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Philosophy of Sciences**

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

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CONTENTS

THE INHIGEO BOARD	1
REPORTS	
President's Message	1
Secretary-General's Report	2
Minutes of the INHIGEO Business Meeting, Lisbon, 2001	3
Geoarchives: Progress Report 3	5
Preserving the Records of Modern Science	8
EPISODES	9
INHIGEO BUSINESS MEETING, PARIS, 2002: AGENDA	9
CONFERENCE AND EXHIBITION REPORTS	
'Geological Resources and History', Portugal, by Richard Howarth	9
International Congress on the History of Science, Mexico, 2001, by Silvia Figueirôa and Cornelia Lüdecke	12
The German Commission for History of Geophysics, Cosmical Physics, and Space Physics, by Wilfried Schröder	13
<i>Universitas Antarctica</i> —An Exhibition on the Occasion of the Centennial of the first German Southpolar Expedition (1901–03), by Cornelia Lüdecke	13
International Association of Geomagnetism and Aeronomy (IAGA) and International Association of Seismology and Physics (IASPEI), Hanoi, 2001, by David Oldroyd	14
SHORT ARTICLES	
The Elevated Land: Science, Land Elevation and the Formulation of a Swedish Past, 1860–1930, by Christer Nordlund	17
Hans Conrad Escher von der Linth (1767–1823) and Johann Gottfried Ebel (1764–1830): Two Representatives of the Early Epoch of Alpine Geology in Zürich, by Nazario Pavoni	21
AWARD	
Walter Oscar Kupsch: Citation for the 2001 History of Geology Divisional Award, Geological Society of America, by Glen Caldwell	22
IN MEMORIAM	
Dr Gábor Csiky (1915–2001), by Endre Dudich	23
INTERVIEW WITH URSULA MARVIN: Kenneth Taylor	23
FORTHCOMING MEETINGS AND EXHIBITIONS	29
BOOK REVIEWS	
'Dating the Earth', by Ursula Marvin	32
'Minuter Details of the Plate Tectonics Revolution, by David Oldroyd	35
'Completion of Walcott's Biography', by William Sarjeant	37
'On the History of the Central Institution of Meteorology and Geodynamics at Vienna, 1851–2001', by Cornelia Lüdecke	38
'On the History of Geophysics', by Cornelia Lüdecke	38

‘Willem Antoon Jozef Maria van Waterschoot van der Gracht’s Distinguished Career’, by Jacques Touret	39
‘Alexander Vasilievich Koltchak: Arctic Explorer’, by Igor Resanov	40
‘Moles and Eagles: An Earthy View of the Origins of British Geology’, by David Corbett	41
‘The Heat of the Earth’, by William Sarjeant	42
‘More Dating of the Earth’, by David Branagan	43
‘On-going Controversies about Vladimir Ivanovich Vernadsky’ by Eugene Krasnov	45
‘The Controversial Prophet of Living Matter: V.I. Vernadsky’, by Endre Dudich	46
‘Homage to Lamarck’, by David Oldroyd	48
NOTES AND QUERIES	50
PUBLICATIONS RECEIVED	55
COUNTRY REPORTS	
Australia	58
Austria	59
Bolivia	62
Brazil	63
Canada	64
China	66
Costa Rica	66
Czech Republic (Prague)	67
Czech Republic (Brno)	68
France	68
Germany	69
Hungary	70
Ireland	71
Israel	72
Italy	72
Japan	74
New Zealand	75
Poland	76
Portugal	77
Russia	78
Spain	79
Sweden	81
Switzerland	81
United Kingdom	81
United States	82
Yugoslavia	85
INHIGEO HONORARY SENIOR MEMBERS	85
INHIGEO MEMBERS	86

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>

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>

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>

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>

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>

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: <nicoletta.morello@lettere.unige.it>

REPORTS

President's Message

1. May I start this address expressing my deep gratitude to those INHIGEO members who in 2001 gave an extraordinary contribution to the visibility of the Commission, being the authors of so many important published or prepared books and papers on the History of Geological Sciences (HOGS), as described in the present *Newsletter*. They are to be congratulated; and of course the Commission, benefiting heavily from such activities in terms of prestige, is also to be congratulated. Encouraging the publication of works on HOGS being one of its overall objectives, I believe that in 2001 such objective was amply fulfilled. Let us hope that such momentum does not diminish and that, on the contrary, 2002 sees an increase in the quantity of published material with a similar level of quality, at least.
2. In 2001 the number of INHIGEO members reached 171 (we were 159 in 2000) from 37 countries (against 36 in the previous year). That is good, meaning that the Commission has appeal and has become 'more international'. But let us not forget once again that in 1996 the number of countries was 40, that the European and North American countries have quite an imbalance in terms of membership and that there is no representation in the Commission of several countries, such as Mozambique and Tunisia, where it is known that there are historians of Geological Sciences.

This is particularly unfortunate as far as African countries are concerned, although some progress has been made in this respect. Efforts have also been made by the Board to recruit new members in Latin America, although not following the appropriate track, according to some members (see letter from Silvia Figueirôa in 'Notes and Queries' in the present *Newsletter*).

Let us not forget, also, that INHIGEO needs 'fresh blood', meaning that it should be able to attract and incorporate good historians of the geological sciences young enough to lower the average age of the members as a whole. Although some progress has been made here, the problem is still complex and related to a number of

questions. For instance, the statutory requirement of each country not being allowed to have more than eleven members is probably a topic that needs discussion, given the political changes seen today in many parts of the world. Some measures have been taken to minimise such difficulties, the effects of which will be eventually seen from 2002 onwards.

The problem is also related to the possibility of an increase in the number of young members being made at the expense of image, a recurrent issue still not solved (see last year Report of the General-Secretary and letter from Silvia Figueirôa).

3. The 2001 INHIGEO meeting was held in Portugal (see review by Richard Howarth on pp. 9–12 and references in the Secretary-General's Report) and the procedures for the publication of the proceedings were initiated, according to the organisers.

In the course of the business meeting held in Lisbon, eyes turned as usual to future meetings: Paris (2002), Ireland (2003), Florence (2004) and China or the Czech Republic (2005). Let us hope that some members will come up soon with an offer to organise the 2006 meeting since 2006 is only four years away! The importance of holding meetings can never be fully pointed out: it is another of the overall objectives of INHIGEO.

Contacts have been made with the IUGS about the interest and feasibility of a couple of projects in which INHIGEO could eventually be involved—one related to the history of IUGS and another to the history of the International Geological Congresses—the subject being still under discussion.

After the business meeting in Portugal, where the idea of a book on the history of the geology of Africa was talked about, IUGS was also approached about its interest on the subject. The appeal made in last year *Newsletter* to all interested members for an exchange of views between them and the Board on that is here made again.

Other matters about what the Board would like to exchange views with the members are, in brief:

Should INHIGEO actively promote a programme of English translations of books on the HOGS?

Should INHIGEO have a journal of its own?

How could INHIGEO act to promote more intensively the interest of institutions (and individuals!) in the preservation and study of their gearchives?

Should INHIGEO try to promote the interest of universities in HOGS?

Should the *Newsletter* be on the Web?

4. The IUHPS, with which INHIGEO is affiliated, held its Congress in 2001 in Mexico, Drs Figueirôa and Lüdecke acted as proxy representatives of the Commission at the Council Meeting in Mexico City, for which many thanks are due to them.

The reasons why INHIGEO was not able to participate in the Congress were reported to the IUHPS in advance, and were understood and accepted (see the Secretary-General's Report).

5. INHIGEO received in 2001 financial support from IUGS and from IUHPS (see Report of the General-Secretary) and many thanks are due to both Unions for that. Unfortunately what was received was not enough to cover the needs of all the members who asked the Board for travel funds.

I should like to stress the fact that the activities of the members of the Board are supported in several ways by the Institutions where they work and so such institutions certainly deserve a word of gratitude from INHIGEO that I gladly leave here as a final note.

Manuel S. Pinto, Aveiro

Secretary-General's Report

The ballot held during 2001 was ratified at the Business Meeting of the Commission, held in Portugal, with all persons on the ballot sheet duly being elected. That election was 'supernumerary', and another one is being held in 2002, details appearing in the sheets mailed with this *Newsletter*. Reports on the Business Meeting and the Portugal Conference appear on pages 3 and 9 respectively. It is anticipated that the ballot results for 2002 will be ratified at the Paris meeting in July, 2002. The new Members elected in 2001 are welcomed to the Commission.

At the 2001 Business Meeting, I drew attention to the fact that all membership positions were filled in some countries. Partly in response to this situation, it was determined that a category of Honorary Senior Membership be established. Honorary Membership would require the decision of a Business Meeting, and, of course, acceptance from the person concerned. Arising from this decision, the following persons have been made Honorary Senior Members: Walter Kupsch (Canada); Emile den Tex (Netherlands); Rudolf Trümpy (Switzerland); and Alexander Ospovat (USA). The Honorary Senior Members no longer have the obligation to vote at the Commission's elections, but will (if they so wish) continue to receive the *Newsletter* and associated notices of meetings. As a result of a resignation and a move to an honorary membership, it has been possible to propose new Members for the USA and the UK.

At the Freiberg Meeting (1999), I was charged with editing the historical papers presented at the Rio Congress (2000) on major contributions to geology in the twentieth century, along with some invited papers, as a Special Publication of the Geological Society of London. Inevitably, that task proved quite arduous, but it was successfully completed and the book *The Earth Inside and Out: Some Major Contributions to Geology in the Twentieth Century* was published as SP No. 192 in March, 2002. I am taking the liberty of enclosing a cover of the book with this *Newsletter* for promotional purposes. This seems a 'not inappropriate' thing to do, as the volume is, in origin, an INHIGEO volume. It is, admittedly, an expensive book. Nevertheless, I hope Members will want to buy it, or at least encourage their institutional or local libraries to do so. At the same time, I am also enclosing a cover, or a flier, to advertise SP No. 190 (*The Age of the Earth: 4004 BC to 2002 AD*),

edited by UK Members Cherry Lewis and Simon Knell. This represents the papers presented at an important meeting held in London in June, 2000, organised by the editors and others, with contributions from several INHIGEO Members. This book is highly recommended, with its comprehensive coverage of the history of ideas about the age of the Earth, and methods of ascertaining this.

Also on the matter of publications, regarding the Classic Papers series for *Episodes*, we are in rather urgent need of contributions. Please see the notice about this on p. 9. The Proceedings of the Conference in Portugal are being edited by Professor Pinto and should appear in 2002. Members will have received the booklet on a bibliography of the geology of the Canary Islands, prepared by Spanish Member, Candido Cruz.

I am pleased to be able to say that the *Proceedings* of the Werner Symposium, held in Freiberg are to be published in German and English shortly, probably in May 2002, according to a recent message from Professor Helmuth Albrecht. The title will be *Abraham Gottlob Werner and the Founding of Geological Sciences*.

At the Lisbon Business Meeting there was discussion of the possibility of the Geological Society publishing translations of books in the history of geology, but on contacting the Society's Publishing House it was found that this idea could not be pursued, since the Society only publishes original works.

As to the present *Newsletter*, I am most grateful to all the contributors, particularly those who have provided reports of various kinds. I repeat my annual request that people follow the guidelines for the provision of references (see inside of back cover) and **do not use abbreviations**. Their use causes **great confusion and inconvenience**.

INHIGEO was not able to participate substantially to the Congress of the IUHPS (Division of History of Science) in Mexico City in 2001, as: (1) we have no Mexican Members who might have organised such a meeting; (2) we had held a meeting in South America the previous year; and (3) the President Professor Pinto was anxious to host a meeting in Portugal in his first year of office (which he did most successfully). However, INHIGEO was represented in Mexico by Silvia Figueirôa (Brazil) and Cornelia Lüdecke (Germany), and their report appears on p. 12.

Looking to the future, we are anticipating the Paris meeting and associated excursions with pleasure, chiefly organised so far as INHIGEO is concerned by Philippe Taquet. Preparations are well advanced for the meeting in Dublin in 2003, organised by Patrick Wyse Jackson, with a geohistorical tour of Ireland to follow. The International Geological Congress will be held in Florence in 2004, and a symposium for this is being organised by Nicoletta Morello and her Italian colleagues, for which they are organising also an extensive INHIGEO field excursion. Announcements for these meetings are given in the section on Forthcoming Meetings (p. 29 ff.).

The President has mentioned in his Report some issues to which INHIGEO might be giving its future attention. If you have any thoughts as to how such matters might be successfully implemented I hope you will contact Professor Pinto or me as soon as possible. But it should be mentioned that I shall be travelling outside Australia from the end of May to mid-July and will be out of contact during that time.

David Oldroyd, Sydney, April, 2002

Minutes of the INHIGEO Business Meeting, held in Lisbon on 26 June, 2001, 8.30 p.m.

Members present

David Branagan (Australia), Barry Cooper (Australia), David Oldroyd (Australia), David Spalding (Canada), William Sarjeant (Canada), Philippe Taquet (France), Martina Koelbl-Ebert (Germany), Nicoletta Morello (Italy), Ezio Vaccari (Italy), António Andrade (Portugal), Manuel Pinto (Portugal), Efgenji Milanovsky (Russia), Nikolai Yushkin (Russia), Octavio Puche (Spain), Frederik van Veen (The Netherlands), Richard Howarth (UK), Hugh Torrens (UK), Léo Laporte (USA), Ursula Marvin (USA).

In attendance

Kathleen Histon (Austria), Claudine Cohen (France), Ana Carneiro (Portugal), Ana Cardoso (Portugal), Joe Burchfield (USA), Thomas Marvin (USA), Sally Newcomb (USA).

1. The President, Professor Manuel Pinto, took the chair and presented the apologies of João Luis Cardoso, Endre Dudich, Emil den Tex, M. Portugal Ferreira, Martin Guntau, Geir Hestmark, Jan Kozak, Goulven Laurent, K.S. Murty, Francisco Pelayo, Daniel Rubiolo, Wilfried Schröder, Gerardo Soto, Kanenori Suwa, Kenneth Taylor, Miguel Telles Antunes, Wang Hongzhen, Silvia Figueirôa and Cornelia Lüdecke, the last two of whom were representing the Commission at the meeting of the IUHPS (History of Science) in Mexico at approximately the same time as the INHIGEO meeting.
2. The order of, and items on, the agenda, as previously notified in *Newsletter* No. 33, and distributed at the meeting, were accepted *nem. con.*, at the motion of Sarjeant, seconded by Marvin.
3. The Minutes of the previous Business Meeting of the Commission, held at Rio de Janeiro in 2000 were accepted *nem. con.*, as moved by Branagan and seconded by Torrens.
4. There were no matters arising from the Minutes of the Meeting in 2000.
5. The President referred to his Report, previously published in *Newsletter* No. 33.
6. There were no matters arising from the President's Report, which was accepted on the motion of Sarjeant, seconded by Marvin.
7. The Secretary-General (David Oldroyd) reported that a grant of US\$3000 had been received from the IUGS in 2001 but no money had been provided this year by the IUHPS. He had been in contact with the IUHPS Treasurer, Dr Liba Taub, about the latter point, and it was, as they mutually understood, a circumstance arising from the fact that INHIGEO was not participating in the Mexico City meeting (because of the lack of INHIGEO Members in Mexico and the fact that the Commission's previous meeting was held in Latin America). The lack of an IUHPS grant in

2001 should not, therefore, be taken as an indication that the Commission would receive no further funding from the IUHPS.

The ballot for 2001 had been completed, but it was remarked that all Austrian Members had failed to vote in two successive elections, so that the Austrian membership could fall to zero, which concerned him [but see the extensive Austrian Report in this year's *Newsletter*].

The S-G further reported that fourteen papers for the Geological Society's Special Publication arising from the Rio Congress had now been received in revised form, subsequent to revision after refereeing, and that it remained for him to write an introduction, which had to satisfy the general editor, Dr Martyn Stoker. The Society would have the final say on the acceptance or rejection of the book, and that final acceptance could not be taken for granted even now. However, the S-G expected to complete his work on the book before the end of July, and publication was expected for 2002.

Additionally reference was made to the publication by INHIGEO in 2000 of a bibliography compiled by Professor Malkhassian on the history of Armenian geology, consisting chiefly of items in Russian. This had been distributed to Members known to speak Russian and to selected libraries, and most of the remaining copies had been posted to Professor Malkhassian for personal distribution. It was planned that a bibliography on Canary Island geology would be similarly published in 2001.

The S-G requested the completion of 'expertise forms'.

8. In matters arising, Dr Histon presented a review copy of a large and impressive volume, *Die Geologische Bundandestalt in Wien: 150 Jahre Geologie im Dienste Österreiche (1849-1999)*, for review in the next INHIGEO *Newsletter*, which indicated strong on-going interest in the history of geology in Austria, and continued association with INHIGEO. Dr Histon and the S-G would follow up this matter.

Professor Sarjeant requested a copy of the Armenian bibliography. Other matters were dealt with under subsequent agenda items.

At the motion of Torrens, seconded by Cooper, the S-G was cordially thanked for his efforts in compiling *Newsletter* No. 33.

9. Considering future meetings, Dr Taquet spoke at length about the plans for the d'Orbigny Meeting planned for La Rochelle, Paris (1-5 July, 2002), and Bolivia, and he distributed brochures to those present, advertising the meeting. Further, he invited INHIGEO's active participation and collaboration in the meeting, organising a symposium on a suitable theme. That proposed by Professor Sarjeant—stratigraphy and its history—was enthusiastically supported by all those present, and an *ad hoc* committee consisting of Torrens, Sarjeant, Howarth, and Taquet was established to develop a programme on this theme as swiftly as possible.

The President reported that the Commission planned to meet in Ireland in 2003, with a conference in Dublin on the theme of 'Geological Travellers', organised by Dr Patrick Wyse Jackson.

Professor Nicoletta Morello then described the preliminary plans for an INHIGEO contribution to the IGC in Florence in 2004. The proposed theme was 'Museums and Institutions in Geology'. A post-Congress field excursion was planned, visiting various museums etc., from Florence to Venice, with visits also to sites of importance in the history of geology such as those associated with Steno, Leonardo, Arduino, etc. Discussions on the proposals were already in hand with the Congress organisers. The proposals were received most favourably.

10. Attention was drawn to Professor Murty's reports on the question of archives. The S-G made a plea to all Members to take every opportunity possible to encourage the preservation of archives, citing the case of Arthur Holmes's papers, as described by Cherry Lewis in *Newsletter* No. 33.

11. Concerning membership of the Commission, the S-G pointed to his efforts to widen the global scope of the membership and pointed, as on previous occasions, to gaps in countries in Latin America, Greece, Africa, etc., and many countries in Asia. He foreshadowed the election of a new Member from Namibia, but mentioned also that three nominations made by the Geological Society of Africa were not deemed suitable. Professor Sarjeant took the view that it was fruitless to elect Members from countries where there was no effective activity in history of geology.

The question of the ability to play a useful role in INHIGEO's work if Members had no knowledge of English was also raised. Professor Guntau had suggested that such persons might receive help for voting, etc., from other Members, if they could be found, but it was felt that while such a plan could indeed be useful in principle, and would be adopted where possible, it would nevertheless still be appropriate a person's membership if he or she failed to vote in two successive elections.

The S-G drew attention to the failure to vote of a small number of senior distinguished Members of the Commission, who had made substantial contributions to the study of the history of geology. Following discussion it was decided that in such cases a Member might be regarded as an Honorary Senior Member, who would continue to receive *Newsletters*, but would otherwise be relieved of further commitments to the Commission's activities. Professors Emile den Tex and Rudolf Trümpy had recently formally resigned from the Commission and could appropriately be named as Honorary Senior Members.

12. The S-G reported on the state of progress of 'Classic Papers' in *Episodes*, by INHIGEO Members. Two such papers had been published and one was 'in press', with another awaiting publication. But a continuous flow of papers was required, there being four issues of the journal per year. The task of soliciting and editing such papers was proving somewhat onerous, as a good deal of time was needed to ensure that English expression was correct. The journal's Editor had expressed the hope that the papers offered might be of greater 'general interest'. Probably more recent topics or survey reviews would be desirable. Offers of help in the soliciting of papers were received from Ezio

Vaccari, Barry Cooper, and Frederik van Veen, while David Branagan, Léo Laporte, and Ursula Marvin offered help with editing. These offers were gratefully accepted.

13. The S-G raised the question of the creation of an INHIGEO web-site, but declined to take on the additional task of 'web-master' for such a site. He pointed that COFRHIGEO had a good web-site, and that the IUGS provided abstracts of INHIGEO's activities on its site. Nicoletta Morello provided details of the new web-site established by the Italian Committee. However, after discussion, and in the absence of anyone willing or able to establish and maintain an INHIGEO web-site the issue was not pursued.
14. The President spoke of his wish to see the publication of a book on the history of African geology. This would entail the invitation of suitable authors for a series of papers on the general topic of the history of African geology. Professor Pinto said that he intended to pursue the matter as a future INHIGEO activity. Not all contributors need be INHIGEO Members.
- The question of INHIGEO acting as a facilitator for the translation of suitable books into English was discussed at some length. It was thought that such books would first need to be formally refereed in their original languages. The Geological Society (or some other publishers) could be approached to see whether it would be interested in such a series of submissions. 'Approximate' translations could be prepared and then put into good prose by suitable INHIGEO Members. It would be necessary to apply for funding from the IUGC to pay for translations in some instances. Following extensive discussion, a motion in favour of pursuing the activity (proposed Branagan, seconded Oldroyd) was passed with a vote of 12 to 1 in favour and 6 abstentions.
15. The S-G announced that all persons named on this year's ballot had been elected (by postal ballot, with a few additional ballot papers completed at the meeting), and he presented copies of the 2000/2001 *Newsletter* to the two newly elected Portuguese Members who were in attendance at the meeting.
16. Under business without notice, Professor Sarjeant urged conference members to wear their name-tags. Also, the format for the proposed round-table discussion on 'Why Study the History of Geology?' was described by the S-G.
17. A vote of thanks to the Portuguese hosts was proposed by Dr Ursula Marvin and heartily endorsed by all those present, with, of course, special thanks to the President for his notable efforts in organising the Conference.

The meeting closed at 10.50 p.m.

David Oldroyd, Secretary-General, Sydney

Geoarchives: Progress Report 3

Progress Report 2 was submitted on 21 April, 2001. Since then, the following information has been received.

Australia

Minerals and Petroleum Victoria (Dept. of Natural Resources and Environment) currently holds all material, published and unpublished, since 1851. Most of the material is held in several formats (e.g. CD rom, microfiche and hard copy) and scanning of some forms of documents has begun. An excellent collection of photographs and maps is available. Much material is held in the Archives Room of the Minerals and Petroleum reference Centre (MPRC) and the rest is held at the Minerals and Petroleum core store at Weribee. Janne Bonnett, Manager at the Reference Centre, can be contacted at: <janne.bonnett@nre.vic.gov.au>. Certain documents and maps have had some preservation work done on them. The Victoria Mining Bibliography is available on the web: <<http://www.nre.vic.gov.au/minpet>>. See under 'Products and services/Databases and Indexes'.

The Geological Survey of Western Australia, East Perth has sent two catalogues, one of pre-1980 Geological Publications and another of Geological Maps and Publications. GSWA has been producing maps and books on the geology and mineral resources of Western Australia since 1898. The vast majority of this work has been published by GSWA. Most of the published (post 1960) collection is available for purchase in hard copy. And much of pre-1960 published output can be found at: <<http://www.dme.wa.gov.au/geology>>. A 'Special reserve' Collection is also there, of which five to ten copies of all that they publish are kept for posterity—never to be sold. A Perth-based private company (<<http://www.digitallibraryco.com>>) scanned many of the Survey's older publications and maps that are available only on microfiche and has been permitted to market them in digital format (Adobe Acrobat, PDF). Preservation and archiving are of primary importance while generation reproduction are of secondary importance. The generation of new geoscientific work is primary, for the Survey. However, Dr Griffin, Director of GSWA believes that the preservation of important geoscientific material should be given strong support. Mr Bernie Joyce of the Geological Society of Australia, and convener of the Standing Committee on Geological Heritage, Sydney, and Dr Kenneth McNamara, Head of the Dept. of Earth and Planetary Sciences, Western Australian Museum, Perth are interested in INHIGEO program on Geoarchives.

Austria

Dr Tillfried Cernajsek, Geological Survey of Austria, has sent a statement regarding the archives of the Survey. Each department of the Survey has its own archive. It has a database in the homepage: (< <http://www.geolba.ac.at/GEOBAS>>).

Canada

The Canadian Geotechnical Society is thinking of about the question of archiving its historical, practical, and heritage material. Some preliminary work has been done on this topic under the direction of the Chair of their Heritage Task Force, Mr Lorne Gold, who has formed a small committee with representatives in most of their major cities. Their intention is to collect information on the nature and location of archival material, particularly photographic records, and then to work towards forming an electronic record of this material, probably by scanning the images and storing them in CD-Rom format.

The Earth Science Information Centre of the Geological Survey of Canada, Natural Resources Canada holds Canada's largest collection of books, serials, and maps in the earth sciences. Its Book and Map Archives holds the Sir William Logan

Collection, consisting of more than 80 books, maps, pamphlets and manuscripts which belonged to Sir William Logan, the founding director of the Geological Survey of Canada. The Centre also holds copies of all Geological Survey of Canada publications since 1842. (See: <http://www.nrcan.gc.ca/ess/esic/esic_e.html>).

China

The Committee on History of Geology of the Geological Society of China has brought out a summary of activities and publications since 1980.

Croatia

The Archives HAZU, Croatia has recently obtained the personal papers and records of academician Milan Herak (Zagreb, Zvonimirova 28, Croatia).

Czech Republic

The Czech Geological Survey, Prague, has its maps well preserved. Among these is the 1845 first geological map of Bohemia, Moravia, and Silesia on 1,875,000 scale. The Survey maintains databases and GIS, and information about all the activities can be found at: <<http://www.cgu.cz>>.

The State Central Archives in Prague, Czech Republic, has 25 archival groups relating to mining and coinage on the territory of the Kingdom of Bohemia from 1472 to the 1850s, with some 20th-century material preserved. Dr Michal Durovic of the Conservation Workshop is in charge of preservation of these archival materials by various methods. Archival materials concerning the mining districts of the Central and North Bohemia particularly, as well as North Moravia, are available in the State District Archives, Municipal Archives, etc. (at: <sua@mvr.cz>).

An interesting paper on the Present State and Future of the Map Collection of Charles University, Prague, has been sent by Petr Jansky. Professor Vaclav Svambera established a map collection, including those from the Geographic Institute. Thirty thousand map sheets from the War archives in Vienna are available. At the end of 1920, a State Map Collection of the Czechoslovak Republic was founded. The Archives of the Map Collection include originals and facsimiles of cartographic works dating from the 8th century to the present, numbering about 130,000 items, including 1800 atlases, 70 globes and a number of cartographic and geographic periodicals and books.

The Archives of the Academy of Sciences of the Czech Republic has sent a list of groups of the geological institutions and personal papers of geologists and geophysicists that are deposited in its Archives. These are: Inventory of the Czechoslovak National Research Council (1924–1952); Inventory list of Masaryk Academy of Labour (1917–1953); Inventory of Natural Historian Club (1865–1939); Inventory of CSAS Geophysical Institute (1928–1973); Inventory of CSAS Institute for Geology and Geotechnology (1958–1986). It also has the following: Inventory list of Danes Jiri V (geography, geomorphology) (1843–1958) and Inventories of Dedina Vaclav (Geomorphology) (1881–1960), Kettner Radim (geology) (1893–1966), Laska Vaclav (geophysics) (1906–1953), Inordinate of Michael Emanuel (geophysics, geology), Inventory lists of Pocta Filip processed papers of Zaruba Quido (geology) and Zatopek Alois (geophysics).

Denmark

Information about the location of geoarchives in Denmark is available with institutions affiliated to the Danish National Commission of Geological Sciences, as I am informed by Dr Koch, Chairman of the Danish Commission on the History and Philosophy of Science.

Estonia

The Estonian Geological Survey and the Estonian Geological Society have geological archives, as informed by Professor Bimiri Kaljo, Foreign Secretary of the Estonian Academy of Science.

Ethiopia

The Geological Survey of Ethiopia (GSE) has a Geoscience Information Centre (GIC) which collects, classifies, stores, displays, publishes and disseminates earth science information of the country, including museum specimens. The Center provides bibliographic databases, Georef CD Rom databases, Book catalogue and journal catalogue database. Dr Sentayehu, the geologist can be contacted at: <sentayehu@usa.net>.

The GIRGEA Letter of July 2001 published the INHIGEO circular on Geoarchives, as informed by C-Amory-Mazaudier.

India

A compilation containing data on 26 National Geological Monuments with illustrations (80 colour photographs + 26 location maps) is under finalization and will be brought out as a Geological Survey of India special publication soon.

The Indian Science Congress Association brought out two publications on Progress of Geology—A decade of (1963–72) Science in India and one giving an account of progress in Geology till 1962. Prof. Santosh Ray authored the former.

Panama

The Institute of Geoscience (University of Panama) has information about Historical Seismicity, as I am informed by Eric A. Chichaco.

Slovakia

The INHIGEO Circular on Geoarchives has been published in the International Geological journal GEOLOGICA CARPATHICA No. 3/52/2001 of the Slovak Academy of Sciences of which the Geological Institute is a part. Further information is awaited.

South Africa

Mrs J. P. Bourne, of the South African ICSU Secretariat, National Research Foundation, Pretoria, promised full cooperation in the Geoarchives project and passed on information about the same to the Director of the South African Council for Geoscience, and the representatives of the South African Geological Societies who serve on the SA National Committee for the IUGS and IGCP. The South African Representative on INHIGEO is Dr. J. C. Loock.

Organisations connected with the preservation of Earth Heritage materials in South Africa are :
 The Council for Geoscience (<<http://www.geoscience.org.za/prospectus/catalogue/index.htm>>
 The University of the Witwatersrand, School of Earth Sciences (<065mct@cosmos.wits.ac.za>
 The University of Pretoria, School of Earth Sciences (Secretary, Melinda de Swardt: <Melinda@scientia.up.ac.za>) (Head:
 Professor T. McCarthy).
 The Geological Society of South Africa
 President, Mrs Lesley Turner (<imturner@ionet.co.za>
 The Transvaal Museum of Natural History
 Dr Francis Thackeray (<mrsples@global.co.za/thack@nfi.co.za>).

Each Organisation uses its own methods to preserve materials. In the case of the Council for Geoscience, a Collections Management Unit looks at the preservation of mineral, fossil, and borehole core material in specifically designed and well-managed collections. The information Centre manages a well-maintained library, reports collection, as well as an archive in a fire-resistant safe. A complete catalogue of all Government publications, as well as those of the Council for Geoscience is available at: <www.geoscience.org.za/prospectus/catalogue/index.html>.

United Kingdom

The Royal Society of London has sent copies entries relating to all the relevant information concerning archives it has. These relate mostly to the British National Committee for Geodesy and Geophysics, its minutes of 1924–1931 onwards, and on various subjects and fields of activity. Entries also relate to the British National Committee for Geodynamics, the BNC for Geography, and the BNC for Geology and its related branches.

Uzbekistan

The Institute of Geology and Geophysics, Academy of Sciences of Uzbekistan, has archives of the bibliographies of the geologists academicians: Abdullaev Kh.M., Akramkhodjaev A.M., Mavlyanov G.A., Popov, V.I., Baymuhamedov Kh.N., and Khambabaev, I. Kh.

Kotopalli Murty, Nagpur (<ankush99_99@yahoo.com>)

[Professor Murty will be pleased to receive further information for next year's report. Ed.]

* * *

Further to the question of archives, we have received a letter from Professor Peter Harper, Chairman of the Bibliography and Documentation Commission of the International Union of History and Philosophy of Science (History Division), from which the following lines have been extracted:

Dear Dr Oldroyd

Thanks again for your email of 2 August. It might help clarify things if I bring you up to date on the work of the Bibliography and Documentation Commission. We had a meeting in December last year in Brussels, which brought together a number of archive professionals from Europe and the US and a number of representatives from the scientific unions. The meeting appointed a committee to draft recommendations for preserving the historically valuable paper and electronic records of modern science: Joseph Anderson of the American Institute of Physics (chair), Fabienne Meyers of IUPAC and Giovanni Paoloni of the University of Rome 'La Sapienza'. These resolutions were subsequently endorsed by IUHPS and sent to ICSU for action. I am sending them to you as an attachment and will also send them directly to Professor Murty. . . . We are very keen that the resolutions receive the widest publicity so if INHIGEO can help with this within its own sphere of activity we should be very grateful.

. . . At the heart of what we do is consciousness-raising. We encourage, we advise, we collect information and make it public when this is practicable and permitted by the provider of the information. . . . [T]he Commission . . . can[not] actually physically save archives, which has to be the responsibility of the institution where the archives were created or an established archive repository in collaboration with the scientific institution. However, consciousness raising is not a negligible activity as I am well aware from the work of my own unit. When my predecessor started work in 1973 scientists' archives were as often as not one or two boxes in size. Now after thirty years of talking to leading British scientists about the importance of preserving their archives it is not unusual to see archives of 100 or 200 boxes!

. . . I am expecting that we shall be able to establish a Bibliography and Documentation Commission website by the end of September [2001], and I hope this will be a means of giving some coherence to the activities of the Commission. I am sure we should be able to find room on the site for Professor Murty's report[s] [INHIGEO *Newsletter* No. 33]. Incidentally I would view even negative results as having some value: identifying organisations that claim to have no archives and organisations that have simply not responded. After consideration those that have not replied might be the subject of a second approach perhaps with a copy of the Commission's resolutions. . . . I should perhaps add that apart from establishing the website my first priority on the archives side as Commission President is investigating the position with respect of the archives of the scientific unions and at this level the geological community is definitely on the side of the angels IUGG having already made provision for its archives with the American Institute of Physics Center for the History of Physics at College Park MD. Elsewhere the position may be much less certain.

I hope this is helpful as a first response from the Commission. We shall certainly keep in touch as our plans develop and I will let you know when the website is established. . . .

Peter Harper (Director, National Cataloguing Unit for the Archives of Contemporary Scientists, University of Bath, Somerset BA2 7AY, UK. <lispbh@bath.ac.uk>)

In addition, INHIGEO has received the following resolutions from the International Union of the History and Philosophy of Science (Division of the History of Science), Commission on Bibliography and Documentation. It can be stated that the INHIGEO office bearers' papers relating to the affairs of our Commission have either been transferred to the headquarters of the IUGS in Trondheim (where, we are informed, they are being stored in a disused mine along with the Union's other archives), or are held in appropriate archives at the institutions where the office bearers have held appointments. The IUHPS's Bibliography and Documentation Commission has been informed of the locations.

Preserving the Records of Modern Science

Introduction

At its meeting on December 16, 2000, the Commission on Bibliography and Documentation of the International Union of the History and Philosophy of Science (IUHPS) discussed the need to preserve permanently the historically valuable paper and electronic records of modern science and make them accessible to researchers. These include the papers of leading scientists and the records of science organizations, as well as the records of the International Council of Scientific Unions (ICSU) and its member organizations. (NB: All references to papers and records are intended to include both paper and electronic files.) Based on its discussions, the Commission recommends that IUHPS propose the adoption of the following resolutions by ICSU:

The Records of ICSU/Member Unions:

Resolved that ICSU and each of its member organizations formally recognize its responsibility for maintaining its records and take the following steps to ensure that they are appropriately cared for:

Identify and assess the current condition of the organization's records, including official materials that may be in the possession of individual officers and former officers.

Prepare a brief report on the findings of the assessment.

Send a copy of the report to the IUHPS Commission on Bibliography and Documentaion.

If not already provided for, develop plans to preserve the records by (1) establishing its own professionally-run archives; (2) transferring them to an independent archival repository; or (3) taking other measures to ensure that the records are preserved and made accessible to scholars.

The Council is pleased to note that three international scientific unions have made formal agreements with major science archives to preserve their records on an ongoing basis and have already transferred material to the archives (see below for a list of the unions and the archives). Placing historically valuable Council and member organization records in major archival institutions, where they will be maintained according to modern conservation standards and made accessible to the scholarly community, is an appropriate and cost-effective way to insure that the records are available in the future to the organizations themselves and to others and that their history will be permanently preserved.

The Commission is willing to provide advice in conducting records assessments, helping to identify independent archives which may be willing to act as the official repositories, and other related activities. In negotiating with independent archives, the unions need to consider providing financial support to help cover the costs of maintaining their records. The following international unions have transferred inactive records to independent archives:

International Union of Pure and Applied Chemistry: records are held by the Beckman Center of the Chemical Heritage Foundation, Philadelphia, PA, USA.

International Union of Pure and Applied Physics: records are held by the Center for History of Science, Royal Swedish Academy of Sciences, Stockholm, Sweden.

International Union of Geodesy and Geophysics: records held by Center for History of Physics, American Institute of Physics, College Park, MD, USA.

Other Papers and Records

Resolved that ICSU alert the international scientific community to the importance, for the sake of both present accountability and future historical research, of preserving proper archival records of scientific work; and recommend that the budgets of all significant scientific projects should include a small margin to cover the cost of such archiving.

The unpublished papers of scientists who have made significant contributions to modern science should be preserved at the institution with which they were mostly closely associated. It is here that scholars will first seek a scientist's papers, and here that they will find administrative records of the institution, papers of colleagues, and related materials which will provide a well-rounded view of the scientist's work and the atmosphere in which it was effected. If the home institution does not have an archives programme, scientists should contact their national history of science organization, national library, local or national archives, or similar organization for advice and referrals on how to preserve their papers.

Science organizations are responsible for their organizational records, and they should support professional archival programmes to insure that historically valuable records are permanently preserved. Organizations that are unable to maintain their own archival programmes should negotiate with existing public or private archives to care for their records.

A Special Note on Electronic Records

In the past two decades electronic records in a variety of formats—email, World Wide Web pages, data files, *etc.*—have become a very important means of creating, storing and exchanging information, especially in science. Electronic records are as important as traditional paper files in documenting modern science, and historically valuable electronic records should be saved permanently. Several national archives and international bodies are currently working to develop solutions to the preservation problems that these records present, and it seems likely that effective long-term systems will be available in a few years. In the meantime, electronic records along with their accompanying metadata should be preserved on the server or,

if storage space is a problem, downloaded to optical disk or magnetic tape. Saving only paper printouts of electronic records destroys contextual information and is not adequate for the historical record.

Additional Information

Additional information on preserving the papers of scientists and the records of science organizations, along with links to many international history of science programmes and resources, is available on the Web sites of the American Institute of Physics Center for the History of Physics (<http://www.aip.org/history/>) and CASE—Cooperation on Archives of Science in Europe (<http://www.bath.ac.uk/ncuacs/case.htm>).

EPISODES

Members know that the IUGS requested INHIGEO to take responsibility for the supply of articles on the history of geology to the Union's quarterly journal *Episodes*, which is now published (most efficiently) in China. The series is called 'Classic Papers'. Contributions 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, provide 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 7,000 words.

The IUGS sets much store by the project, as I do and also the editors of *Episodes* in Beijing. **The project is thus of considerable importance to INHIGEO**, and provides a means whereby the Commission can contribute to the activities of the IUGS, furthering interest in the history of the earth sciences, and providing information that can be of great use to geologists, 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.

So far we have provided papers on James Hutton, Charles Lapworth, Andrija Mohorovicic, Inge Lehmann, Alfred Wegener, and Kiyoo Wadati.

Further offers of contributions are cordially and urgently requested. Four papers are required each year, and at present I only have three in preparation. Please contact me if you have any suggestions for this important INHIGEO activity.

David Oldroyd, Sydney

INHIGEO BUSINESS MEETING, PARIS, 2002: PROVISIONAL AGENDA

1. Apologies.
2. Arrangement of Agenda.
3. Minutes of the previous Business Meeting (see the present *Newsletter*, pp. 3–5).
4. Matters arising.
5. President's Report.
6. Matters arising.
7. Secretary-General's Report.
9. Future meetings of the Commission, including offers from different countries to host meetings.
10. Archives: Help from INHIGEO Members.
12. *Episodes*
13. A book on the history of geology in Africa.
14. Call for nominations of Honorary Senior Members.
15. Completion of Ballot for new Members of the Commission.
16. Business without notice.
17. Vote of thanks to French hosts.

CONFERENCE AND EXHIBITION REPORTS

INHIGEO Meeting, 'Geological Resources and History', 24 June–1 July 2001, Lisbon and Aveiro, Portugal

The meeting was ably organised by a committee under the leadership of Professor Manuel Serrano Pinto (University of Aveiro), which included Professor Lufs Aires-Barros (President of the Geographical Society of Lisbon, and Technical University of Lisbon) and Professor Miguel Telles-Antunes (Lisbon Academy of Sciences and New University of Lisbon), who represented between them the three sites at which the technical sessions were held; other members of the committee were David Oldroyd (INHIGEO Secretary-General); M. Portugal Ferreira; Professor João Luis Cardoso; and Professor António A. Soares de Andrade.

The principal themes of the meeting, chosen on account of their relevance to Portuguese geology, were: the use of stone in building, dinosaurs, and mining. As might be expected, the largest number of participants came from Portugal (but only two persons from Spain), and from North America; Australia, other European countries, Russia and Czechoslovakia. All the talks were delivered in either English or French. While many found it slightly irritating that all the oral sessions (the first at the Geographical Society of Lisbon, the second at the University of Aveiro) each consisted of a day of two parallel sessions, which meant that it was impossible to hear all the papers delivered, the splendid weather, which held throughout, made the field trips particularly enjoyable and any ruffled feathers were soon smoothed out.

Following registration, the meeting essentially began on the afternoon of Sunday 24 June, with a visit led by Professor João Luis Cardoso to the Leceia archaeological site, near Lisbon, excavated in a programme lasting from 1983 to 1999. This was a most impressive hill-fort complex (probably housing 200–300 people), first begun ca 2,900 BC. Of particular interest in the context of the 'mining' theme of the meeting, the site has yielded evidence of copper-working and artefacts, such as parts of axe heads, awls, chisels and punches, produced between ca 2,600 BC and 2,200 BC. The presence of amphibolitic rocks, which make up the bulk of the building stones at the site, and copper ores indicate a thriving trade in imported material existed at that time.

The following day, the first oral session was held in the august surroundings of the Geographical Society of Lisbon, housed in a magnificent building dating from 1897. We listened to a plenary address by Professor Aires-Barros (Portugal; <airesbarros@popserv.ist.utl.pt>), Stones, Monuments and History in the Algarve Room, looked down on by statues of Vasco da Gama and Henry the Navigator, and illuminated by a world map showing the routes taken by Portuguese navigators between 1482 and 1660. Unfortunately, the sound quality in this historic room left something to be desired, but half the subsequent talks were given elsewhere in the building, in a modern lecture theatre with good audio-visual facilities. The presentations consisted of the following papers:

Session 1 (a.m.)

David Branagan (Australia; <dbranaga@mail.usyd.edu.au>): 'Rock and stone on canvas: Fifteenth century images—real or imagined?'

Ezio Vaccari (Italy; <ezio.vaccari@lettere.unige.it>) & Ettore Curi (Italy): 'Quarrying and Geology in early 18th century Italy: the lithological column of Gregorio Piccoli (1739)'

Barry J. Cooper (Australia; <bjcooper@dindoblu.net.au>): 'The use of stone in South Australia'

João Luis Cardoso (Portugal; <arqueolo@univ-ab.pt>): 'L'utilisation de roches dures dans le Chalcolithique de l'Estremadura portugaise: le cas de Leceia (Oeiras)'

Session 2 (a.m.)

Miguel Telles-Antunes (Portugal; <mta@mail.fct.unl.pt>) and Philippe Taquet (France; <taquet@cimrs1.mnhn.fr>): 'Le roi Dom D. Pedro V [1837–1861], Alcide d'Orbigny [1802–1857] et la paléontologie: 'un exemple de rapports scientifiques entre la France et le Portugal'

Léo F. Laporte (USA; <laporte@cats.ucsc.edu>): 'Size and hypertely: [George Gaylord] Simpson's [1902–1984] exemplars for the evolutionary synthesis'

F. Amador (Portugal): 'Analyse comparative des textes scolaires et scientifiques portugais, centralisée dans l'étude des dinosaures et d'autre megafaune'

Maria das Dores Areias (Portugal; <mariaareias@netc.pt>): 'Rocks 'n roll: the contributions to African geology of the Portuguese travellers [Lourenáo] Malheiro [1842–1890] and [Freire d']Andrade [1859–1929]'

Following an excellent lunch in a splendidly Victorian 'Members Common Room', we resumed, to listen to:

Session 1 (p.m.)

Miguel Telles-Antunes (Portugal): 'The earliest illustration [1740] of dinosaur footprints'

Jesus I. Catalá Gorgues (Spain; <jesus.i.catala@uv.es>): 'Between dinosaurs and turtles: José Royo Gomez (1895–1961) and the study of fossil vertebrates in contemporary Spain'

Goulven Laurent (France; <goulven@aol.com>): 'Le catastrophisme chez [Baron Georges] Cuvier [1769–1832] et son disciple Élie de Beaumont'

Efgenji Milanovsky (Russia; <mvk@geol.msu.ru>): 'The development of ideas on the great extinctions, their causes and relations with global cyclicity of the Earth's geological evolution'

David Oldroyd (Australia; <d.oldroyd@unsw.edu.au>): 'The extinction of the Australian megafauna debate'

David A. E. Spalding (Canada; <brandywine@gulfislands.com>): 'Friendly rivalry or bitter feelings? The Canadian dinosaur rush'

Session 2 (p.m.)

Ana Carneiro (Portugal; <amoc@mail.telepac.pt>): '"God has forsaken this land": the anonymous and forgotten work of collecting rocks and fossils [for the Geological Survey of Portugal, 1869–1900s]'

Vanda Leitfo (Portugal; <vandamvsl@mail.telepac.pt>): 'Bringing rocks into state bureaucracy: the Portuguese Geological Survey'

Teresa Salomé Mota (Portugal; <tsalome@geopor.pt>): 'The teaching of geology [in Portugal] through textbooks during the Estado Novo [the years of the dictatorship, 1926–1974]: dealing with some stones in some old fashioned way'

Luís Teixeira Pinto (Portugal; <lpinto.ctorres@mail.telepac.pt>): 'Paul Choffat's (1849–1919) early contribution to Portuguese geology'

L. Povoas (Portugal): 'Dinosaures au Musée National d'Histoire Naturelle (Lisboa). Histoire d'un processus de communication'

António A. Soares de Andrade (Portugal; <asandrade@geo.ua.pt>): 'André Schneider [fl. 1947]: pioneering mobilistic ideas about the Iberian segment of the Variscan orogen'

Owing to the cancellation of a couple of papers, all participants were able to join to hear the last two talks:

Philippe Taquet (France; <taquet@cimrs1.mnhn.fr>): 'Les dinosaures dans le tunnel [the discovery of the first dinosaur eggs in the history of paleontology by Philippe Matheron in the railway tunnel of de la Nerthe, near Marseilles, in 1846]'

Hugh S. Torrens (U. K.; <h.s.torrens@esci.keele.ac.uk>): 'Rev. Joseph Townsend (1739–1816) and his Journey through Spain in the years 1788 to 1787'

Continuing with the theme of building stones, we spent the next day under the guidance of Professor Aries-Barros, firstly looking at examples in the construction of Lisbon Cathedral (where Professor Aries-Barros and his students are conducting an on-going study of their rate of corrosion as a result of air-pollution), and their conservation. This building was founded in 1147, but has undergone much subsequent revision and reconstruction, particularly following damage caused by the earthquake of 1755 and restoration in the 19th and 20th centuries. The results of successful conservation were also demonstrated in the even more splendid surroundings of the beautiful former Monastery of Jerónimos, completed ca 1517. This escaped extensive damage from the earthquake as a result of its foundation on limestone bedrock.

Wednesday began in the Academy of Sciences of Lisbon (once everyone managed to get to the building from the nearest metro station, a task which proved more difficult than it sounds, owing to generalisations on the road-maps!). The Academy was founded in 1779 and is now housed in the former Convent of Jesus, to which it moved in 1838. 'Bill' [W.A.] Sarjeant (Canada; <william.sarjeant@usask.ca>) set the scene with a most interesting, and copiously illustrated, plenary address: 'Footprints Before the Flood: Incidents in the Study of British Vertebrate Footprints in 19th-Century Britain. This talk was given in the Main Hall of the Academy, an impressive, balconied, two-tier room whose walls were lined with glass cases containing part of the former library of the Convent which includes a priceless collection of manuscripts and books of the 14th–17th centuries. Following coffee, we visited the galleries of the museum of the Institute of Geology and Mining (housed in the same building as the Academy) devoted to geology and archaeology. The serried ranks of the mainly rather dimly-lit wooden display cases had a wonderfully Victorian air. Curiously, the labelling at the tops of a series of wall cabinets in one room, whose contents are apparently arranged in chronological order, began 'Precambrian', 'Cambrian', 'Silurian' In the afternoon, under the guidance of Professor Telles-Antunes, we visited exposures at Lagosteiros Bay (just north of Cabo [Cape] Espichel, about twenty miles south of Lisbon), where a variety of Sauropod tracks of Lower Cretaceous, Hauterivian, age are visible on bedding-planes exposed in the sea-cliffs. Some had to be examined through binoculars, while others were on surfaces we could walk over, all helpfully lit by late-afternoon sunlight. The footprints referred to in Professor Antunes' talk are depicted in tile panels inside a small chapel at Cabo Espichel. They were formerly believed to have marked the footprints of the mule on which, according to fisherman legends, Our Lady disembarked from the sea at the Perda da Mua cliffs and ascended to the plateau which overlies them. It is believed that the site was associated with cults dating back to before Roman times. It became a place of pilgrimage in c. 1250 AD and this tradition is continued today.

The following day, we travelled by coach to Aveiro which lies on the coast some 125 miles north of Lisbon, making a detour en route to visit the new dinosaur museum at Lourinhã, (about 37 miles north of Lisbon). Here we were able to admire a number of new species found in the Upper Kimmeridgian/Lower Tithonian (Upper Jurassic) rocks of the area, and a clutch of thirty-four eggs (laid ca 140 million years ago), one of which contains an embryo Theropod. Following an excellent lunch, laid on by courtesy of the town council in the cloisters of the local church, we were taken to see the coastal site at which the eggs were discovered by the Mateus family in 1993 (their son, Octávio, is currently undertaking a PhD on the dinosaurs of the region; and his parents are assisting in running the museum). Miguel Telles-Antunes and Philippe Taquet, among others, are providing regular scientific advice to the museum and to the teams who regularly search the cliffs of the area for new material. The day was rounded off by a visit to another spectacular former monastery at Batalha (built between 1386 and 1517), now also the site of a national war memorial, and on arrival at Aveiro a reception, courtesy of the city council, at the Congress Centre.

Friday, found us in the Department of Mechanical Engineering of the University of Aveiro. The day began with a richly illustrated plenary address by Professor Octavio Puche Riart (Spain; <opuche@dinge.upm.es>): 'Historical mining exploitations in Spain and Portugal, which set the scene for the two parallel sessions, largely devoted to the theme of mining history:

Session 1 (a.m.):

Claudine Cohen (France; <cohen@chess.fr>): 'Practices, images and metaphors for mining in Leibniz's *Protogaea* [probably written between 1691 and 1693 and first published in 1749]'

Martina Kölbl-Ebert (Germany; <martina.koelbl@iaag.geo.uni-muenchen.de>): 'The Cardinal, the witch and the truth: the strange posthumous life of alchemist and mining engineer Martine de Berterau [c. 1580–1645?]'

Nicoletta Morello (Italy; <nicolmo@unige.it>): 'The "republic of miners": The organisation of mining from *De re metallica* [1556] of Agricola'

Session 2 (am): Frederik R. van Veen (Netherlands; <fr.vanveen@wolmail.nl>): 'Ideas about salt-tectonics in Europe and the USA in the early 20th century'

Zoya Bessudnova (Russia; <zoya@sgm.ru>): 'The Museum of Natural History of Moscow University and the development of the history of geology in 19th century Russia'

N.P. Yushkin (Russia; <yushkin@geo.komisc.ru>): 'Mineralogy in Russia: main stages, factors and regularities of development'

Richard J. Howarth (UK; <r.howarth@ucl.ac.uk>): 'Not just a petrologist: the life and work of Frederick Henry Hatch (1864–1932)'

Session 1 (p.m.)

