, and I became an enthusiastic collector. Such youthful enthusiasms are wonderfully revealed by Rene Cutforth in his book *Order to View* (1969). But in Cutforth's case 'London experts' soon arrived to declare there was nothing new among all his Leicestershire fossil finds. My experience was miraculously different.

In 1956, aged 15, I found a small half ammonite in a thin rock unit, which had never before yielded a single ammonite. At first W.J. Arkell (1904–1958) said it must only have fallen downhill from a higher, and known, horizon. But I knew different. For a start there was insufficient hill. Driven by schoolboy enthusiasms, I cycled out as often as possible to collect all the rock from that luckily thin bed, lying around its pipe-line outcrop. Months later I recognised, after work with a toothbrush, the fossil's other half in cross-section; embedded in matrix, which proved I was right and a Fellow of Trinity College, Cambridge, wrong. His letter of apology for assuming that everything in science was already known made me want to become a geologist. So I joined the Geologists' Association and started donating fossils to public museums.¹

So, presumably, your next step was to enrol for a geology degree?

Not quite! I rebelled at school, wanting (but failing!) for example to study modern—useful—languages (Russian and German) rather than the dead ones (Latin and Greek) I felt so unmotivated towards. Things came to a head in 1957–'58, when I decided to attempt a fourth A-level, in Geology, a subject the school did not offer and said it could not teach. Such a juvenile decision did not go down well, but in 1959 I passed, entirely self-taught. The first coloured geological map I ever saw was, I recall, one produced during these exams!

Only then did I start to think about university. My kind friends at the Natural History Museum, London, who were now identifying my better finds for me (in particular L.R. Cox and H.D. Thomas) suggested I apply to Oxford and wrote in support. I had to sit the scholarship exam as there were so few places for geology then. This got me in and I spent a very happy three years at Oxford (University College) 1959–'62, but too often getting sidetracked into journalism, old cars, and student drama.

Such perseverance certainly deserved just rewards! So your next step was your PhD?

I was quite uncertain what to do next until my adequate degree result (although others facing problems over Oxford's bizarre system of not dividing its second class degrees into upper and lower divisions—unlike all other English universities—were dissuaded from postgraduate study). I had got deep into Middle Jurassic stratigraphy at school and decided to tackle this at PhD level. I had had enough of Oxford's 'airs and graces' and, having already been in touch with Peter Sylvester-Bradley (1913–1978) at school, now wrote and asked him if he would supervise me. He at first thought I was the son of the 1956 letter writer!

So I went to Leicester University and had the best three/four years of my life there under an inspirational man who discovered what people were capable of and then left them to their own devices, except to give endless encouragement. He thought nothing was impossible and in 1963 supported the crazy idea that that I and two non-geologist friends go and explore the Middle Jurassic of the Elburz Mountains in Persia. I ended up at outcrops rich beyond my so far English fantasies—one right beside Marco Polo's Silk Road to China. I also made early contact with three ammonite friends Wolfgang Hahn (Germany), Juli Stephanov (Bulgaria) and Carlo Sturani (Italy). It was a great shock a few years later when I had become the only survivor, all three having been killed (in a car crash, dam disaster, and quarry accident). But Peter and they had inspired me and given me a taste for foreign places and languages and a loathing of insularity.

* It had originally been intended to tape this interview while the participants (and the *Newsletter* editor) were at the IGC in Rio. However, last-minute malfunctioning of the tape-recorder prompted us to undertake this experiment. We hope that the results will encourage similar 'interviews' in which e-mail overcomes the necessity of the participants to be in the same place at the same time, and that any lack of spontaneity is made up for by the presence of some, hopefully useful, footnotes.

¹ The ammonite (*Delecticeras* sp.) is: Sedgwick Museum No. J46367.

Life after Elburz must have seemed a bit dull. What influenced your next career move?

Peter (for whom nothing was impossible) got me a post-doctoral fellowship (1965–1967) working on Tethyan Mesozoic limestones in Sicily with Hugh Jenkyns (now at Oxford). This was before I had a PhD (1966)! So the first year was spent frantically finishing one (the PhD), starting the other (the Fellowship), and learning Sicilian from quarrymen. I thought it was Italian (which made for some embarrassing moments at cocktail parties!). Here I saw real kindness from wonderful—but I felt thwarted—people; fighting climate, Pope, and the Mafia.

By 1967 it was somehow inevitable I would stay an academic, and a lecturing job at Leicester was to be mine ‘on a plate’ (Peter assured me), until at interview he persuaded (as only he could) the committee they should afford a much more senior position (which rightly went to John Hudson). Peter had meanwhile encouraged me to apply for other jobs and was a fan of the Keele ‘vision’ (later expensive nightmare) with its Foundation Year and Joint Honours degrees, forcing all students across the Two Cultures. So when offered a lectureship there to replace Tom Burnaby, off I went. Peter thought I would be ‘ideal for Keele’ (there’s a new slogan!) with interests in both stratigraphy and palaeontology and, by then, also in history of science and technology.

What was it that triggered your interest in the history of geology? I notice from your bibliography that your publications in this field (as well as in the history of technology) seem to have begun suddenly, with eight contributions in 1974, and have continued regularly since.

An interesting question! I long wondered if it was merely a ‘male menopausal thing’ (age 34!). When old scientists get bored they take an amateur interest in history, since they are now history, *etc.* This must have been what a former scientist Vice Chancellor at Keele thought (who referred to history as my hobby and made me feel guilty)! Martin Rudwick faced similar problems when he moved professionally from geology to history.² But my early interest in history (or my stupidity!) is proven by my pre-Oxford purchase of Lhwyd’s (1760) *Lithophylacii Britannici* (2 guineas) and my Oxford purchase of Plot’s (1677) *Oxfordshire* (6 pounds, in a week I went very hungry!).³ My interest in the history of technology was inspired by the purchase of a 1929 Alvis sports car (for £100 in 1960). It was so wonderfully made, and so much more fun to drive than ghastly modern cars, that I joined the Vintage Sports Car Club and met—and read a lot of—Tom (L.R.C.) Rolt.

At an Oslo lecture a few years ago, I met my old friend David Bruton, who was a PhD student with me. He reminded me that I was then as equally fascinated in the past of the earth as with the people who had studied it. During my PhD, I certainly realised that some of the rocks I worked on, like the Fuller’s Earth Rock, had *never* been studied since the days of William Smith, who would have had *much better* opportunities than me because there were then so many more exposures available.

As to why I started publishing history from 1974, this had several causes. First, I had got involved trying to improve the often terrible condition of geological collections found in too many of our provincial museums. Brian Page and I started the *Geological Curators’ Group Newsletter/Journal*. This demanded historical investigation of collections and their fates. Second, with the deaths of my three friends (Stephanov 1966, Hahn 1972, Sturani 1975) I felt lonely as an ammonitologist and history may have become a safe refuge. I had started having problems with travel grants, and perhaps, as Derek Ager claimed,⁴ this move over to history was for the same reason why there was more interest in history of geology in former East Europe: ‘because there are so many more geologists in the East unable to travel and looking for things to do’? Most important, in 1970 I married Shirley Morgan, a kind, tolerant, and generous person, which perhaps encouraged me to rush around less? *I find it difficult to believe that someone without an excellent grasp of the history of his subject would have recognised the significance of either Plot or Lhwyd (O lucky man!) when casually browsing in an antiquarian bookshop. Do you think that the seeds of your interest might have been planted during your time at Sherborne?*

Another very interesting question! Politicians here now tell us ‘no one forgets a good teacher’ but I cannot now recall being taught history at school, although I certainly was. Cramming for 4 A/S-levels must have pushed it out of mind. My mother still has my old school reports somewhere, so I could (as a historian) still find out. I recall the Lhwyd was purchased from a Brighton bookseller’s catalogue which my father showed me. He was crucial to my education!

But I’m sure that Sherborne as a place also had a lot to do with it. When researching S.S. [Sydney Savory] Buckman (1860–1929)’s geological career at this school, I discovered that Alfred North Whitehead (1861–1947), O.M., *etc.*, had been his contemporary. Whitehead published posthumously in 1948 a wonderful essay *The Education of an Englishman*⁵ in which he wrote: ‘we had plenty of evidence [at Sherborne] that things had been going on for a long time. It never entered into anybody’s mind to regard 6,000 years seriously as the age of mankind—not because we took up with revolutionary ideas [Buckman’s Darwinian father did!] but because our continuity with nature was a patent, visible fact, and had been so since the days of Saint Aldhelm [A.D. 640? to 709!]. There were incredible quantities of fossils about, more fossils than stones—or rather the stones were built out of fossils welded together’. I felt much the same of the historical continuity of these wonderful surroundings. *Having heard you lecture on many occasions, I would imagine that your lectures to undergraduates at Keele must have been popular, even if palaeontology and non-seismic stratigraphy now seem to be viewed (by some) as rather old-fashioned skills, they would still seem to be still necessary in a well-balanced geology curriculum. How would you describe your career at Keele?*

As a teacher, mixed! Teaching must be so many things, it is difficult to generalise. I may have on occasion stimulated or motivated students, but I was never patient. We have, or had, two brilliantly patient teachers in my department

² See: *Journal of the Geological Society*, 1989, 146, 202.

³ See also: *Archives of Natural History*, 2000, 27, 20.

⁴ When reviewing a volume I had contributed to, in *Geological Magazine*, 1985, 122, p. 214.

⁵ *Essays in Science and Philosophy*, London 1948, 26–33. (The essay first appeared in a periodical back in the twenties.)

over the years, and so I could see the vital importance of this aspect in teaching. On the other hand, Keele gave me a great chance—which I took—to teach a lot of students (subsidiary, sessional, Foundation Year) who'd never been exposed to geology before. I enjoyed this challenge a lot, until our Foundation Year was so suddenly abandoned. Any more specialised teaching has had to respond too much to new fads for me to feel optimistic. I doubt the 'explanatory power' of global sequence stratigraphy, and ammonitology (my other field) is clearly now only a dead science.⁶

The major problem with teaching is the *real* difficulty of assessing good or bad teachers in our obsessively assessed 'system'. I have been 'peer reviewed' and the returns duly filed away, and I have seen endless student appraisals of my teaching but these were too often signed by 'Micky Mouse' or 'Donald Duck' for me to trust them. Students were being asked to appraise too often and this devalued the whole operation. On top of this, as Anon. noted, 'for every person wishing to teach, there are thirty not wanting to be taught'. There seems no way in which to get reliable, objective feedback of one's strengths and weaknesses as a teacher. Much worse, I never felt that anyone really thought that teaching at university was important. Research was all. Whenever I feel angry about this, I re-read Gustav Holst on teaching⁷ (written in response to George Bernard Shaw's 'those who can do, those who can't teach'), and now that I no longer teach, I also re-read Carnegie's thoughts on the pittance then paid to university teachers.⁸ He was so angry, he endowed a \$15 m pension fund to help 'aged university professors' in 1905, but he could instead re-read the grateful letters he got sent.

Were you able to lecture on the history of geology, or were you confined to a regime of paleostratigraphy?

I was employed at Keele as a stratigrapher/palaeontologist and was asked to cover the Mesozoic and Cenozoic and principles of stratigraphy, in which I got progressively more interested as the methodologies of stratigraphy widened to include 'event' and 'sequence' stratigraphy, *etc.* In the field of palaeontology I was busy lecturing on all the Mollusca and Brachiopods and Corals and many other more introductory topics concerning fossils.

I was never able to give any formal series of lectures on history at Keele, despite the oft-claimed interdisciplinary focus of my university. It was not until I went to teach in California for a well-remembered semester in the spring of 1996 that I was able to develop a focused set of lectures on both the history of geology and, more especially, the history of technology (which I have always felt was, and is now, even more seriously, under-represented in Britain). I have let off some steam on this last topic in a forthcoming piece.⁹

How would you describe the evolution of your research over the years?

My research started off by trying to get my PhD thesis on Bathonian stratigraphy into print. Most of it was, and updates of the remainder are deposited at Oxford University or Bristol City museums. But by the 1980s such biostratigraphy was starting to be made rather redundant by the 'new technologies' of 'sequence' and 'event' stratigraphy and I could see new problems on the horizon starting to appear, in part from problems of finding funds to do such 'dead' science. On top of this, between 1966 and 1975 my three closest ammonitological friends had all been killed, as I mentioned earlier. These were some of the reasons why I swung more over to first, the history of museums and then, to the history of geology.

In 1981 came the first inklings of the impending disaster of 'research assessment'. I was 'returned' in the first two of these as a scientist (being expected to have written papers); then in the last one (1996), I was 'returned', without discussion, as a historian. This meant I was given a *week's notice* that I should have been writing books instead of papers!¹⁰

Despite such lunacies, or that such assessments can only allow each person to be returned to one 'unit of assessment' (alias subject), I found that the old excitements of finding new faunas in rocks were matched by those of finding new documents in archives. The two skills did not seem all that far apart either and so I well saw how other geologists, like Martin Rudwick, had become such superb historians. I recall three particular historical 'Eureka moments' of excitement:

The first was uncovering Robert Townson (1762–1827)'s illegitimate origins. He was born and baptised four years before his parents married and all the genealogists said this was impossible. But documents in the House of Lords Record Office proved it, and even provided a probable eye-witness account of his conception in support! The second was when I was trying to discover where S.S. Buckman had been a student in Germany. This was wrongly in print as Dresden, but a chance purchase in a Stoke-on-Trent bookshop (a city not renowned for them) in January 1983 (for £0.50) proved it had been Wiesbaden. The third was when I struggled long and hard to uncover the origins of Jeremiah Cruse, William Smith's land-surveying partner. This proved such an extraordinary, and serendipitous, story that I wrote it up!¹¹

Above all this excitement of the research chase has never left me, although I do now start to see what a really boring struggle getting some of it into print can be, and has been.

During your career, you have held lecturing positions on the history of geology in Canada, Hungary, and the USA, and, indeed, have just received a major award from GSA for your work in this field. In your excellent 1988 paper, 'Hawking history—a vital future for geology's past',¹² you wrote that there was a danger that the history of geology 'would subduct between the drifting

⁶ I was today sent a Nigerian ammonite image to identify and realised such skills are now hardly being taught in this country.

⁷ In: *The Music of Gustav Holst*, 1968, 150–155.

⁸ A. Carnegie, *Autobiography*, 1920, 268.

⁹ 'Some Thoughts on the History of Technology and its Current Condition in Britain', *History of Technology*, 2001, 22.

¹⁰ On the books *versus* papers crisis, see the critic of sequence stratigraphy, Andrew Miall in: *Geoscience Canada*, 25, 183–184

¹¹ The Cruse family of Bath, Avon and Warminster, Wiltshire: A family's Origin and an Incredible Co-incidence. *Journal of the Bristol and Avon Family History Society*, 1984, 34, 14–15

¹² *Modern Geology*, 1988, 13, 83–93.

continents of science and the humanities', and bemoaned the lack of attention paid to the history of applied geology. More recently, Jim Bennett has recently written: 'museums are one of our most visible and accessible resources for influencing public attitudes to science and its history [but] they have not been spared the more baleful outcomes of the narrow vision of 'public understanding''.¹³ Events (even, latterly, in your own career) seem to have born out your early, somewhat gloomy, prediction. To what do you attribute the apparently more receptive attitude to the history of science (and the history of geology in particular) in North America, compared to the UK? How can we interest more geologists (especially younger ones) in the history of their own subject—again, in your 'Hawking History' paper, you quoted David Knight as saying that 'many scientists find history irrelevant to their activities and fear that students will be muddled by being introduced to obsolete science'. Where do you think the root of this problem lies—is it a peculiarly British one? What, if anything, do you think could be done (e.g., by INHIGEO and national organisations) to try to rectify the present situation?

This is the major problem and I see no easy solutions. My first thought is that it is hard to separate one's personal experiences and one's own national, cultural attitudes from those in vogue elsewhere. On the personal front, my official retirement party was held yesterday (19/12/2000) and it was a most cheering event. But it could hide the fact that my former university had not had the slightest interest in what I had been doing in the history of science and technology. Then there are the quite different attitudes to the history of science across the 'Two Cultures' divide. I have personally found that scientists (probably because I am one) were always slightly more interested in this than mainstream historians. This is a paradox. I spoke about such paradoxes at Reno, at the recent GSA meeting, and I'd like to repeat some of what I wrote there.¹⁴

Academic interest in the history of geology is minimal back home in the UK (just as no sane person plays cricket in Reno!). The all-pervading bureaucracy in our universities demands only 'Impact Factors' (to three decimal places!) and 'Research Quality Assessment' of 'Groups'. 'One-Person Groups' are as undesirable as attempts to be both scientist and historian, which supposedly 'diminish' both. Those who try, become marginal, moving in more than one world, but not at home in, or of interest to, either. I hoped for better at my former university, set up in 1949 to encourage *breadth* in education, through its Joint Honours Degree programmes (why aren't its joint honours graduates equally diminished?) and—its now abandoned—Foundation Year. But that university demonstrated its indifference to the history of science by the secret sale of its precious Turner Collection of rare books in 1998.¹⁵

This identifies a first problem, at least in Britain. Good work in science departments there can only be conceived by its many managers if it is done in 'research groups'. No single historian can qualify.¹⁶

But the American Henry Ford was right to urge the importance of such history, as opposed to the history of religion or diplomacy, etc. Science and technology (whether internet, television, laser, motor car, aeroplane or finding more oil for these last two) have had much the greater influence. But how we urge such history, and its fascinations, whether in the academy or on geologists (who should be the most historical of scientists), remain intractable problems. The Anglo-Lebanese-Brazilian Peter Medawar was equally right to assert¹⁷ that 'the history of science bores most scientists stiff'. There are other geographical paradoxes. I think such history is frowned upon in Britain partly because we are 'an old country'.¹⁸ We have simply too much history, which can be all too easily sanitised to show how 'happy' the lives of its former coal miners were, etc. The 'Public Understanding of Science' pressure group here is both too weak, and history too marginal to it, to help us.

One of the reasons I think this subject is better supported in North America is that these are new countries, more anxious to uncover their ancestries. We are anxious to forget it. In support of this, according to a 1995 Roper poll for the American TV 'History Channel', the item of greatest interest to the public [there] is the History of Science and Technology. This is certainly not the situation here. But we have to keep trying to understand such different perceptions. If we are to improve things here we have first to try and teach some geology through its history and we also have to urge more popular, but still rigorous, history books like Cherry Lewis's on Arthur Holmes.¹⁹

Hugh, it's been a pleasure carrying out this e-mail 'interview' and I've very much looked forward to receiving each installment of your replies. I really appreciate very much your patience in participating in this experiment, corresponding over the last few months, the success of which I am sure will be evident to readers, and I hope that it will encourage similar ventures elsewhere.

¹³ From the President, *BSHS Newsletter*, 2000, No. 63 (October), 7–9. (Dr Bennett is currently President of the British Society for the History of Science and Curator of the History of Science Museum, located in the Old Ashmolean Building in Oxford.)

¹⁴ See: *GSA Today*, February, 2001.

¹⁵ See: *Physics Today*, April, 1999, 64.

¹⁶ For the dangers of individuals not qualifying for Research Group status, see: Antony Wyatt's remarkable recent *History of Geology at Aberystwyth University: A Turbid Tale*, published in 2000 by himself in California, well away from the Vice-Chancellorial lawyers!

¹⁷ *Pluto's Republic*, 1984, 273.

¹⁸ The title of Patrick Wright's stimulating 1985 book was *On Living in an Old Country*.

¹⁹ *The Dating Game: One Man's Search for the Age of the Earth*, Cambridge University Press, Cambridge, 2000 (see p. 000).

BOOK REVIEWS

A Savant at Work in the Field

Albert V. Carozzi, *Manuscripts and Publications of Horace-Bénédict de Saussure on the Origin of Basalt (1772–1797)*, Éditions Zoé, Geneva, 2000.

Horace-Bénédict de Saussure (1740–1799) may be less well known in some circles than his great-grandson Ferdinand the linguist. But in his time he was admired, even revered, as the outstanding proponent of a style of scientific work that took the gentlemanly savant out into the field, and—for the first time ever—even to the summit of Mont Blanc, the highest point in Europe. That Saussure is now less familiar than, say, James Hutton is the result of a deplorable bias in the historiography of geology, as of other sciences, favouring those who produced ambitious theories and above all who wrote in English. But if, instead of searching for an iconic father-figure, we want to understand the history of the practices that have made the modern sciences possible, we would do well to pay serious attention to figures such as Saussure. That task is made much easier and more enjoyable, thanks to the indefatigable Albert Carozzi, who has for many years been running an almost one-man scholarly industry on Saussure. His latest volume is a valuable study of Saussure's work on one of the most puzzling problems of the time in the sciences of the earth, but one which has been misunderstood by many modern historians.

Saussure was a native speaker of the then international language of the sciences, although he was not a citizen of France—in this respect the equivalent of the United States of the modern scientific world—but of the independent city-state of Geneva. Fortunately for monoglot anglophones, Carozzi's volume is substantially bilingual. He prints transcriptions of the relevant field notebooks from Saussure's huge archive in Geneva, but also full English translations, along with massive annotations identifying the localities that Saussure visited and explaining what he saw in terms of modern geology. Carozzi has been tireless over many years in 're-treading' Saussure's itineraries in the field, and the value of his translations of Saussure's field notes is greatly enhanced by his many fine photographs of the localities mentioned there. Having covered much of the same ground myself, albeit with slightly different goals in mind, I can confirm how instructive it is to share the visual input of the great savant by seeing the same features through his eyes, despite the intrusions of modernity (the Puy de Dôme is now topped with an ugly TV mast). The volume also contains fine photographic reproductions of sample pages from Saussure's manuscripts, which make it possible to confirm, as one would expect, that Carozzi's transcriptions are reliable (though he has often expanded Saussure's telegraphic notes into more respectable prose).

Saussure's major published work was his great four-volume *Voyages dans les Alpes (Alpine Travels, 1779–1796)*, which set new standards in the description and analysis of the physical geography of mountain regions. Carozzi's present volume deals with what was for Saussure a side issue, although an important one at the time. Basalt was an exceptionally puzzling rock, because—in the days before modern thin-section microscopy and silicate chemistry—neither the study of specimens in a museum nor chemical analysis in a laboratory shed much light on its nature and origin. Yet in the field it was an important component of the landscape of many parts of Europe. So it was a sensation when Nicolas Desmarest claimed that in the central region of Auvergne there was strong evidence that basalt was an ancient volcanic lava; it was closely associated with unmistakable extinct volcanoes. The most substantial part of the present volume deals with Saussure's tour around Auvergne and Vivarais to the south) in 1776, mainly to see Desmarest's evidence for himself. There are also his notes on his earlier scientific Grand Tour to see the active volcanoes of Italy, and some later writings that take us almost to the end of his life. (A fascinating though unrelated section deals finally with his unsuccessful attempts to get a teaching post in Paris or Clermont, after the hyperinflation of the Revolution turned his affluence into penury.)

After his trip to Auvergne, Saussure was fully convinced by the volcanic explanation of basalt; but, as this volume traces admirably, in later years he became more and more ambivalent about the issue. He was increasingly impressed by the newer and contrary explanation, expounded persuasively by the Saxon mineralogist Abraham Werner among others, that basalts were sedimentary and had nothing to do with any volcanic activity. However, this argument between 'Vulcanists' and 'Neptunists'—a classical education put all these savants on familiar terms with the ancient gods—was primarily a matter of deciding the nature of deciding the nature of just one specific kind of rock, albeit an important one. No major change in thinking about the earth hinged on the outcome, still less any change in 'worldview'. It was a technical problem about which the evidence was highly obscure, as anyone can confirm by looking at a specimen of basalt in a museum, or at a cliff of basalt in the field, while suspending any modern knowledge about the matter. One great merit of Carozzi's volume is that it traces that uncertainty in the work of one of the most acute observers of his time. The example of Saussure should (but probably will not) put a stop to some historians' facile description of the controversy in terms of 'goodies' and 'baddies'.

Saussure's notes also embody what is of equal interest for the history of geology, namely their record of his fieldwork practice. Much of this has become so much the standard for geologists that it is difficult to appreciate its originality and historical importance. Because in his time it was not yet standard, Saussure made it explicit, and his notebooks and specimens show that he practised what he preached. He would compile an 'agenda' before starting out on a field trip, because his fieldwork was always designed to investigate specific problems or test specific theories, not just to observe at random. He would note the exact time (to the minute!) at which he started out each morning or after a lunch stop, and his times of arrival, also noting any 'time lost' on the way: not because of some cultural Protestant obsession with accounting profitably for every minute, but primarily to help in planning the best use of limited time on any repeat visit in the future. He would carefully label his specimens on the spot (some extant examples are illustrated here, not relying on a fallible memory to recall where each had been collected). He would make also rough notes in pencil at the same time, with the rocks or the scenery in view, but then to amplify them in ink the same evening at his overnight hotel, to make a permanent record while his visual memory was still fresh. His notes also record his massive use of local informants, and give a good impression of the network of provincial naturalists at this time, many of them local clergy.

Out of such prosaic procedures are effective sciences constructed. It would be good if Carozzi's presentation of Saussure's fieldwork encouraged more historians of science to get their metaphorical boots dirty in the same way, and their minds engaged with the muddle and messiness of real scientific work.

Martin Rudwick, London and Cambridge

Simpson Synthesised

Léo F. Laporte, *George Gaylord Simpson: Paleontologist and Evolutionist*, Columbia University Press, New York, 2000.

George Gaylord Simpson holds a very important place in the history of evolutionary palaeontology. He is one of the four great founders of the 'synthetic theory of evolution' (i.e., Thodosius Dobzhansky, Julian Huxley, Ernst Mayr, and G.G. Simpson), although he may be the least well known. This can be explained partly by the fact that each of the founders of the theory—perhaps with the exception of Dobzhansky—tried to get themselves recognised at the expense of the others. For example, it is known that Mayr considers that Simpson was not a true naturalist, and that 'he never understood what a species was'. Because of these problems, it was even more necessary to make the true importance of Simpson known. That is what Laporte, who has conscientiously read most of Simpson's works and who has had access to his personal papers, has successfully devoted himself to doing.

All his biographers and commentators agree that Simpson's main work, the one that truly transformed the link between palaeontology and the modern theory of evolution—in some respects his 'foundational' work—was *Tempo and Mode in Evolution* (1944). Naturally, Laporte devotes most of his study to the analysis and exposition of the contents of this book, 'which represents the culmination of his ideas on evolutionary rates and patterns and was his contribution to the evolutionary synthesis that was consolidating between 1936–1947'. Simpson brought to the synthetic theory what it was previously lacking, showing that the data of palaeontology were consistent with the new genetics. In particular he convinced people that the 'microevolution' of the geneticist could indeed be extrapolated to explain the 'macroevolution' of the palaeontologist. The new theory of evolution, known under the name of 'The Synthetic Theory of Evolution', was developed from genetic and systematic data, mainly that of Dobzhansky, to which Simpson frequently referred, often with admiration. The main contribution of *Tempo and Mode in Evolution*, in fact of all Simpson's works, was, then, to integrate palaeontology into the new theory, making it an essential element. His detailed professional knowledge of fossils, especially those of the Cainozoic, as well as the knowledge he had conscientiously acquired from a personal study of genetics, made him eminently suited to create this synthesis.

Laporte also evokes the important impact Simpson had on the naturalists of the day—though curiously, however, initially more on geneticists and taxonomists than on palaeontologists. His influence on the latter took longer to establish and also seems, according to Laporte, to have then begun to decline more rapidly, perhaps simply due to the fact that his ideas were soon widely adopted. As is generally known, the usual fate of ideas which become consensual is that they are no longer the object of public expressions of recognition of their authors.

Simpson wrote a lot, mainly on three topics: palaeontology, theories of evolution, and the problems of 'Man'. Some of his theories have been forgotten—in particular his opposition to Wegener's theory of continental drift, which he held right up until his last years and to which he only half-heartedly conceded.

Sometimes it may be regretted that the biographer does not distance himself sufficiently from his 'hero'—as for example in his study of the palaeontologists' work at the beginning of the century in which he quotes comments made by Simpson which bring out his own superiority even more. Simpson was not a historian of science—as this shows! So, to follow him literally is perhaps not the best way of introducing his predecessors. It is difficult for a 'good' biographer to be objective! But that is all part of Laporte's style . . .

Simpson wasn't simply an eminent palaeontologist and staunch evolutionist. As is underscored in this biography, he was also an 'apologist', intent on conveying an anti-religious message. Like many Neo-Darwinians he bitterly objected to any transcendent references, particularly to those of his childhood beliefs, which were based on the Christian traditions of his parents. 'I increasingly realised', he wrote, 'that practically nothing the preachers throw at you has any likelihood of being true . . . Belief in an anthropomorphic god, in a saviour, or in a prophet is nonsense'. Like Lamarck, 150 years earlier (but Simpson hadn't looked for it . . .), his message was: 'Man, too, is a natural phenomenon'.

Laporte cares about clearly differentiating between the qualities of the man and his work, and in his last chapters he returns to the subject he had already evoked in the first. Simpson was a difficult man, which would explain why he had a number of professional and family problems even in his childhood. He had few friends, and it is known how venomous he could be to some of his colleagues, especially Teilhard, whom he called his friend(!). As a man of exaggerated egocentricity and 'hypersensitivity regarding what he thought was due to him as one of the world's leading scientists of his day', Simpson provoked conflict with people close to him, which made him both pessimistic and miserable.

The fact remains, however, that his work was brilliant and engaging, to such an extent that the French palaeontologist and academic Charles Devillers was able to write that one must 'distinguish between the pre- and post-Simpsonian periods'. Simpson was highly regarded, as is shown by the numerous honours and distinctions bestowed upon him: his biographer recalls that he was elected 'to the presidencies of the American Society of Mammalogists (1962), the Society for Systematic Zoology (1962) and the American Society of Zoologists (1964)', and that he received 'the award of more than a dozen international medals and prizes by scientific societies and organisations'. Laporte's book helps us learn more about a great scholar who definitely deserves to be more widely known.

Goulven Laurent, Brest

Dating Gaia

Cherry Lewis, *The Dating Game: One Man's Search for the Age of the Earth*, Cambridge University Press, Cambridge, 2000. This enthusiastic book by Cherry Lewis tells the story of one of the greatest geologists of the twentieth century, Arthur Holmes. Surprisingly, Holmes's work and life has hitherto been somewhat neglected, despite his influence on several generations of geologists who grew up knowing his name through his splendid text-book *Principles of Physical Geology*, which first appeared in 1944, and his smaller books on the age of the Earth. That influence on the international geological community in the 1950s can be seen, for instance, in the numerous references to his work that appear in Serge von Bubnoff's *Grundprobleme der Geologie*, published in 1954.

As the title of the book implies, it is concerned essentially with Holmes's involvement in the dating of the earth through the measurement of radioactive elements in rocks, which kept him on a busy crusade for almost fifty years. The story of Holmes's attempts to date the oldest rocks on Earth and to draw up a consistent and logical table of dates for the Geological Time Scale is interspersed with that of Holmes's personal life, and in these sections Cherry Lewis has done some excellent digging, bringing out particularly the disastrous year for Holmes and his family in Burma, and the following period 'in limbo' in Gateshead, before he gained the chair of the newly-established Geology Department at Durham University.

The story of Holmes's relationship with Doris Reynolds is well told but we never hear what happened to his son, Geoffrey, after the death of Holmes's first wife, Maggie. The 'liaison' with Doris, prior to their marriage, undoubtedly was a source of scandal to many of the conservative establishment, and, apart from the actions of the authorities at Durham University, might well have been a continuing contributing factor to having his scientific work acknowledged. Even in less stuffy Australia at this period there were many who looked askance at colleagues whose sexual mores, even divorce, made their geology doubtful.

The figures accompanying the text are well produced and help tell the story of the chemistry of the radioactive isotopes and the dating of the earth clearly. In addition there are some interesting photos. I should have liked to see a map of the Burma oilfield region to complement those of the earlier Mozambique expedition, which undoubtedly had a great influence on the direction Holmes's work took.

There are a few typographical/grammatical errors: 'prize' for 'prise' (p. 3); 'draw' for 'drawer' (p. 41); 'less' for 'fewer' (p. 57); 'comprised' for 'composed' (p. 75 & p. 113); 'Claire' for 'Clair' (p. 251); 'Acadamy' for 'Academy' (p. 253). Perhaps the major deficiency is the index. There is none. This is almost inexcusable today, when there are so many available computer programs to make this once onerous task both easy and rapidly achieved. Also, historians might like a few more dates, and some will undoubtedly be frustrated by the lack of specific references for points that have been made (such as that concerning Holmes's laborious work, mentioned on p. 58), as the author, perhaps pandering to editors wanting a popular book, has eschewed the use of footnotes, though the source of some quotations is acknowledged at the end of the book.

While there is no doubt that Holmes's persistence paid off, the book, like many others from British and American sources, perhaps lays too much stress on the Anglo-American part of the story of dating the rocks. Even in this matter Dr Lewis uses what I feel is an overworked view of scientific 'progress' with a 'metropolitan' centre-point, largely assumed to be London. Thus, when she refers on p. 55 to Rutherford working in Montreal she does so saying that he was 'somewhat in isolation from the rest of the world'. The British Association had carried its banner to the Dominion several times. Canada had several highly regarded universities. And as regards geology, J.W. Dawson had established a tradition of geological research in Montreal, albeit some of it decidedly controversial. And, despite the anecdote on p. 54, F.D. Adams was no mean intellect, with a decided interest in the history of geology. Certainly by the mid-thirties Adams had accepted an age of the Earth of some 1,599,000 years. There were also other Canadian researchers of note, such as J.B. Tyrrell, close by in the Geological Survey, which began in Montreal and then moved to Ottawa. The United States with its network of universities was just a stone's throw away.

I have a few minor historical/geological quibbles: the conditions in the Permian, *etc.*, as stated (p. 21) pertain to the Northern Hemisphere—they were not universal. Was George Becker (p. 64) 'one of the foremost geologists of the time'? His work on fractional crystallisation was important, as were his metamorphic studies, and perhaps his status needs reconsideration (?scope for another biography), but is he rated too highly here? Perhaps the term 'traditional geologists' (p. 65) is misleading: 'conservative' might be more appropriate. It is not absolutely true that, as Lewis contends (p. 66), the Precambrian was 'undivided' (see for instance M.G. Willmarth, *US Geological Survey Bulletin No. 769, 1925*). As stated (p. 107) it would appear that the Western Front of WW I included Gallipoli. The measurement of lead by the Viennese team (p. 115), although perhaps dominantly lead produced from the decay of U 235, must surely have also included 'ordinary' lead. Dr Prior (p. 118) might usefully be identified; presumably it is G.T. Prior, then Keeper of Minerals at the British Museum.

The comment on the substratum 'now known as the mantle' (p. 155) is rather simplistic and would have deserved a footnote or some expansion, as the complexities of Wegener's ideas and the development of ideas about the lithosphere and the asthenosphere form a major topic. This was a separate aspect of Holmes's research, involving his ideas about convection currents within the earth, and was, I believe, even more important than his work on dating. It is only touched on in the present book, and I suppose that is appropriate. However, Dr Lewis points to the important study of the continental-drift story by Naomi Oreskes (p. 235) that discusses this problem in some depth and which pays due credit to Holmes. Holmes's ideas also receive considerable airing in various articles in Gregory Good (ed.), *Sciences of the Earth: An Encyclopedia of Events, People, and Phenomena*, 2 Vols, Garland Publishing, New York & London, 1998. Particularly relevant to the topic of the present book is the article by Alan Allwardt on 'Radioactivity in the Earth' in Vol. 2 (H-Z), pp. 718-722. So there is certainly a resurgence of interest in this important twentieth-century figure.

One probably quite irrelevant thought about Holmes was brought to my mind by seeing the interesting anonymous Victorian Dhustone section, near Ludlow (p. 195), showing at least one unconformity. With his interest in the geological

time-scale one would assume that Holmes would have been particularly interested in unconformities, as was Serge Tomkeieff who worked nearby at Newcastle-on Tyne. Why then did Holmes never go (as I was reliably [?] informed by a Scottish colleague) to the famous unconformity at Siccar Point? Did his health prevent him from taking the steep path down to the sea?

Despite a slight penchant for extra (repetitive) and atmospheric adverbs and adjectives such as 'very first', 'true age', and 'actually', Dr Lewis's style makes for easy and enjoyable reading and the book will, I am sure, be eagerly taken up by the geological profession. A sure sign of success would be the appearance of a paperback version in the near future. Hopefully this book will encourage those entering the profession to look back beyond the past five years or so, the usual limit for references to most papers today. As this book shows, earlier workers such as Holmes still have plenty to teach us about the Earth. Perhaps Dr Lewis will take up her pen again and tell the public more about the history of geology. It is a worthy cause.

David Branagan, Sydney

The History of Global Climate Change, as Viewed from the United States

James R. Fleming, *Historical Perspectives on Climate Change*, Oxford University Press, New York, 1998.

The history of climate change has been the subject of several investigations and 'climate change', the 'greenhouse effect', and the 'ozone hole' are all on today's agenda. International conferences, such as that held at Rio in 1992, have recommended governments of both industrialised and non-industrialised countries to reduce the production of anthropogenic carbon dioxide to the level of 1990. To date, this goal has *not* been achieved (and seems less likely in the near future with the advent of G.W. Bush to the Presidency of the United States). Carbon dioxide is still increasing rather than decreasing and the greenhouse effect producing global warming is steadily growing. Climate change is not something personally felt or observed from year to year. But one does get a general impression that European summers have been very warm or very rainy during the last decade, while in winter we have had disastrous avalanches in the Alps, although a white winter with good skiing conditions in the Alpine foreland has been more frequent than in former years. But if one looks at the weather records for only one or two decades it will be noticed that they show a rise and fall of sunny and rainy summers and winters with much or little snow. For example, in Germany climate is defined by the mean temperature over thirty years. But to eliminate local influences like traffic or urbanisation, one should use data from weather stations that are not directly affected by changing human activities. Therefore many stations, worldwide, have to be considered.

A different way to proceed is to look at the effects of warming, *i.e.* melting snow and ice as seen in polar regions. The Arctic Ocean is covered by a thin layer of sea-ice, while the Antarctic continent consists mainly of a snow-covered ice-cap rising to more than 3,000 metres. One may be alarmed by newspaper reports that the Arctic ice is becoming thinner or that a gigantic piece of the Antarctic shelf-ice has broken away in the southern Weddell Sea and is now drifting northwards. Also, the substantial retreat of Alpine glaciers gives warning signals.

Even before the advent of computers and computer models analysing myriads of meteorological data, observations were most important. This led to the development of theories of the ice ages, as seen for example in three volumes of the German geographers on *The Alps During the Ice Age* (Penck and Brückner, 1901–1909). Brückner was a specialist in the problem of climate change, publishing many papers on climate fluctuations and their effects on agriculture and the migration of peoples, or on climate change in India (1813 to 1912). His best-known book was *Climate Fluctuations since 1700* (Brückner, 1890). Recently, his work has been acknowledged in publications by Stehr *et al.* (1995) and by Stehr and Storch (1998), discussing climate change in the late nineteenth and early twentieth centuries. Another German author who has dealt with climate variation in Europe since regular observations with instruments began in 1670 is Rudloff (1967). This book gives no account of theories, but it describes, for example, the effects of the weather during the 'Little Ice Age'. There are also more recent analyses (*e.g.* Weikinn, 1958–1963, 2000).

In his new book on the history of meteorology James Fleming recounts the Anglo-Saxon part of the story of historical perspectives on climate change. He analyses English publications and translations, which are supplemented mainly by German and French citations of primary sources and his own translations of French sources. The ideas of eight scientists are treated like milestones. The growing awareness of climate change in its socio-cultural context and the development of instruments and observation methods are only mentioned in the first chapters. Fleming starts with the publications of the French mathematician Joseph Fourier from the 1820s, who was the first to reason about the greenhouse effect. His work was based on Horace Bénédict de Saussure's experiments with a heliothermometer—a glass-covered wooden box—performed in 1774 to investigate the heating effect of the sun at different altitudes in the Alps. The Swedish electrochemist Svante Arrhenius introduced carbon dioxide into the debate concerning ice ages. Fleming's story ends with the American oceanographer Roger Revelle—undeservedly called the 'granddaddy' of the theory of global warming—who contributed to the problem of carbon dioxide exchange between the atmosphere and ocean in 1957. The interim periods are filled by several colourful stones from a larger mosaic. The Irishman John Tyndall worked on atmospheric trace-constituents as active absorbers of radiant heat during the 1860s. The American geologist Thomas C. Chamberlin followed, with publications in the late 1890s and in 1923, on the interconnection of the Earth's dynamic systems, including multiple ice ages, the inorganic carbon cycle, and reversals of deep-sea glaciation. The British 'steam engineer', G.S. Callendar, was interested in meteorology and examined the role of anthropogenic carbon dioxide in climate warming in the late 1930s. Finally, the Canadian physicist Gilbert Plass formulated the carbon dioxide theory of climate change in 1956. The American geographer Ellsworth Huntington's non-scientific contributions between 1913 and 1924 to the understanding of climate change and its effect on civilisation remain unclear.

Apart from Fourier, Fleming's protagonists are introduced by short biographies, and it is intriguing to learn how scientists of various backgrounds and interests dealt with the same problem from different perspectives. The book is at its best in its presentation of the results of the author's archival research in the States. A sort of detective story on 'who has copied erroneous information on Fourier's first mention of the greenhouse effect from whom' provides an interesting footnote in the

history of science, which may arise when texts are treated uncritically. It shows that it is an 'absolute must' to look at original source materials. Fleming's book on the study of the past certainly provides a better understanding of the climate-change problem from an American point of view. He notices the work of Alfred Wegener and his father-in-law Wladimir Köppen, though only referring to their explanation of glaciation in low latitudes due to continental drift and failing to mention their famous monograph on the climates of former geological epochs (Köppen and Wegener, 1924). Fleming also pays no attention to Brückner and Penck's important publications on climate change, mentioned above.

Unfortunately the editor did not ensure that definitions were given for certain important notions such as 'phlogiston', 'climate', or 'modern climatology'. Also, dates for the persons appearing in the book are missing. They should have been provided for Fourier and de Saussure at least, with some brief biographical information. It is regrettable that the German quotations have evidently not been properly checked or proof-read, for they contain several mistakes.

In this context, I look forward to the establishment of a Commission on Meteorology during the coming Congress of History of Science of the International Union of History and Philosophy of Science at Mexico City, 8–14 July 2001, at the initiative of Fleming. It is a worthwhile challenge to bring together the few historians of meteorology from the Old and New Worlds.

Brückner, E., *Klimaschwankungen seit 1700*, Vienna, 1890.

Köppen, W. and Wegener, A., *Die Klimate der geologischen Vorzeit*, Berlin, 1924.

Penck, A. and Brückner, E., *Die Alpen im Eiszeitalter*, Leipzig, 1901–1909.

Rudloff, H. von, *Die Schwankungen und Pendelungen des Klimas in Europa seit dem Beginn der regelmässigen Instrumenten-Beobachtungen (1670)*, *Die Wissenschaft*, 1967, 122.

Stehr, N., von Storch, H. and Flügel, M., 'Climate Variability, Climatic Change and Social Consequences: The Discussion at the Turn of the Last Century', *Historisch-Meereskundliches Jahrbuch*, 1995, 3, 51–70.

Stehr, N., and von Storch, H., *Eduard Brückner: Die Geschichte unseres Klimas: Klimaschwankungen und Klimafolgen. Ausgewählte Arbeiten, herausgegeben und eingeleitet von Nico Stehr, Green College, The University of British Columbia, Vancouver, Canada and Hans von Storch, Institut für Gewässerphysik, GKSS Forschungszentrum, Geesthacht*, 1998.

Weikinn, C., *Quellentexte zur Witterungsgeschichte Europas von der Zeitwende bis zum Jahr 1850*, in: Börngen, M. and Tetzlaff, G. (eds), *Hydrographie*, Vols 1–4, Berlin, 1958–1963 and Vol. 5, Stuttgart, 2000.

Cornelia Lüdecke, Munich

More than a Biography: The History of a Man and an Idea

Evgenij Evgenjevich Milanovsky, *Alfred Wegener 1880–1930*, *Seriya nauchno-biograficheskaya literatura*, Nauka, Moscow, 2000 (in Russian).

Professor Evgenij Milanovsky, whose biographical details are to be found in an interview with David Oldroyd in the *INHIGEO Newsletter* No. 32 for 1999, pp. 30–33, presents us with a biography of particular note. Reflecting the most recent publications on Alfred Wegener, Milanovsky's work constitutes the most up-to-date account of Wegener's life, his academic domain, his researches, and his expeditions. Both the biographical section and the detailed account of Wegener's family history are based upon meticulous studies, utilising the most recent secondary literature as well as primary source material from the Wegener archive. The book itself is, however, far more than a mere biography: it is an historical account of 'tectonic mobilism' and an analysis of Wegener's ideas and theories right up to the concept of plate-tectonics and the notion of an expanding earth. Milanovsky's contribution to the history of plate-tectonics is his account of the struggle Wegener endured in order to gain acceptance of his mobilist theory in the face of prolonged intellectual opposition from supporters of fixism in the Soviet Union. The text is supplemented by a multitude of photographs, diagrams and—typically for Milanovsky—his own artistically hand-drawn landscape sketches, all of which allow the reader to readily absorb the body of the text.

In his foreword, Milanovsky sketches an overview of the reception of Wegener's notion of tectonic mobilism in Russia and the Soviet Union. This section should be of interest to historians of geological sciences not just in the West, but worldwide. Wegener's main work *The Origin of Continents and Oceans*, published in Germany in 1915, was translated into Russian in 1923 and again in 1925 and 1984. It was translated into French in 1924 and 1937, into English in 1924, 1968, and 1996, into Spanish in 1924, into Swedish in 1926, and into Italian in 1964. In Russia, Wegener's theories about continental drift were taken up and propagated by distinguished geologists during the 1920's and '30's: Borisiak (1922), Pavlov (1924), Milanovsky Sr (1930), Lichkov (1931), Krishtafovich (1937), and others. According to Milanovsky (p. 6), Wegener's notion of tectonic mobilism 'provoked scepticism or active opposition from some of our own brilliant [Russian] scientists, who took the orthodox position of fixism (Shatsky: 1945, Belousov: 1948, 1968 etc.); however over the last twenty to thirty years these [mobilistic] ideas have obtained the acknowledgment that they deserved in our country as well as overseas'. Milanovsky presents his first acquaintance with Wegener's life and work while still a student in 1946 until the present day.

Milanovsky expresses his thanks to the German geologists with whom he had personal contact such as Rudolf Daber (Humboldt University, Berlin), Volker Jacobshagen (The Free University, Berlin), Siegfried and Anja Lächelt (Berlin), and also Klaus Vogel (Werdau). In addition to archival sources, Milanovsky relies significantly upon the extensively researched biographies Wegener by Körber (1980), Schwarzbach (1980, 1989) and Jacobshagen (1980), and in particular on the detailed biographies of Ulrich Wutzke (1988, 1997, 1998). Of the more recent Russian studies, Milanovsky mentions the 1984 reprint edition of *The Origin of Continents and the Oceans*, which contains its supplementary commentaries of both P.N. Kropotkin and P.S. Voronov.

The book is divided into nine chapters. Chapters 1 to 7 trace the life of Alfred Wegener and his family, with references to cultural history that shed light upon his interaction with his most important scientific contemporaries in the field

of mobilism, and describe his practical and theoretical research results in detail. Chapters 8 and 9 throw light on Wegener's last expedition to Greenland and the way of acceptance of his ideas and their influence on the development of geotectonic theories to date. Thus we have: (1) Childhood and youth and the first steps towards natural science (1800–1912); (2) The first Greenland expedition (1906–1908); (3) The first Marburg period and the origins of the continental drift hypothesis (1908–1912); (4) The second Greenland expedition (1912–1913); (5) The second Marburg period (1913–1918) and the First World War; (6) The third Marburg period and the Hamburg period (1919–1924); the origins of the moon and moon craters; the development of the continental drift hypothesis and the hypothesis regarding climate in the geological history of the Earth; (7) The happy years of contentment of Wegener's professorship in Graz (1924–1930); (8) The third Greenland expedition and Wegener's tragic death (1929–1930); (9) Wegener's concept of mobilism and the role it played in the development of the geosciences in the twentieth century.

Chapter 1 provides information about Wegener's family history, his childhood and youth, as well as about his later studies in meteorology and other areas of natural science at Heidelberg, Berlin, and Innsbruck Universities. Milanovsky discusses further Wegener's DSc and his first appointment, at the Aeronautical Observatory in Lindenberg near Beeskow, southeast of Berlin.

In Chapter 2, Milanovsky researches the history of the ethnic German Köppen family in Russia, into which Wegener married in 1913. Professor Vladimir Petrovich Köppen, meteorologist and climatologist at the German Maritime Observatory in Hamburg, whom Wegener consulted in 1906 about his first Greenland expedition, became Wegener's father-in-law after he married Köppen's daughter Else. The first Greenland expedition (1906–1908) and its results are dealt with in the latter half of Chapter 2.

In his description of the first period in Marburg (1908–1912, Chapter 3), Milanovsky begins with a depiction of the importance of Marburg as a university town, as well as the influence of Wegener on the study of the natural sciences. He further describes the beginnings of his hypothesis about the origins of the Atlantic Ocean through continental drift, upon which Wegener expanded after 1910, which is followed by an extended discussion about Wegener's intellectual mentors. Milanovsky leads the reader through Wegener's preoccupation with the fundamentals of the continental-drift hypothesis, beginning with an article by Krenkel (1911) concerning a discussion with Hans Cloos, and concluding with the first summary of the drift hypothesis in *Petermanns Mitteilungen* (1912), 'The Origin of Continents', the geological basis of which receives extensive discussion (pp. 79–88).

Chapter 4 covers the preparation and developments of the second Greenland expedition (1912–1913), including the visit to Iceland, under the leadership of Johann Koch. On 16 November, 1913, Wegener married Else Köppen, who survived both Alfred and their three daughters and only died in 1992. In Chapter 5 the family's eight-month 'Marburg idyll', and Wegener's active participation in the Great War, are covered. In 1915, Wegener completed his *Origin of Continents and Oceans*, which was published that year by Vieweg & Son in Brunswick. Whilst residing in Marburg, Wegener became interested in meteorites, and succeeded in locating a heavenly body that had fallen near the village of Treysa (now Schwalmstadt). It was through this discovery that he began working on the origin of lunar craters, which he considered to be largely the result of meteorite impacts. Wegener returned to Marburg after his release from military service in 1918.

Wegener continued to pursue his interest in the origins of lunar craters during his third and brief stay in Marburg (1919, Chapter 6). In the spring of 1919 the Wegeners moved to Hamburg, where Alfred took over the position of his father-in-law in the German Maritime Observatory's Department of Theoretical Meteorology. In addition, Wegener obtained a professorship at the University of Hamburg, founded in 1919, and co-authored *Climate in Geological Prehistory* (1924) with his father-in-law. Milanovsky analyses the then contemporary academic debate surrounding Wegener's ideas about continental movement, as an example the contrary stances taken by Penck, Kossmat, and Semper. Milanovsky's representation of the early reception of Wegener's works in the Soviet/Russian academic literature is original and of special interest to geological historians outside Russia (pp. 130–133).

In the spring of 1924 Wegener was called to the University of Graz in Austria (Chapter 7), where he enjoyed excellent research conditions, working amongst renowned scientists, and was able to have his family join him. Milanovsky analyses the lack of contact that Wegener had with Austrian Geologists during his time in Graz, as well as the weak points of his theory of continental drift (pp. 145–150). Throughout the first years, Wegener occupied himself almost exclusively with the development of his theories. Later, however, the preparation for his final expedition to Greenland took over as the centre of his attentions (Chapter 8). The funds for the expedition were supplied by the Emergency Organisation for German Sciences (*Notgemeinschaft der Deutschen Wissenschaften*), headed by its president, Schmidt-Ott. A preparatory expedition in 1929, comprising only four scientists, was followed by the main expedition, which set off on 1 April, 1930. Milanovsky describes the events and results of the expedition in detail, and also the life and work of the members of expedition in the legendary *Station Eismitte* (pp. 168–181). Just a few days after his fiftieth birthday, Wegener died on 15 or 16 November, 1930, on the inland ice of Greenland.

In Chapter 9, Milanovsky provides an extensive overview and rigorous analysis of the development of Alfred Wegener's concept of the continental drift and tectonic mobilism and the implications it has had for the development of the geological sciences right up to the present, with specialist literature published until 1999 being evaluated.

The extensive bibliography (246 titles) includes Wegener's works, as listed by Ulrich Wutzke (1998) *Kommentiertes Verzeichnis der schriftlichen Dokumente seines Lebens und Wirkens. Berichte für Polarforschung*, Alfred-Wegener-Institut, 1998, No. 288, pp. 1–144, supplemented by Milanovsky's list of Russian publications concerning Wegener's life and works, as well as other sources. The most significant dates relating to Wegener's life and work, and an index of names, complement this important publication, which assuredly deserves to be translated into other languages to reach a wider readership.

Peter Krüger, Berlin

A 'Divine Strip-Tease': Removing Twelve Vells of Gaia

David R. Oldroyd, *Thinking about the Earth: A History of Ideas in Geology*, Athlone Press, London, and Harvard University Press, Cambridge (Mass), 1996.

We do not get ideas.

It is the ideas that get us (Martin Heidegger)

This book (re)presents the fresh views of a 'metascientist' who has succeeded in escaping the fate of those (deep but narrow-minded) professionals who are unable to see the forest because of the trees; or, more to the point, unable to see the Earth because of the rocks. Actually, the undertaking is almost impossible. It can become a kind of epistemological merry-go-round involving (neo)positivism, phenomenology, and Kuhn's 'paradigmology'. Fortunately, the distinguished author has made a (successful) attempt to distinguish *facts* (observed and/or measured), *hypotheses* (both working ones and others that do not work), *theories* (analytic and synthetic), and *paradigms* (some of which may degenerate into 'paradigm[a]s').

Twelve fascinating chapters discuss in a vivid style well-chosen crucial topics. These are (here freely reformulated): (1) Out of a world of magic: from Mesopotamia to the Moon; (2) The Earth Machine, with or without its clockwork master; (3) Caught between stars and crystals; (4) The clash of Vulcan and Neptune in geoscience; (5) The Globe flattened to maps; (6) The fourth dimension: Time; (7) The factor of (changing) climate; (8) How do mountains grow and why?; (9) Are rocks solid indeed, and what happens when they are not?; (10) Waves of a restless underworld; (11) Crustal puzzle on the move; (12) Towards a new paradigm: a complex homeostatic Earth System ('Gaia').

In the last (13th) chapter the author compares the ancient 'mythologies' with the new one (the 'Gaia' hypothesis). He points out the gaps in our knowledge and indicates the main tasks for the future. In this context he deplores the fact that the evolution of some branches of Earth Sciences (e.g. geochemistry, with Goldschmidt, Fersman, etc.) has not been sufficiently studied by (geo)historians. He opts for persistent attempts to develop a (w)holistic synthesis (in the sense of 'geonomy', as conceived in 1974 by the Hungarian professor E. Szadeczky-Kardoss), along with ongoing in-depth analysis facilitated by the accelerating development of instrumentation and computerization. — Sincere congratulations!

As far as 'gaiology' is concerned, I feel obliged to utter a modest warning, in my capacity as professional geologist–biologist–chemist and amateur philosopher. *Analogy is not identity*. A complex homeostatic system comprising quite a number of organisation levels (from physical fields to celestial bodies), including the biosphere and even the noosphere, capable of self-regulation and even self-repair/restoration by means of a multiple feedback mechanism, should *not* be considered as a *living organism*, unless by (ontological) analogy and (poetic) metaphor. And, needless to say, even less a goddess, however attractive it (and not *she*) may be. (Emphasising this point, I am of course in full agreement with the author.)

The (well indexed) bibliography includes almost 1000 (in fact, 929) items ranging from the Bible to Lovelock and from Aristotle to Vernadsky. The undersigned had particular pleasure in noting four Hungarian names (L. Egyed, S. Jaki, I. Lakatos, M. Polanyi), although three of them worked outside Hungary, and none of the four is a geologist. (Egyed was my Professor of Geophysics at the L. Eötvös University of Budapest.) It is no wonder that only works written in (or translated into) English, French, and German have been taken into consideration. A supplement dealing with the ideas developed in Russia (starting with Lomonosov) and eventually in (say) China would be most welcome—but far from easy to produce, even with or through international co-operation.

Endre Dudich, Budapest

A Traveller in Hungary

Péter Rózsa (ed.), *Robert Townson Magyarországi; or Robert Townson's Travels in Hungary. Proceedings of the Townson Symposium, held in Debrecen, 26 September, 1997, Debrecen, 1999.*

This handsome soft-covered book of 219 pages presents the papers given at the symposium held at Debrecen to celebrate the bicentenary of the justly famous book *Travels in Hungary*, which Townson published in London in 1797.

The Symposium, and the publication, was sponsored by INHIGEO, but the major work of planning the meeting and the subsequent publication was carried out by the Regional Centre of the Hungarian Academy of Sciences in association with the Science Historical Department of the Hungarian Geological Society.

The volume comprises seventeen papers, mostly by Hungarian authors, but with contributions from Britain and Poland. Each of the essays is printed first in Hungarian, and then repeated in English, the translations being generally well revised by István Pelyvás, although there are a few infelicities.

The work of this polymath and 'traveller extraordinary', as Hugh Torrens describes Townson in the introductory essay, was quite astonishing for the period, and this is shown in the range of topics discussed in this book. Townson's work (particularly in Hungary) covered topics such as geology, meteorology, geochemistry, botany, entomology, speleology, and particularly topography and mapping. Each of these is analysed in thoughtful essays, with excellent footnotes and references. Furthermore Townson's work is not left in isolation but is placed in the context of the development of Hungarian sciences around the beginning of the nineteenth century in an essay by Péter Rózsa. This I found particularly interesting, with the several strings of culture, both Catholic and Protestant, intertwining, and the input of scholars trained in other countries before returning to their homeland to establish a national science.

Some of the essays deal with very specific topics, such as the beetles collected by Townson, discussed by Ottó Merkl, with a detailed table; the 'geochemistry' by Gyula Szóor, István Barta and Péter Rózsa, which looks at Townson's chemical analyses; and the meteorological observations examined by Péter Rózsa and Károly Tar. Other papers look more generally at places Townson visited, or at topics such as the Wernerian aspects of Townson's geology (geognosy) (Miklós Kázmer), or

speleology (a field in which Hungarians have made many important contributions) (Sandor Hadobás). Sandor Hadobás and József Hála have provided an eight-page list of references on Townson, most in Hungarian, but a few in English and German.

There are several maps. I only regret the lack of more illustrations, but undoubtedly their absence is the result of financial considerations. The cover, designed by Gábor Lukács, shows a reproduction of the fine painting of Townson by the English artist, Augustus Earle, painted in Australia, where Townson lived the last years of his life. It is superimposed on a reproduction of part of Townson's map of Hungary.

As an Australian I can only regret that Townson's scientific work did not continue when he came to Australia. He is remembered in Australia only for his work in viticulture and the breeding of sheep and cattle, but several schools in the region where he lived are named for him.

As Dr Endre Dudich (himself an important contributor to the history of Hungarian science), has written in the preface: 'special thanks are due to Dr Péter Rózsa' for his work in organising the symposium and getting the papers together for publication. It is certainly an important contribution to the history of Hungarian science, and will make Townson's pioneering work better known to younger Hungarian historians. However, it will do much more than that, by making, through the English versions of the essays, Townson's work known and appreciated by historians in the English-speaking world.

David Branagan, Sydney

Early Dutch Volcanology: Humanists, Traders, and Theorists

Emile den Tex, *Een Voorspel van de Moderne Vulkaankunde in West-Europa met Nadruk op de Republiek der Verenigde Nederlanden*, Koninklijke Nederlandse Akademie van Wetenschappen, Amsterdam, 1998.

In his latest book, Emile den Tex, Emeritus Professor of Mineralogy and Petrology at the University of Leiden and long-time Chairman of the Commission for the History of Dutch Geology, offers a magisterial sweep through the volcanology of the early-modern period. Until the nineteenth century, there was no specialised professional volcanology, and in the course of the seventeenth and eighteenth centuries the study of volcanoes was carried out by a colourful variety of people. Den Tex recognises three groups who were interested in volcanic phenomena, namely literary-humanists, seafaring merchants, and armchair theorists of the earth. Den Tex devotes a chapter to each group, adding a fourth on trends towards the professionalisation of volcanology. He ends with a fifth chapter on the 'basalt controversy' of the late-eighteenth century.

Representative of the first group was Philippus Cluverius (1580–1623), who travelled to Italy to study Mediterranean volcanism in the field. A pioneer of historical geography, Cluverius was inspired by his teacher at Leiden, the great philologist and humanist scholar Joseph Justus Scaliger, to check the descriptions of volcanoes from the classical literature by field verification. In the process Cluverius managed to both confirm and correct historical notions about volcanic activity, e.g. with respect to Etna.

In the second category, we encounter employees of the Dutch East and West Indies Companies. Ships of both companies—den Tex observes—frequented regions where volcanoes are common, namely the circum-Pacific and the Caribbean. An example of this group of 'empiricists' was Meindert de Roy, who climbed Gamalama Volcano in the northern Moluccas in 1686 (shortly before its eruption of 1687) and returned with valuable observations. The observations of such men have been culled from sources such as ships' logbooks, which have received little or no previous attention from geohistorians.

In the third, more familiar, category of writers, we find such writers as Athanasius Kircher, René Descartes, Gottfried Wilhelm Leibniz, and also such lesser-known Dutch figures as Petrus van Musschenbroek and Bernard Nieuwenty. Their works dealt with volcanism chiefly in the context of their theoretical speculations about the origin of the earth.

The originality of den Tex's book lies in its recognition of the three different categories of 'volcanologists'. Original, too, is the emphasis on Dutch contributions. The Low Countries have neither active nor extinct volcanoes and even basalt is difficult to find. Yet because of their eminence in humanistic scholarship and their international trade connections with volcano-rich regions, the Dutch were among the early cultivators of volcanological knowledge. Historians of science have long recognised the contribution to science, in particular botany, made by the Dutch East India Company. Yet they have been slow to appreciate the stimulus to geological science that came from trading as well as humanistic scholarship. The jewel in the crown of this book is, however, the convincingly and thoroughly documented fact that the volcanological branch of the earth sciences was nurtured by Scaliger's textual criticism.

The book is furnished with a nine-page English summary, but, with its many beautiful illustrations and little-known Dutch sources, it would be of great value to the international community of historians of science if made available in English translation.

Nicolaas Rupke, Göttingen

The Life-Work of Emil Wiechert, One of the Founders of Modern Physics

Wilfried Schröder, *Emil Wiechert, Physiker, Geophysiker, Wissenschaftsorganisator*, Science Edition, IDC History, and History Commission, *Deutsche Geophysikalische Gesellschaft*, 2000.

Wilfried Schröder's monograph represents a unique study of the history of and developments in the thinking of the German physicists and mathematicians who were active at the turn of the nineteenth and twentieth centuries and in the decades that followed. One of the fundamental centres for this research was Göttingen University, where, as Schröder demonstrates, Emil Wiechert—together with colleagues such as Felix Klein, David Hilbert, Hermann Minkowski, Waldemar Voigt, Peter Debye, Max Born, and Ludwig Prandtl—spent his most productive years. The author, a specialist in the history of the German physical sciences, portrays one of the most advanced cradles of physical and mathematical research a century ago, where the principles of these disciplines were being established and were later accepted by the rest of the world. Indeed, the Göttingen school helped—for good or ill—establish the path of civilisation during the twentieth century.

In the first, fourteen-page section, in English, the author gives the essential achievements of European geographers, as reached at the end of the eighteenth century and developed during the nineteenth century, which influenced Wiechert's scientific orientation during his studies in Königsberg and later in Göttingen.

Special attention is paid to Wiechert's move from theoretical physics to seismology during the last years of the nineteenth century. At that time, some German scientists, namely Ernst von Rebeur-Paschwitz and Georg Gerland, sought to establish an international programme of seismological research, with the permanent international co-operation of seismic observatories under the auspices of newly established International Seismological Association. These proposals, first put forward by Gerland at the International Congress of Geographers in London in 1895, were further discussed with much animation during the first International Seismological Conference at Strassburg in 1901.*

The main part of the monograph is in German and consists of seven separate papers, previously published by Schröder, dealing with different aspects of Wiechert's scientific contributions. The first item (pp. 23–43) is entitled 'Emil Wiechert and his Significance for the Recognition of Geophysics as an Exact Science'. Here the author gives a detailed examination of the situation in Germany of the end of the eighteenth and during the nineteenth centuries (A. Petzold, L. Mitterpacher, Alexander von Humboldt). With this background, Wiechert's rôle is described, beginning with his Königsberg studies and his subsequent researches that followed. His leading participation in geophysical disciplines is presented by description of his activities during his stay at Göttingen University from 1897 to 1928; also his international contacts and collaborations (*e.g.*, with Swedish seismologists), and his role in organising teaching and research at Göttingen.

One of the most important Wiechert's achievements, namely his design and construction of horizontal and vertical seismometers and their use in German and other European seismic observatories is mentioned, as also are his part in founding the German seismic observatory in Samoa and his organisation of macroseismic researches.

Wiechert's work on electricity, notably his studies of cathode rays, are described and it is shown that he often discussed his own and his colleagues' discoveries with the leading physicists of the period—such as Voigt, Lorentz, Zeeman, Abraham, Boltzmann, Bohr, Darwin, Debye, Drude, Eddington, Einstein, Hilbert, von Laue, Minkowski, Planck, Poincaré, Prandtl, Schrödinger, and Sommerfeld.

The second paper (pp. 45–64) deals with Wiechert's correspondence with Lorentz, and reproduces twelve letters between the two. They exchanged general ideas in theoretical physics, the equations of the Lorentz transform, and on the newly formulated theory of relativity.

In the third paper, 'Arnold Sommerfeld and Emil Wiechert' (pp. 65–81), we see the mutual co-operation and change of ideas between Wiechert and his friend and former pupil, Sommerfeld. Twenty letters and other documents are reproduced.

The fourth paper, 'Uppsala and Göttingen: A Brief Record of the Beginning of International Co-operation in Seismology' (pp. 82–92), presents scientific contacts documented by correspondence between Wiechert and the Swedish seismologists H. Hildebrand and F. Åkerblom. These contacts resulted in the purchase of Wiechert's 1000 kg pendulum seismograph and its installation in the Uppsala seismic station. In 1906–1919 another three Swedish seismic stations were equipped with the Wiechert's seismographs.**

Paper 5 (pp. 98–112) deals with 'Einstein and his Relations to the Göttingen Society of Sciences'. Here Schröder depicts an interesting situation, which developed after Einstein's presentation and defence of his theory of relativity and the reactions of the Göttingen scientists. This section is complemented by the schedule of seminars related to Einstein's work organised at the University between 1905–1913. It seems that Wiechert—as theoretical physicist—was interested in, and engaged with, Einstein's theory of relativity, as we see from his correspondence with Lorentz. In 1915, Wiechert, along with his colleagues Hilbert, Klein, Runge, and Voigt, introduced Einstein as a member of the Society of Sciences at Göttingen.

Paper 6 deals with the 'Role of the Society of Sciences in the Development of Physics in Göttingen in 1880–1930' (pp. 113–129). It provides information on the funding of individual scientific projects supported by the University, Wiechert being frequently named among the applicants. Also, the distributions of the financial support of the Wolfskehl-Funds to cover the expenses of the University guest lecturers are shown for 1909–1923.

In Paper 7 Wiechert's ideas and discussions with Lorentz on the existence of the aether, as related to the Einstein's theory of relativity, are presented. In these materials, dated 1905–1925, the reader can find Wiechert's philosophical concepts relating to fundamental achievements of 'this-time' physics. An appendix (pp. 148–216) provides a series of various shorter communications, letters, anniversary speeches, resolutions, *etc.*, pertinent to the subject.

Schröder's monograph displays a series of useful facts concerning Wiechert's scientific achievements, and his part in formulating the viewpoints and philosophy of the 'new physics', with Papers 1, 5, and 7 giving the most interesting information of this kind.

* In the Strassburg Conference some thirty-five specialists in seismology were present, twenty of them from Germany, with a few others from German-speaking regions of eastern Europe. No specialists from the United Kingdom or the USA participated, and only one representative came from France, Italy, and Japan respectively. This unrepresentative regional attendance prevented the establishment of a wide international cooperative effort in seismology. The International Seismological Association was eventually founded in 1904, but it was dissolved in 1922 with retrospective validity related to 1916.

** As mentioned, the first German effort to establish and master international co-operation in seismology, between 1885–1901, failed. The German-Swedish co-operation can be understood as an attempted substitute for the desired global co-operation, though it consisted of purchasing and installing the Wiechert devices only.

But some minor notes and questionable points related to the monograph should be mentioned. I suggest that there could have been a better balance between German and English. The English part does not represent an 'extended abstract', as the reader might take it to be at first sight. Rather, it contains information given repeatedly in the German sections. Obviously, the work was composed chiefly for German readers. This, however, is not altogether appropriate, given Wiechert's international significance and his worldwide influence on seismic instrumentation in the first decade of the twentieth century. Presentation of the author's own text in English (while reproducing the original materials in German) would substantially increase the readership.

Further, the homogeneity and consistency of the text would have been improved if the work had been composed as a simple but logically integrated narrative rather than as a series of mutually independent, reprinted papers. This would have avoided repetition of identical information in the German sections. (Also the photograph on p. 87 reappears on p. 198.)

In a monograph focusing on one personality, biographical data are usually given at the beginning of the work. But in this monograph Wiechert's details first appear on page 30 (though his years of birth and death are mentioned on p. 24). I should also have liked an index of names.

The last note deals with Wiechert's most important achievement (at least as concerns seismology), namely his design and construction of vertical and horizontal seismometers. This part should have been discussed in greater detail, with comparison with other seismographs from the same period (e.g., these of Milne, Rebeur-Paschwitz, Omori, Mainka, Hecker, Golitzin, etc.). See, for example, A. Sieberg's *Handbuch der Erdbebenkunde* (1904).

The foregoing points notwithstanding, Dr Schröder's monograph provides interesting reading for those concerned with the early history of modern physics as it developed after the turn of the nineteenth century, in which the Göttingen circle, of which Emil Wiechert was an outstanding member, played a highly significant role.

Jan Kozák, Prague

An Icelander's Ideas about Volcanos and their History

Haraldur Sigurdsson, *Melting the Earth, The History of Ideas on Volcanic Eruptions*, Oxford University Press, New York and Oxford, 1999.

The Icelandic geologist Haraldur Sigurdsson has written an impressive, widely intelligible, and beautifully styled book on the history of volcanology (largely *avant la lettre*) from its very beginnings in the Stone Age to a highly developed science of the twentieth century.

The first six chapters, entitled 'The Heat Below', 'From Stone Age to Volcano Myths', 'The Bronze Age Eruption of Thera and Lost Atlantis', 'Subterranean Winds and Internal Combustion', 'The Plinian Eruption of Vesuvius in A.D. 79', and 'The Chimneys of Hell', deal with the proto-historical, classical and mediaeval precursors of volcanology, and they comprise nearly one third of the text. In their virtual exhaustiveness they may be considered unique for the English-written history of volcanology. They offer a wealth of new information, derived from a great variety of sources. One discrepancy that caught my eye occurs in Chapter 1, where Sigurdsson states—somewhat Whiggishly—that there was no progress in comprehension of the causes of volcanism in eighteenth-century Europe, whereas in the corresponding Chapters 8 through 11 evidence of such progress is given (albeit constrained within the temporal context). In Chapter 4, Sigurdsson introduces Empedokles of Akragas, who is perhaps the most intriguing personality in early Greek philosophy of nature and who was the first to split the primordial matter or principle (*hulé* or *arché*) of the Ionian philosophers into four elements, to wit: Earth, Water, Air, and Fire. Unfortunately, his didactic poem on nature is only fragmentarily preserved and the fragments are wide open to diverse interpretations. Thus, it is by no means clear whether Empedokles considered the element fire to be concentrated in the Earth, in the Sun, or in both.

In his seventh chapter Sigurdsson arrives at the Renaissance: the very beginning of early-modern insights into the nature of volcanism. In his view, three personalities played a key role in this context: Edward Jordan, Athanasius Kircher, and Francisco d'Arezzo. Indeed Jordan was among the very first to propose valid arguments in 1632 against the popular notion of a volcanic fire kindled by combustion of sulphur, bitumen, and vegetable matter, but it took more than two centuries until the questionable paradigm was definitely buried, along with the corpse of Leopold von Buch in 1852. Similarly, d'Arezzo is rightly hailed as one of the first to doubt the role of burning sulphur in the production of Etna's basalts in 1669 and to compare their vitreous nature with that of iron-bearing glass, but Giovanni Borelli, the famous iatrophysicist, went a step further in 1670 by invoking hydrostatic principles to explain the echeloned effusions of basalt down the slope of Etna. It is a pity that Borelli's booklet, *Historia et meteorologia incendii Aetnae anni* (1669) has not been quoted, since it is a perfect example of early modern volcanology. I also regret the fact that Sigurdsson has made no mention of the contributions by literary humanists, such as Cluverius, Varenius, Ittigius and Rumphius, and their historical geographies of volcanic areas.

Chapters 8, 9, 10, and 11 take us right through the heydays of early modern ideas on volcanism, such as: the nature and origin of volcanic fire, the Vulcanistic and Neptunistic interpretations of columnar basalt, and the ideas developed by the first permanent observer of volcanoes (Sir William Hamilton) and by the main discoverers of extinct volcanoes in France (Guettard and Desmarest) are presented in Chapter 11. In Chapter 10 Sigurdsson implies that the great geologist Dolomieu was convinced of the Neptunistic interpretation of basalt throughout his life. However, in 1797—four years before his death—he saw a basaltic volcano, situated on top of a granite cliff bordering the Sioule valley in Auvergne, that had been fed through a conduit traversing the entire cliff, a feature that convinced him of its Vulcanistic nature. In spite of the exclusion of basalt, the granitic hardcore of Neptunism survived unscathed not only in Dolomieu, but also in a great many Vulcanistic basalt experts of the early nineteenth century. In that context it is rather an overstatement that 'the Auvergne district became the graveyard of Neptunism, once Guettard's observations were widely known' (p. 133).

Modern volcanology of the nineteenth and twentieth centuries is discussed in Chapters 12 through 16, covering another third of the total text. Admittedly, in such a limited space it is hard to give an adequate survey of the cardinal phase in the shaping of the discipline. This is probably the reason why the author has chosen for highlighting a few controversial issues. In Chapter 12 he discusses Humphry Davy's concept of the volcanic fire as a result of the exothermic chemical reaction of water with the alkali metals sodium and potassium, a notion that strongly influenced famous geologists and volcanologists, such as De la Beche, Daubeny, Lyell, Judd and Day until the middle of the nineteenth century, notwithstanding serious objections by Gay-Lussac, von Humboldt, Bischof, Kelvin and Davy himself. Even as late as 1864 the novelist Jules Verne used Davy's idea in his *Journey to the Centre of the Earth*.

In the next chapter the concepts of phlogiston and caloric as substances in the production of volcanic heat are discussed. Sigurdsson claims (unfortunately without reference) that Lavoisier, the discoverer of the element oxygen, was still a firm believer in the caloric as late as 1787. The final blow to the idea of caloric as a substance was delivered by Rumford in 1802. Even so, the great innovator Hutton kept his belief in phlogiston until 1795, in spite of its proven negative weight, while Cordier and Scrope did the same with caloric as late as 1816 and 1825 respectively.