Renato P. Milheiro Ribeiro (Portugal): 'The growing interest in Mining in Portugal by the end of the 18th century'

Ana Cardoso de Matos (Portugal; <acmatos@mail.telepac.pt>): 'Adding value to the history of mining and to the mining heritage: the case of the Lousal [pyrite] mine (Portugal) [discovered in 1882; closed in 1988 and now a mining museum]'

M. Portugal Ferreira (Portugal; <conselhodirectivo@fct.uc.pt>): 'A contribution to the history of metallurgy in Portugal: *Metallurgiae elementa* of M.J. Barjona ([University of Coimbra] 1798)'. [A facsimile of the original Latin textbook and a Portuguese translation are now in press.]

Session 2 (p.m.)

Sally Newcomb (USA; <senewcomb@earthlink.net>): 'Geology: a balancing act? [the early impact of the use of the balance in geology through determination of the specific gravity of minerals and enabling the determination of the chemical composition of rocks and minerals, so that theories of their origin might be tested]'

Ursula B. Marvin, (USA; <umarvin@cfa.harvard.edu>): 'The meteorite fall at Evora, Portugal, 1796'

Manuel Pinto (Portugal; <mpinto@geo.ua.pt>): 'Mining in Transylvania in the 18th century: a memoir by the Brazilian naturalist Manoel Ferreira da Camara (1762–1835)'

There was also a small number of poster presentations

Filomena Amador (Portugal; <famad@univ-ab.pt>): 'Abductive reasoning and representation of megafauna in the history of Geology'

D. Branagan, (Australia; <dbranaga@mail.usyd.edu.au>): '2001 rocks celebrating Australia's century'

Jan T. Kozak (Czech Republic; <jkozak@ig.cas.cz>) & (the late) S. Moreira (Portugal): 'The 1755 Lisbon earthquake: damage to Lisbon constructions as related to rock building materials used [for contemporary images see also: <www.eerc.berkeley.edu/lisbon>]'

and Lufs Filipe Mazadiego Martinez (Spain; <lmazadiego@dermos.upm.es>) & Octavio Puche Riart (Spain; <opuche@dinge.upm.es>): 'Histoire de la fabrication de la chaux à Valdemorillo, Madrid, Espagne'

The Aveiro session was concluded with an open-participation round-table discussion, organised by David Oldroyd (Australia), on the theme 'Why Study the History of Geology?'. The lively discussion which followed the various 'position statements' of persons attending was recorded, with a view to subsequent publication in the *Newsletter*.

With regard to future meetings, the two days of talks (Lisbon and Aveiro) showed that should try to avoid having parallel sessions, as everyone ended up missing talks that they would have liked to hear. Regrettably, in common with meetings in general, some speakers would do well: (1) to avoid the temptation to present overheads of text which they then proceed to read from to the audience (it is far less irritating merely to listen without any 'visual aid', since the eye assimilates on-screen text much faster than the speaker can read it aloud, and it then becomes boring to have its substance repeated); and (2) to check their overheads, well before presentation, for legibility in a lecture theatre. Conversely, a few talks could have done with more illustrations. On the whole, though, standards were high, the content was almost always interesting, and nearly everyone managed to keep to time.

The final weekend was spent in visits to a Roman mine site in the Dórico-Beirfo gold-antimony district, which lies just east of Porto (which is itself about 37 miles north of Aveiro), not far from Rio Tinto, led by Professor Helena Couto (University of Porto); and to the Roman ruins at Conimbriga, with the added bonus of the conference dinner on the Saturday night.

Everyone who took part in the meeting, including partners and offspring of some of the participants, appeared to enjoy it tremendously, and we were all most appreciative of the efforts to which the organising committee (and the sponsors) who had all clearly gone to considerable effort to make the meeting such a success.

Richard Howarth, London

The XXIst International Congress on the History of Science – Mexico City, 8–15 July, 2001

The XXIst International Congress of History of Science was held in Mexico City, in three beautiful old buildings: the Palacio de Minería (where a mining school has functioned since 1792), the Palacio de Medicina, and the National Theatre. The scientific programme was pretty 'jam-packed' as is usually the case in such large events, with two Plenary Lectures every day (opening the morning and the afternoon sessions), Symposia, and Scientific sessions. The subjects and the scholars invited to deliver the conferences were varied, reflecting the Organizing Committee's intention to address the general Congress theme: 'Science and Cultural Diversity'. Unfortunately, the scientific sessions lacked a stronger thematic unity, as is to be expected when one has such broad subjects as 'Earth Sciences since 1800' or 'History of technology'. On the other hand, the Symposia, more precisely focused, were really fine. It will be possible to bring the meeting to the notice of a wider public when the Proceedings are published—a large effort that is being undertaken by the Organizing Committee and the symposia leaders.

Although INHIGEO was not responsible for a specific symposium or session, some members were present, and represented the Commission at two meetings of the General Assembly of the Division of History of Science (DHS) as proxies—Silvia Figueirôa and Cornelia Lüdecke. Many administrative and scientific points were discussed in the Assembly, and some are mentioned below:

The reports of the secretary general and the treasurer were presented and approved unproblematically;

New Commissions were approved ('History of Meteorology', 'Cultural Scientific Diversity', 'Ancient and Medieval Astronomy'), while others were terminated due to long inactivity ('Science Policy' and 'Science and Literature');

New members (countries) of the DHS/IUPHS were elected: Colombia, Cuba, and Serbia;

Decision about the next congress venue: Beijing (37 votes) or Budapest (29 votes);

Election of the Programme Committee Chairperson: Professor Eberhard Knobloch (Germany);

Election of the new board of the DHS:

President: Ekmeleddin İhsanoglu (Turkey)

Vice-presidents: V. Kirsanov (Russia) and Liu Dun (China)

Secretary General: Juan José Saldaña (Mexico)
 Assistant Secretary: Fabio Bevilacqua (Italy)
 Treasurer: Thymios Nicolaidis (Greece).

And just a final remark: the social program that took place every evening, was really pleasant, and we were even delighted with a jazz concert by the ICOHTEC band (integrated by our colleague Friedrich Naumann!).

Silvia Figueirôa, Campinas, Brazil; Cornelia Lüdecke, Munich

The German Commission for History of Geophysics, Cosmical Physics, and Space Physics

A commission for the history of geophysics, cosmical physics, and space physics has been founded under the leadership of Professor Dr Hans-Jürgen Treder, formerly director of the Einstein Laboratory for theoretical physics of the Academy of Sciences. The commission publishes a journal entitled *Contributions to the History of Geophysics and Cosmical Physics*, which is open to all authors. It provides a discussion forum for the interdisciplinary problems in the history and philosophy of geosciences and its sub-disciplines, including solar-terrestrial physics and space physics. This includes space science education, the public understanding of space science, and the history of space science and aeronautics in general. The period covered extends from the first steps with the work of Fabricius, Scheiner, and Galilei up to modern space experiments.

A recent volume has been published under the title *Pathways to Science* and includes authors such as Sir Ian Axford, Syuin-I. Akasofu, Sir Alan Cook, David Oldroyd, Giovanni Gregori, Helmut Moritz, formerly president of IUGG, and many others. The authors describe their 'ways into science', and especially geophysics. A second book deals with the problems of causality, teleology, and free-will, as questions in natural philosophy. A further study dealt with the aurora of 17 March, 1716, and included original texts by Ch. Wolff, G. Langhaußen, and C. Kirch.

In May, 2001, Professor Hans Treder (from Potsdam) organised a conference on the history of developments in gravitational physics.

Another function of the commission is to collect old instruments, biographical notes, scientific correspondence (e.g. the selected letters of between the seismologist Emil Wiechert and Hendrik A. Lorentz and Arnold Sommerfeld has been published by Wilfried Schröder (*Archives for the History of the Exact Sciences*, 1982 ff.); and a book on the life and work of Emil Wiechert has also been published (Wilfried Schröder, *Emil Wiechert: Geophysicist, Physicist and Organizer in International Science*, Science Edition, Bremen, 2000). See also: <<http://huhu.franken.de/history-geophysics/Wiechert.htm>>. Another topic is German-American relations, e.g. in the co-operation between Bauer and Wiechert and others. Parts of the work of Hans Ertel, founder of 'Ertel's Potential Vorticity' and other leading results in geophysical hydrodynamics have been published, including his classical works on the potential vorticity and its application in geophysical hydrodynamics, the Ertel commutative formulae, the Ertel potential theorem, etc. His work in physical oceanography, physical hydrography, coastal research, and theoretical geomorphology will be published as soon as possible as parts of its collected papers (for Ertel visit <http://huhu.franken.de/history-geophysics/hans_ertel.htm>). Another point is the development of the ideas of the IGY, including the discussions and co-operation between Bartels and Chapman, the influence of Bjerknes, Ertel, Nicolet, Berkner, Coulomb, and others in the world-wide cooperation and the interchanges with the first and second international polar years. Chapman was chiefly interested in low and middle auroral data, and upper data since the IGY (Chapman, Paton, Hoffmeister, Schröder, and others). A special study is under preparation for this, including the aspects of increased atmospheric-glow and noctilucent clouds. In this regard, the work of James Paton and Cuno Hoffmeister is being closely studied, and also the developments made by Fogle, Chvostikov, Schröder, Saronov, Vasilyev, Villman, and Wiit. The studies on noctilucent clouds are closely associated with rocket observations, satellite studies and other *in-situ* measurements. All this will be studied into a history of upper atmospheric physics. A general history of studies of noctilucent clouds studies since 1885 has been recently been published in the *Bulletin of the American Meteorological Society* (November, 2001). Also, the development of the idea of the solar wind from data of Hoffmeister from comet-tail measurements and later conclusions by Ludwig Biermann are being studied and will be published in the Commission's journal. The complex studies are also associated with developments in space physics.

The lives of other German geophysicists have also been recorded, including Julius Bartels, Ludwig Biermann, Hans Ertel, Max Eschenhagen, Leonhard Euler, Wilhelm Foerster, Carl-Friedrich Gauß, Beno Gutenberg, Hermann von Helmholtz, Cuno Hoffmeister, Alexander von Humboldt, Johann von Lamont, Helmut Landsberg—for his time in Germany with Gutenberg), Otto Jesse, Adolf Schmidt, Wilhelm Weber, Alfred Wegener, and others. A book on Weber has been published by Commission Member, Karl-Heinrich Wiederkehr.

The commission welcomes comments and suggestions from all colleagues. Its website address is: <<http://verplant.org/history-geophysics/>>.

Wilfried Schröder, Bremen

Universitas Antarctica—An Exhibition for the Occasion of the Centennial of the first German Southpolar Expedition (1901–03)

Towards the end of the 19th century, plans for Antarctic exploration arose in several countries. It was a favourable coincidence that the VIth International Geographical Congress at London (26 July–3 August, 1895) took place under the presidency of Clements Robert Markham (1830–1916), who wanted to promote Antarctic research. Among others, the Director of the German Naval Observatory, Georg von Neumayer (1826–1909), gave a talk on Antarctic exploration. At the end of the polar session, the General Meeting adopted in a resolution 'that the exploration of the Antarctic Regions is the greatest piece of geographical exploration still to be undertaken [and] the Congress recommends that the scientific societies

throughout the world should urge, in whatever way seems to them most effective, that this work should be undertaken before the close of the century.'

Following the Congress, plans for a German expedition were defined. The most disputed problems were the use of one or two ships, the later being favoured by Neumayer; and the unsolved financial support. Only on 19 February 1898 was the geographer Erich von Drygalski (1865–1949) elected leader of the expedition. He had already gained polar experience by guiding two expeditions to Greenland (1891, 1892–1893), which had been financed by the Berlin Geographical Society under the presidency of his PhD supervisor Ferdinand von Richthofen (1833–1905). During a grand Antarctic meeting at Berlin in January 1899, which brought together members of the German Reichstag, the Geographical and Colonial Society, and a broad public, Drygalski presented his expedition plan of using only one ship following Neumayer's favoured route passing the Kerguelen Islands. Fortunately the VIIth Geographical Congress was held in Berlin under the presidency of von Richthofen and concrete planning of Antarctic expeditions was initiated. Markham defined the fields of work of the German and British expeditions, dividing Antarctica into four quadrants. According to the English tradition of exploration, he assigned the Ross and Victoria quadrant to Britain, and the Weddell and Enderby quadrant (90° W to 90° E) to Germany. When Drygalski presented his plan, the German expedition was already financially secured by the Imperial budget. Drygalski also recommended the organization of concomitant magnetic and meteorological observations during the expeditions. A scientific collaboration was agreed within the 'International Co-operation (1901–1903)', during which expeditions would carry out meteorological and magnetic measurements using the same instrumentation and the same times of observation. Magnetic 'term days' with hourly observations were to be held on the 1st and 15th of each month from February 1902 until February 1903. Magnetic term hours, with intensified measurements, started at the same day from midnight to 1 a.m. and then on the next term day starting an hour later. Meteorological observations were defined from October 1901 until 31 March 1903, including all merchant and navy ships sailing on a route south of 30° S.

The expeditions were to be under the leadership of the Englishman Robert Falcon Scott (1868–1912), the Scotsman William Speirs Bruce (1867–1921), the Swede Otto Nordenskjöld (1868–1912) and—later expanding the co-operation until 1904—the Frenchman Jean-Baptiste Charcot (1867–1936) joint.

In Germany, a special research vessel, *Gauss*, as the 'flagship of science', was built with the assistance of the German Admiralty, with an iron-free area for magnetic investigations on the ocean; similarly on the Norwegian vessel *Fram*. The preparations of the expedition were organised by Drygalski and his expedition members. Drygalski was officially designated leader of the German South Polar Expedition by an Imperial Decree of Wilhelm II of 18 July, 1901. The instructions were rather general, referring only to a few fundamental questions and leaving the freedom of action that Drygalski desired. There was general agreement that the expedition would add to the naval prestige of the German Empire.

On 11 August, 1901, the *Gauss* set sail from Kiel for an unknown destination at 90° E somewhere in the southern waters. The Scientific Advisory Board of the German expedition had proposed to establish a station for registering variation of the magnetic field at Samoa, to be working at the same time that the German expedition would be in Antarctica. Observatories for magnetic, seismic, meteorological, hydrological and air-electrical measurements were organized by the Royal Academy of Science at Göttingen at the northern end of the Mulinu Peninsula close to the capital, Apia. An additional meteorological and magnetic base station was installed at Observation Bay in Royal Sund on the Kerguelen Islands (South Indian Ocean).

Unfortunately, during the course the German ship was beset by ice close to the Antarctic Circle at 66° 2' S and 89° 38' E, 85 km off the Antarctic coast on 22 February 1902. But they were lucky that the ice was not drifting, so they were able to establish a fixed winter station on sea-ice 385 metres above sea-bottom. They explored the ice-covered Coast of Kaiser Wilhelm II Land and discovered the ice-free extinct volcano—like a needle in a hay-stack—which they named *Gaussberg*. After fifty weeks of 'captivity' the ship finally broke free. A second attempt to go south was, however, disallowed by the Ministry of the Interior, so they had to sail home, arriving at Kiel on 25 November, 1903. Kaiser Wilhelm II was very disappointed, because Scott had reached 82° 17' S at the same time, when Drygalski never crossed 67° S.

It took nearly three decades to analyse and to publish the data and the material of various collections of Drygalski's expedition in twenty volumes and two atlases with meteorological survey maps and magnetic registrations.

The exhibition was shown at Dresden from 26 March to 20 April, 2001, Bremerhaven, Hannover, and at Munich from 6 March to 31 July 2002, and will then be at Leipzig, Würzburg, and Berlin until 2003. The exhibition displays the political and social-cultural background of the expedition within 26 posters showing many historical pictures, maps and sketches. A catalogue including all posters and references is available from the Institute of Regional Geography at Leipzig, Germany for 5 Euros plus 1.50 E for postage. It can be ordered from Dr Heinz Peter Brogiato, Institut für Länderkunde, Schongauerstrasse 9, D-04329 Leipzig, Germany, E-mail: <H_Brogiato@ifl-leipzig.de>.

Cornelia Lüdecke, Munich

International Association of Geomagnetism and Aeronomy (IAGA) and International Association of Seismology and Physics (IASPEI): Joint Scientific Assembly, 19–31 August, 2001, Hanoi, Vietnam
The joint meeting of the two associations was said by the Vietnamese hosts to be the first of its kind, but I was informed by one participant, Frank Lowes, that in fact a similar joint meeting was held in Portugal in the 1970s. The next conference is scheduled for Sapporo, Hokkaido, Japan.

A full-day session (G6.01) of historical papers related to the interests of the Congress was arranged for the second day of the congress by Dr Wilfried Schroeder (Germany). A large number (25) of poster papers was scheduled for the day

following the oral sessions, but in the event only four were on display at the time I visited the poster hall, and these duplicated their oral presentations.

The morning session was chaired by Michael Schultz of the Lockheed Martin Advanced Technology Center, Palo Alto, who also presented the first paper. He spoke on the last quarter century of research on the heliospheric current-sheet, in which investigations he had himself been an active participant. He started with a slide depicting the present understanding of the form of the sheet (somewhat similar in shape to an extended ballerina skirt). Early investigations of the sheet had only revealed a two-dimensional structure, as space-probes, launched approximately parallel to the ecliptic had passed through the sheet so that its correct three-dimensional shape was not identified or represented. Later probes, launched at about 10 degrees to the ecliptic, revealed the 'ballerina-skirt' form of the sheet, and its rotation in accordance with the 26-day solar cycle.

Rudolf Steiger, of the International Space Science Institute, Bern, spoke on the 'History of the Solar Wind', or rather the intensive investigations of the wind over the last thirty years. (However, he claimed, 'knowledge' of the wind went back to antiquity through observations of comet tails.) The material content of the wind could be sampled by examination of the Moon's regolith, the layers of the grains of which could be 'peeled off' and the successive layers dated. From such investigations, involving determination of the xenon concentration of different layers of the regolith, it appeared that the solar wind had been essentially constant over billions of years. Dr Steiger mentioned that solar-wind studies provided information relevant to the study of the origin of the solar system. Observations made from the spacecraft *Ulysses* (1992) had revealed two kinds of solar wind: a slow one originating in the streamer belt and a faster one originating in coronal holes.

Then Klaus Wilhelm, of the Max Planck Institute, spoke of 'Past and Recent Observations of the Upper Solar Atmosphere in Far UV light'. Essentially, he described the improvement in spectral resolution achieved over the years with improved spectrometers (with a sufficient resolution of 0.04 Angstrom units reached by 1972). The solar radiation is strongly absorbed by the Earth's atmosphere and hence examination from spacecraft is needed. In the lecture, attention was focused on the discovery of elements in the solar spectrum, but in the abstract it was mentioned how many aspects of aeronomy, such as bulk plasma motions, have been studied spectroscopically.

Next Bruce Tsuratani, of Caltech, spoke on 'The Solar and Interplanetary Causes of Geomagnetic Activity'. He was interested in magnetic storms, first described by von Humboldt in 1808, which appeared to be associated with aurora. The storms involved a sudden decrease in the Earth's magnetic field, followed by a recovery. The suggestion was that energy was transferred from the solar wind to the magnetosphere, in an 'interplanetary shock'. In 1859, R.C. Carrington observed a bright solar flare, which was followed by a magnetic storm 17.5 hours later. Hence the velocity of transmission was estimated (but higher velocities have been determined subsequently). The historical data were used to test modern theories of the phenomena, but the nature of the theories favoured by space-age plasma physicists was not clear to your correspondent.

A paper by J. Lestovicka from the Czech Republic was not given, being replaced by an interesting discussion by Jean Rozelot on 'Solar Radiation Variations and the Earth's Climate'. He described the observations of the apparent diameter of the Sun's disc by Picard in 1670-1671, which gave a scatter that allowed an estimate of the precision of the observations to be made. Various later measurements were noted by the author, and modern methods of determination were described. From the historical and modern data, it appeared that, until very recently, when anthropogenic heating of the Earth's atmosphere was occurring, there had been a statistically significant correlation between the Sun's diameter and the Earth's climate: the Earth has become warmer as the solar envelope has *decreased* in size and solar radiance has increased. However, precise determination of the Sun's diameter is difficult from the surface of the Earth because of atmospheric distortions. Hence a 'Picard' micro-satellite is being launched, with instruments designed by Rozelot and others in Europe, to make possible the simultaneous determination of the Sun's diameter and luminosity. Such work should have a significant role in the studies of climate change. It would be dependent on, or stimulated by, knowledge of historical data.

The next paper was by J.M. Torta, recently appointed Director of the Ebre Observatory in Spain, who outlined the history of work undertaken at his new institution since its foundation by Jesuits in 1904-5. He described some of the observatory's more important older instruments, and its design and architecture. Early research had focused on atmospheric electricity, and in the 1920s it was said to be the only observatory making a systematic study of Earth currents. In the 1930s, due to the Civil War, there were long gaps in the data, as the observatory had to be dismantled, though meteorological observations were maintained. Since the 1950s, work on ionospheric soundings has gone forward. Presently, work is focused on physical interpretations and modelling. The observatory has a good library and is an important part of Spain's cultural heritage.

The morning session concluded with a brief paper by Professor Truong Quang Hua on geomagnetic observatories and observations in Vietnam, but for want of time not much information was provided, beyond the locations of Vietnam's several observatories and the fact that the secular magnetic variation differs in different parts of the country, with its considerable latitudinal extension.

[Later during the Congress, many participants made a coach trip to the Phu Thuy magnetic observatory of the Hanoi Institute of Geophysics and the National Center for Natural Science and Technology of Vietnam, set in the paddy fields in the northeastern outskirts of Hanoi. Very many people made the visit and little description of the instruments and their uses was provided, so that, with the crowded conditions, your correspondent could form little notion of the quantity or quality of the instruments and the observations made with them. An old Russian instrument for the study of the ionosphere, said to date from the 1950s, was still 'plugged in', though it was not in use at the time of our visit. Beyond this, we could see some magnetometric data being recorded by hand; also some meteorological recording instruments were remarked in the grounds. The Observatory issued a pamphlet which stated that it was opened in 1978 and had geomagnetic, atmospheric, ionospheric, and seismic instruments. It was supplying data to the 'INTERMAGNET' data-base in Paris (an example of the continuing French connections in

Vietnam). A D-I fluxgate magnetometer had been installed in 1995, and in July 2001 the institution had been upgraded with the acquisition of new electronics and a new data logger, with time synchronization to GPS. In addition to the data provided by the variometer, absolute measurements are made twice a week, with the D-I fluxgate instrument and a proton magnetometer. Power for the magnetometers is furnished by solar energy. The observatory had its instruments substantially damaged by lightning in 1998, and there was a loss of data from March 1998 to January 1999. A lightning protection system is now in place.]

Following the lunch-break, the session (chaired by Michelle Bitterly) began with a paper by Dr Franz Halberg, a medical doctor from the University of Minnesota, substituting for a paper by J.B. Cao on space-physics research at the Center for Space Science and Applied Research at Beijing. Dr Halberg spoke on the correlation of cycles in nature (such as geomagnetic or sun-spot cycles) with those in organisms and in society. He claimed cycles ranging from short ones in the oxygen production of single-celled organisms to a twenty-year cycle in the motivation of Jehovah's Witnesses. Heart rates were correlated with solar activity. A cycle of 6.75 days was deemed important for human activities, corresponding approximately to the seven-day weekly cycle. Whether the two cycles are in or out of synchronization could have significant social correlates. In question time, there was some scepticism about the claims made, and a question about the distinction between correlation and causal connection was not answered to the questioner's satisfaction.

Next, Moira Manda of the Institut de Physique du Globe, Paris, spoke on 'Four Centuries of French Contributions in Understanding the Earth's Magnetic Field'. She had been examining her institution's archives and the early activities of French geomagneticians. The first declination determinations were made by Bellarmatus Cardan in 1541 and the first map showing a geomagnetic equator was that of Guillaume de Nautonnier (1602), who suggested the possibility of longitude determinations by means of the compass. Ms Manda stated in her abstract that she was paying 'tribute to some of [the] French ancestors who made notable advances in both theoretical and observations of geomagnetism'.

Following, Joseph Batllo of the Department of Applied Mathematics at the University of Barcelona described the efforts of himself and his co-workers to compile an inventory of the old geomagnetic instruments in Spain. The goal was to find the instruments, determine their places of origin, when and where they were used, and for what technical purposes. Each item catalogued in the census (so far, about a hundred items) is described, and the related documents and readings identified, where possible, along with old photographs or illustrations of the instruments. The study was intended to be useful to those interested in the historical evolution of geomagnetic instruments in Spain, and for researchers concerned with the old data and the magnetograms generated by or from the instruments.

Then Christine Amory-Mazandier, from the Centre National de la Recherche Scientifique in France, described her heroic efforts to promote 'North-South' scientific collaborations, valuable for the growth of science in developing countries and for the extension of data-bases for the southern hemisphere. Her work had been focused on the Ivory Coast, where she was involved in the training of students in the fields of geomagnetism and aeronomy. She spoke of the need to develop ethical guide-lines for the sharing of data, and how she used historical studies to enable students to become acquainted with the principles of these fields. As I understand, this was achieved (successfully, according to her report) by students reading classical papers in the fields, as provided by Ms Amory-Mazandier.

Scheduled papers on 'The "Collegio Romano" and the Development of Meteorological Activities in Rome' and 'Scientific Correspondence: Historical and Scientific Value', by M. Calacino and G. Ferrari respectively, were not delivered.

In a paper entitled 'Why Study the History of Geoscience?' your correspondent outlined thirteen *prima facie* reasons why one might want to engage in such studies, ranging from hagiography and 'ancestor worship' to nationalism, the development of ideas in the sociology and philosophy of science, and attribution of credit, to the provision of historical data for the advancement of modern research.

Takuya Sugiyama of the Research Institute for Production and Development, Kyoto, spoke on 'Research of Noctilucent Cloud Formation from the Point of View of Self-Organized Oscillations'. He gave a sketch of the discovery of noctilucent clouds and provided interesting slides of the phenomena. His English was difficult to follow, but he provided a written version. His abstract referred to two possible ways in which such clouds may form: fine particles of 'meteor smoke', and heavily hydrated ions. The periodicity of the clouds was mentioned, but their cause was not made clear in the oral presentation. The noctilucent phenomena are only visible on a few days each year, so they have chiefly been studied by amateurs, professional observers being unable to develop continuous full-scale research programmes for phenomena that are only sporadically observable.

A paper by D. Holley, 'The Biological and Anthropogenic Week (Circaseptens, CS) and Half-Week (Circasemiseptens, CSS) and Geomagnetic Disturbance' was not presented. In its place, Tamara Kuznetsova of the Russian Academy of Sciences presented an oral version of her poster paper: 'Global Changes Reflected in C^{14} and Global Temperature Data'. It appeared that C^{14} concentrations, analysed over nine millennia, could be anti-correlated with changes in the Earth's magnetic dipole moment, there being a cyclic variation in the two parameters, with a period of about 6,500 years. However, only about 1.5 cycles of data were useable. Various other cycles were said to have been detected, and there was a possible correlation with global temperatures. The treatment was highly technical, and not possible for your correspondent to evaluate, beyond noting that 1.5 cycles was (I would have thought) hardly sufficient to enable generalisations to be made.

Ahmed Abdel Hady of Cairo University spoke on 'Cyclic Studies of Total Solar Irradiance and the Relations with Solar Activities'. In another substituted paper, M.A. Mosalam Shaltout of the National Research Institute of Astronomy and Geophysics, Cairo, gave a thought-provoking talk ('The Ancient Egyptian Civilization: Maximum and Minimum Coincidence with Solar Activity') on the history of episodes of flooding in the Nile. These floods are detectable by deposits in Lake Birkat Quarun near Giza and elsewhere, which can be dated by radiocarbon methods (the lake only fills at times of exceptionally high floods). They are also recorded in historical texts. It appears that periods of high rainfall (and presumably

snowfall in the mountains upstream) and extensive flooding correlated admirably with the rise and fall of dynasties, societies having flourished in the times of prosperity associated with extensive flooding. These changes were thought by the author to be linked to changes in solar radiation, though the causes of such changes themselves were not discussed. Some poignant carved drawings of starving Egyptians in times of famine were shown.*

In brief, the papers presented were chiefly concerned with the *progress of modern science*, rather than the study of the history of science 'for its own sake'. (This emphasis was surely appropriate for a *scientific congress*.) Several of the papers, especially in the afternoon session, were concerned with the determination of geophysical cycles on the basis of old data. In some senses, the search for correlations appeared to me to be overzealous. But while the search for correlations between physical and biological cycles might appear oversanguine, the claimed correlations of levels of the Nile with stages of Egyptian civilisation seemed (to me) to be highly plausible. In fact, good cases were made in several cases for climatic changes *not* being anthropogenic in character, a point that is relevant to current discussions of recent global warming.

Thus we may say that the papers in Session G6.01, 'History of Aeronomy and Geomagnetism', were chiefly in the realm of science itself, not metascience. There was some 'hagiographic' element in a number of the presentations. The more technical papers in the morning attracted greater attendance, and possibly greater interest, than did those in the afternoon.

The Session's papers are being published in *Beiträge zur Geschichte der Geophysik und Kosmischen Physik* (Volume 3, No. 5), edited by Wilfried Schröder, in 2002. This report is published here by his kind permission.

David Oldroyd, Sydney.

SHORT ARTICLES

The Elevated Land: Science, Land Elevation and the Formulation of a Swedish Past, 1860–1930

Starting with the establishment of Ice Age theory, the present dissertation investigates aspects of geological, plant geographical and archaeological research in the shoreline displacement between land and sea pursued in Sweden during the period 1860–1930, and the significance of this research for the view of the 'Swedish' landscape and its post-glacial history. This scholarship is analysed on three levels under the rubrics 'The Highest Shoreline and the Ancylus Lake', 'The Question of Land Elevation', and 'Charting Sweden's Past', respectively, employing a theoretical and methodological approach whereby both the practitioners of science and their ideas are studied, including work both in the field and at the institution, arguments and hypotheses presented in articles and handbooks (including visual images, diagrams and maps), social networks, career paths and controversies. These scientific practitioners are contextualised in both macro- and microcontextual perspectives, whereby particular attention is paid to the relationship between science and nationalism. By 'nationalism' is meant an ideological force linked to the development of the modern nation-state with the intention of unifying the state and its people, thereby creating an imagined community. Comparisons are made with research conducted in an imperialistic context.

Geological surveying and geology as fields of scholarly research in Sweden were institutionalised and professionalised with the foundation of the Swedish Geological Survey (SGU) in 1858. In an international context, the creation of the SGU was typical of the times, one component among many others of the modernisation process in Europe. However, the step from proposal to decision was no small one. The proposal initially met with resistance in parliament, and its establishment was also preceded by a power struggle over the leadership and organisation of survey activities between mineralogist Axel Erdmann and his network, on the one side, and representatives of the Royal Swedish Academy of Sciences on the other. That the outcome was decided in Erdmann's favour is evident in his appointment as head of the SGU, but also in the fact that the SGU was placed under direct government control, which thereby gained influence over its activities. One expression of this was an increasing emphasis on applied geology in the service of trade and industry.

At the beginning of the 1870s, geology was the still purview of a relatively small circle of men, referred to as 'Sweden's geological family' in the present dissertation. But with the establishment of the job category 'extra geologists' at the SGU and the foundation of the Geological Society of Stockholm in 1871, the number of practitioners increased, several women among them. The appearance of Sweden's first journal dedicated exclusively to geology also served to broaden the geoscientific discussion. However, this discussion was conducted mainly between researchers working within the country's borders. Even though the geological survey was initially planned as a regional project (in the province Uppland), and the society and its journal as a Scandinavian one, both ended up as national undertakings. The SGU's own museum, opened to the public in 1871, was also national in character. The growth of geology as a scientific discipline was also reflected at the country's institutes of higher learning, where departments of research and undergraduate studies in geology were established as the 19th century drew to a close.

The practices of the SGU were based largely on an older geological survey tradition, motivated by three intimately connected phenomena: science, utilitarianism and nationalism. These practices, which eventually resulted in maps and accompanying explanatory texts, essays and collections, can be described, *pace* Bruno Latour, as repetitive accumulation cycles conducted through an interplay between field and 'in-house' research. During the period 1858–1930, the lion's share of southern and central Sweden was charted in this manner, along with smaller portions of Norrland. However, the SGU deviated from international norms in one significant aspect. From the very first map-sheet, not only bedrock but also the

* In a BBC film I recently saw on the TV (March, 2001), the story was told in catastrophic terms, without considering the ultimate causes of the drought. It appeared also to refer to one drought only (about 4,200 years ago). Viewers were shown the present Lake Birkat Quarum (full of water) and we were informed that sediments were missing in the lake for the ancient period of drought. The two accounts appeared not to mesh entirely satisfactorily.

unfixed earth layers (including fossils and ancient remains) were inventoried, categorised and documented. Several factors lay behind this procedure. First of all, the SGU was supposed to serve not only the mining and quarrying industries but also agriculture. Secondly, the founding of the SGU coincided with the introduction of Ice Age theory in Sweden, whereby earth layers became more than just arable or non-arable land but also 'quaternary formations' which could be studied with the same stratigraphic methods as rock layers.

The geological survey did not merely take inventory of the natural resources and general geological character of the country; it also initiated the ingathering of empirical evidence as a basis for the theoretical interpretation of its geological evolution. A survey of Sweden's past began. In Sweden, as in other countries, this evolution was traced as far back in time as possible, though particular interest was dedicated to the time which had passed since (the latest) Ice Age. This quaternary geological enterprise, also financed by Royal Swedish Academy of Sciences and the seats of higher learning, was not primarily coupled to the needs of trade and industry but rather to scientific and nationalistic motives. From the perspective of evolution, quaternary geology was about 'learning to know one's country' and 'learning to know oneself'.

The fundamental material practice of quaternary geology was to localise, take inventory, and interpret such remains as had formed during the post-glacial period. These quaternary formations were thus invested with the status of 'natural landmarks' whose existence and distribution were considered as testifying to various geological processes (on the condition that they be read in the correct manner). Just which quaternary formations were deemed relevant for interpretation and how they should be interpreted were however questions under constant discussion. Shoreline displacement was a geological process ascribed decisive significance for the actual creation of Sweden, but which also roused the interest of geologists for other reasons. There were plenty of natural landmarks which bore witness to shoreline displacement, and there was a long tradition of domestic scientific study upon which to build. This phenomenon, which could still be discerned along the coastline, was further associated with the origin of fertile soil: There was symbolic potency in the very apprehension of shoreline displacement as an ongoing land elevation: Sweden was a nation which had literally risen out of the ice and water with incomparable force.

The charting of its past resulted in a 'narrative' about Sweden's geographic evolution, where shoreline displacement played a prominent role. However, during the process of the survey, it became apparent that the phenomenon was much more complicated than researchers had first imagined, which led to its conclusions being reformulated on numerous occasions. In the 1860s, the narrative stated that the Ice Age had been followed by a subsidence followed in turn by an elevation. However, this oscillation had not been uniform; rather, the southern part of the country had moved in the opposite direction when compared with the rest of the land. Together with changes in the climate, shoreline displacement had affected the physical character of the Baltic basin. These characteristics were interpreted in terms of different evolutionary stages. Before the contemporary brackish inland sea had been formed, the Baltic Sea had first been a polar sea ('the Yoldia Sea') and thereafter a saline sea ('the Litorina Sea').

The fact that Scania had sunk was perceived as an anomaly, but this problem was solved in the 1870s after geologists agreed that this region too was in the midst of an elevation process. However, new problems soon arose. The 1880s generation of geologists noted new types of natural landmarks related to shoreline displacement. Gerard De Geer found that not one but two subsidences had taken place, and Henrik Munthe hypothesised that the Baltic had not only once been a polar and then a saline sea, but also a freshwater lake sometime in between ('the Ancylus Lake'). De Geer's 'post-glacial subsidence' was thus integrated into the narrative of Sweden told in the 1880s, along with the Ancylus Lake.

Ever since the establishment of the Geological Society, the narrative of Sweden's geographical development had been under debate, but what was not particularly problematised was the reigning perception on the nature of shoreline displacement. The discovery of each new natural landmark seems to have been interpreted within the framework of a 'thought style', as formulated by Ludwik Fleck, where it was taken for granted that shoreline displacement in Scandinavia was caused mainly by the elevation and subsidence of the land itself. This thought style was maintained by a 'stable thought collective' consisting of leading geologists at the SGU and the Geological Society. A palpable expression of the stability of this thought collective can be found in the mobilisation which occurred when the thought style—and thereby the narrative of the creation of Sweden—was challenged by the famed geologist Eduard Suess and other scholars in the 1880s and 1890s. According to these researchers, shoreline displacement was primarily the result of global changes in the ocean surface, not land oscillation.

During the 'land elevation debate', Swedish geologists were compelled to clarify their arguments, and it was at this stage that 'the highest marine shoreline' and 'the isobase map' were constructed. Since the highest marine shoreline's altitude above sea level varied from place to place, this confirmed that shoreline displacement had occurred erratically and could therefore not be the result of a general diminishing of the ocean surface. Just how uneven land elevation had been could in turn be shown with a visual representation of this shoreline, the isobase map. Why Sweden had been honoured with this land elevation was explained by referring to the pressure of the inland ice in combination with the frontiers of the Archaean shield.

The narrative of Sweden's geographic evolution thus withstood this onslaught and was perpetuated in a series of handbooks published in the 1890s. This literature not only presented the new land elevation arguments, it illustrated them with the first visual representations of the Baltic region's various stages of post-glacial development. The 'law of land elevation' was also formulated here, according to which land rising had been greatest in central Sweden. However, at the same time as quaternary theories appeared to be solid fact, a controversy broke out within the thought collective concerning land elevation in the north of Sweden, Norrland. During this controversy, which featured Gerard De Geer and Arvid Högbom as its main actors, it emerged that the interpolations and extrapolations which had served as the basis for both the isobase map and the law of land elevation had been faulty and needed to be supplemented. The controversy contributed to shifting the centre of

land elevation to the coast of southern Norrland, more precisely to the area around Skuleberget in Ångermanland (known today as 'the High Coast', a Natural Property at the World Heritage List since November 2000), at the same time as new questions were raised about the results and limitations of shoreline displacement research.

The successes of Swedish geology achieved widespread notoriety and when the narrative of Sweden's geographic evolution (together with polar research and geochronology) was presented at the Eleventh International Congress of Geologists in Stockholm in 1910, it was received as the crowning achievement of quaternary geological work. As was the case during the age of Linnaeus, Swedish natural science found itself at the forefront of international science. Sweden, it was said, had defended its 'leading position' among the nations. Quaternary geology also began to exercise a great deal of influence over other fields, plant geography and archaeology in particular.

In its train, Ice Age theory brought a perception that Swedish flora (and fauna) had emerged via a post-glacial colonisation process. This initiated new research in plant geography with the purpose of discovering how this colonisation had happened. When and whence this flora had migrated into the country and how its spread across the land had actually occurred became central scientific problems, whose solutions were expected to contribute to the understanding of how nature had 'created' Sweden. Initially, this research had its academic seat at the University of Lund, while Uppsala and Stockholm (with the Swedish Museum of Natural History and the Geological Society) became increasingly important actors during the decades around the turn of the last century. Since research was often conducted in connection with moss farming and peat harvesting, lime quarrying and coal mining, such practical, economic activities now had indirect significance in the development of knowledge. On top of this, the populace at large contributed 'local information'.

Conclusions about the history of vegetation were first drawn from studies of the composition of the contemporary plant cover. However, in common with geology, the most important material practice soon became the utilisation of natural landmarks – quaternary plant relics – preserved in the 'botanical archives' of the country in clay deposits, lime tufas and peat mosses. Understanding that the colonisation process had been guided by biological, geological and climatological factors, the interpretation of these natural landmarks became more complicated.

The development and problematics of historical plant geography were reflected in the controversy which broke out between botanists and generational comrades Gunnar Andersson of the University of Lund and Rutger Sernander of the University of Uppsala. Andersson based his plant geographic thought on the theory of vegetational evolution, which had been formulated by Japetus Steenstrup and further developed by Fredrik Areschoug and Alfred Nathorst. According to this theory, the inland ice had been succeeded by a number of flora whose remains were preserved in distinct layers in (some of) the country's peat mosses: the mountain avens region, the aspen and birch region, the pine region, the oak region and the alder and spruce region. These flora had successively immigrated and spread as the temperature changed, which in turn depended upon the subsidence and elevation of the land. Shoreline displacement had furthermore influenced the dissemination channels themselves as causeways between various areas appeared and disappeared, insisted Andersson.

Inspired by Axel Blytt and Ragnar Hult, Sernander stated that the development of vegetation instead needed to be understood as shifting plant communities, whose composition and distribution varied due to repeated changes in the amount of precipitation. For Sernander, the sites of plant remains were just as important as the remains themselves. Sernander also placed great weight on the influence of shoreline displacement on vegetation and created a dating system where shoreline displacement, together with shifting climate periods, determined the chronological points of reference for the evolution of vegetation. This system came to be known as the 'Blytt-Sernander Chronology'. On the other hand, Sernander did not consider shoreline displacement crucial to the channels of plant dissemination, but stated that this could just as easily occur via air and water, for example.

The controversy between Andersson and Sernander was a struggle between the divergent perceptions of science, which they had each long since assumed, both behind the lectern and in the field. However, the controversy must also be understood in the context of their similar career paths and craving for scientific capital. Simply stated, they were competitors in the same field. Even if the controversy started with a strictly delimited problem – the exact time of the migration of the spruce tree – it quickly ballooned into a confrontation about the very foundations of the discipline. Both attempted to profile themselves through 'boundary speech', Andersson with 'rational botanical analysis' and Sernander with 'modern biological plant geography'. They produced handbooks and popular articles and allied themselves with sympathetic researchers and other actors. At the same time, it appeared impossible for the two of them to cooperate, or even converse, with one another. Even if Andersson and Sernander were in disagreement about much, they did share the same thought style about shoreline displacement. Both integrated the narrative of Sweden's geographical evolution into their own interpretations of the evolution of vegetation – that it might have been the water that had diminished and risen, rather than the land mass, was something they apparently never considered. Thus, the land elevation idea within Swedish quaternary geology's thought style was consolidated.

Andersson and Sernander were appointed Sweden's first associate professors in plant geography, but the controversy between them seems never to have abated, nor was a scholarly discipline established. On the other hand, the controversy reached a state of 'open closure' with the discovery and analysis of fossilised microflora. Pollen analysis as a quantitative method was developed by geologist Lennart von Post and others in connection with the peat bog inventory conducted by the SGU before and during the First World War. The advantage of pollen diagrams was that they showed when each individual species of tree had appeared in Sweden, as well as how the occurrence of each species varied over time and from place to place. However, one problem which arose was how pollen curves were to be interpreted chronologically. Like his predecessors, von Post used shoreline displacement and climate change as relative points of reference, but he also attempted to tie the pollen curves in with the historical time-scale with the aid of prehistoric finds which were archaeologically

dateable. With pollen analysis, a new way to interpret the past emerged. Both Andersson's and Sernander's results were revised.

Geology and plant geography went hand in hand, and so did geology and archaeology, although the latter traditionally belonged to an antiquarian discourse. There were several reasons for this. Most fundamental was the fact that archaeology had both developed and consolidated its identity as a scholarly discipline by adopting a scientific method. The typological method of the study of prehistoric finds was one step along the way, systematic collection and field excavation another. Among the geological layers and layers of peat lay also 'cultural layers' which could be analysed from a 'stratigraphic' perspective. At the same time, geology benefited from archaeology. While archaeology may not have directly lent geology scientific legitimacy as a discipline, the activities of the SGU could be further motivated since its taking an inventory of fixed ancient remains contributed to the organisation of the preservation of antiquities in Sweden. Moreover, archaeologists could supplement the geologists' own land elevation studies. From a comprehensive national perspective, archaeology would share the task of geology and historical plant geography: to chart Sweden's past since the Ice Age. Shoreline displacement became a common denominator for all three fields; the difference lay in the fact that natural scientists primarily employed 'natural landmarks' while the archaeologists used 'archaeological finds'.

This close association between the three fields also had social and financial dimensions. When the preservation of antiquities was centralised and professionalised with the foundation of the Museum of National Antiquities and the establishment of Nordic and comparative archaeology as scholarly disciplines, leading archaeologists flocked to Stockholm and Uppsala. Some of these individuals would begin to socialise with natural scientists, both privately and professionally. The Geological Society of Stockholm, the Swedish Society of Antiquities, and the Swedish Anthropological and Geographical Society all became meeting places. This intercourse was partly rhetorical in nature but in some cases also led to real collaboration in studies and archaeological digs, some of which were co-financed by the Royal Academy of Letters, History and Antiquities and the SGU. From the time of natural historian Sven Nilsson (active during the first half of the nineteenth century) to Lennart von Post, it was also not unusual that the same scholar dedicated himself to geology, plant geography and archaeology.

The perception that the earliest appearance of man in Sweden could only be understood in the light of shoreline displacement was already in evidence in the mid-18th century, but it was not until the second half of the 19th century that archaeologists (with the aid of natural scientists) began to take that idea seriously. While it was indeed the Ice Age which determined the ultimate starting point of the Stone Age, shoreline displacement became a significant factor in the study of when and whence the first men had migrated to Sweden and how the population subsequently spread throughout the land. In this, the archaeologists, like the botanists, shared the geologists' thought style on shoreline displacement.

Knowledge about shoreline displacement was applied in different ways within archaeological Stone Age research. Via comparative studies of shoreline displacement and archaeological findings, by the 1890s it was determined that the Stone Age belonged to the epoch of the 'second subsidence'. The localisation of finds from that period was facilitated as archaeologists received guidance as to where they should concentrate their studies – to the area around the highest shoreline of the Litorina Sea, or the 'Stone Age Sea'. Since the reigning perception was that the first men had come from Denmark, it was the Litorina shoreline in southern Sweden which roused the greatest interest. At the very moment Nordic and comparative archaeology were institutionalised at the University of Uppsala, Stone Age settlements were discovered in Uppland, and thus Stone Age research expanded rapidly there as well. From the placement of archaeological finds in relation to known quaternary formations, in marine clays or peat mosses, researchers could further supplement archaeological dating with geological dating. However, the geological dating consisted not only in determining the relative age of the remains; like the natural landmarks of botany, archaeological finds were related to stages in the development of the Baltic Sea and to the climate periods of Sernander, which among other things contributed to the theory of *värmetiden* and *fimbulvintern* (periods of thaw and extreme winter, respectively). It was moreover proposed that approximations of the rate of the land elevation could be used as a factor in the calculation of the absolute age of archaeological finds.

Alongside the excavations and dating inspired by geoscience, 'archaeological geography' also developed, whose idea was to attempt to examine the migratory and settlement patterns of mankind statistically, by comparing the distribution of habitats for Stone Age finds with local variations in shoreline displacement. A variation on this method was used in the so-called 'Provincial Survey' at the University of Uppsala, initially led by Knut Stjerna and thereafter Oscar Almgren. The ambition was to map each and every province, which would show the distribution of known unfixated archaeological relics and fixed remains from the Stone Age, at the same time as it charted topographic and geological conditions, including shoreline displacement. It was expected that conclusions could then be drawn about the historical distribution of the populace (and in certain instances about cultural development) in each province. Another, more criticised variant of the same method was employed in order to date place names in relation to shoreline displacement.

Even if archaeologists did not take the Stone Age datings for granted, they did generally trust the know-how of the geologists and thus integrated the narrative of Sweden's geographic development into their own reports on the Stone Age. However, at the outset of the 1920s, it proved that this integration gave rise to anomalies, and the idea of the highest Litorina shoreline as a coevally-formed seaboard was challenged. In this context, von Post and De Geer each independently proposed that pollen analysis and geochronology, respectively, could be used to date archaeological finds, which is exactly what happened.

The charting of Sweden's past, including the multidisciplinary research on shoreline displacement, resulted in comprehensive knowledge about the landscape and its post-glacial history. The results were remarkable, but during the 1920s there were indications that this knowledge, at least in part, contained problems which were related to the perception of the nature of shoreline displacement. Research in quaternary geology, plant geography and archaeology had been conducted for

several decades within the framework of a thought style wherein the subsidence and elevation of the land were viewed as the vera causa of shoreline displacement. The various research fields backed up and legitimised one another and a common system for understanding 'Swedish' nature and culture had been compiled, visualised and constituted. While anomalies had indeed emerged with the expansion of the research field, it seems as if scholars tried for as long as they could to approach these within the confines of the reigning thought style. The first subsidences and elevations were supplemented with first one, and subsequently several more post-glacial land oscillations. The peak was reached during the 1920s when no fewer than five were proposed. The course of events is reminiscent of the attempts to salvage Aristotelian cosmology with the inclusion of new epicycles in the movement of the planets. The results were also the same: a mental 'Copernican turn' finally occurred, and with that the thought style was forever subverted.

In its stead, a new apprehension of shoreline displacement was established at the end of the 1920s, whereby it was no longer interpreted as vertical transformations in either the bedrock (isostasy) or the ocean surface (eustasy), but rather as both. The idea broached was that the pressure of the inland ice had generated just one subsidence and one elevation. On the other hand, several changes in the position of the ocean surface had occurred, primarily due to climate variations influencing the size of the glaciers. This new multi-factor explanation, whose breakthrough coincides with an increase in Scandinavian research collaboration after the First World War, was arrived at by polar researcher Fridtjof Nansen and geologist Wilhelm Ramsay, among others. Understanding shoreline displacement now became more elementary, at the same time as the narrative of Sweden's geographic evolution became more complicated than before. Conventional plant geographical and archaeological interpretations based on that narrative now found themselves in a problematic situation.

However, the charting of Sweden's past resulted not only in more or less plausible scientific theories. On one fundamental level this survey also contributed to unifying national identity and territory through its very articulation of the landscape and its components. Institutions, conferences, collections, texts, maps – while all this was a result of a professional scientific activity, it also became part of a Swedish nationalising process. 'Vertical territorialisation', to quote Bruce Braun, also led to the nature (and culture) within the borders of Sweden drawn up in 1809 being lent a long and coherent evolutionary history. What was conjured up was an apprehension of a natural tradition – a 'natural legacy' – which was 'Swedish' and which for that very reason was bestowed with special value. The landscape, both past and present, had been nationalised.

The survey had enormous significance for the new image of Sweden which burgeoned around 1900, an image in which not only 'Swedish culture' but also 'Swedish nature' were central components. The present dissertation concludes with two concrete examples of this. The first is comprised of the national survey books of the turn of the century, a 'literature about Sweden' which intertwined knowledge of Sweden's past with a description of contemporary Sweden reproduced for a wider audience. The second example is illustrated by the early rustlings of the Swedish conservation movement, through which certain quaternary natural landmarks were granted the status of 'natural monuments' worthy of preservation. The value of these natural monuments lies in their scientific significance, while at the same time becoming national symbols of a collective identity and collective memory, related to the idea of a Swedish natural legacy.

Christer Nordlund, Umeå

Hans Conrad Escher von der Linth (1767–1823) and Johann Gottfried Ebel (1764–1830): Two Representatives of the Early Epoch of Alpine Geology in Zürich

The work and personalities of Hans Conrad Escher von der Linth (1767–1823) and Johann Gottfried Ebel (1764–1830) have recently been honoured by reviews and reprints. Johann Gottfried Ebel was born on 6 October, 1764, in Züllichau in Prussian Silesia (Poland). He died on 12 December, 1830, in Zürich. He was a medical student in Frankfurt an der Oder, completing his studies in 1788. In 1790, he paid his first visit to Switzerland. He was in Zürich for two years, during which time he undertook many excursions into the Alps, being greatly impressed by the scenery and nature of the mountains; and he showed deep interest in the land, the people, and their customs and institutions. During this time he became acquainted with Hans Conrad Escher and many other personalities in Zürich. Like many of his 'Enlightened' contemporaries, he was suspected of having sympathies for the French Revolution, so he did not return to Prussia but lived in Frankfurt am Main, a liberal town like Zürich. During this period, he prepared his *Anleitung auf die nützlichste und genussvollste Art in der Schweiz zu reisen*, first published in 1793 in two volumes and later in 1809–1810 in four volumes. The publisher was Orell Füssli of Zürich. It was the first tourist guide-book of Switzerland and contained an astonishing amount of geognostical and mineralogical information, indicating Ebel's special interest in geology. Owing to the political situation in Germany, Ebel returned to Switzerland in 1810, becoming a citizen of Zürich, where he lived until his death in 1830.