The concept of melting rock material by decompression is treated in Chapter 14, and the priority of its application to the creation of magma and lava is attributed to Geikie, but the complementary notion of compressed water vapour as a source of mechanical energy for volcanic explosions is hardly given the emphasis it deserves.

The importance of radioactive decay as a source of terrestrial heat and its distribution through convection is given prominence in Chapters 15 and 16. Their established role in the long-lasting production of magma and lava has dispelled the eighteenth-century doubts about the nature and origin of volcanic fire in a cooling earth.

As a whole the book contains a hoard of little-known material and it is well written, though it suffers a trifle from a lack of balance in scope between the three periods of volcanological evolution. This is most striking in the small amount of space allotted to the modern period. But that does not detract from its great merit as a comprehensive text on the development of the multidisciplinary science of volcanology with emphasis on its early phase.

I have only one serious point of criticism to make concerning the notes referring to Sigurdsson's sources, most of which are secondary. For the most ancient period the notes mention only one primary source (Franklin, 1798). This makes the checking of primary sources a laborious undertaking. Some interesting and intriguing opinions, such as Scrope's idea that the degassing of volcanoes has provided the water for the oceans, and Lavoisier's belief in the existence of caloric as late as 1787, are stated without any reference to a source.

Emile den Tex, Zouterwoode, The Netherlands

Buffon Available Again

Buffon, G. L. Leclerc, Comte de, *Des Époques de la Nature. Introduction et notes de Gabriel Gohau*, Diderot Éditeur, [Paris], 1998.

The republication of classic texts in the Earth sciences is always welcome, all the more so when they appear in convenient editions and at moderate cost. Such is the case with this edition of Buffon's famous *Époques de la Nature* (1779), perhaps the most frequently republished part of his thirty-six volume *Histoire Naturelle*. Certainly Buffon meant his *Époques* to be read by a large public. The treatise is the product of his mature reconsideration, relatively late in his career, of how to situate all terrestrial processes and objects (including living beings) within a physical and historical framework. It is also an elegant exposition, a composition to which Buffon devoted enormous labour.

This new edition of *Des Époques de la Nature*, with a valuable introduction and notes by a distinguished scholarly interpreter of geology's early development, is an amplified re-issue of the same text published in 1971 by *Éditions Rationalistes*. There are additions to the notes in Gabriel Gohau's seventeen-page introduction, providing the reader with references updating those in the earlier edition. Here and there the explanatory notes are also extended. But the main additional element in this edition, and a considerable one, is the inclusion of Buffon's own 'Notes justificatives des faits rapportés dans les *Époques de la Nature*'. With this augmentation, adding some seventy-five pages, Buffon's entire text is available here in compact form and at a modest price. Omitted from this edition, however, are the seven pages of illustrations that appeared in the 1971 version.

Kenneth Taylor, Norman, Oklahoma

East Indian Oil

J.Ph. Poley, *EROICA: The Quest for Oil in Indonesia (1850-1898)*, Kluwer Academic Publishers, Dordrecht, Boston, and London, 2000.

The early search for oil in Indonesia is a little-known heroic story of expeditions under difficult and dangerous conditions in the steaming, malaria-infested jungles of the East Indian Archipelago, which caused many untimely deaths of the pioneering young geologists and mining engineers.

Oil seeps from Sumatra had been mentioned as early as 1596 by the Dutch seafarer Jan Huygen van Linschoten and in 1705 from Buton (southeast of Sulawesi) by the naturalist Georgius Rumphius in his *The Ambonese Curiosity Cabinet* (recently superbly translated and annotated from 17th-century Dutch into English by E.M. Beekman, Yale University Press, 1999).

The next published mention of oil was in 1853 by the naturalist Junghuhn from Java. He observed that the seeps occurred near mud volcanoes and believed oil to be of vegetative origin, formed from Tertiary coal layers in the subsurface under the influence of 'eternal fire'. This was a new idea, after von Humboldt's generally accepted theory of inorganic origin. Oil in those times was mainly used for medicinal purposes.

The search for petroleum, which was now used as lamp-oil, started in earnest in 1872 when Jan Reerink drilled the first wildcat in Cheribon, which produced a total of 200 barrels. His subsequently drilled seven wells were all dry holes, which exhausted Reerink's venture capital. More successful was Menten who had drilled for oil in Borneo in 1888. It took him ten years to obtain a concession from the Sultan of Kutei, after which he was rewarded by a gusher in 1897. The most important find was made by the tobacco planter Zijlker, who found exploitable oil in 1889 at Lankat, Sumatra. Zijlker died the following year and his discovery became the first oilfield of Royal Dutch. In April 1892, the first barrels of 'Crown Oil' were marketed at Penang.

The history of oil in Indonesia after the foundation of Royal Dutch in 1890 has been well documented by Gerritson. But Poley is the first who has written the story of the pioneers before the big companies appeared on the scene. He has made extensive use of the *Annual Reports of the Department of Mines*—a real goldmine of historical information—which was established in 1850. He has also discovered many interesting primary sources such as private note books of Reerink and Menten. The numerous original illustrations and a wealth of citations give the reader a fascinating idea of the difficult situations that faced the early explorers.

Poley dedicates his book to the early pioneers and uses as a motto a quotation from the obituary for the mining engineer H. Jonker, who died December 1877: 'His death proved that none of the Service Departments in the Dutch East Indies claim[ed] more victims than the Department of Mines'. 'With this in mind, may it become more and more clear that there is no Service Department in which the daily work presents so many difficulties, and in which more self-sacrifice is required'.

Frederik van Veen, Noordwijk, The Netherlands

The Importance of Russian Soil

S.V. Zonn, *The History of Pedology in Russia in the twentieth Century (Unknown and Forgotten Pages)*, Part I, Institute of Geography, Russian Academy of Sciences, Moscow, 1999.*

Beginning with the late nineteenth century, scientific expeditions to remote parts of Russia, to search for land suitable for settlement, introduced Dokuchaev's ideas to many soil scientists, as depicted in the then new text-book of Sibirtzev. This book is a rambling account of the spread of Dokuchaev's ideas in Russia in the first half of the twentieth century. It deals with many organisational events and their major 'actors', without elucidating the details of their contributions. It mostly cites and refers to articles published in *Pochvovedenie*, founded in 1899, and from 1930 on also relies on the author's memory of events.

At the beginning of the twentieth century, Glinka was the most eminent and influential Russian pedologist. Some criticism of Dokuchaev's ideas, e.g. by Kostychev, Nabokikh, and partly Kossovich is also mentioned. After World War I, during the Soviet period, many new institutes and laboratories were founded.

Considerable space is devoted to preparations for the First International Congress of Soil Science (Washington, 1927) for which a large number of brochures was prepared in English. Though anticipating strong acclaim, the Russian pedologists were disappointed to find that Dokuchaev's notions did not dominate Western pedology, which chose its own direction in soil science. Preparations for the Second International Congress (Leningrad–Moscow, 1930) started soon thereafter. According to Zonn it was the Second Congress that showed during field-trips to world soil scientists (150 participants) the theoretical and 'practical' achievements and superiority of Dokuchaev's pedology. Russian pedologist demonstrated a better theoretical understanding of soil processes though they were lacking in analytical data to support them. The Dokuchaev Soil Institute was in a leading role while in Leningrad. Several heated controversies among the renowned Russian pedologists are mentioned. When the Dokuchaev Soil Institute, after its transfer to Moscow, became part of the Academy of Agriculture (where Lysenko dominated) its reputation suffered.

By the mid-thirties politicization of science dominated its activity and several leading pedologists (Tulaikov, Polynov, Sukachev) were repressed, whereas the Williams School was promoted. Many scientific workers had to adjust in order to survive the ideological terror. Isolation from overseas countries was almost total. This continued in the early post-World War II period. Then many Soviet pedologists started working in communist dominated foreign countries, gaining valuable experience, e.g. with sub-tropical fertilisation. Regionally, small-scale mapping and soil classification occupied many of them.

First, the translation of Jenny's *Factors of Soil Formation*, and subsequently the gradual acquaintance with new approaches to soil materials (clay mineralogy) and soil processes (pseudoleying, clay illuviation, catenization and isotopic dating—all originating in the West—slowly penetrated to the leading pedologists in the fifties. The influence of and rivalry between Kovda (Moscow University) and Gerasimov (Institute of Geography, Academy of Science) in spreading these ideas, and their own, was strong.

This is an honest, most valuable account of the history of pedology in Russia and until the late fifties, worthy of study by those interested in the history of soil science. Only 325 copies were printed. Part II (1999) brings the story to the end of the twentieth century.

Dan Yaalon, Jerusalem.

* Review published by permission from *Bulletin of the International Union of Soil Science*, 2000–2002, No. 98, 124.

A Spanish View of Palaeontology and the Darwinian Revolution

Francisco Pelayo, *Ciencia y Creencia en España durante el siglo XIX: La Paleontología en el debate sobre el Darwinismo*, Cuadernos Galileo de Historia de la Ciencia, 20, Consejo Superior de Investigaciones Científicas, Madrid, 1999.

Dr Pelayo provides a careful analysis of the history of Spanish palaeontology during the nineteenth century, referring it to European 'co-ordinates' for this science. Strictly this book is a sequel to the author's previous work *Del Diluvio al Megaterio*, which was published in the same collection on 1996. Both share a general background of reference to analytic studies of Spanish palaeontological ideas.

The book's title and subtitle express its contents clearly, and indicate the connecting theme of Darwinism. The period studied begins in 1835, when the Spanish Mining School was moved from Almaden to Madrid, and ends in 1900, though several personages and controversial matters were active during the 1900s and 1910s.

The first three chapters make reference to the general framework of European palaeontology, together with some of the main geological controversies. The first chapter gives a panoramic view of catastrophism, actualism, and uniformitarianism ideas, and the introduction and acceptance of uniformitarianism in Spain is described. The second chapter, with the expressive title *Geología Bíblica y Creacionismo* (Biblical Geology and Creationism), displays the various proposals put forward for harmonising science and religion, including the different interpretations of the length of time for the days specified in Genesis—which would allow one to achieve a concordance between Scripture and the geological findings. In this chapter a general perspective on the appearance of species ideas before Darwin's *On the Origin of Species* is also given. The third chapter deals with palaeontological and geological ideas which appeared in Darwin's works, chiefly *The Origin*, clarifying the subsequent polemics on the origin of species, which developed in the palaeontological community during the nineteenth century.

The remaining chapters are dedicated to Spanish scientists and their work, though Pelayo sometimes introduces data about the state of the question from other European countries. Those comments have been used for estimating the Spanish 'ranking'. Chapter 4, entitled *La Armonía entre Ciencias Naturales y Religión* (The harmony between Natural Sciences and Religion), is focused on Juan Vilanova, Professor of Geology and Palaeontology in the *Universidad Central* in Madrid, who always envisaged a concordance of ideas between science and religion. Pelayo's appendix reproduces a text by Vilanova, which was published in several of his works, entitled *Concordancia entre Génesis y las Ciencias* (Concordance between Genesis and the Sciences), and was a clear example of the effort to achieve 'concordant ideas' during that epoch.

Chapter 5, *El darwinismo y los naturalistas españoles* (Darwinism and the Spanish Naturalists), considers the first scientists and books where Darwin's ideas were commented on favourably, although the Spanish authors showed important differences amongst themselves as to the function of their ideological and/or philosophical ideas. The sixth chapter is dedicated to study the authors with anti-Darwinian ideas. However, some of them changed their attitude with the passage of time and accepted the species transformism, though not the natural selection mechanism.

Chapter 7 is centred on two problems that were widely argued in the second half of the nineteenth century: Spanish Tertiary palaeobiogeography and the existence of Tertiary man. Both questions were discussed scientifically, but always with personal and national approaches. Chapter 8 is dedicated to Haeckel's ideas and their reception in Spain. They were very influential in some political and cultural groups, but their influence in Spanish palaeontology was slight, despite the importance of questions such as the *Pithecanthropus erectus* theory.

Finally, Chapter 9, *El evolucionismo y la Iglesia* (Evolutionism and the Catholic Church), shows the main defensive and offensive strategies developed by the Spanish Church against transformism in general and Darwin's ideas in particular. These strategies were used both by high-ranking clergy and by parish priests to disseminate anti-Darwinian ideas amongst their parishioners, and to attempt to sustain a concordance between science and religion.

The book concludes with an epilogue, which is short (at least for us). We think that the importance of the information contained in this work, together with the analysis of the information, calls for a more extensive discussion in the concluding chapter, providing a synthetic view of the arguments and information in this fine book (of course, we understand the difficulties of this proposal). The book has numerous footnotes, which clarify and/or extend some of the questions raised most frequently in the main text. The work has an 'adequate' bibliography. But it does not have either a subject or an author index, although this deficiency is characteristic of the series in which the book is published.

As a whole, the work permits us, in a brief and well-documented way, to get to know and understand the ideas and controversies related to the origin and extinction of species in the nineteenth century. Further, it indicates the reception of evolutionary ideas by Spanish palaeontologists during that period. Finally, it develops notions about the interrelations between science and religion. It is a book that deserves to be read by all those interested in Spanish palaeontology and/or the history of geology.

Rodolfo Gozalo, València

PUBLICATIONS RECEIVED

Aussich, William I., Sevastopolu, George D., and Torrens, Hugh S., 'Middle Nineteenth-Century Crinoid Studies of Thomas Austin, Sr. and Thomas Austin, Jr.: Newly Discovered Unpublished Materials', *Earth Sciences History*, 1999, 18, 180–197.

Ayanessaian, Ashot, Malkhassian, Edward, and Nazaretyan, Sergey, *Unique Geological Monuments of Armenia: Guidebook for Tourists*, Armenian Foundation for Seismic Protection, Yerevan, 2000 (in Armenian, English, and Russian).

Boletín de la Comisión de Historia de la Geología de España (all issues for 2000).

- Bohnenberger, Otto and Salazar, Oscar, 'In Memoriam Gabriel Dengo 1922–1999', *Revista Geológica de América Central*, 1999, 19, 5–8.
- Boylan, Patrick J., 'English and Scottish Glacial Localities of Agassiz, Buckland and Lyell, 1840', supplement to Boylan, P.J., 'Lyell and the Dilemma of Quaternary Glaciation', in: Blundell, D.J. and Scott, A.C. (eds), *Lyell: The Past is the Key to the Present*, The Geological Society, London, 1998, 143, 145–159, at: <<http://www.city.ac.uk/artspol/glaclocs.html>> (40 pp.).
- _____, 'William Buckland (1784–1856) and the Foundations of Taphonomy and Palaeoecology', *Archives of Natural History*, 1997, 24, 361–372.
- Branagan, David, 'Antipodean Ice Ages', *Eclogae Geologicae Helvetiae*, 1999, 92, 327–338.
- Carozzi, Albert V., *Manuscripts and Publications of Horace-Bénédict de Saussure on the Origin of Basalt (1772–1797); Manuscripts and Publications de Horace-Bénédict de Saussure sur l'Origine du Basalte (1772–1797)*, Éditions Zoé, Geneva, 2000.
- _____, 'Les manuscrits de Horace-Bénédict de Saussure: clé de sa personnalité et de sa véritable contribution à la géologie moderne', in: Pont, Jean-Claude and Lacki, Jan (eds), *Une Cordée Originale—Histoire des Relations entr Science et Montagne*, Editions Georg, Geneva, 2000, 27–41.
- Carozzi, Marguerite, 'Hutton voit les Alpes à travers les yeux de H.-B. de Saussure', in: Jean-Claude Pont and Jan Lacki (eds), *Une Cordée Originale—Histoire des Relations entr Science et Montagne*, Editions Georg, Geneva, 2000, 43–61.
- _____, 'H.B. de Saussure: James Hutton's Obsession', *Archives des Sciences: Société de Physique et d'Histoire Naturelle de Genève*, 2000, 53, 77–158.
- Casanova Honrubio, Juan M., Ochando Gómez, Luis E, and Gozalo Gutiérrez, Rodolfo, 'La mineralogía en la Comunidad Valenciana desde 1750 hasta la actualidad', *Boletín de la Sociedad Española de Mineralogía*, 1999, 22, 119–131.
- Committee on History of Geology of the Geological Society of China and China University of Geosciences, *A Summary of Activities and Publications since 1980*, Beijing, 2000.
- Corbett, David W., 'A Staunch Testing Friendship: Douglas Mawson and T.W. Edgworth David', *Records of the South Australian Museum*, 2000, 33, 49–70.
- Czarniecki, Stanislaw, '[Paleontology] Europe: Eastern Europe', in: Singer, Ronald (ed.), *Encyclopedia of Paleontology*, Vol. 1, Fitzroy Dearborn Publishers, Chicago and London, 2000, 411–416.
- Darragh, Thomas A., 'Robert Brough Smyth: His Early Years as Revealed by his Correspondence with Adam Sedgwick', *Historical Records of Australian Science*, 2000, 13, 19–42.
- Dietz, Linda F., Sarjeant, William A.S., and Mitchell, Trent A., 'The Dreamer and the Pragmatist: A Joint Biography of Walter Wetzel and Otto Wetzel, with a Survey of thier Contributions to Geology and Micropaleontology', *Earth Sciences History*, 1999, 18, 4–50.
- Figueirôa, Silvia F. de M., 'Applied Science in Latin American Countries: The Case of the 'Geological Mineralogical Survey of Brazil', 1906–1934', *Science, Technology & Society*, 1999, 4, 303–318.
- Fleming, James, R., 'Charles Lyell and Climatic Change: Speculation and Uncertainty', in: Blundell, D.J. and Scott, A.C. (eds), *Lyell: The Past is the Key to the Present*, The Geological Society, London, 1998, 161–169.
- _____, 'Joseph Fourier, the 'Greenhouse Effect', and the Quest for a Universal Theory of Terrestrial Temperatures', *Endeavour*, 1999, 23, 72–75.
- Ford, Trevor D., 'The Growth of Geological Knowledge in the Peak District', *Mercian Geologist*, 1999, 14, 161–190.
- Fortey, Richard, *Trilobite! Eyewitness to Evolution*, Harper Collins, London, 2000.
- Franks, Sibylle, Trümpy, Rudolf, and Auf der Maur, Josef, 'Aus der Frühzeit de alpinen Geologie: Johann Gottfried Ebels Versuch einer Synthese', *Neujahrsb;att herausgegeben von der Naturforschenden Gesellschaft in Zurich*, 203 Stück, Naturforschende Gesellschaft in Zürich, Zurich, 2000.
- Fritscher, Bernhard, 'Die "James Hall-Sammlung" in Keyworth', *Berichte zur Wissenschaftsgeschichte*, 1998, 11, 27–34.
- _____, 'Paul Groth, Mineraloge: Aspekte einer Wissenschaftlerkarriere im Deutschen Kaiserreich', *Sudhoffs Archiv*, 1998, 82, 30–51.
- _____, 'Bemerkungen zu einer historischen Epistemologie der romantisch-idealistischen Erdwissenschaft am Beispiel der "Geosophie" Lorenz Oken', *Zeitschrift für geologische Wissenschaften*, 1999, 27, 61–69.
- Fritscher, Bernhard and Urbani, Franco, 'Bringing Latin America On-Stage: Alexander von Humboldt's Contribution to Earth Sciences in Latin America', *Sonderheft Zag*, 2000, 1, 27–33.
- Fröhlich, François and Schubnel, Henri-Jean, et al., *Les Ages de la Nature*, Muséum National d'Histoire Naturelle, Paris, 1999.
- Geological Society of New Zealand, Historical Studies Group, *Newsletters for 2000*.
- Gozalo Gutiérrez, Rodolfo, 'Propuesta de periodización para la geología y paleontología españolas', *Actes de les Trobades d'História de la Ciència de la Tècnica*, 2000, 71–75.
- _____, 'La paleontología española en la Univesidad y centros asociados en la periodo 1849–1936', *Temas Geológico-Mineros ITGE*, 1999, 26, 21–29.
- Grigelis, A. et al. (eds), *The Earth Sciences in the Republic of Lithuania 1996–2000*, Lithuanian National Committee of Geologists and Geological Society of Lithuania, Vilnius, 2000.
- Groessens, Eric, 'La pierre bleue de Belgique dite "petit granit"', *Excursion des 2èmes Journées Internationales du Patrimoine Géologique aux Carrières Gauthier & Wincqzde Soingnies, Vendredi 18 Juin 1999*.
- _____, 'Le Condroz, une entité géographique, reflet de son passé géologique', in *Trésors du Condroz*, Monograph No. 18, Musée des Arts Anciens du Namurois, Namur, 1999, 17–24.

- _____. 'Le marbre noir', *Boiseries et Marbres Sculptés en Namurois*, Société Archéologique de Namur, Namur, 1997, 67–73 and plate.
- _____. 'Les diamants de Fleurus', *Lithorama*, No. 7, September, 1998, 12–17 and plate.
- Groessens, Eric and Brodtkom, Frédéric, 'La pierre de Tournai', *Louvain, Dossier: Lumières des Cathédrales*, No. 94, 1998, 28–30.
- Groessens-Van Dyck, Marie-Claire, 'Archives originales de l'humanité', *Louvain*, 2000, No. 107, 18–19.
- _____. 'D'Adam à Lucy: la Galerie de portraits de nos ancêtres', *Louvain*, 1995, No. 61, 15–17.
- _____. 'L'avifaune de la fouille sur l'oppidum du Titelberg (entre 1986–1991)', *Bulletin de la Société Préhistorique Luxembourgeoise*, 1991, 13, 219–49.
- _____. 'L'intuition de Lamarck à la Lumière des données actuelles', in: J. Ruffié (ed.), *De la Biologie à la Culture*, Flammarion, Paris, 1983, 401–408.
- _____. 'La finalité en paléontologie', *Revue d'Éthique et de Théologie Morale*, 1998, No. 206, 99–121.
- Groessens-Van Dyck, Marie-Claire and Simonet, P., 'Aspects paléontologiques et taphonomiques du site de Bernissart', *Tunnels et Ouvrages Souterrains*, 1989, No. 93, 117–120.
- Herbert, Sandra, 'An 1830s View from Outside Switzerland: Charles Darwin on the "Beryl Blue" Glaciers of Tierra del Fuego', *Eclogae Geologicae Helvetiae*, 1999, 92, 339–346.
- International Council for Science (ICSU), *ICSU Year Book 2000/2001*, Paris, 2000.
- _____. *Science International*, ICSU Newsletters for 2000.
- International Union of Geological Sciences (IUGS Strategic Planning Committee), *International Earth Science in the 21st Century: Science and Organizational Strategies for the International Union of Geological Sciences*, IUGS, Trondheim, 2000.
- _____. *Minutes of the 10th Ordinary Session of Council August 9 and 12, 1996, Beijing, China*, Trondheim, n.d.
- Jagiellonian University, *The Jagiellonian University in Documents 14th–20th Century: Exhibition Catalogue*, The Jagiellonian University Archives, Cracow, 2000.
- JAHIGEO, *Kaiho* No. 16, March 2001 (in Japanese).
- Kázmér, Miklós, 'Eine Widmung im Buch des Schweizer Wissenschaftlers Johann Jakob Scheuchzer an Sámuel Köleséri', *Zeitschrift für Siebenbürgische Landeskunde*, 1999, 22, 64–66.
- Kázmér, Miklós and Papp, Georg, 'Minerals from the Carpathians in an Eighteenth-Century British Collection', *Annales Historico-Naturalis Musei Nationalis Hungarica*, 1999, 91, 5–36.
- Khain, Victor E., 'Some Problems of Geophilosophy (extended abstract)', *Zeitschrift für geologische Wissenschaften*, 1999, 27, 33–36.
- La Volpe, L., Manetti, P., Trigila, R., and Villari, L., 'Volcanology and Chemistry of the Earth's Interior: Italian Research Activity (1995–1998): Report to IAVCEI', *Bollettino di Geofisica Teorica ed Applicata*, 1999, 40, 163–298.
- Laporte, Léo F., *George Gaylord Simpson: Paleontologist and Evolutionist*, Columbia University Press, 2000.
- Laurent, Goulven, 'Lamarck et l'évolution au XIX^{ème} siècle', *Impacts: Revue de l'Université Catholique de l'Ouest*, 1996, No. 3, 3–24.
- _____. 'Gaston de Saporta (1823–1895): paléontologie végétale et transformisme', *Bulletin d'Histoire et d'Epistemologie des Sciences de la Vie*, 1996, 3, 3–15.
- _____. 'Lamarck (1744–1829) et la paléontologie', *Eclogae Geologicae Helvetiae*, 1999, 92, 115–121.
- _____. 'Paléotologie(s) et évolution au début du XIX^{ème} siècle: Cuvier et Lamarck', *Asclepio: Revista de Historia de la Medicina y de la Ciencia*, 2000, 52, 133–212.
- Leonardi, Giuseppe and Sarjeant, William A.S., 'Memorial Piero Leonardo (1908–1998)', *Ichnos*, 2000, 7, 53–87.
- Lifian, E. and Gozalo, R., 'La historia del conocimiento paleontológico del yacimiento de Murero, Cámbrico Inferior alto-Cámbrico Medio (provincia de Zaragoza)', *Temas Geológico-Miners ITGE*, 1999, 26, 83–88.
- Lockley, Martin and Meyer, Christian, *Dinosaur Tracks and Other Fossil Footprints of Europe*, Columbia University Press, New York, 1999.
- Michado, Iran F. and Figueirôa, Silvia F. de M., '500 Years of Mining in Brazil: A Brief Review', *Ciência e Cultura: Journal of the Brazilian Association for the Advancement of Science*, 1999, 51, 287–301.
- Milanovsky, Eugeni E., *Alfred Wegener 1880–1930*, Nauka, Moscow, 2000 (in Russian).
- Mohr, Paul, *Wind, Rain and Rocks: The Discovery of West Connacht Geology 1800–1950*, The Author, Indreabhán, n.d. [2000].
- Nelson, Clifford M. (ed.), *Records of the United States Geological Survey*, U.S. Geological Survey, Reston, 2000 (U.S. Geological Survey Circular 1179, issued as a CD). This contains: 1. Renée Jaussaud's inventory of the documents accessioned by the end of 1997 into the Record Group 57 (U.S. Geological Survey) at the National Archives and Records Administration's Archives II facility in College Park Maryland; and 2. a republication of Mary C. Rabbitt's *The United States Geological Survey 1879–1989* (USGS Circular 1050).
- Newsletter of the Earth Sciences History Group of the Geological Society of Australia* (all issues for 2000).
- Newsletter of the Historical Studies Group of the Geological Society of New Zealand* (all issues for 2000).
- Nyambok, Isaac O., 'Some Historical and Philosophical Aspects of Geology', *Afric Thought and Practice: The Journal of the Philosophical Association of Kenya*, 1974, 1, 81–84.
- _____. *A Bibliography on Kenya: Geosciences*, The Scandinavian Institute of African Studies, Uppsala, 1977.
- Oreskes, Naomi and Rainger, Ronald, 'Science and Security before the Atomic Bomb: The Loyalty Case of Harald U. Sverdrup', *Studies in the History and Philosophy of Modern Physics*, 2000, 31, 309–369.

- Pelayo, Francisco, 'El orden natural y los gigantes: *La Gigantología Spagnola Vendicata* (1760) de José Torrubia', *XV Jornadas de Paleontología y Simposios de los Proyectos PICG 393, 410 y 421, Actas (Tomo II), Colección Temas Geológico-Mineros, ITGE*, Vol. 26, Madrid, 1999, 685–716.
- _____, 'La Real Sociedad Española de Historia Natural y la consolidación de la geología, la paleontología y la prehistoria en España (1900–1936)', *Memorias de la Real Sociedad Española de Historia Natural*, 1998, 1 (2nd series), 251–258.
- _____, 'Las polémicas sobre las teorías paleontológicas en la Sociedad Española de Historia Natural', *Memorias de la Real Sociedad Española de Historia Natural*, 1998, 1 (2nd series), 205–219.
- _____, 'Los orígenes de la paleontología en España', *XV Jornadas de Paleontología y Simposios de los Proyectos PICG 393, 410 y 421, Actas (Tomo I), Colección Temas Geológico-Mineros, ITGE*, Vol. 26, Madrid, 1999, 3–12.
- _____, *Ciencia y Creencia en España Durante el Siglo XIX*, Consejo Superior de Investigaciones Científicas, Madrid, 1999, 380 pp.
- Perotto, Maurizio and Tozzi, Mario, *Journeys in the Geology and History of Italy: The Italian Geological Renaissance*, Consiglio Nazionale delle Ricerche, Rome, 2000 [an interesting publication issued to promote Italy's successful bid to hold the 32nd International Geological Congress in Florence in 2004 (Ed.)].
- Principe, Claudia, 'Volcanology by the End of the XVIIIth Century Through the Writings of Lazzaro Spallanzani, Déodat de Dolomieu and William Hamilton', in: Walter Bernardi and Marta Stefani (eds), *La Sfida della Modernità: Atti del Convegno Internazionale di nel Bicentenario della Morte di Lazzaro Spallanzani*, Leo S. Olschki, Florence, 2000, 319–342.
- Proceedings of the Second International Mineralogical Seminar, Syktyvkar, Komi, 4–8 October, 1999*, Russian Academy of Science, Ural Branch, Komi Science Centre, Institute of Geology, Syktyvkar, Komi Republic, Russia, 1999 (in Russian, with English translations of some contributions).
- Rózsa, Péter (ed.), *Robert Townson Magyarországi Utazásai/Robert Townson's Travels in Hungary: Proceedings of the "Townson Symposium" held in Debrecen, 26th September, 1997*, Debrecen, 1999 (in Hungarian and English).
- Sarjeant, William A.S., Entries on Georges Deflandre, Christian Ehrenberg, Alfred Eisenack, Otto Erdtman, Beverly Halstead, William Smith, and Alice Wilson, in: R. Singer (ed.), *Encyclopedia of Paleontology*, Fitzroy Dearborn Publishers, Chicago, 1999.
- _____, Reviews of: Albert V. Carozzi, *Les Plis du Temps*, . . . , Collections Payot Amoudruz, Geneva, 1999; James H. Rieuweris, *Glossary of Derbyshire Lead Mining Terms*, Peak District Mines Historical Society, Matlock, 1998; and Th. E. Wong et al. (eds), *The History of Earth Sciences in Suriname*, Royal Netherlands Institute of Applied Geosciences, Amsterdam, 1988, in: *Earth Sciences History*, 1999, 18.
- _____, Review of: Victoria Dickenson, *Drawn from Life: Science and Art in the Portrayal of the New World*, Toronto U.P., Toronto, 1998. In: *Canadian Journal of History*, 1999, 34, 514–515.
- _____, Review of: Roger Osborne, *The Floating Egg: Episodes in the Making of Geology*, Cape, London, 1998. In: *Metascience*, 2000, 9, 136–138.
- _____, 'Can the Decline of the Latin Name be Halted?', *Journal of Geoscience Education*, 2000, 48, 121–126.
- _____, Obituaries of Charles Downie. In *Acritarch Newsletter*, 1999, No. 15, 4–8; *Newsletter of Micropalaeontology*, 1999, No. 61, 7–9; *The Palaeontological Association Newsletter*, 2000, No. 43, 36–37; and *Stuifm@il*, 2000, Spring Issue, 33–44.
- _____, 'The First Permian Vertebrate Footprints from the English Midlands: A Tale of Discovery and Rediscovery', *Paleontological Society of Korea, Special Publication No. 4*, 2000, 39–48.
- _____, 'The Three Mary Annings', *War on Earth: A Newsletter for the Earth Sciences*, 2000, 13 (2), 16–17.
- Sarjeant, William A.S. and Mitchell, Trent A., 'A Forgotten Theory on the Origin of Fossils: Daines Barrington's Concept (1781)', *Archives of Natural History*, 2001, 28, 123–133.
- Sarjeant, William A.S. and Wimbledon, William A.P., 'The Terminal Jurassic Stage: History of a Controversy in Stratigraphy', *Modern Geology*, 2000, 24, 125–158.
- Schaer, Jean-Paul, 'Agassiz et les glaciers. Sa conduite de la recherche et ses mérites', *Eclogae Geologicae Helvetiae*, 2000, 93, 231–256.
- Schneider, Gabriele, 'The History of Mining in Namibia', *Namibia Brief*, 1998, 21, 19–31.
- Schröder, Wilfried, 'Geophysics Contributed to Radical Change from Classical to Modern Physics 100 Years Ago', *Eos*, 1998, 79, 559 and 562.
- _____, 'Height Determination of Noctilucent Clouds—100 Years' *Acta Geol. Geoph. Hung.*, 1997, 32, 461–466.
- _____, 'Some Aspects of the Earlier History of Solar–Terrestrial Physics', *Planetary and Space Science*, 1997, 45, 395–400.
- _____, 'The First International Polar Year (1882–1883) and International Geophysical Cooperation', *Earth Sciences History*, 1991, 10, 223–226.
- _____, 'Were Noctilucent Clouds Caused by the Krakatoa Eruption? A Case Study of the Research Problems before 1885', *Bulletin of the American Meteorological Society*, 1999, 80, 2081–2085.
- _____, 'Wilhelm Foerster and the Development of Solar and Cosmical Physics', *Planetary and Space Science*, 1999, 47, 587–590.
- Schröder, Wilfried (ed.), *Geomagnetism: Research Past and Present*, Interdivisional Commission on History of the IAGA, European Division, Bremen-Roennebeck, 2000.
- Secord, James E., *Victorian Sensation: The Extraordinary Publication, Reception, and Secret Authorship of Vestiges of the Natural History of Creation*, Chicago University Press, Chicago and London, 2001.

- Soto, Gerardo D. Review of: Guillermo E. Alvarado Induni, *Los Volcans de Costa Rica: Geología, Historia y Riqueza Natural*. In: *Los Libros* (supplement to the Costa Rican weekly *Universidad*), May, 2000, 4.
- Srinivasan, M.S. (ed.), *Significant Contributions to Geoscience Research in India during the Nineties: A Status Report 2000*, Indian National Science Academy, New Delhi, 2000.
- Torrens, Hugh S., 'William Edmond Logan's Geological Apprenticeship in Britain 1831-1842', *Geoscience Canada*, 1999, 26, 97-110.
- Torrens, Hugh S. *et al.*, 'Etheldred Benett of Wiltshire, England, The First Lady Geologist—Her Fossil Collection in the Academy of Natural Sciences of Philadelphia, and the Recovery of "lost" Specimens of Jurassic Trigonidae (Mollusca: Bivalvia) with their Soft Anatomy Preserved', *Proceedings of the Academy of Natural Sciences of Philadelphia*, 2000, 150, 59-123.
- Van Veen, Frederik R., 'Van der Gracht's Introduction of European Geological Ideas to the USA in the Early Part of the 20th Century', *Oil-Industry History*, 2000, 1, 3-9.
- Wang Hongzhen, Zhai Yusheng, You Zhendong, Shi Baoheng, Yang Weiran, and Yang Guangrong, 'Development of Geological Science in China in the Twentieth Century', *Journal of China University of Geosciences*, 2000, 11, 197-203.
- Wilson, R.C.L., Drury, S.A., and Chapman, J.L., *The Great Ice Age: Climate Change and Life*, Routledge and The Open University, London and New York, 2000.
- Wyse Jackson, Patrick N. (ed.), *Science and Engineering in Ireland in 1798: A Time of Revolution*, Royal Irish Academy, Dublin, 2000.
- Yaalon, Dan H., 'Down to Earth: Why Soil—and Soil Science—Matters', *Nature*, 2000, 407, 301.
- , 'Soil Care Attitudes and Strategies of Land Use through Human History', *Sartoniana*, 2000, 13, 147-159.

NOTES AND QUERIES

A Website for Spanish and Latin American Palaeontologists

Professor Leandro Sequieros has written to inform us about a new website in which he is involved, which gives details of Spanish and Latin American palaeontologists of historical importance, with bibliographic information and illustrations. The texts are in Spanish. The address is: <www.ehu.es/~gpplapam/galeria/>.

Abraham Werner

Alexander Ospovat has written to point out that he expressed the view at the Freiberg Symposium that Abraham Werner was *one* of the founders of modern mineralogy and geology, not *the* founder. We regret that there was an unfortunate and inadvertently incorrect representation of what Professor Ospovat said in my report of the Symposium in *Newsletter* No. 32.

David Oldroyd, Sydney

A Good Buy if You Are in the Peak District, UK

We recommend the purchase of T.D. Ford and J.H. Rieuwerts (eds), *Lead Mining in the Peak District* if you are in Derbyshire (UK) and are interested in mining history. This popular book, now in its 4th edition, provides itineraries to assist you in visiting the old Peak District mines. Price 9.95 pounds for a volume of 208 pp., and is handsomely illustrated with colour photographs. Inquiries to Trevor Ford (see Members' list, UK).

The University of Oklahoma Travel Fellowship Program

The Library of the University of Oklahoma has a wonderful history of science collection, with particularly rich holdings in the history of geology. Due to a generous grant from the Mellon Foundation, the University's History of Science Program is now able to offer short-term travel grants to graduate students, with travel and *per diem* expenses, to stay in Norman, Oklahoma (where the University is located), and work with, at, or on the collection. For further information, contact Dr Kerry Magruder (kmagruder@ou.edu) or INHIGEO Member Kenneth Taylor (ktaylor@ou.edu). Thoroughly recommended. I have recently been there.

David Oldroyd, Sydney

Surveys and Archaeology?

Swedish Member, Christer Nordlund (Christer.Nordlund@histstud.umu.se), writes:

When the Swedish Geological Survey started up their work, in 1858, they mapped not only rocks and soils, but archaeological findings as well. This combined 'geological and archaeological survey' did not end until the beginning of the 20th century. Can anyone inform me, please, whether other Surveys did similar work, or was the Swedish Survey alone in doing this?

Special Issue of *Journal of Geodynamics* on 'Evolution of Geodynamics'

We are informed by Gaston Godard (Paris) that a special issue of the journal is planned for 2001, with the following papers lined up (others may also be included): M. Brown (Maryland), 'From Microscopes to Mountain Belts: 150 years of Petrology and Tectonics'; G.V. Dal Piaz (Padua), 'History of Tectonic Interpretations of the Alps'; F. Dickson (Reno), 'Chemical Emplacement of Plutons'; S. Frank (Potsdam), 'Geodynamics and the Biosphere'; A. Glikson (Australian National University), 'The Astronomical Connection of Early Crustal Evolution: Evidence of Post-LHB Mega-Impacts and the Origin of Archaean Sialic Nuclei'; G. Godard (Paris), 'Eclogites and their Geodynamic Interpretation: A History'; S. Horn (Jena), 'History of Experimental Earth Science: Goethe and Humboldt'; W. Jacoby (Mainz), 'Translation of *Origin of Continents*, by A. Wegener, 1912'; W. Jacoby (Mainz), 'Evolution of the Image of the Earth'; P. Kennan (Dublin), 'The Enigma of Granite'; G. Ranalli (Ottawa), 'Sir James Hall and the Birth of Experimental Tectonics'; R. Tilling (Menlo Park), 'The Study of Volcanoes'.

Changes in the History of Soil Science?

Soil science has been inextricably linked with the development of agriculture and irrigation. By the mid- to late-nineteenth century, V.V. Dokuchaev and E.W. Hilgard recognised that substrate, climate, and vegetation are forcing factors in the unique horizonisation of the soil body. Gradually topographic effects, biota, and duration of soil forming processes were recognised as equally important factors in soil evolution. In 1941, Hans Jenny published his five-factor quantitative paradigm of soil formation. This paradigm was gradually expanded by including deterministic process-response functions for soil profile development in landscape models. Additionally, two other significant paradigms can be identified. In the 1840s, the Liebig–Sprengel paradigm of mineral plant nutrition replaced the unproven humus theory of plant nutrition. This together with the corollary ‘law of the minimum’ led to the rapid spread of chemical fertiliser use. The final paradigm shift—and the third significant paradigm in soil sciences—involved the physically based concepts of Karl Terzaghi, pioneer of soil mechanics, and was represented principally by his work on stress–strain and moisture relations in soils’ materials governing movement and slope stability. This paradigm shift was the basis for safe soil use in engineering and construction.

Dan Yaalon, Jerusalem

Russian Publications

The Russian Academy of Natural Sciences, Institute of Mathematical Geology, ‘Theophrastus Publications’: St Petersburg–Athens, 12 Shpalernaya Str., 191187 St. Petersburg Russia. Email: <agat@bp2956.spb.edu>; web-page: <<http://www.spbu.ru:82/Science/Nii/NiiZK/imagraen.htm>>

Theophrastus Publications, St Petersburg–Athens, is a Russian–Greek publishing house operating as a part of the Institute of Mathematical Geology, Russian Academy of Natural Sciences. We publish selections of papers and monographs in English in various fields of geology, from volcanology to economic geology, with special emphasis on modelling approaches, including mathematical modelling.

A Guide to the History of Science

INHIGEO Members may find matters of interest in: Arne Hassenbruch (ed.), *The Reader's Guide to the History of Science*, Fitzroy Dearborn, London, 2001. (See <<http://www.fitzroydearborn.com/readgths.htm>>.) The publisher’s blurb reads: ‘An international team of over 200 contributors looks at the literature of the history of science in some 500 entries on individuals (e.g. Einstein), institutions and disciplines (e.g. Mathematics), general themes (e.g. Romantic Science) and central concepts (e.g. paradigm and fact). The field has been construed broadly to include the history of medicine and technology and other related disciplines’.

Minerals and Architecture?

Non-Member, Michael Bispham has written:

Dear Minerologists,

I wonder if I could ask for help with an enquiry I’m conducting into early Mediaeval concepts of matter. I’m exploring the hypothesis that the design systems ‘*ad quadratum*’ and ‘*ad triangulum*’, used in Mediaeval art and architecture, may be seen as containing references to contemporary theories of the nature of matter. There are several pointers that suggest this is so, not least of which is the observation that the use of these schemes results in buildings (mostly abbeys and cathedral churches) that have cubic and hexagonally ordered structures. Another pointer is the point–line–surface–solid account of the process of divine creation found in 12th-century Quabbalist and Neoplatonic writings (and quoted in modern Masonic rites) that simultaneously describes Creation and the geometer/stonemason’s art. Again, arguments about the nature of matter were at the forefront of medieval metaphysics and theology. Much of the contemporary alchemical work—which was mostly, like the theological debates, carried out within cathedral walls—revolved around the idea of purification by dissolution and crystallisation: of minerals in the ‘outer work’ and of the soul in the ‘inner work’. And the practice of composition on the geometric grids ‘*ad quadratum*’ and ‘*ad triangulum*’ is found in many examples of paintings and diagrams, especially those designed to illustrate the cosmological ideas that relate to matter and its creation.

The theories in use for the period up to the end of the 13th century seem to have been based on Neoplatonic philosophy, synthesising the creation account of Genesis with the ‘atomic’ theory given in Plato’s *Timaeus*. Plato’s account ties the classical system of the elements; fire, earth, air, and water, to the mathematical regular solids: cube, tetrahedron, octahedron, and icosahedron, and their ultimate components, the ‘most beautiful triangles’—Plato’s ultimate ‘atoms’, whose shape coincides with the geometry described above, that of the cubic and hexagonal lattices.

In view of the foregoing, it seems appropriate to investigate the notion that in ancient Greece geometric minerals were so common that the geometric nature of matter was recognised, and contributed to Plato’s matter theory. (The same might be posited for the Mediaeval period.) Both the Greek Atomisms, and the later Aristotelian hylomorphism, probably developed as ways of accounting for this observation. If so, the fact may be recorded somewhere—but I’ve yet to find it. Could I ask if any of this rings any bells among minerologists that might help me confirm or deny both the general thrust of the enquiry? Michael Bispham, Sunnybank, Church Path, Great Mongeham, Deal, Kent, CT14 0HH, UK <mikebispham@cs.com>

Frederic Henry Hatch (1864–1932), English Petrologist and Mining Engineer

INHIGEO Member Richard Howarth (r.howarth@ucl.ac.uk) writes: I have been studying Hatch’s career for some years (see *Dictionary of National Biography—Missing Persons*, Oxford University Press, 1993, pp. 293–294). Unfortunately, records for the London firm of Messrs. Lewis & Marks (with whom he was connected in the period 1902–1913) appear to have been destroyed in the WWII bombing of London. Despite considerable help from family papers, I have been unable to find any records of material relating to work he carried out in the USA (Montana, Arizona, New Jersey, ?California) and Canada in 1898–1899. Unattributed photos, probably taken by FHH, relate to the High Ore, Anaconda, Niagara, and Green Mountain Mines, Butte, Montana; the United Verde Copper Co., Jerome, Arizona; and the Oreford Copper Co., Constable’s Hook, NJ. Any additional information would be most welcome.

The Society for the History of Natural History

Members may be interested to learn that the Society for the History of Natural History has a new website, located at <<http://www.shnh.org>>. The SHNH is the only international society devoted to the history of botany, zoology and geology, in the broadest sense, including natural history collections, exploration, art and bibliography. The Society is based in London, but has active international representatives in the Americas, Asia and Europe, and holds meetings all over the world. It produces a prestigious journal entitled *Archives of Natural History* and an informative *Newsletter*, as well as occasional publications. The Society makes annual awards for merit in the study of the history of natural history. Membership is open to all and a flexible system allows for individual, joint, and associate categories. Subscriptions to *Archives of Natural History* are welcomed from libraries and other institutions.

William Smith

INHIGEO Member Cecil Schnee writes: In celebration of the new Millennium you are invited to visit the University of New Hampshire Earth Sciences Department web-site to view our progress in making available the seminal work of William Smith, so important in the development of our science. The URL is: <www.unh.edu/esci/wmsmith.html>.

If you have access to a copy of any of the single sheets of coloured tables 'Geological Table of British Organized Fossils which Identify the Course and Continuity of the Strata in their Order of Superposition. . . ' and would be willing to provide us with a full colour photograph, we would be delighted to add it to our images of Smith's 'Strata Identified. . . ' on the web.

Japanese Studies of Early 'Geoscience'

INHIGEO Member Toshihiro YAMADA writes:

I finally finished writing my master's thesis at the end of January. The title and contents are as follows: 'Nicolaus Steno and Seventeenth-Century Geology'; Ch.1 Sketches for research history and background; Ch. 2 Life of Nicolaus Steno; Ch. 3 Descartes' *De terra*—The emergence of mechanical geological thought; Ch. 4 Nicolaus Steno's geological works (from 'Chaos' to 'Prodromus'); Ch. 5 Spinoza and Steno—Biblical interpretation and geological thought; Ch. 6 From Steno to Leibniz—How geology was transmitted; Ch. 7 Conclusion.

In the thesis I stressed that: (1) Steno's geological interests had already appeared in his 'Chaos' MS (1659) and his famous 'Prodromus' (1669) was mapped out as a general consideration about *solidum intra solidum*, not only for the reinterpretation of fossil bodies within the Earth but also for objects in human bodies (e.g. parasites, calculi, etc.); (2) although the relationship between Spinoza and Steno has been neglected both in Spinoza scholarship and geoscience history, it is important to compare their epoch-making works (*TTP* (1670) and 'Prodromus'), and clarify their attitudes to historical things in common, as well as their different attitudes to the religious significance of Holy Scripture; and (3) one should remark the importance of Johann Friedrich's Hanover court, where Leibniz and Steno were together during the years 1677–1680. Leibniz adopted many more geological ideas from Steno than from Descartes in his *Protogaea* (ca 1691/1749), which subsequently influenced the German school of geology (and Buffon's ideas in France).

Further, I discovered presumably unpublished drawings in the photos of Leibniz' MS of 'Protogaea', obtained by the Japanese publishing company Kosakusha (Tokyo), which published the ten volumes of Leibniz's *Opera* in Japanese, including *Protogaea*. The manuscripts contain three figures presenting the distribution of ore deposit strata by conic section, a section of horizontal strata in the Osterode Valley in the Harz region; and some small fossil-like object (?). Of course, we find no equivalent figures in the published *Protogaea*. [For further details, see *JAHIGEO Newsletter* No. 3, 2001 (Ed.)]

Hiroshi HIRAI has written to say that his PhD from Université de Lille 3, entitled 'Le concept de semence dans la théorie de la matière à la Renaissance: de Marsile Ficin à Pierre Gassendi', was awarded in 1999 and will receive the 'Prix des Jeunes Historiens' at the History of Science Congress at Mexico City in 2001. (Readers may recall that Dr Hirai published a most useful bibliography of writings on the history Renaissance 'earth science' in the *JAHIGEO Newsletter* No. 2 for 2000.) INHIGEO is pleased to congratulate Dr Hirai on his achievement. French and English summaries of the contents of the thesis may be found at: <<http://www.livinghistory.co.uk/homepages/hermes/hirai.html>>. The thesis will be published in *Collected Studies of the International Academy of the History of Science* (published by Brepols, Belgium). Dr Hirai's award will be the first to be made in the field of the history of earth sciences.

Commemorative Plaque to Charles W. Peach (1800–1886) Unveiled at Gorran Haven, South Cornwall
Non-Member Norman Butcher has written from Edinburgh:

On 30 September 2000, the exact bicentenary of his birth at Wansford, Northamptonshire, the Royal Geological Society of Cornwall unveiled a plaque to Charles William Peach (1800–1866), the renowned Coastguard naturalist and fossil collector, on the old Custom House in Gorran Haven, Cornwall. The ceremony, conducted in brief sunshine interrupting rain, was carried out by Professor Keith Atkinson, Director of the Canborne School of Mines. The audience of some thirty people included William and Sheila Marshall from Peterborough, great-great grandchildren of Charles Peach, two representatives of the present Coastguard service, several geologists from the Exeter office of the British Geological Survey, and some academics. After Professor Atkinson's speech extolling Peach's achievements everyone enjoyed refreshments in the Custom House, kindly provided by the owners Mr and Mrs Debotte, who now run a café there. Professor Colin Bristow from nearby St Austell was the principal instigator of the project and deserves the thanks of the whole scientific community, not just those in Cornwall. The rain resumed in time for a short geological excursion across the sands to examine rocks appearing on the Survey's new Mevagissey Sheet.

Charles Peach was one of those early Victorian self-taught pioneers of palaeontology who made important discoveries in South Cornwall, and later in NW Scotland. Living with his large family in Gorran Haven between 1834 and 1845, where he was stationed as a 'riding officer', his principal geological contribution was the discovery of brachiopods in the quartzites of Great Perhaver Bay, which led to the recognition of rocks older than the Devonian in SW England. He published several papers

in the *Transactions of the Royal Geological Society of Cornwall*, and some of his specimens are lodged in the Cornwall Geological Museum in Penzance. Transferred to Scotland in 1849, first at Peterhead and then at Wick in Caithness, he discovered fossils in the Durness Limestone in the NW Highlands, again leading to recognition of a Lower Palaeozoic age.

Peach's youngest son, Benjamin Neeve Peach, was born in Goran Haven in 1842, and was to become one of the famous 'Peach & Horne' duo who unravelled the structure of the NW Highlands, commemorated since 1930 in the memorial at Inchnadamph. Charles Peach was awarded the Neill Gold Medal of the Royal Society of Edinburgh in 1875 and ended his days at his home in Haddington Place, at the top of Leith Walk. It is remarkable that father and son are each now commemorated at opposite ends of Britain.

The Commission for the History of Geophysics and Cosmical Physics

An international commission for the history of geophysics and cosmical physics was established under the leadership of Professor Hans-Jürgen Treder, Holger Filling, Hans Gaab, and Karl-Heinrich Wiederkehr in March 2000. The commission publishes a journal entitled *Contributions for the History of Geophysics and Cosmical Physics* and is open to authors from all countries. It serves as a discussion forum for the history and philosophy of science, particularly in relation to the geosciences and related disciplines.

Volume 3 of the journal discussed the history and philosophy of geophysics. Volume 4 contained articles in which leading scientists such as Syun-ichi Akasofu, Juan Roederer, Reimar Lüst, Sir Ian Axford, Gerhard Haerendel, Giovanni Gregori, Stephen Brush, Neville Skinner and others discussed their 'Pathways to Science'. Further prominent authors who have contributed include David Oldroyd (Australia), Antal Adám and Jozsef Vero (Hungary), Vaclav Bucha (Czech Republic), Bernard Saint-Guily (France), Helmut Moritz, Josef Pratl, and Rainer Burghardt (Austria).

Another function of the commission is to collect old instruments, biographical notes, scientific correspondence, and other items of historical interest. Lives of leading German scientists are being recorded, including Julius Bartels, Hans Ertel, Helmut Landsberg, Ludger Mintrop, Beno Gutenberg, Hermann von Helmholtz, J. von Lamont, Alfred Wegener, and others.

Membership of the commission is open to all interested scientists. For further information, please contact Hans Gaab (<HansGaab@t-online.de>). Also please visit our website: <<http://huhu.franken.de/history-geophysics>>.

Wilfried Schroeder, Bremen-Roennebeck

Some Web-Sites

European (& World) Geoscience Departments and Surveys are listed at: <<http://www.uni-mainz.de/FB/Geo/Geologie/GeoInst/Europa.html>>.

American Geological Institute Member Societies: <<http://www.agiweb.org/members/index.html>>.

The *International Directory of Geoscience Organizations*, 2nd edn, edited by Nicholas H. Claudy, was published in 1996 and is not available on the Web. Purchase details are at: <<http://www.agiweb.org/pubs/pubdetail.html?item=800808>>.

COFRHIGEO: <<http://www.cri.enscm.fr/cofrhiggeo/fr.htm>>. This address was given incorrectly in *Newsletter* No. 32. We apologise to our French colleagues for the error.

William Smith at the University of New Hampshire: <www.unh.edu/esci/wmsmith.html>.

University of Oklahoma history of geology library and collections (c/o Dr Kerry Magruder): <www.ou.edu/cas/hsci>.

German Working Group in History of Geology: contact Dr Gottfried Hofbauer (<geoldoky@gdgh.de>); or visit: <<http://www.gdgh.de/arbkreis/haupt.html>>.

An Exhibition in Padua

A new exhibition entitled 'A Thousand Years of Science in Italy' has been opened at Padova University in 2001, as part of the national programme for the dissemination of scientific culture, organised by the Ministero dell'Università e della Ricerca Scientifica e Tecnologica. It goes back to 1058–1060, with Alfano of Salerno and Constantine the African, who did much to promote the progress of the famous Salernitan Medical School. Then comes St Anselm from Aosta. He wrote works on theology and science, the last of which was completed in 1078; and he died as Archbishop of Canterbury at the beginning of the following century. The programme involves the participation of thirteen Italian universities. For Padua, the subject is 'Nature, Man, and the Arts'. This exhibition focuses particularly on Antonio Vallisneri, physician and naturalist, together with his homonymous son, Giovanni Poleni, physicist, and Giovanni Battista Morgagni, physician and anatomist. For geology and palaeontology, the 'confutations' by Vallisneri Senior are pointed out, regarding the confusions, current in his time, between the coral Meandrina and the supposed fossil ox brain, and between Serpulid fossil worms and the supposed fossil snake and shark teeth and what were thought to be fossil 'tongues'; in addition, the origin of springs from rain rather than sea water, subterranean fires acting as 'alembics', and Vallisneri Junior's ideas on the processes of fossilization.

Giuliano Piccoli, Padua

A Note on Wilfried Schröder's Article on Research into History of Geosciences (INHIGEO Newsletter No. 32 for 1999, pp. 27–29)

Since 1997, the History of Meteorology Specialist Group has organised meetings every three years, devoted to special subjects; or the group participates at other conferences with its own sessions. The three annual conferences of the German Meteorological Society have attracted most interested audiences. Due to the general interest in the history of meteorology, we are able to publish our papers in the 'Historical Notes' of the German meteorological journal *Meteorologische Zeitschrift* or in the *Mitteilungen der Meteorologischen Gesellschaft*. These papers are read not only by the few historians of meteorology but also by meteorologists working on present-day problems. In my opinion, the situation does not look so bleak as that described by Dr Schröder.

Cornelia Lüdecke, Munich

A Book for Those Attending the INHIGEO Conference in Portugal

The following publication is recommended: Martin Lockley and Christian Meyer, *Dinosaur Tracks and Other Fossil Footprints of Europe*, Columbia University Press, New York, 1999. Among many other things it discusses the fossil footprints in Portugal, some of which will be visited during the conference field excursions. The work of William Sarjeant, one of the conference's keynote speakers, receives considerable mention, as do numerous historical issues.

COUNTRY REPORTS

Australia

The Earth Sciences History Group (ESHG) of the Geological Society of Australia continues to link interested members across the country, producing one or two newsletters a year, and arranging occasional events. The group is chaired by Carol Bacon.

In March 2000 the ESHG held a one day-symposium in Adelaide, in conjunction with the Adelaide-based History of Science, Technology and Ideas Group. The theme of the symposium was 'Geology over the past Millennium'. Approximately thirty people attended the day-long meeting which was held in the rooms of the Royal Society of South Australia. It also included a casual restaurant luncheon in the nearby historical restaurant 'The Chapel', which forms part of a historical precinct in the city centre. (The weather was exceedingly hot.)

The following day (still hot), several delegates spent the morning visiting the famous Late Palaeozoic glacial pavements at Hallett Cove. Bob Major provided details of the geology, a description of the historical discovery of the site and subsequent investigations, and interpretations of the geology were given by Barry Cooper. Hallett Cove now forms part of a Conservation Park, which was declared about twenty years ago following a prolonged battle between developers and conservationists wishing to preserve the famous geological features.

Speakers at the symposium were:

David Oldroyd (The University of New South Wales), 'Problems of Disposing Radioactive Waste in a Democracy: Lakeland Geology, the Nuclear Industry Radioactive Waste Executive, the British Geological Survey, and the Universities'.

David Branagan (The University of Sydney), 'T.W. Edgeworth David and the Recognition of Precambrian Fossils in South Australia'.

David White (Student), 'Geo-political Culmination in Edwardian Australasia: The Foundation of State Coal Mines in Victoria—Opportunities at Large versus Ministerial Prerogative'.

Wolf Mayer (The Australian National University), 'Geological Clues in Tracing the Paths of Early Explorers to the Canberra District'.

Bernard O'Neil (Consultant Historian, Adelaide), 'Johannes Menge, South Australia's First Geologist: New Findings on his Life and Associates'.

Bob Major (Consultant Geologist), 'Charles Darwin the Geologist'.

David Corbett (Honorary Associate, South Australia Museum), 'The History of Geology: A Personal View'.

Barry Cooper (Primary Industries & Resources South Australia), 'Perspective in Geology From the End of the Millennium: Changes in the Past Century in South Australia'.

The ESHG also organised a walking tour to view historical buildings in Melbourne in November 2000, as part of the Fourth International Mineralogy and Museums Conference. Participants walked through the Central Business District of Melbourne, looking at interesting buildings, and discussed the links between their architectural history and the geology of their building-stones.

Work of Individual Members

Neil Archbold is still searching for antecedent and contemporary literature of the 1830s and 1840s that would have aided R.I. Murchison and colleagues on their great Russian expeditions, particularly the maps of Helmersen. He is also collecting data on the early work and mapping in Argentina mainly by workers of German origin.

Carol Bacon maintains her interest in the history of Tasmanian Geology, and work has continued on her compilation of a *Dictionary of Tasmanian Mining*.

Max Banks maintains his interest in the history of Tasmanian geology and has recently investigated historical writings related to the locally well known 'tesselated pavement', a shore platform in southeastern Tasmania exhibiting striking regularity of jointing in siltstone and sandstone.

David Branagan has continued his researches for a biography of Edgeworth David (1858–1934), an important Australian geologist. He gave a presentation of David's search for Precambrian fossils at a meeting of the Earth Sciences History Group of the Geological Society of Australia in Adelaide in March. His paper 'Antipodean Ice Ages', presented at the INHIGEO Meeting in Neuchâtel, was published in *Eclogae Geologicae Helveticae* in March, 2000 (issue dated 1999). The third edition of *Field Geology of New South Wales*, co-authored with Gordon Packham, was published in June. It contains some material of historical interest. Two papers concerned with the Hawkesbury Sandstone of the Sydney region were presented at the Australian Geological Convention in Sydney in July. These were published in the volume *Sandstone City*, edited G.H. McNally & B.J. Franklin for the Engineering and Environmental Specialist Group, Geological Society of Australia. They too contain a number of historical matters. Several articles on metallurgists concerned with treatment of the ore from the Broken Hill ore body were completed for the *Australian Dictionary of Biography*.

David Corbett continues to research the work of Sir Douglas Mawson. In 2000, he published a paper on the friendship between Sir Douglas Mawson and T.W. Edgeworth David.

Barry Cooper is examining the history of the use of building stone in Australia and will present a paper on this at the 2001 INHIGEO meeting in Lisbon.

Tom Darragh has finished the introduction to his translation of Ferdinand Hochstetter's notes of his visit to Victoria in 1859 and is looking for a publisher. His paper on the Smyth/Sedgwick correspondence has now been published.

David Oldroyd has again been pre-occupied with the administration of INHIGEO affairs. He attended the Adelaide meeting, referred to above. His paper on the history and politics of the burial of nuclear waste in Cumbria was a by-product of his large-scale study of the history of geological research in the Lake District (UK), the manuscript for which has recently been accepted for publication by the Geological Society (subject to revisions!), and which has also recently generated two small papers (see below). This project has involved a considerable amount of oral history work, and three 'Lakeland' geologists have been located and interviewed in Australia. But sadly one of them, Dr Robin Oliver, who attended the Adelaide meeting, died early in 2001. With Silvia Figueirôa and Hugh Torrens, DRO spent much time and effort organising the symposium on major developments in geology in the twentieth century for the Rio Congress (see p. 10). Work has been done on Bailey Willis's researches in China, with INHIGEO Member Yang Jing Yi, and will be published by *Annals of Science* in 2002. The organisation of the INHIGEO 'Classic Papers' series in *Episodes* has also been undertaken, and the first paper in the series (on James Hutton) appeared in September, 2002. DRO also looks after the reviews of books concerned with the history of geology for the review journal *Metascience*. A paper, 'Adam Sedgwick: A Confident Mind in Turmoil', was written in 2000 as a contribution to the Cambridge University Press's volume *Cambridge Minds* (2001/2?). Other items awaiting publication in edited volumes are on 'Geophysics and Geochemistry', a review of the historiography of nineteenth-century geology, and (with INHIGEO Member Beryl Hamilton) an historical chapter for the new (fourth) edition of *The Geology of Scotland*. These volumes remain unpublished about three years after the submission of manuscripts, and no referees' reports have been received. Hmm! In December, DRO attended the 4th 'Museums and Mineralogy' International Conference in Melbourne, presented a paper on the role of museums for historians of geology (and *vice versa*), and learned much of historical interest by means of a field excursion to Western Victoria. The conference was admirably organised by Bill Birch of the Museum of Victoria. Currently, DRO is worrying his head about the megafauna extinction debate in Australia.

During the year the ESHG suffered a great loss with the death of John Wennrbom (1934–2000) after a long struggle with cancer. John was nominated for membership of INHIGEO early in 2000, was posthumously elected at the meeting held at the International Geological Congress in Rio, Brazil in August 2000. For his obituary, see p. 27.

Publications

Branagan, D.F., 'Antipodean Ice Ages', *Eclogae Geologicae Helveticae*, 1999 (issued 2000), 92, 327–338.

_____, 'Structural Geology of the Hawkesbury Sandstone Region', in: McNally, G.H. and Franklin, B.J. (eds), *Sandstone City—Sydney's Dimension Stone and Other Sandstone Geomaterials*, Conference Books, Sydney, 39–54.

_____, 'The Hawkesbury Sandstone: Its Origins and Later Life', in: McNally, G.H. and Franklin, B.J. (eds), *Sandstone City—Sydney's Dimension Stone and Other Sandstone Geomaterials*, Conference Books, Sydney, 23–38.

Branagan, D.F. and Packham, G.H., *Field Geology of New South Wales*, NSW Department of Mines and Mineral Resources, Sydney, 2000.

Corbett, D., 'A Staunch but Testing Friendship: Douglas Mawson and T.W. Edgeworth David', *Records of the South Australian Museum*, 2000, 33, 49–70.

Darragh, T.A., 'Robert Brough Smyth: His Early Years as Revealed by his Correspondence with Adam Sedgwick', *Historical Records of Australian Science*, 2000, 13, 19–42.

Oldroyd, D.R., 'Adam Sedgwick and Lakeland Geology (1822–24): The First Professional Lake District Geologist', *Proceedings of the Cumberland Geological Society*, 1998–1999 (2000), 6(3), 315–324.

_____, 'John Edward Marr (1857–1933): The Foremost Lake District Geologist of his Era', *Proceedings of the Cumberland Geological Society*, 1998–1999 (2000), 6(3), 361–379.

_____, 'James Hutton's "Theory of the Earth" (1788)', *Episodes*, 2000, 23, 196–202.

_____, 'Theories of the Earth and its Age before Darwin', in: G.B. Ferngren (ed.), *The History of Science and Religion in the Western Tradition: An Encyclopedia*, Garland Publishing Inc., New York and London, 2000, 391–396.

_____, 'Geology/Mineralogy', in: W.B. Applebaum (ed.), *Encyclopedia of the Scientific Revolution: From Copernicus to Newton*, Garland Publishing Co., New York and London, 2000, 264–265.

_____, 'Hooke, Robert (1635–1703)', in: W.B. Applebaum (ed.), *Encyclopedia of the Scientific Revolution: From Copernicus to Newton*, Garland Publishing, New York and London, 2000, 299–301.

_____, 'Steno, Nicolaus (Niels Stensen) (1638–1686)', in: W.B. Applebaum (ed.), *Encyclopedia of the Scientific Revolution: From Copernicus to Newton*, Garland Publishing Co., New York and London, 2000, 618–619.

_____, 'Theories of the Earth', in: W.B. Applebaum (ed.), *Encyclopedia of the Scientific Revolution: From Copernicus to Newton*, Garland Publishing Co., New York and London, 2000, 639–641.

_____, 'Lyell', in: A. Hassenbruch (ed.), *Reader's Guide to the History of Science*, Fitzroy Dearborn, London, 2001.

_____, 'Geology', in: A. Hassenbruch (ed.), *Reader's Guide to the History of Science*, Fitzroy Dearborn, London, 2001.

_____, Review of: C. Lawrence and S. Shapin (eds), *Science Incarnate: Historical Embodiments of Natural Knowledge*, The University of Chicago Press, Chicago and London, 1997. In: *Journal of Early Modern History*, 2000, 4, 136–140.

_____, Review of: D.B. McIntyre and A. McKirdy, *James Hutton: The Founder of Modern Geology*, The Stationery Office, Edinburgh, 1997. In: *Metascience*, 2000, 9, 298–300.

Review of: F. Ellenberger, *History of Geology Volume 2: The Great Awakening and its First Fruits—1660–1810*, A.A. Balkema, Rotterdam and Brookfield, 1999. In: *Episodes*, 2000, 23, 136–137.

Review of: A.M.C. Godlewska, *Geography Unbound: French Geographic Science from Cassini to Humboldt*, The University of Chicago Press, Chicago and London, 1999. In: *Metascience*, 2000, 9, 501–502.

Review of: W. Ryan and W. Pitman, *Noah's Flood: The New Scientific Discoveries about the Event that Changed History*, Simon & Schuster, New York, 1999. In: *Metascience*, 2000, 9, 450–455.

Carol Bacon, Hobart

Bolivia

As a member of the research team of the ARCHISS Project (Archival Climate History Survey), the results of our work have been presented: at the Conference on 'Reconstructing Climatic Variability from Historical Sources and other Proxy Records', in Manzanillo Mexico; in a paper 'Archival Reconstruction of Central Andes Precipitation (Potosi, 1585–1815)'; and at the 'Congress on Global Changes in Bolivia', sponsored by the National Academy of Sciences, held in La Paz from 21 to 23 June, 2000, under the title of 'Archives Data and Reconstruction of Rainy Seasons in Potosi (1585–1737)'. The authors of the publications are Dr Alain Gioda, Dra Maria Rosario Prieto, Ana Forenza and Dr-Ing. Carlos Serrano.

In July, I visited my colleagues and Spanish INHIGEO Members: Drs Luis Mansilla and Octavio Puche. In Almadin, the former organised a visit to the mine and mercury smelting mill, since this city provided mercury during the colonial period for the amalgamation of the Potosi silver ores. In Madrid, the latter organised a conference at the School of Mines for a group of historians and archaeologists, where I lectured on the subject: 'Industrial Mining and Archaeology in Potosi'.

In the July issue of *Investigacion y Ciencia* (pp. 56–61), which is the Spanish edition of *Scientific American*, Alain Gioda and I published the article 'La Plata del Peru'. This was about mining at the Cerro Rico, for which the water requirements were provided by the construction of a system of lakes and transported by open channels that fed the hydraulic wheels in the processing plants. Water was used not only for the fragmentation of silver ores but also for the processes of separation by amalgamation. The work relied on cheap labour, which is why emphasis was given to the so called *mita* (forced labour, imposed on the natives).

In October, I was invited by the organisers of the Festival of Culture to deliver a lecture at the Mint on Potosi Archaeology to an invited group of interested persons.

Carlos Serrano, Potosi

Brazil

The main activity related to the history of Geological sciences in Brazil in the year 2000 was the sessions held within the 31st International Geological Congress. As a especial report on this is enclosed in this *Newsletter*, so it is not the case to comment upon it here. We list the main publications of the group that works in the Institute of Geosciences, University of Campinas, that include the INHIGEO Members Silvia Figueirôa, Margaret Lopes, and Pedro Gonçalves, as well as some MSc and PhD students. (Titles are quoted in the language of publication.)

Publications

Figueirôa, Sílvia F. de M. (ed.), *Um Olhar Sobre o Passado: História das Ciências na América Latina*, Unicamp, Campinas, 2000.

Figueirôa, Sílvia F. de M. and Brice, William Robert, 'A Toy-shop for Boys: Views of Charles Frederick Hartt and his Pupils about Brazilian Nature', *Proceedings of the 31st International Geological Congress*, CD-ROM, Rio de Janeiro, RJ, BR, 2000.

Figueirôa, Sílvia F. de M. and Silva, Cláudia Paranhos da, 'Cientistas em ação no Brasil colonial: o período ilustrado', *Proceedings of the 1st Congresso Luso-Brasileiro de História da Ciência e da Técnica*, Évora e Aveiro, 2000, 1, 23–24.

_____, 'Enlightened Mineralogists: Mining Knowledge in Colonial Brazil, 1750–1825', *Osiris*, 2000, 15, 101–116.

Gonçalves, Pedro W., 'História e epistemologia: bases para organizar o ensino de campo em ciências da Terra', *Proceedings of the VII Encontro 'Perspectivas do Ensino de Biologia/I Simp Lat Americano'*, São Paulo—FE—USP, SP, 2000, 1, 58–62.

Lopes, M^a Margaret, 'Cooperação Científica na América Latina no Final do Século XIX: Os Intercâmbios dos Museus de Ciências Naturais', *Interiencia*, 2000, 25, 228–233.

_____, 'The construction of paleontology in South America', *Proceedings of the 31st International Geological Congress*, CD-ROM, Rio de Janeiro, 2000.

_____, 'Nobles Rivaes: Estudios Comparados entre el Museo Nacional de Río de Janeiro y el Museo Público de Buenos Aires', *Manantial*, 2000, no volume number, 20 and 277–296.

Lopes, M^a Margaret and Podgorny, I., 'Caminos Cruzados', *Revista Ciencia Hoy*, 2000, 10, 15–20.

Machado, Iran F., Figueirôa, Sílvia F. de M., 'Brazil: The First 500 years', *Mining Annual Review*, no volume number, 2000, 212–213.

_____, 'Revealing the El Dorado: 500 years of Mining in Brazil', *Proceedings of the 31st International Geological Congress*, CD-ROM, Rio de Janeiro, RJ, BR, 2000.

Pataca, Ermelinda M. and Lopes, M^a Margaret, 'Arte e Ciência na iconografia da viagem philosophica (1783–1792) de Alexandre Rodrigues Ferreira', *Proceedings of the 1st Congresso Luso-Brasileiro de História da Ciência e da Técnica*, Évora e Aveiro, 2000, 1, 73–74.

- Pinheiro, Raquel and Lopes, M^a Margaret, 'João da Silva Feijó (1760–1824) no Ceará—um elo entre a ilustração luso-brasileira e a construção local das ciências', *Proceedings of the 1^o Congresso Luso-Brasileiro de História da Ciência e da Técnica*, Évora e Aveiro, 2000, 1, 71–72.
- Sanjad, Nelson R. and Lopes, M^a Margaret, 'Ciência, tecnologia e urbanização na Amazônia: a reforma de Belém do Grão-Pará, 1790–1810', *Proceedings of the 1^o Congresso Luso-Brasileiro de História da Ciência e da Técnica*, Évora e Aveiro, 2000, 1, 75–76.
- Sanjad, Nelson R., Pataca, Ermelinda M. and Lopes, M^a Margaret, 'As fronteiras do Império: militares, naturalistas e artistas na Amazônia (século XVIII)', *Proceedings of the IV Jornadas Latino-Americanas de Estudos Sociais da Ciência e da Tecnologia*, Campinas, Brazil, 2000, no volume number, 10–19.

Silvia Figueirôa, Campinas

Canada

Publications from Professor William Sarjeant are listed under 'Publications received'.

David Spalding writes as follows:

The long promised *Encyclopedia of Paleontology* was published in January 2000, and includes many contributions of interest to the historian of Earth Sciences. Biographical studies (79) include leading figures from around the world. A five-page history of palaeontology touches on highlights, and other material appears in regional and topical sections, including one on hoaxes and errors (Singer, Ronald (ed.), *Encyclopedia of Paleontology*, Fitzroy Dearborn Publishers, Chicago & London, 1999, 2 vols, 1435 pp.).

The History of Earth Sciences in British Columbia (the westernmost province of Canada) is increasingly well served by publications. Its history is rich in mining development, its fossils are extremely rich and diverse, and many of its early explorers were significant figures in the development of Canadian geology. Since I planned to report on two recent titles, I will take the opportunity to list some other key publications.

Brown, Athol Sutherland, *British Columbia's Geological Surveys 1895–1995. A Century of Science and Dedication*, Pacific Section, Geological Association of Canada, 1998.

Gould, Stephen Jay, *Wonderful Life. The Burgess Shale and the Nature of History*, W.W. Norton & Co., New York, 1989.

Levson, V. (compiler) *Pioneering Geology in the Canadian Cordillera. Proceedings, Victoria. British Columbia, B.C. Geological Survey Branch, Open File 1992–19, 1991.*

Ludvigsen, Rolf (ed.), *Life in Stone: A Natural History of British Columbia's Fossils*, UBC Press, Vancouver, 1996.

Taylor, G.W., *The History of Mining in British Columbia*, Hancock House, Saanichton, 1978.

Wright, Richard Thomas and Wellner, Cathryn, *Castles in the Air. Music and Stories of British Columbia's 1860's Gold Rush*. Winter Quarters Press, Book and CD, 2000.

Yorath, C.J., *Where Terrains Collide*, Orca Book Publishers, Victoria, 1991.

My paper 'Bones of Contention. Charles H. Sternberg's Lost Dinosaurs', mentioned in the last *Newsletter*, will appear this summer in a symposium volume *Mesozoic Vertebrate Life*, co-edited by Darren Tanke and Ken Carpenter, to be published by Indiana University Press/ National Research Council.

I am currently at work on a paper for the INHIGEO 2001 conference entitled 'Friendly Rivalry or Bitter Feelings? The Canadian Dinosaur Rush', which will deal primarily with the relations between the rival parties led by Barnum Brown and Charles H. Sternberg during the First World War. In this context, I was happy to receive from Greg Liggett, Assistant Director at the Sternberg Museum of Natural History in Hays, Kansas, his new guide to the museum entitled *Dinosaurs to Dung Beetles: Expeditions Through Time*. Fort Hays State University. This volume contains substantial new contributions to the growing field of 'Sternbergiana', including numerous photographs not previously published.