Ebel's two-volume *Ueber den Bau der Erde in dem Alpen-Gebirge* was published by Orell Füssli in 1808. This work represented the first, and for a long time the only, attempt at a geological synthesis of the Alps and their foreland. It includes a geognostic map of Switzerland and Savoy on a scale of 1: 1 333 000, a map of the highest mountains in Europe, in four colours, with geological sections and panoramas. Ebel's theoretical base was derived from the ideas of Abraham Gottlob Werner and Peter Simon Pallas. His data were derived from his own observations and those of numerous correspondents and colleagues, of whom Horace-Bénédict de Saussure and Hans Conrad Escher were the most important. Ebel was an adherent of the 'ultra-autochthonist' system. Primitive Rocks, which supposedly formed the core of the Alps, were precipitated from the 'broth' of a 'primordial ocean', in their present steep-standing position. Thus, unlike de Saussure, Escher, and Leopold von Buch, Ebel did not have the concept of tectonic deformation; and in order to accommodate his 'facts' (observations) to his theory he was often obliged to 'stretch' the evidence. For this reason, he was severely criticised by his contemporaries, especially Escher, and has been largely ignored by modern geologists and historians.

Now, nearly two centuries later, Sibylle Franks, Rudolf Trümpy, and Josef Auf der Maur (2000) have presented an excellent view (in 68 pages) of Ebel's early effort to formulate a genetic theory of the Alps, entitled *Aus der Frühzeit der alpinen Geologie: Johann Gottfried Ebels Versuch einer Synthese (1808)*. It appeared as *Neujahrsblatt herausgegeben von der Naturforschenden Gesellschaft in Zürich auf das Jahr 2001*. In addition to the review of Ebel's work, the authors provide an interesting, carefully documented picture of early nineteenth-century geognosy. The book is warmly recommended to all those interested in the history of Alpine geology.

Interest in the work and personality of Hans Conrad Escher (1767–1823) has been stimulated by the establishment of the *Linth-Escher-Stiftung* (Foundation), in Mollis, Glarus Canton, in 1993. A descendent of an aristocratic Zürich family, Escher represented the typical universal scholar of the Enlightenment. Besides his deep scientific interests and his abilities as draftsman and painter, he was a prominent politician and statesman, teacher, businessman, and humanitarian. He was the initiator and driving force behind the famous *Linthentreprise*—the first large-scale Alpine river 'correction'. He was honoured by the addition of 'von der Linth' to his name, to acknowledge his great and unselfish contribution to the project. Every year, he undertook excursions and travels in the Alps, and his sketches, drawings, and panoramic views represent the largest collection of landscapes of Switzerland in the years 1780 to 1822. Escher was deeply interested in geognosy and mineralogy and probably had the best knowledge of the geology of the Swiss Alps in his time, sufficient to know something about the complexity of composition and structure of the Alpine rock units. In contrast to Ebel, he was reluctant to publish any speculative results from his observations. His motto was *Zweifel ist besser als Irrtum* ('Better to doubt than err').

In the autumn of 2002, the Linth-Escher-Stiftung (<www.linth-escher.ch>) will publish a *Werkverzeichnis* (work-catalogue) of Escher von der Linth, in a volume of about 440 pages, with over a thousand illustrations and folded panoramas, with texts in German and English.

Nazario Pavoni, Adliswil

AWARD

Walter Oscar Kupsch: Citation for the 2001 History of Geology Divisional Award

Walter Oscar Kupsch, Professor Emeritus of Geology in the University of Saskatchewan, has enjoyed a sixty-year love affair with the science of geology throughout which he has taken every reasonable opportunity to expose and interpret the history of the science. This has been done in part through sustained service to a variety of professional organisations but mainly through his own researches, the pursuit of which straddles key events in his career and the rich comprisal of geological and related fields in which he has engaged. Three disparate examples make the point.

Post-doctoral appointment to the faculty of Saskatchewan's provincial university in 1950 formed the backdrop to Kupsch's studies of certain critical geological blocks of the prairie heartland. Review of prior investigations in these led him to evaluate the written records left by three illustrious figures in medicine and science who had been members of exploratory expeditions to British North America in the early to middle nineteenth century. Exposition of this fascinating chapter in the history of the Canadian Great Plains can be found in *Pioneer Geologists in Saskatchewan (1955)*, written by Kupsch for the province's golden jubilee.

Appointment as Executive Director of the Carrothers Commission on Government of the Northwest Territories in 1965 was the first of a series of prestigious positions held by Kupsch that fuelled latent interest in the Canadian North and brought him face to face with the history of exploration of what he himself has called, 'a vast, empty, cold country'. *Living Explorers of the Canadian Arctic (1986)*, with Shirley Milligan, is merely one of the historical works that developed from his Arctic interests.

Finally, the discovery of rich uranium mineralisation in the Athabasca Basin of northern Saskatchewan in 1972 generated in Kupsch an interest in the history of mineral exploration, an interest that burgeoned in subsequent years and led to the inclusion of other kinds of industrial and of precious-metal deposits. The uranium story was summarised historically in his lengthy 1978 paper, 'From Erzgebirge to Cluff Lake—a scientific journal through time'.

Kupsch's predilection for the history of geology has its roots in the elementary- and high- school education he received prior to WW II in his native Netherlands—an education forcefully shaped by the historical tradition. In like fashion, his geological breadth and versatility can be traced to experiences in the University of Amsterdam and, subsequently, the University of Michigan. As an undergraduate student in the former, he had to satisfy a broad-based geological curriculum that did not permit elective specialisation and, as a graduate student (MSc, 1948; PhD, 1950) in the latter, he was directed by one of North America's renowned geological generalists, Professor A. J. Eardley, who by engaging him in field-based regional interpretations required that he draw upon the full range of his diverse undergraduate training. What distinguishes Kupsch's historical work is the thoroughness with which he has treated the observations of his predecessors and the skill with which he has drawn from them interpretations that are readily reconciled to modern concept and principle. As a youth in Europe, he may have studied the writings of Johann Wolfgang von Goethe (1749–1832). Certainly Kupsch's historical research allows us to understand exactly what Goethe meant when, with mineralogy and geology the focus of his thoughts, he made his now-familiar remark: 'The history of science is science itself'.

W.G.E. Caldwell, 28 August, 2001

[We are informed that no award of the Sue Tyler Friedman Medal was made by the Geological Society in 2001. Ed.]

IN MEMORIAM

Dr Gábor Csiky (1915–2001)

The Grand Old Man of the History of Hungarian geology passed away in Budapest, on 8 November, 2001.

Born at Kiskapus, a small Transylvanian village of historical Hungary, he attended primary and secondary school in the Saxon towns Segesvár/Sighisoara and Brasso/Brasov/Kronstadt. (Hence he was fluent in German.) In 1920, the Trianon Peace Treaty adjudged Transylvania to Romania.

Gábor Csiky studied Natural History and Chemistry at the Bucharest University, and eventually did military service in the Romanian army. After graduation (June 1940) he moved to Kolozsvár/Cluj/Klausenburg, which at that time was recently 're-attached' to Hungary. He started his professional career at the Department of Geology of the Hungarian-language university of Kolozsvár. But only a few months later Csiky moved to the capital of Hungary, and became Assistant of Professor A. Vendl at the Department of Geology and Mineralogy of the Technical University in Budapest. His PhD thesis dealt with the petrography of Transylvanian dacites.

In 1942 he was employed by MANÁT (the Hungarian–German Oil Company)—to be involved in oil and gas exploration for thirty-four years (until 1976). In early 1945, serving in the Hungarian artillery retreating before the advancing Russians, Dr Csiky was taken prisoner by the US Army in Germany. A few months later, safely back home, he married Margit Hrivnák, and in January 1946 obtained a job with MASZOVOL (the Hungarian–Soviet Oil Company). Holding various posts, Csiky directed successful oil explorations in different prospective areas of the Great Hungarian Plain. 1951–1954 he served as the Chief Geologist of the Division of Geophysics. Having retired from OKGT (the National Oil and Gas Trust) in 1976, he went on working for the Geological Institute of Hungary until 1991 (when he was 75).

From 1960, Dr Csiky became increasingly interested in the history of Hungarian geology. He was one of the founders of the Section for the History of Hungarian Geology of the Hungarian Geological Society, and was elected successively its Secretary (1975), President (1986), and life-long Honorary President (1997). He was also a member of the Commission on the History of Science and Technology of the Hungarian Academy of Sciences, and for twenty years he was editor of the *Annals of the History of Hungarian Geology*.

A Full Member of INHIGEO from 1976, and as such the representative of Hungary, Dr Csiky attended five INHIGEO Symposia: Münster 1978, Paris 1980, Budapest 1982 (which he masterminded brilliantly), Pisa-Padova 1987, and Dresden 1991. In 1995, for his 80th birthday, a Special Issue (No.7) of the *Annals of the History of Hungarian Geology* presented the full list (439 items) of his papers, with congratulations from Ursula B. Marvin, at that time Secretary General of INHIGEO. Later he added two more papers.

I am glad to report that Dr Csiky was duly appreciated in his beloved home country. An Honorary Member of the Hungarian Geological Society, he was awarded its *Pro Geologia Applicata* Medal, the Science and Technology Association (MTESZ) Prize, the Golden Miners' Medal of Merit, etc.

He maintained his interest in the history of Hungarian Geology until the very last day of his life.

Dr Csiky was a faithful devotee of Science, Hungary (including Transylvania), and God. (He professed the Unitarian faith.) His work will not only be remembered: it is being and will be continued in the same spirit by his grateful colleagues and disciples.

Endre Dudich, Budapest

INTERVIEW WITH URSULA MARVIN

KENNETH TAYLOR

Ursula, would you please say a bit about where you came from, and how you became a scientist? I understand you grew up in northern New England.

URSULA MARVIN

I am indeed from northern New England. I was born in a rural countryside in Vermont. Our family lived on a high terrace overlooking the Connecticut River, with the White Mountains of New Hampshire dominating the skyline to the east. It was one gorgeous scene by daylight or moonlight—best of all was just after sunset when a breathtaking alpenglow lit up the mountains in shades of peach and purple. Living in that landscape gave us all a great love of the out-of-doors.

How large was your family?

We were five: my father, mother, a brother ten years older, and a sister eight years older.

So you were the baby?

Yes, I was the baby. To give you some idea of how far away and long ago that was, my mother once showed me a record indicating that for 1921 our doctor charged \$12.00 for delivering me (at home) and caring for all the rest of the family.

Was it a foregone conclusion that you would go to college?

Yes, it was a foregone conclusion that all three of us would go to college. My parents placed a high value on education. My father had graduated from Tufts College in Massachusetts, in 1908, and made his career as an entomologist directing programmes of plant-pest control for the Vermont Department of Agriculture. My mother had spent a year at Mills College in California and then taught school for several years.

Did you choose Tufts College because your father went there?

Probably, although I wouldn't have admitted it at the time. My father never put any pressure on us to go to Tufts, but my brother went there as an undergraduate and then on to medical school at the University of Vermont. He wanted no part of city living, so he opened a general family practice in a small town. (That childhood scene, I'm sure.) My sister went to Middlebury

College and majored in biology, then got a Masters Degree in Guidance Counseling at Columbia. When my turn came, I felt adventurous. I wrote to far off places, including the University of Saskatchewan and to Rollins College in Florida. I never got an answer from either of them. So I chose Tufts, partly because it is close to Boston where I could go to museums and plays, and partly because of its beautiful campus, built on a high oval hill (a glacial drumlin) overlooking the city. I used to ski down the slopes every snowy evening when I could find the time.

You majored in history at Tufts, isn't that right?

That's right. I'd been interested in history all through school. One thing I felt certain of was that I never would want to be a scientist. However, in those days every undergraduate at Tufts had to take two full years of science. So, like all majors in history, music, fine arts, or whatever, I took a year of introductory biology. Biology can be fascinating. My sister certainly thought so, but my course was overcrowded and hurried and it turned me off so completely that I gladly would have ignored science for the rest of my life.

I had to have another year of science, though, so I took introductory geology. That time, something struck a chord—in the very first lecture. When Professor Robert L. Nichols, a speaker of immense force, began talking about continents and oceans and how they have changed and evolved over long periods of time, I was spellbound. I'd never known that there was a science of the Earth. I worked hard in geology, earned top grades and then I went to Nichols and told him I wanted to change my major from history to geology. "No", he said, "you cannot major in geology". "You should be learning to cook!".

He wouldn't say anything like that to you today.

He certainly wouldn't. It would be illegal anywhere in America. But it was perfectly legal back then and would remain so for the next thirty-five years.

Was it just geology that the professor thought was off limits to women, or did this apply to all the fields of science?

I think it was mainly geology. Nichols was very much what we now would call a 'macho' man. To him, the heart and soul of geology meant long months of strenuous fieldwork in remote places, which would be no life for a woman. Also, he thought of majors as training for careers and he knew there were essentially zero opportunities for women in geology. (Before we leave this topic, let me say a good word for Bob Nichols: we became good friends in later years and he helped me in numerous ways.)

So with a degree in history you decided to go to graduate school in geology anyway?

Yes. I knew it would be self-defeating to challenge Nichols' authority outright, so I fulfilled my requirements as a history major while fitting in all the geology-related courses I could. I found time for mineralogy, geological mapping, and some physics and math. Meanwhile, World War II had begun, Nichols had taken off for some distant place, and one of the substitutes that came to teach geology was Dr Katherine Fowler-Billings, wife of Marland Billings, the structural geology professor at Harvard. She had spent years in Sierra Leone, directing teams prospecting for gold. I didn't fancy anything quite like that, but now I knew that women geologists existed. When I asked her about graduate work she gave me the excellent advice to apply to Radcliffe. By the time I graduated from Tufts in 1943, there was a great hue and cry up and down the land for more women in science. So, despite my decidedly spotty preparation I won a full tuition scholarship to Radcliffe for graduate work in geology! Of course, I had to do an immense amount of hard work there, and I didn't cover myself with glory, but I stayed the course.

So you took a Masters degree. With what sort of focus?

Mineralogy. After my first year in graduate school I got a research assistantship with Professor Esper S. Larsen, Jr. I didn't realise it at the time, but that made me the first woman research assistant in the geology department at Harvard. I took courses half-time and worked for him half-time, partly on a project to study uranium ores from Katanga on his grant from the Manhattan Project. Then, after the war ended, new students and veterans on the GI Bill came flocking into the department in such numbers that there was a dearth of teaching assistants in Professor Kirtley F. Mather's popular introductory geology course. So Mather persuaded the faculty to let him hire me as a teaching assistant—another first! In his recent biography of Mather, Kennard Bork says that Mather had been trying for years to hire women as teaching assistants, but the faculty always vetoed the idea.

I understand you also went to the University of Chicago for a few years.

Yes, I got my Master's Degree in 1946 (bearing the signatures of the presidents of both Harvard and Radcliffe). Meanwhile, in 1944, I had married my sweetheart from Tufts. After he came home from the war we went to Chicago where he attended Northwestern Dental School. Oddly enough, I landed a job as research assistant to Dr Julian Goldsmith in the Department of Geology at the University of Chicago—even though I was not registered as a student there. Julian was creating artificial feldspars in his electric furnaces and I performed optical and x-ray studies of the products. The x-ray generator arrived in the laboratory while I was there and for a short while I was its most experienced operator.

But you came back to Harvard.

Yes, in 1950, we left Chicago and soon afterward my husband and I split up. Then I went back to Harvard to finish my PhD. There, I met Tom Marvin who was just back from six years of doing mining geology in the Andes. Within a year we decided to marry. Meanwhile, Tom was being bombarded with letters from an American colleague, Donald F. Campbell, who had married a Brazilian and founded his own mining company there. Don offered Tom a princely salary to come back to South America to work with him. Tom said "No", and "No" again. Then, he said: "No, because I am getting married to a geologist". Don wrote back: "Great, bring her along. You can work together; we will pay all her expenses". This looked like too good an adventure to pass up. So we married on April 1st, 1952 (the day my divorce became final) and left for Brazil in May. We both had finished our courses for the PhD and passed the required reading tests in French and German. Tom also had passed his comprehensive oral exam, but I hadn't taken mine.

So what did you work on in Brazil?

We were assigned to search for manganese oxide deposits in the region of Corumba, the northernmost port city on the Paraguay River. Corumba is on the border with Bolivia and not far north of Paraguay, almost in the centre of South America. One large manganese deposit was known there and we went looking for more of them.

So this was jungle?

Not at all. It is a region with a long dry winter, when cactuses thrive, and a wet summer when palms, green trees and vines proliferate, making an exotic mix. Much of the country is fairly open and used for cattle ranching. But during the winter, the lowlands fill with waters draining from all around—the eastern slopes of the Andes, the southern rim of the Amazon basin, and highlands to the east. These waters create El Pantanal, the largest flood plain in the world. People count on this and move their herds to higher ground when the floods come. When we arrived, the water was high and we found it to be a tropical paradise of birds, flowers and an abundance of alligators.

How did you get around out there?

We had a jeep we drove over roads and rough trails, but sometimes we arranged for men from the ranches to paddle us in their dugout canoes, over pastureland and fences to the mountainsides. We carried hammocks—the standard gear for sleeping—and camped in ranch buildings or between trees from time to time. It was much easier to get around in winter than it was in summer. The waters had drained away by then, but the rains came and the vegetation grew explosively.

How long did you stay there? I know you eventually got to Africa.

We had agreed to spend a year in Brazil. After six months we had found a previously unmapped bed of manganese oxide and things were looking up. Then Tom got a telegram from Don saying: "Come to Rio next Saturday. Bring Ursula."

This put us into a tizzy—especially me. I assumed Don was including me because he thought I would resent being left by myself in the wild west of Brazil. But I liked Corumba and would gladly have stayed there. What I did not relish was the prospect of the 950-mile flight to Rio in the small plane that bobbed up and down all along the way.

But I am guessing that you did go.

Yes, we decided to obey orders. And it was fortunate we did, because Don had one question for us: "Would you sign on for another year, or at least for another six months, and go directly from here to Angola?" When Tom caught his breath, he asked: "Where is Angola?"

Don showed us a map of Africa with Angola stretching southward along the Atlantic coast from the equator to "Southwest Africa" (Namibia), and eastward to "Northern Rhodesia" (Zambia) and the Congo. Angola was a Portuguese colony at that time, and Tom's skill with Portuguese, as well as his knowledge of mineral deposits, would be a great asset. Don didn't know what fieldwork would be like there, but he said that, if possible, we still could work together. Then Don said: "Don't hurry. Take your time, go out on the beach and talk it over. Just let me know by tomorrow noon."

We very nearly said, "NO". It upset all our plans for going home and finishing graduate school. But by the next morning we were so intrigued that we signed on for a year in Angola.

What was your life like there?

Fieldwork in Angola turned out to be easier than it had been in Brazil. We worked mainly in fairly open plateaus where the trees were far enough apart to allow us to drive our truck across the countryside. The highlight of our stay was a five-month tenting expedition through the highlands near the source of the Zambezi River. To get there, we loaded our truck and two tents, one for us and one for geochemical prospecting equipment, plus lots of supplies, onto the railroad at Nova Lisboa (Huambo), where Don had set up his headquarters, and rode to Vila Teixeira de Sousa (Luau) on the Angola side of the border with the Congo. Two Africans, José, an elderly cook, and Antonio, a general aide-de-camp, came with us. Both spoke Portuguese, as did many of the people we met, except in very remote villages.

Wherever we set up our tents, women would come each morning to sell us fresh produce: corn, beans, squash, mandioca, eggs, live chickens. There were herds of antelope around and we saw plenty of elephant footprints and spoor but caught no glimpses of elephants. At first, we thought we were camping on the same series of rock formations that were enriched in copper farther east in "Northern Rhodesia." Not so. We found no valuable minerals in that part of Angola.

Was that discouraging for you?

Not really. We had come to look; someone else would have done the mining, if any. What interested me most were the people; we interested them, too. Many of them never had seen a white woman, so they pointed me out to their children. The people assumed that we could serve as medical doctors and they often called on us for help.

My most memorable experience occurred while Tom was away for a few days replenishing our supplies and picking up our mail. Our head man, who was a brother to the king of the Lunda people, asked if I could cure his new, young wife, whose foot was so painfully swollen from a cut that she could not walk. I had to do what I could. First, I gave her some aspirin; then I sterilised a razor blade and, with great trepidation, made a small cut near the source of the swelling. Puss exploded out in long white ribbons, while I held her foot gently but firmly over a basin. Out came almost a cup of it, to her great relief and mine. Then I cleaned the wound with alcohol, put on some iodine, and bandaged it. Any of us would need antibiotics and crutches to recover from an infection like that. But the next day she was up and around, healed and happy. Her husband was happy, too. He gave Tom a glowing report of my medical skills.

When did you leave Angola?

We left in the spring of 1954, sailing 2nd class to Lisbon in *The Quanza*, a small Portuguese steamer. We passed through mile after mile of floating pink-bladdered Portuguese Man-o'-War jellyfish, and were accompanied much of the way by flying fish. We crossed the equator almost exactly at the prime meridian, and observed a thick infusion of yellow Saharan dust over the coast of northwestern Africa.

That gets you to Europe, what then?

We had two months of paid vacation coming to us, so we took the train from Lisbon to Paris, bought a small car, and drove to southern Spain, back to Barcelona, across the French Riviera, and on to Milan where we stayed a few days. Then we drove over the Brenner Pass (just after the last snow melted away) to Innsbruck, which we found to be so stunningly beautiful that we stayed nearly a week. Finally, we drove through West Germany to Copenhagen. We explored Denmark at bit and then stowed our car and a Leitz ore microscope, which we had bought at Wetzlar in Germany, on the good ship *Stockholm*, and sailed for New York. (A few years later, the *Stockholm* gained doubtful fame by ramming and sinking the Italian liner, *Andrea Doria*.)

So, did arriving in New York end your responsibilities with the mining company?

No. Don Campbell's explorations were underwritten by the Union Carbide Corporation, so Tom wound up on their payroll for as long as he wanted to stay. Carbide had a new chief geologist who sent us on several interesting assignments. I began writing my own reports of work I was doing, and soon I was offered a full time job at one of Carbide's research laboratories—or, if I wanted to continue to work with Tom, they would pay me a half-time salary with all expenses.

Today they would pay you both full-time.

They surely would. But at the time I happily chose half-time. To be sure, they got two geologists for the price of 1 Ω , but I got the life-style I wanted. In 1956 they sent us back to Brazil. This time we lived in Rio, in an apartment looking down on Copacabana Beach, and examined mineral deposits in Bahia, Minas Gerais, and Ceara.

How long did you stay that time?

Nearly two years. Then the Corporation wanted Tom to open an office in Rio and serve as its director. He decided against that so we came home and resigned from Union Carbide.

Where did you come home to?

All that time we had been sub-letting our apartment in Harvard Square (while the rental price rose from \$45 to \$60 per month), so we came home to Cambridge. But by that time, neither of us was seriously planning to take up graduate school again, so we were looking for jobs. Tom began consulting for various companies and two things happened to me:

First, Professor Clifford Frondel, who had been my adviser at Harvard, asked if I would join him in a project to study the mineralogy of the meteorites in the Harvard collection. The Space Age had dawned and he realised what a precious resource he had as its curator; he also realised that I had exactly the expertise he needed—if he could raise a research grant.

Second: Professor Robert L. Nichols knocked on our door at 8.00 o'clock one morning and asked if I would come and teach mineralogy at Tufts for the fall semester—which was beginning the next week. Suddenly, he needed someone to fill the job.

Which offer did you accept?

Both! I taught part-time at Tufts for the next three years, while the meteorite project went through several revisions before it was funded. By then, Frondel had entered into a collaborative study of meteorites with Edward L. Fireman, at the Smithsonian Astrophysical Observatory, which was situated nearby under the same roof as the Harvard College Observatory. Frondel provided the meteorites and the expert mineralogist (me), and Fireman paid me.

That sounds like a good arrangement.

It was, but then an even better one came along: I was offered a permanent job at the Smithsonian as a federal civil servant. Such a position, with its high degree of security, sounded splendid to both of us, so I took it. I joined the Smithsonian Astrophysical Observatory in 1961 and retired in 1998. Meanwhile, in 1973, the SAO had been linked with the Harvard College Observatory in the new entity called the Harvard-Smithsonian Center for Astrophysics. As a 'classical' geologist who knows nothing about astrophysics, I feel rather odd having such an address, but we were directed to use it on all our publications and correspondence.

So, you came to the Smithsonian to do research on meteorites.

Yes, and I enjoyed it immensely. After a few years we were preparing to work on samples to be brought back from the Moon by the *Apollo* missions. Those were exciting times.

Your CV shows that you got your PhD from Harvard in 1969.

I did. I had given up all thought of getting the degree, when the Department offered me the opportunity to take the comprehensive oral examinations I had missed in 1952, and use my publications on meteorites in lieu of a thesis. I was the third former student who was making a career in geology to whom the Department offered this arrangement, so I took it, gladly.

How did you get into the history of geology?

In an indirect manner. In the spring of 1966, the Assistant Director for Science at the SAO asked me if I would give a seminar, toward the end of the summer, on crustal motions across the East African rift valleys. At that time, satellite tracking for NASA was the biggest project at the Astrophysical Observatory, and expectations were high that new tracking techniques could be used to pin-point the locations of stations on the Earth to within a few centimetres. So they were very interested in what was known about crustal motions.

As usual, I nearly said "No". I knew nothing whatever about motions across the rift valleys and my thought were taken up by meteorites. But this was our Assistant Director, and I did know where there was a good library, so I said, "Yes". I began reading about the rift valleys, and even ordered a book to be bought by the library. Then, in early June I had lunch with a colleague who had just received the programme for the summer seminar. (I had not.) He said: "I see that you are giving us a session on continental drift. I didn't know you were an expert on continental drift." At first, I was speechless. Then, I asked him when I was giving my seminar on continental drift. He said early in July. I thought: "Shall I tell him right now what an expert I am on continental drift; or shall I let him wait four weeks and find out for himself?"

Which did you do?

I let him wait.

Didn't you protest to the Assistant Director about the switch in your topic?

No. Continental drift was, by far, the more interesting subject. I knew all the arguments against continental drift from having been educated at Harvard by Professor Marland Billings and others. Since then, I had observed that in South America all the geologists took continental drift for granted—they didn't even realise there was any controversy about it. The same was true in Angola and among the South Africans we'd met. Clearly there was an intellectual—or perhaps a psychological—barrier separating geologists on this subject, although the same scientific information was available to everyone. I was eager to look into this situation.

I finished lunch that day as soon as I could and went to the library. There, I found the newly arrived *Symposium on Continental Drift*, a collection of papers, compiled by P. M. S. Blackett, Sir Edward Bullard, and S. K. Runcorn, from a meeting sponsored by the Royal Society of London in 1964. It was like sitting down to a feast. It included the best arguments in favour of drift that I ever had read, along with the familiar ones against it. Next, I sought opinions from all the professors I could find at Harvard. The geophysicists would have none of it. Then I went to MIT and had the luck to meet with the geochronologist, Patrick M. Hurley, who said that he had gone to the London meeting a fixist and come home a drifter. Subsequently, Hurley had organised a project of dating samples of rock provinces on the coast of Brazil and testing whether they would match those of similar compositions and ages in West Africa when plotted on the computer-generated pre-drift map shown at the symposium by Sir Edward Bullard.

What did you say in your seminar?

I reviewed the arguments even-handedly, I thought, although some attendees detected a slight anti-drift bias. But then I had six months in which to write a chapter for a Special Report of the SAO. Those six months were the crucial ones in which new data compelled a decisive switch of opinions in favour of drift. Hurley's dates on rock provinces across the Atlantic matched spectacularly well; dated samples of basalts with normal and reversed remanent magnetism established the timing of pole reversals for the past four million years; the concept of transform faults took effect; and the basic idea of ocean floor-spreading came into its own. My chapter presented the latest evidence for drift, soon to evolve into plate tectonics.

So then you wrote your book?

First, in 1968 I was asked to write an article for Volume 1 of *Geoscience News*, a magazine that didn't last long. Then in 1969 the Smithsonian Press asked me for a book on continental drift, written for general readers with an interest in science. They suggested that it be "discursive". I looked up "discursive" in two dictionaries: one said "covering a wide range of topics", the other said, "moving from topic to topic without order". Both said, "rambling". I decided to write the book according to the first definition, but without rambling. If I was to do all that work, however, I wanted to collect royalties, if any. That meant that I must write the book in my own time—during evenings, weekends, and vacations—while carrying on full-time research on meteorites and lunar samples. This took three years—much longer than if I had assigned the royalties to the Smithsonian, but I greatly enjoyed the process. I got very curious about what people in the past had thought about continental distributions, so I traced ideas back to ancient times. Then I brought them forward to the advent of plate tectonics. So my one and, so far, my only book, *Continental Drift: the Evolution of a Concept*, was published in 1973. Once I saw it, I was struck for the first time by the realisation that this was a history book. So, Ken, that is my long-winded answer to your question of how I got into the history of geology.

I'm afraid your book is out-of-print now.

Yes, long since. Much to the surprise of Smithsonian Press, it went through three printings in the first year and a half. And before long they wanted to reprint it in paperback. No doubt I should have said, "Yes" early on, but I knew it had a few mistakes I would want to correct and that many out-moded ideas should at least be identified in a preface. The science was moving so fast that I knew I never should try to bring it up-to-date. But I was especially encouraged to go for a reprint when I got a visit from I. B. Cohen, the professor of history of science at Harvard, who brought a student to my office to discuss a project with me. He liked my book very much and said he would be willing to write a preface for the reprint. I was delighted, and planned to get at it in just a short while. I planned "to do it in a short while" for years. In fact, however, I was getting deeper and deeper into research and teaching, and then I was elected to the Board of Trustees of Tufts College and that made immense demands on my time. So I never did prepare the book for reprinting. Now it is much too late. I'm certain, though, that the book must have been the main thing for which I was awarded the GSA History of Geology Award in 1986.

You mentioned teaching, were you back teaching at Tufts?

No. In 1974, I was offered an opportunity to teach a course in the Geology Department at Harvard. I chose to give a course that could be taken by students in any department in the university. I called it: "Seminar on the Resolution of Scientific Problems". It attracted mostly geologists, of course, but I also got a few English majors, pre-meds, a history of science student or two, and one from the School of Design. I insisted that they all avoid jargon and talk and write in language all the others could understand. I taught it every second year from 1974 to 1992.

I know you've written articles and given many talks on the history of meteorites and impact structures.

Yes, I've done numerous studies on those subjects—always finding new things by searching through original sources. I hope to organise this work into a book some day.

When did you first begin to attend INHIGEO meetings?

In 1975; though I didn't realise it was an INHIGEO meeting until afterward. That year I was the president of The Meteoritical Society, which was holding its annual meeting at Tours, France, in late July. While perusing some magazine or other I noticed that a "Centenary Symposium" in honour of Charles Lyell was to be held in London in early September with a prior excursion in Scotland. I suggested to Tom, that after Tours we should go bird-watching in the Pyrenees until it was time to

take a ferry to Britain for the excursion and the Symposium. I even put in an abstract titled: "Meteorite Impact Structures and Lyellian Uniformitarianism". So I participated in that Lyell Symposium. We knew few people at the meeting except Cecil Schneer, the American mineralogist and historian, but we enjoyed meeting many others. I was particularly pleased to meet Gordon Davies, whose book, *The Earth in Decay* I'd just read and enjoyed. The next year we attended the International Geological Congress in Sydney, Australia, where I spoke on lunar rocks, and also on the significance of the impact craters of Wabar, Arabia, in the history of geology session.

I remember that you and Tom both came on the History of French Geology tour led by François Ellenberger before the IGC in Paris in 1980.

Yes. We would not have missed that for the world. There again, I spoke at both a technical session and a history of geology session, and I began doing the same thing at meetings of the Geological Society of America. Before long I was elected to the Executive Committee of the U. S. Committee on the History of Geology, and in 1982, I chaired the History of Geology Division. I also joined the History of Earth Sciences Society. By 1984, Cecil Schneer decided to relinquish his positions in INHIGEO as the full member from the USA and Vice-President for North America, and nominated me to replace him. I was elected as a full member of INHIGEO in 1984 at the IGC in Moscow, and as the V. P. for North America at Pisa in 1987. To finish this recital, in 1989, I was elected as Secretary-General of INHIGEO at the meeting in Washington, D. C. I served two terms until 1996 and enjoyed it enormously.

It sounds as though history began to take over from your research during all this time?

It did, to some extent, but not entirely. I asked the Director of the Center for Astrophysics if my activities in history were acceptable and he said yes, as long as my research on space rocks remained first priority. I continued studying lunar minerals and discovered a new rock type, a cordierite-spinel troctolite, of such broad interest that my paper was published as a cover article in *Science* in 1989. And we've not even mentioned my field seasons in Antarctica.

That's right. I had it in mind to ask about your work in Antarctica.

Briefly, the discovery that meteorites sometimes occur in concentrations on patches of the Antarctic ice sheet was made in 1973, when two Japanese scientists reported analyses showing that four of nine meteorite fragments found close together on a patch of ice were not broken fragments of the same body but were pieces of completely different kinds of meteorites. This astonishing news conjured up visions of flow patterns in the ice carrying meteorites of all ages and types shoreward, but sometimes stranding them in placer deposits, particularly where the ice stagnates behind mountain ranges. Japanese search parties found such concentrations in 1974 and 1975, and American-led teams have collected meteorites in Antarctica every austral summer since 1976.

Hearing of this, I had to go to Antarctica, so I asked the team leader, Professor William Cassidy, of the University of Pittsburgh, to include me in an expedition. He did so, not once but twice. First in the 1978–79 season, and again in 1981–82. I was the first woman to go, but women have joined the teams nearly every year since then. Working in Antarctica is a marvellous experience. We tented and searched in gorgeous mountainous regions. By dressing for the cold we kept comfortable, and I loved having twenty-four hours of daylight. By now, teams from Japan, the USA, Germany, and the European Union have collected more than 20,000 meteorite fragments, including the first lunar meteorites found on the Earth, and several meteorites from Mars. I have been rewarded for my field seasons and for service on advisory committees to the project, by having "Marvin Nunatak" named for me. A nunatak is a mountain peak protruding through an ice sheet in either polar region. This is an honour I greatly appreciate—along with "Asteroid Marvin" for my research on space rocks.

I'd like to have your opinion about how a scientist goes about doing history of science. You are an excellent example of someone who has come to be involved in history of geology through the doing of the science. Do you have any observations for Earth scientists who have similar inclinations? Can anything in particular be done to encourage more historical work by scientists? Or do such people have to expect they will need always to paddle against the tide?

I think I've been exceptionally lucky in being able to fit in history along with science. At the Smithsonian I have worked for a succession of directors who approved of my approach. But some university departments do not favour having their scientists doing history, and worse yet, others are overtly hostile to history-related activities. That kind of opposition is hard to handle.

Another problem is the one so familiar to you, Ken, of the wide divergence between the "outsider" historians and the "insider" geologist-historians, who easily become disenchanted with one another. I know that some geologist-historians view historians as rejecting real science in favour of social construction. I now am more aware than ever that one major difference between scientists and historians of science is that scientists always have a primary commitment to their science, so when they take up history they may be seen as amateurs. Historians and philosophers, in contrast, devote their whole time to history or philosophy and can reap the rewards due to them with the full approval of their institutes or departments. They are professionals. And, inasmuch as they know each other, historians can elect their own to society offices, set agendas, and edit journals, without being aware that they may be excluding anyone.

It's much harder for geologist-historians to know each other unless they form their own societies, and that was the original purpose of INHIGEO. One of the founders—I think it was V. V. Tikhomirov—wrote that INHIGEO is a society for geologists who have an interest in their science. And the original bylaws tried to make this stick by requiring that any new member be nominated by his or her country's National Committee on Geology. Eventually, this seemed so unfair, that we changed the bylaws in 1993, an act that I favoured and put into motion. However, I do wonder how long there will be many geologists left in INHIGEO. I really cannot answer your question about what can be done to encourage more historical work by geologists. I do know, though, that some of them are much inclined to go into history but they hesitate, often for good reasons.

Now that you've retired, I know you still have an office at the Observatory and are keeping busy. Do you still do any science?
 No. I finished my research grants and now I'm working entirely on history, at my own pace. But believe me, I have no regrets that I chose geology over history in college. I once mentioned to one of my friends that I was glad I'd been forced to take sciences in college against my will. He replied: "You don't know that. You might have had a much happier life if you had stayed in history." Certainly not happier, I thought. I cannot agree to that. I really would not exchange for anything our work in Brazil and Angola, or the thrill of seeing those first samples from the Moon, or of spotting black rocks on the Antarctic ice and finding them to be fragments fallen from space.

Thank you very much, Ursula, for sharing your memories of your career with me.

FORTHCOMING MEETINGS AND EXHIBITIONS

Hugh Miller, Edinburgh, March–3 June, 2002

'Testimony of the Rocks: Hugh Miller (1802–1856)'. This Exhibition, held at the Royal Museum, Chambers Street, Edinburgh, celebrates the life of the Scot, Hugh Miller, self-educated stonemason, crusading newspaper editor, Free Churchman, geologist, and brilliant populariser of science. It is organised by Michael Taylor, nominated for INHIGEO membership in 2002.

Mineralogy and Museums, St Petersburg, 24–29 June, 2002

We are pleased to invite you to attend the IV International Symposium 'Mineralogical Museums', which will be held in one of the oldest Universities of Russia: St Petersburg State University, in a famous historical building 'Twelve Collegia'. The meeting is organised by the Department of Mineralogy of the Geological Faculty.

The Scientific programme of the Symposium includes the following topics:

History of mineralogy and mineralogical museums

The role of museums in the development of fundamental scientific knowledge

Scientific research in museums,

All aspects of museum activity: description, storage, and display of specimens, exhibition and excursion activities.

In addition, the subjects of the symposium will include the latest discoveries and results of researches in mineralogy, crystal chemistry, crystallogeneses and gemmology; problems in mineralogy teaching and other geological disciplines in universities; computer technologies in scientific, museum and educational work. For further information, please contact: Galina Anastasenko (<galina@AA5709.spb.edu> or <mm2002@AA5709.spb.edu>), Department of Mineralogy, Faculty of Geology, St Petersburg State University, 199034 St Petersburg, Russia. Or visit <<http://www.mineral.pu.ru/MM2002>>.

6th International Symposium, Cultural Heritage in Geoscience, Mining, and Metallurgy, Idrija, Slovenia, June 17–21, 2002

For information, contact: <<http://www.rzs-idrija.si>>; or Tatjana Dizdarevic (<tatjana.rzs.idrija@s5.net>), Idrija Mercury Mine, SI5280 Idrija, Slovenia.

Registration fee \$US 210 or 231 Euros. Symposium topics: (1) Hygiene and occupational health in mining history; (2) Sociability in mining history; (3) Ecology in the history of mining; (4) The Idrija Mercury Mine in foreign archives; (5) Handicrafts in mining towns; (6) 'Others'.

The d'Orbigny Symposium, Paris, July, 2002

The meeting will be arranged as following:

1. Pre-meeting excursion: 29–30 June
 The Stampian of Etampes and the Toarcian of Thouars; a two days excursion from Paris to the Loire valley by bus (under the direction of Patrick de Wever, Professor of Geology, Museum, Paris). Cost 125 Euros.
2. Meeting: 1–4 July (held in the Auditorium of the great Gallery of Evolution, Natural History Museum, Paris)
 'D'Orbigny: His Life and Work'
 'History of the Stratigraphy: From d'Orbigny to the Present' (organised by INHIGEO)
 Registration fee: 100 Euros.
3. Post-meeting excursion: 5–7 July (under the direction of Myette Guiomar, Geological Park of Luberon)
 Paris to Avignon by TGV, and then by bus: The Urgonian of Orgon; The Aptian of Apt and Gargas; First night in Digne; The geological park of Digne; Barrême and the Barremian; Second night in Castellane; Localities where d'Orbigny collected his fossils; To Aix en Provence and then to Paris by TGV. Cost 340 Euros.

All the abstracts, manuscripts, and editorial work will be organised by Elsevier–France, with a web-site devoted to the d'Orbigny Symposium. This web-site will give all the necessary information on the different parts of the ceremonies, exhibit, and symposium. Elsevier want to publish the symposium volume. For further information, contact Colloque A. d'Orbigny, Laboratoire de Paléontologie, MNHN, 8 rue Buffon, 75 005 Paris, France. Tel. 33 (1) 40 79 30 38. Fax 33 (1) 40 79 35 80. <venec@mnhn.fr>; <<http://www.orbigny.org>>.

Bath, John Strachey, and William Smith: July, 2001

A geological tour in the neighbourhood of Bath, led by two INHIGEO members, Hugh Torrens and John Fuller, will celebrate the works of John Strachey (1671–1743) and William Smith (1769–1839) and examine 'The Industrial Basis of Stratigraphy'. For further information, contact Cherry Lewis: <Cherry.lewis@bristol.ac.uk>.

South American and Caribbean Seismology: Caracas, Venezuela, 19–21 July, 2002

A meeting is to be held on the occasion of the 30th year of the foundation of FUNVISIS (Venezuelan Foundation for Seismological Research), with special attention to the history of earthquakes in Venezuela, South America more generally, and the Caribbean region. For further information, contact INHIGEO Member Dr José Antonio Rodríguez Altez (<dptoct@internet.ve>). Dirección Funvisis, Final Prolongación Calle Mara, El Llanito, Caracas 1070. Apdo. postal 76.880, Caracas 1070-A, Venezuela (<http://www.funivisis.org.ve>).

Tethys Symposium, Budapest, August, 2002

The 6th Shallow Tethys Symposium will be held in Budapest in August, 2002. It will involve a one-day 'Tethys—History of Geology' Colloquium, open to both geologists and historians. Professor Hugh Torrens (UK) has agreed to act as convenor. For details, please, see the home-page: <http://pangea.elte.hu/paleo/tethys/history/index.htm>; or contact, Miklos Kazmer, Department of Palaeontology, Eotvos University, Budapest, Hungary (<kazmer@ludens.elte.hu>; and <http://ludens.elte.hu/~kazmer>).

Mineral Sciences in the 21st Century, Edinburgh, 1–6 September, 2002

The 18th General Meeting of the International Mineralogical Association is to be held in Edinburgh 1–6 September, 2002. It will include a session on the 'Teaching of Mineral Sciences in the 21st century'. The session is designed to cover the teaching of the Mineral Sciences over the fields of Mineralogy and Crystallography, Petrology, Geochemistry, and Applied Mineralogical Sciences such as Environmental Mineralogy and Technical Mineralogy.

Topic areas might be: 'Why do we teach Mineral Sciences at all?'; 'What is teaching of Mineral Sciences today?'; 'Which type(s) of Mineral Sciences are taught around the world?'; 'To whom do we teach Mineral Sciences?'; 'Teaching border-line fields connected to Physics, Chemistry etc.'; 'Multimedia/web support for teaching'; 'How might we use the Web or computer based packages to enhance mineral teaching?'; 'How do we inspire 21st-century students to become mineralogists and petrologists?'. For further information, visit: <http://www.minersoc.org/IMA2002>.

Peter J. Treloar, Kingston University, UK (<P.Treloar@kingston.ac.uk>); Dana Pop, Babes-Bolyai University, Romania (<danapop@bioge.ubbcluj.ro>).

21st Scientific Instrument Symposium, Athens, 9–14 September, 2002

A meeting organised by the Scientific Instruments Commission of the International Union of History and Philosophy of Science (Division of History of Science). The Symposium will be held at the National Hellenic Research Foundation, Athens, and will include visits to the Pentelli Observatory, the Archaeological Museum, the National Observatory of Athens, and the new Technological Museum at Syros island. For further information, see <http://www.eie.gr/hasi> or contact <gvlahakis@eie.gr>.

Ignacy Domeyko 1802–1889, Vilnius, Lithuania, September 2002

An international conference on the life, work, and contributions to geological and social sciences of Ignacy Domeyko will be held in Vilnius from 10 to 12 September, 2002. There will be a one-day excursion to Domeyko's homeland in western Belarus. The Conference is sponsored by the Lithuanian National Commission for UNESCO, the Lithuanian State and Science Foundation, Vilnius University, the Institute of Geology, the Institute of History of Lithuania, the Academy of Sciences of Lithuania, the Lithuanian Art Museum, the Geological Survey of Lithuania, Foundation 'Everestas', and Dr Romualdas Aviedrys (USA). For further information, contact: Professor Algimantas Grigelis, Academy of Sciences and Institute of Geology, Sevcenkos Street 13, Vilnius 2600, Lithuania <grigelis@geologin.lt>.

Hugh Miller Bicentenary, Cromarty, Scotland, 10–13 October, 2002

The bicentenary of Hugh Miller—geologist and naturalist, writer, and folklorist; born 10 October, 1802—will be remembered in Cromarty (20 miles NE of Inverness). Keynote speakers will be James Secord (INHIGEO) (Cambridge), David Lowenthal (U. California, Berkeley), Christopher Harvie (Tübingen), and Eric Richards (Adelaide). There will be three concurrent subject themes: Geology and Natural History; Ethnography and Folklore: Church and Society. For geology, the speakers will be Hugh Torrens (INHIGEO), Simon Knell (INHIGEO), Michael Taylor (nominated INHIGEO), Michael Collie, Ralph O'Connor, Nigel Trewin, Philippe Janvier, John Hudson, and Alison Morrison-Low. There will be excursions to Eathie and to the Elgin area. For further information, contact Dr Lester Borley, Cromarty Arts Trust, 4 Belford Place, Edinburgh EH4 3DH, UK (Tel. 031 332 2364).

Third International Congress on Geological and Mining Heritage, Cartagena, Spain, 14–26 October, 2002

This meeting, organised by the Spanish Society for the Preservation of the Geological and Mining Heritage, will form the Society's sixth scientific session, will analyze aspects related with the preservation and management of the Geological,

Mining and Metallurgical Heritage'. Registration fees: 30 Euros for Society Members; 90 Euros for non-Members; 45 Euros for students. For further information, contact <mercedes.escudero@dep.upct.es> or visit <<http://www.upct.es/sedpgym>>.

SPANISH SOCIETY FOR THE
PRESERVATION OF THE
GEOLOGICAL AND MINING
HERITAGE



III INTERNATIONAL CONGRESS
ON GEOLOGICAL AND MINING
HERITAGE

History of Science Society Meeting, Milwaukee, USA, November, 2002

The History of Science Society annual meeting will be held in Milwaukee, Wisconsin, 7–10 November, 2000. For further information, contact: Executive Office, History of Science Society, Box 351330, University of Washington, Seattle, WA 98195-1330, USA. <hss@hssonline.org>

International Conference: 'Museum Training in a Globalising World': New Delhi, India, 25–29 November 2002

The next annual meeting of the International Committee for the training of Personnel of the International Council of Museums (ICOM) will be held in New Delhi, India, by invitation of the National Museum Institute of India, with the support of the ICOM National Committee for India and the ICOM Asia-Pacific Regional Organisation. All ICOM colleagues, and any others interested in museum training and/or the cultural implications of globalisation, are warmly invited to attend and contribute. For details, please go to the First Circular, which is now at: <<http://www.icom.org/ictop/india-1.html>>. Alternatively, for an e-mail version please write to <P.Boylan@city.ac.uk>.

Economic Geology, Bucharest, November, 2002

The Third Symposium on Economic Geology will be dedicated to one of Romania's main personalities in Ore Deposit research, Prof. Dr Dr Gratián Cioflica, now retired. For further information, contact Sorin Udubasa, Lecturer, Mineralogy Dept., Faculty of Geology & Geophysics, University of Bucharest, 1 N.Balcescu Blvd, 70111-Bucharest, Romania (<udubasa@ns.geo.edu.ro>).

British Hydrogeology, 12 December, 2000

A meeting on '200 Years Of British Hydrogeology' will be held at the Geological Society, London, jointly with the Hydrogeological Society. For further information, contact Cherry Lewis: <Cherry.lewis@bristol.ac.uk>; or John Mather: <mather@jjgeology.demon.co.uk>.

History of Geophysics, London, 12–13 March, 2003

The History of Geology Group of The Geological Society (HoGG), London, is to hold a meeting on the History of Geophysics at the Society's premises at Burlington House, Piccadilly, London. Offers of papers (the conference language will be English) should be sent, as soon as possible, to the Convenor, Professor Richard J. Howarth, Department of Geological Sciences, University College London, Gower Street, London WC1E 6BT, England (<r.howarth@ucl.ac.uk>). Intending participants should note that regretfully HoGG does not have funds to offer travel grants, *etc.*

Geological Cartography, Bologna, June 2003

The fourth Congress on Regional Geological Cartography and Information Systems will be held in Bologna, Emilia-Romagna (Italy), in June 2003. It will focus on the analysis of the effectiveness of geological and soil surveys, contributing to society's needs, and the institutions operating at different levels in the quest for spatial planning and sustainable development. Fees are 125 Euro before 30 April, 2003 and 150 Euro after this date. For further information, contact Raffaele

Pignone, Servizio Geologico, Sismico e dei Suoli, Viale Silvani 4/3, 40122 Bologna ITALY (<seg4cegr@regione.emilia-romagna.it>), or visit <www.regione.emilia-romagna.it/geologia>.

History of Oil Exploration in the Carpathians, Cracow, July, 2003

A conference relating to the 150th anniversary of the beginning of oil exploitation in the Carpathians is provisionally arranged for 9–12 July 2003 in Cracow, the 'royal capital of Poland'. The dates have been chosen to enable people to attend both this meeting and the INHIGEO conference in Dublin. (There are daily flights from Cracow to Gatwick Airport in England.) For further information, please contact Professor Wojciech Narebski (<narebski@geos.ing.uj.edu.pl>).

28th INHIGEO Symposium on the theme of 'Geological Travellers' Dublin, Ireland, July, 2003

The International Commission on the History of Geological Sciences (INHIGEO) will be holding its 28th Symposium in Dublin, Ireland, during July 2003 on the general theme of 'Geological travellers'. The dates of the symposium are Monday 14–Friday 18 July, 2003; the optional post-symposium field trip will take place between Saturday 19–Saturday 26 July, 2003. The symposium will be held in the Department of Geology, Trinity College, Dublin. The 40-acre campus is situated in the heart of Dublin, within walking distance of shops, theatres, cinemas and museums. The programme will comprise four days of talks and poster sessions. The symposium language will be English.

The optional post-meeting field trip will involve an anticlockwise circumnavigation around Ireland during which some classic areas of Irish geology will be examined. A number of these sites hold particular significance in the history of geology. Sites to be visited may include the Giant's Causeway in north east Ireland; the Donegal granite upon which much of the debate of the granite controversy of the 1950s was debated, Cregg Castle the ancestral home of the celebrated mineralogist and chemist Richard Kirwan; the Burren in County Clare a site of exceptional beauty in karstic limestones; Cashel, Co. Tipperary—an important early Christian site; the River Blackwater valley where J.B. Jukes examined the nature of Tertiary river drainage patterns; and Hook Head in the southeast corner of the country where Captain Thomas Austin described wonderful Lower Carboniferous crinoids. The trip will be led by Patrick Wyse Jackson and will be joined by Gordon Herries Davies for part of the trip. Numbers for the field excursion will be limited to 30 persons.

Estimated costs are as follows: Registration fee: c. 380 EUROS (accompanying members: 100 EUROS). Accommodation: c. 58 EUROS per night. Field trip: 500 EUROS per person.

Further details including the 1st Circular, Registration Form, Details of abstract submission, and the Post-Symposium excursion are available on the Web site: <http://www.tcd.ie/Geology/> from mid-April 2002 or from the convenor: Dr Patrick N. Wyse Jackson, Department of Geology, Trinity College, Dublin 2, Ireland. Tel: 353–1–6081477; Fax: 353–1–6711199; <wysjcknp@tcd.ie>.

Historical People and Events in Aeronomy and Geomagnetism, Japan, August 2003

This interdisciplinary session, to be held in Sapporo (Hokkaido), will seek to describe and explore the varied and powerful history of aeronomy, geomagnetism, and related disciplines by considering many aspects of their development during past decades. Papers and posters are welcome for biographical studies, histories of institutions and research programmes, and specific topics in the history of geophysical work. For further information, contact the German INHIGEO Member, Dr Wilfried Schroeder (see Member list).

32nd International Geological Congress, Florence, Italy, August 20–28, 2004

From the Mediterranean toward a Global Renaissance; Geology, Natural Hazards and Cultural Heritage

The 32nd International Geologic Congress will be held in Florence. The recently remodelled pentagonal fortress of the Fortezza Da Basso, a wide area in the heart of the town, will host the event. The congress centre has a variety of modern integrated spaces, which allow the display of a large number of posters nearby the session rooms, meetings of Scientific Associations, a Geoxpo exhibition, etc. The 32nd IGC is being organised in co-operation with a number of perimediterranean countries grouped in the GEOMED Consortium. For further information, contact Ms Chiara Manetti, Università degli Studi di Firenze, Dipartimento di Scienze della Terra, Via La Pira, 4–50121 Firenze, Italy. Tel/Fax 055/2382146, <cmanetti@geo.unifi.it>. Or visit <<http://www.32igc.org/>>.