Another Sternberg, C.H.'s youngest son Levi, is featured in a web story by Darren Tanke of the Royal Tyrrell Museum (<http://dns.magtech.ab.ca/dtanke>), intriguingly entitled 'Sardine Tins and Old Dinosaur Quarries in Alberta, Canada'. Darren has been working on garbage found at old dinosaur quarries (i.e. the archaeology of palaeontology) and finding sardine cans at sites known to have been excavated by Levi Sternberg, during his years at the Royal Ontario Museum. He has other sites of unknown history with sardine cans apparently opened left-handedly, and is asking for confirmation that Levi was left-handed.

In the uncertain zone between scientific publication and journalism, the occasional magazine *Dinosaur World* is worth the attention of the historian interested in recent vertebrate palaeontology. Published in Canada, it has reached Issue 9, and covers a wide range of news, reviews, interviews with paleontologists and artists, with a strong, but not exclusive, focus on North America. Contact 436 Parliament St., Suite One, Toronto, Ontario, Canada, M5A 3A2; email: <dinoworld@centel.com>.

China

Principal activities of the Chinese Society of the History of Geological Science

1. *The 20th anniversary conference on the founding of Committee on the History of Geology of the Geological Society of China (HGGSC)*

The HGGSC was found in 1980. It attracted over thirty Members and other participants to its 20th anniversary conference in 2000. During the meeting, the delegates considered that the HGGSC had made substantial improvements in the research on the history of Chinese geology, and that there were significant achievements made by senior scholars during the Society's two decades. The HGGSC has been making an increasing number of international contacts, especially since it joined INHIGEO in 1981. In particular, it extended its influence and promoted understanding after it successfully held the 15th Annual Meeting of INHIGEO in Beijing in 1990, and its 21st Meeting in 1996 (as part of the 30th International Geological Congress).

2. *The 14th Annual Meeting of the HGGSC*

The CSHG held its 14th Annual Meeting at the Chinese Geology University in Beijing, on November 20–21, 2000. The main subjects considered were: (1) a thorough discussion of the history of Chinese geological sciences, such as the histories of different geological fields, biographies of individual geologists/histories of geological careers, and the history of scientific ideas; (2) an historical review of the work of the HGGSC. President Wang Hongzhen pointed out that the research on the history of geology will focus on scientific ideas in the new millennium. With the change of the centuries the new focus should be on reform. The delegates discussed different aspects of the history of geology from different historical perspectives. During the meeting, the HGGSC held an exhibition of pictures, and of the more than forty books published during the twenty years since its establishment. The exhibition was well received and attracted strong interest, and will, it is hoped, serve to stimulate future activities.

3. *Publications and Communications*

In 2000, the HGGSC published its *Newsletters* Nos 15 and 16. No. 16 was a special issue commemorating the Society's twentieth anniversary, for which President Wang Hongzhen compiled an English edition. This was circulated by Vice-president Zhai Yusheng at the 31st International Geological Congress in Rio de Janeiro and is being distributed to INHIGEO Members in 2001. In 2001, the HGGSC will publish its fourth collection, *Papers on the History of Geology*, which contains thirty-four papers.

ZHANG Jiuchen, Beijing

(Also, Professor Wang Genyuan has reported his publication: 'Some Problems on the History of Recognition and Use of Jadeite in Ancient China', *Bulletin of the History of Science Society*, 2000, 3 [Ed.]

Costa Rica

In 200, the Central American School of Geology (Spanish acronym ECG), belonging to the University of Costa Rica (UCR), celebrated its first thirty years. A trilogy of articles dedicated to ECG was published by Professor Jorge Cortés, pointing to the School's outstanding contributions and challenges during its thirty years of rock hammering. Among the activities of the ECG celebration the 'IV Jornadas Geológicas de Costa Rica' (geological meeting) was held on 6–7 September and two papers relating to the history of geology were delivered by Professors Percy Denyer and Giovanni Peraldo. Denyer's contribution was about the pioneering geological work of the American geologist W.M. Gabb in the Caribbean region of Costa Rica in 1873–1874. Peraldo's work analysed the development of formal and informal geological ideas in Costa Rica during the nineteenth century, and how they influenced or were influenced by the education system.

Prior to Dr Gabriel Dengo's death in 1999, it had been intended to award him an honorary doctorate from UCR. However, following his much regretted death it was determined to award him his *honoris causa* posthumously, which was presented to his family in a solemn ceremony on 28 August, 2000, on the occasion of the 60th anniversary of UCR. An obituary was published in *Revista Geológica de América Central* [see publications received], with an account of his outstanding contributions, honours, and personal qualities.

History of Geology in Costa Rica Publications

Cortés, Jorge, 'Geociencias y la Escuela Centroamericana de Geología', *Semanario Universidad*, 2000, 1403, 23.

_____, 'Geodiversidad', *Semanario Universidad*, 2000, 1404, 19.

_____, 'Los geólogos', *Semanario Universidad*, 2000, 1405, 19.

Denyer, Percy, 'William M. Gabb: El pionero de la geología de Costa Rica', *IV Jornadas Geológicas de Costa Rica, Ciencias Geológicas: Perspectivas para el siglo XXI, Programa y Resúmenes*, 2000, 17.

Peraldo, Giovanni, 'El proceso del conocimiento geológico a la luz de las ideas formales e informales anteriores al siglo XX y su incorporación en la educación formal del país', *Perspectivas para el siglo XXI, Programa y Resúmenes*, 2000, 6

Gerardo Soto, Kagoshima, Japan (Costa Rican Member)

Czech Republic (Brno)

This report is focused on activities concerned with the history of geological sciences especially in the eastern lands of the Czech Republic: Moravia and Silesia. It has been prepared by specialists at the Department of Geology and Palaeontology, Masaryk University, Brno.

Since 1998, a brief biography of workers in geological sciences living in the area during former centuries has appeared regularly in the journal *Universitas*, of Masaryk University. The number of biographies is already considerable, namely 44 individuals of various geological professions. The number of specialists formerly working in Moravia and Silesia is substantially higher, as the forthcoming memoirs will show. After their completion, detailed monograph treatment is envisaged. The purpose will be not only the evaluation of their work but also the cultural and scientific relations of their times.

One of the undersigned (A. Prichystal) participated in an international conference '*Ius Regale Montanorum*', held from 3–5 October, 2000, on the occasion of the 700th anniversary of the important mining rights introduction to the prominent Bohemian mining centre of Kutná Hora. As a result of intensive silver mining in the 13th century, the shafts soon reached a great depth and it was necessary to establish corresponding mining rights. About 1300, King Wenceslas II introduced the *Ius regale montanorum*, regulating the work of the miners in Kutná Hora as well as for miners all over the Bohemian kingdom. The rich mines also made possible a reform of the Bohemian coinage system. From 1300 onwards, the Prague *groschen* were coined (14.2 g of silver), which were in considerable demand all over the Europe during the Middle Ages. The mining regulations, *Ius regale montanorum*, are believed to have been the best in Europe at that time.

During the conference, besides numerous lectures on medieval mining rights and the most important medieval mining centres in former Czechoslovakia (Kutná Hora, Jihlava, Příbram, Banská Štiavnica, Kremnica), there were also contributions on prehistoric mining (A. Prichystal: 'The Mining of Raw Materials in the Territory of the Czech Republic in Prehistoric Times'; P. Zamora: 'Ancient Mining for Raw Materials in the Territory of the Slovak Republic').

The 'Montanistic-Geological Foundation' (since 2000 the 'Montanistic-Geological Foundation Fund') was established in 1993 to protect important geological and geomorphological objects, as well as cultural monuments connected with the historical mining of raw materials. Thanks to its activities, nine objects in the Zlaté Hory ore district (Silesia) have been proclaimed as 'Technical Monuments' by the Ministry of Culture of the Czech Republic. Since 1996, the Fund has owned the entrance to the Haklberk adit in the Zlaté Hory district. The Fund makes possible the preparation and conservation of geological and historical trails for tourists. It publishes an annual bulletin, *Terra* (in Czech), concerned with the problems of historical mining and its relics, and distributes this to members (26 companies and 95 individuals). The Fund also organises and participates in specialised workshops in the Czech Republic and also in Poland, and organises popular public lectures. It compiles a database on important geological and mining-historical localities. Contact address: Dr Josef Vecera, Czech Geological Survey, P.O. Box 65, 790 01 Jeseník, Czech Republic, tel./fax (420)-0645-412081 (<vecera@cgu.cz>).

Rudolf Musil and Antonín Prichystal, Brno

Czech Republic (Prague)

With the co-operation of Czech and German specialists, the 'Sixth Symposium on Agricola' was held in Jáchymov from 24 to 26 March, 2000, with a focus on Czech-German relations in the sixteenth century. Fifteen papers were presented. Günter Wartenberg (Leipzig) spoke on Johannes Mathesius (in relation to the history of the geological sciences). Stanislav Burachovic (Karlovy Vary) presented a paper on 'The Jáchymov Region Yesterday and Today', and Pavel Beran (Sokolov) spoke on 'The Tin Deposits in the Czech Massif'. The communications by Andrea Kramarczyk (Chemnitz) on 'Jáchymov Physicians, Their Tracts and their Citations in Agricola's *Bermann*' and by Josef Haubelt (Prague) on 'Two Points of View as Concerns the "Jáchymov Illness"' were received with interest. The participants at the Symposium had the chance to visit the unique Jáchymov Library, founded in 1524, in which are held 232 incunabula and other prints before 1629. The Library and its relation to *montanne* activities was analysed in 'The Library of the Latin School in Jáchymov' by Jiří Martinek (Karlovy Vary). The Symposium was held under the auspices of the *Agricola-Forschungszentrum* (Chemnitz), the Karlovy Vary Museum, and the *Sächsische Landesstelle für Volkskultur* (Schneeberg, Germany). It was admirably organised by Andrea Kramarczyk, Friedrich Naumann, and Pavel Burachovic.

INHIGEO Member Jan Urban helped organise the 'Luck Hour III' Symposium, held under the auspices of the Ignac Born Society from 3 to 8 September, 2000, in the old mining centre of Kutná Hora, commemorating the 700th anniversary of the mining codex *Ius Regale Montanorum et Montium*. The symposium was, however, chiefly devoted to matters relating to the history of alchemy. The most important contributions from the point of view of the history of geology were those of Alena Richterová and Miroslava Hejnova from the National Library of Prague.

The international symposium on 'Tin in the Year 2000 in Central Europe' was held in Sokolov from 3 to 8 September, with participants from eight countries. Contributions relating to the history of geology were made by Otfried Wagenbrath (Freiberg) on 'Tin in the History of Knowledge of Saxon Mineral Deposits'; Vladimír Karel (Příbram) on 'The Past and Future Deposits of Sn, W, and Li Ores in Cinovec'; by Pavel Beran (Loket, Czech Republic) on 'Tin Deposits in the Czech Massif'; and by Jaroslav Hrabánek (Mainz) on 'Agricola: Not only Physician, but also Miner, Geologist, and Mineralogist'.

The National Technical Museum in Prague organised three seminars in 2000, with contributions relating to the history of geological and geographical sciences. In the seminar 'History of Metallurgy', held in Prague in November, Vladimír Dufek (Prague) spoke on 'Another Manuscript of Lazar Ecker'. Jindra Biolková (Ostrava) discussed the work of 'Josef Teindl, Professor of the Metallurgical University in Ostrava', and Josef Haubelt analysed the importance of oxidation chemistry for the development of *montanne* sciences in his contribution 'Alchimie, Amalgamation, and Oxidation Chemistry in the Work of Ignac Born'. In the seminar on the history of mining, held in Prague in December, Jaroslav Kudrncák (Prague) presented his paper on '*Montanne* Archaeology of the Medieval Gold Mines of Bohemia', and Josef Haubelt spoke on 'The Activities of the *Agricola-Forschungszentrum* in Chemnitz', which was founded in 1994 on the occasion of the 500th anniversary of the birth of Agricola (1494-1555). In the seminar on the 'History of Cartography', Jan Kozák presented his paper on the 'Discovery of the Unknown Prospect of Prague from the Year 1536'. The view that he discussed is the only depiction of Prague surviving from the period prior to the great fire of 1541.

Jan Kozák also continued his series of pictorial exhibits of historical geophysical phenomena, complemented by informative lectures, delivered in the Geophysical Institute, Prague. The exhibits were organised in March 2000 ('Images of Historical Eruptions') and in October 2000 ('Images of Historical Landslides'). The exhibition of historical rock-bursts will open in April, 2001.

At the end of 2000, Dr Kozák received permission to establish 'Seismological Archives for the 19th and 20th Centuries' at the Geophysical Institute, Prague, in accordance with the aims of the INHIGEO Archive Project (Professor Murty, India).

The Mining Foundation of Silesia, Moravia, and Bohemia (Chairman Miloš Zarybnický, Prague) organised a meeting in August 2000 in Mikulov (Krušné Hory Mountains), with the participation of Czech and German mining historians. The Fourth Symposium, 'Agricola's Pupils', was organised by the Foundation in the Polish town of Kowary.

Josef Haubelt is continuing his work on a monograph on the importance of the achievements of Alexander von Humboldt as regards the development of the geological sciences in the Czech countries.

Josef Haubelt and Jan Kozák, Prague

France

The French Committee on the History of Geology organised three annual scientific sessions during 1999–2000, during which eight lectures were delivered. The corresponding written contributions were printed in the annual volume of its *Travaux* (3rd series, Volume 13):

- Jean Vogt, 'A propos d'Emmanuel de Margerie et de son équipée strasbourgeoise (1919–1930) ou Le doyen est sans pitié ou (à la manière d'un titre de roman policier) M. le doyen Rothé veut ma peau!'.
 Hocine Bendjoudi et René Létolle, 'Géologues et "mer intérieure" du Sahara'.
 Jean Gaudant, 'Hommage à Jean Piveteau (1899–1991) pour le centenaire de sa naissance'.
 Claude Babin, 'Joachim Barrande (1799–1883), paléontologue, émigré, bohémien et colonial'.
 Jean Boulaïne, 'Charles Demolon (1809–1886): prospecteur et industriel mêlé à la polémique des phosphates au milieu du XIXe siècle'.
 Jacques L. R. Touret, 'La découverte du gaz carbonique dans les inclusions des minéraux: une grande aventure scientifique du dix-neuvième siècle'.
 Pascal Richet, 'Temps géologique et désintégrations radioactives: la fin d'une longue controverse'.
 Philippe Grandchamp, 'Un essai inédit de classification des terrains: le cours de Géognosie professé en 1813 par Alexandre Brongniart à la Faculté des sciences de Paris'.

Despite the progressive deterioration of his health, François Ellenberger still attended the session held on 17 March, 1999. But unfortunately it was the last time that he was able to join us and he passed away on 11 January, 2000. (See obituary notice by Gabriel Gohau in *Newsletter* No. 32, p. 51.) His memory was duly celebrated during our first scientific meeting of the year.

Thanks to the enthusiastic activity of Gaston Godard, it has been possible to establish speedily an Internet site called 'Cofrhigeorama', which exist in two versions:

- <http://www.cri.ensmp.fr/cofrhigeo/fr.htm> (French)
<http://www.cri.ensmp.fr/cofrhigeo/en.htm> (English)*

You are now welcome to join us on the web!

Some unexpected technical problems arose during the preparation of the table of contents of our *Travaux* and their distribution was delayed.

For several years, Professor Michel Durand Delga has been in charge of editing papers on the History of Geology in the *Comptes Rendus* of the French Academy of Sciences. Five papers have already been published:

- Bárdossy, G., 'Berthier, Les Baux et l'histoire de la bauxite', *Comptes Rendus de l'Académie des Sciences, Paris*, 1997, 324 (IIa), pp. 1031–1040.
 Gohau, G., 'L'origine de l'usage du mot magna en sciences de la Terre' *Comptes Rendus de l'Académie des Sciences, Paris*, 1998, 326 (IIa), pp. 743–750.
 Trümpy, R. and Lemoine, M., 'Marcel Bertrand (1847–1907): les nappes de charriage et le cycle orogénique', *Comptes Rendus de l'Académie des Sciences, Paris*, 1998, 327 (IIa), pp. 211–224.
 Bourrouilh-Le Jan, F., 'Déodat de Gratet de Dolomieu (1750–1801), vie et œuvre d'un géologue européen, naturaliste et lithologiste', *Comptes Rendus de l'Académie des Sciences, Paris, Comptes Rendus de l'Académie des Sciences, Paris*, 2000, 330 (IIa), pp. 83–95.
 Bárdossy, G., Dercourt, J. and Durand-Delga, M., 'Rôle des géologues français dans l'essor de la géologie au XIXe siècle en Europe centrale et spécialement en Hongrie', 2000, 330 (IIa), pp. 585–594.

The annual volume of the *Travaux* (3rd series, Volume 14) is currently in preparation. Its contents include twelve papers:

- Gabriel Gohau, 'François Ellenberger (1915–2000)'.
 Michel Durand-Delga, 'François Ellenberger: le géologue'.
 Pierre Collomb, 'Quelques souvenirs à la mémoire de François Ellenberger'.
 Jean Vogt, 'Autour de la sismicité: souvenirs et propos à l'emporte-pièce'.
 Charles Pomerol and Gérard Bignot, 'Deux (et bientôt peut-être trois) siècles de controverses sur la limite Crétacé-Tertiaire'.
 Claude Audren, 'Le "coffret de voyage" de Jacques de Morgan ou le laboratoire portatif d'analyse chimique et de topographie d'un ingénieur des mines dans les années 1884–1885'.
 Gabriel Gohau, 'La "théorie de la terre" de Thomas Burnet (1681): entre science et religion'.
 Michel Durand-Delga, 'Les querelles de "deux amis de vingt ans": les professeurs Alexandre Leymerie, de Toulouse, et Victor Raulin, de Bordeaux'.
 Goulven Laurent, 'Alphonse Milne-Edwards (1835–1900) et le transformisme'.
 Edouard Lanterno, 'Les sciences géologiques, paléontologiques et minéralogiques à Genève du XVIIIe au XXe siècle'.
 Asti Papa, 'Jacques Bourcart et les fondements de la géologie alpine de l'Albanie'.
 Gabriel Gohau. Review of: Albert V. Carozzi, *Manuscripts & publications of Horace-Bénédict de Saussure on the origin of basalt (1772–1797) / Manuscrits et publications de Horace-Bénédict de Saussure sur l'origine du basalte (1772–1797)*, Editions Zoé, Geneva, 2000.

Jean Gaudant, Paris

* We regret that there was an error in the web address as given in *Newsletter* No. 32.

Germany

Meetings

The Committee for the History of Meteorology of the German Meteorological Society held its second international symposium at Garmisch-Partenkirchen on the occasion of the 100th anniversary of the meteorological observatory at the *Zugspitze*. About sixty participants discussed the role of meteorological observatories in the context of scientific meteorology in German-speaking countries in the last 100 years. The symposium, entitled 'The Contributions of Meteorological Observatories to the Development of Meteorology' was chaired by Cornelia Lüdecke (München) and Hans Volkert (Oberpfaffenhofen). The abstracts of the symposium are published in *Mitteilungen der Meteorologischen Gesellschaft* (2000), and can be seen in more comprehensive versions at the FAGEM-website (http://www.met.fu-berlin.de/dmg/dmg_home/fagem/observatorien2000.html).

INHIGEO Member Martin Guntau was one of the organisers of a symposium on 'The History of Mining in Mecklenburg-Vorpommern' on 13–14 October, 2000 at Schwerin, which was held on the occasion of the 100th anniversary of the Mining Office Stralsund by the *Technisches Landesmuseum* (Frau Dr Kathrin Müller), *Ernst-Alban-Gesellschaft für Mecklenburgisch-Pommerische Wissenschafts- und Technikgeschichte* and the *Industrie- und Handelskammer Schwerin*. Besides the technical problems of mining, past and present, the symposium focused on the geological problems of the winning and utilisation of sand, clay, lime, coal, oil, amber, and other local mineral resources. Also discussed were geothermal resources in Mecklenburg-Vorpommern, and natural gas. An excursion was made to the mineral district of Southwestern Mecklenburg. The Mining Office Stralsund published a commemorative volume that may be recommended to geohistorians.

Lecture courses

Lecture courses were given by Rudolf Daber on 'The History of Palaeobotany and Geology' at Humboldt University (Berlin); by Bernhard Fritscher on 'National Styles of Earth Sciences in the 19th Century'; and by B. Fritscher, Cornelia Lüdecke and S. Kirschner on the 'Meteorology of Aristotle' at the University of Munich.

Publications

- Daber, Rudolf, 'Erinnerungen an die Deutsche Gesellschaft für geologische Wissenschaften', *Geohistorische Blätter*, 2000, 3, 129–138.
- Fritscher, Bernhard, 'Die Entmoralisierung der Naturgewalten: Vulkane und politische Revolutionen im System der Natur', in: F. Eybl, H. Heppner and A. Kernbauer (eds), *Elementare Gewalt. Kulturelle Bewältigung: Aspekte der Naturkatastrophe im 18. Jahrhundert, Jahrbuch der Österreichischen Gesellschaft zur Erforschung des 18. Jahrhunderts*, 2000, 14/15, 217–237.
- _____, 'Meteorologie (Klassische Antike)', in: Cancik, H. and Schneider, H. (eds), *Der Neue Pauly: Enzyklopädie der Antike*, 8, Stuttgart and Weimar, 2000, 89–93.
- _____, 'Geographie', in: *Der Neue Pauly: Enzyklopädie der Antike*, Vol. 14, Stuttgart and Weimar 2000, 122–126.
- _____, 'Geologie (und Mineralogie)', in: *Der Neue Pauly: Enzyklopädie der Antike*, Vol. 14, Stuttgart and Weimar 2000, 126–131.
- _____, Review of: Naomi Oreskes, *The Rejection of Continental Drift: Theory and Method in American Earth Science*, Oxford University Press, New York and Oxford, 1999. In: *Berichte zur Wissenschaftsgeschichte*, 2000, 23, 55–56.
- _____, (with Franco Urbani), 'Bringing Latin America on Stage: Alexander von Humboldt's Contribution to Earth Sciences in Latin America', *Zeitschrift für angewandte Geologie*, 2000, Sonderheft 1, 27–32.
- Guntau, Martin, 'Der Geologe Kurd von Bülow (1899–1971) und seine wissenschaftlichen Arbeiten', *Geohistorische Blätter* 2000, 3, 11–19.
- _____, 'José Bonifácio de Andrada e Silva—Estudos e trabalhos científicos na Europa Central', in: Silvia E. de M. Figueiroa (ed.), I, Campinas, Brazil, 2000, 253–282 (in Portuguese).
- _____, 'Friedrich Leutwein'; 'Friedrich Stammler'; 'Gerhard Tischendorf', in: Helmut Müller-Enbergs, Jan Wielgohs, Dieter Hoffmann, and Ch. Links (eds), *Wer war wer in der DDR?*, Berlin, 2000, 522, 814–815, 857.
- _____, 'Moritz Hochschild (1881–1965)', *Zeitschrift für Freunde und Förderer der TU Bergakademie Freiberg*, 2000, 7, 65.
- _____, 'Heinrich Friedrich Link'; 'Eugen Geinitz', in: A. Hartwig and T. Schmidt (eds), *Die Rektoren der Universität Rostock 1419–2000, Beiträge zur Geschichte der Universität Rostock*, 2000, 23, 136–137, 186–187.
- _____, Reviews of: Heinz Wiefel, *Biobibliographische Daten über Geowissenschaftler und Sammler, die in Thüringen tätig waren, Geowissenschaftliche Mitteilungen von Thüringen*, Thüringische Landesanstalt für Geologie, Beiheft 6, Weimar 1997; Hans Prescher and Christel Hebig, *Lexikon der Geowissenschaftler: Ein halbes Jahrtausend Geowissenschaftler aus und in Sachsen 1494–1994, Schriften des Staatlichen Museums für Mineralogie und Geologie zu Dresden*, No. 8, Dresden, 1998, *Geohistorische Blätter*, 2000, 3, 9–10.
- Hofbauer, Gottfried. Review of: Otfried Wagenbreth, *Geschichte der Geologie in Deutschland*, 1999, *Zentralblatt für Geologie und Paläontologie*, Part II, 2000, 346–349.
- Kölbl-Ebert, Martina, 'Objectivity in Science Revisited—The Ries-Crater-Sphinx Reveals a Human Face: Asteroids, Meteorites, Impacts and their Consequences' AMICO 2000, Spring Meeting Astronomische Gesellschaft & Deutsche Geologische Gesellschaft, May 16–20, 2000, Nördlingen im Ries, Germany: <<http://ecf.hq.eso.org/~ralbrech/amico/postabstracts/koeblm.html>>.
- _____, 'On the Origin of Women Geologists by Means of Social Selection', 31st International Geological Congress, Rio de Janeiro, Brazil, 6–17 August, 2000, Abstracts Volume, Session 26.1.
- _____, 'Geschichte der Geochemie', in: *Spektrum Lexikon der Geowissenschaften*, 2000, 2, 253–254.
- _____, Review of: Londa Schiebinger, *Has Feminism Changed Science?* In: *Endeavour*, 2000, 24, 43.

- _____ (with Kennard B. Bork), 'Celebrating the Age of the Earth—Report on a Symposium on Geological Time, organised by the History of Geology Group, The Geological Society of London, Burlington House, Piccadilly, London, 28–30 June 2000', *Episodes*, 2000, 23, 215–217 (see this *Newsletter*, pp. 15–21).
- _____ (with Hubert Miller and Rudolf Scherreiks), 'Die Geologische Staatssammlung', in: Miller, Hubert and Söllner, Frank (eds), *Allgemeine und Angewandte Geologie an der Ludwig-Maximilians-Universität München, Festschrift zum 80-jährigen Jubiläum von Institut und Sammlung—Geschichte, Lehre und Forschung, Münchener Geologische Hefte, Reihe A*, 2000, 29, 33–37.
- Peter Krüger, 'Geochemie und globale Probleme der Menschheit: zum fünfzigsten Todestag V.I. Vernadskijs und zum Erscheinen der deutschen Ausgabe seiner *Geochemie in ausgewählten Kapiteln* vor 65 Jahren', in: B. Fritscher and F. Henderson (eds), *Toward a History of Mineralogy, Petrology, and Geochemistry*, Institut für Geschichte der Naturwissenschaften, Munich, 1998, 399–424.
- _____ 'Die Leopold von Buch-Ehrung 1974 in Freiberg. Auszüge aus den Vorträgen in einer neuen Zusammenschau—Grundlage für neue Forschungen. Teil I', *Geohistorische Blätter Berlin*, 1998, 1, 47–53; 'Teil II', *ibid.*, 130–137; 'Teil III', *ibid.*, 1999, 2, 146–151.
- _____ (with K. Fuchs-Kittowski), 'The Noosphere Vision of Pierre Teilhard de Chardin and Vladimir I Vernadsky in the Perspective of Information and Worldwide Communication', in: W. Hofkirchner (ed.), *The Quest for a Unified Theory of Information: Proceedings of the Second International Conference on the Foundations of Information Science*, World Futures General Evolution Studies 13, Amsterdam, 1999, 525–551.
- Lüdecke, Cornelia, 'Lifting the Veil: Circumstances that Caused Alfred Wegener's Death on the Greenland Icecap, 1930', *Polar Record*, 2000, 36, 139–154.
- _____ 'Alfred Wegener's Death on the Greenland Icecap: A Tragedy', *The Northern Space, The International Network on the History of Polar Science*, Working Paper No. 13, Stockholm, 2000.
- _____ '100 Jahre Wetterstation auf der Zugspitze: Das Gebirge als Experimentiertisch. alpinwelt, Mitgliererzeitschrift der Sektionen München und Oberland', Sommer/Herbst 2000, 18–21.
- _____ 'Zur Gründungsgeschichte der Hochstation auf der Zugspitze', *Mitteilungen der Deutschen Meteorologischen Gesellschaft*, 2000, 3, 1–3.
- _____ 'Die meteorologische Hochstation Zugspitze als glänzender Appendix: 100 Jahre meteorologischer Turm auf der Zugspitze', *Alpenvereinsjahrbuch Zeitschrift*, 2000, 125, 136–148.
- _____ 'In Commemoration of Alfred Wegener (1880–1930), 120 Years after his Birth and 70 Years after his Death', *Meteorologische Zeitschrift*, 2000, 9, 393–394.
- _____ 'Hundert Jahre meteorologische Hochstation auf der Zugspitze: Der Deutsch-Österreichische Alpenverein als Förderer der alpinen Meteorologie', *Meteorologische Zeitschrift*, 2000, 9, 381–391.
- _____ 'Hurricanes and Lightning'. Review of: *Kinderbücher und Experimentierhästen für Kinder* ('Unser Wetter', A. Weinhold; 'The Weatherbirds', T. Dewan; 'Wetter', J. Farndon; 'Wetterstation'; 'Weather & Climate', F. Watt & F. Wilson; 'Stormy Weather', A. Ganeri; 'Wind und Wetter', F. Vogel & C. Kraul; 'Kachelmanns Wetterstation', J. Kachelmann & A. Lehmann), in *Nature*, 2000, 408, 522.
- _____ Review of: Mark Monmonier, *Air Apparent: How Meteorologists Learned to Map, Predict, and Dramatize Weather*, The University of Chicago Press, Chicago, 1999, *Metascience*, 2001, 10, 93–97.
- Lüdecke, Cornelia, E. Tammiksaar and U. Wutzke, 'Alfred Wegener und sein Einfluss auf die Meteorologie an der Universität Dorpat (Tartu)', *Meteorologische Zeitschrift*, 2000, 36, 175–183.
- Lectures*
- Fritscher, B., 'Kritik der naturhistorischen Vernunft: Umriss einer historischen Epistemologie der Kantschen "Archäologie der Natur"', Berlin, IX. Internationaler Kant-Kongress (27.03.2000).
- _____ 'Mineralogie und "Wiener Moderne": Zu Leben und Werk Gustav Tschermaks, Peggau/Steiermark', 2. Symposium Geschichte der Erdwissenschaften in Österreich (17.11.2000).
- Güntau, M., 'Die Bewegung der Kontinente: Das Bild von der Krustenentwicklung in der Geologie des 20. Jahrhunderts', 56. Rostocker Wissenschaftshistorisches Kolloquium (Reihe: Die Wissenschaft im 20. Jahrhundert), Rostock, 27.7.2001.
- Lüdecke, C., 'Meteorologische Meßmethoden früher und heute. Vom Thermometer zur Satellitenmessung', VDI AK Technikgeschichte, München (28.01.2000).
- _____ 'Die Verbindung zwischen astronomischen und meteorologischen Messungen am Beispiel der Expeditionen zur Beobachtung des Venusdurchgangs auf den Aucklandinseln und den Kerguelen (1874) und Südgeorgien (1882). 60. Jahrestagung der Deutschen Geophysikalischen Gesellschaft, 28.2.–3.3.2000, München (01.03.2000).
- _____ 'Die Kerguelen 'Ein Eintrittstor für die deutsche Südpolarforschung, Institut für Planetare Geodäsie, Dresden (5.6.2000).
- _____ 'Die Gründungsgeschichte der Hochstation auf der Zugspitze. Tagung 2000, Der Beitrag von Observatorien zur Entwicklung der Meteorologie Fachauschuss Geschichte der Meteorologie der Deutschen Meteorologischen Gesellschaft', 19.–20.7.2000, Garmisch Partenkirchen (19.07.2000).
- _____ 'Meteorologische Untersuchungen aus der Sicht deutscher Polarexpeditionen im Zeitraum von 1868 bis 1945', Geophysikalisches Kolloquium, Hamburg (09.11.2000).
- _____ 'Beyond Cook's 'nec plus ultra': Unveiling the Secrets of Antarctica'. Symposium, Antarctica, Past, Present, Future, Chair of Philosophy and Social Studies of Science and Collegium Helveticum, Zürich (6.11.2000).
- _____ 'Securing Whaling for the Third Reich: The German Antarctic Expedition 1938/39 (SCHWABENLAND-Expedition)'. Fifth Cologne-Bremerhaven Whaling Meeting. 10, 11 & 12 November 2000 in Bremerhaven (12.11.2000).

- _____ 'SWEDARC 2000' Wissenschaftshistorische Feldarbeiten in Spitzbergen (Sommer 2000).
Donnerstagsvormittagsseminar, Institut für Geschichte der Naturwissenschaften, München (7.12.2000).
- _____ '...ein genufreiches Zusammenleben und -arbeiten 'Friedrich Ratzel in München (1875–1886)'. HSP-Kolloquium WS
2000/1, Universität München (20.12.2000).
- _____ '80°N Bericht über die Expedition der Swedischen Akademie der Wissenschaften nach Nordspitzbergen'. HSP-
Kolloquium WS 2000/1, Universität München (20.12.2000).

Bernhard Fritscher, Munich

Hungary (1999)

1999 was the 150th anniversary of the birth of Lajos Lóczy Sen., the greatest Hungarian earth scientist (civil engineer, geologist, and geographer), and several commemorative meetings were held, along with nine regular meetings.

19 January (lectures previously presented at the 16th Congress of CBGA in Vienna in 1998):

Irma Dobos, 'Mapping of the Springs and Artesian Wells of Hungary in the 19th Century'.

Endre Dudich, 'Changing Concepts: From the Median Mass to Microplates'.

Teréz Poka, 'Propylitisation: Classification and Genesis. The 19th-Century Hungarian School of Petrography'.

16 February

Endre Dudich, 'Co-operation between the Imperial Geological Survey (*Geologische Reichsanstalt*), Vienna, and the Royal Hungarian Geological Institute, Budapest (1869–1918)'.

Csaba Horváth, 'Commemoration of László Tokody'.

Irma Dobos, 'A. Vendi's "Hydrogeology of the Bitter Waters of Buda" was Published 50 Years Ago'.

22 March

Sándor Végh, 'Hungarian Geological Exploration and Mining on the Competitive World Market in the Years 1976–1990'.

Álmos Tóth, 'Bauxitogenic Iron-rich Rocks, Ancient Iron Ore Mines and Smelters in Historical Hungary'.

10 April

József Cseh-Németh, 'Contributions to the History of the Hungarian Central Office of Geology (KFH): Prospecting for Copper Ore at Recsk and for Iron Ore at Rudabánya'

György Vitális, 'On the Teaching Activity of Hugó Böckh at the Selmecebánya (Schemnitz, Banská Stiavnica) Mining Academy, on the 125th Anniversary of his Birth'.

17 May

Gy. Bárdossy, I.R. Szabó, and B. Jankovich, 'The Exploration History of the Szöc-Szárhegy Bauxite Deposit (Bakony Mountains, Hungary)'.

Álmos Tóth, 'Baron Béla Splény, Mining Engineer and Witness of the Nineteenth Century'.

27 September

Teréz Póka, 'The Development of the System of the Earth Sciences in the 19th and 20th Centuries'.

Tibor Kecskeméti, 'Tales Told by a Register Book: Contributions to the History of the Hungarian Geological Society'.

25 October

Irma Dobos, 'Commemoration of Mátyás Béli (Early 19th Century)'.

Álmos Tóth, 'Concerning "Unknown" Earthquakes in the Carpathian Basin'.

22 November (joint session with the Section of Mineralogy and Geochemistry)

Gábor Papp and Tamás Weiszbürg, '225 Years of Teaching Mineralogy at the University Level in Hungary'.

Péter Rózsa, Miklós Kázmér, and Gábor Papp, 'Foreign Vulcanists and Neptunists in the Tokaj Mountains, Hungary, Towards the End of the 18th Century (Fichtel, Townson, Esmark)'.

József Hála, 'Stone Cooking, Stone Baking, Stone Eating'.

Péter Buzinkay, 'The "Carlsbad Mineral Collection"'.

Miklós Kázmér, 'Carpathian Minerals in John Woodward's Mineral Collection in London, 1729'.

István Viczián, 'Letters of Saxon Mineral Collectors to Count Domokos Teleki at the End of the 18th Century'.

13 December

Erzsébet Bircher, 'The Central Museum of Mining in the Town of Sopron (Mining Museums of Hungary I)'.

Other Meetings

14 April: A meeting organised by the Count Kuno Klebelsberg Foundation and the Earth Sciences Department of the Hungarian Academy of Sciences (HAS): 'Great Personalities in the Earth Sciences, II'.

Gábor Bidló, 'Professor Ferenc Schafarzik'.

Endre Dudich, 'Professor Károly Telegdi Roth'.

Tamás Weiszbürg, Professor Sándor Koch'.

10 September: at the Limnological Institute of the Hungarian Academy of Sciences, Tihany: 'Great Personalities in the Earth Sciences, III'.

János Kubassek, 'The Scientific Career of L. Lóczy, With Particular Regard to the Scientific Investigation of Lake Balaton, and to his Discoveries in South and East Asia'.

* This Report should have appeared in *Newsletter* No. 32. We apologise to Dr Dudich for the error.

4 November: Commemorative session on the occasion of L. Lóczy's birth, organised jointly by the Earth Sciences Department of the Hungarian Academy of Sciences, the Geographical Institute of the HAS, the Geological Institute of Hungary, and the Hungarian Geographic Society.

Sándor Marosi, 'The Scientific Career of L. Lóczy'.

Károly Brezsnayánszky, 'L. Lóczy as Director of the Geological Institute'.

János Kodolányi, 'L. Lóczy's Geographical Research Activities'.

Gyula Gábris, 'L. Lóczy, Initiator and Manager of the Scientific Investigation of Lake Balaton and its Surroundings'.

János Kubassek, 'L. Lóczy's Role in the Geoscientific Exploration of Asia and the International Echo of his Achievements'.

A special exhibition was organised in the Geological Institute of Hungary, displaying a selection of photographs made by Lóczy during his fieldwork in Hungary and abroad around the turn of the century.

2 December: 'Great Personalities in the Earth Sciences, IV'.

Béla Nagy, 'Professor József Krenner, Mineralogist'.

Endre Dudich, 'Professor Raimund W. W. von Klebelsberg zu Thumburg, Geologist (Innsbruck, Austria)'.

In February, E. Dudich assisted the formation of Working Group on the History of Geology of The Geological Society of Austria at Graz. In September, M. Kázmér, S. Papp, and P. Reozsa attended the A.G. Werner Symposium held at Freiberg and gave lectures.

Selected Publications

Dobos, Irma, 'Exploration and Exploitation of Thermal Waters at Harekányfürdő, Hungary', *Balneologia*, 1999, 20, 34–45 (in Hungarian).

Rózsa, Péter (ed.), *Robert Townson's Travels in Hungary*—Bilingual English–Hungarian edition, Kossuth Egyetemi Kiadó, Debrecen, 1999.

Rózsa, Péter, Kázmér, Miklós, and Papp, Gábor, 'Observations of Vulcanist and Neptunist Natural Philosophers in Hungary in the Late 18th Century (Johann Ehrenreich von Fichtel, Robert Townson and Jens Esmark)', *Proceedings of the International Symposium of INHIGEO on "Abraham Gottlob Werner (1749–1817) and his Times"*, Freiberg.

Tóth, Álmos, 'Beauxite, Bauxite, Wocheinite (on the Early History of Bauxite in Hungary)', *Földtani Kutatás*, 1999, 36 (in Hungarian).

_____, 'Bauxitogenic Iron-rich Rocks, Ancient Iron Ore Mines and Smelters', *Földtani Kutatás*, 1999, 36 (in Hungarian).

Vizy, Béla, *History of Bauxite Exploration in Hungary (1903–1998)*, Hungarian Museum of the Aluminium Industry, Székesfehérvár, 1999 (in Hungarian).

Zelenka, Tibor, 'Geology', in: *Hungary in the Twentieth Century; Volume 4/1: Sciences*, Szekszárd, 1999, 404–418 (in Hungarian).

(Some other Hungarian publications for 1999 were listed in *Newsletter* No. 32, p. 66 [Ed.])

Hungary (2000)

In April, the Chairman (Endre Dudich) and the Secretary (Josef Hála) of the Geohistorical Section of the Hungarian Geological Society were re-elected for another three-year term.

The section held seven independent *meetings* (sixteen presentations) and seven more (twenty-seven presentations), in co-operation with (eight) other institutions (two of them outside Budapest, at Hajdusoboszlo and Szekesfehervar, respectively.)

Commemorations were read on:

L. Bogsch (palaeontologist), J. Cholnoky (geographer), A. Foldvari (geologist), S. Mikoviny (mining engineer, full-day session), T. Posewitz (geologist), A. Ronai (cartographer), P. Teleki (geographer), E. Vadasz (geologist, full-day session), and S. Vitalis (geologist, half-day session).

Jubilees celebrated:

100th anniversary of the headquarters building of the Geological Institute of Hungary (half-day session.) A representative bilingual (Hungarian–English) album was printed: *Art GEO Palace in Budapest*, in colour, by J. Hála and Gy Maros.

75th anniversary of the Hajdusoboszlo-1 medicinal–thermal water-well (commemorative session)

50 years of the Laboratory for Geochemical Research of the Hungarian Academy of Sciences, by T. Poka

25 years of the Association of European Geological Societies (AEGS), by E. Dudich. He submitted the manuscript of the 'Chronicle of AEGS' to be published in Warsaw (Poland) for the forthcoming 12th Meeting of AEGS in September, 2001.

The *lecture series* started last year on the Mining Museums in Hungary was continued:

II. Oil Industry, at Zalaegerszeg, by A. Toth;

III. Ore Mining, at Rudabanya, by S. Hadobas;

IV. Ore Mining, at Recsk, by Cs. Baksa et al.

Other lectures:

The 20th-century history of Hungarian geology, I–II, by T. Zelenka

Geosciences in times of peace and war, by A. Toth *et al.*

Vulcanist and Neptunist naturalists in the Tokaj Mts, Hungary in the 18th century (Fichtel, Thomson, Esmark), by P. Rózsa, G. Papp and M. Kazmer

Publications on R. Townson's 'Travels in Hungary', by J. Hála

New details on A. Koch and Maria Vendl, by P. Papp

P. Eskola, a Finnish geochemist in Hungary, by V. Székely-Fux

An ambiguous ('double-edged') tendency in the development of mining, by G. Faller Geographers and geologists as photographers, by J. Varga

The Nummulitic in Hungary before and after 1969, by E. Dudich, presented at the celebration of the 70th birthday of palaeontologist T. Kecskemeti).

An important event was the Conference on 'The role played by the members of the Hungarian Academy of Sciences in the development of Earth Sciences in Hungary', organised by the Earth Sciences Department of the Hungarian Academy of Sciences on the occasion of the 'Day of Science', on 7 November (including four presentations on the geological sciences: geology proper, mineralogy–petrography–geochemistry, palaeontology and meteoritics).

Two new INHIGEO members were elected from Hungary at the 31th IGC in Rio de Janeiro: Irma Dobos and Peter Rozsa. (There are now altogether eight Hungarian members.)

Endre Dudich, Budapest

Selected papers published in 2000

Csath, Bela, 'Water Management Operations at Selmecebánya/Schemnitz (now Banska Stiavnica in Slovakia), Performed by Engineer Samuel Mikoviny in the 18th Century' (in Hungarian), *Hidrológiai Tájékoztató*, 65–68.

Dobos, Irma, 'S. Mikoviny's Engineering Activities in Pozsony and Komárom Counties' (in Hungarian), *Hidrológiai Tájékoztató*, 61–65.

——— 'Research History of the Pliocene Thermal Water Aquifer of Subotica/Szabadka'. In: *Water and Protection of Aquatic Environment in the Central Basin of the Danube. – IVth International Hydrological Conference, September 20–22, 2000, Subotica (Yugoslavia)*.

Hála, József, 'Italian Journeys and Connections of Jozsef Szabo: "The Greatest Hungarian Geologist"' (in Hungarian). In: Keményfi, R. and Illyes, Z. (eds), *Hommage to Jozsef Szabo: Studies in Geographical Sciences*, 95–105.

——— 'Contributions to knowledge of the medicinal waters and holy wells situated along the rivers Ipoly/Ipel and Garam/Hron' (in Hungarian), *Láthatár [Horizon]*, 9, 323–354.

Hála, József and Maros, Gyula, *Art Geo Palace in Budapest: The building of the Geological Institute of Hungary is 100 years old, designed by Ödön Lechner* (in Hungarian and partly in English), Geological Institute of Hungary.

Kázmér, Miklós, *Eighteenth-century Books in the Library of the Department of Palaeontology*, Eotvos University, Budapest (in Hungarian with English abstract).

Vitalis, Gyorgy, 'Commemoration on Professor Sandor Vitalis as a Hydrologist and Hydrogeologist, on the Centenary of his birth' (in Hungarian), *Hidrológiai Tájékoztató*, 5–10.

Vitalis-Zilahy, Lidia, 'Plans of Channels to Connect the Danube and Tisza Rivers, from the Second Half of the 15th Century to the Mid-19th Century' (in Hungarian), *Hidrológiai Tájékoztató*, 42–44.

Endre Dudich, Budapest

Ireland

Somehow, through either the laziness or forgetfulness of this reporter, no report for Ireland appeared in the last *Newsletter*. My apologies for this oversight. The list of publications below contains publications by INHIGEO members as well as papers relating to the history of geology in Ireland by non-INHIGEO members.

After a slight delay, the book *Science in Ireland in 1798: A Time of Revolution* appeared in 2000. It contains a number of papers presented at a commemorative event organised by the National Committee for the History of Science and Philosophy in Dublin. Copies are available from the Royal Irish Academy, 19 Dawson Street, Dublin 2, Ireland (h.shiels@ria.ie).

Gordon Herries Davies continues his work on the history of the Geological Society of London. Patrick Wyse Jackson took part in the William Smith meeting at the Geological Society in July 2000 where he spoke on the geochronological work of John Joly. The event was well-organised, and most enjoyable, particularly given the opportunity to meet up with like-minded friends again. Patrick is putting the beginning touches to the organisation of the INHIGEO 2003 meeting that will take place in Dublin.

Publications

Archer, J.B. and Herries Davies, G.L., 'Inspiration from Nature and Some Plays Written by John O'Keefe (1747–1833)', *Archives of Natural History*, 2000, 27, 123–136.

Herries Davies, G.L., 'John Christopher Thackray 1948–1999', *Archives of Natural History*, 2000, 27, 1–8.

James, K. 'Commander Charles Morton, R.N.', *The Geological Curator*, 2000, 7, 157.

Nelson, E.C. 'A Caricature of an Irish Naturalist: Revd Dr William Richardson (1740–1820)', *Archives of Natural History*, 2000, 27, 149–152.

Parkes, M.A., Coffey, P. and Connaughton, P., 'The Printing Wood Block Collection of the Geological Survey of Ireland', *The Geological Curator*, 2000, 7, 149–156.

Wyse Jackson, P.N., 'Grenville Arthur James Cole (1859–1924) a Memoir', in: Cole, G.A.J., *Memoir of the Mines and Metalliferous Deposits of Ireland*, Mining Heritage Society of Ireland, Dublin 1998, vii–xvi.

——— 'The Wollaston Medal: Fitton's Found', *Geology Today*, 1999, 15, 11–12.

——— 'Veronica Conroy Burns (1914–1998)', *Irish Naturalists' Journal*, 1999, 26, 1–4.

——— 'Geological Museums and their Collections: Rich Sources for Historians of Geology', *Annals of Science*, 1999, 56, 417–431.

- _____ 'Introduction'; and 'Tumultuous Times: Geology in Ireland and the Debate on the Nature of Basalt and Other Rocks of North-East Ireland between 1740 and 1816', in: Wyse Jackson, P.N. (ed.), *Science and Engineering in Ireland in 1798: A Time of Revolution*, Royal Irish Academy, Dublin, 2000, vii-viii; 35-49.
- _____ 'Silver Pages: 25 Years of the Newsletter of the Geological Curators' Group and *The Geological Curator*', *The Geological Curator*, 2000, 7, 95-99.
- Wyse Jackson, Patrick N. (ed.), *Science and Engineering in Ireland in 1798: a Time of Revolution*, Royal Irish Academy, Dublin, 2000.

Patrick Wyse Jackson, Dublin

Israel

Professor Yaalon's receipt of the Sarton Medal for 2000 is reported elsewhere (p. 24). INHIGEO is pleased to congratulate him for the recognition of his important work in this way. We have received notification of the following publications of Professor Yaalon:

- 'Soil Care Attitudes and Strategies of Land Use through Human History'; *Sartoniana*, 2000, 13, 147-159.
- Review of: S.V. Zonn, *The History of Pedology in Russia in the XX Century (Unknown and Forgotten Pages), Part I*, Institute of Geopgraphy, Russian Academy of Sciences, Moscow, 1999 (in Russian), in: *Bulletin of the International Union of Soil Science*, 2000, No. 98, 124.

Italy

During 2000 more contacts were established with individuals and institutions for increasing the membership of Italian Group of History of Geology (GITHIGEO). The project of a web page, which will be hosted by the University of Genoa, was also prepared, in order to activate the GITHIGEO website in 2001. For further information, contact Nicoletta Morello and Ezio Vaccari, c/o Dipartimento di Storia moderna e contemporanea, Università di Genova, via Balbi 6, 16126 Genova, Italy. Fax: +39 0102099826 Email: <GITHIGEO@lettere.unige.it> (Please, use capitals when typing GITHIGEO in this email address.)

In May, Ezio Vaccari was invited by the Goethe Institut of Turin (Italy) to speak about Goethe's geological observations in his *Italian Travels* at the symposium on Art, Science and Nature in Goethe. In July, Dr Vaccari was invited to the William Smith Millennium Meeting 'Celebrating the Age of the Earth', organised by the Geological Society of London, where he gave a talk on 'The Time of Genesis and the Time of the Rocks: The European View'. Later, he took part in the 5th International Mining History Congress at Milos (Greece), with a paper on 'Geology and Mining in 18th-Century Italy: Giovanni Arduino and Spirito Benedetto Nicolis di Robilant'. Finally, he contributed to the Geological Society of America's Annual Meeting in Reno, with a paper entitled 'Mining Expertise and Geological Chronology in the Lithostratigraphical Theories of Giovanni Arduino (1714-1795) and Johann Gottlob Lehmann (1719-1767)'.

In June, Nicoletta Morello was invited by the Museum of Natural History of Pisa to inaugurate the new palaeontological hall, with a conference on the meaning of fossils and the development of palaeontology from the 17th to the 19th century ('Scherzi del tempo, resti del diluvio, strane creature... Significati dei fossili e divenire della paleontologia, sec. XVII-XIX'). She also continued to lecture in history of early modern sciences (with particular attention to the Earth sciences) at the University of Genoa and to coordinate some PhD courses in history of science at the University of Bari.

In December, Professor Morello took part in the congress on 'Agostino Scilla (1639-1700), naturalist and painter', which was held in Messina and organised by the Sicilian Society of Natural Sciences, in collaboration with the Universities of Messina and Palermo. The following papers were presented (in Italian): Luigi Hyerace on Agostino Scilla, painter; Rosario Moscheo on the academies and scientific culture in the 17th-century Messina; Laura Bonfiglio on the 'glossopetre' as fossil remains of great marine vertebrates in the Aspromonte hills; Sebastiano Di Bella on the sources and bibliography regarding Scilla; Italo Di Geronimo on the fossils illustrated by Scilla; Nicoletta Morello on the 17th-century palaeontology; Stefania Randazzo on Scilla as collector; Francesca Campagna Cicala on painting in 17th-century Messina. The proceedings of the congress are to be published. For further information, contact Professor Enzo Burgio, Dipartimento di Geologia e Geodesia, Università di Palermo, Corso Tukory, 131-90134 Palermo, Italy. Fax: 39 91 7041041. Email: <mgup@mbox.unipa.it>.

Publications

- Brianta, Donata, 'Education and Training in the Mining Industry, 1750-1860: European Models and the Italian Case', *Annals of Science*, 2000, 57, 267-300.
- Donati, Vitaliano, *Della storia naturale marina dell'Adriatico [On the Natural History of Adriatic Sea. Facsimile, originally published in Venice, 1750]*. Introduction by Cinzio Gibin, T. & G. Edizioni, Conselve (Padova), 1999.
- Morello, Nicoletta, 'Gastaldi, Bartolomeo', in: *Dizionario Biografico degli Italiani*, Vol. 52, Istituto dell'Enciclopedia Italiana, Roma, 1999, 524-526.
- Mottana, Annibale, 'Oggetti e concetti inerenti le scienze mineralogiche ne La Composizione del Mondo con le sue cascioni di Restoro d'Arezzo (anno 1282)' ['Objects and Ideas of Mineralogical Interest in the Book *The Composition of the World* by Restoro d'Arezzo (1282 A.D.)'], *Rendiconti Lincei, Scienze Fisiche e Naturali*, 1999, 10, 133-229.
- Vaccari, Ezio, 'Mining and Knowledge of the Earth in Eighteenth-Century Italy', *Annals of Science*, 2000, 57, 163-180.
- _____ 'Le accademie minerarie come centri di formazione e di ricerca geologica tra Sette ed Ottocento' ['The Mining Academies as Centres of Geological Education and Research from the 18th to the 19th Century'], in: Ferdinando Abbri & Marco Segala (eds), *Il ruolo sociale della scienza (1789-1830)*, Olschki, Firenze, 2000, 153-167.
- _____ 'Voyageurs scientifiques dans les Apennins entre le 17e et 18e siècle: perspectives géologiques', in: Jean-Claude Pont and Jan Lacki (eds), *Un cordée originale: Histoire des relations entre science et montagne*, Georg, Genève, 2000, 160-181.

- _____ 'Spallanzani e le scienze geologiche del Settecento: un percorso interpretativo tra carteggi e diari di viaggio' ['Spallanzani and the Geological Sciences in the 18th Century: An Interpretation through Correspondence and Diaries'], in: Walter Bernardi and Marta Stefani (eds), *La sfida della modernità. Atti del Convegno Internazionale di Studi nel Bicentenario della morte di Lazzaro Spallanzani*, Olschki, Firenze, 2000, 293–317.
- _____ 'The Museum and the Academy: Geology and Paleontology in the *Accademia dei Fisiocritici* of Siena during the 18th Century', in: Michael T. Ghiselin and Alan E. Leviton (eds), *Cultures and Institutions of Natural History*, California Academy of Sciences (Memoir 25), San Francisco, 2000, 5–25.

Ezio Vaccari and Nicoletta Morello, Genoa

Japan

The Japanese Association for History of Geological Sciences (JAHIGEO) held general meetings at Hokutopia, Tokyo, on 17 June and 13 December, 2000, and an evening meeting at the annual meeting of the Geological Society of Japan at Shimane University on 1 October, 2000.

The following presentations were made at the general meeting at Hokutopia in June:

M. Osawa, 'Mineral collections in the Edo Era'.

M. Okubo, 'L. Kober's life and his publications'.

M. Omori, 'Professor H. Fujimoto's contribution to geology and education of geosciences'.

H. Fujimoto (1897–1982) was professor of geology in the Tokyo University of Education. He clarified the nappe structures in the Palaeozoic and Mesozoic formations and found Mesozoic radiolaria in the Sanbagawa metamorphic rocks in the Kanto Mountains. He was one of the founders and President of the Japanese Society of Earth Science Education and endeavoured to promote geoscience education in high schools.

The following lectures were presented at the evening meeting at Shimane University:

D. Shimizu, 'B. Koto and his contributions to the geology of San'in district'.

K. Fukuda, 'S. Yamane's contributions to the Geological Institute, Shimane University, during its initial phase'.

I. Imai, 'S. Yamane's contributions to geology'.

T. Mitsunashi, 'Publication of geology (1982) and geologic map of Shimane Prefecture (1985)'.

T. Tokuoka, 'Change of stratigraphic horizons for the Daikon-jima basalt'.

B. Koto (1856–1935) was the first professor of geology at the Imperial University of Tokyo and studied the geotectonic structure of the Japanese islands and their region, volcanoes and earthquakes. His description of Neo Valley Fault, which occurred in the Nobi Earthquake in 1891, was an important and well-remembered contribution. S. Yamane (1885–1962) was the sixth Director of the Geological Survey of Japan, and first President of Shimane University. He studied and reviewed the geology of China, especially with regard to economic geology. His contribution to the foundation of Shimane University was highly esteemed.

At the general meeting at Hokutopia in December, the following presentations were made:

M. Nakai, 'Contribution to paleo-magnetism by Japanese geoscientists'.

T. Yamada, 'How geology was transmitted from Steensen to Leibniz?'.

H. Hirai, 'Underground world: some problems in the study of geo-sciences before Leibniz (1691)'.

A seminar on the history of geosciences was proposed under the leadership of the younger members of the Association. The first meeting was held at Aoyama Gakuin Women's Junior College on 2 December and the following papers were presented:

N. Aida, 'Paleo-geomagnetism and plate tectonics'.

F. Tochiuchi, 'S. Tsuboi's introduction to Bowen's theory of the origin of igneous rocks'.

S. Tsuboi (1893–1986) was professor of petrology at the University of Tokyo. He introduced the crystallization-differentiation theory into Japanese petrology and its application to microscopic observation.

In 2000, the association published *Kaiho* of the JAHIGEO Nos 14 and 15 in Japanese, and *Newsletter* No. 2 in English.

We are pleased to report that Hiroshi HIRAI has successfully completed his doctoral thesis at the University of Lille under Professors Bernard Joly and Robert Halleux: *Le concept de semence dans les théories de la matière à la Renaissance: de Marsile Ficin à Pierre Gassendi*. Dr Hirai was awarded the *Palma tinorum (Prix des jeunes historiens)*.

The following publication from 1997 has not been reported previously: Suwa, Kanenori, *Splitting Continent: Wonders of the African Rift Valley*, Kodansha Publishers, Tokyo (in Japanese) in 1997, with reprintings in 1997, 1998, and 2000.

Yasumoto SUZUKI, Tokyo, and Kenzo YAGI, Sapporo

New Zealand

It has been an eventful year for the Historical Studies Group of the Geological Society of New Zealand.

At a meeting of the Group held in November 2000, a new Convenor was appointed: Dr Mike Johnston, a freelance geologist working in Nelson at the northwest corner of the South Island. Mike is a winner of the McKay Hammer Award from the Geological Society of New Zealand and a New Zealand Science and Technology Medal from the Royal Society of New Zealand. His historical publications include three books on the history of mining in New Zealand. Alan Mason continues as Treasurer of the Group and Editor of its *Newsletter*. The separation of the functions of the Convenor from those of the Treasurer and Editor will enable more attention to be given to the future direction of the Group, and Mike already has ideas on this.

The second major event occurred at the Annual General Meeting of the Geological Society of New Zealand when the Society set up a fund to support historical research in New Zealand earth science. The fund, to be known as the Alan Mason Historical Studies Fund, will be financed by donations from members of the Society and from friends and organizations outside the Society.

Even prior to the above announcements, increased and wider research had become evident. Major items include:

Historical earthquakes, tsunamis, landslides, etc.

Ferdinand von Hochstetter

West Nelson goldfields

The geology of Otago from the 1860s to the 1960s

Biographical memoirs of Brian Mason and Harold Wellman

The development of ideas on the New Zealand greywackes.

The climate for historical research on New Zealand geology has changed dramatically during the last twelve months and no longer can it be said, as it was said in last year's report, that a "sense of history is lacking" amongst New Zealand geologists.

Newsletters 20 and 21 were published during the year and included the following articles (among others):

Peter Ballance, 'Patrick Matthew, Natural Selection, and a New Zealand Connection'

Alan Mason, 'Augustus Koch: Artist to Ferdinand von Hochstetter'

Alan Mason, 'Mont Ongley: The Legend and the Man'

Gary Tee, 'Relics of Davy and Faraday in New Zealand'.

Alan Mason, Auckland

Portugal

Events and News

1. Two meetings in Portugal (the 1st Luzo-Brazilian Congress of the History of Science and Technology was held in Evora and Aveiro in October and the 2nd Science and Technology in the European Periphery. Meeting was held in September in Lisbon), together with the 31st International Geological Congress in Rio de Janeiro, dominated the scene as far as the attendance of Portuguese-speaking historians of geology was concerned.
2. The Portuguese Instituto Geologico e Mineiro (former Geological Survey of Portugal) opened its archives to a team of historians of science and technology of the Universidade Nova de Lisboa. The results of research to date were presented at the 2nd Science and Technology in the 'European Periphery' Meeting (see papers by Areias, Carneiro, Leitao, and L. Pinto).
3. In April and May an exhibition organised by A.C. Matos was held in Evora concerning the exploitation of gold mines in colonial Brazil and its artistic application in Evora, which is a World Heritage Site.
4. Manuel S. Pinto co-convoked the General Symposium 27-1 of the IGC: 'Different Perceptions of Geological Sciences in the Tropics'. His election as President of INHIGEO was confirmed during the Congress, following a postal ballot.

Publications

- Aires-Barros, L.A. *et al.*, The Cult of Geology: Short historical Appraisal of the Contributions of Portuguese Mining Engineers, *Boletim de Minas*, 1999, 36, 103-110 (in Portuguese).
- Andrade, A.A.S., 'European Mineralogy in the Brazilian Royal Court through the Influence of a Portuguese Philosopher', 1st Luzo-Brazilian Congress of History of Science and Technology, Evora and Aveiro, Volume of Abstracts, Universities of Evora and Aveiro, 2000, 107-108 (in Portuguese).
- Antunes, M. Telles, 'Paleontology and Portugal', *Coloquio/Ciencias/Revista de Cultura Cientifica*, 2000, 25, 54-75 (in Portuguese).
- _____, 'About the History of Palaeontology in Portugal: Closing conference, I Congress Iberico de Paleontologia, *Jornadas de la Sociedad Espanola de Paleontologia*, 2000, 14 (in Portuguese).
- _____, *Man and Animals: Some Evidence in Portugal up to the Middle Ages: Lecture delivered to the Mestrado em Historia Medieval/Arqueologia*, New University of Lisbon, Lisbon, 2000 (in Portuguese).
- Antunes, M. Telles *et al.* (2000) 'A Brief Presentation: The Latest Neanderthals in Portugal - Odontologic and Other Evidence, Historic References', *Memorias da Academia das Ciencias de Lisboa, Classe Ciencias*, 2000, 38, 21-22.
- Areias, M.D. 'A Centre or a Periphery? Portugal in Relation to its African Colonies and to Europe at the End of the 19th Century', 'Scientific Travels' - 2nd 'Science and Technology in the European Periphery' Meeting, Lisbon, *Volume of Abstracts*, 2000, 30.
- Araujo, R. and Pinto, M.S., 'Mozambique Geology in 1894 and 1929: Two Giant Steps Ahead, The Same Perception', 31st International Geological Congress, Rio de Janeiro, CD-ROM, *Volume of Abstracts K28*, 2000.
- Carneiro, A., 'The Travels of Nery Delgado (1853-1908) in the Context of the Portuguese Geological Survey', 'Scientific Travels' - 2nd Science and Technology in the European Periphery Meeting, Lisbon, 2000, *Volume of Abstracts*, 17-18.
- Carvalho, A.M.G. 'A Contribution to the History of Mineralogy', 1st Luzo-Brazilian Congress of History of Science and Technology, Evora and Aveiro, *Volume of Abstracts*, 2000, 169 (in Portuguese).
- Domingues, H.M.B., 'The French Reception of Brazilian Sciences (1860-1900)', 1st Luzo-Brazilian Congress of History of Science and Technology, Evora and Aveiro, *Volume of Abstracts*, 2000, 91-92 (in Portuguese).
- Figueir6a, S.F and Silva, C.P., "'Scientists in Action'" in Colonial Brazil: The Enlightenment', 1st Luzo-Brazilian Congress of History of Science and Technology, Evora and Aveiro, *Volume of Abstracts*, 2000, 23-24 (in Portuguese).

- Gordon, A.M.P.L., 'News from European Travellers who Visited Brazil in the Colonial Period—Implications for European Culture with a Focus on Sciences', 1st Luzo-Brazilian Congress of the History of Science and Technology, Evora and Aveiro, *Volume of Abstracts*, 2000, 39–40 (in Portuguese).
- Leitao V., 'The Travel of the Geologist Carlos Ribeiro to Europe in 1858'—'Scientific Travels'—2nd Science and Technology in the European Periphery Meeting, Lisbon, *Volume of Abstracts*, 2000, 31.
- Lopes, M.M. and Pinheiro, R., 'Joao da Silva Feijo (1760–1824) in Ceara—A Link Between Luso-Brazilian Enlightenment and the Local Construction of Science', 1st Luso-Brazilian Congress of the History of Science and Technology, Evora and Aveiro, *Volume of Abstracts*, 2000, 35–36 (in Portuguese).
- Martins, D.R., 'Science in Coimbra in the Nineteenth Century', 1st Luso-Brazilian Congress of the History of Science and Technology, Evora and Aveiro, *Volume of Abstracts*, 2000, 77–78 (in Portuguese).
- Menezes, M.G., 'Sociedade Mineralogica de Passagem: Registering the Advances in Gold Exploration Technology from Empire to Republic', 1st Luso-Brazilian Congress of the History of Science and Technology, Evora and Aveiro, *Volume of Abstracts*, 2000, 109–110 (in Portuguese).
- Neto, M.J., Soares, C., Aires-Barros, L. and Dionisio, A., 'The Batalha Monastery (Portugal): An Interdisciplinary Study of the Tombs of Prince Henry the Navigator and Prince John in the Founders Chapel—5th International Congress on the Restoratorion of the Archaeological Heritage, Florence, *Proceedings*, 2000, 1671–1679.
- Pinto, L.T., 'Moving to the Periphery: Paul Chaffat (1849–1919) and the Portuguese Geological Survey—'Scientific Travels', 2nd Science and Technology in the European Periphery Meeting, Lisbon, *Volume of Abstracts*, 2000, 29.
- _____, 'Aspects of the History of Mining in Colonial Brazil', in: *Brasil 500 anos—A Construcao do Brasil e da America Latina pela Mineracao*, Centro de Tecnologia Mineral, Rio de Janeiro (in Portuguese) (in press).
- _____, 'Concepts about Brazilian Gold Deposits in the 16th and the 17th centuries', 31st International Geological Congress, Rio de Janeiro, CD-ROM, *Volume of Abstracts* K28, 2000.
- _____, 'Domenico Vandelli and the Inventory of the Brazilian Mineral Resources', 1st Luso-Brazilian Congress of the History of Science and Technology, Evora and Aveiro, *Volume of Abstracts*, 45, 2000 (in Portuguese).
- _____, 'Gaspar Frutuoso: A Portuguese Volcanologist of the 16th Century', *Cadernos IG*, 2000, 8, 87–103.
- Pinto, M.S. and Malaquias, I., 'The Independence of Brazil and Some Brazilian Miners', 1st Luso-Brazilian Congress of the History of Science and Technology, Evora and Aveiro, *Volume of Abstracts*, 63, 2000 (in Portuguese).
- Praia, J. and Marques, L., 'The History of Geology in Constructing Knowledge: A Study from a Kuhnian Perspective', 1st Luso-Brazilian Congress of the History of Science and Technology, Evora and Aveiro, *Volume of Abstracts*, 247, 2000 (in Portuguese).
- Rios, E.O., 'Natural Sciences and the Environment—Past and Present in the State of Goias (Brazil)', 1st Luso-Brazilian Congress of History of Science and Technology, Evora and Aveiro, *Volume of Abstracts*, 2000, 171–172.
- Rosa, R.N. and Nunes, F., 'Science and Technology in Building the XVIII-Century State, 1st Luso-Brazilian Congress of History of Science and Technology, Evora and Aveiro, *Volume of Abstracts*, 2000, 21–22.
- Soares, C., Aires-Barros, L., and Neto, M.J., 'An Interdisciplinary Study of the Historical Stone-quarries of the Batalha Monastery (Portugal)—Quarry—Laboratory—Monument' International Congress, Pavia; *Proceedings*, 2000, 449–454.

Manuel Pinto, Aveiro

Russia

Professor Eugeni Milanovsky has written:

During 2000, along with my main work as Professor and Head of the Department of Regional Geology and Earth History in the Geology Faculty of Moscow University, I have continued my long-standing activities in the history of geology (and, more widely, the history of science and culture). This has been expressed in the organisation of and participation in several national and international scientific conferences, and the preparation and publication of a number of monographs and articles devoted to such problems.

1. In August, 2000, during the 31st International Geological Congress in Rio de Janeiro I participated in the INHIGEO meeting and the symposium on the history of geology, presenting a large paper on Alfred Wegener's life and scientific activities and the subsequent development of his innovative mobilist ideas in Earth science.
2. In January, 2000, I had earlier presented a similar paper at the all-Russian annual geotectonics conference in Moscow. Its contents were published in 2000 in three versions (see below).
3. On 21 December, 2000, I organised a joint jubilee conference of the Earth Sciences Section of the Russian Academy of Sciences, Moscow University, and the Moscow Naturalists' Society at the Geology Faculty, Moscow University, dedicated to the 120th birthday and the 70th year of the tragic death of Alfred Wegener. The meeting attracted more than 250 participants and was accompanied by an exhibition of his books and papers, photographs, maps, and other materials reflecting different stages of his life, his scientific activities, and the development of his mobilist concepts. Papers were presented by Academicians E.E. Milanovsky, V.E. Khain, A.P. Lisitsyn, and a letter of greeting was read out from Jorn Thiede, Director of the Alfred Wegener Institute for Polar and Marine Research at Bremerhaven (Germany). First copies of my new book, *Alfred Wegener*, were distributed during the course of the conference [for review, see p. 42].
4. Eleven works devoted to the history of science and culture were published in Russia and abroad during 2000 [see below].

- Milanovsky, E.E., *Alfred Wegener (1880–1930)*, Nauka, Moscow, 2000 (in Russian).
- _____ 'Wegener's Mobilist Hypothesis and its Destiny in the Course of the Development of Geotectonics during the Twentieth Century (for the 120th Anniversary of Wegener's Birth', in *General Problems of Tectonics: The Tectonics of Russia*, GEOS Publishers, Moscow, 2000, 322–325 (in Russian).
- _____ 'A. Wegener's Mobilist Hypothesis and its Role in the Development of the Earth Sciences in the Twentieth Century', *Otechestvennaja Geologija*, 2000, 4, 4–14 (in Russian).
- _____ 'Wegener's Mobilist Hypothesis and its Destiny in the Course of the Development of Geotectonics during the Twentieth Century (for the 120th Anniversary of Wegener's Birth', *Vestnik Moscow University, Series 4, Geology*, 2000, 4–12 (in Russian).
- _____ 'Recently: Ten Million Years Ago. Interview with Academician E.E. Milanovsky', *Poisk Newsletter*, 21 March, 2000, 3 (in Russian).
- _____ 'My Teacher by God's Favour', in: Schmidt, S.O. (ed.), *On the Moscow Teacher of Literature, I.I. Zelentsov*, "Moskvovedenie" Publisher, Moscow, 2000, 219–223, with 'friendly' caricatures, pp. 144–145 (in Russian).
- _____ 'The Problem of Atlantis in the Light of New Data from Geology and Archaeology', in: Koronovsky, N.V. (ed.), *Encyclopedia of Modern Natural Sciences, Volume 9 Earth Sciences*, Soros Science Education Programme, Moscow, 2000, 88–95 (in Russian).
- _____ 'The Plio- Pleistocene Glaciation in Eastern Europe, Siberia and the Caucasus: Evolution of Thoughts', *Eclogae Geologicae Helvetiae*, 2000, 93, 379–394.
- _____ 'Transcript of Interview with David Oldroyd', *INHIGEO Newsletter*, No. 32 for 1999, Sydney, 2000, 30–34.
- _____ Drawings made in September 1999: Freiberg, Dresden, and Scheibenberg, *ibid.*, 10–11 and 14.
- Milanovsky, E.E. and Pusharovskiy, D.J., 'A. Werner's 250th Birthday Anniversary and International Symposium Dedicated to his Memory in Freiberg', *Vestnik Moscow University, Series 4, Geology*, 2000, 4, 67–69 (in Russian).
5. Recently I have begun preparation of my next book on the history of geology: *The Geological School of Moscow University (From the Beginning of 19th Century to the Present)* timed to be ready for two jubilee dates which will be celebrated in 2005: the 250th year since the opening of Moscow University and 200th year of the foundation of Moscow Naturalists' Society (attached to Moscow University). The word 'Geological' in the title of this book means the term 'geology' in its narrow sense, *id est* stratigraphy, geotectonics, geomorphology, palaeogeography, Quaternary geology, and partly volcanology, sedimentology and palaeontology. My position in Moscow University, where I have been working since 1949, is at present named 'The Chair of Regional Geology and Earth History'. It is a direct descendant of the first 'Chair of Geognosy and Mineralogy', established at Moscow University in 1835, now in existence for more than 165 years and the producer of more than twenty future members of the Russian Academy of Science (I have been fortunate to be personally acquainted with most of them). In this book I should like to examine the development of geological science and geological education at Moscow University against the background of the history of Russia in 19th and 20th centuries and try to give a series of scientific portraits of the more outstanding alumni of our Alma Mater.

[Professors Victor Khain and Anatoly Ryabukhin have contributed a paper on the history of the reception of plate-tectonic theory in Russia to a volume, based on papers presented at the INHIGEO symposium in Rio for the IUGC, on major developments in geology in the 20th century, which should be published by the Geological Society of London in 2001 (Ed.)]

Spain

1999

Anniversaries

- a) The 200th Anniversary of the death of Juan-Bautista Bru (1740–1799), a Spanish naturalist of the Royal Laboratory of Natural History, assembler around 1790 of the first *Megatherium* found in 1787 by Manuel de Torres near Buenos Aires, and author of twenty-two drawings of the fossil, called by Cuvier *Megatherium* in 1796.
- (b) 150 Anniversary of the Geological Map Commission (now *Instituto Geológico y Minero de España*). This Commission was created in 1849 to prepare the first systematic geological map of Spain. The work, performed by provinces by a small team of geologists and mining engineers, was completed in 1889 at the scale 1:400,000, and the explanation and memoirs, were published between 1895 and 1911 by Lucas Mallada (1821–1921). Several scientific events have been organised, among them a Symposium on the History of Palaeontology in Spain held in October and an international meeting of PROGEO about conservation of Geological Heritage, was held in November. A book about the history of the Survey was published in 2000: *Ciento cincuenta años (1849–1999)*.
- (c) The 100th Anniversary of the death of Federico de Botella (1822–1899), a geologist-mining engineer of the Geological Commission, author of a geological map of Spain at 1:2,000,000 in 1879 and of the first hypsometric map of Spain. He also established Spanish Mining Statistics.

Scientific Meetings

Scientific Meeting of SEDPGYM (Spanish Society for Defence of the Geological and Mining Heritage), October, Belmez (Córdoba). Details may be obtained from: <mata@bages.eupm.upc.es>. A Symposium on the History of Paleontology in Spain was organised in Madrid by the Spanish Society of Palaeontology in October (contact <i.rabano@itge.mma.es>). Drs Octavio Puche, Mariano Ayarzagüena, Benjamín Calvo, and V. Cabrera organised a series of public lectures on the history of archaeology at the School of Mines in Madrid from November 1999 to May 2000.

Publications

The Commission of History of Geology of the Spanish Geological Society published two numbers (12 and 13) of its *Bulletin*, edited by Leandro Sequeiros (lsequiros@probesi.org; fax 34-958-151440).

The SEDPGYM (Spanish Society for Defence of Geological and Mining Heritage) has published two numbers (13 and 14) of its *Bulletin* (contact <opuche@dinge.upm.es>).

The *Instituto Tecnológico Geominero de España* has published a facsimile edition of the *Descripción Física y Geológica de la Provincia de Madrid* of Casiano de Prado (1797–1866), member of the Spanish Mapping Commission, published in 1864—a classic of Spanish naturalism.

Bocamina, the mining–mineralogical review of the Mineralogical Group of Madrid, dedicated its fourth issue to a splendid full-colour edition of 'Riotinto, the Cradle of Mining'.