Italian Members of INHIGEO will be organising a Congress symposium on museums, collections and geological institutions. Following the main conference, they will also run a field excursion of about a week's duration, visiting sites, institutions, and collections of major historical significance in the northern half of Italy. For preliminary information, contact either Professor Nicoletto Morello (<nicoletta.morello@lettere.unige.it>) or Dr Ezio Vaccari (<ezio.vaccari@lettere.unige.it>).

BOOK REVIEWS

Dating the Earth

Lewis, Cherry, *The Dating Game: One Man's Search for the Age of the Earth*, Cambridge University Press, Cambridge, 2000. In this small book, Cherry Lewis has woven a fascinating tale of Arthur Holmes (1890–1965), the English physicist-turned geologist, who spent nearly five decades of the 20th century attempting, almost single-handedly, to determine the age of the Earth and to construct a radiometric time scale of geologic history. Holmes also was almost alone as one of the earliest and most articulate advocates in England or America of continental drift, which he ascribed in the 1920s to the rising of

convection currents at oceanic ridges and the rafting of continental fragments to either side. Despite his brilliance as a scientist, and the spicing of his personal life by his wildly illicit love affair with his colleague, Doris Reynolds, whom he married after the death of his first wife, no previous book has been written on Holmes.

Lewis conducted an exhaustive search for widely scattered archival materials, and sought letters, photographs, and personal recollections of Holmes from his family members, colleagues, and friends. Early on, she learned to her dismay that a rich collection of Holmes's papers, which had been stored in a garden shed at his widow's home, was dispersed and some of it apparently lost after her death. As a result, Lewis now possesses what must be the world's most complete files of source materials on Arthur Holmes. Nevertheless, she chose to write this book in an anecdotal style accessible to young people and to the public rather than as a strictly scholarly work. She says she finds footnotes and end-notes so intrusive to a good story that she has dispensed with them altogether. In place of a list of references cited she has provided her readers with a selection of books and journal articles in which they may delve further into her subject matter if they so choose. She also dispensed with an index, leaving her readers to thumb through the text each time they wish to check back on any passage that interests them.

Lewis has fulfilled her purpose by writing a delightful book. It also is a highly informative one. She shows a great talent for composing brief passages that explain difficult scientific concepts in a lucid and engaging style. She takes only a few pages to limn in the background knowledge of both geology and atomic physics that her readers will need to appreciate the difficulties Holmes faced and the significance of his contributions. And she clearly illustrates how science often progresses not by a steady increment of well-conceived investigations but by taking three steps forward and two steps back—with a few 'wild miracles' thrown in.

Holmes himself recalled that his interest in the age of the Earth was first aroused when he found the statement printed in the margin of his family's Bible that God created the world 4004 years before the birth of Christ. Puzzled by the odd '4', Holmes asked his parents why the number wasn't rounded off to 4000, why the date was so recent, and how anybody could know. They informed him that to question the 'Word of God' was not done.

As a student, however, Holmes learned that the Biblical date had been seriously questioned and that the whole science of 'modern' geology had been erected in the 19th century on the premise that the Earth was incalculably old, with no discernible beginning or end, and that unlimited time was available in which to account for repeated cycles of erosion, sedimentation, uplift and rejuvenation, which always operated at uniform rates.

But he also learned that in 1862, Lord Kelvin, the world's greatest living physicist, had denounced this geological world view and calculated that it had taken at least 20 million and perhaps as much as 400 million years for the Earth to have cooled from a primeval molten globe. Subsequently, Kelvin fixed the Earth's age at 100 million years. Such a time span was acceptable to many geologists, but not to all; certainly not to Charles Darwin who needed much more time than that for species to evolve by natural selection.

Various geological methods also had been employed for calculating the age of the Earth. One of them assumed zero sodium in Earth's earliest ocean and calculated the time required for the salt content to build up to its present level. Another method involved measuring the maximum thickness of stratigraphic formations throughout the world and calculating the time required to deposit them. These 'hour-glass' methods yielded a wide range of dates but Lewis points out that, fortuitously, most of them fell within Kelvin's 100 million years.

Then, in 1899, Kelvin reduced his age of the Earth to between 20 and 40 million years—with a strong preference for 20 million. Such an age threw geology into chaos. How did Kelvin arrive at such a recent date? As Lewis explains it, Kelvin originally had assumed that rocks melt at about 4,000°C, but then he learned from experiments carried out in America that rocks actually melt at temperatures closer to 1,200°C. Therefore, the Earth required a much shorter cooling time than he had supposed. Meanwhile, radioactivity had been discovered.

Lewis points out that the ten years that straddled the turn of the twentieth century must have been some of the most thrilling times Science has ever seen. We read with mounting excitement the passages in which she guides us through the series of discoveries that changed atomic physics forever. In 1895, the atom was the fundamental, indivisible building block of matter. By 1903 radioactivity had been discovered and shown to be spontaneously transforming atoms of uranium and thorium into new elements. That year it also was discovered that the radioactive decay of radium was releasing heat! If rocks were capable of producing their own heat, so much for Kelvin's calculations of the Earth's rate of cooling from a molten globe.

Kelvin didn't see it that way. In the summer of 1906, he wrote an irate letter to *The Times* protesting that all this work on radioactivity added nothing to the atomic theory that was proposed by Democritus two thousand and five hundred years ago. With scarcely concealed irritation, the active researchers responded to the effect that Lord Kelvin should do his homework. The exchange of letters went on for more than a month and kept Arthur Holmes and Bob Lawson, his equally brilliant friend and boon companion since boyhood, on the edge of their seats. They realised that they were watching history unfold before their eyes. They learned the names of all the principal scientists involved and the progress of their research projects. In their excitement, both Holmes and Lawson decided to major in physics and to pursue research on radioactivity wherever it might lead. Holmes vowed to measure the age of the Earth and construct an 'absolute' time scale for geology. Both men excelled scholastically and obtained academic posts. Over the next few decades they would collaborate on numerous research projects, with Holmes often proposing the ideas and Lawson attending to the mathematics.

But Holmes' academic career did not proceed in a straight line. Given the meagre salaries paid to university faculty members, Holmes twice took jobs in the tropics hoping to improve his fortunes. In 1911, he signed on for six months of exploration for mineral deposits in Mozambique. His pay was good and he gained first hand knowledge of the complexities of Precambrian basement rocks from which he collected zircons in hopes of measuring their ages. But he contracted malaria,

which weakened his health for the rest of his life (but may have saved his life by making him ineligible for serving in World War II).

The morning of his departure from England, Holmes gave a manuscript containing his first geological time scale to Professor R.J. Strutt to read to the Royal Society. It was the first effort anyone had made to assign radiometric dates to geologic periods. Holmes listed dates for a Carboniferous, a Devonian, and a Silurian rock, and for early, middle and late Proterozoic rocks. Lewis includes a table showing that, despite the crude analytical methods available in 1911, Holmes' dates lie well within the age ranges we accept today for the same periods. His earliest date is of a mineral 1,640 million years old. Most geologists, still relying on the hour-glass methods, could not conceive of such an ancient age and concluded there must be something wrong with the radiometric method.

But Holmes persevered, and in 1913 he published his first book, *The Age of the Earth*, which went into a second edition and parts of which were incorporated into many of his later writings. Lewis traces Holmes's continuing efforts to date the periods of the Phanerozoic era and to bring chronological order into Precambrian complexes. As decades went by, he refined his methods with every new discovery about isotopes and their daughter products, and his ultimate successes led a colleague to call him the 'Father of Geological Time Scales'.

In 1920, again in need of money, Holmes accepted the promise of a munificent salary and a bright future to serve as Chief Geologist of an oil company in Burma. Holmes moved there with his wife, Maggie, and their two year-old son, Norman. But the seemingly prosperous and influential oil magnate who headed the company was a swindler and Holmes received very little of the promised compensation. Worst of all, little Norman fell fatally ill and died out there. Overwhelmed by their loss, Arthur and Maggie, sailed home to England and an uncertain future.

That future included a stint Holmes served as a shopkeeper, and the birth of their second son, Geoffrey, in February, 1924. That same year Holmes re-entered university life as the Head (and only staff member) of the newly created Department of Geology at Durham University. He soon became well known for his spellbinding lectures on geology which drew into the field several students who ultimately became famous in their own right. These lectures served as the basis for his highly acclaimed textbook *Principles of Physical Geology*, published in 1944 with a dazzling second edition issued in 1965, the year Holmes died.

In 1931 at a scientific meeting in Scotland, Holmes met Doris Reynolds, a petrologist whom Lewis describes as an extremely boisterous and vocal woman in her early thirties who had strong opinions on absolutely everything, especially geology. They fell into animated conversation the first evening and by the meeting's end ten days later they were in love. They corresponded continually and met whenever possible (Doris was a Lecturer in London). Then, in 1933 an opening came for a Lecturer in geology at Durham, and Doris applied for it. With Arthur advising the selection committee, she got the appointment! Presently, Doris moved into Holmes' office and established herself face-to-face with Holmes across his desk. It was a very big desk, Lewis explains. But most of us probably would agree that only a truly great and consuming love could long survive an arrangement like that. Holmes' students were less than enthusiastic; never again did any of them get a chance to meet and discuss their studies with Holmes alone.

Maggie Holmes' health declined and she died in September, 1938. Nine months later, Arthur and Doris were married at the Registry Office in Durham. The small party that gathered afterward in their new house did not include Bob Lawson and his wife. Lewis speculates that Doris prevailed upon Arthur not to invite them. In any case, the two lifelong (up to then) friends never again collaborated on a scientific paper.

The unabashed behaviour of Arthur and Doris had caused such a scandal at Durham, that they were not forgiven despite their marriage. So, when Doris' appointment as a Lecturer came due for renewal she didn't get the customary five-year continuation. In 1942, this led Holmes to seize an opportunity to move to Edinburgh University at a salary larger than both of theirs combined at Durham. Doris was given an honorary appointment with no salary, but this allowed her to continue with her research (which some denigrated as her 'hobby') and to wield a strong influence in the department.

Lewis writes: 'Doris had a theory; she called it 'granitisation''. But surely Lewis does not mean to imply that Doris originated this theory or gave it its name. The idea of granitisation dated back at least as far as the early years of the twentieth century. It held that granites are not igneous rocks but are formed by the in situ recrystallisation of sediments which are soaked through with silica and potash-rich fluids and gases—variously called 'ichors', 'emanations', or 'mineralisers'—rising from depth. As the emanations advanced, they drove magnesium and iron before them to form a dark halo called a 'basic front'. Debates about granitisation raged in the years after World War II, especially in Norway, Finland, France, and England, where H.H. Read, of the Imperial College in London, and Doris were its most outspoken advocates. Lewis observes that all of Holmes' students in Edinburgh chose granites for their PhD theses and risked 'having their heads chopped off' by Doris if they so much as mentioned the magmatic alternative. Lewis refers to this as an unhealthy situation, but she might have added that it seems even more so today when granitisation as a major rock-forming process has fallen into almost total eclipse. This came about when microanalytical techniques showed that the major-element, minor-element, and isotopic compositions of volcanic rhyolites and ash deposits closely match those of granites, thus lending strong support to the plutonic origin of most granites.

What of Geoffrey Holmes? Lewis includes a photograph taken about 1930 of Geoffrey as a happy-looking boy of six standing between his mother and his tall father. Lewis does not mention him again until the closing pages of the book where she reports that when Holmes died in September, 1965, Doris told Geoffrey, who had settled his family in Geneva, 'not to bother' to come to the cremation ceremony. Lewis's silence elicits a starker picture than words ever could of Doris Reynolds as a stepmother.

If this excellent book is to go into further editions, which it certainly should, I would urge Lewis to place in her text the dates and places where each of the letters or other sources of her quotations was written. She lists these in the

acknowledgments, thus obliging her readers to stick a book mark there and continually flip from the text to the back of the book to look for such pertinent information. Also, the name of the lead mining locality in Greenland from which Holmes and others obtained samples, should be corrected to Ivigtut—or perhaps Lewis would prefer to adopt the more recent version, Ivittuut, used in *The Times Atlas*.

Another suggestion would be to delete the sentences on page 154 that speak of Francis Bacon's observations in 1620 of the good fit of South America against West Africa if the Atlantic Ocean were eliminated from between them. The idea that he said this is firmly entrenched in the secondary literature, but Francis Bacon wrote nothing remotely like it. In his *Novum organum* he remarked on 'conformable instances' in nature, which he thought were no mere accidental occurrences but for which he suggested no explanation. These included the fact that both the old and new worlds (presumably Eurasia, Africa, and the Americas) are broad at the north but narrow and pointed at the south. No idea of continental matching is implied in that. He also mentioned the similar isthmuses and capes of Africa and Peru with the continent which stretches to the Straits of Magellan. Here he seems to have been referring to the roughly similar outlines of the Atlantic coast of Africa and the Pacific coast of South America. In any case, Bacon named Peru, not Brazil, and if we accept him at his word we cannot find in his text the germ of an idea of matching continents across the Atlantic Ocean.

These quibbles aside, I strongly recommend this book to high school students, college students, senior scientists, and lay readers. It covers a much broader range of subject matter than has been mentioned here, including topics such as advances in isotope geochemistry, Holmes' dating of meteorites as analogues to the Earth's interior, and an age of the Earth which was older than astronomers would allow for the entire universe—until a change took place in astronomical theory. Toward the end of the book, our excitement builds up once again as Lewis recounts the final race in the mid-1950s to determine the age of the Earth. Even those who know the outcome will find themselves reading breathlessly. Arthur Holmes was such a gigantic figure in modern geology that we can only cheer for the appearance of this book. But there is more to say; perhaps some day Cherry Lewis will favour us with a complete biography of Holmes.

Ursula B. Marvin, Cambridge (Mass)

Minuter Details of the Plate Tectonics Revolution

Naomi Oreskes and Homer Le Grand (eds), *Plate Tectonics: An Insider's History of the Modern Theory of the Earth*, Westview Press, Boulder, 2001.

To my knowledge, there have been more writings on the plate tectonics revolution than any other issue in the history of geology. (Naturally, INHIGEO Members will think of volumes by Ursula Marvin, Homer Le Grand, and Naomi Oreskes in this context, and doubtless there are others in languages I can't read and which I don't know about, but should.) Is there much more to be said about it all? This latest contribution from Oreskes and Le Grand shows that there is indeed much more to be said; and what they have done is invite some of the actual participants in the story to have their say. Thus we have illustrated essays, partly autobiographical, from Ron Mason, Fred Vine, Lawrence Morley, Walter Pitman, Neil Opdyke, Gordon MacDonald, John Sclater, Bruce Bolt, Jack Oliver, Dan McKenzie, Robert Parker, Xavier Le Pichon, John Dewey, Tanya Atwater, William Dickinson, Peter Molnar, and David Sandwell—each telling their side of the story, how things appeared to them, or how they fitted into the scheme of things. We are told that nearly all those invited to participate in the project did so, but in some cases one author 'represents' the work of a whole 'aspect' of the revolution. Some of the contributors are 'getting on' a bit, and some notables—such as Maurice Ewing, Harry Hess, Edward Bullard, Bill Menard, Keith Runcorn, or Tuzo Wilson—whom one would dearly love to have had as contributors, are now deceased. But all in all, the collection of papers will add immeasurably to the historical record and the public understanding of what happened during the 'revolution'.

In my own experiences in undertaking oral history for the study of the history of geology, I have found that geologists talk (and write) well, have *remarkably* good memories for events and dates, and seem to be able to lay all before me effortlessly, as the story appears to them, or as they would wish it to appear to me or to the world. On points of detail as to places and events, everything mostly hangs together (as it should). It is when one hears geologists' comments about other geologists that one begins to find that there can be considerable differences, and the historian must beware of taking everything at face value! This is where discretion is needed, and where care in diction and editing are required. In the book here under review, we find the pieces of the historical jigsaw do indeed fit together (cohere) admirably—as they must if the job is properly done. (Someone cannot have been in two different places at the same time!) And there don't seem to have been too many antagonisms or recriminations. But perhaps the editors will tell me privately one day whether they had to tread very carefully, or whether all was sweetness and light. That in itself would be an interesting addition to the historical record. Maybe Oreskes could leave a note about this in her papers before she goes to the 'great unknown'? It might provide valuable nutriment to sociologists of science!

That aside, what does the book reveal? First, it was a geophysicists' revolution. Most of the contributors were trained in physics or geophysics to a greater or lesser degree (mostly greater degrees!). Classical geologists could have gone on for years more, studying outcrops and refining their stratigraphies. Well before the revolution, they had already found stratigraphical, lithological, and palaeontological analogies from one continent to another. They had proposed models for drift too (e.g., Holmes's convection hypothesis); but they did not convince. In a sense, they didn't need to. There was still plenty to do in geology, without getting into all that physics. But geomagnetics, gravimetry, oceanographic survey, and seismology pushed the idea new ideas forward. I have read Menard's *Ocean of Truth*, and I know that everyone says that new knowledge of the ocean floors was what made the plate tectonics revolution possible; and Russian geologists, largely limited to work on dry land, did not make the great breakthrough initially. Yes, but until I read these overlapping personal accounts the paramount importance of oceanography did not really 'sink in' for me, even after all the accounts I'd read. Repeatedly, the work of Lamont and Scripps scientists was *the* thing; and many of the contributors in this book were directly or personally

involved in the oceanographic work. One can 'know' something or know it 'viscerally' and the two are not the same. Oreskes and Le Grand have furnished me with 'visceral' understanding of the role of oceanography. Thank you!

It's interesting, then, that when I got to the last chapter, Sandwell's 'Plate Tectonics: A Martian's View', I found that he was saying something that had gradually dawned on me as I read through the book, namely that the clinching and most important evidence (such as space determinations of plate motions) was achieved last, and the least significant evidence (e.g., matching of rock types across oceans; palaeontological correlations) was found first. Sandwell suggests, as a 'thought history', that if 'Martians' came to examine the Earth, they would have likely reversed the order of investigations and discoveries. The 'Lilliputian' stratigraphers, palaeontologists, and petrologists—the classical geologists—were starting at the wrong end so far as direct and conceptually straightforward arrival at plate tectonics was concerned. Hmm!

But one must also consider the role of individuals and specific discoveries. Among the former, the genial Edward Bullard's name appears repeatedly, as the mentor for the young turks who brought about the Cambridge end of the revolution. Incidentally, Bullard appears in a photo in the book, sitting on a rock, clad in nothing but a topee. I wonder how many of his epigone at Cambridge could ever have imagined him thus!

For technical or empirical discoveries relevant to the revolution, the famous Raff and Mason 'zebra' pattern, showing geomagnetic reversals on the ocean floor off the west coast of North America must surely take the prize. Between them, our contributors choose to reproduce it no less than four times! For theoretical insight, the Morley/Vine/Matthews interpretation of the stripes was critical. It must have been a kind of 'on the road to Damascus' experience to suddenly see how the geomagnetic evidence could be interpreted in terms of sea-floor spreading. And everyone agrees that Wilson's idea of transform faults was of paramount importance. But so too was the evidence of earthquakes occurring at the locations of faults, with movements in the appropriate directions as requested by theory. Tuzo Wilson may have had a *eureka* experience too when he flew over the Hawaiian islands and had the idea of a plate moving over a hot-spot. But I suspect that the 'smartest' piece of work was that of Dan McKenzie, Bob Parker and Jason Morgan, working out separately, and conjointly, how to fit all the plate motions together on the surface of a sphere, using Euler's theorem (with the concept of 'Euler poles'), eventually to solve the problem of the meeting(s) of three plates. McKenzie says: 'Even though the problem is purely geometric, we found it surprisingly hard to solve'. Xavier Le Pichon (the only Continentally-trained geologist contributor to the book) developed the theory as one that applied to the tectonics of the globe as a whole. Also fundamental was the work of Morgan leading on (from Wilson's hot-spots) to the theory of plumes, which is now so central to recent theorising about the behaviour of the mantle, the emission of radiogenic heat from the Earth, and the activities at the level of the crust from the goings on at the mantle depths. Peter Molnar gives a sketch of the earlier stages of such developments in the post-revolution years, as the plate-tectonic theory began to be exploited on continental tectonics, especially for Asia.

Reading this excellent book (for which Oreskes' introductory chapter supplies a useful thumb-nail sketch of the history of the plate tectonics revolution), I formed the impression that the editors had actively encouraged the contributors to bend their minds in the direction of methodological matters. Certainly, there are several interesting discussions of matters methodological, such as one might not expect geologists to indulge in without prompting.

John Sciater, for example, who writes on heat flows under the oceans, doubts that the plate tectonics revolution was simply Kuhnian in character. Nor, it seems, does he think that science progresses simply by the successive formulation and testing of hypotheses. Hess and Wilson were not, for example, testing hypotheses empirically. Rather, they were 'creating new concepts out of the synthesis of poorly-constrained observational information'. The concepts they developed were believable because they explained so much disparate information: they allowed the information to cohere (by 'colligation of phenomena', in philosophy-speak). And the revolution (if, supposing, there was one) could not have been Kuhnian, for the simple reason that there wasn't a preceding 'crisis' in geology. Geologists were unperturbed! McKenzie, thinking about geo-science (i.e., being 'metascientific'), says that observations may be: (1) wrong; (2) correct and describable by existing theories; (3) correct, but too complex to be described by some extant model or theory or one that can be devised at the time; or (4) correct, but lacking a theory to account for them. Progress in science occurs when a new model that accounts for Category (2) data also accounts for data in Category (4). This is what happened in the plate tectonics revolution. (Today, data for mantle convection belong in Category (4).) Because geologists can not, to a large extent, create experimental situations to simulate or study large-scale geological processes they have to develop explanatory models. And in a sense this was what the plate tectonics revolution was all about, the empirical study of ocean floors, and all that, notwithstanding.

If one asks about the causes of the Reformation or the First World War, there can never be a single answer. And history, I think, can never be a science. There is always the possibility of multiple valid perspectives. *Plate Tectonics: An Insider's History* illustrates this point admirably. There can also be multiple attempted synthetic accounts. This book should provide essential material for all future syntheses of the grand revolution in geo-theory in the middle years of the twentieth century. I wonder whether it will be the last. Probably not, if history can teach us anything.

By the way, one bit of history still remains hidden: the name of the simultaneously pig-headed and smart-Alec referee who thought that Lawrence Morley's rejected paper was 'interesting . . . but . . . most appropriate over martinis, say, [rather] than in the *Journal of* . . .' (p. 84). I wonder if it was an Englishman [*sic*]. 'Interesting' is a rather popular 'put-down' word in that quarter. But that can't be right. My spell-checker tells me I have used it three times in this review, and the last thing I want to do is disparage *Insider's History*.

David Oldroyd, Sydney

Completion of Walcott's Biography

Ellis L. Yochelson, *Smithsonian Institution Secretary, Charles Doolittle Walcott*, Kent State University Press, Kent, Ohio and London, 2001. xvi + 590 pp. US \$55.00

Charles Doolittle Walcott (1850–1927) holds a lasting renown among invertebrate palaeontologists for his innovative studies of trilobites and, in particular, for his discovery of the truly remarkable Middle Cambrian fauna from the Burgess Shale of British Columbia. Among Canadian geologists, he is remembered also for his establishing of the Early Palaeozoic succession and structures of the southern Rockies of Alberta and British Columbia.

Yet it is arguable whether these were Walcott's greatest contribution to science, for there were so many. It was Walcott who, after the disastrous ending to John Wesley Powell's directorship in 1880, saved the United States Geological Survey from total wreck; by his skill in charming and manipulating politicians and civil servants alike. Walcott attained for it a new stability and clearer purposes. When in 1907 he became Secretary to the Smithsonian Institution, he may have believed that he was moving to an easier position that would give more time for research. Perhaps it did, initially; but Walcott's skills, and the trust placed in them by so many organisations, brought a swift increase in his work-load, causing him to extend his influence into many unexpected areas. His importance in the development of aeronautical research in the United States is as considerable as his work in geology (even if it did involve him in one of the few controversies in a generally tranquil career). He was responsible for the extension of the Smithsonian Institution's buildings and the creation of an independent home for the National Academy of Sciences, developments important in themselves. Yet he found energy also to develop the United States' national art collections—in particular, by charming the difficult Charles L. Freer into donating his remarkable personal collection to the nation, along with an endowment for its housing and maintenance.

These were only highlights among the many achievements of a man whose administrative talents and social skills were drawn upon by a diversity of local and national bodies. His immense energy was supplemented by his capacity for compartmentalising his life, so that he could shift readily from the affairs of the National Aeronautics and Space Administration to those of the finances of his church and give both his entire attention, then spend several hours in work on fossil invertebrates, as relaxation, before holding a dinner party of 20 or more folk for some newly appointed ambassador or some temporarily important politician. As for the US presidents, he knew them all personally.

Yet somehow Walcott managed to escape from Washington, DC each summer for two or more refreshing months and spend that time geologising amid the mountains of his own land or Canada. His problems would cease to be administrative; they would become those of travelling by horse and pack train; setting up a succession of camps; and finding, and shipping to Washington, fossils which might be of new types or might be familiar, but capable of establishing crucial correlations. Sometimes the weather was good and the discoveries were exciting, but there were many days when snow, fog or exceptional rains made it undesirable or impossible even to leave the tent. His children and his second wife, Helena, participated in these expeditions and gave such help as they might. After Helena's early and accidental death, Walcott's third wife Mary (*née* Vaux) furnished fresh inspiration for his field activities, since she was a glaciologist, a skilled photographer and a wild-flower artist of distinction. Despite mounting physical problems—tooth troubles, stomach and kidney pains, migraines and all the problems of slowness and muscular deterioration that so increase with age—Walcott kept up those expeditions until two years before his death, when he was in his seventy-fifth year.

The published products of Walcott's various endeavours comprise some 130 books and papers, only one co-authored. Some 50,000 fossils were shipped back from Walcott's expeditions to the Smithsonian Institution, of which around 15,000 are from the Burgess Shale. His scientific investigations were sufficiently distinguished to gain Walcott twelve honorary degrees, some of them from institutions in Europe—no mean achievement for a man who had never taken a university class. All in all, the very contemplation of Walcott's energy and commitments makes a mere mortal like the reviewer feel tired!

Ellis Yochelson is a very suitable biographer for such a person, in view of his own skills in invertebrate palaeontology, his association with the Smithsonian Institution and his familiarity with Washington in all its moods and climatic vicissitudes. After writing a memoir of Walcott for the *Biographical Memoirs series of the National Academy of Sciences* (1967), he published several short papers on Walcott's achievements before completing his study of Walcott's pre-Smithsonian years, *Charles Doolittle Walcott, Paleontologist* (1998)—a massive volume of some 525 pages. This second volume is even larger, exceeding 600 pages; but then it needs to be, for the complexity of Walcott's activities grew with the years.

Two approaches are possible in writing a biography of a person with such diverse interests and commitments. One is an essentially chronological treatment; the other is thematic. Ellis Yochelson has chosen the former approach, presenting almost a day-by-day record of Walcott's activities, with the occasional informative flashback or harking-forward to facilitate comprehension of particular problems facing him. The product is a mine of information, so rich as to perhaps deter some readers; but I found it fascinating.

The vein of humour in Yochelson's writings is enlivening: e.g. 'stratigraphic paleontology or biostratigraphy, or whatever the latest buzzword may be' (p. 24). I have some sympathy with his view that 'graptolites look like pencil marks on shale, but are not as interesting' (p. 366). However, as one who loves the Mesozoic strata most of all, I must disagree wholly with his judgement (p. 4) that one should forget about the Mesozoic and Cenozoic, since 'these are younger overburden, in many cases covering up the more interesting Paleozoic strata'.

Recurrently entertaining are his wry comments, for example: '... one minor myth of the Burgess Shale is that *Sidneyia inexpectans* was so named because Walcott was in the field and a baby Sidney came sooner than expected. Since Sidney was eighteen and with father and mother at the time, this story shows how much some folks can read into an innocent scientific name'.

Yochelson states boldly (p. 63) that:

The idea that a mistake in a paper is the printer's error is not the sort of excuse fellow scientists generally accept. If one's name is on the paper, one is responsible for the contents.

There are, in fact, rather too many typographical or other errors—most of them ones that would evade a computer spell-check. The trilobite family *Mesonacidae* is twice misnamed the *Mesonascidae* (pp. 53, 54) but cited correctly on p. 57; then we have 'Receptaculites' (p. 458), 'oxymononic' (p. 317) and 'would commented' (p. 503) and quite a number more. However, one must sympathise: it is a massive volume and must have taken much patience in checking.

This, then, is a fascinating picture of science in past times. The expansion of the railroads was still happening during Walcott's years; there were hesitations by Walcott about buying an automobile—a White Steamer—in 1909, when he was almost 60, but a continuing preference for the horse; and he bought his first radio in November 1924, less than three years before his death (p. 414). Yes, it was a very different world, and Walcott was a person of his time, as indeed are we all. Had he lived later, Walcott might have received better medical and dental treatment. He would surely have been spared those recurrent, severe tooth troubles (pp. 359, 393, 376, 410, 411, 499) and perhaps also the stomach and kidney pains that so bedevilled his latter years, though one suspects they may have been concomitant to his being such a workaholic.

However, in that time and despite these ailments, Walcott was splendidly effective. He left a legacy to the Smithsonian Institution far greater than his personal gifts and bequests—a legacy of discovery, initiatives and service that deserve always to be remembered. These two volumes by Yochelson will remain prime sources for all future scientific historians.

William Sarjeant, Saskatchewan

On the History of the Central Institution of Meteorology and Geodynamics at Vienna, 1851–2001.

Ch. Hammerl, W. Lenhardt, R. Steinacker und P. Steinhäuser (eds), 2001, *Die Zentralanstalt für Meteorologie und Geodynamik 1851–2001: 150 Jahre Meteorologie und Geophysik in Österreich*. Leykam, Graz, 2 CD-Roms.

This glossy book weighs nearly three kilos and displays the great importance of the Central Institution in an impressive manner. It describes in detail the development of meteorology and geophysics at the *Zentralanstalt für Meteorologie und Geodynamik* and the closely connected Institute of Meteorology and Geophysics at the University of Vienna. The historical part of the book is written by Christa Hammerl, who gives deep insight into the archival material, linking the stages of development to the cultural and political environment in Austria.

The author divides her part of the book on the history of the *Zentralanstalt* (297 pages) into seventeen chapters, focusing on the special influence of each director or on the effect of major political circumstances such as the Great War (1914–1918), the interwar period until Austria was united with Germany in 1938, World War II, the recovery, and the period after the Austrian treaty in 1956. Additional chapters describe the splendid library of the *Zentralanstalt*, the connection with the Institute of Meteorology and Geodynamics. There are biographies of the directors and a list of all persons who were working at the *Zentralanstalt* on 1 April, 2001. The chapters are illustrated with historical pictures, reproductions of important letters, newsletter clippings, meteorological data recordings, and maps with German and English explanations. Although an historian, Mrs Hammerl shows a very good understanding in the scientific problems, having worked at the *Zentralanstalt* on historical seismic data for a long time.

The other authors contribute (either in German or English) papers on single subjects, such as the founding of dynamical meteorology at Vienna (Huw Davies, pp. 301–312), 150 years of climatology in Austria (Michael Hantel, pp. 313–332), F.M. Exner and the Austrian school of meteorology at Vienna (Heinz Fortak, pp. 354–386), and historical earthquakes (Rudolf Gutdeutsch, pp. 487–497). Other reports present current projects in geophysics. All papers provide an English abstract.

An extensive index covering all the contributions and two CD-ROMs are included, which need no special installations on your PC. The first CD is an interactive digital climatological atlas of Austria. It also gives information on the *Zentralanstalt* and on climate change, giving, for example, five pictures of the glacier *Wurtenkees* in the Alps, which almost disappeared between 1896 and 1997. A meteorological glossary is also included. The second CD concerns geophysics. It is divided into chapters on crustal dynamics, gravimetry, magnetism, and applied geophysics. Here the user will find a biography of the first director and magnetician, Karl Kreil. His maps of the first magnetic ordnance survey of Austria are also given. The reproduction of seismic recordings of the historical earthquakes that occurred at San Francisco on 18 April 1906 (5h 12) and Messina on 28 December 1908 (5h 20) are fascinating. This CD adds to the book with supplementary documents, coloured pictures, and maps. Short movies are used to explain methods of engineering-geophysics. Unfortunately, both CD-ROMs give no English information.

If you are working on the histories of meteorology and geophysics and referring to Austria, this large volume is an excellent source for German readers.

Cornelia Lüdecke, Munich

On the History of Geophysics

Walter Kertz, *Geschichte der Geophysik. Zur Geschichte der Wissenschaften. Eine Reihe der TU Braunschweig*, Vol. 3, Ruth Kertz & Karl-Heinz Glafmeier (eds), Georg Olms Verlag, Hildesheim, Zürich, and New York, 1999.

Walter Kertz was one of the very few writers of textbooks on geophysics in Germany so that most of the students of geophysics in German-speaking countries know the new editions of his classic *Introduction to Geophysics* Volumes I and II (1969 and 1971). (I myself used the books for my final examination in geophysics.) Kertz liked to introduce chapters with short historical or biographical reviews, which was, and still is, rather unusual. Here Kertz showed already his interest in the

history of the geophysical disciplines and its importance in teaching, providing the context to the current geophysical methods and theories that students had to learn. He collected historical and biographical information on geophysics over three decades, but did not start writing until he retired. Unfortunately he died on 8 September, 1997, when the manuscript was still not finished. His wife Ruth Kertz and his colleague Karl-Heinz Glafmeier took it and prepared for publication those parts that were already ready for final revision. They have not altered the text or added new literature or missing chapters. In his introduction, Kertz said that he wanted to keep his amateur status in dealing with the history of geophysics. He began at 1600, when William Gilbert published his book *De magnete*—the first milestone of geomagnetics—and he finished with Alfred Wegener as the reformer of earth sciences and the new geophysical techniques of exploration, especially oil exploration, before World War II.

The book is divided into five parts according to time periods. The first part (Chapters 1 to 5) describes the development of geophysics within the frame of seventeenth-century natural science. The second part (Chapters 6 to 10) explains how Newton's science was accepted in the period 1700 to 1775. The middle part (Chapters 11 to 14) presents the political, industrial, and scientific revolution during the following years to 1855. Chapter 13 is devoted to the Göttingen Magnetic Association, one of the famous German contributions to the history of magnetism. How 'nation and society' used earth sciences up to 1905 is the subject of the fourth part (Chapters 15 to 19). Here, for example, an introduction of meteorology in connection with oceanography, the investigation of solar and polar lights, and seismic research are given. The history ends in 1939 under the promising heading of the final section 'On the Way to the Service of Mankind' (Chapters 20 to 22).

Kertz wanted to give an interesting story, as his example Egmont Colerus had done in his books on Pythagoras (1934) and Leibniz (1936). Reading the text one gets a feeling for Kertz's love of the history of his discipline. He liked to present the human side of science, how people work and develop their ideas, and how these ideas were used and developed by others (or not). This could only be done by someone having a thorough overview of the history of science, neglecting all national boundaries, concentrating on persons and their ideas, and showing how these were disseminated—by letters or conferences for example. Possessing these attributes, Kertz's story is most stimulating to read.

Editor Glafmeier also gives an indication of what Kertz had in mind to write in the missing chapters. He mentions the discovery of radioactivity and its importance in geophysics, the investigation of the seafloor, as well as the investigation of the upper atmosphere and the ionosphere. The International Geophysical Year (1957–1958) would have been Kertz's final highlight. It was the greatest joint undertaking ever in geophysics. It was for Kertz the classic example of scientific, political and personal collaboration. The editor gives a short overview of these subjects to round off the book. Many pictures, technical sketches, important graphs and maps illustrate the development of geophysics. References and a name index are provided, but a general index would have been also very useful.

Originally a *Biographical Encyclopaedia of Geophysics* was planned as second volume of the *History of Geophysics*. Unfortunately Kertz died before its realisation, but fortunately Glafmeier has prepared a data-bank of biographical sketches of important geophysicists, with pictures and biographical references. This important resource is available on the internet at: <<http://www.tu-bs.de/institute/geophysik/kertz/html>>. It is highly commendable that the editors undertook the effort to make Kertz's work available to readers. If you are a German-speaking historian of earth science you should have the first German edition on the history of geophysics.

Cornelia Lüdecke, Munich

Willem Antoon Jozef Maria van Waterschoot van der Gracht's Distinguished Career

Frederik R. Van Veen, *Willem van Waterschoot van der Gracht, een biografie*. Delft Technical University Press, 1996. The name 'van Waterschoot van der Gracht' may look complicated to those not familiar with the Dutch language, but it sounds prestigious and familiar to Dutch Earth scientists, as it designates the most important prize in Earth Sciences for The Netherlands, awarded annually by the Royal Dutch Association for Mining and Geology (KNGMG). This name is given in honour of a man of international stature, Mr (Magister) Dr (Doctor) Ir (Ingenieur) Willem Antoon Jozef Maria van Waterschoot van der Gracht DSc, ME (1873–1943), who as jurist, mining engineer, and geologist played a most important role in the development of the mining industry (including oil) and applied geology in The Netherlands during the first half of the twentieth century.

The eldest son of a well-known Amsterdam Catholic family (his father, a notary, was later elected a member of Parliament), Willem was first educated at the aristocratic Roman Catholic college of Katwijk, but felt then the need to pursue his education abroad, at the Jesuit College of Stonyhurst, in England. There, during excursions in the Lancashire countryside, he had his first contacts with geology, which were to determine the rest of his life. Upon his return to Amsterdam, he quickly wrote a thesis in law (on the state regulation of fresh-water fishing), in order to fulfil the familial tradition and accede to his father's wishes, but then he decided it was time to undertake the studies of his own choice. Mining geology found his favour, but after the premature death of Hermann Vogelsang, in 1874, the formerly prestigious school of Delft had declined, and Willem felt he should go to the most famous place in Europe, the Bergakademie of Freiberg. The course there was not easy, and he had to work hard. But, after four years, he obtained the title of *Diplom Ingenieur mit Auszeichnung* (with distinction), and left Freiberg with the record of a good student, much stronger, however, in geology and mathematics than in crystallography and mineralogy. At the conclusion of his studies at Freiberg, he was thirty years old, ready for a distinguished career.

Willem's background as a lawyer, as well as his family tradition, initially orientated him towards governmental circles. As Secretary of the Council of Mines, he played an important part in the elaboration of the Dutch legal mining system—directly inspired by the Napoleonic *Code Minier*—and became the real founder of the organisation that was later to

become the modern Dutch Geological Survey. But, after some years in administration, he felt greater ambitions within the rapidly developing oil industry and, having travelled worldwide, began a career in the United States, which was to bring him international fame. As field geologist, and then president of a number of oil companies in Louisiana, Wisconsin, and Oklahoma (Roxana, Rowland, Matador), he became an important figure in the newly founded AAPG. He had a gift for organisation, having already played a most important role in the development of the Dutch professional association of Mining and Geology. Within the AAPG, he was a respected member of the 'Research Committee', and as such, under the name of Van der Gracht (which he had chosen for the US, whereas he was better known in Holland as Van Waterschoot), he chaired in the autumn of 1926 the memorable symposium on Continental Drift, with which his name is often associated. During this symposium, he firmly supported Wegener's views, in opposition to most of the scientific authorities of the time.

Willem's professional and scientific activities in the USA were quite successful. He had, however, a number of problems with his successive small companies, which, one after the other, were absorbed by the big companies, Royal Dutch Shell or Standard Oil. He also possibly foresaw the approaching economic crisis, and at the end of the 1920s he decided to return to Europe for family reasons and to take care of the family properties. But Holland could hardly miss someone of such international stature. In 1932, he was nominated by the Government as General Inspector of Mines—the highest authority in the mining sector for that country. This led to another success story, namely the discovery of important coal deposits in the southern part of the Netherlands (Limburg).

Jurist, mining engineer, and geologist, Willem van Waterschoot van der Gracht was a man of broad experience, internationally minded, who deserves to be better known outside his home country. His adventurous and successful life is adroitly described by Frederik Van Veen, Emeritus Professor at the Technical University Delft, in a small but well written book, at least for those who have a minimum knowledge of the Dutch language. The book has twenty-five chapters, most of them very short (1 to 2 pages), illustrated by few original photographs and by exquisite drawings taken from the notebooks of the young Willem at the Katwijk college, then about 15–17 year old. They reveal the family's artistic tradition, also manifested by his portrait, painted by his daughter Gisèle d'Ailly, which graces the entrance hall of the Dutch Geological Survey (formerly in Haarlem but presently under transformation and rebuilding as a new institute (TNO-NITG) in Utrecht University). The book also contains a list of all the recipients of the Van Waterschoot van der Gracht medal until 1994. It is published by the Press of the Technical University, Delft (Delftse Universitaire Pers, Stevingweg 1, 2628 CN Delft, Tel + 31 (0) 15 2783254, Fax + 31 (0) 15 2781661), from which it can be obtained at the price of 13.61 Euros.

Jacques Touret, Amsterdam

Alexander Vasilievich Koltchak: Arctic Explorer

Valerii V. Sinyukov, *Alexander Vasilievich Koltchak as Arctic Explorer*, Nauka [Nature] Publishing House, Moscow, 2000 (in Russian).

Alexander Vasilievich Koltchak (1874–1920) is generally remembered as a 'Supreme Ruler' of Russia and Commander-in-Chief of her land and sea forces. He resisted the power of the Soviets in 1919–'20 and publication of his previous biography was banned for eighty years. It was Valerii Sinyukov, a senior research fellow at the S. I. Vavilov Institute of the History of Natural Sciences at The Russian Academy of Sciences, who first collected archival materials on Koltchak's life and his activities and showed the world of his achievements as an Arctic explorer in the years before the October Revolution.

Koltchak graduated from The Maritime Military School in St Petersburg in 1894, and sailed as a sub-lieutenant on military ships in 1895–1898. He participated in the Russian Polar Expedition of 1900–1903, sailing on the first Russian scientific vessel *Zaria*, under the command of E.V. Toll. The expedition was searching for 'Sannikov Land', which was supposedly situated in the eastern Arctic region, north of the New Siberian Islands, but the vessel could not move north of the islands because of ice. On the third year of the expedition, Toll went north using dog teams, but failed to return. After the *Zaria's* food supplies were exhausted she went south to the mouth of the Lena River. Koltchak returned to St Petersburg to prepare a rescue mission, which he headed at the age of 28. In May 1903, the expedition moved from Irkutsk to the New Siberian Islands, using dog teams. After passing the Lyakhovsky and Kotel'ny Islands, the expedition reached the northern Bennett's Island, where Koltchak found Toll's last notes: "We start south today. We have food for 14 to 20 days. All of us are healthy. E.V. Toll. Guba Pavla Keppena, ostrov [island] Bennetta 26.X–8.XI.1902". Toll did not reach land, but perished in the ice.

While sailing on the *Zaria*, and during the expedition, Koltchak made systematic physical observations and measurements. He prepared a scientific monograph, *The Ice of Kara and the Siberian Seas*, which was published in *The Transactions of the Imperial Academy of Sciences*. There he proposed a four-phase model for the formation and development of ice; laid out the scheme of ice movement in the Arctic regions; and gave the results of hydrographic measurements of sea-water and ice. Even now, Koltchak's book has not lost its significance. His theoretical conclusions on the development of sea-ice have been used in numerous handbooks on oceanography. However, his name was never mentioned in Soviet times.

The ships *Vaygach* and *Taimyr* were constructed specially for scientific researches at Koltchak's initiative. In 1910, *Vaygach* sailed under his command for scientific purposes along the northern coast of Russia and in the Bering Strait.

Based on archival materials, Sinyukov's book opens new pages in the study of the history of investigations in Arctic regions.

Igor Resanov, Moscow

Moles and Eagles: An Earthy View of the Origins of British Geology

Hugh Torrens, *The Practice of British Geology, 1750–1850*, Variorum Collected Studies, Ashgate, Aldershot, 2002.

This is a valuable collection of thirteen papers (I–XIII, reprinted with original pagination), originally presented and subsequently published following meetings held in the United Kingdom, France, Italy, USA, Canada, and Brazil between 1983 and 1999. It brings together what at first glance is a disparate set of studies and presents an illuminating and at times exciting view of British geology in its formative stages. Hugh Torrens must surely be one of the most industrious and prolific of geological historians working today. He defines himself in a revealing introduction as 'a mole-like historian, more interested in detail and the hidden, eroded aspects of the history of geology [rather] than attempting to be an eagle-eyed surveyor of the past'. His work exemplifies G.M. Trevelyan's view that it is the detailed study of history that helps to bring the past to life. Torrens certainly provides the details (often hard-won). His task has been all the harder because he has chosen for his subjects the practical men—land surveyors, mineral surveyors, mining surveyors and the like who for long were ignored, or worse, by the 'gentlemen' geologists and later by the historians of geology. The fact that for financial reasons or for lack of the right connections their work often went unpublished, presents a daunting challenge to the would-be historian. It is the previous lack of recognition for these early pioneer geologists and a desire to set the record straight that provides the common thread running through this selection of papers, and Torrens, through his painstaking research, has been able to reveal some, at least, of these lost practitioners as significant figures in the early years of geology.

One such was James Ryan (*ca* 1770–1847), an Irish mineral surveyor who invented an efficient coring device (patented 1805) which would have greatly advanced data-gathering from bore holes had it been developed at the time, but it was considered too expensive. William Smith, although he was to receive belated recognition in his own lifetime, is another of the practical men championed by Torrens. He would prefer Smith be called the 'Father of Mineral Prospecting' rather than 'The Father of English Geology' as he is usually designated; for it was his understanding of the use of fossils in the ordering of strata that was to revolutionise the methods of prospecting for minerals—principally coal and ironstone in the heyday of the Industrial Revolution. Equally, recognition of the order of strata could help in deciding where it was not worth looking for coal. Paper VII gives a case-study of an abortive search for coal in the Bexhill area of Sussex, where, despite contrary advice given by John Farey (1766–1826) on stratigraphic grounds, bores were sunk and much money lost in the project.

Farey features in two other papers (V and VI, with Trevor Ford). He was a friend and follower of William Smith and after surveying the route from London to Brighton (1806), and his work being seen by Sir Joseph Banks, he was commissioned by Banks to survey some of his estates in Derbyshire and Lincolnshire. These surveys he carried out efficiently according to Smith's methods and with results, in the form of maps and sections, the equal of those of the master. Farey was a man of many parts, an unrecognised polymath according to Torrens, with interests in music, mathematics, agriculture, and politics in addition to geology, in which he achieved much, and perhaps nothing greater than the promotion of William Smith's principles and methods. His publications run to over 250 items, and much of his work remained unpublished.

The importance of Georgian Bath in the history of geology is well established through the connections of William Smith with the area between 1792 and 1806. In Paper III, Torrens reconstructs the scientific, economic and social climate of Bath around and before this time and demonstrates that there was a keen local interest and activity in geological matters. The Bath Philosophical Society was the first to be established in the provinces (1779), and became a focus for discussion and debate. Local residents with geological interests including Edmund Rack (1735–1787), William Watson (1744–1824), John Wickham (1730–1783) and John Arden (1720–1791), together with many others, have been 'discovered' by Torrens and feature here. While some had interests restricted to collecting and classifying, others took a more 'economic' view, for Bath was a community concerned with the search for building stones and coal (the Somerset coalfield being nearby). One aim of this study of late eighteenth-century Bath was to help clarify whether Smith owed a debt to previous workers in the area and had built on their foundations. It seems that while he was to find himself in a congenial scientific environment, and clearly gained from his associations within it, his was a new and original talent and had no precursors.

As with Bath before William Smith, Torrens also examines, in Papers IX and X, the Welsh Borderland region of Shropshire before the work of Roderick Murchison and his creation of 'The Silurian System' (1839). Here, it was a different story, for there had been considerable geological activity in Shropshire from the time of Robert Townson (1762–1826) who published 'A Sketch of the Mineralogy of Shropshire in 1799. Townson was aware that many of the rocks occurred in superimposed sequences and he collected fossils, but he was too early to apply stratigraphic principles in his work. Somewhat later, Arthur Aikin (1773–1854) made extensive geological surveys of Shropshire between 1810 and 1816, producing maps and sections which were never published due to lack of funding and the general depression that followed the end of the Napoleonic Wars. Murchison was to make use of Aikin's work, which was based on stratigraphic principles, as well as gaining from the observations and discoveries of a number of local amateur geologists, including doctors and clerics.

Aikin had been a founder member of the Geological Society of London (1807) and had a foot in two worlds, for the provinces were considered as of little consequence compared with the 'gentlemen' geologists of the capital, or the 'metropolitan monopolists' (*i.e.* of The Geological Society), as Lyell had once called them. As Bakewell was to put it in 1830, there was 'a certain prejudice more or less prevalent among the Scientific Societies in large cities like London or Paris, which makes them unwilling to believe that persons residing in provincial towns or in the country can do anything important for science'. There is no doubt that despite the greatness of Murchison's achievement with his work on the Silurian, he was slow, to say the least, to acknowledge those who preceded him, and quick to take all the credit for himself.

Joseph Harrison Fryer (1777–1855) was another little-known mineral surveyor who worked in England, and briefly in South America, in the early decades of the nineteenth century. Like many of his kind, he almost slipped through the net of history, but has been rescued by Hugh Torrens, who in Paper XI gives us as much information on his life and work as could be

salvaged. That Fryer was a notable scientist is supported by the opinion of no less eminent a geologist than Ami Boué who wrote, in 1820, that he was 'one of the best informed geologists I found in England'.

The final two papers in this collection illustrate Torrens' skills as a geological detective. W.E. Logan was the first Director of the Geological Survey of Canada, but Paper XII explores his early life and career, and the experiences that set him up for the role for which he is best known. He was at Edinburgh University in 1816–1817, but while he might have been expected to pick up some geological ideas there, he apparently did not. After a time in business in London he moved to Swansea in 1831 and became deeply involved with the coal mining industry, and it was here where he learned his geology. He did much mapping of the South Wales Coalfield, and from 1838 worked unofficially for the Geological Survey. He was invited by the Director of the Survey, Henry De la Beche, to set up the Geological Survey of India, but Logan had ties with Canada, where he was born. Later, when asked to establish the Survey there, he accepted.

Britain was well supplied by men with practical skills, as is further demonstrated by the career of James Buckman (1814–1884). Yet another little known figure in British geology, Buckman was appointed to a professorial position at the newly established Cirencester Agricultural College in 1848—one of the earliest academic positions held by a professional scientist in Britain. Later he was to carry out consulting work in the coalfields of Virginia. Torrens concludes this paper (No. XIII) with a quotation from a recent commentator (Tweedale 1991), which echoes the motive for his own work as presented here: 'Applied geological work has so far proved of little interest to historians, in part because of the particular difficulty of locating source materials and also because of the long bias towards academic and theoretical geology by historians'

In these studies, Hugh Torrens takes us along the byways of early British geology, along paths for the most part unfrequented previously. He is a true geological explorer, ferreting out a wealth of detail, making a multitude of connections, leading us on side tracks which may not be strictly relevant, but are always interesting and unearthing not a few nuggets which have excited this reviewer. Inevitably, in a compilation of this nature there is some overlap and repetition between papers; but this only serves to strengthen the whole. This is a collection that richly rewards study. And long live the practical geologists!

David Corbett, Adelaide.

The Heat of the Earth

Raffaele Cataldi, Susan F. Hodgson, and John W. Lund (eds), *Stories From a Heated Earth: Our Geothermal Heritage*, Geothermal Resources Council, International Geothermal Association, 1999.

The aim of this substantial volume is stated succinctly on an early page (p. xv):

This is not an Earth science text or a technical treatise, and geothermal phenomena themselves are not geologically or industrially described. Instead, the focus is on people throughout time, on how geothermal features at the surface of the Earth have affected mankind all over the world, sometimes with important consequences. Each chapter relates this story, as for the first time a project so comprehensive views the history of people around the globe through a geothermal lens.

The phrase 'around the globe' is correct enough, but the content was inevitably controlled by the contributors. Though thirty-four papers are presented, certain regions with geothermal resources of great commercial importance are not treated with—in particular, Germany, Austria and the British Isles, where mineral 'spas' were very much a feature of social life during the nineteenth and early twentieth centuries. That was, no doubt, because no willing authors could be found—always a problem for editors striving to assemble a comprehensive volume, whatever the topic.

However, though the gaps are significant, the coverage remains impressive. After presenting a first chapter summarising the Mexican legends of geothermal creation, Raffaele Cataldi presents (in 'The Year Zero of Geothermics') entertaining speculations concerning the relation between primitive peoples and the geothermal phenomena amid which they lived. He shows how the relationships that must have developed were both utilitarian and spiritual, often involving the development of cults imagining subterranean divinities.