Other publications

AAVV, *Cultura minera en Andalucía*, Demófilo. *Revista de Cultura Tradicional de Andalucía*, 1999, No. 32, 7–396.

Aragonés i Valls, E., 'La Societ  Geol gica de France a Catalunya (setembre–octubre, 1898)', *Revista Museo Geol gico de Barcelona*, 1999, 8, 113–155.

Ayala-Carcedo, Francisco-Javier, *Historia de los mapas geol gicos de Espa a*, Consejo de Seguridad Nuclear, Madrid, 1999.

_____, 'De la Comisi n del Mapa Geol gico al Instituto Tecnol gico Geominero de Espa a', *Industria y Miner a*, Madrid, 1999, 338, 29–35

Calvo, Antonio, *Bibliograf a fundamental de la Antigua Mineralog a y Miner a Espa olas*, Libris, Madrid, 1999.

Pelayo, Francisco, *Ciencia y creencia en Espa a durante el siglo XIX: La Paleontolog a en el debate sobre el Darwinismo*, Cuadernos Galileo de Historia de la Ciencia, CSIC, Madrid, 1999.

_____, 'Puentes continentales e islas atl nticas: una propuesta paleobiogeogr fica alternativa a la deriva acontinental', *Historia e Meio-Ambiente. O impacto da expans o europeia*, Centro de Estudos de Historia do Atl ntico, Madeira, 1999, 233–258

_____, 'El orden natural y los gigantes: la Gigantolog a Spagnola Vendicata (1760) de Jos  Torrubi a', *Actas XV Jornadas de Paleontolog a, ITGE*, 2000, 2, 685–716

Puche, Octavio, 'Historia de la Geolog a espa ola', *Historia de la Ciencia y de la T cnica*, 1999, 128–139.

_____, 'Apuntes biogr ficos de D. Lorenzo G mez-Pardo (1801–1847)', *Anales de la Real Academia de Farmacia*, 1999, 65, 129–149.

2000

Puche, Octavio & Mazadiego, Luis-Felipe, 'Salinas hist ricas de la Comunidad de Madrid: Carcaballana', *Arqueologia e Industria, APAI*, 1999, 2, in press

Puche, Octavio and Orche, Enrique & Mazadiego, Luis-Felipe, 'Datos hist ricos y actuales sobre el trabajo de los ni os en las minas en Europa y en Am rica', *Bolet n Geol gico y Minero, ITGE*, 1999, 110–113.

Anniversaries

- (a) The 200th anniversary of the birth of Wilhem Schulz (1800–1877). Schulz was a German mining engineer, born in the mining region of Habichtswald. After completing his studies, he came to Spain in 1826 and remained there for the rest of his life, reaching the highest levels in the geological and mining administration: General Inspector of Mines, and Director of the Spanish Geological Map Commission and the School of Mines. He was author of the first published geological map of Spain, the Petrographic Map of Galicia on a scale of 1:400,000 (1835), the Geological and Topographical Map of Asturias (1858), and also the first Map of the Carboniferous of Spain and Portugal (1856). Because Schulz was a well-known and respected personality in Asturias, an event was organised in Oviedo in November by the mining engineers, and a book was published with good reproductions of Schulz's Asturias maps. Another event was organised in Madrid by the ITGE and the Mining School.
- (b) The 100th anniversary of the birth of Isidro Parga Pondal (1900–1985). This geologist and geochemist, a figure with an international reputation, was the main geological figure of Galicia, NW Spain, in the twentieth century. During the Spanish Civil War (1936–1939), as a professor at Santiago University, he was dismissed by the Franco Government after the military *coup d' tat*. He founded the Geological Laboratory of Laxe in 1946 and worked (and helped) with Dutch, German, and French geologists in his researches in Galicia.
- (c) The 100th anniversary of the birth of Guillermo Colom (1900–1993). Colom was a world-class micropaleontologist who discovered more than 250 new species. He working in the Balearic Isles all his life, at both public and private institutions, and was also connected with the leading scientific societies.
- (d) The 900th anniversary of decease of Azarquiel, an astronomer working in Toledo
- (e) The 400th anniversary of the death of Jos  de Acosta, author of the first Natural History of America, the *Historia Natural y Moral de las Indias*, and founder of Paleobiogeography

Scientific Meetings

Seminar on Mines and Metallurgy in Al-Andalus, Casa de Vel zquez, 21–22 February.

1st Symposium on Ancient Mining and Metallurgy in the SW of Spain, Ser s (Lleida), 5–7 May.

5th Geological Congress of Spain, Alicante, 12–14 July.

Iberoamerican Meeting on Mine Closures, La R bida (Huelva), 25–29 September.

International Congress on Geological and Mining Heritage, and Sustainable Development, Linares (Ja n), 20–22 October.

1st Iberian Symposium on Geology, Heritage and Society, Tarazona (Zaragoza), 3–5 November.

Publications

- The Commission of History of Geology of the Spanish Geological Society published its *Bulletin* No. 14, edited by Leandro Sequeiros (lsequiros@probesi.org, fax 34 958 151440).
- The SEDPGYM (Spanish Society for Defence of Geological and Mining Heritage) published its *Bulletin* No. 15, which may be obtained from <opuche@dinge.upm.es>. The author of the present report has, with the collaboration of more than forty specialists, edited (January 2001) the first *History of Technology in Spain* in two volumes, with hundreds of colour illustrations (Valatenea Editorial, Barcelona, 835 pp. ISBN 84.923944-4-7).
- Other publications*
- Alcalá, L. and Martín-Escorza, C., 'La caída del meteorito Cabeza de Mayo al sur de Murcia en 1870', *Geogaceta*, SGE, 2000, 28, 3-6.
- Ayala-Carcedo, F.J., 'El Medio Ambiente, los Riesgos Naturales y la Geotecnia en la Historia del ITGE', in: Custodio and Huerga (eds), *Ciento cincuenta años (1849-1999). Estudio e investigación en las Ciencias de la Tierra*, ITGE, 2000, 235-250.
- Ayala-Carcedo, F.J. and Puche, O., 'Guillermo Schulz (1800-1877), un clásico de la Geología y la Minería españolas, en su Bicentenario', *Colegio de Ingenieros de Minas del Noroeste*, 2000, 122-123, 37-39.
- _____, 'Bicentenario de Guillermo Schulz (1800-1877), un clásico de la Geología y Minería españolas', *Industria y Minería*, 2000, 342, 42-46.
- Cabezas, E. and Melendez, G., 'La labor científica de Lucas Mallada y Pueyo (1841-1921) contemplada bajo el prisma del historicismo epistemológico', *Boletín Geológico y Minero*, 2000, 111, 89-96.
- Calvo Roy, A., 'Lucas Mallada, el clásico desconocido' *Estratos*, ENRESA, 55, 54-58.
- _____, *Lucas Mallada. Rocas y razones. Biografía de un geólogo regeneracionista (1841-1921)*, Madrid, Obra Social, Madrid, 2000. (An interesting new biography of Spanish geologist Lucas Mallada.)
- Casado de Otaola, S., *Edición facsímil: Guía de los sitios naturales de interés nacional. La Comisaría de Parques Nacionales y la protección a la naturaleza en España. Madrid, 1933 de Eduardo Hernández Pacheco*. Organismo Autónomo de Parques Nacionales, Madrid, 2000.
- _____, 'De extremo a extremo de la "Península Ibérica" con Eduardo Hernández-Pacheco', *Quercus*, 2000, No. 175 (September), 40-46.
- Català, J., 'Daniel Jiménez de Cisneros (1863-1941) i la geologia i la paleontologia alacantinas', *Actes de les V Trobades d'Histori de la Ciència i de la Tècnica*, SCHCT, 2000, 329-333.
- _____, 'El excursionismo en la práctica científica y docente de Daniel Jiménez de Cisneros', *Geotemas*, 2000, 1, 56-59.
- Gurriarán, R., *Da prerromanización ao Wolfram: apuntamentos históricos das explotacións mineiras en Valdeorras*, Grupo Cupire Padesa, Santiago, 2000.
- Martínez, N., 'Jose Luis Sanz: el "cazador" de dinosaurios', *Newton*, October 2000, 39-42.
- Mateu, G., Centenario del nacimiento de Guillermo Colom (1900-1993), *Boletín de la Comisión de Historia de la Geología, Sociedad Geológica de España*, 2000, 14, 10-11.
- Pelayo, F., 'El despertar de la Paleontología en España', *Newton*, 2000, 102-107.
- Puche, O., 'La conservación del Patrimonio Geológico y Minero', Custodio y Huerga (eds) *Ciento cincuenta años (1849-1999): Estudio e investigación en las Ciencias de la Tierra*. ITGE, 2000, 73-102.
- _____, 'El Patrimonio Minero en Francia', *Boletín de la SEDPGYM*, 2000, 15, 7-11.
- Puche, O., Mazadiego, L.F., and Orche, E., 'Apuntes sobre los intercambios culturales y comerciales, con especial relación a los minerales, entre España y Egipto, desde la antigüedad a la alta Edad Media', *Actas del Simposio sobre la Minería y la Metalurgia Antigua en el SW. Europeo, Serós (Lleida)*, 2000.
- Puche, O. and Mazadiego, L.F., 'Conservation of the European Mining and Metallurgical Heritage', *CIM Bulletin*, 2000, 93, 1040 and 1041; 96-107 and 152-154.
- Riccardi, A.C., 'Historia del estudio de los ammonites Jurásicos y Cretácicos en la Argentina y Chile', *Boletín de la Academia Nacional de Ciencias*, 2000, 64, 153-185.
- Rodríguez de la Torre, F., 'Bibliografía del sismólogo Alfonso Rey Pastor (1890-1959)', *Instituto de Estudios Riojanos, Serie Ciencias de la Tierra*, 2000, No. 22, 168 páginas.
- Sequeiros, L., 'El padre José de Acosta (1540-1600): misionero, naturalista y antropólogo en la América hispana' *Proyección*, 2000, 196, 63-73.
- _____, año de Athanasius Kircher (1601-1680)', *Boletín de la Comisión de Historia de la Geología de España*, 2000 (2001), 15, 14-16.
- _____, 'Necrológica: François Ellenberger', *Boletín de la Comisión de Historia de la Geología de España*, 15, 24.
- _____, 'Lucas Mallada y Pueyo y la Naturaleza Aragonesa', *Naturaleza Aragonesa*, 2000, 5, 10-18.
- _____, 'Centenario de un micropaleontólogo aficionado: Guillermo Colom', *Revista ACMIPA*, 2000, 41, 13.
- _____, 'Teología y Ciencias Naturales: las ideas sobre el Diluvio Universal y la extinción de las especies biológicas hasta el siglo XVIII', *Archivo Teológico Granadino*, 2000, 63, 91-160.
- _____, 'Paleontología erótica en el siglo XVIII', *Revista Acmipa*, 42, 16-17.
- _____, 'Nuestro personaje es: Guillermo Schulz y Schweizer', *Revista Acmipa*, 2000, 42, 19-20.
- Sequeiros, L. and Montero, A., 'Historia del yacimiento paleontológico del Jurásico de Cabra (Córdoba)', *Revista Acmipa*, 2000, 41, 15-17.
- Truyols, J., 'Centenario de Isidro Parga Pondal (1900-1985)', *Boletín de la Comisión de Historia de la Geología, Sociedad Geológica de España*, 2000, 14, 7-9.

_____ 'Nuestro personaje es: Isidro Parga Pondal', *Revista ACMIPA*, 2000, 41, 20–21.

_____ 'Notas necrológicas: Bermudo Meléndez Meléndez (1912–1999)', *Memorias de la Real Sociedad Española de Historia Natural*, 2000, 97, 83–98.

Francisco J. Ayala-Carcedo, Madrid, and Leandro Sequeiros, Granada

The Netherlands

On 17 May, 2000, the Society for Scientific Research in the Tropics organised a symposium to commemorate the *Siboga* expedition (1899–1900) to the eastern seas of the Indonesian Archipelago.

Programme

Dr A.C. Pierrot, 'The Siboga Expedition and its Importance for Marine Research'.

Drs J. de Visser, 'Who were Max and Anna Weber?' [The Webers were the leaders of the *Siboga* expedition.]

Dr A.M.C. van Dissel, 'Sailing for Science: The Naval Officers of H.M. *Siboga*'.

Drs M. Ossewijer, 'Anthropological Explorations of the *Siboga* Expedition'.

Professor dr H. Postma, 'Oceanographic Expeditions in the Tropics'.

Professor drs F. van Veen, 'The Geology of the *Siboga* Expedition'.

Dr W. Backhuys, 'The Official Publication of the Expedition's Results'.

On 10 November, 2000, the Commission for the History of the Earth Sciences, working under the auspices of the Royal Academy of Science, organised a symposium on 'Dutch Pioneers of the Earth Sciences', held in Amsterdam.

Programme

Professor dr E. den Tex, 'Two Dutch Naturalists as Arbitrators in the Basalt Controversy'.

Professor dr G. Vanpaemel, 'National Glory or Economic Interests? Geology in the United Kingdom of the Netherlands'.

Professor drs F. van Veen, 'Staring's Lectures (1863) for Mining Students'.

Dr P.E. Faasse, 'On the Geological Map of the Netherlands'.

Drs E. Muldert, 'Dutch Pioneers of Vertebrate Palaeontology, 1700–1900'.

Professor dr J. Touret, 'H. Vogelsang, a European *avant la lettre*'.

The proceedings of this conference will be published in English in 2002.

Robert Visser, Utrecht

Turkey

In April 2000, Professor Celal Sengör was elected a foreign associate of the US National Academy of Sciences (the first Turkish citizen to be elected to this Academy).

Historical publications

'Continental Interiors and Cratons: Any Relations?', *Tectonophysics*, 1999, 305, 1–42 (a scientific paper with a strong and important historical component [Ed.]).

'Prens Pierre de Tchihatchef ve Eserleri [Prince Pierre de Tchihatchef and his work]', in: Pierre de Tchihatchef *Istanbul ve Bozaziçi* (çeviri Ali Berktaş), Tarih Vakfı Yurt Yayınları, 97, İstanbul, 2000, vii–xvii.

'Die Bedeutung von Eduard Suess (1831–1914) für die Geschichte der Tektonik', *Berichte der Geologischen Bundesanstalt*, 2000, 51, 57–72.

Istanbul Teknik Üniversitesi 227. Açılış Dersi – Akıl, Bilim, Deprem, İnsan [227th Opening Lecture of the Istanbul Technical University – Rationality, Science, Earthquake, Man], Hava Harp Okulu Bülteni, Deprem Özel Sayısı, 2000, 1–57.

'Lyell, Charles', in: Eblen, R.A. and Eblen, W.R. (eds), *The Environment Encyclopedia*, Vol. 6, Marshall Cavendish, Tarrytown, NY, 2000, 784–785.

Abstract

'Die Ansicht von Eduard Sueß über das Aussterben der Dinosaurier', in: *Geschichte der Erdwissenschaften in Österreich 2*.

Symposium Abstracts, *Berichte des Institutes für Geologie und Paläontologie der Karl-Franzens-Universität Graz*, 2000, 1, p. 56.

A.M.C. Sengör, Istanbul

United Kingdom

Awards

John Fuller, a founder member of the UK's History of Geology Group, was awarded the AAPG's coveted Certificate of Merit for his contribution to the 'Education of the AAPG Membership in the Field of the History of Geology'. Dr Fuller was responsible for the joint effort in 1995 between the Geological Society of London and AAPG to publish William Smith's 1819 suite of stratigraphic cross-sections. This year his work has mainly been focused on industrial geology in England during the sixteenth and seventeenth centuries.

Professor Richard Howarth was awarded the William Christian Krumbein Medal from the 'International Association of Mathematical Geology' for 'exceptional contributions to the field of mathematical geology and support for the Association' (see *Newsletter* No. 32, p. 25), in consequence of which he gave an address at the Rio IGC (August, 2000) entitled 'Aspects of Model-Fitting in the Earth Sciences'.

Dr James Secord was awarded the Geological Society's Sue Tyler Friedman Medal for the History of Geology (see p. 25).

In memory of John Thackray, archivist at the Natural History Museum and Geological Society, who died on 6th May 1999, the Thackray Medal of the Society for the History of Natural History was inaugurated and first awarded in 2000 for

'significant achievement in the history of natural history' to Professor Hugh Torrens, former President of INHIGEO, who retired from Keele University in September 2000, aged 59. He had indefatigably enthused students at Keele about the wonders of geology, as well as the history of science and technology, since 1967. Hugh became Professor Emeritus at Keele, and was then honoured with the Geological Society of America's History of Geology Division Award for 2000 'for his long and outstanding contribution to the field of history of geology' (see p. 25). Hugh's latest PhD student, Mr Stuart Baldwin, had the privilege of entering the *Guinness Book of Records* last year for having taken the longest time to do an Open University degree—28 years! Aged 70, Stuart is now embarking on a PhD with the Open University, entitled 'The Contribution of the Amateur to English/British Geology 1850-1950', with Hugh as supervisor. He has eight years in which to complete it . . .

General activities

The History of Geology Group (HOGG) is one of the specialist groups of the Geological Society of London, to which all INHIGEO members in the UK also belong. In 2000, it enjoyed its most successful year since the group's formation seven years ago and went through some major changes. In particular, formal elections for committee posts were held for the first time. Following the tragic death in 1999 of HOGG's Chairman, John Thackray, Richard Wilding gallantly stepped into the breach and held the fort for almost a year. As a result of the elections a new committee was formed. The executive members are as follows: Dr John Martin (Chairman), Dr Cherry Lewis (Secretary), Dr John Fuller (Treasurer), Mr Peter Tandy (*Newsletter* Editor), Mr Stuart Baldwin (Meetings), while Dr. Cynthia Burek, Mr Bill George, Professor Richard Howarth, Professor Martin Rudwick and Mr Richard Wilding are ordinary committee members. We were sad to lose INHIGEO member, Dr. Simon Knell, from the committee, due to work overload.

HOGG held three meetings during 2000, which included hosting the Geological Society's flagship William Smith Millennium Meeting 'Celebrating the Age of the Earth'. A two-day event, scientists from many disciplines came together to recreate the famous debate over the age of the Earth that dominated science a hundred years ago (see pp. 15–21). But while the historians looked backwards through time, Professors Chris Stringer (archaeologist), Aubrey Manning (zoologist) and Sir Martin Rees (Astronomer Royal), brought us right up to date on the age of Life and the Universe. Professor Al Hofmann (geochemist) introduced new controversy to the debate by suggesting that the traditional methods of dating the age of the Earth were based on a geochemical 'coincidence'. A Geological Society Special Publication entitled *The Age of the Earth: 4004 BC–AD 2002* will be published later this year. It will contain most of the papers given at the meeting, plus a number of others on the same theme.

The Group holds two or three meetings a year, one of which is usually based in the regions. These regional meetings may also include field trips, such as that held in Dudley this year with the Black Country Geological Society, the members of which were celebrating its twenty-fifth anniversary. Meetings planned for 2001 include one to be held on 27 June at the Natural History Museum on 150 years of the Geological Museum; another on the History of Palaeobotany, and a third early in 2002 on 'The Role of the Amateur in Geology'. Persons interested in further information on HOGG should contact the Secretary, Cherry Lewis, preferably by email: <clewis@aol.com>.

Publications

Four books were published by INHIGEO members in 2000:

Ford, T. D., *Derbyshire Blue John*, Ashbourne Editions, Ashbourne, 2000.

Knell, Simon J., *The Culture of English Geology, 1815–1851*, Ashgate Publishing Limited, 2000.

Lewis, Cherry, L.E., *The Dating Game: One Man's Search for the Age of the Earth*, Cambridge University Press, Cambridge, 2000.

Secord, James, A., *Victorian Sensation: The Extraordinary Publication, Reception, and Secret Authorship of Vestiges of the Natural History of Creation*, University of Chicago Press, Chicago and London, 2001.

Additionally, the following papers have been published:

Ford, T.D., 'The Growth of Geological Knowledge in the Peak District', *Mercian Geologist*, 1999, 14, 161–190.

Rudwick, Martin, 'Geologists' Time: A Brief History, in: Kristen Lippincott (ed.), *The Story of Time*, National Maritime Museum, London, 2000, 250–253.

_____, 'Georges Cuvier's Paper Museum of Fossil Bones' *Archives of Natural History*, 2000, 27, 51–68.

Torrens, H.S., 'Robert Townson (1762–1827): Gondolatok egy Rendkívüli Polihisztor Természettudós Utazorol' (and in English!), in: Rózsa, P. (ed.), *Robert Townson Magyarországi Utazásai*, Kossuth Egyetemi Kiadó, Debrecen, 2000, 11–26.

_____, 'Winners and Losers—What Can we Learn of the Future from the Past?', in: Moody, R.T.J. et al. (eds), *'Earth Alert': The Past, Present and Future of our Planet*, The Geologists' Association, London, 2000, 53–58.

_____, 'Notes on the Geology of Cadbury Castle, South Cadbury, Somerset', in: Barrett, J.C., Freeman, P.W.M., and Woodward, A., *Cadbury Castle, Somerset: The Later Prehistoric and Early Historic Archaeology*, English Heritage, London, 2000.

_____, Review of: M.J.S. Rudwick, *Georges Cuvier, Fossil Bones, and Geological Catastrophes*, in: *Geological Journal*, 2000, 34, 416.

_____, Review of Joseph Needham's *Science and Civilisation in China, Volume 5. Chemistry and Chemical Technology, Part XIII, Mining*, By Peter J. Golas, Cambridge University Press, Cambridge, 1999. In: *Ambix*, 2000, 47, 196–197.

_____, 'Entering Geology's Third Century—What Have we Learnt?', *Journal of the Open University Geological Society*, 2000, 21, 1–13.

Torrens, Hugh S., Ausich, W.I., and Sevastopulo, G.D., 'Middle Nineteenth-century Crinoid Studies of Thomas Austin, Sr. and Thomas Austin, Jr.: Newly Discovered Unpublished Materials', *Earth Sciences History*, 2000, 18, 180–197.

Torrens, Hugh S., Benamy, E.B. Daeschler, E.S. Spamer, and Bogan, A., 'Etheldred Benett of Wiltshire, England, the First Lady Geologist—Her Fossil Collection in the Academy of Natural Sciences of Philadelphia, and the Rediscovery of "Lost" Specimens of Jurassic Trigoniidae (Mollusca: Bivalvia) with their Soft Anatomy Preserved', *Proceedings of the Academy of Natural Sciences of Philadelphia*, 2000, 150, 59–123, 2000.

Cherry Lewis, Macclesfield

United States

The History of Geology Division of the Geological Society of America presented its History of Geology Award to Hugh S. Torrens at the GSA annual meeting in Reno, Nevada. For the Citation by William Brice and Hugh's Response see pp. 25–26. The Division also held a Pardee Keynote Symposium titled: 'Lamont and Plate Tectonics: History of Geology Division Millennium Symposium: Lamont 1949–1999'. This symposium, arranged by the division chair, Gerald M. Friedman, sought to bring together surviving founders of the plate-tectonics theory who were at the Lamont Geological Observatory (now the Lamont-Doherty Earth Observatory) at Palisades, New York, during periods of the 1950s, 1960s, and 1970s, along with an outsider and two historians of geology. Friedman began the session with an introduction to the history of Lamont. The speakers included Jack E. Oliver, on early earthquake seismology and plate tectonics at Lamont; Neil O. Opdyke, on Lamont's role in the acceptance of magnetic field reversals; James R. Heirtzler, on marine magnetic anomalies and reconstruction of the world; Lynn S. Sykes, on seismology at Lamont, the advent of plate tectonics and the quest for a comprehensive test-ban treaty; Manik Talwani, on the contributions of Bruce Heezen and Maurice Ewing to plate tectonics; Marie Tharp, on mapping the tectonic fabric of the world's oceans from 1947 to 1977 (which she accomplished by using continuously recorded echo profiles); Heinrich D. Holland, on the impact of plate tectonics on geochemistry; Karl K. Turekian, on radiogenic isotope tracers and plate tectonics: a failure that made it interesting; W. Jason Morgan, on an outside view of the contributions of Lamont; Naomi Oreskes, on whether the change from continental drift to plate tectonics constituted an evolution, a revolution, or both; and William Glen, on a historian's lessons from Lamont, 1949–1999. Two speakers, Marie Tharp and William Glen, were unable to attend, so their papers were read by Friedman. Seeing and hearing these pioneers was a memorable experience.

Pardee Keynote Symposia, which are supported by a memorial fund honouring Joseph T. Pardee (1871–1960), a distinguished geologist and geomorphologist, have replaced the traditional division symposia. Only four to eight half-day, nonconcurrent symposia of invited speakers are authorised during each annual meeting. They are judged on the basis of excellence in addressing topics in a leading-edge scientific discipline, an area of public policy, concerns of global significance, or those requiring a broad interdisciplinary approach. The competition is fierce, so the Division can be proud to have been awarded a Pardee Symposium in 2000.

Three posters were displayed in a History of Geology poster session. One, by Dianne Baclawski, discussed 'The History and the Mystery: Frank Leverett, Stannard Bergquist, and the Legacy of Glacial Studies in Michigan'. A second, by Marie C. Johnson of Westpoint, illustrated 'Two Hundred Years of Iron Mining in the Hudson Highlands'; and the third, by James R. Hinthorne, reported on the earliest ion microprobe dating of zircon and other minerals.

For the GSA meeting in Boston in 2002 Sarah Newcomb, the Division chair, plans to hold a session on ophiolites and ultramafic rocks as problem and solution. The intention is to discuss the interactions of theory, fieldwork, and laboratory research relating to ophiolites over the past 200 years. Sarah will submit the ophiolite session for consideration as a Pardee Keynote Symposium. There also will be topical sessions, including one arranged by Michele Aldrich on 'Geobiography', and two history of geology field trips. Details may be found in the April 2001 issue of *GSA Today*.

In 2000, the History of Earth Sciences Society (HESS) became an Associated Society of the GSA through the joint efforts of Kennard Bork, the President of HESS, and Kenneth Taylor, Chair of the GSA History of Geology Division. Beginning in 2000, HESS will serve as a co-sponsor, with the History of Geology Division, of GSA sessions, including the Pardee Keynote Symposia. HESS will continue to publish *Earth Sciences History* and to seek an ever more international membership.

Kennard B. Bork received the Neil Miner Award, which is presented annually by the National Association of Geoscience Teachers to a teacher of college-level courses for his or her exceptional stimulation of interest in the earth sciences. Bork reports that he has just returned to Denison University after a sabbatical period performing research at the University of New Mexico (biography of William G. Tight, geologist and UNM President) in Albuquerque plus five weeks in Sedona, Arizona, during which he worked on book reviews and spoke at Columbia University's Biosphere 2. Last year, Bork continued on the editorial board of the 'Rock Star' project, initiated and supervised by Robert Ginsburg, of the University of Miami, Florida. Illustrated biosketches of famous geologists appear in *GSA Today* and are written in an effort to interest young readers in careers in earth science. In June, Bork attended the Geological Society of London's William Smith Symposium on the Age of the Earth and co-authored a report of the sessions with Martina Kölbl-Ebert. In August, he participated in a symposium on 'The History of Geologic Pioneers' convened by Gerald Friedman at the Northeastern Science Foundation in Troy, New York. The emphasis was on American pioneers, many of whom lived and worked in the general region of the meeting. Bork gave a talk on 'Kirtley F. Mather (1888–1978): A Pioneer in Petroleum Exploration, Educating the Public, and Political Activism'.

Publications

Bork Kennard B., 'Correspondence as a Window on the Development of a Discipline: Brongniart, Cleaveland, Silliman and the Maturation of Mineralogy in the First Decades of the Nineteenth Century', *Earth Sciences History*, 1999, 18, 44–91 (issued in 2000).

_____, Review of: F. Ellenberger, *History of Geology 2: the Great Awakening and its First Fruits, 1660–1810*. In: *The Journal of Geological Education*, 2000, 48, 717–718.

Review of: Carozzi, A.V., Crettaz, B., and Ripoll, D. (eds), *Les plis du temps, mythe, science et H.-B. de Saussure*. In: *ISIS*, 2000, 91, 362–363.

Kölbl-Ebert, Martina and Bork, K. B., Report on 'Celebrating the Age of the Earth: The William Smith Millennium Meeting' of the Geological Society of London (28–29 June 2000), *Episodes*, 2000, 23, 215–217.

Albert V. Carozzi's bilingual volume (English–French) entitled *Manuscripts and Publications of Horace-Bénédict de Saussure on the Origin of Basalt (1772–1797)* appeared as scheduled in June 2000 in Geneva, under the auspices of the University of Geneva and the Museum of Ethnography (see p. 38). Given its success, it was followed at the end of the year by a shorter version, which consisted of the anecdotal portion of de Saussure's account of his trips to Auvergne in relation to the origin of basalt entitled *Avec femme et enfants aux volcans d'Auvergne*. Carozzi reports making great progress on a trilingual volume (English, French, and Latin) dealing with the course taught by de Saussure on *Géographie physique* (introductory geology) in 1775. He will base this work on de Saussure's lecture notes and the class notes of his student Jacques-Louis Peschier.

Publications:

Carozzi, A.V., *Manuscripts and Publications of Horace-Bénédict de Saussure on the Origin of Basalt (1772–1797)—Manuscripts et Publications de Horace-Bénédict de Saussure sur l'Origine du Basalte (1772–1797)*, Editions ZOE, Geneva, 2000.

'Les manuscrits de Horace-Bénédict de Saussure: clé de sa personnalité et de sa véritable contribution à la géologie moderne', in: Jean-Claude Pont et Jan Lacki (eds), *Une cordée originale—histoire des relations entre science et montagne*, Editions Georg, Geneva, 2000, 27–41.

Carozzi, A.V. (ed.), *Saussure, H.-B.: avec femme et enfants aux volcans d'Auvergne*, Editions ZOE, Geneva, 2000, Minizoé Series, No. 48.

Robert H. Dott, Jr. writes: 'I have completed a long paper to be published in the *Bulletin of the Geological Society of America* (2001?) titled 'The Wisconsin Roots of the Modern Revolution in Structural Geology', which analyses the major impacts of the Van Hise–Leith–Mead dynasty upon our science. Recently I have been researching William H. Twenhofel's career for three different publications. Being a direct heir of the Wisconsin sedimentary geology tradition, which he created, I decided it was time I learned more about the man. My other principal project has been continuing with a colleague to write a Roadside Geology of Wisconsin, destined to be part of a Roadside Geology series of guides for laypeople. We hope to complete our writing during 2001.

'In November, my wife and I went to Paris and Bruges, Belgium, for two weeks with a son and his family. It was amusing to view Paris through the eyes of a three-year old; the catacombs and sewer museum were much more interesting for him than the Louvre, Orsay, or even the Eiffel Tower. I got a special thrill from visiting the Jardin des Plantes, that great scientific cradle for much of France's important 18th and 19th Centuries contributions to the natural sciences. Here were Buffon and Lamarck perched at either end of a central esplanade. And to the west were Cuvier's house and the Curies' lab. On the opposite side, was a geology museum with wonderful minerals and a palaeontology museum with dusty fossilised displays. We reached the gardens via Rue Geoffroy St. Hilaire and Rue Buffon, but could also have come via Rue Cuvier. Once inside, we strolled on walkways named for Brongniart, Haüy, and Becquerel.

'Geologically, I keep getting involved with a remarkable Cambrian fossil locality in a central Wisconsin quarry. Several years ago I helped interpret the environment for some excellent examples of the track called *Climactichnites*, which resembles a tire track. It is thought by paleontologists Ellis Yochelson and Mikhail Fedonkin (1993, *Smithsonian Contributions*) to have been formed by an extinct, giant slug-like animal. This enigmatic trace fossil was named in 1860 by Canadian geological pioneer William Logan. Charles Walcott was interested enough in it to have a collector acquire some specimens from Wisconsin in the 1880s. Recently hundreds of impressions of jellyfish medusae have turned up on a few sandstone layers in the same quarry. These medusoids must represent beach strandings of countless animals by onshore storm winds, which is consistent with the tropical latitude of Wisconsin during Cambrian time. Other geologic projects, which distract me from history, involve new research in the classic Baraboo district of Wisconsin, where some of the important Van Hise–Leith–Mead concepts of structural and metamorphic geology discussed in my pending GSA paper were developed during the early twentieth century.'

Leo Laporte's book, *George Gaylord Simpson, Paleontologist and Evolutionist* was published by Columbia University Press (see review p. 39).

Ursula Marvin presented an invited paper titled 'Geology: from Earth to Planetary Science in the 20th Century' in the INHIGEO Symposium at the IGC in Rio de Janeiro. Ten days after the Congress ended she attended the annual meeting of The Meteoritical Society in Chicago to begin taping interviews for an oral history project she is undertaking at the behest of the Society. As a first step she decided to interview those scientists, born no later than 1930, who have received one (or, very rarely, both) of the two prestigious medals that are awarded by the Meteoritical Society. Each of these individuals was sufficiently well-grounded in a career to be able to influence the directions taken in his or her chosen branch of science when the Space Age opened in 1957. Emphasis will be placed mainly on their evaluations of scientific accomplishments in their own specialties, and in the broad field of space science as a whole, rather than on their autobiographical recollections. The taped interviews will be published as a series of essays in the journal, *Meteoritics and Planetary Science*.

Publications

Marvin, Ursula B., 'The Meteoritical Society and Meteoritics and Planetary Science: Past and future [Guest Editorial]', *Meteoritics and Planetary Science*, 2000, 35, 4–5.

Citation for David R. Oldroyd for the History of Geology Award of the Geological Society of America, *GSA Today*, March 2000, 81, 28.

- _____ 'Historical Notes on Three Exceptional Iron Meteorites of Southern Africa: The Cape of Good Hope, Gibeon, and Hoba', in: Ludolf Schultz, Ian A. Franchi, Arch. M. Reid and Michael E. Zolenski, *Workshop on Extraterrestrial Materials from Cold and Hot Deserts*, LPI Contribution No. 997, 48–52.
- _____ Review of: Peter Day (ed.), *The Search for Extraterrestrial Life: Essays on Science and Technology*, Oxford University Press, 1998. In: *ISIS*, 2000, 91, 342–343.
- _____ 'Iron Meteorites and Controversies over the Origin of Erratic Boulders', *Eclogae geologicae Helvetiae*, 2000, 93, 25–31.
- _____ Review of: Michael R. Molnar, *The Star of Bethlehem: The Legacy of the Magi*, Rutgers University Press, 1999. In: *Meteoritics & Planetary Science*, 2000, 35, 1400–1402.
- Marvin, Ursula B., Wood, John A., and Campbell, Bruce A., Obituary of: Patricia Grizzaffi Rogers Campbell, 1963–2000. In: *Bulletin of the American Astronomical Society*, 2000, 32, 1657–1658. In her undergraduate years at Harvard, Patricia was a student of Marvin's and of Wood's.

Clifford Nelson completed a 15-month, half-time detail to assist the US Bureau of Land Management's history programme and finished three articles (on Clarence King, John Wesley Powell, the USGS) for publication in 2001 in Ari Hoogenboom's volume on the development of the industrial United States (1870–1900) in the Facts on File Encyclopedia of US history. USGS Circular 1179 (CD-ROM; see *INHIGEO Newsletter* 32, 76) was issued in a 1,000-disk pressing. Oxford University Press accepted a revised version of Nelson's article about Vincent E. McKelvey for posting in January 2001 in the *American National Biography Online*.

Publications

Nelson, Clifford M., 'Nolan, Thomas B.', *American National Biography Online*, June 2000.

_____ 'King of Diamonds, King of Hearts', *Cosmos Club Bulletin*, 2000, 53 (July/August), 23–25.

Naomi Oreskes has a book in progress with co-editor Homer Le Grand entitled: *Plate Tectonics: An Inside History*. It is a collection of historical memoirs and essays commissioned by the American Geophysical Union and will be published by Columbia University Press.

Publications

Oreskes, Naomi, 'Living with Uncertainty, Learning from Mistakes', Reply to Victor Baker and Mott Greene for their reviews of her book *The Rejection of Continental Drift*. In: *Earth Sciences History*, 2000, 18, 344–350.

Oreskes, Naomi and Fleming, James R. (eds), 'Perspectives on Geophysics', Special Issue of *Studies in the History and Philosophy of Modern Physics*, 2000, 31B.

Cecil Schneer writes that he has recently taken it on himself to provide historians of geology with access to a rare source book: William Smith's *Strata Identified* . . . He hopes to complete this in a reasonable time but meanwhile the beginning of the project is accessible at: <<http://www.unh.edu/esci/wmsmith.html>> and <www.unh.edu/esci/wmsmith.html>. The usefulness of this 'publication' would be enhanced if he could add a copy of Smith's single page 'Geological Table of British Organized Fossils in their Order of Superposition . . .'. For this he needs a good-quality digital image or a colour photograph. He asks if anyone knows of a possible source?

Cecil adds that it would really be great if those of us with access to this kind of material would try this new means of publication—no reviewers, no critics, no page charges! Of course if a journal or publisher were willing to put it into hardcopy, that would be all to the good.

Kenneth L. Taylor is spending a six-month sabbatical in Paris.

Ursula Marvin, Cambridge (Mass)

Venezuela (1998–2000)

The Venezuelan Society for the History of Geosciences continued the publication of its newsletter, with the following contents:

No. 63, April 1998

The Contributions of the British Geologists G.P. Wall and J.G. Sawkins to the Geology of Venezuela. (In 1860, those two geologists working in the island of Trinidad also made a general survey of some parts of Venezuela, producing the second modern geological map of the country.)

Exploration of Caves with Bat Guano Deposits during 1894 by the Engineer Juan de Dios Monserrate.

Notes on Geological Exploration in Western Venezuela in 1945 by the Swiss Geologist Peter Bitterli-Brunner.

Information Concerning the José Royo y Gúmez Collection in the National Geological Museum of Colombia.

No. 64, August 1999

'A Journey in Venezuela' by the German Ernst von Hesse Warteg is reproduced, translated into Spanish and accompanied by a study of the work.