The chapters that follow comprise examinations of the legends surrounding geothermal phenomena, their geological circumstances, and the history of their interplay with human activities (malign or benign) in different regions. Some are large in scope. John Lund (Ch. 3) treats with the whole East African rift valley from Mozambique to Ethiopia, Raffaele Cataldi and Paolo Chiellini (Ch. 11) discuss the use of geothermal energy in the whole Mediterranean region during the Middle Ages. Lund treats the relation of geothermal phenomena to the peoples of North America—the continental United States, Alaska, Hawaii and western Canada (Ch. 29); albeit with heavy stress on Hawaiian legends and omits mention of Saskatchewan's mineral spas. The central American region, from Mexico to Panama, is treated in papers, respectively by Mario C. Suárez Arriaga *et al.* (Ch. 31) and José L. Hernández Galán *et al.* (Ch. 32), while Gonzalo Rico Calderón (Ch. 34) treats with geothermal phenomena in Andean cultures from Ecuador to Chile, stressing the period prior to the Spanish conquest of that great region. Even larger in scope is the treatment by Valentina Svalova (Ch. 21) of the whole region of the former USSR, from Russia to Kamchatka.

Most chapters are devoted to the interplay of geothermal phenomena with human activity and imagination in particular countries. Mehmet Emin Özgüler and Ahmet Kasap (Ch. 5) treat the region of Anatolia, Turkey, and the origin of the 'Turkish bath'; Michael Fytikas *et al.* (Ch. 6) describe the significance of geothermal energy in the history of ancient Greece, while Kiril Popovski and Konstantin Dimitrov (Ch. 7) treat Macedonia. Italy is dealt with in four chapters. Renata Grifoni Cremonesi discusses geothermal phenomena in Italian prehistory, while Raffaele Cataldi and Pier Domenico Burgassi (Ch. 9) discusses thermal balneology among the Etruscans, with a sidelong glance at the Atlantis legend and Santorini. Cataldi and Burgassi thereafter discuss the importance of thermal springs in ancient Rome to the year 1000 AD (Ch. 10), then carry their story onward to the 16th century (Ch. 12). Ioan Cohut and Miklós Árpási (Ch. 15) describe the geothermal history

of Romania and Hungary, while Marián Fendek *et al.* treat Slovakia (Ch. 16) and Julian Sokolowski *et al.* Poland (Ch. 17). Ingvar Birgir Fridleifsson (Ch. 19) surprises with his account of the remarkably late development of geothermal resources in highly volcanic Iceland.

In addition to these broad treatments, specific local areas in the Near East and Europe are treated in several papers. Felice C. Jaffé *et al.* (Ch. 4) deal with lore and legend in the Jordan valley, between Lake Kinneret and the Dead Sea; Cataldi and Burgassi (Chs 12 and 13) describe in detail the development of geothermal resources in the Boraciferous and Larderello regions of Italy; and Jean-Pierre Gibert and Florence Jaudin (Ch. 18) discuss the Chaudes-Aigues region of Auvergne, France.

Moving out from Europe, we have accounts of geothermal history and legend in the Transcaucasus region (Armenia, Georgia, Azerbaijan) by Guram Buachidze *et al.* (Ch. 20); the thermal springs of India in prehistory, by D. Chandrasekharam (Ch. 22) and the use of geothermal waters in China's long history by Wang Ji-yang (Ch. 23), with mention of the development there of the first seismoscope. Following this, we have treatments of the hot springs of Korea, by Byoung Woo Yum (Ch. 24), of Japan by Mitsuro Sekioka (Ch. 25), of the Philippines by Leonard M. Ote *et al.* (Ch. 26) and of Indonesia by Wimpy S. Tjetjep *et al.* (Ch. 27). C.M. Severne discusses the traditional use of hot springs by the Maori of New Zealand (Ch. 28). The history of the Geyser region of central California is recounted, and further geothermal stories from Mexico are reported, by Susan F. Hodgson (Chs 30, 33).

A fascinating feature of all chapters is the illustration, sometimes in colour, more often in monochrome but always effective. There is an especially charming early map of Iceland (p. xx), many illustrations of artefacts and geothermal vistas, plans and photographs of bath chambers and of equipment for controlling geothermal emission, and an array of helpful maps, including helpful small-scale location maps at each chapter's beginning. Pictures of Easter Island statues begin and end the work, charmingly if perhaps somewhat irrelevantly.

This work will be enjoyed by anyone intrigued by the interplay of human thought and activity with geological phenomena. It is destined to become a major resource for those of us fascinated by the folklore of the earth sciences, and it shows also how technological ingenuity has transformed the initially alarming products of the earth's activity into a range of benefits for humanity. All in all, then, this is a unique and fascinating work for any earth scientist with imagination and a concern for the past.

William Sarjeant, Saskatoon

More Dating of the Earth

C.L.E. Lewis & S.J. Knell (eds), *The Age of the Earth: From 4004 B.C. to A.D. 2002*, The Geological Society, London, Special Publication No. 190, 2001.

What an interesting and informative book! In nineteen separate chapters, from twenty-three historians of science, geologists, geophysicists, and geochemists, we see how ideas about the age of the Earth have 'evolved', how these ideas have influenced thinkers in the past five centuries, what individual workers have contributed, and how the measurement of the Earth's age has been attacked (in both senses), particularly during the past one hundred years.

The papers have been written by respected researchers about well-known figures, some of whom have been misunderstood or not appreciated; and there are also lesser figures whose work deserves to be recognised. As might be expected, there is a strong Anglophile (or at least English-speaking) tone to the book, but a broader picture is sketched in papers on Buffon and Desmarest (Ken Taylor), De Luc, 'half-English' perhaps (Martin Rudwick), not forgetting a bundle of Italian, German and Spanish savants (Ezio Vaccari).

John Fuller tells us how the additional four years got tacked on to a nice round 4000 BC for Bishop Ussher's famous age of creation (which was not really Ussher's at all), and also tells us that there were many more, and better, biblical scholars than Ussher, and that they produced different numbers. He also makes the intriguing suggestion that Elizabethan 'central thought-control and printing management' were influential in the development of English theories of the Earth, and that these influences persisted well into the nineteenth century.

Some of the papers deal with well-known matters such as the battle between the physicists, led by Lord Kelvin, and the geologists, who perhaps lacked a leader of similar stature. Arthur Holmes deservedly gets good cover, championed as he has been in recent years by Cherry Lewis, as does Edwin Hubble (Stephen G. Brush), who seems to have doubted his own concept of the expanding universe.

In dealing with John Joly, Patrick Wyse Jackson took me back to my own university days when we looked at Joly's ideas on sedimentation and salinity (unaware of Halley's thoughts on such matters several centuries earlier) and examined pleochroic haloes. We also read Holmes, a little more than fifty years ago, unaware that our own aging professor, Leo Cotton, had pioneered Uranium/Lead dating of Australian Precambrian rocks, and had the temerity to question Holmes's constant, which he applied in his calculations.

Martin Rudwick makes a good case for the poor treatment of De Luc in past years in discussing how the then existing 'science' of chronology was transposed from human history on to the history of the earth. De Luc, he says, played a pivotal role. Furthermore, Rudwick stresses, 'we should not ignore the historical evidence that the intellectual roots of this crucial transposition from culture into nature lay in De Luc's commitment to a religious tradition that had historicity at its heart'. We learn more new information about William Smith from Hugh Torrens than we might have expected, in the context of thoughts not so much about the age of the Earth, but about 'timeless order'. It is only space (and time) that prevents me from commenting in detail on the papers I have mentioned, and the others, which present many ideas worthy of discussion. Other readers will doubtless be drawn to different papers, and they are all interesting and informative.

As is common with the Geological Society publications, the book is well set out, and only in the first chapter, written by the editors and probably in haste, summarising (very well) the remainder of the book, are there notable

typographical and grammatical errors. The book is illustrated, but not copiously, and has as its cover a reproduction of the well-known Dhustone Section from Ludlow. When will someone find out (or tell us) who drew this splendid section, and when? And who is 'No. 4' in Fig. 2 (page 5) at the 1838 BAAS? Surely the ear trumpet must give someone a clue. The references in the volume are themselves a revelation. How many books have been written on the age of the Earth and related topics? There must be hundreds, yet this book has a freshness about it that is engaging. Although W.G. McGee's extraordinary claim of a fifteen-billion year age of the Earth gets a mention I am surprised that nowhere does J.G. Goodchild's surprisingly good figure for the base of the Cambrian and ages for the periods of the Palaeozoic, just prior to the discovery of radioactivity, get mentioned, although it was known in Australia. His long paper on the subject seems to have escaped the eagle eye of the various researchers, such as Brent Dalrymple, who provides a good table of various attempts to solve the question of the Earth's age. Geologists, with only a slight interest in the history of their profession have much to gain from this book, which is weighted towards history. Historians of science will find new viewpoints about their subject and could benefit, if they persist, by reading the more technical papers dealing with recent advances in geochronology and related topics, such as that by B.S. Kamber and others on the 'Oldest Rocks on Earth'; 'The Age of the Earth—a Geochemical Accident' by Albrecht Hofmann; 'Is the Earth too Old?' by Stephen Brush, a look at cosmological dating compared with geochronology; and the final paper 'Understanding the Beginning and the End' by the Astronomer Royal, Martin Rees.

All in all, this is an informative and thought-provoking book. Make sure it gets into your college libraries, and use it as a basis for discussion. Make it known to your Creationist contacts, who reject the entire foundations of modern geology and astronomy. Remind them of Einstein's comment: 'Subtle is the Lord, but malicious he is not'. I think the book is pretty good.

David Branagan, Sydney

Dr Branagan found the following table in his papers, from 'Cooper's Chronicle' (1560). It will be of interest to readers.

The computacion of the ages of the worlde.

The bible and Hebrews ch. 7.		The creation of the worlde		To the deluge.	
The ages of the world after the computation of	1	The deluge	To the deluge.	1656	
	2	Abrahams nativitee	To Abraham.	292	
	3	The departing out of Egypt	To the departing of Israel out of Egypt	503	
	4	Building the temple.	To the temple building.	481	
	5	The captivitee of Babil.	To the captivitee of Babil.	414	
	6	The captivitee of Christ	To Christ.	614	
	7	To this yere.	To this yere.	1560	
Eusebius and the latine cro. 6	1	The creation	To the deluge.	2242	
	2	The deluge	To Abraham.	942	
	3	Abrahams birthe	To David.	941	
	4	David	To the captivitee of Bab.	485	
	5	The captivitee of Christ	To Christ	589	
	6	To this yere.	To this yere.	1560	
The summe of the ages of the world after the compute of	The Hebrews		5521.		
	Divandala		5041.		
	Eusebius		6737.		
	Augustine		6391.		
		Alphonse.	8522.		

[Now follow two reviews of the same book, offering interesting similarities and contrasts. Ed.]

On-going Controversies about Vladimir Ivanovich Vernadsky

Vernadsky – Pro et Contra. An Anthology of Literature about V.I. Vernadsky during the Hundred Years (1898–1998). 114 papers, 872 pp. (in Russian, with contents and summary in English). Editor-in-chief A.L. Yanshin, compiler A.V. Lapo. Russian Christian Institute Press, St Petersburg, 2000.

The scientific ideas of the great Russian natural scientist and thinker, Vladimir Ivanovich Vernadsky (1863–1945), have long drawn praise and admiration from some, but the outright antagonism of other researchers in earth science history. The debates, which started off in Vernadsky's lifetime, sometimes die down, only to flare up again with renewed force.

Confirmation of this fact is provided by an anthology of writings on Vernadsky for his centenary (1898–1998), published by the Russian Christian Humanitarian Institute. With the compiler's scrupulous attitude to highlighting the subject and his care in the selection of texts, which reflect the opinions of 111 authors, the book reveals not only his hero's world, but also the great variety of assessments of Vernadsky's activities.

The contrasting of the frequently polarised views upon Vernadsky's ideas mirrors the characteristic traits of the Russian intelligentsia—apt to set its leaders on a pedestal at one time and knock them down at another. The book begins with an introductory article by Dr Lapo: 'Vernadsky's Worlds: From Crystal to the Noosphere', which imparts an identifiable tone to the collection as a whole. The body of the text is made up of three parts. The first characterises or delineates 'The Phenomenon of Vernadsky'—in his native country and in world culture. The second part, 'Setting on a Pedestal', reflects the period of Vernadsky's 'canonisation' as a great natural scientist. Part III, 'Time of Comprehension', features current evaluations of his intellectual legacy. There are useful commentaries, with brief biographical data of the authors; and there is a name index.

In our opinion, however, the section on 'Vernadsky's Personality' from the second part of this book would have been more appropriately placed at the beginning, followed by a description of the epoch and environment which shaped his intellectual development. 'The Phenomenon of Vernadsky', would have been more suitable as the conclusion.

The anthology is easy to read, sometimes even resembling a fascinating novel. The reader witnesses the life and numerous activities of geologist Vernadsky one by one—from a young crystallographer to the mature biogeochemist and philosopher. Most of his followers and friends called him a naturalist, though primarily he was a geologist. However, Vernadsky's significance does not lie merely in the quantity of his publications on mineralogy, crystallography, geochemistry, and natural resources (according to Alexander E. Fersman's calculations, there were about four hundred of them). On the basis of his geological thinking, Vernadsky developed his conception of the 'biosphere', introducing the notion of the importance of living matter in the formation of the lithosphere. Eventually, he emphasised the importance of thinking about geological problems on a truly global scale. Having taken a great interest in the interconnections of geology with biology and chemistry, he quickly realised that science is indivisible; and specialisation, or narrow focus, can lead to deadlocks in theory and practice. (A tragic example is offered by the present situation in the atomic industry, with its ever-increasing volumes of radioactive waste.) By contrast, current biogeochemistry provides a geologist with valuable methods for the discovery of mineral deposits. The agronomist collaborating with a medical doctor may produce improvements in both soil fertility and health.

More than fifty years have passed since Vernadsky's death, and throughout these years science historians have been discovering, with amazement, his ideas, finding their striking contemporaneity, accuracy, and permanent value. In fact, we have only now 'reached the point in the development of our knowledge, where the sage [Vernadsky] used to be, and the poignant indications of his immense intellectual activity that he bequeathed to us' (see Boris S. Sokolov, p. 91).

The facts of recent years, including those given in the book, seem to confirm Vernadsky's ideas about the geological 'eternity' of life (in accordance with the principle 'all life from life'), and the sedimentary origin of granites (see *American Scientist*, 1945, 33, 6–7). But, in reading the anthology, one realises that the number of Vernadsky's opponents has been increasing in the course of time. Some of them do not accept him even as a naturalist; they detect fallacies in his ideas about cosmic nature and the geological eternity of life.

In this context let us not forget that organic remains have been discovered even in Archeozoic rocks, their age being approximately the same as the Earth itself. It also seems that we may have direct evidence of extraterrestrial life existence (according to observations on meteorites). The significance of the organic (biogenic) matter for the formation of most oil deposits is generally accepted.

The biogeochemical principles discovered by Vernadsky allow the explanation of many features of the Earth's cyclic processes, large and small cycles of chemical elements and compounds in the atmosphere, hydrosphere, and lithosphere. Vernadsky laid the conceptual foundations of many new areas of science—from radiogeology and 'genetic mineralogy' to 'biospherology' (according to Genzel V. Gegamyan), and even 'biospherosophy' (according to Boris S. Sokolov).

The study of mineral radioactivity has come to form the basis for the development of isotopic geochronology and new methods of geological time measurement. The helium 'breath' of the Earth, and the escape of this element to space, noticed by Vernadsky, have been understood only recently when an efflux of the light isotope of this element from the mantle was discovered. Many of Vernadsky's successors see evidence of solar-terrestrial relationships in the regularly repeating manifestations of tectonomagmatic activation of the Earth's interior (see Nikolai P. Laverov *et al.*, pp. 712–715).

However, the 'pro' and 'contra' opinions are not always systematised in this book. Given that it is intended not only for mature researchers but also for young readers (particularly students) such complexity becomes an irritation. Reading the book, one notices that Vernadsky is often praised and criticised for the same thing. But perhaps this was the compiler's intention—to induce the reader to think and search for answers on the multitude of questions raised by Vernadsky. One of the

questions is central — mankind as a force able to destroy itself in the result of the profligate use of natural resources, wars, and environmental pollution.

For his 'seditious' ideas, Vernadsky was repeatedly exposed to attacks by orthodox Marxists. In the anthology, their opinions are reproduced with more than sufficient completeness. We meet, for example, the accusatory passages of Abraham M. Deborin, Isaak I. Present, Arkady K. Timiryazev, *etc.* Vernadsky was accused of 'lack of class consciousness', or the neglect of 'fundamental differences between capitalism and socialism'. According to Vladimir I. Nevsky, Vernadsky's ideas concerning the beginning and eternity of life conflicted with proletarian philosophy. According to Ivan I. Bugayev (p. 346), the search for 'numerical allowabilities' takes us back to Pythagorism. The tendency to stigmatise Vernadsky is even more distinctly expressed by David M. Novogradskiy and Abraham M. Deborin, who were outraged by his attitude to religion, which he sought to reconcile with science and philosophy.

After Vernadsky's death, criticism of his ideas became more overt. The geographers David L. Armand and Igor M. Zabelin opposed his ideas about the noosphere, and the palaeontologist Leo Sh. Davitashvili found fault with Vernadsky's definition of 'biosphere constants' and his demonstration of biogeochemical principles.

In the present work, the microbiologist George A. Zavarzin attacks the term 'living matter' from positions of globalism and the 'systems paradigm', while supporting the idea of the geological eternity of life and the holistic 'biosphere approach' (pp. 599–604). The marine architect A. L. Vasilyev denies the significance of the noosphere concept and doubts that it will survive in the 21st century (p. 654).

Some critical notes against Vernadsky's ideas are given by the hydrobiologist Alexey Ghilyarov, but first of all he reproaches him for neglecting the Darwinian theory of evolution. From Ghilyarov's point of view, Vernadsky's thinking about the development of the biosphere was too mechanical (pp. 690–698).

Like Alexander von Humboldt, Immanuel Kant, and Albert Einstein, Vernadsky's thinking covered not only the Earth, but the universe as a whole, abstracting from details and paying attention to both short-range interactions and long-distance ones in space. From Vernadsky's works it follows that the Earth was initially populated by newcomers from space, rather than by protobionts, produced by chance in a Precambrian 'broth' (cf. Alexander I. Oparin). The biosphere, in Vernadsky's opinion, is something greater than the sum of organisms, or some geographic region, in which one form of life exists. Certainly, the idea of the Earth as a kind of living organism is old (as the creator of the Gaia concept, James Lovelock, points out on p. 556). It was stated by Pliny the Elder in Antiquity, and in the 18th century by James Hutton. Vernadsky's merit is that, having overcome barriers of so-called 'professional science', he offered to consider a biosphere as a whole, combining the troposphere, hydrosphere and the 'rock sphere'. Thereby he anticipated the systems approach, nowadays commonplace in natural sciences.

For long, geologists underrated the role of living matter in geological processes, but Vernadsky demonstrated that organisms have participated in the formation of many ore deposits. Many explorers now recognise the role of biogenic factors in the formation of bauxites, phosphorites, the geochemical differentiation of many rocks and ores, and the extraction of metals. The discovery of micro-organisms in minerals of iron, copper, antimony, molybdenum, and some other metals, also shows the merit of Vernadsky's ideas. The lasting value of his ideas for the extension of the supply mineral resources is underlined by Alexander I. Perelman, Alexander L. Yanshin (Chief Editor of this book), recently deceased, Nikolai P. Laverov, *etc.*

Certainly, such an anthology cannot contain even a small part of the innumerable responses to Vernadsky's life, activity, and achievements. But the publication is more than enough for readers to recognise an extraordinary bibliographic edition in its value and content. It will encourage historians of science to scrutinise the answers that have been given to the many questions raised by Vernadsky — about the beginning and eternity of life, the future of mankind. In all, the merit of Andrei V. Lapo's accomplishment is undoubted. This book will not lie unread on shelves of libraries and will be acclaimed not only by Russian geologists, but also by scientists of other nations and students specialising in the geosciences.

Eugene Krasnov, Kaliningrad

The Controversial Prophet of Living Matter: V.I. Vernadsky (1863–1945)

There is nothing more powerful in the world than free scientific thought (Vernadsky)

V.I. Vernadsky's long life (82 years), astounding creative activity and movement afterlife in the scientific community of the world might well serve as the topic of a fascinating novel, bridging the 19th and 21st centuries. All the necessary elements are provided by this carefully compiled and meticulously annotated book. It is, in fact, the revelation of a revolution: a balanced historical revelation ('unveiling') of a scientific revolution ('turnover'): the troubled birth of a new paradigm in Earth science. A summary of the contents is as follows:

Editor's Foreword, pp. 5–6

Vernadsky's Worlds: from Crystal to Noosphere, by A.V. Lapo, pp. 7–28

The Vernadsky Phenomenon (pp. 29–100): 8 papers, 1946–1995

Vernadsky's Personality (pp. 101–310) 24 papers, including three of his own, 1886–1998

Vernadsky's Epoch

III/1 Time of discussions (pp. 313–438) 26 papers, 1898–1962

III/2 Placement on a pedestal (pp. 441–598) 28 papers, 1963–1988

III/3 Time of comprehension (pp. 599–768) 27 papers, 1989–1998

Concluding remarks, by A.L. Yanshin, pp. 761–768

Contents in Russian and English, pp. 857–868

Comments, Abbreviations, Name index, pp. 769–856

English Summary, pp. 869–871

Vernadsky is beyond doubt one of the brightest stars in the firmament of Russian science. A talented and diligent disciple of V.K. Dokuchaev (zonal soil science) and D.I. Mendeleev (of periodic table fame) at the University of St Petersburg, he started his career in crystallography. Having acquired further expertise in Italy (Naples), Germany (Munich), France (Paris), and Great Britain in 1888, he passed on to genetic mineralogy and eventually became one of the founders of modern (post-Dana and post-Clark) geochemistry, along with the Norwegian V.M. Goldschmidt (his friend) and the Russian A.E. Fersman (one of his first and best disciples). As a Visiting Professor, invited to the Sorbonne in Paris (1922–1926), he became acquainted with Henri Bergson's philosophy, with the mathematician and philosopher Edouard Leroy and the Jesuit palaeontologist Pierre Teilhard de Chardin. Vernadsky decided to return to the USSR, but his son George went to the USA.

Although he was one of the founders of the Party of Constitutional Democracy ('Cadets') in Russia (1905), and acted as Deputy Minister of Culture in Kerensky's Provisional Government in 1917, Vernadsky was not seriously punished after the triumph of the Communist revolution (only being under arrest for a short time). Subsequently, he held various high posts in the Academy of Sciences of the USSR and was active until his very last days. He was an ardent promoter of radiogeology and nuclear research.

Coming from a scholarly family, Vernadsky possessed encyclopaedic erudition, ranging from Ancient History, through the Earth Sciences, to Cosmology and Philosophy. He commanded over a dozen languages (of the Slavic, Germanic and Romance linguistic groups). The sincerity of his quest for scientific truth, moral integrity, and fearless action for personal freedom have never been questioned, not even by his fierce adversaries.

It is generally acknowledged that Vernadsky founded the new scientific discipline of *biogeochemistry*, recognising and emphasising the prominent role of life as a geological factor at the planetary scale. He introduced radiogeology to Russia and developed it in theory and practice (including the notion of the 'helium breathing' of the Earth), laying the foundations of Soviet nuclear power. He contributed considerably to the knowledge of sub-surface waters (their types and chemistries), and fostered the development of meteoritics ('cosmic metabolism'). Nobody questions his remarkable merits as an outstanding organiser and successful manager of science (expeditions, commissions, laboratories, research institutes, etc.) He was founder and first president of the Ukrainian Academy of Sciences. Moreover, he was also a well regarded historian of science (two volumes of his relevant papers were published posthumously).

Vernadsky was awarded several top distinctions by the Soviet state, such as the Order of the Red Banner of Labour, and the First Category Stalin Prize (on the occasion of his 80th birthday). Two minerals (*vernadite*, *vernadskite*), an avenue, a scientific research institute, and a museum bear his name in Moscow, as well as a library in Kiev, and a university in Simferopol. He even has a memorial statue in Kiev.

There are, however, several points of heated debate about Vernadsky's ideas, which continue right up to the present. The main ones are the reinterpretation or extension of the following concepts and, or, ideas:

- ⊙ 'living matter' (Christiaan Huygens) as an empirically-founded geochemical concept, as opposed to the abstract concept of 'life';
- ⊙ structural asymmetry and energetical negentropy (entropy decrease) as fundamental characteristics of living matter;
- ⊙ 'biosphere' (Eduard Suess), not as simply one of the geospheres, but the decisive factor in the evolution of the planet Earth;
- ⊙ 'noosphere' (Edouard Leroy), as an inevitable next evolutionary stage of the biosphere;
- ⊙ 'duration' (John Locke, Henri Bergson), defining objectively different types of unidirectional and irreversible time.

Quite a number of Vernadsky's approaches, views, and statements have been repeatedly contested and attacked. While most Soviet geologists and geochemists showed rather favourable reactions, some geographers and biologists decidedly opposed him, sometimes in a rather violent manner ('inacceptable for a geographer', 'more than a nonsense', 'he completely ignores the achievements of modern biology', 'he is not a naturalist', etc.).

However, Vernadsky's main and, under the Soviet circumstances, extremely dangerous adversaries were the 'official philosophers' (or inquisitors) of the militant and monopolistic ideology of dialectic and historical materialism. Vernadsky was criticised by them for relying upon what he termed 'empirical generalisation', for his strict and unconditional determinism, for his recognising, sources of cognition other than (empirical) science, such as philosophy, art, and religion, and last but not least for having labelled Friedrich Engels' materialism ('Dialectic of Nature') as 'obsolete'. The main stumbling blocks were the following.

- ⊙ Life is 'as eternal as the Universe': living and non-living ('inert', 'crude') matter are fundamentally different. And *Omne vivum ex vivo* (cf. Francisco Redi and Louis Pasteur): there was no azoic (lifeless) epoch in the Earth's history.
- ⊙ There are 'biogeochemical constants': the quantity and the chemical composition of living matter, as well as the rate of multiplication and propagation of life forms (species).
- ⊙ Only the biosphere has been evolving, the other geospheres are characterised by merely repetitive cyclic processes.
- ⊙ The entire crust of the Earth, even its 'granite layer', has been produced by the biosphere (comprising living, 'inert' and combined natural bodies).

Vernadsky has established three 'biogeochemical laws':

1. There is an overall trend towards a maximum 'migration' or dispersion of atoms.
2. The evolution of the biosphere (i.e., of the biological species) promotes the migration of atoms.
3. The biosphere tends towards the densest possible population.

No wonder Vernadsky has been accused of (in alphabetical order): ahistoricism, aristocratic individualism, Bergsonism, bourgeois ideology, eclecticism, fetishism, hylozoism, idealism, materialist dualism, metaphysicism, mysticism, organicism, pantheism, Pythagorism, scepticism, utopianism, and vitalism! The wonder is that he has managed to survive. In the 1930s, many people were sent to 'state re-education camps' (*Gosudarstvennyye upravitelnyye lageri*, or

Gulags) or were even executed for lesser sins than the 'ideological deviations' listed above. He must have had good luck (or good friends) indeed.

Beside the 'biosphere' and the 'noosphere', numerous other 'spheres' were invented by different authors and fervently debated (anthroposphere, biogeosphere, ecosphere, megabiosphere, phytosphere, pneumatosphere, sociosphere, technosphere, tellurobiosphere, vitasphere). One author cried out in desperation: *less new spheres, please!* (which makes a good pun in English).

While, for his adversaries, Vernadsky was the great Great Heretic of Science, who must at the very least be censured, to his enthusiastic followers he has become the true Prophet of the Living Matter, and even of Thinking Matter, and one to be canonized. (Incidentally, Vernadsky himself confessed to having a prophetic vocation.) He has been called the Darwin of Mineralogy, a Universal Man of Thought, and presented as being of the same intellectual level and historical importance as Aristotle, Avicenna, Buffon, Lomonosov, and von Humboldt. *Vernadistics*, *vernadskiana*, and *vernadskology* were born. Some commentators happily identified the predicted noosphere with the forthcoming Eden of the worldwide Communist society, an assumption firmly rejected by others.

While the controversy was going on in the USSR, destined to acquire new impetus in the years of Gorbachev's *perestroika*, when the 'Champion of Free Thought' aspect was to be highlighted, in western Europe and America Vernadsky was virtually ignored. His *La géochimie* (Paris, 1924), and *Les problèmes de la radiogéologie* (Paris, 1935) were his only known publications. His 'renaissance' came in the 1970s, thanks to the efforts of G.E. Hutchinson, a renowned ecologist and biogeochemist at Yale University, who had established close contact with Vernadsky's son, George (Professor of History at Yale University) and the zoologist, Alexander Petrunkevich, one of his emigrated devotees (also at Yale). Vernadsky's high appreciation is testified by several papers included in the present volume, by such distinguished authors as J. Grinevald, R.G. Gröbel, D.J. Holloway, W.E. Krumbein, G. Levit, J.E. Lovelock, L. Margulis, M. & D. McMenamin, D. Sagan, D.R. Weiner. He has been acknowledged as a kind of (*post festa* discovered) 'grandfather' of Gaia, the Man and Biosphere Programme (MAB) of UNESCO, the United Nations Environmental Programme (UNEP) and the International Geosphere—Biosphere Programme (IGBP).

Unlike those extremes, ranging from simple misunderstanding to deliberate misinterpretation, and from preconceived condemnation to almost religious veneration (I am tempted to write 'vernation'), Vernadsky has always been realistically appreciated in Central Europe. At the Charles University of Prague, Czechoslovakia, where he delivered a series of lectures in the 1920s, his memory has been cherished ever since. At the L. Eötvös University in Budapest, the undersigned became acquainted with Vernadsky's innovative ideas and scientific achievements as an undergraduate student of geology in 1955, when the *Geochemistry* textbook of Professor E. Szádeczky-Kardoss had been newly published. It deals with 'The Biosphere' on pp. 598–606, repeatedly referring to Vernadsky and listing several of his works in the References. In the 'Conclusion', on p. 607, Szádeczky-Kardoss wrote:

Life plays a great role in the development of increasing degrees of ionisation of the geospheres that governs the processes of concentration and dispersion of elements. Life affects, in a hitherto inadequately appreciated manner, also the evolution of the Earth's interior, first of all by enhancing the differences in the degree of ionisation. The so-called inorganic and organic phenomena of the Earth constitute a unity of interrelations. Life gradually increases the oxygen content of the atmosphere and of the entire surface of the Earth. The rocks of high oxidation degree produced by life are moved by tectonic movements into the depths, where their ionisation degree becomes lower. This process promotes the migration of elements in the crust. Thus . . . [life] also influences the Earth's interior; the peculiarities of the endogenic igneous, crystalline rocks.

Please note that this was written ten years before plate tectonics was proposed.

I was so fascinated with all this that my first scientific paper dealt with 'Some Problems of Biogeochemistry'. (A fellow-student wrote about 'Biogeophysics'—and graduated in Meteorology.) But it was only in 1961 that I became acquainted with the noosphere—in Teilhard de Chardin's more 'spiritualistic' version of the Evolving Creation (reversing Bergson's *Creative Evolution*).

In 1984, at the International Geological Congress in Moscow I presented a lecture entitled: 'From Alchemy through Geochemistry to Cosmochemistry'. It was on that occasion that I met A. V. Lapo, sharing with pleasure our common interests. Now I congratulate him on the success of his strenuous efforts to make Vernadsky's ideas and achievements known all over the world. (He is, in the best sense, the Prophet of the Prophet.)

I can only warmly recommend this valuable and instructive *Summa Vernadskologiae*, even though it is not easy to read. Fortunately, the Comments and the Name Index provide considerable help (but a Subject Index would have done so even more).

Endre Dudich, Budapest

Homage to Lamarck

Goulven Laurent, *La naissance du transformisme: Lamarck entre Linné et Darwin*, Vuibert/Adapt Éditions, Paris, 2001. Professor Goulven Laurent's book appears in a new series (*Inflexions*) on 'les grands tournants de l'histoire des sciences'. Intended for a fairly general audience, it provides an exposition and analysis of the ideas of Lamarck, based on the author's extensive knowledge and quotations from primary sources. In this regard, it seems to me to stand in the long tradition of such distinguished French historians of science as Hélène Metzger (chemistry and crystallography) or Alexandre Koyré (physics, cosmology, and astronomy)—though these authors did not aim at general audiences. Laurent's work does, of course, have a much more modern appearance than those of his grand predecessors, having several illustrations and the 'boxing' of selected portions of text, as is commonly done in modern text-books. But like his predecessors, he is interested in the philosophical

ideas underlying scientists' work as well as their particular scientific accomplishments. In its rather more popular mode, *La naissance du transformisme* is different from the author's *magnum opus* (*tour de force!*), *Paléontologie et évolution en France 1800–1860: de Cuvier–Lamarck à Darwin* (1987), but it covers part of the same ground.

Laurent is a strong *advocate* of Lamarck's importance in the history of science, and in common with other books about, and favouring, Lamarck, he believes (correctly I think) that Lamarck has had a raw deal at the hands of many commentators, to the extent that some egregiously false ideas about him have grown up, such as that he died in poverty and misery, without appreciation of his contributions. But, Laurent points out, he was a *bon vivant* and lived to a ripe old age, his income being maintained to his death. He was a prolific and successful writer, and had many persons attending his lectures at the *Muséum d'histoire naturelle*. He was an indefatigable worker and did an enormous amount in fundamental taxonomy, enunciating the distinction between vertebrates and invertebrates, and formally recognising such major categories as spiders, echinoderms, cirripeds, tunicates, ammonites, etc. (I take Laurent to be correct in this claim, though obviously people before Lamarck must have seen differences between spiders and insects.) Lamarck also gave us the important 'invention' of biology as the science of living bodies, embracing both animals and plants.

Lamarck was philosophically a materialist, so that the science of living bodies was to be based only on the physical and chemical properties of matter. But that does not mean he was an atheist. He wrote: '*la volonté du sublime Auteur de la nature et de tout ce qui existe est invariablement exécuté*' ('the will of the sublime Author of nature and everything that exists is fulfilled without fail') (*Philosophie zoologique*, 1809, 1, 101). My impression is that Laurent himself supports this position, along with transformism and Lamarck himself. So be it.

That Lamarck has had such a bad press among many, especially those wretched anglophones, can probably be attributed in considerable measure to the influences of Darwin and Lyell. As is well known, Darwin—though a supporter of the idea of inheritance of acquired characteristics—did not think much of Lamarck's ideas, referring to his work in a letter to Lyell of 11 October, 1859, as 'extremely poor'. He was more polite in his historical introduction to the 6th edition of the *Origin*. Nevertheless, Darwin sought to distance his theory from Lamarck's, and with the triumph of Darwinism the eclipse of Lamarck (if not necessarily of Lamarckism) almost inevitably followed. In Laurent, he now finds another staunch advocate (there have been others of course) and I applaud his effort to make the world see Lamarck in a more accurate and favourable light.

So far as geology is concerned, Lamarck's work in 'hydrogeology' (*Hydrogéologie*, 1802) is quite well known to historians. Its similarities in some respects to ideas of his mentor Buffon may be remarked. Speaking anachronistically, Lamarck was an actualist or uniformitarian, had ideas about the effect of the activities of living organisms (or 'life') on geological processes that are remarkably like some modern concepts (e.g. Peter Westbroek, *Life as a Geological Force* [1992 (1991)]). I was, however, particularly interested to read what Laurent had to say about Lamarck's stratigraphic notions and his palaeontology. He cites with approval A.S. Packard's (1901) judgement that Lamarck's *Mémoires sur les fossiles des environs de Paris* (1806) was 'the first truly scientific palaeontological work ever to be published'. I have no reason seriously to dispute this claim. Many fossils had been described or figured before Lamarck, but assuredly invertebrate palaeontology could not get very far before the establishment of the major invertebrate groups.

Lamarck also, Laurent informs us, represented fossils not as anything that could be dug from the ground but as things that looked like the remains of once living organisms. Lamarck made this point explicit, and we are informed that he was the first to have done so. He also made the distinction between littoral and pelagic fossils. It was fossil evidence that underpinned his transformist biology.

Further Laurent discusses Lamarck's ideas on stratigraphy. In the *Annales* of the *Musée* for 1802 he wrote, according to Laurent's transcription and my translation:

In comparing the fossils of Courtagna with those of Grignon and likewise with those that [Gustavus] Brander [1720–1787] collected in Hampshire in England, one is led to believe that the fossils in question belong to the same bed [*banc*]; for the shells from these three places are all exactly the same.

Lamarck continued by suggesting the broad lie of the stratum, across the Channel, and inferred that the fossils were emplaced before the separation of England and France or prior to the incursion of the sea that caused the formation of the Channel. This was surely indicative of a beginning of stratigraphy in action.

However, the part that Lamarck played in the action is a little uncertain. Laurent says little about the extent to which he did or did not go out in the field, and one must suppose that at that fairly late period of his career Lamarck was essentially a museum geologist, sitting at the centre of a web of interconnected persons and synthesising the field observations of others. Moreover, I think that Laurent does not really do justice to William Smith as a stratigrapher. He writes (p. 65, my translation): 'It is known that the 'founders' of palaeontological stratigraphy, William Smith (1769–1839) in England and Alexandre Brongniart (1770–1847) in France used and conscientiously followed Lamarck in identifying fossils, his descriptions in their hands'. The citation given for Smith is to his *Stratigraphical System of Organized Fossils* (1817). I do not have a copy of this work, but some of my old notes from it read (for the page cited by Laurent):

Lamarck's system, which is an extension and improvement of that of Linnaeus, has been preferred as most applicable to the arrangement of organized fossils; of which the species and even the genera are sometimes not without difficulty determined. . . . [However, a]s this country abounds with numerous species which cannot be arranged under any of the genera given by M. Lamarck, new genera have been formed by Sowerby, Parkinson, and others, which are herein adopted and referred to: reference is likewise made to most of our old authors on the subjects.

To me this suggests that Smith was not at all indebted to Lamarck for his stratigraphic principles (or practice for that matter) but simply used his works, and those of others, for the purpose of identifying and naming fossils. Thus while what Laurent says is true, it does not quite give the full picture, and I think Lamarck's contribution to stratigraphy may be somewhat magnified.

This raises the question of the very large use of quotations in the book. It is possible to lead the reader to think that because of the firm anchorage in primary sources, which Laurent undoubtedly has, all must be historical 'fact'. But sometimes one can 'prove' more than is warranted by means of quotations. Laurent has a bit of a crusade against historians who have not read enough, have taken their ideas from secondary sources, or misrepresent their sources, so one is justified in checking some of his quotations. Here, for example, is one (p. 123), in a boxed section headed '*La fin d'histoires fausses?*' (I translate): 'Asa Gray, in a letter to Darwin of 23 January 1860, allows himself to make the remark that his theory is in part "pure Lamarck"'. The source quoted is the French translation of Darwin's *Life and Letters*.

I do not have this French translation. Even so, I was not a little dismayed to read Gray's actual words, when I checked the English original (Volume 2, p. 272):

Well, what seems to me the weakest point in the book [the *Origin*] is the attempt to account for the formation of organs, the making of eyes, &c., by natural selection. Some of this reads quite Lamarckian.*

As it seems to me, the author's 'pro-Lamarckism' has got a bit out of hand here. Direct quotation does not guarantee objectivity.

All this is not to quarrel with the suggestion that Lamarck was a great and original scientist—and one whose contributions have often been misrepresented or misunderstood. But for the writing of history, I rather prefer a 'digested' narrative based on primary sources, suitably referenced for the benefit (or silencing) of 'doubting Thomases'. Of course, if the objective is *primarily* to provide a source of primary sources, then I should be the last to object. And in this connection I should like to mention one of Laurent's recent publications, in which he instructively shows how arguments were hit back and forth by Cuvier and Lamarck for many years in successive and opposed publications. I thoroughly recommend: G. Laurent, 'Paléontologie(s) et évolution au début du XIXe siècle Cuvier et Lamarck', *Asclepio*, 2000, 52, 133–212.

David Oldroyd, Sydney

NOTES AND QUERIES

INHIGEO Newsletter No. 33; Corrections

1. *Newsletter* No. 32 contained a copy of a photograph of the founding Members of INHIGEO. In it, the name 'Koran' should have been written 'Korah' and 'Pavikovich' should have been 'Ravikovich'. We apologise for these errors.

2. Dr Robin Brett, the past-President of the IUGS, has written (6 July, 2001):

Dear David:

I have just finished reading the . . . [INHIGEO *Newsletter*, 2000/2001], which I found useful and very interesting, as usual. I note that your reports on pages 3 and 12 state that I offered INHIGEO my apologies for the foul-ups by the IGC in Rio. I doubt that I did so, because the IGC is an entirely separate organization from the IUGS and was started more than 80 years before IUGS. I think that I probably wrote that I was sorry for the inconvenience and the treatment that you got, which I still am. I couldn't apologise because IUGS was not responsible for the problems that arose. . . . I am concerned that some of your readers may think that IUGS and I were responsible for the many mistakes made.

Abjext Apology

A few months ago, Professor Efgenji Milanovsky sent me a set of his splendid sketches, from the Portugal INHIGEO Conference, for use in the present *Newsletter*. Now, when I am doing the final compilation of the *Newsletter*, I cannot find them in my midden, despite many hours of searching. Dear Efgenji, please accept my most humble and abjext apology. I hope that the sketches may 'turn up' before next year; and if they do not we pray that you will still continue to send us your sketches in the future.

David Oldroyd, May Day, Down Under

Good Wishes to Ursula Marvin

INHIGEO is pleased to offer its congratulats to American Member Dr Ursula Marvin, who celebrated her 80th birthday on 20 August, 2001. She has been one of the most notable contributors to the work of the Commission, serving for two terms (eight years) as Secretary-General, and is presently the Vice-President for North America. Active and helpful as ever, she has recently contributed a major article 'From Earth to Planetary Science in the Twentieth Century' for a Geological Society Special Publication on major contributions to geology in the twentieth century prepared by Members of the Commission (and some others). Ursula has been of special assistance to me in my period of office as Secretary-General, being an invaluable mentor. You will find it most interesting to read the interview recently recorded between Ursula and Kenneth Taylor (see p. 23).

David Oldroyd, Sydney

* Some of Gray's words are omitted from the letter in the English edition, and possibly are restored in the French (which is not available to me). If the omission in the edition I have includes the words 'pure Lamarck' the point I am making here is obviously without validity, and I tender my apology to Professor Laurent in advance!

Contributions to the History of Geophysics and Cosmical Physics

This new journal is published by the German Society for the History of Geophysics and Cosmical Physics. The Editor is INHIGEO Member Wilfried Schroeder. The Members of the editorial board are: Giovanni Gregori, Hans Gaab, Holger Filling, Thomas Schalk, Josef Verö, and Hans-Jürgen Treder. 2–3 volumes will be published annually, each volume, including postage, being priced at 25 Euros. Requests to: Wilfried Schroeder, Geophysical Commission, Hechelstrasse 8, D-28777 Bremen, Germany.

Journal of Geodynamics. Special Issue: "Geodynamics: History and Perspectives", Vol. 32, Nos 1–2, 2001

Contents

- | | |
|---|--|
| p. 1: | Preface |
| p. 3: W.R. Jacoby | 'Successes and failures in geodynamics: from past to future' |
| p. 29: W.R. Jacoby | 'Translation of <i>Die Entstehung der Kontinente</i> by Dr Alfred Wegener' |
| p. 65: G. Ranalli | 'Experimental tectonics: from Sir James Hall to the present' |
| p. 77: S. Horn, B. Kreher-Hartmann and K. Heide | 'Melting experiments and field work on Komorní Hůrka volcano, Bohemia, by Johann Wolfgang von Goethe' |
| p. 99: G.V. Dal Piaz | 'History of tectonic interpretations of the Alps' |
| p. 115: M. Brown | 'From microscope to mountain belt: 150 years of petrology and its contribution to understanding geodynamics, particularly the tectonics of orogens' |
| p. 165: G. Godard | 'Eclogites and their geodynamic interpretation: a history' |
| p. 205: A.Y. Glikson | 'The astronomical connection of terrestrial evolution: crustal effects of post-3.8 Ga mega-impact clusters and evidence for major 3.2±0.1 Ga bombardment of the Earth-Moon system' |
| p. 231: S. Franck and C. Bounama | 'Global water cycle and Earth's thermal evolution' |
| p. 247: L.V. Morrison and F.R. Stephenson | 'Historical eclipses and the variability of the Earth's rotation' |
| p. 267: C. Braitenberg, I. Nagy, M. Negusini, C. Romagnoli, M. Zadro and S. Zerbini | 'Geodetic measurements at the northern border of the Adria plate' |
| p. 287: | Book review |

In the Preface, Wolf R. Jacoby & Giorgio Ranalli state:

On special dates and anniversaries, as for instance the new millennium, a sense of history and direction becomes particularly relevant. Janus, the guardian god of endings and beginnings, looks both forwards and backwards. This awareness has motivated us to invite contributions on historical aspects of geodynamics, or on present problems in a historical perspective, in the hope that in this way future directions may become more clearly focused. The papers in this issue, therefore, deal in varying degrees not only with the question "How did we get here?", but also with the question "Where do we go from here?".

The first paper (Jacoby) is a personal view of the evolution of geodynamic thought, within the general framework of the evolution of science, with emphasis on problems left open or unsolved by current models. This is followed by a translation, from the original German, of Wegener's first seminal paper (1912), in which he first expounded in detail his continental drift hypothesis. This paper, previously unavailable in English, illustrates beautifully Wegener's clarity of thought and determined search for truth, coupled with an awareness that "truth" can be only approximated by imperfect models.

The next five papers deal with selected aspects of the history of geodynamics. The first two illustrate the role of laboratory scale models and melting experiments, focusing respectively on the work of Sir James Hall (Ranalli) and Goethe (Horn *et al.*). These are followed by a review of tectonic models of the Alps (Dal Piaz), a survey of the contributions of petrology to the understanding of orogenic belts (Brown), and a detailed account of the evolution of geodynamic interpretations of eclogites (Godard).

The last four papers reflect a relative shift in emphasis, as they illustrate recent attempts to model geodynamic problems, offering examples of different approaches and new (and possibly controversial, in the spirit of Wegener) interpretations: the integrated geophysical and geochemical analysis of water fluxes in subduction zones (Franck and Bounama); the possible role of large meteorite impacts in the early evolution of the crust and its tectonism (Glikson); the variability of the Earth's rotation as inferred from historical eclipses (Morrison *et al.*); and the importance of geodetic measurements in determining present-day plate kinematics (Braitenberg *et al.*). . . .

'Earth Art'

Cherry Lewis (UK) has written about a provisional proposal for an exhibition in London, jointly put together by the Geological Society and the Royal Academy, to celebrate and compare the way in which artists and earth scientists have portrayed the solid earth. She would be pleased to hear from any INHIGEO Member who may have an interest in such a project. Please contact her at: <cherry.lewis@bristol.ac.uk>.

William Smith

Cecil Schneer has written as follows:

I'm pleased to report that the *Strata Identified by Organized Fossils*, 1815–1817, a monograph of signal historic importance for its introduction of the principle of faunal succession, and Smith's *Geological Table*, 1817, a broadsheet prototype of the Geologic Columns and the Geological Time Scales of the present, are now available in full color facsimile at the web-site of the Department of Earth Sciences of the University of New Hampshire, USA, together with my brief explanations and bibliographic notes (<<http://www.unh.edu/esci/wmsmith.html>>). The nineteen color plates of the monograph were the work of the famous British naturalist and engraver, James Sowerby. It is my hope that you will find the accessibility of this work of Smith's famous book a reasonable substitute for my presence at INHIGEO functions over recent years, and an excuse for my lapses in correspondence.

Cecil Schneer (Member INHIGEO 1966–present, and for 8 years Vice-President for the Americas).

History of Meteorology

Non-member, Professor James Fleming has written (24 August, 2001):

Dear friends of the history of meteorology,

The Commission on History of Meteorology (CHM) was established this summer in Mexico City at the International Congress of History of Science.

I would like you to visit the new website of the CHM at <<http://www.colby.edu/chm>> and consider joining (for free) by completing the interactive membership form.

Included are membership lists, the constitution, pictures from the Mexico City meeting, announcements, and abstracts.

Any ideas for meetings, sessions, outings, or other projects are most welcome. Please feel free to use the website for communicating your activities.

You may want to share the URL with friends or print out some membership forms and give copies to likely new members.

The proceedings of the Mexico meeting are being published and speakers have already received guidelines for submitting their papers by October 1.

Hope to see you soon, perhaps in Denver at the History of Science Society or in Orlando at the American Meteorological Society, or perhaps in some more exotic location.

With all good wishes,

Jim Fleming

Important New Web-site

Dear colleagues,

History Earth Sciences Society (HESS) has a new web-site at the following address:

<http://www.historyearthscience.org>. There you can find information about the Society's history and membership, and about its journal *Earth Sciences History* (guidelines for submitting papers for publication are also available). Please enjoy it and give us your feedback. Those who do not yet belong to HESS are invited to join us.

Sincerely,

Silvia Figueirôa, Campinas, Brazil

[For further information, contact the Treasurer, Ed Rogers (<erogers@geology-books.com>). We congratulate Silvia on her election to the presidency of the Society (Ed.).]

Information about Catastrophes?

The Cambridge-Conference Network is a scholarly electronic network moderated by Dr Benny Peiser at Liverpool John Moores University, United Kingdom. 'CCNet' was founded in 1997 and has some 1,100 subscribers (mainly Earth and planetary researchers, astronomers, climatologists, etc.) from around the world. The aim of this network is to disseminate information and research findings related to: geological and historical neo-catastrophism (hypervelocity impact craters, impact dynamics); research on Near Earth Objects (NEOs) and the impact hazards due to comets & asteroids. For further information, or to subscribe, please contact Benny Peiser at <b.j.peiser@livjm.ac.uk>. [I was on this list for a few months, but was so 'bombarded' with information that I felt obliged to withdraw. Ed.]

Second-hand Geology Books

Members looking for old geological books may be able to find them at the following addresses. Many other suppliers may, of course, be found by searching on the web:

John Henly, Brooklands, Walderton, Chichester, PO18 9EE, UK. <johnhenly1@compuserve.com>. Natural History & Geological Bookseller. Free catalogues upon request.

Wheldon & Wesley Ltd., 10 Church Square, Leighton Buzzard, Bedfordshire, LU7 1AE, UK. Books on Natural History. <wheldwes@dircon.co.uk>. <<http://www.users.dircon.co.uk/~wheldwes>>.

Stuart Baldwin, Fossil Hall, Boars Tye Road, Silver End, Witham, Essex CM8 3QA, UK. <yimg43@dial.pipex.com>.

Graham Weiner, 78 Rosebery Road, London N10 2LA, UK. Fax 44 (0)20 8444 6505

John and Marjorie Sinkankas, 5372 Van Nuys Court, San Diego, CA 92109, USA.

Arnoldo Forni, Sala Bolognese, Via Gramsci 160, I-40010, Bologna, Italy. He also reproduces classic publications in the geosciences, as for instance: Anton Lazzaro Moro *De' crostacei e degli altri corpi marini che su' monti si truovano* (Concerning Crustaceans and other Marine Bodies Found on Mountains), 1740; and Giovanni Battista Brocchi *Conchiologia fossile subapennina* (Subapennine Fossil Conchology), 1811.

Biography of Erhard Eylmann

Wilfried Schröder has written:

Please note the following new book on the topic of Australian anthropology, aborigines, and history in general, concerning the pioneer of Australian culture and time, Erhard Eylmann. Eylmann was familiar with the other pioneers Baldwin Spencer and James Gillen, and travelled through Australia in 1896, producing a fundamental book, *The Natives of the Colony of South Australia*, and some other ethnographic works. The biography, including original text, figures, photos, references, handwritten sources, etc., is: Wilfried Schröder, *Ich reiste als Buschmann. Zum Leben und Wirken des Australienforschers Erhard Eylmann*. With English summaries. Science Edition, Bremen, 2002, 250 pp., US\$ 25.00 or 30 Euros. Payment is requested in advance by cheque on a German Bank in Euros, or by sending to the following account (please add the bank exchange charge): Wilfried Schröder, Account: 5788 76-205, Postbank Hamburg (Germany), SWIFT Code: PBNKDEFF200 (Sort Code in Germany: 200 100 20). Dr W. Schröder, Science, Hechelstrasse 8, D-28777 Bremen, Germany.

Contributions for the History of Geophysics and Cosmical Physics

The following series of history of geophysical books, published by Science Edition, D-28777 Bremen, was started in 2000. The texts are in English unless otherwise stated.

Volume 1 comprises discussions of Hans Ertel's paper on causality, free-will, and teleology as a problem of natural philosophy. Ertel, author of the well-known 'Ertel Potential Vorticity', the 'Ertel Potential Theorem', and the 'Ertel-Euler Equations', discussed the problem of weather forecasting and related matters. Ertel's results are discussed by different authors.

Volume 2 gives a review of general problems in 'History and Philosophy of Geophysics'.

Volume 3 presents the papers on the ether by Albert Einstein, Gustav Mie, and Emil Wiechert. It includes letters on this topic from David Hilbert to Gustav Mie.

Volume 4 presents autobiographical sketches of various scientist, their 'Pathways to Science', including papers by Sir Ian Axford, FRS, Alan Cook, FRS, Syuin-I. Akasofu, Gerald Friedman *et al*.

Volume 5 discusses the changes in interpretation of auroras, and presents original sources on the aurora of 17 March, 1716.

Volume 7 (2002) presents the lectures given at the Hanoi Conference on 'Solar Variability and Geomagnetism'.

The books can be ordered from Science Edition, Hechelstrasse 8, D-28777, Bremen, Germany.

Wilfried Schröder, German Commission for the History of Geophysics and Cosmical Physics

A Book on Mining and Geoscience in Italy, especially the Venetian Republic

Professor Piccoli informs us that the reports of a meeting held in Venice in October, 2001, on mining activities in northeast Italy from the fifteenth century to the present are contained in a book that was published in February, 2002. Various contributors describe the relationships between geosciences and mining operations through the centuries. The booklet has 88 pages with many illustrations. It recalls the names of the most illustrious geologists and mining engineers in the period covered, especially in the Republic of Venice. The edition was published by the Venetian Society of Natural Sciences (*Società Veneziana di Scienze Naturali*) and the Ligabue Center for Study and Research in Venice. *Atti del Seminario—Mineralogia e ricerca mineraria dal Quattrocento ad oggi* [Reports of the meeting—*Mineralogy and mining research since the fourteenth century to the present*] and it is a supplement to Vol. 27 of *Lavori della Società Veneziana di Scienze Naturali* [Works of the Venetian Society of Natural Sciences], c/o Museo Civico di Storia Naturale, S. Croce 1730, 30135 Venezia (Italy).

Lavoisier Wrote some Geological Papers

Professor Beretta has written:

A new version of 'Panopticon Lavoisier', which includes a complete inventory of Lavoisier's manuscripts, instruments, his bibliography, and other digital archives is available at <<http://moro.imss.fi.it/lavoisier>>. I also announce that I have published a book on Lavoisier's iconography (see: <<http://www.shpusa.com/books/lavoisier.html>>).

Yours sincerely, Marco Beretta, Professor of History of Science, Università degli Studi di Bologna, Dipartimento di Filosofia, via Zamboni 38, Bologna, Italy.

Sciences and Empires Group

Silvia Figueirôa (Brazil) writes:

The 'Sciences and Empires' mail list is an 'unmoderated' list, operated by the *Sciences et Empires Groupe*, a Commission of the Division of the History of Science (DHS) of the International Union of Philosophy and History of Science (IUPHS). The group itself was founded in conjunction with an international meeting held at UNESCO in Paris in April, 1990. The theme of that meeting was 'Sciences and Empires: European Expansion and Scientific Development of Asia, Africa, America and Oceania'.

The group owes its continued existence to the energy of clusters of scholars in Europe, Asia, North America, and Latin America. Now more than a decade old, crucial support and promotion of the group has come from the following

individuals, among many others, Patrick Petitjean, Catherine Jami, Anne Marie Moulin, Kapil Raj, Deepak Kumar, Venni Krishna, Roland Waast, Roy MacLeod, Mic Worboys, Michael Osborne, Togo Tsukahara, Silvia Figueiroa, *etc.*

While open to all who are interested in our topic, it is intended to serve as the major forum for discussions by historians, philosophers, and sociologists of science, technology, and medicine who study how these activities intersect with colonialism, imperialism, and postcolonialism. It will also serve as the newsletter distribution list.

If you would like to subscribe to the mail list, and have a web browser, go to this address:

<<https://mail.lsit.ucsb.edu/mailman/listinfo.cgi/sciemp>>. If you are having problems subscribing, or unsubscribing, contact the list manager directly via email at <osborne@history.ucsb.edu>

Subversive Thoughts about English

A former Japanese student, now friend, sent me a copy of a paper by Franz Candler, of Emory University, USA, about the ideas of the Japanese ethologist-biologist Kinji Imanishi, reproduced from *New Scientist* (December, 2001). It contained the following paragraphs, which I thought worth disseminating. Professor Candler's first language is Dutch.

It is hard for non-English speakers to make themselves heard in an English-speaking world.

Naturally, you can speak your own tongue faster than any other. This can make it impossible for those who are not native English speakers to keep up at international meetings. It is worse on those occasions when an English speaker doesn't pull any punches while debating with a scientist whose English is poor.

I have seen it happen often. The English speaker rises from the audience, articulates a penetrating question, sometimes with a joke mixed in, and barely takes the time to listen to the clumsily phrased reply of his opponent. Since English speakers dominate all discussions, they form a class of great minds, strutting around in the secure knowledge that no one will dare challenge them.

Hmm!

David Oldroyd, Sydney

The Hutton Memorial Garden at St John's Hill, Edinburgh

The year 2002 sees the completion by the company Fountains PLC of the construction of the Hutton Memorial Garden at St John's Hill in Edinburgh for the University of Edinburgh, the architects for the project being Crichton Lang Willis & Galloway of Edinburgh. Constructed on what was effectively a small piece of waste ground since the late 1960s, the site coincides exactly with the location of the house and garden of James Hutton (1726-1797), recognised throughout the world as the 'founder of modern geology'. As the second son of William Hutton, merchant and City Treasurer, and Sarah Balfour, James Hutton abandoned his farming in Berwickshire at the two small farms that he inherited from his father at the end of 1767. He then returned to Edinburgh, building a house at St John's Hill in the early 1770s, at that time a fancy new area of development within sight of the Salisbury Crags, where Hutton was to make some of his profound geological observations. He lived there with his three sisters and wrote the four books, including his *Theory of the Earth*, for which he is renowned. But Hutton is still probably the least known of the four great figures of the Scottish Enlightenment, the others being Adam Smith, David Hume, and Joseph Black.

Hutton died in his house at St John's Hill on 26 March, 1797, and is buried in the Greyfriars Kirkyard in Edinburgh, where his grave remained unmarked until 1947, the 150th anniversary of his death, when the then Lord Provost, Sir John Falconer, unveiled a plaque commemorating Hutton as the 'founder of modern geology'. For the bicentenary of his death, an international conference was organised by the Royal Society of Edinburgh (which Hutton co-founded in 1783), in the rooms of the Royal College of Physicians, in August, 1997. During the meeting, on Wednesday 6 August, a bronze plaque cast by Charles Laing & Sons Ltd Foundry was unveiled at the north side of the site of Hutton's house in the names of The Royal Society of Edinburgh and the Edinburgh Geological Society (founded 1834). Participating in the unveiling ceremony, attended by delegates and invited guests, was Mr David Land, President of the Edinburgh Geological Society, Mr Fraser Morrison, Executive Chairman of Morrison Construction Group PLC, Councillor Brian Weddell, Chairman of the Housing Committee of Edinburgh Council, Professor Sir Stewart Sutherland, Principal and Vice-Chancellor of Edinburgh University, and Professor Malcolm Jeeves, President of the Royal Society of Edinburgh.

The bronze plaque was mounted on a single block of Clashach stone from the southern side of Moray Firth, a Triassic dune-bedded sandstone from a coastal quarry north of Elgin, now much used in major buildings, for example the new Museum of Scotland. On the cut face of the stone beneath the plaque David Lindsays Stone Carvers inscribed the famous final sentence of Hutton's 1788 paper: '... we find no vestige of a beginning, no prospect of an end'.

At the unveiling ceremony in 1997, the stone bearing the bronze plaque was surrounded by other large boulders designed to illustrate two of the main themes of Hutton's remarkable geological work. His own collection of rocks having long since disappeared, the stones were specially brought to St John's Hill by the Morrison Construction company. Two boulders showing granite veins came from the famous locality above the Duke of Atholl's hunting lodge in Glen Tilt in the Scottish Highlands, by courtesy of Charles Pirie, the Duke's gamekeeper. These illustrate Hutton's work on the origin of granite from September, 1785. The other three boulders of conglomerate carried by ice an water came from Barbush on the edge of Dunblane, by courtesy of Andrew Fleming & Sons and illustrate Hutton's understanding of the cyclicity of geological processes.

From 1997, all these materials were in store with the British Geological Survey in Edinburgh, but they are now all incorporated in the splendid new Hutton Memorial Garden. Excellent features of the design include a substantial flight of well-lit steps, with railings, leading up the steep bank from Viewcraig Gardens, with disabled access from the southern back of the garden by a ramped path leading from the University car park off The Pleasance.

Norman Butcher, Edinburgh

History of Soil Science

We should like to draw readers' attention to a publication co-edited by Israel INHIGEO Member, Dan Yaalon: D.H. Yaalon & S. Berkowicz (eds), *History of Soil Science: International Perspectives*, Catagena Verlag, Ärmelgasse 11, D-35447, Reiskirchen, Germany, 439 pp. 1997, 135 Euros (<catenaverl@aol.com>).

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COUNTRY REPORTS

Australia

The Earth Sciences History Group (ESHG) of the Geological Society of Australia continues to provide links between Australian researchers. Newsletters are distributed at periodic intervals with articles, conference reports, lists of events, publications and reviews. The Group is chaired by Carol Bacon.

David Branagan's major work during the year consisted in completion of a draft of a biography of Sir T.W. Edgeworth David (1858–1934), and a continuing revision, following reports from colleagues. Additional research on David was carried out in England, Wales, France, Japan and Australia. It is hoped the text will be ready for presentation to potential publishers by April, 2002. Lectures on Edgeworth David's life and work were given in Sydney, Canberra, and Cardiff (Wales).

David's second project during the year concerned research on the topic of the depiction of geology in early European art, carried out in Australia and Europe. Two presentations were given on this topic in Sydney and another at the INHIGEO meeting in Portugal. A paper was completed for the proceedings of the Conference. This research is continuing. A paper at the Australian Mining History Conference in Kalgoorlie, September 2001, was presented on three metallurgists W. McBride (1879–1970), T.A. Read (1886–1972) and G.K. Williams (1896–1974), who were concerned in the treatment of Broken Hill ores between 1900 and 1950. Biographical details of McBride were published in the *Australian Dictionary of Biography*, 2000, 15, pp. 159–160 (2000) and similar articles on Read and Williams, together with the dredge designer, G.H. Watson (1894–1963), completed during the year, are scheduled to appear in later volumes.

A similar article on the clergyman/geologist the Reverend Joseph Campbell (1856–1933) was completed for the *Supplement to the Dictionary of Australian Biography*.

Several book reviews on the history of geology and related topics were made for the INHIGEO *Newsletter* and *Isis*, together with obituaries of John Wennerbom and Leo Koch.

David was also involved in the restoration of the grave of the pioneer Australian geologist, Robert Logan Jack, and in the planning and development of the 'Lucinda' monument, during which 2001 rocks were collected and placed in a steel structure on the shore of an inlet of Sydney Harbour to commemorate the Centenary of Australian Federation in January, 2001. A poster explaining this event was presented at the INHIGEO meeting in Portugal, and is scheduled for publication in the proceedings of the conference.

Barry Cooper is currently preparing an update on the History of the Geological Society of Australia for the 50th anniversary of the Society. David Branagan and Barry compiled and edited a volume of contributions on this subject which was published in 1994 as *Rock Me Hard... Rock Me Soft: A History of the Geological Society of Australia*. The current effort is a synopsis of this effort together with an update on events from the past decade. Barry also continues work on the history of building-stone use and has been photographing buildings illustrating the historic use of stone in South Australia, and to a limited extent in Victoria.

David Corbett reports that, due to family illness, all his research and writing activities were suspended for the entire year in 2001. He hopes to be able to resume his work on Sir Douglas Mawson in the near future, focusing on his investigations in the Flinders Ranges, South Australia, which incorporated his most significant geological achievements.

Carol Bacon continues an interest in the history of geology of Tasmania, and is currently working on a *Dictionary of Tasmanian Mining*. Carol produced an updated version of the history of the Tasmanian Department of Mines during the year.

Max Banks prepared a citation with David Duncan on Robert Mackenzie Johnston to be displayed in the newly developed museum (Miller House) in Cromarty, Scotland, which honours Hugh Miller of Old Red sandstone fame. Miller and Johnston were both born close to Cromarty and both had wide interests beyond geology. In Tasmania, Johnston was known for his contribution to geology and palaeontology, best seen in his *Systematic Account of the Geology of Tasmania* published in 1888. Max continues his research into facets of the history of Tasmanian geology, including the history of a quarry at Geilston Bay and the opening of a mine on Mt Wellington, the mountain that forms the backdrop to Hobart. He is contributing to celebrations of the bicentenary of the exploration by Nicholas Baudin in 1802 by preparing a paper titled 'Peron and Maria Island'.

Tom Darragh is researching the printing of the first maps issued by the Geological Survey of Victoria from 1853 to 1870. The Victorian maps were a technical innovation in colour printing in Australia. A lecture on this topic will be given to the Victorian Division of the Geological Society of Australia in May, 2002. An account of Frederick McCoy's time in Ireland was researched for the McCoy commemorative volume of the Victorian naturalist. A biographical entry on the graptolite specialist William James Harris is being written for the *Australian Dictionary of Biography*. The translation of Ferdinand Hochstetter's notes on his visit to Victoria in 1859, with commentary, has now been published.

Homer Le Grand has co-edited with Naomi Oreskes in California a volume entitled *Plate Tectonics: An Insider's History of the Modern Theory of the Earth. Seventeen Original Essays by the Scientist who made Earth History* (Westview Press, Cambridge [Mass.], 2001) (see p. 35).

David Oldroyd presented a paper on the history of ideas about the extinction of the Australian megafauna at the INHIGEO meeting in Portugal, and while in Lisbon he gave a talk at the Geological Survey of Portugal on the question of why one should study the history of the geosciences at the Geological Survey of Portugal. A shortened version of this paper was also presented at the international congress in Vietnam of IAGA and IASPEI (see p. 14). He completed the editing of the papers presented by INHIGEO Members and others at the Rio Congress in 2000, and also his book on the history of geological research in the English Lake District. These volumes have been, or are being, published by the Geological Society of London in 2002.

Carol Bacon, Hobart



Gluck auf

GEOLOGISCHE BUNDESANSTALT

Dear David,
a merry Christmas
and happy and
peaceful new Year
2002.

Tillfried
Austrian working group
on the history of geosciences

Dr. phil. Tillfried Cernajsek

Austria

Because of two missing reports from Austria to the INHIGEO *Newsletter* the following report stretches on the main activities and publications from the years 1999 to 2001.

As already announced in INHIGEO *Newsletter* No. 31, the Austrian Geological Society established a new working group on 'The History of Earth Sciences in Austria'. The foundation session took place on 21 February, 1999, at the University of Graz. Bernhard Hubmann (University of Graz, Institute of Geology and Paleontology) was appointed first chairman of this working group. In January 2001 his successor, INHIGEO member Tillfried Cernajsek (Geological Survey of Austria: Library and Archive Services), was nominated. In the meantime this working group has developed into a national centre for all activities on the history of earth sciences in Austria.

Meetings and anniversaries

Since the foundation of our working group in 1999 already three very successful international symposia have been organised in Austria, attended by over hundred participants each.

The first symposium was held at the *Museum Joanneum* in Graz, on 22 February, 1999, organised in collaboration with the Institute of Geology and Palaeontology of the Karl-Franzens-University in Graz, the Department of Mineralogy and Geology of the Museum Joanneum and the Austrian Society of the History of Mining and Metallurgy in Leoben. During the symposium, entitled 'The History of Earth Sciences in Austria', eighteen papers were presented. The abstracts of the symposium were printed in *Res montanarum*, 1999, 20, the corresponding proceedings in *Berichte der Geologischen Bundesanstalt* (2000), Vol. 51.

The main event in 1999 related to the history of Geological sciences in Austria was, of course, the 150th anniversary of the Geological Survey of Austria. It was founded on 15 November, 1849, and is one of the oldest state surveys of Europe. Several scientific and social events took place, among them a festive ceremony in the historic ceremony hall of the Survey on 12 November 1999. On the occasion of this anniversary a special volume *Die Geologische Bundesanstalt in Wien: 150 Jahre im Dienste Österreichs (1849-1999)* was published by the INHIGEO members Tillfried Cernajsek and Albert Schedl and two other co-editors, Christine Bachl-Hofmann and Thomas Hofmann. The anniversary volume comprises papers not only on the development of the institutional geological survey in Austria but also on the beginning of systematic geological mapping in parts of the Austrian- Hungarian monarchy, now neighbouring countries of Austria.

The second symposium on the 'History of Earth Sciences in Austria (17 to 18 November 2000)' in Peggau was well-organised by the Austrian Geological Society, the Austrian Society of History of Mining and Metallurgy, the Institute of Geology and Palaeontology of the Karl-Franzens-University in Graz and the community of Peggau. It was chiefly devoted to the famous Austrian geologist Carl Ferdinand Peters (1825-1881) and his time. More than a hundred people attended the symposium with altogether eighteen lectures. The papers read at the Symposium dealt with various earth science disciplines. Extended abstracts of the papers were published in *Berichte des Institutes für Geologie und Paläontologie der Karl-Franzens-Universität Graz/Austria* (Vol. 1). The proceedings in *Berichte der Geologischen Bundesanstalt* (2001), Vol. 53 comprise eight papers.

The high acceptance of the symposium in Peggau documents impressively again the lively interest in the history of earth sciences in Austria. It was also interesting to observe a pronounced desire among earth scientists to discuss diversified topics concerning history of science.

The third symposium on the 'History of Earth Sciences in Austria' was held in Hallstatt, Upper Austria, from 27 to 29 September 2001, organised mainly by members of the Geological Survey of Austria. Since December 1997 the region of Hallstatt-Dachstein/Salzkammergut has been honoured with a position on the UNESCO World Heritage list. The Hallstatt region is not only a cultural heritage site but it also has the distinction of being a natural heritage location famous for its beautiful alpine scenery. The region of Hallstatt also represents an important area in the history of Earth science research in the Eastern Alps. Therefore the general theme of the symposium was devoted to the history of the geological investigations of the Salzkammergut, starting with early geological works in the late 18th century up to the development of modern geotectonic and stratigraphic ideas in the Eastern Alps, especially for the Triassic period. The abstracts were published in *Berichte der Geologischen Bundesanstalt* (2001), Vol. 56. The publication of the proceedings is planned in *Mensch Wissenschaft Magie: Mitteilungen der Österreichischen Gesellschaft für Wissenschaftsgeschichte*, Vol. 22.

One of the numerous ongoing activities in Austria is a project in Wellington by the young Austrian geologist Dr Elenore Hoke. This study in the history of Earth Sciences in New Zealand (1858-1859) is concerned with Ferdinand von Hochstetter's scientific involvement with New Zealand, and with the special stimulus this had for the establishment of science in New Zealand on the one hand and the influence of his work on New Zealand in his later scientific career in Austria on the other. Preliminary work for this study was funded by the Bilateral Research Activities Programme (BRAP) in co-operation with the Geological Survey of Austria. This work started in April 2001, with specific researches on the unique historical material held at the Alexander Turnbull Library, Wellington, the Academy of Sciences in Vienna, and in other public and private collections in Austria and New Zealand. Les Kermodé from the University of Auckland also made a short stop in Vienna in June reviewing the Hochstetter material at the Survey and in private collections including an unpublished field notebook of his stay in New Zealand.

(For further mention of Hochstetter and New Zealand, see the New Zealand report, where the untimely death of Les Kermodé is also reported. [Ed.]

Major publications

(For complete listing of all publications concerning the history of earth sciences in Austria please visit the home page of the Geological Survey of Austria with the special database GEOLIT (<<http://www.geolbsa.ac.at>>).

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Tillfried Cernajsek & Albert Schedl, Vienna

Bolivia

In January, I was invited by the Restoration Plan of Historical Areas and SWISS CONTACT to run a course for tourists' guides. Six topics were presented; (1) The organization of the Imperial Village; (2) Mining at the *Cerro Rico de Potosí* (the Rich Mountain of Potosí); (3) Examples of scientific and technical transfer between America and Europe; (4) Mining and Health; (5) Religion, religiosity and productive activities; and (6) Mining families. There was also a field excursion.

In May APEMIN, a non-government organization invited me to run a course on 'Training about Heritage and Sustainable Tourism', the aim of which was the training of human resources in tourism and the maintenance of cultural heritage. Through twelve days the participants interacted discussing the development of the following topics: (1) Raw materials for Europe; (2) Correlation of the veins system of Cerro Rico; (3) Mining in Potosí during the vice-royalty. (4) The 'mita' (exclave work); (5) Processing of argentiferous ores and the hydraulic system and route of the mills.

From October onwards, together with the Italian sociologist Luca Citarella, we have been publishing a column in the daily newspaper *El Potosí* on 'Salubrity in Potosí'. The important topic, to be developed in twenty-five weekly issues, is related to the Foundation of hospitals (which has had a close relation to the mining history of the city, both during the colonial period and in the Republic).

In December, two papers were published in the city of Sucre. The first one, in the tenth issue of the *Journal of the House of Freedom*, was concerned with 'Miners and Mining Families in Potosí', with examples from the 16th to the 19th

centuries. Many outstanding women acted as managers and had leading roles, along with some magnates, and it was also important in the establishment of the nobility in Potosí. The second paper, in the *Yearbook of the National Archive and Library of Bolivia* for 2001 was entitled 'The Sisters of Charity'. It acknowledged the work of the Daughters of Saint Anne, a congregation of Italian and Bolivian women who devoted their efforts to the many suffering and sick mining people in hospitals under their management, to orphans and the helpless, and to the benefit of the girls and young women in the many schools and high schools in their charge. Emphasis was given to their work in the mining city of Potosí.

Carlos Serrano, Potosí

Brazil

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Pedro Gonçalves, Campinas

Canada

David Spalding writes:

During 2002, my paper 'Bones of Contention: Charles H. Sternberg's Lost Dinosaurs' was published in *Mesozoic Vertebrate Life, New Research Inspired by the Palaeontology of Philip J. Currie*. (Also of ESH interest, the volume contains a paper by William Sarjeant on 'Dinosaurs in fiction'.)

The volume was co-edited by Darren Tanke and Ken Carpenter, and published by Indiana University Press. It contains 33 papers by 46 specialists from Argentina, Australia, Canada, China, Denmark, Norway, and the US. This volume celebrates twenty five years in vertebrate palaeontology by Philip Currie. Fascinated by dinosaurs from childhood, Canadian Currie took an MSc, and shortly afterwards joined my staff at the Provincial Museum of Alberta, getting special permission to waive residence requirements for his PhD so that he could do so. While continuing his PhD studies, Currie's energetic collection and research program in Alberta produced a remarkable amount of new dinosaur material, which in turn made possible the development of what is now The Royal Tyrrell Museum in Drumheller, opened in 1985, where Currie now holds a senior position.

One of Currie's early inspirations was the work of Roy Chapman Andrews in Mongolia, and so when the Canada-China project was devised by Brian Noble it received Phil's enthusiastic support. Much of Currie's important work with Dale Russell and others in China, carried out in conjunction with Chinese scientists, has been published under his editorship in two special volumes of the *Canadian Journal of Earth Sciences* (1993, 1996). With a strong interest in theropods, it is natural that Currie would pursue the links between dinosaurs and birds, now so strongly supported by new fossil discoveries in China. He is also actively researching in Argentina.

Currie's research is acknowledged by a bibliography listing sixteen books, over a hundred academic papers, and many other non-technical publications. He has always taken public interest in his field seriously, and several of his books are written for children, some co-written with his wife Eva Koppelhaus. Currie has in turn received much recognition, including a *Time* cover and inclusion in Maclean's, list of twelve outstanding Canadians in 1998, and election to the Royal Society of Canada in 1999.

Ammonite Tales

The *British Columbia Paleontological Alliance Newsletter* (Feb., 2001, No. 27, 9–11) offers an intriguing bit of detective work in an account of 'Whiteaves' missing plate', by Tom Cockburn, David Starr, and Jim Haggart. J.F. Whiteaves was an invertebrate palaeontologist with the Geological Survey of Canada whose *Mesozoic Fossils* published up to 1903 is still an

invaluable resource. The last volume refers to an unusually large ammonite from Sucia Island, but it is not illustrated. Research work in the British Columbia's Provincial Museum and Provincial Archives and Ottawa sources located correspondence relating to the fossil, and what seems to be the fossil itself (though in the absence of adequate documentation or contemporary photographs this cannot be finally confirmed). In an entertaining *jeux d'esprit*, the article is illustrated not with a modern photograph, but with a tipped-in plate rendered in the lithographic style of the original work, complete with an appropriate plate number and an attribution to the long-dead palaeontologist-artist Lawrence Lambe. If copies of these plates ever become separated from their source, they may create complications in the lives of bibliographers of Canadian palaeontology.

In the next issue (No. 28), Rolf Ludvigsen chronicles a series of pilgrimages to another ammonite, still in situ in a remote spot in southeastern British Columbia. A cast has been made, but the remarkable size of the fossil (1.5 metres) has precluded collection. Discovered in 1947, and figured by Arkell, this specimen has given the name to its locality, Ammonite Gully. There it has been visited by a roster of eminent Jurassic palaeontologists, including (among others) Hans Frebald, Gerd Westermann and Paul Smith (Canada), Arnold Zeiss (Germany) and John Callomon (UK).

Homeless Archival Materials

Lawrence Lambe's artistic work was mentioned above, but he was also an important Canadian vertebrate palaeontologist, working extensively on dinosaurs and other vertebrates for the Geological Survey. He lived between 1863-1919, and his dinosaur work has been discussed in a number of publications, but no extensive biographical/paleontological study has been published. I have recently been shown parts of a journal kept by Lambe, currently in private hands. The diaries and numerous drawings were acquired from an antique dealer, and the new owner recognised their significance and is seeking an appropriate purchaser. I would be happy to put any interested individual or institution in touch with the owner.

Who began plastering fossil bones?

During finalisation of my paper on the 'Canadian Dinosaur Rush' for the proceedings of the INHIGEO conference in Lisbon, I have become intrigued by a new twist in the history of the plastering of bones of vertebrate fossils. Historians of the earth sciences, it seems, rarely pay attention to questions of transfers of technology, yet this method is of vital importance in the provision of intact specimens for taxonomic study.

The question arose because early in the 20th century Lawrence Lambe, vertebrate palaeontologist to the Geological Survey of Canada, went to study at the American Museum of Natural History where the technique was well known, yet he does not seem to have applied it back in Canada. This led me to revisit what is known of the development of the technique. The method was originally devised by surgeons for protecting broken bones (and is still used in this way). Paleontological literature generally ascribes its application to fossils by a few pioneers in North America in the 1870s and 1880s. I summarised the generally available information about the technique in my *Dinosaur Hunters* in 1993. However, I had also noted then an apparent reference to the use of plaster for this purpose in a publication of Henry de la Beche as early as 1836, and had long wondered how this had developed in the UK and whether there had been any transfer of the method across the Atlantic.

By courtesy of William Sarjeant, I have recently acquired a number of privately published pamphlets on English fossil collectors by William George of London, England. One of these, on Sir Antonio Brady (1811-1881), quotes a letter by William Davies of the British Museum referring to the same method, and by courtesy of Mr George I have now seen the detailed account of the technique published in 1874. Clearly, the method was in use in Britain before it was reported in the United States.

The problem remains whether this technology was transferred (perhaps by someone like Arthur Lakes, an Oxford graduate who ended up collecting in Wyoming for Marsh), or whether it was independently invented in each country. I should be most interested to hear from anyone who can shed further light on this intriguing question.

Mount Logan no longer?

During 2000 a public controversy erupted when Canada's Prime Minister Jean Chretien decided to name a mountain to commemorate the late Prime Minister Pierre Trudeau. Since no mountain considered to be of suitable stature remained unnamed, it was decided to rename Mount Logan (at 6050 metres Canada's highest), which is located in Yukon's St Elias range near the Alaska border. This had been named in honour of Sir William Edmund Logan (1798-1875), the Canadian-born founder of Canada's Geological Survey and National Museum, who was apparently no longer considered of importance in political circles. There has been considerable public controversy, but politicians proved themselves unmoved by public opinion. In official circles, the mountain is therefore now known as Mount Trudeau, while Logan's name is retained for a peripheral peak.

It is not perhaps surprising that Logan is unknown to many Canadians outside geological circles. His only biography was published in 1883. A recent overview of his life is given by an article 'Rough Science in the Bush', which was published in the popular Canadian history magazine *Beaver* (Feb.-March, 2002, 82, 8-15). Written by Brian Shipley, a PhD candidate in the department of history of Dalhousie University, it based on his doctoral dissertation on William Edmond Logan and the practice of geology in pre-confederation Canada. Let us hope a new biography of this important figure is in sight.

Historians may be consoled by a reminder that political re-naming of mountains can have a short life. Castle Mountain in Banff National Park was renamed Mount Eisenhower after World War II. This name has been widely ignored by residents, and has finally been dropped in favour of the original much more appropriate appellation. The name Eisenhower is now applied to an outlying peak.

David A. E. Spalding, Canada

China

1. The 15th Annual Meeting of the HGGSC and its publication *The 15th Annual Meeting of the Committee on History of Geology of the Geological Society of China* (HGGSC) was held at China University of Geosciences, Beijing, from 11 to 12 November, 2001. The main subjects were focused on Earth Material Sciences. More than twenty scholars attended the meeting and the details of the meeting were published in the HGGSC *Newsletter* No. 17 in 2001.
2. The year 2002 is the 80th Anniversary of the Founding of the Geological Society of China. Scientific meetings and other activities will be organised in its celebration in the coming Autumn. The China University of Geosciences will also celebrate its 50th Anniversary later this year, and a special exhibition of the history of the University will be held in Beijing.
3. The Research Project supported by the Chinese Academy of Sciences: 'A Synthetic Study on the Modern and Contemporary Science and Technology of China' was started in 2001, which includes research topics on the history of the Chinese Earth sciences. The project will be finished next year and a series of books on the research of the modern history of the various branches of Chinese science will be published subsequently.

Wang Hongzhen, Beijing

The following publication has also been reported:

Wang Ganyuan, 'Some Problems in the History of Recognition and Use of Jadeite in Ancient China', *Bulletin of the History of Science Society*, 2000, 1, 36–40 (in Chinese).

Costa Rica

In early 2001 a book was published about the Geology of Costa Rica (*Geología de Costa Rica*, Editorial Tecnológica de Costa Rica, 515 pages), edited by Professors Percy Denyer and Siegfried Kussmaul. Among the 29 chapters, which cover almost all aspects of Geology in the country, three are related to the history of geology (see references below) and are grouped in a section called 'Historical Aspects and Geological Patrimony'. Aguilar's paper proposes the official creation by law of geological patrimony and recommends several key sites to be declared as geological monuments. Castillo and Peraldo's article summarises the history of the establishment of the Central American School of Geology at the University of Costa Rica in the late 1960s and early '70s. Denyer and Alvarado's paper makes an overview of the development and evolution of Geology in Costa Rica.

At the beginning of 2002, Gerardo J. Soto became a member of the Japanese Association for the History of Geology (JAHIGEO). He co-authored two papers about W.M. Gabb and his contributions to the geological knowledge of Costa Rica in the 19th century, and has written some short notes and book reviews.

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Gerardo Soto, Kagoshima

Czech Republic (Prague)

Josef Haubelt has written:

The 'Mining Foundation of Silesia, Moravia and Bohemia' was established by Milos Zarybnicky on December 10, 1998, as a successor to the Mining Section of the 'Friends of the National Technical Museum of Prague'. Forty-nine specialists participate in its activities individually, as well as sixty-one committees and working groups whose activities are mostly focused on the territorial history of mining, with significant attention to the history of geological sciences. The Foundation issues a *Bulletin* twice a year and publishes scientific papers on an irregular basis. In 2001, it issued a paper of Jiri Slouka, Tomas Hromadka and Jaromir Marek entitled 'To the Quarries in Slivenec, Lochkov and Mala Chuchle', in connection with the newly opened nature trail in the Barrandienne, with historically significant locations from the turn of the Silurian and Devonian. On 25 and 26 August, on the occasion of the exhibition 'Fame of the Ore Mountain Mining', it organised a meeting of Czech and German historians in Mikulov u Teplic and participated in the 4th meeting of Agricola's 'Followers', with Polish colleagues, in Zabrze (Poland) on 22–23 November, emphasising the work of personalities from mining history.

The 4th Mining Pribram in Science and Technology Conference, held in Pribram on 15–17 October, meant a considerable departure from the original focus on technical and technological problems of mining and metallurgy, which are mainly connected with the drastic reduction of ore and coal mining in today's Czechia. Attention is now given to the problems of geo-ethics, mining law, ecology (clean-up work), traditions, and historic relics. The participation of German scientists from the Mining and Industrial Museum of the Castle in Bavarian Theuern (Helmut Wolf) and from the *Agricola-Forschungsstelle* from Saxon Chemnitz (Andrea Kramarczyk) should be mentioned. The lectures on the history of mining education in Saxony (Gütz Altmann, Schwarzenberg and in Czechia (Ota Spinka, Ostrava, Tomas Hlava, Pribram and Vaclav Trantina, Pribram) attracted much attention. Great interest was paid to the lectures given by Koloman Ivanyi (Pribram) and Pavel Sudek (Pribram) on the clean-up of the mediaeval tin mine, 'Hieronymus I', which is a cultural monument of European significance. A lecture on the 150th anniversary of the establishment of the Mining University in Pribram (today's Ostrava) was given by Josef Haubelt (Prague), who spoke about the scientific work of this school's first director, Franz Xaver Maximilian Zippe (1791–1863). Zippe was the first curator of the National Museum in Prague and also, until 1849, a professor of mineralogy at the Prague Polytechnic Institute. Dr Haubelt spoke about the activities of the Friends of the National Technical Museum in Prague in his lecture on Franz Xaver Maximilian Zippe (1791–1863) and the Polytechnic Institute of the Czech Kingdom.

On 2 October, a conference entitled Reusses of Bilina was held in Bilina Spa. The keynote paper was given by Josef Haubelt, showing the relationship of the work of the geologist and balneologist Franz Ambroz Reuss (1761–1830) to the Saxon Neptunism of Abraham Gottlob Werner (1750–1817), and the researches of his son August Emanuel Reuss (1811–1873)—geologist and professor of mineralogy of the Prague College of Natural Philosophy in 1849–1863 and the College of Natural Philosophy in Vienna in 1863–1867—in connection with the school of Friedrich Mohs (1773–1839). Further important papers were given by Oldrich Fejfar (Prague) on the Palaeontological Work of the Reusses; Jiri Kourimsky (Prague), on the 'Mineralogical Work of the Reusses' (Petr Ceska Lipa), 'Geological Work of F.A. Reuss in the Petr Ceska Lipa'; and Jan Valeka and Svatoech (Prague) with the paper 'A.E. Reuss, Cretaceous Stratigraphy and Palaeontologist'. The conference was organised by Norbert Krutsky (Teplice), who together with Jitka Budinska, issued a set of lectures from the conference. This set represents the first summary of the work of the two geologists.

Pribram was one of the most important mining locations for uranium ore in Czechia. This is why we find it strange that neither in Pribram nor anywhere else have we found an attempt to carry out a critical evaluation of the history of uranium mining in this centre of Bohemia. However, just this year we find in the *Collection of the Czech Geologic Institute* the best study so far written, by Jan Slezak (Prague)—'History of Uranium Production in the Area of Strz pod Ralskem (the North Bohemian Cretaceous Basin) and Hydrogeology'. It states that in this area 27,000 tons of uranium concentrate were mined (in Czechoslovakia between 1945 and 1990; and 98,481 tons of uranium concentrate were mined altogether). A summarising overview entitled 'Uranium in Czech History' was published in the *Science and Technology History Magazine* by Jiri Majer (Podlesi u Pribrami). Another contribution was a lecture on the 'History of Prospecting for Uranium Ore in the Region of Pelhrimov and Humpolec' given by Jiri Litochleb (Prague) at the Silver Jihlava Symposium, held on 15 and 16 September, 2001.

The symposium in Jihlava focused on the problems of geology and mining in the Bohemian and Moravian Highlands. Josef Haubelt's lecture treated a topic of wider geographic scope: the Slovenian 'Karel Hinterlechner (1874–1932) and his Work in the Highlands', dealing with map-work performed by the *k. k. Geologische Reichsanstalt* of Vienna in the Bohemian and Moravian region before the foundation of Czechoslovakia. A continuation of this work was the study 'The Slovenian Karel Hinterlechner and Radim Kettner' (on the occasion of the 110th anniversary of the birth of Radim Kettner), presented at a workshop at the Prague National Technical Museum, entitled 'From the History of Mining', held on 6 December, 2001, by Josef Haubelt (Prague), presenting documents from the Geological Survey of Austria Library provided by Tillfried Cernajsek (Vienna). The workshop started with a lecture by Jiri Majer (Podlesi, Pribram) the 75th Birthday of PhDr Ladislav Jungl about the work of this leading expert in mining history, which was suitably complemented by the distinguished person's own presentation: 'Review of Mining History'.

The lectures from Pribram, Jihlava and Bilina have been issued in collections. The lectures presented in the Prague National Technical Museum are ready to be printed.

Josef Haubelt, Prague

And Jan Kozak has reported his activities:

Symposia:

1. Workshop of the European Seismological Commission, working group 'Historical Seismicity', Vienna, June 22–23, 2001. Poster presentation.
2. INHIGEO Symposium, in Lisbon/Aveiro, June/July 2001. Poster presentation.
(During the Symposium, the INHIGEO Secretary General, David Oldroyd, was informed that there was a possibility of organising the INHIGEO meeting for 2005 in Prague. It was decided to continue discussion on this subject during his personal visit to Prague in June, 2002.)

Publications:

- Kozak, J., '100th anniversary of the first International Seismological Conference in Strasbourg in 1901', *Studia Geoph et Geod.*, 2001, 45, 200–209.
- _____ & Chotebor, P., (2001), 'Ilustrovan zprava o pražském ohni z. r. 1541' (in Czech, 'Illustrated report on the Prague fire of 1541'), *Průzkumy Památek VIII*, 1, 145–152.
- _____ & Spicak, A., 'Pictorial series of the manifestations of the dynamics of the Earth: 1. Historical images of World Earthquakes', *Studia Geoph. et Geod.*, 2001, 45, 93–101.
- _____, _____ & Hanus, V., (2001), Pictorial manifestations of the dynamics of the Earth, 2. Historical Images of the World Volcanoes, *Studia Geoph et Geod.*, 2001, 45, 445–456.
(This paper gives new information about the historical natural disaster [fire] in Prague in 1541, discovered in a rare print kept in the British Library, in London.)

Exhibits and lectures:

- Preparation and presentation of five pictorial exhibits on the history of natural phenomena in the territory of the Czech Republic (Prague, Ceska Lipa and Rychnov towns), accompanied by opening lectures.
- Presentation of a special exhibit on the 18th-C cartographic output by the North Pacific (Kamchatka, Alaska, Aleutian) discoverers, accompanied by an opening lecture (National Technical Museum, Prague, December, 2001.)
- Organisation of a special exhibit in the Ventura County Museum for the History and Arts (Ventura, California, USA, September–November, 2001), with two opening lectures.

Jan Kozak, Prague

Czech Republic (Brno)

In 2001, we commemorated an important geological anniversary in Moravia and Silesia: the sesquicentenary of the establishment of the *Werner-Verein zur geologischen Durchforschung von Mähren und Schlesien* (Werner Society for the Geological Research of Moravia and Silesia) in Brno. The memory of Abraham Gottlob Werner was still alive and well in Central Europe at that time (1851), the first systematic geological works in the two eastern 'lands' of the Czech Republic being associated with this society and Werner's name. The Werner Society was active for fifteen years (up to 1866) and it had 101 members in the time of its establishment, and later 130. The Members prepared a few geological maps and reports from the aforementioned 'lands', including one of the first geological maps of the whole of Moravia and Austrian Silesia (O. von Hingenau, 1852, Scale 1: 867 000).

Rudolf Musil continued with his characterisation of important geologists associated with Moravia and Silesia, considering ones having anniversaries of their birth or death in 2001 (*Moravian geology IV*, Masaryk University, Brno, 2001, pp. 3–15). It dealt with thirty-six personalities, including such famous geologists such E. Suess (born 1831), his son, F.E. Suess (died 1941), F. Becke (died 1931), K.J. Maška (born 1851), H. Wankel (born 1821), and others.

Antonín Prichystal took part in work of IGCP/UNESCO project 442—'Raw materials of the Neolithic/Aeneolithic polished stone artefacts: their migration paths in Europe'. The geological basement of the Czech Republic (the Bohemian Massif) was probably the most important source of raw materials for polished artefacts in Central Europe in the Neolithic/Aeneolithic. It yielded various types of green-schist, amphibolite, marble, serpentinite, spilite, basalt, and other rocks suitable for polishing. On the Polish side there was even only one source of nephrite in Central Europe (Jordanow). Some of the rocks were quarried or mined and distributed over a large area as early as the 5th millennium BC. The Neolithic–Aeneolithic miners could be said to have represented the earliest 'geologists' in Europe.

Antonín Prichystal & Rudolf Musil, Brno

France

The French Committee on the History of Geology celebrated last year (in November) the bicentenary of Dolomieu's death (28 November, 1801), in a symposium co-organised with the French Geological Society. This meeting took place in the Hotel de Vendôme in which is presently housed the famous *Ecole nationale supérieure des mines* where Dolomieu formerly taught (but in another location) in 1794. About thirty people attended this meeting, during which twelve lectures were delivered. It should be noticed that three Italian colleagues (Enrico Rizzi, Ezio Vaccari and Luigi Zanzi) spoke on Dolomieu's travels in the Alps and his studies of Italian volcanos. We anticipate that the French Academy of sciences publish the proceedings of this symposium.

Additionally, our Committee has held its three usual annual scientific meetings during which we enjoyed a series of interesting lectures. These will be printed in the next annual issue of our *Travaux* (3rd series, Vol. 15), which is currently in preparation. Its contents will include eight papers:

Kenneth L. Taylor, 'Un commentaire inédit sur les observations et les idées de William Hamilton (1730–1803) relatives aux phénomènes volcaniques de la région de Naples'.

Lydie Touret, 'L'abbé Jérôme Tonnelier (1750–1819): quarante ans au service des mines'.

- Gaston Godard, 'Histoire des écoligites et de leurs interprétations géodynamiques'.
 Robert Fox, 'Théologie naturelle et géologie à l'époque de William Buckland'.
 Jean-Paul Schaer, 'Agassiz et les glaciers ou la réussite d'un entrepreneur scientifique ambitieux'.
 Jacques Debelmas, 'Un siècle et demi de géologie alpine à l'université de Grenoble (1850–2000)'.
 Bernard Maitte, 'René-Just Haüy (1743–1822) et la naissance de la cristallographie'.
 Christian Giusti, 'La perception du relief des Monts du Haut-Dourdou dans la *Statistique minéralogique du département de l'Aveyron* de Jean Blavier (1806)'.

Jean Gaudant, Paris

Germany

1. Meetings and other events

The German group held its annual meeting on March 16–17, 2001, in Munich, kindly supported by the Institute for General and Applied Geology of the University of Munich, and the Munich Center for History of Science and Technology. Among the participants were guests from Italy, The Netherlands, and Austria. Eighteen papers were given, including topics such as 'The making of earth sciences at the Reichuniversität Strassburg between 1872 and 1885' (Wolfgang Czegka, Potsdam), 'The early history of geology and mineralogy at the University of Graz' (Bernhard Hubmann, Graz), 'The mineralogical collection of Alois Sigmund at the Joanneum in Graz (Bernd Moser, Graz)', 'The "Societät für die gesammte Mineralogie zu Jena"' (Birgit Kreher-Hartmann, Jena), 'Alexander von Humboldt as a mineralogist and geologist' (Herbert Pieper, Berlin), 'The geological territory in 19th century Germany' (Peter Schimkat, Kassel), 'Researches on geology in the time of Fascism in Germany' (Martin Guntau, Rostock), 'J.W. von Goethe's melting experiments around 1800' (Susanne Horn, Jena), "'Sublime rage": the development of volcano painting in 18th century' (Joachim von der Thüsen, Utrecht), and 'Novalis as a student and critic of A.G. Werner' (Matteo Vincenzo d'Alfonso, Milan). A public evening lecture was given by Wolf von Engelhardt (Tübingen) on 'Goethe and earth sciences'.

During the meeting Martina Koelbl-Ebert (Munich) was elected as the new chairman of the group, with Martin Guntau (Rostock) as Vice-chairman, and Oskar Burghardt (Krefeld), Gottfried Hofbauer (Erlangen), and Bernhard Fritscher (Muenchen) as councillors.

Cornelia Lüdecke, together with Ingrid Hoensch and Heinz Peter Brogiato (both Leipzig), organised an exhibition on the 100th anniversary of Erich von Drygalski's Antarctic expedition (1901–1903), entitled '*Universitas Antarctica*', which was presented at the town hall of Dresden from 26 March 26 to 20 April, 2001. Dr Lüdecke also chaired a section on the 'Institutionalisation of meteorology since 1847' on the occasion of the German–Austrian–Swiss Meeting of Meteorologists at Vienna on 19 September, 2001. Bernhard Fritscher presented a lecture course on 'Science and travelling in modern times' at the History Department of the University of Munich.

2. Publications

- Fritscher, B., Art. 'Meteorologie', in: M. Landfester (ed.), *Der Neue Pauly: Enzyklopädie der Antike*, 15/(1), Stuttgart/Weimar 2001, 415–420.
- _____, "'Kritik der naturhistorischen Vernunft": Umrisse einer historischen Epistemologie der kantischen Archäologie der Natur', in: Volker Gerhardt, Rolf-Peter Horstmann, Ralph Schumacher (eds), *Kant und die Berliner Aufklärung: Akten des IX. Internationalen Kant-Kongresses*, 4, Berlin/New York 2001, 513–520.
- Kölbl-Ebert, M., 'Abraham Gottlob Werner's conflicting images: thoughts inspired by special exhibitions for his 250th anniversary', *Neues Jahrbuch für Geologie und Paläontologie*, 2001, 277–297.
- _____, 'The Cardinal, the Witch and the Truth: The Strange Posthumous Life of Alchemist and Mining Engineer Martine de Bertereau', *Universidade de Aveiro & International Commission on the History of Geological Sciences (INHIGEO), INHIGEO Meeting Portugal 2001, 'Geological Resources and History', Programme and Abstracts, 24th, June–1st, July 2001, Lisboa–Aveiro 2001.*
- _____, 'On the Origin of Women Geologists by Means of Social Selection–German and British Comparison', *Episodes*, 2001, 24, 182–193.
- _____, 'Inge Lehmann's paper: "P"' (1936)', *Episodes*, 2001, 24, 262–267.
- Kunkel, A., Kölbl-Ebert, M., Jobe, E., 'Sven Hedins Steine'. *Aviso*, 2001, No. 3, 8–9.
- Lüdecke, C., 'Universitas Antarctica: Centennial of the First German Antarctic Expedition (1901–03)', *Terra Nostra: Schriften der Alfred-Wegener-Stiftung*, 2001, No. 1, 38–39.
- _____, 'Das Prinzip der Freiheit: Erich von Drygalski leitete die erste deutsche Antarktisexpedition (1901–03)', *Naturwissenschaftliche Rundschau*, 2001, 154, 643–648.
- _____, 'The Belgian attempt to institutionalize polar research (1905–1915) and the German point of view', in: H. Decler, C. de Broyer (eds), *The BELGICA Expedition Centennial: Perspectives on Antarctic Science and History*, VUB Brussels University Press, Brussels, 2001, 161–169.
- _____, 2001, 'Wetterstationen der deutschen Kriegsmarine auf Spitzbergen (1941–1945): Ein Besuch im Sommer 2000', *Geohistorische Blätter*, 2001, 4, 127–133.
- Lüdecke, C., 'Das deutsche Observatorium in Ebeltoftshafen, Crossbai, Spitzbergen (1912–14): Ein Besuch im Sommer 2000', *Mitteilungen DMG*, 2001, No. 2, 25–27.
- _____, 'Die meteorologische Untersuchungen des praktischen Arztes und Astronomen Wilhelm Olbers in Bremen zu Beginn des 19. Jahrhunderts', in: G. Biegel, G. Oestmann, K. Reich (eds), *Neue Welten: Wilhelm Olbers und die Naturwissenschaften um 1800 (Disquisitiones Historiae Scientiarum, Braunschweigische Beiträge zur Wissenschaftsgeschichte, 1)*, Braunschweigisches Landesmuseum, Braunschweig 2001, 134–141.

- _____, 'History of Meteorology: From Below', Review of: Mark Monmonier, *Air Apparent: How Meteorologists Learned to Map, Predict, and Dramatise Weather*, The University of Chicago Press, Chicago, 1999, *Metascience*, 2001, 10, No. 1, 93–97.
- _____, 'On the History of Global Change, as Viewed from the United States', Review of: James Roger Fleming, *Historical Perspectives on climate change*, Oxford University Press, New York, 1998, 194 p, International Commission of the History of Geological Sciences, *Newsletter*, No. 33, 2001, 41–42.
- _____, 'Tragic outcome of extreme conditions', Review of: Susan Salomon, *The Coldest March: Scott's Fatal Antarctic Expedition*, Yale University Press, New Haven and London, 2001, *Nature*, 2001, No. 414, 150–152.
- _____, Review of: Richard Hamblyn, *Die Erfindung der Wolken—Wie ein englischer Apotheker die moderne Wettervorhersage begründete. Aus dem Englischen von Ilse Strasmann*, Frankfurt am Main und Leipzig, Insel Verlag, 2001, *Mitteilungen DMG* 2001, No. 4, 27–29.
- Schröder, W., 'Das Polarlicht in Vergangenheit und Gegenwart', *Astronomie + Raumfahrt im Unterricht*, 2001, 38, 8–11.
- _____, 'Über den Äther in der Physik (Bemerkungen zur Diskussion zwischen Albert Einstein, Gustav Mie und Emil Wiechert)', *Beiträge zur Geschichte der Geophysik und kosmischen Physik*, 2001, 3.
- _____, 'Wege zur Wissenschaft: Gelehrte erzählen aus ihrem Leben, Beiträge zur Geschichte der Geophysik und kosmischen Physik', 2001, 4.
- _____ & Wiederkehr, K. H., 'Die erste photographische Aufzeichnung erdmagnetischer Pulsationen', *NTM* 2001, 9, 15–28.
- Seibold, Ilse, *Die Geologen und die Künste*, E. Schweizerbart, Stuttgart, 2001.
3. *Lectures*
- Fritscher, B., 'Commentator on the section "Legitimation of Science by History of Science around 1800"', Hamburg, *Konjunktoren und Perspektiven der Medizin-, Wissenschafts- und Technikgeschichte: Annual Meeting of the Deutsche Gesellschaft für Geschichte der Medizin, Naturwissenschaften und Technik* (28.9.–1.10.2001).
- _____, 'Entwicklung in der Geologie bei Lorenz Oken', Offenburg, *Von Freiheit und Verantwortung in der Forschung: Symposium on the 150th anniversary of Lorenz Oken* (19.–20. 10. 2001).
- Kölbl-Ebert, M., 'Augenzeugin der Gebirgsbildung: Das chilenische Erdbeben von 1822 als wissenschaftshistorischer Kriminalfall', *Münchner Fossilienfreunde* (14. 2. 2001).
- _____, '"Steine fallen nicht vom Himmel": Ernst Florens Friedrich Chladni und der Beginn der Meteoritenkunde', München, Ludwig-Maximilians-Universität, *Geowissenschaftliche Fakultät* (14. 11. 2001).
- Lüdecke, C., '"Auf zum Südpol!": 175. Geburtstag von Georg von Neumayer und 100 Jahre deutsche Südpolarexpedition', Hamburg *Kolloquium des Instituts für Geschichte der Naturwissenschaften* (29. 1. 2001).
- _____, 'Die Bedeutung der Deutschen Universität Dorpat (1918) am Beispiel des Meteorologen Alfred Wegener', München, *Haus des Deutschen Ostens* (8. 2. 2001).
- _____, 'SWEDARC 2000: Wissenschaftshistorische Feldarbeiten zur Geschichte der Polarforschung in Spitzbergen', München, *Jahrestagung des Arbeitskreises Geschichte der Geowissenschaften der GGW* (16.3.2001).
- _____, 'Universitas Antarctica: 100 Jahre deutsche Südpolarexpedition 1901–1903 unter der Leitung Erich von Drygalskis', München, *Volkshochschule* (5.4.2001).
- _____, 'Studie über den Tod Alfred Wegeners (1880–1930) auf dem Grönländischen Inlandeis', Dresden, *Town Hall, Exhibition's opening* (26.3.2001).
- _____, 'The history of science and exploration in Antarctica: The International Cooperation (1901–1903) from a German perspective', Mexico City, *Palacio de Minería, XXith International Congress of History of Science* (11.7.2001).
- _____, 'The First International Polar Year (1882–83): A big science experiment with small science equipment', Göteborg, *Universität, International Scientific Symposium 'Antarctic Challenges—Historical and current perspectives on Antarctica'* (11.5.2001).
- _____, 'Planned Occupation on Antarctica during the Third Reich: On the political Background of the third German Antarctic Expedition (1938/39)', Twente University, *Summer School of the Netherlands Graduate School on Science, Technology and Modern Culture* (4.9.2001).
- _____, 'Das 1. Internationale Polarjahr (1882–83) und die Gründung der Deutschen Meteorologischen Gesellschaft (1883)', Hamburg, *Universität, Jubiläumstagung '100 Jahre Deutsche Gesellschaft für Geschichte der Medizin, Naturwissenschaften und Technik'* (9.9.2001).
- _____, 'Wissenschaft und Politik im Kaiserreich: Die erste deutsche Südpolarexpedition vor hundert Jahren, Bremerhaven', *Alfred-Wegener-Institut für Polar- und Meeresforschung, public lecture on the occasion of the presentation of a series of stamps celebrating 100 years of German Antarctic research* (31.10.2001).
- _____, 'The German South Polar Expedition of 1901–03', Cambridge, *Scott Polar Research Institute, public lectures* (10.11.2001). Lüdecke, C., 'Semper vivum- Beginn der instrumentellen Meteorologie zu Otto von Guericke's Zeit', Magdeburg, *20th International Guericke-Meeting 'Vakuum und Mensch'* (1.12.2001).