Notes about the Earthquake of 1900 from the Diary of Mrs Lucila Luciani de Pérez-Díaz.

Facsimile Reproduction of the Works of German Geographer Wilhelm F. Sievers Concerning the Venezuelan earthquakes of 1894 and 1900.

Documentation of the Early Works (1826–1942) on the First New Mineral from Venezuela: Gaylussite.

No. 65, December 2000:

Summaries of the Geological and Mining Information from Government Memoirs from 1883 to 1994.

Notes of the Diary of Dr Peter Bitterli-Brunner during his Exploration of the Perij Range in 1945.

Romero González, Photographer of the Earthquake of 1894.

Catalogue of Mineralogical Samples from the Museum of Mérida.

Reproduction of the Graveyard Stones Texts from the Private Cemetery of a British Operated Copper Mine in Aroa, from 1836 to 1925.

No. 66, April 1999:

History of Lime Production in the Caracas Region during the 18th Century and some Recent Archaeological Investigations of the Furnaces.

Reproduction of Papers published in 1912 about Iron, Coal, and Asphalt Mines in Eastern and Southern Venezuela.

No. 67, August 1999:

Information Concerning the Installation of a Seismograph in the Jesuit 'San Ignacio High School' in Caracas.

Reproduction of an 18th-century Document about the Gold mines of Chacao in Central Venezuela.

No. 68, December 1999:

Chronology of Activities relating to Guacharo Cave in Eastern Venezuela from the Sixteenth Century to 1999.

Notes on a Film made of the Cumana Earthquake in 1929.

For further information about the Society, please write to: Sociedad Venezolana de Historia de las Geociencias, Apartado 47334, Caracas 1041A, Venezuela. Fax: 58 2 272 07 24. Email: <urbani@cantv.net>

Note The website for the Venezuelan Foundation for Seismological Research (FUNVISIS) is:

<<http://www.funvisis.org.ve>>.

Franco Urbani, Caracas

Yugoslavia

The most important event that happened in the country was radical change in the political situation. We expect a lot from those changes, especially in geology, which has been much neglected during the past decade.

The Group for the History of Geology started to work within the Serbian Geological Society. On the first meeting (31 January, 2000) there were three lectures: (1) A. Grubic on the foundation of the Serbian Geological Society; (2) V. Jovic on Leonardo da Vinci as geologist; and (3) I. Djokovic on the history of geological mapping in our country.

In July, the Museum of Natural History in Belgrade opened an exhibition with the title 'Mollusca'.

On 30 and 31 October there was a very successful meeting in Novi Sad on: 'Natural and Mathematical Sciences of Serbians from 1850 to 1918'. There were four lectures: (1) A. Grubic, 'Serbian Geology from 1850 to 1918'; (2) G. Jovanovic, 'The Importance of the Tertiary Collections of Petar Pavlovic in the Museum of Natural History in Belgrade'; (3) V. Jovic, 'The geological survey of the Serbian 'Society of Knowledge' from 1860'; (4) T. Milic-Babic, 'The Beginnings of the Petrological Collection in the Museum of Natural History in Belgrade'.

At the end of December, in a volume entitled *Lives and Work of Serbian Scientists*, the Serbian Academy of Sciences and Arts published 'Vladimir Dimitrijevic Laskarev (1868–1954)' by A. Grubic and N. Pantic.

Alexander Grubic, Belgrade

- Professor Walter O. Kupsch, Department of Geoscience, University of Saskatchewan 114 University Place, Saskatoon, Saskatchewan S7N 5E2, CANADA
Tel: 1 306 966 5696 **Fax:** 1 306 966 8593 **Email:** none
- Professor William A. S. Sarjeant, Department of Geological Sciences, University of Saskatchewan, 114 Science Place, Saskatoon, Saskatchewan S7N 5E2, CANADA
Tel: 1 306 966 5722 **Fax:** 1 306 966 8593 **Email:** william.sarjeant@usask.ca
- Mr David Spalding, 1105 Ogden Road, RR No. 1 Pender Island, British Columbia V0N 2M1, CANADA
Tel: 1 250 629 2047 **Fax:** 1 250 629 2047 **Email:** brandywine@gulfislands.com
- Dr Keith Tinkler, Department of Geography, Brock University, St. Catharines, Ontario L2S 3A1, CANADA
Tel: **Fax:** **Email:** ktinkler@spartan.ac.brocku.ca
- Dr Jian-Zhao YIN (CHINA Member), Suite 108, 2131 Pandora Street, Vancouver BC V5L 1N4, CANADA
Tel: 001 604 2145 1632 **Fax:** 001 604 2145 1632 **Email:** jianyin@attavista.com
- Professor Baoheng SHI, Science and Technology Development, Department CNCP, Liu Pu Kang, Beijing 100724, CHINA
Tel: 86 10 6209 4131 **Fax:** 86 10 6209 4384 **Email:** Chinangv@163.net
- Professor Gen Yuan WANG, CuiLu Jewellery, 1/F(S.) Yue Gang Commercial Centre, East Gate Shopping Mall, Shenzhen 518 001, CHINA
Tel: 86 755 239 7183 242 9451(H) **Fax:** 86 755 239 7233 **Email:** none
- Professor Hongzhen WANG, China University of Geosciences, Xueyuan Road 29, Beijing 100083, CHINA
Tel: 86 10 6231 3652 **Fax:** 86 10 6231 0897 **Email:** wwhongzhen@21cn.com
- Professor Jing-yi YANG, Institute for the History of Natural Science, Academia Sinica, 137 Chao Nei Avenue, Beijing 10010, CHINA
Tel: 86 10 6275 3887 **Fax:** **Email:** yang_jingyi@sina.com
- Professor Guangrong YANG, Research Section on History of Geology, China University of Geosciences (Beijing), 29 Xueyuan Road, Beijing 100083, CHINA
Tel: **Fax:** 86 10 8232 6368 **Email:** none
- Professor Yusheng ZHAI, China University of Geosciences (Beijing), 29 Xueyuan Road, Beijing 100083, CHINA
Tel: 86 10 8232 2650 **Fax:** 86 10 9232 2005 **Email:** yszhai@cugb.edu.cn
- Ms Jiuchen ZHANG, Institute for the History of Natural Science, Academia Sinica, 137 Chao Nei Avenue, Beijing 100010, CHINA
Tel: **Fax:** **Email:** jhbz@glc.cn.net
- Professor Armando Espinosa-Baquero, Universidad del Quindío, Facultad de Ingeniería, Armenia, COLOMBIA
Tel: 6745 2708 **Fax:** 6746 2563 **Email:** espinosa@armenia.multi.net.co
- Sr. Guillermo E. Alvarado, Section of Seismology and Seismic Engineering, Costa Rica Institute of Electricity, P.O. Box 10032, 1000 San José, COSTA RICA
Tel: 506 220 6394 **Fax:** 506 220 8212 **Email:** none
- Dr Josef Haubelt, Svojsovická 10/2834, Sporilov II, CZ-14100 Praha 4, CZECH REPUBLIC
Tel: 420 2 7176 2531 **Fax:** **Email:** fatka@prfdec.natur.cuni.cz
- Dr Jan Kozák, Geophysical Institute, Czech Academy of Science, Bocni 11/1401, 14131 Prague 4, CZECH REPUBLIC
Tel: 42 2 6710 3018 **Fax:** 42 2 7276 1549 **Email:** kozak@ig.cas.cz
- Professor Rudolf Musil, Dept. of Geology and Palaeontology, Masaryk-University, Kotlářská Street 2, 611 37 Brno, CZECH REPUBLIC
Tel: 42 6 4112 9255 **Fax:** 42 6 4121 1214 **Email:** Rudolf@gap.sci.muni.cz
- Dr Antonin Prichystal, Department of Geology and Palaeontology, Masaryk University, Kotlarska 2, CZ-611 37 Brno, CZECH REPUBLIC
Tel: 42 5 4112 9247 **Fax:** 42 5 4121 1214 **Email:** prichy@gap.sci.muni.cz
- Dr Jan Urban, Masarykova 580, 28401 Kutna Hora, CZECH REPUBLIC
Tel: **Fax:** **Email:** none

Dr Miloš Zárbynický, Za Chalupami 144, 150 00 Prague 5, CZECH REPUBLIC

Tel: 420 2 5791 1514

Fax: 420 2 5791 0031

Email: hornicka.matice@post.cz

Mr Tonu Pani, Vanemuise 46, Tartu 51014, ESTONIA

Tel: 372 7 375 839

Fax:

Email: tpani@ut.ee

Professor Geneviè Bouillet, 36 Boulevard de l'Avenir, F-18000 Bourgues, FRANCE

Tel:

Fax:

Email: none

Professor Michel Durand-Delga, 8 Rue Charles-Lefebvre, F77210 Avon, FRANCE

Tel: 33 1 6422 5559

Fax: 33 1 6422 5559

Email: r.bourrouilh@cibamar.u-bordeaux.fr

Dr Jean Gaudant, Sciences de la Terre, Université Paris 7, 2 Place Jussieu, Paris, Cedex 05, FRANCE

Tel: 33 1 4424 1133

Fax: 33 1 4427 8148

Email: gaudant@ipgp.jussieu.fr

Dr Gaston Goddard, UFR de Sciences de Terre, Université de Paris 7, 2 Place Jussieu, 75251 Paris Cedex 05, FRANCE

Tel: 33 1 4427 5191

Fax:

Email: gg@ccr.jussieu.fr

Dr Gabriel Gohau, 2 av. Bernard Palissy, 92 210 Saint Cloud, FRANCE

Tel: 33 1 4602 0097

Fax: 33 1 4046 0295

Email: none

M. Philippe Grandchamp, 5 rue du Coteau, 92370, Chaville, FRANCE

Tel: 33 1 4709 6465

Fax:

Email: phgrandchamp@aol.com

Professor Goulven Laurent, 5 rue Jean-Paul Sartre, 29200 Brest, FRANCE

Tel: 33 2 9805 4367

Fax: 33 2 9805 4367

Email: goulvenn@aol.com

Professor Philippe Taquet, Laboratoire de Paleontologie, 8 rue Buffon, Paris, 75005, FRANCE

Tel: 33 1 4079 3039

Fax: 33 1 4079 3580

Email: taquet@mnhn.fr

Dr Lydie Touret, Musée de Minéralogie, E.N.S.M.P., 60 bvd St Michel, 75006 Paris, FRANCE

Tel: 33 1 4051 9143

Fax: 33 1 4634 2596

Email: touret@musee.ensmp.fr

Professor Rudolf Daber, Humboldt-Universität, Naturkundemuseum, Invalidenstrasse 43, 10115 Berlin, GERMANY

Tel: 49 30 2093 8576

Fax: 49 30 2093 8561

Email: none

Dr Bernhard Fritscher, Diteramszellerplatz 7, D-81371 München, GERMANY

Tel: 49 89 723 4081

Fax: 49 89 2180 3162

Email: B.Fritscher@lrz.uni-muenchen.de

Professor Martin Guntau, Thomas-Müntzer-Platz 30, D-18 057 Rostock, GERMANY

Tel: 49 38 1201 8810

Fax: 49 38 1493 4604

Email: guntau@debitel.net

Dr Martina Koelbl-Ebert, Am Waldhang 18, 82205 Gilching-Geisenbrunn, GERMANY

Tel:

Fax:

Email: martina.koelbl@iaag.geo.uni-muenchen.de

Dr Peter Krueger, Bahnhofstrasse 27, D-13127, Berlin, GERMANY

Tel:

Fax:

Email: Krueger@aol.com

Dr Cornelia Lüdecke, Valleystrasse 40, D-81371 München, GERMANY

Tel: 49 89 725 6725

Fax: 49 89 725 6725

Email: C.Luedecke@lrz.uni-muenchen.de

Prof. Dr N.A. Rupke [NETHERLANDS Member], Institut fuer Wissenschaftsgeschichte, Goettingen University, Humboldtallee 11, D-37073 Goettingen, GERMANY

Tel: 49 551 399 467

Fax: 49 551 399 748

Email: nrupke@gwdg.de

Dr Wilfried Schröder, Geophysical Institute, Hechelstrasse 8, D-28777, Bremen-Roenebeck, GERMANY

Tel: 49 421 603 037

Fax: 49 421 603 037

Email: none

Professor Wolf von Engelhardt, Institut für Mineralogie, Petrologie und Geochemie, Universität Tübingen, Wilhelmstrasse 56, D-72074 Tübingen, GERMANY

Tel: 49 7071 297 6097

Fax: 49 7071 293 060

Email: wolf.von.engelhardt@uni-tuebingen.de

Dr Otfried Wagenbreth, Pfarrgasse 11, D-9200 Freiberg, GERMANY

Tel: 49 3731 247 073

Fax:

Email: none

- Dr Gabor Csíky, Arokto u. 3, H-1172 Budapest, HUNGARY
Tel: 36 1 2586 844 **Fax:** **Email:** None
- Mrs Irma Dobos, Margit krt 44, H-1027, Budapest, HUNGARY
Tel: 36 1 202 2741 **Fax:** **Email:** none
- Dr Endre Dudich, Karolyi M.u. 14/B iv.5, H 1053 Budapest, HUNGARY
Tel: 36 1 251 0109 **Fax:** 36 1 251 0703 **Email:** dudich@metavnet.hu
- Dr József Hála, Hungarian Geological Survey, Népstadion ut 14, Pf. 106, H 1442 Budapest XIV, HUNGARY
Tel: **Fax:** **Email:** none
- Dr Tibor Kecskemeti, Deputy Director-General, Hungarian Museum of Natural History, H-1431 Budapest, PO Box 137, HUNGARY
Tel: 36 1 338 3905/2728 **Fax:** 36-1 317 1669 **Email:** kecs@paleo.nhmus.hu
- Ms Teresa Póka, Laboratory for Geochemical Research, Hungarian Academy of Science, Budaörsi út 45, H-1112 Budapest, HUNGARY
Tel: **Fax:** 361 319 3137 **Email:** none
- Dr Peter Rozsa, Department of Geology and Mineralogy, University of Debrecen, H-4010, Debrecen Pf 40, HUNGARY
Tel: 36 52 447 474 (ext. 2311) **Fax:** **Email:** rozsap@tigris.klte.hu
- Dr Gy Vitális, Hungarian Geological Survey, Népstadion ut 14, Pf. 106, H 1442 Budapest XIV, HUNGARY
Tel: **Fax:** **Email:** none
- Dr Srinavas Madabhushi, AMSE WING, Geological Survey of India, Vasudha Bhanav, Bangalore, INDIA
Tel: **Fax:** **Email:** madabhu@satyam.net.in
- Professor Kotapalli S. Murty, 101 Sneh Chaya Apts, 28 Hindustan Colony Amaravti Road, Nagpur 440-010, INDIA
Tel: 91 712 557 984 **Fax:** 91 712 547 141 **Email:** ankush99_99@yahoo.com
- Professor Gordon L. Herries Davies, Ballinacloough House, Ballinacloough, Nenagh, County Tipperary, IRELAND
Tel: 353 673 2742 **Fax:** 353 673 2742 **Email:** none
- Dr Patrick N. Wyse Jackson, Geological Museum, Department of Geology, Trinity College, Dublin 2, IRELAND
Tel: 353 1 608 1477 **Fax:** 353 1 671 1199 **Email:** wysjcknp@tcd.ie
- Professor Paul Mohr, 83 Bothar na Mine, Salthill, Galway, IRELAND
Tel: 353 91 524 411 **Fax:** 353 91 524 850 **Email:** pmohr@indigo.ie
- Dr Dov Ginzburg, Geological Survey of Israel, 30 Malchei Yisrael St., 95 501 Jerusalem, ISRAEL
Tel: 972 2 14 251 **Fax:** 972 2 538 0668 **Email:** none
- Professor Dan Yaalon, Inst. of Earth Sciences, The Hebrew University, Jerusalem 91 904, ISRAEL
Tel: 972 2 570 4411 **Fax:** 972 2 566 2581 **Email:** Yaalon@vms.huji.ac.il
- Ms Imma Menditti, Via Torre 75, 80030 Scisciano, Napoli, ITALY
Tel: 39 338 278 3060 **Fax:** **Email:** immamenditti@infinito.it
- Professor Nicoletta Morello, Istituto di Storia Moderna e Contemp., University of Genoa, Via Balbi 6, 16126 Genova, ITALY
Tel: 39 010 353 8317 **Fax:** 39 010 209 9826 **Email:** Nicolmo@unige.it
- Professor G Giuliano Piccoli, Dipartimento di Geologia Paleontol. e Geofisica, Via Giotto 1, Padova University, I-35137 Padova, ITALY
Tel: 39 049 827 2050 **Fax:** 39 049 827 2070 **Email:** Piccoli@epidote.dmp.unipd.it
- Dr Claudia Principe, Area della Ricerca, CNR di Pisa San Cataldo, Via V. Alfieri 1, 56010 Ghezzano, ITALY
Tel: 39 050 315 2355/6 **Fax:** 39 050 315 2360 **Email:** C.Principe@iggi.pi.cnr.it
- Dr Ezio Vaccari, Centro di Studio sulla Storia della Tecnica (CNR), Via Balbi 6, 12126 Genova, ITALY
Tel: 39 010 246 5459 **Fax:** 39 010 209 9826 **Email:** ezio.vaccari@lettere.unige.it
- Professor Isao IMAI, 9-5-805 Sakana-cho, Morioka 020 0878, JAPAN
Tel: 81 196 25 8327 **Fax:** **Email:** none

Professor Toshio KUTSUKAKE, Laboratory of Geological Sciences, College of General Education, Aichi University,
Toyohashi 441, JAPAN

Tel: 81 532 47 4111 **Fax:** **Email:** kutukake@vega.aichi-u.ac.jp

Professor Hakuyu OKADA, 4-8-36-601 Yoshizuka, Hakata-ku, Fukuoka 812, JAPAN

Tel: 81 92 623 8161 **Fax:** **Email:** hokada@bb.mbn.or.jp

Professor Masae OMORI, 3-32-5 Sakujii-di, Nerima-ku, 177-0045, Tokyo, JAPAN

Tel: 81 3 3984 1226 **Fax:** 81 3 3996 2341 **Email:** geoplanning@ozone.total.co.jp

Dr Daikichiro SHIMIZU, 48 Tanaka-nishihinokuchi, Sakyo-ku, Kyoto 606, JAPAN

Tel: 81 75 701 4652 **Fax:** 81 75 701 4699 **Email:** None

Dr Gerardo J. Soto [COSTA RICA Member], Kotokuji-dai 5-1-16-24, Kagoshima-shi, 891-0103, JAPAN

Tel: 81 99 264 4446 **Fax:** 81 99 257 2730 **Email:** none

Professor Kanenori SUWA, 1-1020 Umemori-zaka, Meito-ku, Nagoya 465-0065, JAPAN

Tel: 81 52 701 0457 **Fax:** 81 52 701 0457 **Email:** Suwa@handy.n-fukushi.ac.jp

Professor Yasumoto SUZUKI, Geothermal Energy Research & Dev. Co. Ltd., Kyodo Building, 11-7, Kabuto-cho,
Nihonbashi, Chuo-ku, Tokyo 103-0026, JAPAN

Tel: 81 3 3666 5822 **Fax:** 81 3 3666 5289 **Email:** suzuki@gerd.co.jp

Professor Kenzo YAGI, 2-5-10 Moiwashita, Minami-ku, Sapporo 005-0040, JAPAN

Tel: 81 11 581 1473 **Fax:** 81 11 581 1473 **Email:** none

Dr Michiko YAJIMA, Tokyo Seitoku Gakuen, 8-26-9 Toshima, Kita-ku, Tokyo 114-0003, JAPAN

Tel: 81 3 3812 7039 **Fax:** 81 3 3812 7039 **Email:** PXI02070@nifty.ne.jp

Mr Toshihiro YAMADA, 4-4-2-908 Takasu, Mihama-ku, Chiba, 261-0004, JAPAN

Tel: 81 43 279 7094 **Fax:** 81 43 279 7094 **Email:** tosmak-yamada@muf.biglobe.ne.jp

Dr George Zammit-Maempel, 148 Triq San Frangisk, Hal Balzan BZN 07, MALTA

Tel: 356 442 204 **Fax:** **Email:** nibmike@maltanet.net

Mr Alan Mason, 75-A Argyle St., Herne Bay, Auckland 1002, NEW ZEALAND

Tel: 64 9 378 6981 **Fax:** **Email:** none

Professor J. B. Waterhouse, 25 Avon Street, Oamaru, NEW ZEALAND

Tel: **Fax:** **Email:** loris@xtra.co.nz

Professor Geir Hestmark, University of Oslo, Department of Biology, Blindern Postboks 1066, N-0315 Oslo, NORWAY

Tel: 47 2 45 5050 **Fax:** 47 2 285 4664 **Email:** geir.hestmark@bio.uio.no

Dr Stanislaw S. Czarniecki, Zespól Pracowni ZNG PAN, ul. Senacka 3, Kracow, POLAND

Tel: **Fax:** **Email:** micku@poczta.onet.pl

Dr Jadwiga Garbowska, Museum of the Earth PAN, A. Na Skarpie 20/26, 00-488 Warszawa, POLAND

Tel: **Fax:** **Email:** none

Professor Wojciech Narebski, Muzeum Ziemi PAN, Collegium Geologicum UJ, ul. Oleandry 2a, 30-063 Krakow, POLAND

Tel: **Fax:** **Email:** narebski@geos.ing.uj.edu.pl

Professor Janusz Skoczylas, Inst. of Geology, Uniwerytet im. Adama Mickiewicza, ul. Maków Polnych 16, 61-606 Poznan,
POLAND

Tel: 48 61 8257 332 **Fax:** 48 61 8257 845 **Email:** skocz@amu.edu.pl

Dr Zibigniew Wojcik, Muzeum Ziemi Polska, Akademia Nank al na Skarpie 20/26, Warszawa, POLAND

Tel: **Fax:** **Email:** none

Professor Dr João Luís Cardoso, Universidade Aberta, Palacio de Ceia, R. Escola Politecnica n. 147, 1200-1000 Lisboa,
PORTUGAL

Tel: **Fax:** **Email:** mta@mail.fct.unl.pt

Professor Antonio Augusto Soares de Andrade, Dept Geociencias, Universidade de Aveiro, 3810-Aveiro, PORTUGAL

Tel: 351 34 370 747 **Fax:** 351 34 370 605 **Email:** asandrade@geo.ua.pt

Mr Christer Nordlund, Department of Historical Studies, History of Science and Ideas, University of Umea, S-90187 Umea, SWEDEN

Tel: 46 90 786 9733

Fax: 46 90 143 374

Email: christer.nordlund@histstud.umu.se

Dr Bjorn Sundquist, Falkvagen 2, SE-75756 Uppsala, SWEDEN

Tel: 46 18 421 282

Fax: 46 18 420 684

Email: bjorn.sundquist@swipnet.se

Professor Henri Masson, Institut de Géologie, BFSH2 Université de Lausanne, CH-1015 Lausanne, SWITZERLAND

Tel:

Fax: 41 21 692 4305

Email: henri.masson@igp.unil.ch

Dr Nazario Pavoni, Sonnenbergstrasse 11, CH-8134, Adliswil, SWITZERLAND

Tel: 41 1 710 6689

Fax: 41 1 710 6689

Email: none

Professor Dr Jean-Paul Schaer, Jopèsses 6, 2036 Cormondreche, Neuchâtel, SWITZERLAND

Tel: 41 32 731 5264

Fax: 41 38 718 2601

Email: jean-paul.schaer@geol.unine.ch

Dr Marc Weidmann, Sentier du Molard 3, CH-1085, Jongny, SWITZERLAND

Tel: 41 21 922 9675

Fax: 41 21 922 9675

Email: weidmann-dutoit@bluewin.ch

Dr Emile den Tex, Rhijnvreugd 9, 2382 BG, Zoeterwoude, THE NETHERLANDS

Tel: 31 71 541 0110

Fax: 31 71 568 7666

Email: none

Professor Dr Jacques Touret, Faculteit der Aardwetenschappen, Vrije Universiteit, De Boelelaan 1085, 1081 HV Amsterdam, THE NETHERLANDS

Tel: 31 20 444 7270

Fax: 31 20 646 2457

Email: Touj@geo.vu.nl

Professor Emeritus Frederik R. van Veen, Dobbelmannduin 38, 2202 EA, Noordwijk, THE NETHERLANDS

Tel: 31 71 364 6696

Fax: 31 71 364 6707

Email: fr.vanveen@wolmail.nl

Professor A. M. C. Sengör, I.T.U. Maden Fakultasi, Jeoloji Muhendisligi Bolumu, Ayazaga 80 626 Istanbul, TURKEY

Tel: 90 216 332 0856

Fax: 90 242 285 6210

Email: Sengor@itu.edu.tr

Professor Gordon Y. Craig, Grant Institute of Geology, University of Edinburgh, West Mains Road, Edinburgh EH9 3JW, UNITED KINGDOM

Tel: 44 131 663 8275

Fax: 44 131 663 8275

Email: gcraig@kevoock.demon.co.uk

Dr Trevor D. Ford, 21 Elizabeth Drive, Oadby, Leicester LE2 4RD, UNITED KINGDOM

Tel: 44 1116 271 5265

Fax:

Email: none

Dr John Fuller, 2 Oak Tree Close, Rodmell Road, Tunbridge Wells, Kent TN2 5SS, UNITED KINGDOM

Tel:

Fax: 44 1989 253 4644

Email: none

Dr Andrew Grout, 30 Lutton Place, Edinburgh EH8 9PG, UNITED KINGDOM

Tel:

Fax:

Email: agg@geo.ed.ac.uk

Dr Beryl M. Hamilton, Orlig, Kirk Road, New Galloway, Dumfries and Galloway DG7 3RS, UNITED KINGDOM

Tel: 44 1644 420 200

Fax: 44 1644 420 200

Email: BERYLHAMILTON@cs.com

Professor Richard Howarth, 49 Selwyn Avenue, Richmond, Surrey, TW9 2HB, UNITED KINGDOM

Tel: 44 20 8332 7835

Fax: 44 20 8332 7835

Email: r.howarth@ucl.ac.uk

Dr Simon Knell, Department of Museum Studies, University of Leicester, 105 Princess Street, Leicester LE1 7LG, UNITED KINGDOM

Tel: 44 116 252 3963

Fax: 44 116 252 3960

Email: sjk8@le.ac.uk

Dr Cherry Lewis, Wells Cottage, 21 Fowler Street, Macclesfield, Cheshire SK10 2AN, UNITED KINGDOM

Tel: 44 1625 260 049

Fax: 44 1625 260 049

Email: clelewis@aol.com

Professor Martin J. S. Rudwick, Department of History and Philosophy of Science, University of Cambridge, Free School Lane, Cambridge CB2 3RH, UNITED KINGDOM

Tel: 44 207 837 9283

Fax: 44 207 837 9283

Email: mjsr100@cus.cam.ac.uk

Dr James Secord, Department of History and Philosophy of Science, The University of Cambridge, Free School Lane, Cambridge CB2 3RH, UNITED KINGDOM

Tel: 44 1223 334 544

Fax: 44 1223 334 554

Email: jas1010@cam.ac.uk

- Mr Christer Nordlund, Department of Historical Studies, History of Science and Ideas, University of Umea, S-90187 Umea, SWEDEN
Tel: 46 90 786 9733 **Fax:** 46 90 143 374 **Email:** christer.nordlund@histstud.umu.se
- Dr Bjorn Sundquist, Falkvagen 2, SE-75756 Uppsala, SWEDEN
Tel: 46 18 421 282 **Fax:** 46 18 420 684 **Email:** bjorn.sundquist@swipnet.se
- Professor Henri Masson, Institut de Géologie, BFSH2 Université de Lausanne, CH-1015 Lausanne, SWITZERLAND
Tel: **Fax:** 41 21 692 4305 **Email:** henri.masson@igp.unil.ch
- Dr Nazario Pavoni, Sonnenbergstrasse 11, CH-8134, Adliswil, SWITZERLAND
Tel: 41 1 710 6689 **Fax:** 41 1 710 6689 **Email:** none
- Professor Dr Jean-Paul Schaer, Jopèsses 6, 2036 Cormondreche, Neuchâtel, SWITZERLAND
Tel: 41 32 731 5264 **Fax:** 41 38 718 2601 **Email:** jean-paul.schaer@geol.unine.ch
- Dr Marc Weidmann, Sentier du Molard 3, CH-1085, Jongny, SWITZERLAND
Tel: 41 21 922 9675 **Fax:** 41 21 922 9675 **Email:** weidmann-dutoit@bluewin.ch
- Dr Emile den Tex, Rhijnvreugd 9, 2382 BG, Zoeterwoude, THE NETHERLANDS
Tel: 31 71 541 0110 **Fax:** 31 71 568 7666 **Email:** none
- Professor Dr Jacques Touret, Faculteit der Aardwetenschappen, Vrije Universiteit, De Boelelaan 1085, 1081 HV Amsterdam, THE NETHERLANDS
Tel: 31 20 444 7270 **Fax:** 31 20 646 2457 **Email:** Touj@geo.vu.nl
- Professor Emeritus Frederik R. van Veen, Dobbelmannduin 38, 2202 EA, Nordwijk, THE NETHERLANDS
Tel: 31 71 364 6696 **Fax:** 31 71 364 6707 **Email:** fr.vanveen@wolmail.nl
- Professor A. M. C. Sengör, I.T.U. Maden Fakültesi, Jeoloji Muhendisligi Bolumu, Ayazaga 80 626 Istanbul, TURKEY
Tel: 90 216 332 0856 **Fax:** 90 242 285 6210 **Email:** Sengor@itu.edu.tr
- Professor Gordon Y. Craig, Grant Institute of Geology, University of Edinburgh, West Mains Road, Edinburgh EH9 3JW, UNITED KINGDOM
Tel: 44 131 663 8275 **Fax:** 44 131 663 8275 **Email:** gcraig@kevoock.demon.co.uk
- Dr Trevor D. Ford, 21 Elizabeth Drive, Oadby, Leicester LE2 4RD, UNITED KINGDOM
Tel: 44 1116 271 5265 **Fax:** **Email:** none
- Dr John Fuller, 2 Oak Tree Close, Rodmell Road, Tunbridge Wells, Kent TN2 5SS, UNITED KINGDOM
Tel: **Fax:** 44 1989 253 4644 **Email:** none
- Dr Andrew Grout, 30 Lutton Place, Edinburgh EH8 9PG, UNITED KINGDOM
Tel: **Fax:** **Email:** agg@geo.ed.ac.uk
- Dr Beryl M. Hamilton, Orlig, Kirk Road, New Galloway, Dumfries and Galloway DG7 3RS, UNITED KINGDOM
Tel: 44 1644 420 200 **Fax:** 44 1644 420 200 **Email:** BERYLHAMILTON@cs.com
- Professor Richard Howarth, 49 Selwyn Avenue, Richmond, Surrey, TW9 2HB, UNITED KINGDOM
Tel: 44 20 8332 7835 **Fax:** 44 20 8332 7835 **Email:** r.howarth@ucl.ac.uk
- Dr Simon Knell, Department of Museum Studies, University of Leicester, 105 Princess Street, Leicester LE1 7LG, UNITED KINGDOM
Tel: 44 116 252 3963 **Fax:** 44 116 252 3960 **Email:** sjk8@le.ac.uk
- Dr Cherry Lewis, Wells Cottage, 21 Fowler Street, Macclesfield, Cheshire SK10 2AN, UNITED KINGDOM
Tel: 44 1625 260 049 **Fax:** 44 1625 260 049 **Email:** clelewis@aol.com
- Professor Martin J. S. Rudwick, Department of History and Philosophy of Science, University of Cambridge, Free School Lane, Cambridge CB2 3RH, UNITED KINGDOM
Tel: 44 207 837 9283 **Fax:** 44 207 837 9283 **Email:** mjsr100@cus.cam.ac.uk
- Dr James Secord, Department of History and Philosophy of Science, The University of Cambridge, Free School Lane, Cambridge CB2 3RH, UNITED KINGDOM
Tel: 44 1223 334 544 **Fax:** 44 1223 334 554 **Email:** jas1010@cam.ac.uk

- Professor Hugh S. Torrens, Department of Earth Sciences, Keele University, Staffordshire, ST5 5BG, UNITED KINGDOM
Tel: 44 1782 750 689 **Fax:** 44 1782 751 357 **Email:** gga10@Keele.ac.uk
- Professor Kennard B. Bork, Department of Geology and Geography, Denison University, Granville, OH 43023, UNITED STATES
Tel: 1 740 587 6486 **Fax:** 1 740 587 6417 **Email:** bork@cc.denison.edu
- Professor Albert V. Carozzi, Department of Geology, University of Illinois, NHB 245 301 W. Green Street, Urbana, IL 61801-2999, UNITED STATES
Tel: 1 217 333 3540 **Fax:** 1 217 244 4996 **Email:** acarozzi@hercules.geology.uiuc.edu
- Professor Robert H. Dott Jr., Department of Geology and Geophysics, Weeks Hall University of Wisconsin, 1215 West Dayton St., Madison, WI 53706, UNITED STATES
Tel: 1 608 262 8960 **Fax:** 1 608 262 0693 **Email:** RDott@geology.wisc.edu
- Léo F. Laporte, 430 Nimitz Avenue, Redwood City, CA 94061 4226, UNITED STATES
Tel: 1 650 364 3386 **Fax:** **Email:** laporte@cats.ucsc.edu
- Dr Ursula B. Marvin, Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, MA 02138, UNITED STATES
Tel: 1 617 495 7270 **Fax:** 1 617 495 7001 **Email:** umarvin@cfa.harvard.edu
- Dr Clifford M. Nelson, US Geological Survey, 950 National Center, VA 22611-9740, Reston VA 201-0001, UNITED STATES
Tel: 1 703 648 6080 **Fax:** 1 703 648 6373 **Email:** cnelson@usgs.gov
- Associate Professor Naomi Oreskes, Department of History, University of California at San Diego, La Jolla, CA 92093, UNITED STATES
Tel: 1 619 534 1996 **Fax:** 1 619 534 7283 **Email:** noreskes@ucsd.edu
- Professor Alexander M. Ospovat, 2131 Arrowhead Drive, Stillwater OK 74074, UNITED STATES
Tel: 1 405 377 8448 **Fax:** **Email:** ospovat_osu@ionet.net
- Professor Cecil J. Schneer, River Road, Newfields, NH 03856-0181, UNITED STATES
Tel: 1 603 772 4597 **Fax:** 1 603 862 2649 **Email:** cjs1@hopper.unh.edu
- Professor Kenneth L. Taylor, Department of the History of Science, University of Oklahoma, Norman, OK 73019-0315, UNITED STATES
Tel: 1 405 325 5416 **Fax:** 1 405 325 2363 **Email:** KTaylor@uo.edu
- Dr José Antonio Rodríguez Arteaga, FUNVISIS Earth Sciences Department, Urbanizacion El Llantino, Calle Mara Apartado Postal 76880, Caracas 1070-A, VENEZUELA
Tel: 58 2 257 7153/9346 **Fax:** 58 2 257 9977 **Email:** jarteaga@cantv.net
- Dr Aníbal R. Martínez, Departamento de Ciencias de la Terra, Urbanizacion El Llantino, Prolongacion Calle Mara, 1070-A Caracas, VENEZUELA
Tel: 58 2 908 2411 (ext. 3445) **Fax:** 58 2 908 3349 **Email:** martinezan@pdvsa.com
- Professor Franco A. Urbani, Universidad Central de Venezuela, Apartado 47028, Caracas 10411A, VENEZUELA
Tel: 58 2 693 0927 **Fax:** 58 2 693 0927 **Email:** urbani@cantv.net
- Professor Aleksandar Grubic, Rudarsko-Geoloski Fakultet, Djusina 7, 11001 Beograd, YUGOSLAVIA
Tel: 99 38 11 402 707 **Fax:** 99 38 11 631 137 **Email:** grubic@infosky.net

It is requested that contributors to the *INHIGEO Newsletter* kindly use the following conventions for references.

For books:

Author(s) or editor(s), *Full Title and Subtitle [Capitalized and Italicized]*, Publisher(s), Place(s) of publication, date.

Please place a colon between the title and the sub-title.

E.g.

Foster, Mike, *Strange Genius: The Life of Ferdinand Vanderveer Hayden*, Roberts Rinehart Publishers, Niwor (Colorado) and Schull (West Cork), 1994.

For journal articles:

Author(s), 'Title [Capitalized]', *Journal Title [Not Abbreviated, Capitalized, Italicized]*, date, *Volume number [italicized]*, page numbers.

E.g.

Rudwick, Martin, 'Cuvier and Brongniart, William Smith, and the Construction of Geohistory', *Earth Sciences History*, 1996, 15, 25-36.

(Note that volume numbers only, not issue numbers, are needed.)

For chapters in books:

Author(s), 'Title [Capitalised]', in: Book editor(s), *Full Title and Subtitle [Capitalized and Italicized]*, Publisher, Place, date, page numbers.

E.g.

Briggs, John C., 'Mass Extinctions: Fact or Fallacy?', in: William Glen (ed.), *The Mass-Extinction Debates: How Science Works in a Crisis*, Stanford, Stanford University Press, 1994, 230-236.

For book reviews:

Author of review. Review of: Author of Book, *Title of Book*, Publisher, Place of publication, date. In: *Title of Journal*, date, *Volume number*, pages.

E.g.

Sarjeant, William A.S. Review of: Jerry MacDonald, *Earth's First Steps: Tracking Life Before the Dinosaurs*, Johnson Books, Boulder (Colorado), 1994. In: *Earth Sciences History*, 1996, 15, 84-85.

Please use single inverted commas.

Please do NOT make ANY abbreviations; and do NOT capitalise the names of persons (except in the case of Chinese or Japanese names, where capitalisation of family names is helpful). In articles and reports, etc., please supply 'given' ('Christian') names where possible, and (as a general guideline) use them in the main body of a text for their FIRST mention ONLY. Thereafter, just give the family name, without the given name(s) or initial(s).