The help of the German members of INHIGEO in the compilation of this report is gratefully acknowledged.

Bernhard Fritscher and Martina Kölbl-Ebert, Munich

Hungary

The Geohistorical Section of the Hungarian Geological Society held seven independent *meetings* (17 presentations) and three more (7 presentations) in co-operation with (4) other institutions. Furthermore, an extraordinary year-farewell party was also organized.

Comemorations were read on J. Böckh, G. Csiky (Honorary President of the Section, who passed away on 8 November 2001, aged 86 [see p. 23, Ed.]), O. Kadic, B. Mauritz, N. Meszaros, G. Panto, R. Reichert, A. Ronai, E. Sedilek (Pehm), T. Szontagh, V.I. Vernadsky.

Jubilees celebrated:

- ⊙ Paleontology in the 175-year old Hungarian Academy of Sciences
- ⊙ Petrography and Geochemistry in the Hungarian Academy of Sciences
- ⊙ Geology (including Hydrogeology) in the Hungarian Academy of Sciences

The lecture series on the Mining Museums in Hungary was continued.

- ⊙ 'V. The Vilmos Zsigmondy Collection of the Museum of Oil Industry'

Other lectures were:

- ⊙ 'Hungarian bauxite exploration in Yugoslavia between the two World Wars', by A. Toth
- ⊙ 'Report on the J. Treiber Commemorative Meeting held at Cluj/Kolozsvár (Romania)', by P. Papp
- ⊙ 'Historical and folkloristical aspects of a Hungarian miners' legend', by J. Hala and I. Landgraf
- ⊙ 'Presentation of the publications of the Hungarian Aluminium Industry', by J. Radnai
- ⊙ 'Some words about the mineral 'klebelsbergite'', by B. Nagy
- ⊙ 'Relationship between Gy. Halavats and the Sigmondy brothers', by B. Csath
- ⊙ 'Hungarian families with several generations of geologists', by E. Dudich
- ⊙ 'Exploration history of the Füzérradvány illite', by I. Viczian
- ⊙ 'Fragments from the diary of I. Vitalis', by Gy. Vitalis

An important event was the year-closing party held at the Geological Institute of Hungary under the title 'Geology in Poetry—Poetry in Geology'. Altogether fifty-five poems (selected by E. Dudich and J. Hála) dealing with geological themes or written by geologists (worldwide, from the antiquity to present times) were presented (by three geologists) and partly accompanied by music (by a fourth one).

In 2001, two new INHIGEO members were elected from Hungary: Gábor Papp and István Viczián. (At present, there are nine Hungarian members.)

Selected papers, 2001 (Hungary)

Benke, Istvan, *One Thousand Years of Mining in Hungary*, Vols I–III OMBKE, Budapest (in Hungarian).

Benke, Istvan, *History of the Telkibanya Gold–Silver Mine*, Miskolc, Rudabanya (in Hungarian).

Dobos, Irma, Main aspects of the use of thermal waters in historical and present-day Hungary *Balneologia*, 21, 23–31 (in Hungarian).

Dudich, Endre (ed.), *The Chronicles of the Association of European Geological Societies (1975–2000)*, Polish Geological Institute, Warsaw.

Hala, József and Landgraf, Ildiko, *Miners' Legends in Hungary*, Rudabanya (in Hungarian).

Szakall, Sandor, *The Rudabanya Iron Ore Deposits in the Early Literature (1880–1939)*, Rudabanya (in Hungarian).

Tóth, Almos (ed.), *Old Geological News*, Hungarian Museum of the Aluminium Industry, Szekesfehervar (in Hungarian).

Vitalis, Gyorgy, 'Commemoraton of T. Posewitz on the 150th Anniversary of his Birth (in Hungarian with English abstract)', *Földtani Közöny*, 131, 561–567.

Information on Professors A. Vendl and F. Papp is available on the home page.

Endre Dudich, Budapest

Ireland

Dublin is looking forward to the arrival of INHIGEO members in July 2003. Beds are being booked, lunches arranged, and hostelleries visited in advance. Please return your registrations forms in good time.

Gordon Herries Davies continues his work on the history of the Geological Society and is also writing a history of the Royal Zoological Society of Ireland. Patrick Wyse Jackson was elected a Councilor of the History of Earth Sciences Society, and Chairman of the Geological Curators' Group. During July 2001 he organised a one-day meeting on the history of bryozoological research as part of a larger international symposium on bryozoans. Hugh Torrens spoke on the woman bryozoologist Eliza Jelly, while Patrick co-authored a paper on the corset-maker and palaeontologist George Robert Vine of Sheffield.

Publications

Buttler, C.J., Wyse Jackson, P.N. and T.S. Sharpe, 'George Robert Vine (1825–1893): Stay Maker, Bryozoologist and Fossil Dealer', *Abstracts International Bryozoology Association and Society for the History of Natural History meeting—From John Ellis To Bryostatins: The History of Study of Fossil and Living Bryozoans*, Trinity College, Dublin, Ireland, 21st July 2001, 5.

Herries Davies, G.L., 'A History of Irish Geology', in: Holland, C.H. (ed.), *The Geology of Ireland*, Dunedin Academic Press, Edinburgh, 2001, 493–504.

James, K.W. 'A Mineral Collection in the Ulster Museum Matched with a Lecture Syllabus of Sir Charles Giesecke (1761–1833)', *The Geological Curator*, 2001, 7, 167–173.

Wyse Jackson, P.N., 'Chronological Listing of Books Published on the Geology of Ireland from 1699 to 1999', *Irish Naturalists' Journal*, 2001, 26, 293–313.

———, 'John Joly (1857–1933) and his Determinations of the Age of the Earth', in: Lewis, C.L.E. and Knell, S.J. (eds), *The Age of the Earth: from 4004 BC to AD 2002*, Geological Society Special Publication No. 190, London, 107–119.

- _____. 'Some "Irish" bryozoologists', *Abstracts International Bryozoology Association and Society for the History of Natural History Meeting—From John Ellis to Bryostatins: The History of Study of Fossil and Living Bryozoans*, Trinity College, Dublin, Ireland, 21 July 2001, 19.
- _____. 'Seven Ages of Geological Investigation: A Biographical study of the Geological Society of Dublin and its Successor the Royal Geological Society of Ireland 1831–1894', *Geological Society of America Abstracts with Programs*, 2001, 33, 59.
- _____ & Spencer Jones, M.E., 'From Rondelet to Bryostatins: Chronology of 100 Important Events and Publications in the History of Bryozoological Research', *Abstracts International Bryozoology Association and Society for the History of Natural History Meeting—From John Ellis To Bryostatins: The History of Study of Fossil and Living Bryozoans*, Trinity College, Dublin, Ireland, 21 July 2001, 20.

Patrick Wyse Jackson, Dublin

Israel

Professor Yaalon reports that he is now busy with his colleague Benno Warkentin (Oregon, WA) on another edited book on the History of Soil Science, but it will take a couple of years before it comes out. He and his colleagues have also produced Newsletter No. 9 of the IUSS Commission on the History, Philosophy, and Sociology of Soil Science. Some papers have been published in the *Israel Journal of Earth Sciences*, which may be of interest to INHIGEO Members as they include some references to early papers, which many publications nowadays discount:

- Y. Avni, Y. Bartov, Z. Garfunkel & H. Ginat, 'Evolution of the Paran drainage basin and its relation to the Plio-Pleistocene history of the Arava Rift western margin, Israel', *Israel Journal of Earth Sciences*, 2000, 49, 215–238.
- R. Adler, J. Forrai & Y. Melzer, 'The evolution of a geodetic-geodynamic control network in Israel', *Israel Journal of Earth Sciences*, 2001, 50, 1–7.

Italy

In January 2001 Nicoletta Morello was invited to carry out some research on the history of palaeontology in Malta, in an exchange programme between the University of Genoa and the University of Malta. Later, she contributed to the catalogue of the exhibition on Athanasius Kircher, *Il Museo del Mondo*, which took place in Rome in March and April 2001.

Early in April, the Centre *Musei delle Scienze Naturali* of the University of Naples 'Federico II', organised a meeting on the occasion of the bicentenary of the Royal Mineralogical Museum of Naples, established in 1801. The following papers relating to the history of the Earth sciences were presented (in Italian): A.M. Rao on science and policy in Naples between 18th and 19th century; M. Torrini on science and museums in the 16th century; B. D'Argenio on the Earth sciences in Naples and the birth of modern geology; C. Cipriani on the development of mineralogy in the last two centuries. During a video-conference with the *Muséum d'Histoire Naturelle* of Paris the following papers were presented (in French and Italian): H.J. Schubnel on the the mineralogical collections of the *Muséum*; G. Luongo on Vesuvius and the birth of volcanology; L. Touret on the relationships between Naples and the *École des Mines* of Paris during the 18th century; A. Mottana on Arcangelo Scacchi as a notable discoverer of Vesuvian minerals; G.C. Parodi on two centuries of cultural exchanges between the Royal Mineralogical Museum of Naples and the Museum of Natural History of Paris; P. Tandy & A. Wooley (in English) on the British Museum's collections of rocks and minerals from Vesuvius made by William Hamilton and Teodoro Monticelli, and Hamilton's observations on Vesuvius. Among the presented posters, several concerned the history of geological sciences, such as I. Menditti & C. Petti on Teodoro Monticelli's museum; A. Nazzaro on the Pompei's frescos about Vesuvius; C. Petti on Matteo Tondi and the Royal Mineralogical Museum of Naples; C. Principe on Arcangelo Scacchi as volcanologist in the 19th century; E. Stendardo on the *Theatro di Natura* by Ferrante Imperato between the 16th and 17th centuries. The proceedings of this meeting were published in December, 2001, and may be requested from the Real Museo Mineralogico, via Mezzocannone 8, 80134 Napoli (Italia). Fax +39 0812535162. Email: <mgliara@unina.it> or <petti@unina.it>.

In May, Nicoletta Morello and Ezio Vaccari took part to the first International Meeting 'OH₂—The Origins and History of Hydrology', which was hosted in Dijon (France) by the Universities of Bourgogne and Paris VII–Jussieu. Nicoletta Morello presented a paper in French on the 17th-century hypotheses on the origin of fresh water, while Ezio Vaccari presented a paper in French on geology and hydrology in the 18th-century Italian debates on the origin of springs. Towards the end of May Professor Morello attended the international workshop *La Géologie des Lumières* (The Geology of Enlightenment) organised by the *École des Hautes Etudes en Sciences Sociales* in Paris, where she gave a lecture on ideas about the Deluge in the 18th century.

In Jun, Nicoletta Morello and Ezio Vaccari took part to the INHIGEO Meeting in Portugal, with papers on 'Agricola and the Mining organisation according to *De re metallica* (1555)' (N. Morello) and 'Quarrying and geology in early 18th century Italy: the lithological column of Gregorio Piccoli (1739)' (E. Vaccari, with E. Curi).

In September, Ezio Vaccari contributed to the 3rd Symposium on the History of Earth Sciences in Austria (held in Hallstatt) with a paper on 'Geological relationships between Italian and Austrian scientists in the 18th century'. During the same month he presented a paper (in Italian) on 'Dolomieu and the problem of orogenesis in 18th century Italy' at the 18th Walser meeting on 'Déodat de Dolomieu and the science of the Alps' (held in Formazza, Italy). This meeting also included the following papers: L. Zanzi on Dolomieu and the science of his times; P. Guichonnet on the relationships between Dolomieu and the scientists of Geneva; C. Maccagni on the 'method' of geology in the 18th century; J. Dabelmas on Dolomieu's ideas on Alpine geology; P. Cazzola on Dolomieu's personality through his correspondence; and E. Rizzi on Dolomieu's Alpine travels. An exhibition about Dolomieu's travels was opened during the meeting and the first Italian translation of published

and unpublished material on Dolomieu's Alpine travels (edited by Enrico Rizzi) is being printed in 2002, together with the proceedings of the meeting. For further information, please contact Dr Enrico Rizzi, Fondazione Monti, Anzola d'Ossola (Novara), Italy. Tel/Fax: +39 024980316.

In October, the Venetian Society of Natural Sciences organised in Venice a workshop on 'Mineralogy and mining research from the 14th century to the present'. The following papers were presented (in Italian): E. Vaccari on mining research and development of geology in the Veneto region between 18th and 19th century; S. Citon on an unpublished manuscript by the Venetian naturalist Giuseppe Innocente; A. Pollazzon & V. Salton on the restoration of the ancient mining centre of Valle Imperina; C. Lazzari on a 'geological walk' near Padua in 1842; A. Guermani on the history of the gold mines of Mt Rosa; F. Bizzarini on the mining district of Primiero (in south Tyrol) from the times of Sigmund of Austria to Napoleon I; R. Zucchini on the mining history of the Carnic Alps. The proceedings will be published in 2002. For further information please contact *Società Veneziana di Scienze Naturali*, c/o Museo Civico di Storia Naturale, S. Croce 1730, 30135 Venezia, Italy. Email: <socven@iol.it>. Fax: +39 041721000.

Finally, in November Ezio Vaccari gave a talk (in French) on Dolomieu's studies of Italian volcanoes at the meeting *Dolomieu et son temps*, organised by COFRHIGEO and the *Société Géologique de France* in Paris.

Publications:

- Borelli, Giovanni Alfonso, *Storia e meteorologia dell'eruzione dell'Etna del 1669* [History and meteorology of the 1669 eruption of Mt. Etna]. Introduction, Italian translation and notes by Nicoletta Morello, Giunti, Firenze, 2002.
- Cipriani, Curzio, 'L'evoluzione della mineralogia negli ultimi due secoli' [The development of mineralogy in the last two centuries], in: *Atti del Bicentenario del Real Museo Mineralogico 1801-2001*, edited by M.R. Ghiara and C. Petti, Medias, Napoli, 2001, 58-64.
- Dal Piaz, Giorgio V. 'History of tectonic interpretations of the Alps', *Journal of Geodynamics*, 2001, 32, 99-114.
- D'Argenio, Bruno, 'Le scienze della Terra a Napoli e la nascita della geologia moderna' [The Earth sciences in Naples and the birth of modern geology], in: *Atti del Bicentenario del Real Museo Mineralogico 1801-2001*, edited by M.R. Ghiara and C. Petti, Medias, Napoli, 2001, 47-57.
- Donati, Vitaliano, *Viaggio mineralogico nelle Alpi Occidentali. Valle di Susa, Maurienne, Trentaise, Valle d'Aosta e Faucigny, nell'estate 1751* [Mineralogical travel in the Western Alps, during the summer of 1751]. Edited by G. Scalva, INRM / Editrice Compositori, Bologna, 2001.
- Giacomoni, Paola, *Il laboratorio della natura. Paesaggio montano e sublime naturale in età moderna* [The laboratory of nature: Mountain landscape and natural sublime in the modern age], Franco Angeli, Milano, 2001.
- Luongo, Giuseppe, 'Il Vesuvio e la nascita della vulcanologia' [Vesuvius and the birth of volcanology], in: *Atti del Bicentenario del Real Museo Mineralogico 1801-2001*, edited by M.R. Ghiara and C. Petti, Medias, Napoli, 2001, 147-151.
- Morello, Nicoletta, 'Nel corpo della Terra. Il geocosmo di Athanasius Kircher' [Inside the body of the Earth. Athanasius Kircher's geocosm], in: *Athanasius Kircher. Il museo del Mondo*, edited by Eugenio Lo Sardo, Roma, De Luca, 2001, 179-196.
- Mottana, Annibale, 'Arcangelo Scacchi: massimo scopritore di minerali al Vesuvio' [Arcangelo Scacchi as great discoverer of Vesuvian minerals], in: *Atti del Bicentenario del Real Museo Mineralogico 1801-2001*, edited by M.R. Ghiara and C. Petti, Medias, Napoli, 2001, 160-167.
- Parodi, Gian Carlo, 'Due secoli di scambi culturali tra il Real Museo Mineralogico di Napoli e il Muséum d'Histoire Naturelle a Parigi' [Two centuries of cultural exchanges between the Royal Mineralogical Museum of Naples and the Museum of Natural History of Paris], in: *Atti del Bicentenario del Real Museo Mineralogico 1801-2001*, edited by M.R. Ghiara and C. Petti, Medias, Napoli, 2001, 168-170.
- Robilant, Spirito Benedetto Nicolis. *Viaggi mineralogici* [Mineralogical travels], edited by V. Garuzzo, Olschki, Firenze, 2001.
- Saussure, Horace-Bénédict de, *Viaggi nelle Alpi. Passo del Gries e Monte Rosa* [Travels in the Alps. Gries Pass and Mt. Rosa], edited by E. Rizzi et al. Fondazione Monti, Anzola d'Ossola, 2000.
- Schubnel, Henri-Jean, 'La Collection nationale du Muséum', in: *Atti del Bicentenario del Real Museo Mineralogico 1801-2001*, edited by M.R. Ghiara and C. Petti, Medias, Napoli, 2001, 142-146.
- Tandy, Peter & Wooley, Alan, 'The British Museum's Collections of rocks and minerals from Vesuvius made by William Hamilton and Teodoro Monticelli (1759-1846), and Hamilton's observations on Vesuvius between 1764 and 1800', in: *Atti del Bicentenario del Real Museo Mineralogico 1801-2001*, edited by M.R. Ghiara and C. Petti, Medias, Napoli, 2001, 171-180.
- Touret, Lydie, 'Les relations entre Naples et l'École des Mines de Paris au XVIIIème siècle', in: *Atti del Bicentenario del Real Museo Mineralogico 1801-2001*, edited by M.R. Ghiara and C. Petti, Medias, Napoli, 2001, 152-159.
- Vaccari, Ezio, 'La geologia', in: *Per una storia del Consiglio Nazionale delle Ricerche* [Toward an history of the National Research Council], edited by R. Simili & G. Paoloni, Laterza, Bari - Roma, I, 2001, 465-491.
- _____, 'Les "Voyages dans les Alpes" et la géologie italienne' [The *Voyages dans les Alpes* and Italian geology], in: *H.-B. De Saussure (1740-1799), Un regard sur la Terre*, edited by R. Sigrist, Georg / Bibliothèque d'Histoire des Sciences, Genève, 2001, 197-213.
- _____, 'Secco, Andrea', in: *Österreichisches Biographisches Lexikon 1815-1950*, Edited by the Österreichischen Akademie der Wissenschaften, 55. Lieferung (Schwarz Marie-Seidl Carl), Verlag der Österreichischen Akademie der Wissenschaften, Wien, 2001, 78.

- _____, 'European Views on Terrestrial Chronology from Descartes to the mid-18th century', in C.L. Lewis & S.J. Knell & (eds), *The Age of the Earth: from 4004 BC to AD 2002*, Geological Society of London (Special Publication No. 190), London, 2001, 25–37.
- _____, 'Geology and mining in 18th century Italy: Giovanni Arduino and Spirito Nicolis di Robilant', in: J.E. Fell, P.D. Nicolaou & G.D. Xydous (eds), *5th International Mining History Congress. Book of Proceedings*, Milos Conference Centre—George Eliopoulos, Milos, 2001, 346–354.
- Zanzi, Luigi, 'La scienza sulle Alpi: Horace-Bénédict de Saussure' [The science of the Alps: H.-B. de Saussure], in: Saussure H.B. de, *Viaggi nelle Alpi. Passo del Gries e Monte Rosa*, edited by E. Rizzi et al. Fondazione Monti, Anzola d'Ossola, 2000, 9–39.

Ezio Vaccari, Varesi; Nicoletta Morello, Genoa

Additionally, Professor Piccoli has written:

In May–June 2001 an International Conference on Paleobiogeography and Paleocology was organized in Piacenza, Italy. From the historical point of view, F. Westall, from Houston (TX, USA) exposed a short outline of the studies about development of life on Early Earth and maybe Mars, particularly considered in the last years, of course.

In early October, 2001, the 7th Cave Bear Symposium took place in Villa Opicina (Trieste), organized by the Trieste Civic Museum of Natural History. Some papers and posters included a short history of researches regarding this big mammal since the 19th Century, as the paper by Doris Doeppers from Vienna (Austria) and respectively the poster by Mariagabriella Fornasiero and Alessandra Menegazzi from Padova (Italy). A paper by Ina Wunn from Hamburg (Germany) dealt with the philosophical approach to the evolution of the mankind in respect to other branches of the animal kingdom.

In December, the exhibition, 'The New Science in Padova, XVIIth to XVIIIth Century', was concluded. As far as history of geology was involved, Antonio Vallisneri Senior (1661–1730) and his homonymous son Antonio Vallisneri Junior (1708–1777) were illustrated. A CD-rom was also produced.

A volume regarding scientists and the university professors in Padova during the eighteenth century is now in print. For geology, the main name is Giovanni Arduino (1714–1795), the 'father of stratigraphy', who proposed the geologic eras (Primary, Secondary, Tertiary and Quaternary) in two letters to Antonio Vallisneri Junior, at that time teacher of Natural Science in Padua University, in 1759. Another geologist was Antonio Carlo Dondi Dall' Orologio (1751–1801), who studied the Euganean Hills, recognized the volcanic origin of the local basalts, and considered the thermal waters of the area (I am the author of his biography).

A short biography of Giovanni Meneguzzo (1831–1912) was published in Vicenza by Paola Zamperetti. Meneguzzo was a guide to geological, and especially palaeontological, sites in Veneto for scientists from all over Europe and himself discovered many fossiliferous sites. A biography of his son, Vittorio Meneguzzo, who undertook similar activities, by Isabella Bertozzo, will follow soon.

Giuliano Piccoli, Padua

Japan

The Japanese Association for History of Geological Sciences (JAHIGEO) held ordinary and general meetings at Hokutopia, Tokyo, on 16 June and 23 December, and an evening sessional meeting at the annual meeting of the Geological Society of Japan at Kanazawa University on 22 September, 2001 respectively.

The following presentations were made at the general meeting in June.

Toshio Kutsukake, 'Goethe and Karlsbad Twin';

Hiroo Mizuno, 'On the History of Earth Science from the Time of the Imperial Earthquake Investigation Committee to the End of the Year of the Geodesy Council';

Yuu Higuchi, 'Historical Review of the Geological Contributions of Petroleum Exploration'.

The following three lectures relating to Hokuriku district were presented at the evening sessional meeting at Kanazawa University.

Yoshio Kaseno, 'An Historical Review of the Geological Investigations in Ishikawa Prefecture from 1877 to 2000'.

Yoichi Azuma, 'History of Geological Researches from the Jurassic to the Cretaceous Tetori Group, with special reference to the discovery of dinosaurs fossils';

Shoji Fujii, 'History of the Toyama Geographical Society';

At the general meeting in December, the following presentations were made.

Hiroshi Ishiyama, 'Ryushichi Togi's Life, and his Geographical and Archaeological Contributions';

Isao Imai, 'Japanese Geology in Relation to the Great Kanto Earthquake in 1923';

Koichiro Ichikawa, 'Changing concepts of the Kurosegawa Tectonic Line during the Half Century since its First Definition'.

Ryushichi Togi (?–1943) was a geographer known for the reconstruction of a paleo-shore line map during the Neolithic age in the Kanto Plain, based on the distribution of shell mounds. The Kurosegawa tectonic line is a zone characterized by the distribution of Pre-Silurian metamorphic rocks, Silurian strata, and crushed granitic rocks in the Chichibu belt in the outer zone of Southwest Japan.

The seminar on the history of geosciences started last year under the leadership of the young members of the Association. Four meetings were held: on 17 March, 27 May, 29 September, and 22 December, 2001. The following presentations were made.

'On the Activities of the Central Museum of Manchuria before and during World War II', by Naoki Yamaguchi (in March, at Aoyama, Tokyo).

'On the History of the Discovery of the Intermediate-deep Earthquake Zone', by Yasumoto Suzuki (in May at Waseda, Tokyo).

'Aspects of 17th-century Western Theories of the Earth in Relation to Kircher and Steno', by Toshihiro Yamada (in September, at Aoyama, Tokyo).

'A View of the Translation of *The Dark Side of the Earth* by Robert Muir Wood (1986)' by Tsutomu Tanimoto;

'Takeaki Enomoto's Geology from an Historical Viewpoint', by Manabu Yoshioka in December, at Aoyama, Tokyo).

Enomoto was a minister in the Meiji Era after a higher official in the Edo Shogunate. Yoshioka showed Enomoto's interests in science and highly appreciated the geological survey of the coal field and iron sand in Hokkaido.

The Association published *Kaiho* of the JAHIGEO Nos. 16 and 17 in Japanese, and *Newsletter* No.3 in English.

The Editorial Committee of History of Geosciences in Japan, and the Tokyo Geographical Society published 'The Development of Geosciences in Japan, 1924–1945' as one of a series in the *Journal of Geography* in 2001.

Yasumoto Suzuki published 'Kiyoo Wadati and the Path to the Discovery of the Intermediate-deep Earthquake Zone' as part of the Classic Paper series in *Episodes* (Vol. 24, No.2).

It was very sad news that Dr Yutaka Ikebe, a co-founder and enthusiastic member of JAHIGEO, died of cancer at the age of 83 on 13 April, 2001.

Yasumoto Suzuki, Tokyo; Kenzo Yagi, Sapporo

New Zealand

The Historical Studies Group of the Geological Society of New Zealand continues its co-ordinating role by keeping researchers of the history of New Zealand geology in contact with each other as well as publishing its *Newsletter* twice a year. The latter is very much due to Alan Mason the instigator of both it and the group. Alan is now in his 12th year as Editor and in recognition of his considerable input into historical studies, including both as Editor and as a prolific contributor to the *Newsletter*, the Geological Society of New Zealand in 2001 named one of its trust funds the 'Alan Mason Historical Studies Fund'. The fund, as the name suggests, is to assist research into the history of New Zealand geology.

Amongst the articles published in *Newsletters* 21 and 22 in 2001 is an account by David Kear of the, by today's standards, very low-key introduction of the hypothesis of 300 miles (480 km) dextral strike-slip movement on the Alpine Fault of the South Island of New Zealand. The article is based on minutes taken by R.W. Willett at a Geological Survey staff conference held at Rotorua in 1948. Both Dick Willett and David Kear were to become directors of 'The Survey'. In another article, Alan Mason who writes about W L Lindsay who was mapping in Otago at the time that extensive gold placer deposits were being found. Lindsay was a doctor trained in Edinburgh, something he had in common with at least two other early New Zealanders, James Hector and David Monro.

A relatively large number of New Zealand institutions, including several in provincial centres, have a wide range of material relating to the history of New Zealand geology. This in part reflects the search for minerals, which received considerable impetus with the discovery of New Zealand's first payable goldfield at Collingwood in the north of the South Island in 1856. Further gold rushes occurred in many parts of New Zealand and much of the country was surveyed and prospected for other minerals such as copper, chromite and coal. The active Taupo Volcanic Zone also received early attention with the engagement by the Auckland Provincial Council in 1858 of Ferdinand von Hochstetter, who was with the Austrian *Novara* expedition. After Auckland, Hochstetter produced the first geological map of Nelson and named the rock 'dunite' from there. As well as New Zealand material, there are items of overseas interest such as, for example the papers of Gideon Mantell, which were brought to New Zealand by his son Walter and are largely held at the Alexander Turnbull Library in Wellington.

Rodney Grapes and Gaye Downes continue their research into the effects of very large earthquakes on colonial society in the first two decades following the commencement of organised European settlement in 1840. For their work both were in 2001 awarded Royal Society of New Zealand Science and Technology medals. Although Rodney has now moved from Victoria University of Wellington to Freiburg in Germany he continues his New Zealand research. Alan Mason is looking into some of the lesser-known activities of Charles Heaphy, an early explorer and surveyor, and for a period soldier. Like most explorers and surveyors Heaphy took more than a passing interest in geology. It was recognised very early on that in New Zealand, with its diverse geology, which even if mineral deposits were absent the soil type, and hence agricultural potential, strongly reflected the underlying bed-rock. Graham Bishop of Dunedin is following the career of Alexander McKay, a self-taught Scot who, after trying his luck on the Otago gold fields joined the Geological Survey. He is rightly revered as one of New Zealand's greatest field geologists. The development of stratigraphic nomenclature, so critical to the understanding of the history of the earth, and with all its inherent controversies is being studied by Auckland Heather Nicholson

It was with regret that the New Zealand Earth science community learnt of the death in January 2002 of L.O. (Les) Kermodé, formerly of the New Zealand Geological Survey in Auckland (1963–1992). Les did much for geo-conservation and was a recognised authority on Hochstetter.

Mike Johnston, Nelson

Poland 2000–2001

Systematic studies on the history of geosciences in our country are being carried out in several institutions and social organizations. We should mention: 'Museum of the Earth' of the Polish Academy of Sciences (with its section on History of Geosciences and archives, as well as the periodical *Transactions of the Museum of the Earth* and documentary elaborations); the Institute of History of Science of the Polish Academy of Sciences (with a Group on the History of Cartography editing the annual *From the History of Cartography*); the Committee on the History of Science and Technics of the Polish Academy of Sciences, with Natural History and Siberian Commissions; the Stanislaw Staszic Museum in Pila, which publishes a periodical *Staszic's Fascicles*; the Commission on the History of Sciences of the Polish Academy of Arts and Sciences, publishing its *Proceedings and Monographs* (in Polish); and the private Laboratory of History of Polish Geology established by INHIGEO member S. Czarniecki. Historical problems are also occasionally studied in the State Geological Institute, the Archives of the Polish Academy of Sciences, the Geological Society of Poland, the Mineralogical Society of Poland, and in various institutes of higher education—notably the Technical University of Mining and Metallurgy in Cracow.

INHIGEO members are fostering historical studies in social and scientific organizations and regional museums. The 600th anniversary of renovation of the Jagellonian University in Cracow was celebrated by editing *Golden Book* of this famous institution. The volume of its Department of Natural Sciences contains biographies of outstanding academic teachers of geosciences: Ludwik Zejszner (1805–1871); Wladyslaw Szajnocha (1857–1928)—both by S. Czarniecki; Jozef Boleslaw Grzybowski (1869–1922)—by S. Czarniecki and S. Geroch; Jan Nowak (1880–1940)—by A. Slaczka; Antoni Gawel (1901–1989)—by W. Narebski; and Marian Ksiazkiewicz (1906–1981) by S. Dzulynski. Moreover, on the occasion of 25th anniversary of reactivation of geological studies at this ancient University a conference was organised and a book on the history and scientific achievements of the staff of its Institute of Geological Sciences was published, containing also complete list of its publications. These celebrations were accompanied by scientific sessions. One of them, devoted to Ignacy Domeyko (1802–1889), was organised by Z.J. Ryn, the former ambassador in Chile. Worth emphasising is the participation of Chilean historians of sciences and of descendants of this famous geoscientist from various continents. The State Geological Institute has celebrated the 90th birthday of outstanding geologist W. Pozaryski by a special session and publication of a fascicle on history of geology in the 20th century, including memoirs of the jubilee.

Publications.

Two important books by Z. Wojcik were published: *Jozef Siemiradzki (1858–1933), Natural Scientist, Humanist and Explorer of South America*, 278 pp.

Bibliography of the Polish Natural History Museum Management in the period 18th–20th Centuries, 324 pp.

The 46th volume of *Proceedings of the Museum of the Earth (Prace Museum Ziemi)* contains several historical papers (with English summaries):

B. Kosmowska-Ceranowicz—'The old Gdansk amber collection' (pp. 81–106).

A. Pielinska—'A fraction of the H.R. Goepfert amber collection held at Wroclaw University's Museum of Geology' (pp. 107–116)

J. Popiolek—'The study of Poland's youngest geological formations and theories on their origin prior to 1875' (pp. 149–170)

A. Gawel—'From the diary of scientific expedition to Greenland in 1937, fragments selected and commented by W. Narebski' (pp. 171–184).

J. Garbowska has edited a book *Archival materials concerning history of geosciences in the collections of the Museum of the Earth, Part IV*.

Zeszyty Staszicowskie (Staszic's Fascicules), No. 2 contains several papers on the history of geosciences by S. Czarniecki, A.S. Kleczkowski, J. Skoczylas, and Z. Wojcik.

Prace Komisji Historii Nauki PAU (Proceedings of the History of Sciences of the Polish Academy of Arts and Sciences), Vol. 2, contains a paper on stratigraphy in the 18th century by Z. Wojcik.

J. Skoczylas is the author of a new academic handbook *Introduction to Geology* containing a chapter on the history of geology.

A.S. Kleczkowski has prepared a paper on initial period of pedagogic activity of Polish geological and mining higher schools.

Conferences

During successive 'Staszic's Meetings' in Pila, lectures by S. Czarniecki, J. Skoczylas, and Z. Wojcik were delivered, dealing with new aspects of the scientific, economic, and social activities of the author of the first monograph on geology of central Europe.

Z. Wojcik is cooperating with Lithuanian and Ukrainian historians of geosciences (A. Grigelis and G. Bojko) in the study of the geological collections at the former Vilna University, and on Carpathian oil geology in the 19th and 20th centuries. The 200th anniversary of the birth of Ignacy Domeyko was celebrated in all the countries of activity of this prominent geoscientist, i.e. Chile, France, Belorussia, Lithuania, and Poland. The 150th anniversary of the beginning of the exploitation of oil in the Carpathians and of the invention of oil lamp by Ignacy Lukasiewicz will be in 2003. W. Narebski and S. Czarniecki are attempting to find sponsors to organise a historical international conference on this subject in Cracow, just before the INHIGEO Meeting in Ireland, i.e. in July 2003.

Wojciech Narebski and Zbigniew Wojcik

Portugal

1. INHIGEO Meeting Portugal 2001. The annual meeting of INHIGEO was held in Portugal from 25 June to 1 July, in Lisbon (sessions in the Lisbon Academy of Sciences and the Lisbon Geographical Society) and in Aveiro (sessions in the University of Aveiro), with visits to monuments and sites of archaeological and paleontological interest and also to old (Roman) mines (see review by Richard Howarth on pp. 9–12)

Forty participants from twelve countries (Australia, Canada, Czech Republic, France, Germany, Italy, The Netherlands, Portugal, Russia, Spain, UK and USA) presented three plenary conferences, thirty-eight oral presentations and four poster presentations. A volume containing forty-eight abstracts was distributed. A round-table on 'Why study history of geology?' was held in Aveiro on 29 June.

The proceedings of the meeting will include the papers from the three invited speakers (L. Aires Barros, A. Puche Riart and W. Sarjeant), plus twenty-nine others from twenty-nine authors and co-authors: F. Amador, A. S. Andrade, M.T. Antunes, M.D. Areias, Z. Bessudnova, D. Branagan, A. Carneiro, J. Catal-Gorgues, B. Cooper, E. Curi, M. Koelbl-Ebert, L. Laporte, G. Laurent, V. Leitão, C. Lopes, U. Marvin, E. Milanovsky, T. Mota, S. Newcomb, D. Oldroyd, L.T. Pinto, M.S. Pinto, L. PÓvoas, R. Ribeiro, W. Schröder, J. Seidl, D. Spalding, P. Taquet, and E. Vaccari. Some of these papers have been received only recently by the editor, but it is expected that the volume will be published before the end of 2002.

Publication of the proceedings is receiving the support from Gulbenkian Foundation and the University of Aveiro.
2. INHIGEO business meeting. The annual INHIGEO business meeting was held in Lisbon on the 26th, June (see minutes on pp. 3–5).
3. New members. Three new members from Portugal joined INHIGEO in 2001: Professors L. Aires Barros (Instituto Superior Técnico, Lisboa), Ana Carneiro (*Universidade Nova de Lisboa*) and Ana Cardoso de Matos (*Universidade de Évora*).
4. Talks. Several talks on the history of geology were delivered at Lisbon and at Aveiro by INHIGEO members: D. Oldroyd, in the *Instituto Geológico e Mineiro*, Lisbon ('Why study the history of geology? And why are archives important?'); H. Torrens ('Entering geology's third century [i.e. 1800–2000]. What we have learnt?') and A.S. Andrade ('The major geologic units of the Iberian Peninsula: an historical perspective'), both in the University of Aveiro; J. Luís Cardoso, in the *Academia Portuguesa de História*, Lisbon ('History of Geology', in Portuguese); and Ana Carneiro at the Museu da Ciência, Lisbon ('History of the Portuguese Geology', in Portuguese).

Two other talks related to the history of geology were delivered at the University of Aveiro by non-INHIGEO members: one by R. Trend ('Perceptions and conceptions of geologic time: a barrier to geoscience learning') and the other by F. Amador ('The history of geology and teaching it', in Portuguese).
5. Miscellaneous

A one-day meeting on 'History of geology and education in science' was held at the University of Aveiro on 29 June; it included four talks on the history of geology by H. Torrens, A.S. Andrade, R. Trend, and F. Amador (see titles above).

The archives of the *Instituto Geológico e Mineiro* have continued to be the subject of search and study by Ana Carneiro and a team of postgraduate students from the *Universidade Nova de Lisboa*.

The 2nd International Congress on Geological Heritage, held in Beja, Portugal in October, 2001, attracted 280 participants from Portugal, Spain and France.

In May, 2001, a mining museum was opened in Lousal, an old mining town in Southern Portugal.
6. Publications

Amador, Filomena & Contenâas, P., *A História da Biologia e da Geologia*, Universidade Aberta, Lisboa, 2001 (a book in Portuguese, half of which is devoted to the history of geology).

_____, 'Abductive Reasoning and Representation of Megafauna in the History of Geology', INHIGEO Meeting Portugal 2001, Lisboa and Aveiro, *Abstracts*, 2001.

_____, 'Analyse Comparative des Textes Scolaires et Scientifiques Portugais, Centralisé dans l'Étude des Dinosaures et d'Autre Megafaune (1850–1950)', INHIGEO Meeting Portugal 2001, Lisboa and Aveiro, *Abstracts*, 2001.

_____, 'Contributions to the Iconographic Study of the 1755 Lisbon Earthquake', in *Actas do 1 Congresso Luso-Brasileiro de História da Ciência e da Técnica*, Universidade Évora and Universidade Aveiro, Évora, 2001, 300–310.

Andrade, António A. S., 'André Schneider: Pioneering Mobilistic Ideas about the Iberian Segment of the Variscan Orogen', INHIGEO Meeting Portugal 2001, Lisboa and Aveiro, *Abstracts*, 2001.

Antunes, Miguel T., 'The Earliest Illustration of Dinosaur Footprints', INHIGEO Meeting Portugal 2001, Lisboa and Aveiro, *Abstracts*, 2001.

_____ & Taquet, Philippe, 'Le Roi Dom Pedro V, Alcide d'Orbigny et la Paléontologie—un Exemple de Rapports Scientifiques entre la France et le Portugal', INHIGEO Meeting Portugal 2001, Lisboa and Aveiro, *Abstracts*, 2001.

Areias, Maria D., 'Expeditions in the African Colonies during the 19th Century: Geological Contributions from Portuguese Travellers', *Comunicações do Instituto Geológico e Mineiro*, 2001, 88, 347–354.

_____, 'Rocks'n Roll': the Contributions to African Geology of the Portuguese Travellers Malheiro and Andrade', INHIGEO Meeting Portugal 2001, Lisboa and Aveiro, Vol. *Abstracts*, 2001.

Barjona, Emmanuel J., *Metallurgiae Elementa*, Universidade de Coimbra, Coimbra, 2001. (Facsimile of the 1798 edition. The preface, by A.M. Cerveira, and the postscript, by M.P. Ferreira, deal with the history of metallurgy and mining and are followed by a translation into Portuguese by I. Martins.)

- Cardoso, João L., 'L'utilisation de Roches Dures dans le Chalcolithique de l'Extremadura Portugaise: le Cas de Leceia (Oeiras)', INHIGEO Meeting Portugal 2001, Lisboa and Aveiro, *Abstracts*, 2001.
- ____ & Melo, Ana A. 'Commented Correspondence between Carlos Ribeiro and Nery Delgado: a Contribution to the History of Portuguese Archaeology', *Comunicações do Instituto Geológico e Mineiro*, 2001, 88, 309–346.
- Carneiro, Ana, "'God Has Forsaken This Land!'" (the Anonymous and Forgotten Work of Gathering Rocks and Fossils)', INHIGEO Meeting Portugal 2001, Lisboa and Aveiro, *Abstracts*, 2001.
- ____, 'The Travels of Nery Delgado (1835–1908) in the Context of the Portuguese Geological Survey', *Comunicações do Instituto Geológico e Mineiro*, 2001, 88, 277–292.
- Carvalho, António G., *Sopas de Pedra I. De Mineralibus*, Gradiva, Lisboa (a book in Portuguese containing sections on the history of mineralogy, geology and mining).
- Ferreira, Martim P., 'A Contribution to the History of Metallurgy in Portugal: Metallurgiae Elementa of M.J. Barjona (1798)', INHIGEO Meeting Portugal 2001, Lisboa and Aveiro, *Abstracts*, 2001.
- Leitão, Vanda 'The Travels of Geologist Carlos Ribeiro (1813–1882) in Europe in 1858', *Comunicações do Instituto Geológico e Mineiro*, 2001, 88, 301–308.
- ____, 'Bringing Rocks into State Bureaucracy: the Portuguese Geological Survey', INHIGEO Meeting Portugal 2001, Lisboa and Aveiro, *Abstracts*, 2001.
- Lopes, Maria M. & Pinheiro, R.J., 'João da Silva Feijó (1760–1824 in Cear — a Link Between Luso-Brazilian Enlightenment and the Local Construction of Science', in *Actas do I Congresso Luso-Brasileiro de História da Ciência e da Técnica*, Universidade Évora and Universidade Aveiro, Évora, 2001.
- Matos, Ana C., 'Adding Value to the History of Mining and to the Mining Heritage: the Case of the Lousal Mine (Portugal)', INHIGEO Meeting Portugal 2001, Lisboa and Aveiro, *Abstracts*, 2001.
- Mota, Teresa S., 'The Teaching of Geology through Textbooks during the Estado Novo: Dealing with Stones in Some Old Fashioned Way', INHIGEO Meeting Portugal 2001, Lisboa and Aveiro, *Abstracts*, 2001.
- Pinto, Luis T. 'Paul Choffat's First Stay with the Portuguese Geological Survey (1878–1880)', *Comunicações do Instituto Geológico e Mineiro*, 2001, 88, 301–308.
- ____, 'Paul Choffat's (1849–1919) Early Contributions to Portuguese Geology', INHIGEO Meeting Portugal 2001, Lisboa and Aveiro, *Abstracts*, 2001.
- Pinto, Manuel S. 'Mining in Transylvania in the 18th Century: a Memoir by the Brazilian Naturalist Manoel Ferreira da Camara', INHIGEO Meeting Portugal 2001, Lisboa and Aveiro, *Abstracts*, 2001.
- ____, 'Aspectos da História da Mineração no Brasil Colonial', in 'A construção do Brasil e da América Latina pela mineração', Centro de Tecnologia Mineral, Rio de Janeiro, 2001, 20–40.
- ____, 'D. Vandeli and the Inventory of the Brazilian Mineral Resources', in *Actas do I Congresso Luso-Brasileiro de História da Ciência e da Técnica*, Universidade Évora and Universidade Aveiro, Évora, 2001, 214–225.
- Póvoas, Liliana & Lopes, César, 'Dinosaures au Museum National d'Histoire Naturelle (Lisboa). Histoire d'un processus de communication', INHIGEO Meeting Portugal 2001, Lisboa and Aveiro, *Abstracts*, 2001.
- Ribeiro, Renato P. M. 'The Growing Interest in Mining in Portugal by the End of the Eighteenth Century', INHIGEO Meeting Portugal 2001, Lisboa and Aveiro, *Abstracts*, 2001.

Manuel S. Pinto, Aveiro

Russia

Professor Eugeni Milanovsky, Head of the Department of Historical and Regional Geology of Moscow State University, has written to record his participation in the INHIGEO Conference in Lisbon and Aveiro in June/July, 2001, for which he presented a paper on 'Development of Ideas on the Great Extinctions: Their Causes and Relations to the Earth's Geological Evolution'. As usual, he was busy drawing sketches during field excursions, and copies of six of his drawings have kindly been sent to me. Two are reproduced in the present *Newsletter*. Nikolai Yushkin (who has been working on problems of the origin of life) and Zoya Bessudnova (who has co-authored a volume on major early Russian geologists and is working towards a PhD on the history of geology) were also able to attend the Portugal conference.

In October, Professor Milanovsky gave a series of lectures on the problems of geotectonics, historical geology, and the history of geology at Peking University. One of them was devoted to the life and scientific ideas of Alfred Wegener and their role in the development of geotectonics. While in China, Professor Milanovsky visited the famous site where the remains of so-called 'Peking Man' were discovered, and the associated archaeological museum. In addition to the published abstract of his INHIGEO paper, his publications in the history of geology for 2001 were:

Marburg and its University: An Essay on the History of Marburg University and the Activities of Some of its Famous Scientists and Students (M.V. Lomonosov, A. Wegener, B.L. Pasternak, Scientific-Literary Almanac, Moscow, 2001 (in Russian).

'Professor Ju. A. Zaitsev: Outstanding Researcher of Kazakhstan Geology (for the 70th anniversary of his birth)', in: Milanovsky, E.E., Veimarn, A.B. & Tevelev (eds), *Geology of Kazakhstan and Problems of the Ural–Mongolian Fold-Belt*, Moscow University Press, 2001, 3–10 (in Russian), 3–10.

'My First Geological Journey Along the Rivers of the North of European Russia', *Vestnik [Herald] of the Geological Institute, Komi Scientific Centre of the Russian Academy of Sciences*, October, 2001, 26–31 (in Russian).

Professor Anatoly Ryabukhin has notified me of the following publications. (The first item is in fact a kindly review of my book *Thinking About the Earth!*) With Victor Khain he has co-authored a paper on the history of the reception

of plate-tectonic theory in Russia, which appears in the 'INHIGEO volume' for the Geological Society of London, Special Publication No. 192: *The Earth Inside and Out: Some Major Contributions to Geology in the Twentieth Century*.

Khain, Victor E. & Ryabukhin, Anatoly G., 'History of Geology: Point of View of the Australian Scientist', *Bulletin of the Moscow State University*, 2001, No. 3, 56–58 (in Russian).

_____ & _____ 'Geology of the 20th Century: Main Features of Progress. Part 1', *Bulletin of the Moscow State University*, 2001, No. 5, 3–8 (in Russian).

_____ & _____ 'Russian Geology and the Plate Tectonics Revolution', in D.R. Oldroyd (ed.), *The Earth Inside and Out: Some major Contributions to Geology in the Twentieth Century*, The Geological Society, London, 2002, 185–198.

Ryabukhin, Anatoly G. Social Aspects of Geology: The Second International Conference. Geology at School and at High Schools, 26–28 June, 2001, SPb, 2001, 33–34 (in Russian).

Dr Andrei Lapo has furnished the following information:

1. I participated in the Interstate Conference 'The Scientific Heritage of V.I. Vernadsky in the Context of Global Problems of Civilization' (23–25 May 23–25, Crimea, Ukraine) and presented a paper 'Tuning-Fork of Present-day Ecology (for the 75th anniversary of the first publication of *The Biosphere* by V.I. Vernadsky)'
2. At a meeting of the Interdisciplinary Philosophical Seminar at the St Petersburg Mining Institute on March 29 I gave a paper 'Unfathomable Book', on the occasion of the 75th anniversary of the first publication of *The Biosphere*.
3. As chairman of the Organizing Committee of the V.I. Vernadsky St Petersburg Interdisciplinary Seminar, I conducted its 5th, 6th, and 7th meetings on 12 March, 29 May, and 30 October respectively, which were devoted to various aspects of Vernadsky's scientific heritage.
4. As a consultant, I took part in organising book exhibitions dedicated to the 75th anniversary of the appearance of *The Biosphere*, held in St Petersburg in the All Russian Geological Library in March and the Library of the Russian Academy of Sciences in May.
5. I was awarded the Silver Medal of the V.I. Vernadsky Russian Academy of Natural Sciences on 21 November.
6. Publications
'Vladimir I. Vernadsky (1863–1945), Founder of the Biosphere Concept', *International Microbiology*, 2001, 4, 47–49.
'Tuning-fork of Present-day Ecology', *Scientific Heritage of V.I. Vernadsky in the Context of Global Problems of Civilization*. Papers of the Interstate Conference, 23–25 May, 2001, Crimea Publishing House.
'Noosphere', Moscow, 2001, 108–117 (in Russian).
'Tuning-Fork of Present-day Ecology', *The Noosphere: The Newsletter of the Nongovernmental Ecological, Vernadsky Foundation*, 2001, No. 11, 12–13 (in Russian).

David Oldroyd, Sydney

Spain

The following list of recent publications by Spanish or Latin American authors has been received from Professor Leandro Sequeiros:

Alcalá, L. & Martín-Escorza, C., 'La caída del meteorito Cabeza de Mayo al sur de Murcia en 1870', *Geogaceta*, SGE, 2000, 28, 3–6.

Barrera, J. L., 'El institucionalista Francisco Quiroga y Rodríguez (1853–1894), primer catedrático de Cristalografía de Europa', *Boletín Instituc. Libre de Enseñanza*, 2001, 40/41, 99–116.

Calvo Roy, A., *Lucas Mallada. Rocas y razones. Biografía de un geólogo regeneracionista (1841–1921)*, Obra Social, Madrid, 2000.

Denyer, P & Soto Bonilla, G.J., 'Contribución pionera de William M. Gabb a la Geología y Cartografía de Costa Rica', *Anuario de Estudios Centroamericanos, Universidad de Costa Rica*, 1999, 25, 103–138.

_____ & _____, 'Análisis de los trabajos geológicos de William M. Gabb sobre Costa Rica, a la luz del paradigma geológico del siglo XIX', *Revista Geológica de América Central*, 2000, 23, 97–118.

Gozalo, R., Review of: F. Pelayo, *Ciencia y Creencia en España durante el siglo XIX. La paleontología en el debate sobre el darwinismo*, *Revista Española de Paleontología*, 2001, 16, 8.

Jiménez Díaz, J.A., Los ingenieros de Minas y la prehistoria en el siglo XIX. Una aproximación historiográfica. *Archaia*, 2000, 1, 67–72.

Mones, Alvaro, 'La mastozoología en el Uruguay: pasado y presente', *Comunic. Zoológ. Museo de Historia Natural de Montevideo*, 2001, 197, 1–19.

_____, 'Orígenes de la paleontología de vertebrados en América del Sur', *Ciencia & Ambiente*, 1998, 16, 15–28.

_____, 'La Historia de la Expedición Malaspina en el contexto científico de la época. Fauna y flora de Uruguay', *Public. Extra Museo Nacional de Historia Natural, Uruguay*, 1996, 44, 1–26.

_____, 'Bibliografía sobre Geología y Paleontología del Uruguay. Suplemento 1', *Comunic. Paleontológ. Museo Historia Natural de Montevideo*, 1982, 11, 187–197.

_____, 'Bibliografía sobre Geología y Paleontología del Uruguay. Suplemento 2', *Comunic. Paleontológ. Museo Historia Natural de Montevideo*, 1991, 23, 33–59.

_____ & M.A. Klappenbach, 'Un ilustrado aragonés en el virreinato del Río de la Plata: Félix de Azara (1742–1821): estudios sobre su vida, su obra y su pensamiento', *Anales del Museo Nacional de Historia Natural de Montevideo*, 1997, 20 Ser., 9, 1–231.

- Puche, O., 'Apuntes biográficos de D. Lorenzo Gómez-Pardo (1801-1847)', *Anales de la Real Academia de Farmacia, Madrid*, 1999, 65, 129-149.
- ____ & Ayarzagüena, M., 'Sobre unas cartas inéditas de Casiano de Prado', *Boletín Geológico y Minero*, 2001, 112, 96-104.
- ____ & Ayala-Carcedo, F.J., 'Guillermo P. D. Schulz y Schweizer (1800-1877): su vida y su obra en el bicentenario de su nacimiento', *Boletín Geológico y Minero*, 2001, 112, 105-122.
- Rábano, I., 'Colecciones históricas de fósiles de la provincia de Jaén en los fondos del Museo Geominero (IGME, Madrid)', *Temas Geológico-Mineros*, 2000, 31, 529-535.
- ____, 'Bibliografía del sismólogo Alfonso Rey Pastor (1890-1959)', *Instituto de Estudios Riojanos, Serie Ciencias de la tierra*, 2000, No. 22, 168 pp.
- Sánchez Marco, A. & Sastre Paéz, I., 'Historia de la Paleornitología en España a través de los documentos científicos', *Revista Española de Paleontología*, 2001, 16, 99-114.
- Sequeiros, L., 'El Geocosmos teológico del jesuita Athanasius Kircher (1601-1680)', *Proyección*, 2000, 199, 281-300.
- ____, 'José de Acosta (1540-1600) y sus ideas sobre la Evolución biológica, cuatro siglos después', in: A. Blanch (ed.), *La Nueva Alianza de las Ciencias y la Filosofía. Conferencia en el homenaje a Acosta. XXVII Reunión ASINJA, Madrid, septiembre de 2000, XXVII*, 2000, 235-248.
- ____, 'Charles Robert Darwin y el Origen de las Especies', <Ciencia Digit@al>. <www.cienciadigital.net>, July 2000, n1 10.
- ____, 'El Aparato para la Historia Natural Española (1754) del franciscano granadino fray José Torrubia (1698-1761): aportaciones postridentinas a la Teología de la Naturaleza', *Archivo Teológico Granadino*, 2001, 64, 59-127.
- ____, '2001: año de Athanasius Kircher (1601-1680)', *Boletín de la Comisión de Historia de la Geología de España*, 2000, 14-16.
- ____, 'Las ciencias en España (1901-2001): un siglo en compañía de Razón y Fe', *Razón y Fe*, No. 1231, May 2001, 477-485.
- ____, 'De José de Acosta (1540-1600) a Athanasius Kircher (1601-1680): dos momentos en los albores de la biogeografía', in: *Los Fósiles y la Paleogeografía, Actas XVII Jornadas de Paleontología*, SEPAL, 2001, 5, 3-27.
- ____, 'Los fósiles "hablan": Qué aporta la paleontología al conocimiento del planeta tierra?', in: J.A. Gámez & E. Liñan (eds), *La Era Paleozoica. Jornadas de Paleontología de Ricla*, 2001, 27-59.
- ____, 'La "biología" cumple dos siglos: pervivencia de las ideas de Lamarck', *Proyección*, 2001, 201, 121-140.
- ____, 'El Geocosmos de Athanasius Kircher: un encuentro con la filosofía y la teología desde las ciencias de la naturaleza en el siglo XVII: Discurso inaugural 2001-2002', Facultad de Teología, Granada.
- Truyols, J., 'Notas necrológicas: Bermudo Meléndez Meléndez (1912-1999)', *Boletín de la Real Sociedad Española de Historia Natural*, 2000, 97, 83-98.
- Additionally, Professor Francisco Ayala (Madrid) has sent notice of the following items:
- Ayala-Carcedo, F.J. (ed.), *Historia de la Tecnología en España*, Valatenea, Barcelona, 2 vols.
- ____, 'Noah's Flood and Science: A Short Review and Analysis', *INHIGEO Newsletter*, No. 33, 2001, 27-30.
- ____, 'La frustrada navegación interior', in Ayala-Carcedo, F.J. (ed.), *Historia de la Tecnología en España*, 2001, 391-396.
- ____, 'La evolución histórica de la Tecnología y la Sociedad', in: Ayala-Carcedo, F.J. (ed.), *Historia de la Tecnología en España*, 2001, 3-20.
- ____, 'Las invenciones y los escritos sobre máquinas e instrumentos anteriores al siglo XX', in: Ayala-Carcedo, F.J. (ed.), *Historia de la Tecnología en España*, 2001, 463-472.
- ____, 'Historia y presente de la Ciencia y la Tecnología en España', in: Ayala-Carcedo, F.J. (ed.), *Historia de la Tecnología en España*, 2001, 729-758.
- ____, 'La investigación tecnológica actual en España: análisis cuantitativo de la I+D', in: Ayala-Carcedo, F.J. (ed.), *Historia de la Tecnología en España*, 2001, 723-728.
- ____, 'La imprenta en España y América', in: Ayala-Carcedo, F.J. (ed.), *Historia de la Tecnología en España*, 1998, 539-546.
- ____, 'Historia de las obras hidráulicas y la Política del Agua', in: Ayala-Carcedo, F.J. (ed.), *Historia de la Tecnología en España*, 1998, 183-194.
- ____, 'Historia de la agricultura de secano', in: Ayala-Carcedo, F.J. (ed.), *Historia de la Tecnología en España*, 1998, 133-146.
- ____, 'Introducción a la Historia Económica de España', in: Ayala-Carcedo, F.J. (ed.), *Historia de la Tecnología en España*, 2001, 39-60.
- ____ & López Santiago, F., 'Historia de las Energías Renovables en España', in: Ayala-Carcedo ed., *Historia de la Tecnología en España*, 1997, 283-290.
- Mazadiago, L.F. & Puche-Riart, O. 2001. 'Arqueología industrial: Conservación del Patrimonio Minero-Metalúrgico madrileño', *Boletín Sociedad Española para la Defensa del Patrimonio Geológico y Minero*, 2001, 16, 8-13.
- Puche-Riart, O., 'Frigolitos', *Boletín Sociedad Española para la Defensa del Patrimonio Geológico y Minero*, 2001, 16, 7-8.
- ____, 'Los hermanos Elhúyar, descubridores del volframio', *Fundetel*, 2001, 5, 72-84.
- ____, 'La minería del oro durante el período colonial en la cultura española: El oro en la cultura iberoamericana', CYTED-Comité aurífero del Perú, Madrid, 2001, 41-49.

- _____, 'La ciencia y la tecnología del agua subterránea', in: Ayala-Carcedo, F.J. (ed.), *Historia de la Tecnología en España*, 1, Valatenea, Barcelona, 2001, 195–202.
- _____, 'La minería no energética', in: Ayala-Carcedo, F.J. (ed.), *Historia de la Tecnología en España*, 1, Valatenea, Barcelona, 2001, 219–232.
- _____, 2001. 'Contribución de los ingenieros a la ciencia en España: La Geología', Ayala-Carcedo, F.J. (ed.), *Historia de la Tecnología en España*, 2, Valatenea, Barcelona, 2001, 659–670.
- _____ & Ayarzagüena, M., 'Sobre unas cartas inéditas de Casiano de Prado', *Boletín Geológico y Minero*, 2001, 112, 95–104.
- _____ & Ayala-Carcedo, F.J., 'Guillermo P.D. Schulz and Schweizer (1800–1877): su vida y su obra en el bicentenario de su nacimiento', *Boletín Geológico y Minero*, 2001, 112, 105–122.
- _____ & _____, 'Industrias cerámicas históricas de Madrid: Hornos continuos y sus chimeneas'. *II Congreso Internacional sobre Patrimonio Geológico y Minero—VI Sesión Científica de la Sociedad Española para la Defensa del Patrimonio Geológico y Minero*, Beja, Portugal, 4–7 October, 2001.
- _____ & Fernández-Gutierrez, L.J., 'Hornos cerámicos antiguos de la Comunidad de Madrid: Campo Real', *II Congreso Internacional sobre Patrimonio Geológico y Minero—VI Sesión Científica de la Sociedad Española para la Defensa del Patrimonio Geológico y Minero*, Beja, Portugal, 4–7 October 2001.
- _____, _____ & _____, 'Fabricación histórica de ladrillos refractarios en Valdemorillo (Madrid): Minas y fábricas de D. Ángel González', *II Congreso Internacional sobre Patrimonio Geológico y Minero—VI Sesión Científica de la Sociedad Española para la Defensa del Patrimonio Geológico y Minero*, Beja, Portugal, 4–7, October, 2001.

Meetings

- Jornadas sobre Arqueología Industrial en el marco histórico-minero, Nerva, Huelva, 14–17 November, 2001.
- Curso Historiografía de la Arqueología Española: I Instituciones, Museo San Isidro, April–June, 2001.

Sweden

Publications

- Nordlund, Christer, *Det upphöjda landet: Vetenskapen, landhöjningsfrågan och kartläggningen av Sveriges förflutna, 1860–1930* [*The Elevated Land: Science, Land Elevation and the Formulation of a Swedish Past, 1860–1930*], Royal Skytte Society, Umeå, 2001, 425 pp.
- _____, 'On Going Up in the World: Nation, Region and the Land Elevation Debate in Sweden', *Annals of Science*, 2001, 58, 17–50.
- _____, 'Bildens betydelse: Om vetenskapliga visualiseringar av det postglaciala landskapets utvecklingshistoria' [*The Meaning of the Picture: On Visualising the Development of the Post Glacial Landscape*], *VEST: Tidskrift för vetenskaps- och teknikstudier* [*VEST: Journal for Science and Technology Studies*], 2001, 14, 7–26.
- _____, review of: David Oldroyd, *Sciences of the Earth: Studies in the History of Mineralogy and Geology*, Variorum Collected Studies series CS628, Aldershot, UK and Brookfield, US: Ashgate. In: *Annals of Science*, 2000, 57, 210–212.
- _____ & Salzman, Katarina, 'Ett högt och ett stort: Om Sveriges två nya världsarv' ['One High and One Big: On the New World Heritages in Sweden'], *Area: Tidskrift om landskapsarkitektur* [*Area: Journal for Landscape Architecture*], 2001, 4, 24–28.

Award

The Swedish History of Science Society has awarded Christer Nordlund, Umeå University, 'The Johan Nordström and Sten Lindroth Award for outstanding work in history of science', for his doctoral dissertation *The Elevated Land: Science, Land Elevation and the Formulation of a Swedish Past, 1860–1930*.

Christer Nordlund, Umeå

Switzerland

We have heard that Professor Rudolf Trümpy has been awarded the Wollaston Prize of the Geological Society of London, and extend our hearty congratulations to him (Ed.)

For information from Switzerland, see pp. 21–22.

United Kingdom

The history of geology is largely represented in the United Kingdom through the activities of the Geological Society's History of Geology Group (HOGG). HOGG's newly elected committee, three members of which are also INHIGEO members, got off to an energetic start early in the new year.

Breaking the normal pattern of events, where one meeting is held in London and one in the regions, this year saw two meetings held in London. The first one, '150 years of the Geological Museum', celebrated the Geological Museum's history, architecture, and current role. It attracted such a large audience that at the last minute it had to be transferred to a larger lecture theatre. This meeting was held jointly with the Curators' Group. Following several excellent lectures and a tour of the Museum, the geological walk led by Eric Robinson was particularly enjoyed by those able to participate, the majority of whom returned to the Museum for a 'Happy Birthday toast'.

The second meeting of the year was also co-organised, this time with the Linnean Society. 'The History of Palaeobotany' was another highly successful and very interesting meeting, covering topics such as the first palaeobotanists, the first scientific description of fossil plants, and illustrators from the golden age of palaeobotany.

HOGG meetings for 2002 include a 2-day meeting on 'The Amateur in British Geology', a joint meeting with the Geologists' Association to acknowledge the tremendous contribution made by the amateur to the science of geology. This was held in March.

One of this year's major accomplishments by two INHIGEO members, was completion of a Geological Society Special Publication *The Age of the Earth: 4004 BC-AD 2002*, edited by Cherry Lewis and Simon Knell. This book, resulting from last year's highly successful HOGG meeting, 'Celebrating the Age of the Earth', brings together contributors from many disciplines, particularly geologists, biologists, physicists and astronomers, along with historians, to produce a comprehensive review of how the Earth's age has been perceived since ancient times. Touching on the works of eminent scholars from the seventeenth to twentieth centuries, it describes how concepts of the Earth's history changed as geology slowly separated itself from religious orthodoxy to emerge as the rigorous and self-contained science it is today.

Following publication of Simon Winchester's successful *The Map that Changed the World* and other recent 'popular' books on the history of geology (*The Dinosaur Hunters* by Debbie Cadbury, *Aeons* by Martin Gorst, *The Dating Game* by Cherry Lewis), it would seem that the history of science, and geology in particular, is going through something of a renaissance in the eyes of the public. All these publications act as a good introduction to the subject and inform the lay person as to how the science of geology came about. They also help to further public understanding about the importance of geology as a science.

Sadly though, this renaissance does not seem to be occurring in academic institutions where, quoting Hugh Torrens, 'the all-pervading bureaucracy in our universities demands only 'Impact Factors''. Despite this, Torrens has produced an excellent new book *The Practice of British Geology 1750-1850* [for review, see pp. 41-42 (Ed.)], which analyses the careers of some important figures in British geology between 1750 and 1850. Torrens ably illustrates how the practice of geology, through the search for mines and minerals, was as important in the past as the oil industry is today.

Publications:

- Fuller, J.G.C.M., 'Before the Hills in Order Stood: The Beginning of the Geology of Time in England', in: Lewis, C.L.E. & Knell, S.J. (eds), *The Age of the Earth: from 4004 BC to AD 2002*, Geological Society, London, Special Publication No. 190, 2001, 15-24.
- Knell, S.J. & Lewis, C.L.E., 'Celebrating the Age of the Earth', in: Lewis, C.L.E. & Knell, S.J. (eds), *The Age of the Earth: from 4004 BC to AD 2002*, Geological Society, London, Special Publication No. 190, 2001, 1-14.
- Lewis, C.L.E., 'Arthur Holmes' Vision of a Geological Timescale', in: Lewis, C.L.E. & Knell, S.J. (eds), *The Age of the Earth: from 4004 BC to AD 2002*, Geological Society, London, Special Publication No. 190, 2001, 121-138.
- Rudwick, M.J.S., 'Jean-André de Luc and Nature's Chronology', in: Lewis, C.L.E. & Knell, S.J. (eds), *The Age of the Earth: from 4004 BC to AD 2002*, Geological Society, London, Special Publication No. 190, 2001, 51-60.
- Torrens, H.S., History of Geology Award, speech at Reno, *GSA Today*, February 2001, 41-42.
- _____, 'Some Thoughts on the History of Technology and its Current Condition in Britain', *History of Technology*, 2001, 22, 223-232.
- _____, 'Early Collecting in the Field of Geology', in: O. Impey and A. MacGregor (eds), *The Origins of Museums: The Cabinet of Curiosities in Sixteenth and Seventeenth Century Europe*, 3rd edn, House of Stratus, London, 2001, 281-293.
- _____, 'Debate, Definition and much Dithering'. Review of: N. Cossens (ed.), *Perspectives on Industrial Archaeology*, 2000, *Times Higher Education Supplement*, 31 August 2001, 27.
- _____, 'Timeless Order: William Smith and the Search for Raw Materials 1800-1820', in: Lewis, C.L.E. & Knell, S.J. (eds), *The Age of the Earth from 4004 BC to AD 2002*, Geological Society of London Special Publication No., 190, 2001, 61-83 (The William Smith Lecture 2000).
- _____, & Trevor Ford, 'A Farey Story: the Pioneer Geologist John Farey (1766-1826)', *Geology Today*, 2001, 17, 59-68, March-April.
- Yochelson, E.L. & Lewis, C.L.E., 'The Age of the Earth in the United States (1891-1931): from the Geological Viewpoint', in: Lewis, C.L.E. & Knell, S. J. (eds), *The Age of the Earth: from 4004 BC to AD 2002*, Geological Society, London, Special Publications No. 190, 2001, 139-156.

Cherry Lewis, Bristol

United States

Participants in the INHIGEO Conference in Portugal

Three Americans, Léo Laporte, Ursula Marvin, and Sally Newcomb, presented papers in the sessions. In his talk, 'Size and Hypertely: Simpson's Exemplars for the Evolutionary Synthesis', Laporte discussed the influence of the American palaeontologist, George Gaylord Simpson (1902-1984), in consolidating and advancing the 'modern evolutionary synthesis.' Simpson opposed the concept of 'hypertely' — that an increase of phyletic size often led to inadaptable structures resulting in extinction. He argued that features such as the huge antlers of Irish deer had been adaptive for long periods of geologic time and had developed in accordance with contemporary genetics and ecology. After the symposium banquet, Léo and his wife and young son upheld the honour of the USA contingent as the only ones who volunteered their voices at the high-spirited, international song-fest.

Ursula Marvin presented a paper on the witnessed meteorite fall that occurred in 1796 at Evora Monte in Portugal. Although the stone itself was lost almost as soon as it was collected, the sworn testimony to the event, published in England in 1797 by the writer and poet, Robert Southey (1774-1843) in his book of letters from Spain and Portugal, proved to be highly influential in gaining acceptance for the authenticity of meteorite falls.

Sarah Newcomb described her paper, 'Geology: a Balancing Act?', as a start at the story of the development of balances when weight relations and the means of determining them first began to be valued in the acquisition of quantitative data. She showed that balances not only changed the face of chemistry but also of geology as a modern science.

At the Business Meeting in Lisbon on June 24, 2001, the INHIGEO board voted to confer a newly-created Honorary Life Membership on Professor Alexander Ospovat, of Oklahoma State University, for his long-term membership and contributions to the history of geology. When informed of this action, Professor Ospovat accepted the award with pleasure and expressed his thanks to the board.

Communications from Members

Kennard Bork reports that he had a relatively quiet year with respect to the history of geology after several active ones. He began a two-year term as the past-president of the History of Earth Sciences Society, during which he was called upon to unearth his early secretarial correspondence showing that the U.S.A. Internal Revenue Service had granted a tax-free status to HESS. He published a review of Albert V. Carozzi's Manuscripts And Publications Of Horace-Bénédict De Saussure On The Origin Of Basalt, in *ISIS*, 92, 611. He also presented a paper at the GSA meeting in Boston, titled: 'Holes in the biographer's net: the case of William G. Tight (1865–1910), geomorphologist and university president,' *Geological Society of America Abstracts with Programs*, 2001, A-58

Robert Dott, Jr completed a project about North American influences upon the development of fundamental concepts in structural geology during the 20th Century. He summarised this research in 'Wisconsin roots of the modern revolution in structural geology' published in August, 2001, in the *Bulletin of the Geological Society of America*, 113, 996–1009. A related article, 'The remarkable legacy of the Wisconsin School of Precambrian Geology' appeared in *Geoscience Wisconsin*, 2001, 18, 27–40. Dott also wrote a short biographical profile of the Wisconsin scientist, 'W. H. Twenhofel: Patriarch of Sedimentary Geology,' in the Geological Society of America's Rock-Stars series published in *GSA Today*, July, 2001, 16–17. Dott received the Laurence L. Sloss Award for Sedimentary Geology at the Geological Society of America meeting in Boston.

Léo Laporte presented papers on George Gaylord Simpson at both the INHIGEO symposium in Portugal (see above) and the Geological Society of America meeting in Boston, where he discussed the 'Social Ecology of Simpson's Success.' In this paper, Laporte traced the influences on Simpson's career of a long list of individuals, including his childhood playmate and second wife, Anne Roe, and numerous teachers and colleagues who played important roles in determining the directions of his scientific interests.

Ursula Marvin gave two papers on historic meteorite falls: one at the INHIGEO Symposium in Portugal (see above), and the second one at the Meteoritical Society meeting in Rome, where she attempted to set the record straight with respect to who first published the idea that meteorites fall from space. Credit is widely (and correctly) given to E.E.F. Chladni of Wittenberg for his book of 1794. But some leading American meteoriticists argue for Domenico Troili, who published a book in 1766 on the fall of a stone that year at Alboreto in Italy. Troili clearly documented the fall of a meteorite, and found in the stone a brassy mineral he called 'marchesita'. A century later, that mineral was shown to be stoichiometric iron sulfide (FeS) and named 'troilite' in his honour. But Marvin showed slides of pages from Troili's book (which is exceedingly rare and difficult to locate today) in which he declared that the stone was volcanic; it had arisen from a cleft in the Earth and then fallen back again. So the honours go to Chladni, who reasoned from the physics of fireballs and fall phenomena that meteorites originate in space.

Marvin finally saw publication of a geologic map of four contiguous quadrangles of Jupiter's moon, Ganymede, on which she collaborated with Ted Maxwell of the Smithsonian's Air and Space Museum in Washington, DC. They submitted their maps and text to the US Geological Survey in 1992, so they feel that the publication after 10 years of waiting is almost a historic event in itself.

Marvin published the first four in a series of oral histories she is recording of scientists over the age of 60 who have won medals from The Meteoritical Society. These men all helped to shape the course of scientific research after the birth of the Space Age with the lofting of Sputnik I on 4 October 1957.

Publications

Marvin, Ursula B. 'Oral histories in meteoritics and planetary science: I. Edward Anders', *Meteoritics and Planetary Science*, 2001, 36, A255–267.

_____, 'Oral Histories in Meteoritics and Planetary Science: II. Robert N. Clayton', *Meteoritics and Planetary Science*, 2001, 36, A269–274.

_____, 'Oral Histories in Meteoritics and Planetary Science: III. Robert M. Walker', *Meteoritics and Planetary Science*, 2001, 36, A275–283.

_____, 'Oral Histories in Meteoritics and Planetary Science; IV. James R. Arnold', *Meteoritics and Planetary Science*, 2001, 36, A285–292

_____, 'Stones Which Fell from the Sky', in: Brigitte Zanda and Monica Totaru (eds), *Meteorites: Their Impact on Science and History*, 2001. (English Translation of chapter in *Les Météorites!* Bordas, Paris, 1996, Cambridge University Press, pp. 16–29.)

_____, Review of: Naomi Oreskes, *The Rejection of Continental Drift: Theory and Method in American Earth Science*, Oxford University Press, New York, 1999. In: *Metascience*, 2001, 10, 208–217.

Maxwell, Ted, A. and Marvin, Ursula B., 'Geologic maps of the Dardanus Sulcus (JG-6), Misharu (JG-10), Nabu (JG-11), and Namtar (JG-14) Quadrangles of Ganymede', *Geologic Investigations Series I-2642*, 2001, maps prepared for NASA by the U. S. Geological Survey, Astrogeology Branch, Flagstaff, Arizona.

Clifford Nelson began the research and writing required to complete for publication the fourth volume (1939–1979) of Mary Rabbitt's book *Minerals, Lands, and Geology for the Common Defence and General Welfare*. He also published the following on-line bio-sketch and two reviews:

Nelson, Clifford M., 'McKelvey, Vincent E.', *American National Biography Online*, January 2001.

_____, Review of: James G. Cassidy, *Ferdinand V. Hayden: Entrepreneur of Science* University of Nebraska Press, 2000. In: *Western Historical Quarterly*, 2001, 32, 383–384.

_____, Review of: Donald Worster, *A River Running West: The Life of John Wesley Powell*, Oxford University Press, 2001. In: *Geotimes*, 2001, 46, 52–53 (updated version: <www.geotimes.org>).

Naomi Oreskes presented a paper at the Geological Society of America meeting in Boston on the loyalty case of Harald Sverdrup. She showed that despite being Norwegian-born, Sverdrup, the Director of the Scripps Institution of Oceanography at La Jolla, California, was refused a full security clearance for Navy-sponsored research in underwater acoustics, mainly because his Germanic accent and connections in Germany raised the suspicions of some faculty members.

Oreskes published her 'Author's Response' to a review by Ursula Marvin of her book, *The Rejection of Continental Drift in Metascience*, 2001, 10, 217–222. Oxford University Press, 1999. She also has edited, with assistance from Homer Le Grand, a book: *Plate Tectonics: an Insider's History of the Modern Theory of the Earth*, in press in 2001; published by Perseus Book Group, Cambridge, England, 2002.

Cecil Schneer did an immense favour for all of us when he produced a facsimile of William (Strata) Smith's book of 1816 and put it on the web, with its many plates of fossils in full colour. It may be accessed and printed out at <<http://earth.unh.edu/wmsmith.html>>. Its title page reads: *Strata Identified by Organized Fossils; containing Prints on Coloured Paper of the most Characteristic Specimens in each Stratum. By William Smith, Mineral Surveyor, Author of "Map of the Strata of England and Wales", and "A Treatise on Irrigation". London, Printed by W. Arding, June 1, 1816.*

Cecil is now in the final stages of putting Smith's huge wall-map on the Web. When his copy first was scanned the resulting map had gaps in it. Now the University of New Hampshire has obtained a new scanner and is doing it over again. The original map was mounted on canvas and folded into sixteen sections so that it could be carried in the field. The plan is to reduce the entire map to the size of a web-page to be used as an index from which users can click on any of the sixteen sheets and print it individually at screen size. The photographs that Schneer put on line last year of participants at the early INHIGEO meetings in 1967 and 1972 are still there. You can find them by starting at: <<http://www.unh.edu/esci>> and clicking on history of geology and related links. Cecil, himself, owns such a magnificent collection of first-edition geology books that we only can wonder what treasures he may make available to us in the future.

Kenneth Taylor spent a six-month sabbatical leave in Paris, where he held an appointment as a visitor at the École des Hautes Études en Sciences Sociales, at the invitation of Claudine Cohen. Together, Claudine and Ken organised a conference entitled 'La Géologie des Lumières', held in Paris at the end of May, with participants from Great Britain, Italy, Canada, and the US, as well as France. Ken's presentation for the conference was on 'The Languages of Volcanology.' For EHESS, in March, Ken gave a pair of lectures on 'Ordre et histoire dans la pensée géologique du 18^{ème} siècle'. At the March meeting of the Comité Français d'Histoire de la Géologie, Ken presented his findings on a previously unknown critique by Nicolas Desmarest of William Hamilton's *Campi Phlegraei*. This paper will appear in the COFRHIGEO *Travaux* for 2001. (An adapted digest of this report appeared in the magazine *Pour La Science*—which can be viewed at <<http://www.pourlascience.com>>—the August 2001 number.) While in Paris Ken also presented a historical talk at the *Institut de Physique du Globe*. His essay 'Buffon, Desmarest and the ordering of geological events in Époques' appeared in the Geological Society volume edited by Cherry Lewis and Simon Knell, *The Age of the Earth: from 4004 BC to AD 2002. The History of Geology Division of the Geological Society of America*

At the 2001 meeting in Boston, the Division was more active ever before. A year earlier when she assumed the Division chair, Sally Newcomb announced that she planned to hold a symposium on ophiolites. This topic proved to be of such interest and attracted papers of such high quality that Sally and Yildirim Dilek, as co-convenors, won a much-coveted ranking for it as a GSA Pardee Symposium. There also were two topical sessions and a poster session, all with the same title: 'Ophiolites as Problem and Solution in the History of Geological Thinking'. Newcomb and Dilek were assisted in planning these sessions by the Structural Geology and Tectonics Division and the International Division of the GSA, and by the History of Earth Sciences Society and the Society of Economic Geologists. As a result, participants from fifteen countries presented thirty-nine oral and seven poster papers on ophiolites.

Michele Aldrich and Alan Leviton co-chaired a technical session titled: 'Geobiography: Life Histories of Geologists as a Way to Understand How Science Operates'. It attracted twenty-one papers, eighteen of which were presented in this session and some of the rest were scheduled in the general History of Geology Division session. The History of Geology session had no specific topic and therefore it included papers on a very wide range of topics, such as a contribution on Chinese art and why modern geologic thought did not arise in China; the evolution and influence of the petrographic microscope, the granitization controversy, and the New England Intercollegiate Geological Conference and its connection with William Morris Davis.

The Division held its first-ever formal reception for students and guests at 5:30 p.m. on Tuesday evening and attracted more than sixty people who enjoyed the refreshments and the good company. Léo Laporte and Robert Ginsburg arranged for several door prizes of historical interest that had been donated by members. The stellar prize of the evening was a small notebook signed by John Wesley Powell (1834–1902), himself. A student won it and was thrilled with it. The Division hopes to make similar receptions a lasting tradition at GSA meetings.

At the annual luncheon and business meeting, the History of Geology Award was presented to Walter O. Kupsch, of the University of Saskatchewan, Canada. As neither Professor Kupsch nor his citationist, Glen Caldwell, could be present,

Gerald V. Middleton read the citation and Ken Bork read Professor Kupsch's acceptance (see *GSA Today*, 12, No. 2, pp. 25–26, February, 2002.)

Also at the annual luncheon, Ken Bork, Past-President of the History of Earth Sciences Society made special presentations of Honorary Life Memberships in HESS to Ellis Yochelson and Gerald Friedman, in recognition of their long service and many contributions to that Society. Both men were instrumental in creating the History of Earth Sciences Society and also the History of Geology Division. Friedman founded the journal *Earth Sciences History* in 1982 and served as its editor during the first twelve years of its existence.

As the final event of the business meeting, Sally Newcomb turned over the virtual gavel to the incoming chair of the Division, A.M. C elal Seng or of Istanbul, Turkey. For more details on activities and other items of interest, such as lists of new books and upcoming events, see the GSA Division Newsletter: <<http://gsahist.org/v25n04/HoGdec01.html>>.

Ursula Marvin, Cambridge (Mass)

Yugoslavia

During 2001 there were two celebrations: one hundred and ten years from the founding of the Serbian Geological Society; and seventy years from the founding of the Geological Institute of (the kingdom of) Yugoslavia in 1931, now called '*Geozavod*'.

The Serbian Geological Society was founded on 10 February, 1891 by Jovan Zujovic, Professor of Mineralogy and Geology in the Faculty of Philosophy. The Society, like the whole Serbian nation, had a very turbulent history. It had its up and downs, ceased its work during the wars, and began again during the peace. There was special enthusiasm just after the Second World War when the number of geologists was enlarged. They expounded their discoveries and achievements under the aegis of the Society. The ideas and information were published in *Serbian Geological Society Protocols*, which was published from 1897. During the celebration of the jubilee on 28 February, 2001 the President gave a short talk about the most interesting history of the Society, following which nineteen honorary foreign members were elected—from Bulgaria, Great Britain, France, Italy, Hungary, Germany, Slovakia, and Poland.

Geozavod (the Geological Institute) celebrated its seventy years of work in various ways. The most significant were the Ceremonial Meeting on 13 March, 2001, and publication of a special number of the *Bulletin* (Vol. 50). In this, A. Grubic had an article 'Geological Bibliography of Yugoslavia' (pp. 37–49), in which all relevant data about the bibliography of the Balkan Peninsula and Yugoslavia since 1888 were systematised.

Accounts of the work and biography of six scientists were published in *Lives and work of the Serbian scientists* (Serbian Academy of Sciences and Arts):

S. Karamata, 'Luka Maric', Vol. 6, pp. 325–360.

M. Zeremski, 'Petar S. Jovanovic', Vol. 6, pp. 265–294.

A. Grubic, 'Dimitrije Antula', Vol. 7, pp. 121–169.

N. Pantic, 'Milutin Milankovic', Vol. 7, pp. 171–224.

M. Jankovic and B. Tatic, 'Pavle I. Cernjavski', Vol. 7, pp. 261–286.

V. Knezevic and S. Karamata, 'Milan Ilic', Vol. 7, pp. 447–473.

The Historical section of the Serbian Geological Society held two meetings, at which members held free discussions on various topics about the history of geology in Serbia.

In the first issue of *Episodes* for 2001, A. Grubic presented the classical work of Andrija Mohorovicic 'About the Earthquake near Zagreb 1908', which gave rise to the idea of the Mohorovicic discontinuity within the Earth.

Alexsander Grubic, Belgrade

INHIGEO HONORARY SENIOR MEMBERS

Emile den Tex, The Netherlands

Walter Kupsch, Canada

Alexander Ospovat, United States

Rudolf Tr umpy, Switzerland

INHIGEO MEMBERS

Dr Daniel G. Rubiolo, Secretaria de Minería de la Nación, Avenida Julio à Roca #651, 10 Piso, Buenos Aires, ARGENTINA

Tel: 54 1 349 3166 **Fax:** 54 1 349 3160 **EMAIL:** drubio@secind.mecon.gov.ar

Dr Luis Alberto Buatois, Residencia Universitaria Horco Molle, Casa Nro 4 Horco Molle, Tucuman, ARGENTINA

Tel: 54 381 425 3053 **Fax:** 54 381 425 3053 **EMAIL:** ichtnolog@infovia.com.ar

Dr Maria Gabriela Mangano, Residencia Universitaria Horco Molle, Casa Nro 4 Horco Molle, Tucuman, ARGENTINA

Tel: 54 381 425 3053 **Fax:** 54 381 425 3053 **EMAIL:** ichtnolog@infovia.com.ar

Professor Edward G. Malkhassian, Yesnik Koghbatsi str. 4, App. 31, Yerevan, ARMENIA

Tel: 374 2 533 686 **Fax:** **EMAIL:** gmalkhas@acc.am

Dr Neil Archbold, School of Ecology and Environment, Rusden Campus Deakin University, 662 Blackburn Road, Clayton, Victoria 3168, AUSTRALIA

Tel: **Fax:** **EMAIL:** narchie@deakin.edu.au

Ms Carol Bacon, Mineral Resources Tasmania, PO Box 56, Rosny Park, Tasmania 7018, AUSTRALIA

Tel: 61 3 6233 8326 **Fax:** 61 3 6233 8338 **EMAIL:** cbacon@mrt.tas.gov.au

Dr Maxwell R. Banks, 38 View Street, Sandy Bay, Tasmania 7005, AUSTRALIA

Tel: **Fax:** **EMAIL:** none

Dr David Branagan, 83 Mimimbah Road, Northbridge, Sydney, New South Wales 2063, AUSTRALIA

Tel: 61 2 9958 7127 **Fax:** 61 2 9692 0184 **EMAIL:** dbranaga@mail.usyd.edu.au

Dr Barry Cooper, 20 Royal Avenue, Burnside, South Australia 5066, AUSTRALIA

Tel: 61 8 8226 0462 **Fax:** 61 8 8226 0323 **EMAIL:** cooper.barry@saugov.sa.gov.au

Dr David W. P. Corbett, 41 Hawthorndene Drive, Glenalta, South Australia 5052, AUSTRALIA

Tel: 61 8 8278 1851 **Fax:** 61 8 8278 1851 **EMAIL:** drcorbett@ozemail.com.au

Dr Thomas A. Darragh, Division of Natural History, Museum of Victoria, P.O. Box 666E, Melbourne, Victoria 3001, AUSTRALIA

Tel: 61 3 9270 5040 **Fax:** 61 3 9270 5043 **EMAIL:** tdarragh@mov.vic.gov.au

Professor Homer Le Grand, Faculty of Arts, Monash University, Clayton, Victoria 3118, AUSTRALIA

Tel: 61 3 9905 2797/2100 **Fax:** 61 3 9905 5110 **EMAIL:** Homer.Legrand@arts.monash.edu.au

Professor David R. Oldroyd, 28 Cassandra Avenue, St Ives, Sydney NSW 2075, AUSTRALIA

Tel: 61 2 9449 5559 **Fax:** 61 2 9144 4529 **EMAIL:** D.Oldroyd@unsw.edu.au

Dr Tillfried Cernajsek, Geologische Bundesanstalt F.A. Bibliothek und Verlag, Geodatenzentrale u. Wiss. Archiv, Postfach 127 Rasumofskygasse 23, A-1031, Wien, AUSTRIA

Tel: 43 1 7125 67465 **Fax:** 43 1 7125 6747490 **EMAIL:** tcernajsek@cc.geolba.ac.at

Dr Albert Schedl, Geologische Bundesanstalt, Rasumofskygasse 23, Postfach 127, A-1031 Wien, AUSTRIA

Tel: 43 1 7125 67428 **Fax:** 43 1 7125 67456 **EMAIL:** aschedl@cc.geolba.ac.at

Professor Eric Groessens, Rue Louis Marcelis 98, B-1970 Wezembeek-Oppem, BELGIUM
Tel: 32 2627 0402 **Fax:** 32 2647 7359 **EMAIL:** eric.groessens@pophost.eunet.be

Dr-Ing. Carlos Serrano, Casilla 115, Calle Millares 21, Potosí, BOLIVIA
Tel: 591 62 22498 **Fax:** **EMAIL:** carlos_sarah12@yahoo.com

Associate Professor José Carlos Barreto de Santana, Department of Exact Sciences, State University of Feira de Santana, Bahia State, BRAZIL
Tel: 55 75 622 0307 **Fax:** 55 75 224 8085 **EMAIL:** zecarlos@uefs.br

Associate Professor Silvia F. de M. Figueirôa, Instituto de Geociências, Universidade de Campinas C.P. 6152, 13083-970 Campinas, São Paulo, BRAZIL
Tel: 55 19 3788 4571/4568 **Fax:** 55 19 3289 1562 **EMAIL:** Figueroa@ige.unicamp.br

Dr Pedro Wagner Gonçalves, Dept. of Geosciencias Applied to Education, Institute of Geosciences, State University of Campinas, P.O. Box 6152 13081-970 Campinas Sao Paulo, BRAZIL
Tel: 55 19 3788 7352 **Fax:** 55 19 3289 1562 **EMAIL:** pedrog@ige.unicamp.br

Associate Professor Maria Margaret Lopes, Instituto de Geosciências, UNICAMP, Caixa Postal 6152 13081-970 Campinas, São Paulo, BRAZIL
Tel: 55 19 3289 1097 **Fax:** 55 19 3289 1562 **EMAIL:** mmlopes@ige.unicamp.br

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 302, 2320 Franklin Street, Vancouver BC V5L 1S1, CANADA
Tel: 1 604 215 1632 **Fax:** 1 604 215 1632 **EMAIL:** jimyin7@yahoo.ca

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 **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, Academica Sinica, 137 Chao Nei Avenue, Beijing 10010, CHINA
Tel: 86 10 6288 3390 **Fax:** **EMAIL:** yang-j-y@sohu.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

Associate Professor Jiuchen ZHANG, Institute for the History of Natural Science, Academia Sinica, 137 Chao Nei Avenue, Beijing 100010, CHINA

Tel: 86 10 8402 7627 **Fax:** 86 10 8402 7627 **EMAIL:** jhbz@glc.cn.net jhbz@ihns.ac.cn

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:** alfacz@volny.cz

Dr Jan Kozák, Geophysical Institute, Czech Academy of Science, Bocni 11/1401, 14131 Prague 4, CZECH REPUBLIC

Tel: 420 2 6710 3018 **Fax:** 420 2 7276 1549 **EMAIL:** kozak@ig.cas.cz

Professor Rudolf Musil, Department 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@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.malice@post.cz

Mr Tonu Pani, Vanemuise 46, Tartu 51014, ESTONIA

Tel: 372 7 375 839 **Fax:** **EMAIL:** tpani@ut.ee

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 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@cimrs1.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

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

Professor Geneviève Bouillet, 36 Boulevard de l'Avenir, F-18000 Bourgues, , FRANCE
Tel: **Fax:** **EMAIL:** none

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 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

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

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

Professor Rodney Grapes [NEW ZEALAND Member], Institut fuer Mineralogie, Petrologies und Geochimie, Universitaet Freiburg, Albertstrasse 23b, 79104 Freiburg, GERMANY
Tel: 49 761 203 6394/6407 **Fax:** 49 761 203 6394/6407 **EMAIL:** rodney.grapes@minpet.uni-freiburg.de

Dr Martina Koelbl-Ebert, Am Waldhang 18, 82205 Gilching-Geisenbrunn, GERMANY
Tel: 49 89 2180 6546 **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 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@axelro.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 Gy Vitális, Hungarian Geological Survey, Népstadion ut 14, Pf. 106, H 1442 Budapest XIV, HUNGARY

Tel: **Fax:** **EMAIL:** none

Professor Istvan Viczian, Branylaskou u. 7. I.5, H-1026, Budapest, HUNGARY

Tel: 36 1 275 3263 **Fax:** 36 1 251 0703 **EMAIL:** viczian@mafi.hu

Dr Gabor Papp, Department of Mineralogy and Petrology, Hungarian Natural History Museum, Pf. 137, H-1431 Budapest, HUNGARY

Tel: **Fax:** **EMAIL:** pappmin@ludens.elte.hu

Mrs Irma Dobos, Margit krt 44, H-1027, Budapest, HUNGARY

Tel: 36 1 202 2741 **Fax:** **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

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, Ballinacough House, Ballinacough, 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, Tanagharaun, Corrandulla, County Galway, IRELAND

Tel: 353 91 789 819 **Fax:** **EMAIL:** pmohr@indigo.ie

Professor Gordon L Herries Davies, Ballinacough House, Ballinacough, Nenagh, County Tipperary, IRELAND

Tel: 353 673 2742 **Fax:** 353 673 2742 **EMAIL:** none

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:** Nicoletta.Morello@lettere.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:** giuliano.piccoli@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, C.R.I.I.--Facolta di Scienze, MM FF NN, Universita dell'Insubria, Via Ravasi 2, 21100 Varese, ITALY
Tel: 39 010 246 5459 **Fax:** 39 010 209 9826 **EMAIL:** ezio.vaccari@unisubria.it

Dr Stefano Marabini, Via S. Martino 1, 48018 Faenza (RA), ITALY
Tel: 39 054 628 067 **Fax:** 39 054 628 067 **EMAIL:** stemarabini@libero.it

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:** katomirodriguez@yahoo.com

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 Masae OMORI, 3-32-5 Sakujii-di, Nerima-ku, 177-0045, Tokyo, JAPAN
Tel: 81 93 3996 2341 **Fax:** 81 93 3996 2341 **EMAIL:** user555nob@aol.com

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

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

Dr Daikichiro SHIMIZU, 48 Tanaka-nishihinokuchi, Sakyo-ku, Kyoto 606, JAPAN

Tel: 81 75 701 4652 **Fax:** 81 75 701 4699 **EMAIL:** None

Dr George Zammit-Maempel, 148 Triq San Frangisk, Hal Balzan BZN 07, MALTA

Tel: 356 442 204 **Fax:** **EMAIL:** nibmike@maltanet.net

Dr Gabriele I. C. Schneider, Geological Survey of Namibia, PO Box 2168, Windhoek, NAMIBIA

Tel: 264 61 208 5205 **Fax:** 264 61 249 144 **EMAIL:** gabi@mme.gov.na

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

Dr Michael Johnston, 395 Trafalgar Street, Nelson, NEW ZEALAND

Tel: 64 3 546 7575 **Fax:** 64 3 546 7574 **EMAIL:** mike.johnston@extra.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, ul Zelechowskiego 4/30, 30-124 Krakow, POLAND

Tel: **Fax:** **EMAIL:** narebski@geos.ing.uj.edu.pl

Professor Janusz Skoczylas, Inst. of Geology, Univerytet 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, Chlodna 15/1022, 00391 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 Geosciencias, Universidade de Aveiro, 3810-Aveiro, PORTUGAL

Tel: 351 34 370 747 **Fax:** 351 34 370 605 **EMAIL:** asandrade@geo.ua.pt

Professor Martim Portugal e Vasconcelos Ferreira, Departamento de Ciências da Terra, Apartado 3014, Universidade de Coimbra, 3049 Coimbra, PORTUGAL

Tel: **Fax:** 351 239 825 144 **EMAIL:** none

Professor Manuel C. S. Pinto, Department of Geosciences, University of Aveiro, 3810 Aveiro, PORTUGAL

Tel: 351 2 34 370 744 **Fax:** 351 2 34 370 605 **EMAIL:** mpinto@geo.ua.pt

Miguel C. F. Telles Antunes, Departamento de Ciências de Terra, Centro de Estudos Geologitas, Universidade Nova de Lisboa, P-2825 Monte de Caparica, PORTUGAL

Tel: 351212948537 **Fax:** 351212948556 **EMAIL:** mta@mail.fct.unl.pt

Dr Ana Carneiro, SACSA, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, 2825-114 Monte de Caparica, PORTUGAL

Tel: 21 2948 533 **Fax:** 21 2948 551 **EMAIL:** amoc@mail.telepac.pt

Dr Ana Cardoso De Matos, Centro de Estudos de História e Filosofia da Ciência, Universidade de Évora, Apartado 94, Évora, PORTUGAL

Tel: **Fax:** **EMAIL:** anacmatos@mail.telepac.pt

Professor Luis Aires-Barros, Laboratory of Mineralogy and Petrology, Instituto Superior Técnico, Av. Rovisco Pais, 1049-001 Lisbon, PORTUGAL

Tel: 351 218 400 806 **Fax:** 351 218 400 806 **EMAIL:** airesbarros@popsrv.ist.utl.pt

Professor Victor Efimovich Khain, Institute of the Lithosphere, Russian Academy of Sciences, 22 Staromonetny per, Moscow 109180, RUSSIA

Tel: 7 095 939 1109 **Fax:** 7 095 233 5590 **EMAIL:** Khain@ilsan.msk.ru

Professor Efgenji E. Milanovsky, Department of Geology, Moscow State University, 119899 Moscow, RUSSIA

Tel: 7 095 939 2750 **Fax:** 7 095 932 8889 **EMAIL:** nikishin@geol.msu.ru

Dr Igor Alexandrovich Resanov, Institute of the History of Natural Sciences and Technology, Russian Academy of Sciences, Staropansky Street 1/5, Moscow 103012, RUSSIA

Tel: 7 095 928 4173 **Fax:** 7 095 925 9911 **EMAIL:** postmaster@history.ihist.ru

Professor Anatoly G. Ryabukhin, Faculty of Geology, Moscow State University, 119899 Moscow, RUSSIA

Tel: 7 95 939 2081 **Fax:** 7 95 954 5103 **EMAIL:** ryabukhin@dynamo.geol.msu.ru

Dr Yu. Ya. Soloviev, Vernadsky State Geological Museum, Mokhovaya 11, Building 2, 103009 Moscow, RUSSIA

Tel: 7 95 203 4796 **Fax:** 7 95 203 4736 **EMAIL:** histgeo@sgm.ru

Professor Nikolai Pavlovich Yushkin, Russian Academy of Science, 54 Pervomaiskaya St., 107610 Syktyvkar, Komi Republic, RUSSIA

Tel: 7 95 82 1242 0037 **Fax:** 7 95 82 1242 5346 **EMAIL:** yushkin@geo.komisc.ru

Dr Andrei V. Lapo, All-Russian Geological Research Institute (VSEGEI), Sredny pr. 74, 199106, St Petersburg, RUSSIA

Tel: 812 328 91 65 **Fax:** 812 321 30 23 **EMAIL:** vsegei@mail.wplus.net
marina@dovts.spb.ru

Dr Georgy Khomizuri, Vernadsky State Geological Museum, Mokhovaya Street 11, Bd. 2, 103009, Moscow, RUSSIA

Tel: **Fax:** **EMAIL:** histgeo@sgm.ru

Dr Fidan Taufikovna Yanshina, Zwenigorodskaja str. 11, Flat 1, MOSCOW 121993, RUSSIA

Tel: **Fax:** **EMAIL:** yanshin@df.ru yanshin@mnirti.ru

Dr Johan C. Loock, University of the Orange Free State, Bloemfontein, SOUTH AFRICA

Tel: 27 51 401 2374 **Fax:** 27 51 447 8501 **EMAIL:** LoockJC@glg.nw.uovs.ac.za

Professor Francisco J. Ayala-Carcedo, Instituto Tecnológico GeoMinero de España, C/Rios Rosas 23, 28003 Madrid, SPAIN

Tel: 34 91 349 5966 **Fax:** 34 91 349 5834 **EMAIL:** f.ayala@igme.es

Dr Juan-José Durán, Instituto Tecnológico GeoMinero de España, C/Rios Rosas 23, 28003 Madrid, SPAIN

Tel: 34 349 5700 **Fax:** 913495742 **EMAIL:** jj.duran@itge.mma.es

Dr Emilio Pedrinaci, Loma Verde no 11, 41120 Gelves, Sevilla, SPAIN

Tel: 34 95 560 0651 **Fax:** 34 95 560 0651 **EMAIL:** pedrinac@arrakis.es

Dr Francisco Pelayo, CSIC-Universidad de Valencia, Facultad de Medicina, Avda. Vicente Blasco Ibanez 15, 46010 Valencia, SPAIN

Tel: 96 386 4164 **Fax:** 96 386 4091 **EMAIL:** Francisco.Pelayo@uv.es

Dr Luis Mansilla, Pablo Iglesias 59-20B, 134400 Almaden, Ciudad Real, SPAIN

Tel: **Fax:** **EMAIL:** lmansi@pol-al.uclm.es

Professor Dr Octavio Puche Riart, San Telesforo 8, 28017 Madrid, SPAIN

Tel: 34 91 3366 951 **Fax:** 34 91 3366 977 **EMAIL:** opuche@dinge.upm.es

Dr Luis Adaro, Marques de San Esteban 15, 33206-Gijón, Asturias, SPAIN

Tel: **Fax:** 34 985 358 3878 **EMAIL:** comercial@suministros-adaro.com

Professor Leandro Sequeiros, Apartado de Correos 2002, 28080 Granada, SPAIN

Tel: 34 57 295 369 **Fax:** 34 57 958 151 440 **EMAIL:** lsequeiros@probesi.org

Mr Candido Manuel Garcia Cruz, Urbanizacion Llombet 15, 38296 La Laguna, Tenerife, Canary Islands, SPAIN

Tel: **Fax:** **EMAIL:** cgarcru@gobiernodecanarias.org

Dr Bjorn Sundquist, Falkvagen 2, SE-75756 Uppsala, SWEDEN

Tel: 46 18 421 282 **Fax:** 46 18 420 684 **EMAIL:** bjorn.sundquist@swipnet.se

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

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

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:** jtouret@paris.ensmp.fr

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 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 Martin J. S. Rudwick, Department of History and Philosophy of Science, University of Cambridge, Free School Lane, Cambridge CB2 3RH, UNITED KINGDOM

Tel: 44 1353 665 043 **Fax:** 44 1353 665 043 **EMAIL:** mjsr100@cus.cam.ac.uk

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@kevock.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 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 583 183 **Fax:** 44 1782 751 357 **EMAIL:** gga10@Keele.ac.uk

Dr Cherry Lewis, 35 Morgan Street, St Agnes, Bristol BS2 9LG, UNITED KINGDOM

Tel: 44 117 955 1254 **Fax:** **EMAIL:** cherry.lewis@bristol.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@leicester.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, 7530 Lead Mine Road, #304 Raleigh, North Carolina 27615-4897, UNITED STATES

Tel: 1 919 845 3451 **Fax:** **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 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 Aníbal R. Martínez, PDVSA, Ave. E. Blohm, Chuao, Caracas, VENEZUELA

Tel: 58 2 908 2411 (ext. 3445) **Fax:** 58 2 908 3349 **EMAIL:**
martinezan@pdvsa.com

Dr José Antonio Rodríguez-Arteaga, Venezuelan Foundation for Seismological Research, Urbanizacion El
Llantino, Prolongación Calle Mara, Apartado Postal 76880, Caracas 1070-A, VENEZUELA

Tel: 58 212 257 9346 **Fax:** 58 212 257 9977 **EMAIL:** jrodriguez_a@cantv.net

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

Associate Professor Vidojko Jovic, Faculty of Mining and Geology, Djusina 7, 11000 Belgrade,
YUGOSLAVIA

Tel: 381 11 3226 032 **Fax:** 381 11 182 363 **EMAIL:** None

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